"A GEOGRAPHICAL ANALYSIS OF CASHEWNUT PROCESSING INDUSTRY IN THE SINDHUDURG DISTRICT, MAHARASHTRA"

A Thesis

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by

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APRIL 2010

DECLARATION

I hereby declare that the thesis entitled "A GEOGRAPHICAL ANALYSIS OF CASHEW NUT PROCESSING INDUSTRY IN THE SINDHUDURG DISTRICT, MAHARASHTRA" completed and written by me has not previously formed the basis for the award of any Degree or other similar title of this or any other University or examining body.

Place: Pune (Shri. Rajaram B. Patil)

Date: 28-04-2010 Research student

CERTIFICATE

This is to certify that the thesis entitled "A GEOGRAPHICAL ANALYSIS OF CASHEWNUT PROCESSING INDUSTRY IN THE SINDHUDURG DISTRICT, MAHARASHTRA" which is being submitted herewith for the award of the Degree of Vidyawachaspati (Ph.D.) in Geography of Tilak Maharashtra Vidyapeeth, Pune is the result of the original research work completed by Shri. Rajaram Balaso Patil under my supervision and guidance. To the best of knowledge and belief the work incorporated in this thesis has not formed the basis for the award of any Degree or similar title of this or any other University or examining body.

Place: Pune Dr. Praveen G. Saptarshi

Date: 28-04-2010 Research Guide

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Place : Pune PATIL RAJARAM BALASO

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CONTENTS

List of Tables

List of Maps, Graphs and diagrams

LIST OF PHOTOGRAPHS

“A GEOGRAPHICAL ANALYSIS OF CASHEWNUT PROCESSING INDUSTRY IN THE SINDHUDURG DISTRICT, MAHARASHTRA”

Abstract

IMPORTANCE OF PROPOSED INVESTIGATION :

Cashew (Anacardium Occidentale L.) belongs to the family Anacardiacae is an economically important tropical crop. The Indian Cashew Industry is export oriented and hence called as dollar earning crop of the country. It provides employment to more than 5 lakh people both directly and indirectly, particularly in the rural areas. India is largest producer, processor, consumer and exporter in the world contributing for 26.40 per cent and 46.09 per cent of the world production and export respectively during 2006-07. Even though, India is importing sizable quantity of raw cashewnut to get the advantage of value addition. There is huge scope to increase productivity by putting waste land under cashew plantation in the konkan region. For this there is a need to carry out the geographical study to strategies the plan for improvement.

In Maharashtra state cashewnut is grown mainly in Ratnagiri and Sindhudurg districts. Most of the cashew producers in Ratnagiri and Sindhudurg districts are small producers and they are unorganized. Consequently, marketing of cashewnut remained to be of primitive nature and unorganized. Cultivation of cashew is also unscientific and not commercialized

in most of the areas. Hence, the study is proposed to collect the information on production and cashew processing units.

It is imperative to study cashewnut production and to carry out analysis of cashew processing units so as to enlighten cashew growers for improvement. This study would help to understand the productivity pattern, costs, gross and net returns from cashew orchards and facilitate the implementation of the programme of plantation of cashew orchards on extensive scale. The study mainly aims to provide necessary 'feed-back' to cashew unit and understanding the functioning of the cashew processing unit with investment pattern, cost and returns and business performance in the Sindhudurg district.

1.INTRODUCTION :

Cashew (*Anacardium Occidentale L.*) belongs to the family Anacardiceae is an economically important tropical plantation crop. It ranks second only to Almond, among the nine tree nuts of importance in the world trade. Cashew was a native of Brazil introduced by Portuguese travelers during 16^{th} century at Goa from where it was spread to other parts of India. It is an important plantation crop in wasteland development programme due to its utility in soil and water conservation and to build up balanced ecosystem. Apart from economic significance, cashew industry has the potential leading role in the social and financial upliftment of the rural poor. So, cashew is generally described as poor man's crop and rich man's food.

Cashewnut cultivation provides employment to more than 5 lakhs people both directly and indirectly, particularly in the rural areas. The production period of cashew is from 6^{th} to 40^{th} year after plantation. Raw nut, cashew kernels and cashewnut shell liquid (CNSL) are the three main cashew products while the cashew apple is generally processed and consumed locally.

Cashew kernel is known for its delicious, pleasant taste and for balanced nutritive profile. The nutrients present in cashew kernels are protein, fat, carbohydrate and all fat soluble vitamins (A, D, E and K). It is also source of minerals like calcium, magnesium, potassium, sodium, iron and other. Cashew is a perfect food with zero per cent cholesterol. The by-products like cashewnut shell liquid (CNSL) which is a valuable raw material for preparation of oil paints, varnishes, water proofing agents, adhesive ingredients, pigments of gums, typewriter rolls, automobile break lining and lubricants in aircraft. The cashew apple is used in preparation of fruit juice, syrup, candy, jelly, pickles, cashew wine and fenny.

Cashew is grown in India, Brazil, Vietnam, Tanzania, Mozambique, Indonesia, Sri Lanka and other tropical Asian and African countries. The area under cashew in the world is 30.62 lakh hectares. The world production of cashew is estimated to be around 20.82 lakh tones. India's share in the world raw nut production contributes to about 25 per cent. In recent times, India is facing stiff competition from Vietnam and Brazil in the international cashew trade (Bhat 2007).

India is the largest producer, processor, exporter and second largest consumer of cashew kernels in the world. Indian cashew kernels are exported to more than 60 countries in the world, mainly to U.S.A., Netherlands, U.K., Germany, Japan, Australia, U.A.E., etc. The country earned foreign exchange equivalent to Rs. 2464.35 crores, from export of 118540 MT of cashew kernels (Rs. 2455.15 crores) and 5589 MT of cashewnut shell liquid (Rs. 9.20 crores) during the year 2006-07.

In India cashew is grown mainly in Maharashtra, Goa, Karnataka and Kerala along the west coast and Tamil Nadu, Andhra Pradesh, Orissa and West Bengal along the east coast. To a limited extent it is grown in Manipur, Meghalaya, Tripura, Andaman and Nicobar Islands and Chattisgarh. In the year 2006-07, cashew was grown in an area of 8.37 lakh ha. with the total production of 6.2 lakh MT. The productivity has been steadily increasing from 430 kg/ha. in 1985 to 810 kg/ha. in 2005. Still India is importing raw nuts from African and other countries to the tune of 5.8 lakh tonnes to meet the domestic demand of cashew processing industries. Presently African countries have taken up cashew processing themselves resulting to partial availability of raw cashewnut for processing. Hence, there is urgent need to increase the domestic raw cashewnut production by increasing large area under plantation of high yielding varieties and improved technology to increase productivity per unit area to become self sufficient in raw cashewnut production.

In Maharashtra state, the production and productivity of cashewnut is highest in the country, as majority of plantation are developed primary by

clones of high yielding varieties and also cultivators are adopting better management practices. Maharashtra topped cashew production with 1,83,000 MT followed by Andhra Pradesh at 92,000 MT. Maharashtra also ranked 1st in productivity with 1300 kg/ha followed by West Bengal 950 kg/ha and Kerala 900 kg/ha (Venkatesh 2007).

Cashew is traditional crop of Konkan region, mainly grown on hill slopes as rainfed perennial horticultural crop. The Konkan region of Maharashtra comprising of Thane, Raigad, Ratnagiri and Sindhudurg districts is the major tract of cashew cultivation. The total area under cashew cultivation is 1.60 lakh hectares of which more than 80 per cent (1.30 lakhs ha.) is in the South Konkan region of Maharashtra, mainly in Sindhudurg and Ratnagiri district. Therefore, it is attempted in the present study to understand cultivation and processing of cashewnut by selecting one district like Sindhudurg.

2.HYPOTHESIS :

The study mainly focuses on cost structure of cashewnut production in the district. This exercise may be useful to understand to what extent farmers would be benefited due to processing activity. The study mainly aims at understanding the effect of "Value addition" by way of cashewnut processing activity. Therefore the hypothesis of the study may be outlined as below:

"The cashewnut processing industry in the Sindhudurg district is useful to improve the income of the farmers and thereby the standard of living."

3.STUDY AREA:

The Sindhudurg district has been selected for the study because it is one of the two important cashewnut producing districts of Maharashtra which is 1st ranked state in the country in cashewnut production.

4.OBJECTIVES OF THE STUDY :

The Sindhudurg district is one of the cashewnut producer district in the Konkan region. There are various cashewnut processing units dominant in Sindhudurg district. The study mainly aims at understanding the net gains at the farmers end. It further aims to find out the impact of the industry on the rural economy of the district as cultivation of cashewnut is the significant agricultural activity in the district. With this view in mind following specific objectives have been outlined:

1. To study in brief geographical setting of the Sindhudurg district as a basis for the growth of cashewnut cultivation and processing industry.
2. To review the historical background of cashewnut industry in the Sindhudurg district.
3. To study the spatio temporal distribution of cashewnut, cultivation and processing.
4. To carry out cost structure of the selected cashewnut processing units.
5. To analyse the effect of cashewnut processing units, on socio-economic conditions.

6. To study the problems and prospects of cashewnut cultivation and processing in

   Sidhudurg district and to develop strategy for future growth.

5.METHODOLOGY:

As revealed from the previous literature present study has used cost-benefit-analysis of the cashewnut cultivation and processing. The study has attempted to develop planning strategy based on the results obtained in the analysis

The methodology for this kind of analysis require proper sampling and field study with structured questionnaire.

5.1 SAMPLING:

The district is divided into 8 tahsils. In each tahsil village code numbers are used for random selection. This selection process has been to select 2 villages from each tahsil. The map(Fig.1) shows the location of randomly selected cashew nut cultivating villages in each tahsil. About 10 farmers have been enquired with the help of structured questionnaire from each randomly selected village. Thus the cost-benefit analysis is based on answers given by 160 farmers covering 371.28 hectares of cashewnut orchards. The district has 64366.33 hectare area under the cashew cultivation. There are about 50 cashew processing units located in the district. The district offens suitable geographical conditions for cashewnut cuntivation and favourable environment for

cashewnut production. The production areas has good linkage with Mumbai for export market.

5.2 DATABASE :

The primary data regarding cost structure, capital investment, fertilizers, pestisides etc have been used in the study. The secondary informations has also been collected from the District statistical abstract, agricultural bulletins, fruit processing reports etc. This information has provided the details regarding cultivation, processing history, marketability, nutrient status etc. of cashewnut.

5.3 DATA ANALYSIS:

By using usual statistical techniques like trend analysis moving average etc. have been used. Cost-benefit-analysis, comparative cost structure, cash flow analysis etc. have been carried out for the primary data.

5.4 PLANNIG STRATEGY:

The main objective of the study is to design planning strategy. Here the strategy has been outlined on the basis of cash-flow analysis is such a way that profitability of the farmers should increase.

6.BACKGROUND INFORMATION OF THE DISTRICT :

List of cashew processing units was obtained from D.I.C. of Sindhudurg districts. According to this information, there have been 50 units in Sindhudurg district and only four units have been in Ratnagiri district. To obtain adequate

sample size, Sindhudurg district was selected purposively. At the time of data collection, it was observed that some of the units have been not in existence as they have been closed. To overcome this problem, personal discussion was made with office bearer of the Konkan Cashew Processors and Exporters Association at Vengurle. According to them, 18 units have been in operation. All these units have been selected and contacted personally. The information related to various aspects have been recorded in a well designed schedule. The information so collected pertained to the year 2008-2009.

7.OBSERVATION AND FINDINGS : :

1.GENERAL:

1.Concept of fruit processing industry and Agricultural Scenario of Sindhudurg District. The production of cashew nut has increased from 0.36 million tonnes in 1997-98 to 0.47 million tonnes in 2001-2002.There is need to identify gaps in adoption, so that it could be used as basis for technical planning of demonstrations/training programmes.

2.It is necessary to understand the cashew processing as a system and to analyze the system for knowing the quantity and recipients of the benefits. These kinds of study can be useful to develop policy instrument in such a way that the benefits of cashew nut processing should reach to the farmers nearing there by maximum cost should be paid for local soil, water, and human resources in the region. It is in the sense study has academic as well as social relevance.

3.Training in cashew processing is being provided on regular basis at Gopuri Ashran at Kankavli and M/S Hedgewar Seva Prakalpa (HSP). There is a lack of awareness and enterprise among cashew farmers about agriculture management practicals to be followed by improving yield existing plantation. Thus the favourable geographical condition and Government policies are suitable to this cashewnut processing industry in the district.

4.Cashewnut processing industry in the Sindhudurg district is main economic activity, and in future it will be tremendous growth and development. State Government and Agriculture department gives various facilities and 100% grants to the farmers. Land under cashew cultivation in increasing but in this study there is limitations.

2.PHYSIO-SOCIO-ECONOMIC SETTING OF THE REGION :

The study of background information necessary to understand the economic implications of the physical conditions under which production is carried out. The various factors like topography, location, climate, rainfall, soil, irrigation, marketing, and communication facilities decide the stability of particular enterprise in the area. Therefore a brief account of socio-economic conditions prevailing in the selected area is given so as to have better understanding of the region and the interpretation and implications of findings of the study. Therefore, the physiography, social and economic factors are the major hidden basic components of farmers and fruit processing industries in the district.

Sindhudurg is the Konkan area of Maharashtra having stretch of land on the west coast of India, endowed with the beautiful seashore, picturesque Mountains and scenic natural beauty and known for tropical fruits like the world famous Alphonso mangoes, cashews, Jamuns etc. Sindhudurg district was earlier a part of the Ratnagiri district. For administrative convenience and industrial and agricultural development Ratnagiri district was divided into Ratnagiri and Sindhudurg with effect from 1st May,1981.Geographical location of the Sindhudurg district is lies from 15.37 N to 16.40 North Latitudes and 73.19 E to 74.18 East Longitudes. The district is surrounded by the Arabian Sea on the west, the Belgaum district and Goa on the South, and the Ratnagiri district on the north and Sahyadri hill ranges to the East. Sindhudurg district is spread over an area of 5287 sq. km. Sindhudurg district now comprises of 8 tahsils of Sawantwadi, Kudal, Vengurla, Malvan, Devgad, Kankavli, Vaibhavwadi and Dodamarg.743 villages are situated in various tahsils of the district. The map (Figure no.2) shows that the tahsils of sindhudurg district.

The study has attempted to understand the social profile of the district. The various components like population, health, culture, education, tourism, banking, transport and communication and others facilities determine the suitability of a particular area for certain enterprises in the area. Therefore, the social factors are the major hidden basic components of farmers and fruit processing industries in the district. Located on the southernmost fringe of Konkan and the last district of Maharashtra on the coast, the district is not

much known for its history or any other aspect. It has a composite social structure as similar to that of remaining Konkan area. The majority of the people are farmers and there is hardly any industry of greater consequence that provides employment to the locals. Fishing is a flourishing business because of coast and creek.

Konkan Agricultural University creates new varities of cashew and provides to the farmers. Due to this cashew cultivation area is increasing in the district. Thus the cashew processing industry is dominant from ancient period.

3.DISTRIBUTION OF CASHEW NUT PROCESSING UNITS :

The various components like establishment of the units, form of ownership, scale wise distribution of the processing units, technology for the processing, cashew and by products are the major components. Sindhudurg District is the southern part of the greater tract famous for its long coast line and safe harbors' having basically agriculture oriented economy. It receives rainfall for about four months from June to September.

Sindhudurg District enjoys warm and humid climate throughout the year. The year can be divided into 3 seasons. Winter season is from November to February, March to May Summer season and Kharif season is from June to October. Selection of suitable cashew varieties for the specific region and appropriate package of practices determines the final yield. More than 30 varieties which are having exportable grade of cashew kernels are released from different research institutes in India and details are furnished.

Harvesting is generally done by collecting the nuts from the fallen fruits, by hand picking and with a long bamboo pole to which a hook is fitted at the tip. No fruit harvesting devices sere reported for cashew in the literature. Harvesting and collection of nuts is done almost every day. Harvesting of cashew crop is not done at a time because from flowering to harvest nearly 2.5 to 3 months time is required since flowering occurs in two to three waves harvesting of fruits and nuts also varies. The duration of the harvest extends from 45 to 60 days, April-May is the peek season in and around Bangalore. In other parts of the country duration of the harvest is slightly more extending from 45 to 70 days.

Cashewnut processing is generally done on a home scale and factory scale. In the home scale the dried nuts are burnt in an open fire and hand shelled. The nuts which are required to be processed at factory should be dried again for 1 to 2 days to reduce and maintain the moisture level of 7 to 8 percent. Processing of cashew nuts can be defined as the recovery of edible meat portion the kernel from raw nuts, by manual/mechanical means.

In Maharashtra and Sindhudurg district, the processing is mostly manual. The process is highly labour intensive and the work force consists mainly of women. It consists of moisture conditioning roasting, shelling, drying, peeling, grading and packing.

The highest price is paid for better quality kernels of the W180 and W210 grades which are the largest and heaviest grades. The processing of cashew in the orchard is mainly confines to removal raw nuts from cashew

apple and drying. Harvest only fully matured nuts. Cashew nut shell liquid is a valuable raw material obtained as a by product during the isolation of cashew kernel.

4.COST STRUCTURE :

. In the present age of competition, the success of any enterprise in the business of agriculture can be judged on the basis of economic benefits accured to entrepreneur from a particular crop or livestock enterprise. It has become necessary for the farmers to look towards agriculture as a commercial proposition, particularly fruit crops like cashew which has long economic life of almost 40 years. Returns from cashew are spread over longer period, on the other hand during development stage of orchard, large investment is made in establishment of orchard. The production performance of raw cashewnut, investment pattern in cashew processing unit, cost and return structure in cashew processing unit, performance of cashew processing unit and the problems faced by the unit and measures for effective functioning of the unit.

The average age of the cashew grower is 48.70 years. This indicated that, cashew growers have been in adult age group. It is observed that, overall educational score is 10.64. This indicates that by and large the cashew growers in the study area have been educated from 10^{th} to 11^{th} standard. Size of the family is the important factor influencing the supply of farm labour. It also affects income generating capacity of farmer's family.

The cashew orchard starts bearing generally after five years from the year of plantation. The establishment cost includes the variable, material and

fixed costs. The cashew growers have to invest considerable amount in the form of inputs for establishment of the cashew orchard up to its bearing stage. Considering above changes, the approximate cost of establishment of local varieties of cashew orchard is estimated to Rs. 87430.56.

As regards the per hectare quantities of physical inputs utilized for HYV cashew orchard more than the local variety of cashew orchard. Per hectare net returns obtained from local varieties have been Rs. 24219.20 and the benefit cost ratio is 1.80. In case of HYV, per hectare net returns obtained have been as Rs. 46897.38 and benefit cost ratio is 2.00.

The selected units have been classified as small having working season upto 225 days, medium working season between 225 to 275 days and large, working season above 275 days. The average establishment period is 26.8 years. The units have been also classified on the basis of type of ownership as partnership and individual. There have been 13 units (72.22%) owned and managed by individual, while remaining 5 units (27.78%) in partnership.

The working of the units is seasonal in nature. There is a great variation in the working season from unit to unit. It is seen that average working season of unit in small, medium and large group is 187.40 days, 261.24 days and 298.76 days, respectively. The per unit male employment is 2.4 days, 4.6 days and 3.2 days in small, medium and large group respectively, while per day female employment is 19.2 days, 40.3 days and 52.4 days in small, medium and large group, respectively.

The comparison between the small, medium and large size processing units revealed that, the total fixed capital investment increased with the increase in size of the cashew processing units. In all the three size groups the fixed capital investment on building and land accounted for a major share followed by machinery and equipment, infrastructure and other fixtures. Actual expenditure incurred on purchase of raw nut, salary, wages, packing material, taxes, rent, fuel etc. have been included in working capital

At the overall level the per unit working capital investment is found to be Rs. 83.44 lakh. Major amount is spent on the purchase of raw cashewnut, from the total working capital investment in running the cashew processing industry. It is found that, purchase of raw nuts shared Rs. 30.41 lakh (93.05%) in small group, Rs. 82.14 lakh (91.62%) in medium group and Rs. 114.20 lakh (91.87%) in large group.

The average aggregate capital invested per processing unit is Rs. 94.47 Lakh. The investment pattern of the cashew processing units revealed that, there is a direct relationship between total capital invested and size of the processing units. The capital investment increased with the size of units, because of the increased requirement of fixed and working capital. The major part of the working capital invested is for procurement of cashewnut (raw material) which is seasonal in nature.

At overall level on an average, the quantity of cashewnut procured is highest in the months of April and May, which is 603.28 q. (37.25%) and 601.42 q. (37.14%), respectively. In the months of June, July and August, it is

244.57 q. (15.10 %), 95.52 q. (5.90%) and 74.60 q. (4.61%), respectively. The total quantity procured is 1619.39 q. at the overall level.

The cost of processing is the most important factor on which the success or failure of the unit depends. More the cost of processing, lesser is the profit margin to the unit and vice-versa. Handling charges, drying, salary, wages, bonus, packing material, fuel charges, taxes and rent, depreciation, interest on fixed and working capital are the items of cost of processing. The cost of processing per quintal of cashewnut is Rs. 872.65 in small group, Rs. 940.46 in medium group and Rs. 937.95 in large group whereas at overall level per quintal cost of processing is Rs. 938.45. The per quintal cost of processing exhibited positive relationship with the scale of production. This revealed that, processing is costly in the units of large capacities. The major cost is interest on working and fixed capital. At the overall level, it is Rs. 429.21 (45.74%) and Rs. 68.11 (7.26%) respectively.

At the overall level, one quintal of cashewnut when processed resulted in 24.70 kilograms of kernels (24.70%). 70.00 kilograms of shells (70.00%) and 3.00 kilograms of testa (3.00%) and 2.30 kilograms of rejection (2.30%).

At the overall level, the net returns worked out to Rs. 23.93 lakh. Considering the total cost of processing and quantity of kernels received, the per quintal cost of production of kernel is worked out. It is Rs. 22418 at the overall level, whereas it is observed that per quintal cost of production of kernel is found to be increase with increase in size of factory, which is Rs.

22156 in small group. Rs. 22175 in medium group and Rs. 22578 in large group.

Due to processing of agricultural produce its sale value increases. This increase in value because of processing over its original value is called as added value.

The per quintal gross added value is worked out by deducting cost of raw material charges from the gross value received and net value added is worked out by deducting processing cost from gross added value received. The gross added value in cashew processing is 43.07 per cent, 47.59 per cent and 54.64 per cent in small, medium and large group respectively. Whereas net added value in cashew processing is 24.34 per cent 27.70 per cent and 34.95 per cent respectively. At the overall level the gross added value came to 48.18 per cent and net added value came to 28.36 per cent. It is observed from the table that, as the working season increased the gross added value is found to increase.

5.PROBLEMS AND PROSPECTS OF CASHEWNUT PROCESSING INDUSTRY :

Cashewnut processing on commercial basis was initially started in Mangalore, in Karnataka. In 1927 the business started in Quilon of Kerala, later it became the centre of trade. Maharashtra is one of the leading cashew growing state. In Maharashtra, more than 90 per cent area under cashew is concentrated in Konkan region. Cashew possesses high economical as well as nutritive value. In spite of it's importance it's cultivation has not fetched the

careful attention of farmers, due to lack of knowledge about standard package of practices, timely unavailability of good quality planting material and inadequate market infrastructure facility. Cashew is seasonal in nature and price fluctuation due to various agencies involved in marketing of nuts is a major problem in this fruit crop. It is therefore, highly essential to standardize the storage methodology and marketing facility for this crop

Regarding the problems of processing factories, the bank finance was not easily available and high interest rate of bank have been the most prominent. Shortage of labour, non availability of good quality raw material, frequent failure of electricity, non availability of skilled labour have been the major problems.

On the basis of analysis made and its recapitulation, some strategy had drawn for progress of cashew growers and industry. Processing unit requires huge amount of raw material and gives around 90 per cent of female employment in the region. Grading and sorting of raw nuts should be done at the production site. Since grading in vogue was improper. All the unit owners are facing the problem of credit. The credit was not available in adequate quantity and at proper time. Because of this problem, they could not purchase sufficient quantity of raw material which was available in nearby area. To overcome this problem, it is necessary to make modifications in lending policy of financing institute. Low capacity utilization by the cashew processors is hindering the progress of this industry. To overcome this problem, Government may improve electricity supply failure, revise credit policy by way of providing

easy credit availability and lower interest rate.Co-operative cashew processing units are required to be established in this area for getting additional benefit in income and employment.

6.CONCLUSION :

1. PRODUCTION :

i. Cashew is the perennial cash crop which is having gestation period of five years. In this period to establish a cashew orchard growers have to incur huge expenditure. It is observed from the study that, on an average an amount of Rs. 114610.83 was required for establishing one hectare of HYV cashew orchard, while the approximate cost of establishment of local cashew orchard was worked out to Rs. 87430.56.

ii. In establishing a cashew orchard (HYV) highest amount (34.50%) was incurred on labour wages. Out of total establishment cost, 42.04 per cent was incurred during the first year, 15.92 per cent during second year, 15.78 per cent during third year, 13.25 per cent during fourth year and 13.01 per cent during fifth year. This indicated that, maximum expenditure was incurred during the first year.

iii. Regarding groupwise cost of cultivation of cashew orchard was observed that per hectare cost of cultivation was considerably maximum, (Rs.46793.29) in HYV cashew orchard than (Rs. 30257.40) in local variety cashew orchard. In local variety cashew orchard the share of cost ‘A’ was 26.35 per cent and cost ‘B’ was 86.98 per cent. In

HYV cashew orchard the share of cost 'A' was 29.49 per cent and cost 'B' was 87.92.

iv. Regarding profitability of bearing cashew cultivation, in study area the per hectare net profit was considerably higher in HYV cashew orchard (2.00) than local variety cashew orchard (1.80) as indicated by benefit cost ratio.

2. PROCESSING :

i. The cashew processing unit in the region had provided 1.92 lakh day employment. Out of the total employment, nearly 92.00 per cent was female labour employment.

ii. The average capital investment per unit was Rs. 94.47 lakhs. The investment on working capital was more (88.32%) than the fixed capital (11.68%) Of the total working capital invested, the purchase of raw nuts shared about 91.87 per cent.

iii. The per quintal cost of processing was Rs. 938.45 and exhibited positive relationship with the scale of production.

iv. One quintal of cashewnut when processed resulted in 24.70 kgs of kernels. The gross and net value added came to 48.18 per cent and 28.36 per cent, respectively. The picture of utilized capacity in relation to installed capacity was to the tune of 64.05 per cent of the total capacity utilized. The cost-benefit ratio for unit was 1.25.

v. Major problems faced by the unit have been mainly related with finance, followed by quality of raw material, labour, electricity supply etc.

8. RELEVANCE OF THE STUDY:

At the end of this work it is felt that the study is quite relevant. It is useful to understand the cost structure of the cashew plantation and processing activities. This has direct relationship livelihood of the farmers. Some of the results of the study have thrown light on how to save cost of production and improve marketability of the same. In addition to this the study states how advantage of " Value addition" can be sought of by the farmers.

So far as geographical studies are concerned the preset works is in tune with the recent trends in Agricultural Geography. It gives idea about how to use cost-benefit analysis as a tool to understand geographical parameters. The study may be considered as good addition in the knowledge of Agricultural Geography.

9. LIMITATIONS :

Obviously, present work is not free from any limitations. The candidate is aware of the limitations regarding data collection, data analysis and exposition. The cost of production is mainly based field enquiry without any laboratory experiments. However, this may be considered as more realistic data as it comes from the farmers who are practicing cashew cultivation in the

given geographical situation. The cost structure is open for correction in different geographical situations.

It may be remarked that in depth study may be carried out in future by the same scholar or other researchers in the field of agronomy, agriculture geography and environmental management.

10. FURTHER STUDY:

The present work has outlined the planning of strategy how to transfer benefits of ' **alue additionV**' to the farmers and to reduce 'risk'. However, it is not completion in the sense that proper 'action plane' suitable to different geographical situations. Therefore it may be suggested to carry out comparative cost-benefit-analysis for different area producing cashewnut.

As a part of further study it may be suggested to integrate this type of work with the scenario of globalisation, national policies and environmental aspects of farming. It would be interesting to evaluate cashewnut cultivation in terms of cost, output, quality and marketability if principle of organic farming are adopted. Furthermore, it may be worth studying the impact of environmental degradation on cashew plantation.

The present work has given proper methodology to understand costing of plantation crop. It may be applicable to other plantaion crops also. Therefore it may be suggested that the cost-benefit-analysis of other crops like mango, pepper, jambhul etc. may be carried out as further study.

Thus, the present work provides good academic background for various types of further studies.

11. CONCLUDING REMARKS:

The present work has outline strategy to achieve development of the farmers cultivating cashew. It also has suggested the strategy that cashewnut processing activity should be carried out by farmers on co-operative basis to achieve improvement of farmers 'economic status' Thus, the hypothesis stated in the beginning is accepted in the work.

INTRODUCTION

1.01 Introduction :

India is developing country and agriculture is the backbone of Indian economy. Fruit and vegetable processing are the most important agriculture based activity. Objective of the fruit and vegetable processing is to supply wholesome, safe, nutritious and acceptable food to consumers throughout the year. This may be useful for exporting finished or semi-processed products. The fruit and vegetable processing activities have been set up, or have to be established in developing countries for some of the following reasons :

- ❖ Diversification of the economy, in order to reduce present dependence on export of limited commodities.
- ❖ Government policy to promote activity.
- ❖ To contribute to some extent to achieve balance of payment at national level.
- ❖ To stimulate agricultural production by obtaining marketable products.
- ❖ To generate both rural and urban employment.
- ❖ To reduce loss of perishable commodities like fruit and vegetable.
- ❖ To improve employment status in rural sector during the off-season and thereby generating new sources of income for farmers and local artisans.
- ❖ To get the advantage of value addition.

1.02 Importance of Agriculture :

Agriculture is the main foundation of rural life. Most of the villagers ranging from 15 to 60 years of the age are occupied in agriculture. In rural life land is called mother earth. The level of development of the civilization and culture of a particular place is measured according to the land productivity. Land provides him opportunity for life by supporting the basic needs of food, fodder, fuel, clothes etc. In rural life, land is worshipped on occasions of marriage, festivals and celebration. In this way, rural life beings with land and ends with land.

Agriculture is the most important, occupation of the people in India. The agricultural sector contributes nearly one-third of the national income provides livelihood to about two-third of the population supplies the bulk of wage goods required by the non-agricultural sector and raw materials for a large section of industries (Dauthy, 1979). In the recent past contribution of agriculture has been reduced. However, it is significant as it provides employment to about 60 % of working population especially in the rural sector.

Agriculture is the oldest and most important industry of the world. Leaving out China, there is no country in the world in which so many people depend on agriculture for their livelihood as in India.

The two outstanding features of agricultural production Firstly developing countries are the wide variety of crops and the preponderance of food over non-food crops (Negi,2000).

In terms of population and geographical area, Maharashtra is the third largest state in India. The share of agriculture and allied activities in net State Domestic Product (SDP) for Maharashtra has declined from around 38% in 1961-62 to 22.9% in 1992-93.The corresponding numbers for all India have been 50.9% and 32.3% respectively (Mungekar, 2003). Thus, the contribution of agriculture to the net SDP has been less in Maharashtra as compared to the national average. It may, however, be noted that Maharashtra's economy is predominantly agrarian since around 61 percent of the total workers are dependent on agriculture and allied activities for their livelihood in the early 1990s.

The soil, topography and climate in Maharashtra are not very much favourable for some high valued crops and have led to relatively low yields of the important crops in the state as compared to that in India. The state has, however, several advantages for development of horticulture and vegetable crops. Banana, oranges, cashew nut and grapes are the important horticulture crops grown in the state.

The 8^{th} five year plan of Maharashtra gives lot of emphasis on agro-processing. The establishment of processing units will help to support prices of agricultural commodities. It also creates further employment opportunities in grading, transporting and processing. Broadly speaking in konkan region,

items requiring processing have been identified as kokam, late season mango, cashew nut and cashew apple (Mungekar, 2003).

1.03 Concept of Horticulture and Crops :

Horticulture is tremendous industry composed of numerous commercial enterprises. Lot of raw material can be produced from horticultural crops. It contributes to health happiness and prosperity of the mankind. Horticulture is the applied science. It is defined as an expensive art and science of study of garden plants.

This term applied first in 17th Century. The word 'Hortus' means 'Garden' and 'Culture' means 'Cultivation'.

The cultivation of flowers, fruit, or vegetables in small plots using intensive methods of farming. The most intensive form of horticulture is probably the cultivation of crops (Smith, 1979).

Horticulture is part of agriculture, which is concern with the garden crops. Thus the horticulture means cultivation of garden crops. India and Maharashtra, with its wide variability of location, climate, soil and other agro-climatic conditions has good potential for growing a wide range of horticulture crops, such as fruits, vegetables and plantation crops. The district has commercial and horticultural crops as listed below :

Table 1.1

Major crops in Sindhudurg District.

Subsistant crops	Commercial Crops (Food Crops)	Plantation Crops (Horticultural Crops)
1. Paddy	1. Groundnut and other oil seeds	1. Mango
2. Nachani	2. Vegetables	2. Cashew
3. Kulith	3. Pulses	3. Coconut
		4. Kokum
		5. Arecanut
		6. Jackfruit
		7. Oil palm

Source : After Mathkar Jayanand, 2001.

In the mid eighties Government identified horticulture crops as a means of diversification for making agriculture more profitable through efficient land use, optimum use of natural resources. The past efforts have been rewarding in terms of increased production and productivity and availability of horticulture produce. India has thus emerged as the largest producer of coconut, arecanut, cashew nut, ginger, turmeric, black pepper and the second largest producer of fruits and vegetables. The Fig 1.1 shows location of the study area and the table 1.2 depicts area under horticultural crops compared with target in last 15 years.

LOCATION OF SINDHUDURG DISTRICT IN MAHARASHTRA

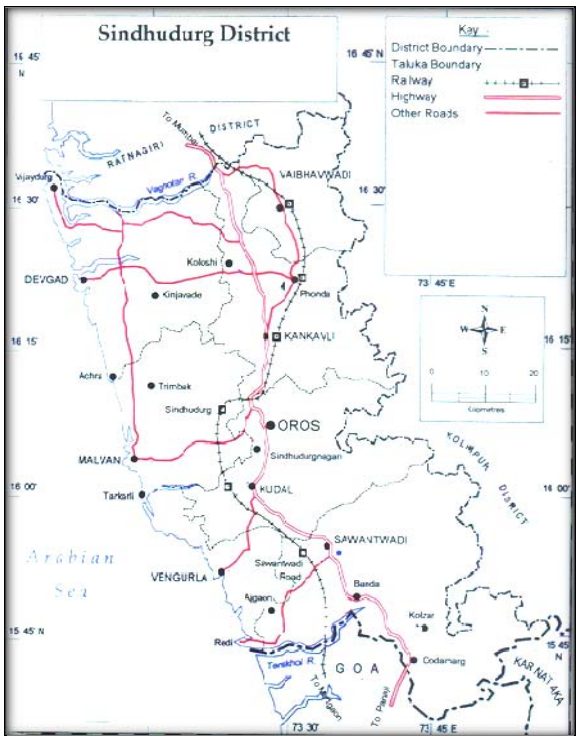


Figure No.1.1

Table no. 1.2

Year Wise Area under Horticulture Crops in Sindhudurg District :

Sr. No.	Cultivation Year	Area under cultivated (Hect)	Number of beneficiaries under the government scheme
1	1990-91	3308.06	4142
2	1991-92	6272.75	7412
3	1992-93	6322.55	7504
4	1993-94	6376.07	7680
5	1994-95	4566.64	5854
6	1995-96	4909.66	6159
7	1996-97	5681.59	7541
8	1997-98	4752.18	5733
9	1998-99	4946.64	6447
10	1999-00	4627.69	6385
11	2000-01	4955.19	6624
12	2001-02	2860.57	7748
13	2002-03	959.69	1539
14	2003-04	1342.24	2446
15	2004-05	1147.21	2217
16	2005-06	1345.60	2298
17	Total	64366.33	87729

Source: Agricultural Department Sindhudurg District.

Maharashtra state has several advantages in terms of marketing of products both domestically and internationally, for development of horticulture. Horticulture can also provide large year-round employment as compared to various other seasonal crops. Regarding horticulture development in the state, the Kolhe Committee on agro-marketing and agro-processing (1991) says that there are lot of constraints in the development of horticulture in the state, but

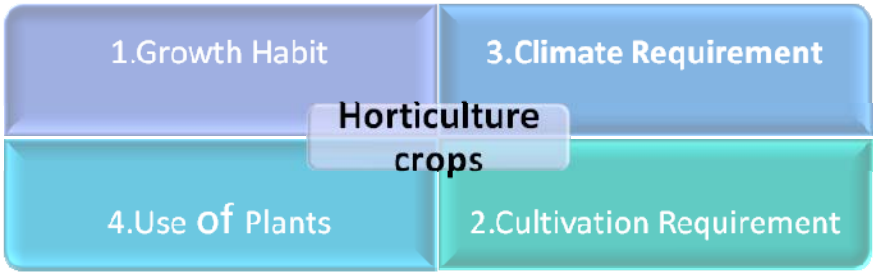
mainly low productivity and improper varieties have proved a major bottleneck (Mungekar,2003).

The development of horticulture is the only way for solving the economic condition of the vast peasantry of India and the growing unemployment among both educated and uneducated masses of this vast region since crop husbandry has proved uneconomical in most of the areas (Negi, Economic and Commercial Geography of India).

1.04 Classification of Horticulture Crops :

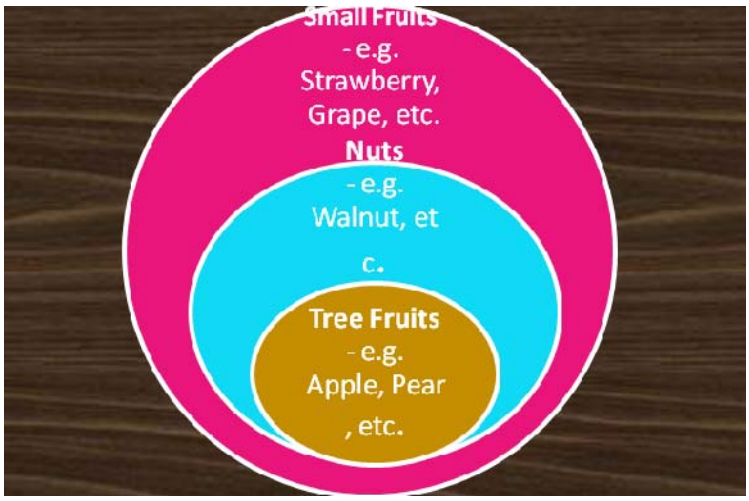
The intensively cultivated horticultural plants directly used by people for food, for medicinal purposes and for esthetic gratification. Horticulture crops have been classified into various groups depending on their growth habits, cultivation requirement, climate requirement and use as listed below :

Classification of Horticulture crops:



They are classified into the three broad divisions viz. fruits, vegetables and flowers. The classification of horticulture crops based on use of plants is as follows (Figure no. 1.2).

A.Temperate (Decidous) Fruits:



B. Tropical and Subtropical (Evergreen) Fruits:

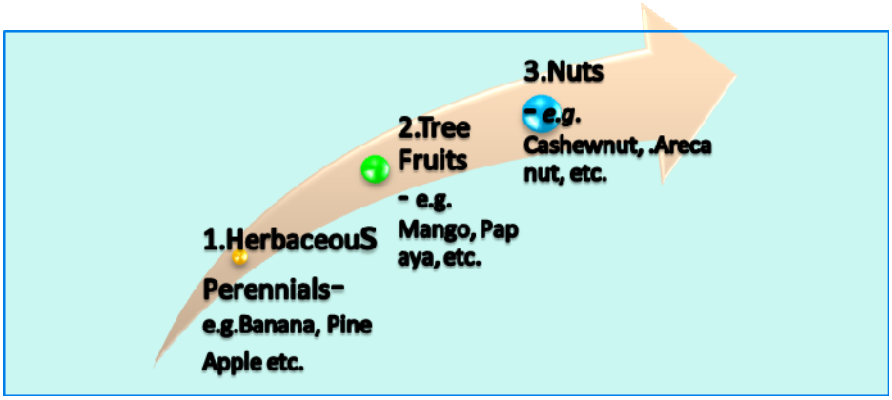


Figure No.1.2

1.05 Importance of Fruit :

Fruits and vegetables, which are among the perishable commodities, are important ingredients in the human dietaries. Due to their high nutritive value, they make significant nutritional contribution to human well-being. They are the cheaper and better source of the protective foods. If they can be supplied in

fresh or preserved form throughout the year for human consumption. The national picture will improved greatly.

Vegetables and fruits are essential for a balanced diet and maintenance of good health. They are rich sources of protective elements like minerals, salts, vitamins and other chemical substances which protect the human body against a number of diseases. They are also important for neutralizing the acids produced during digestion of meat, cheese and other fatty foods. They provide valuable roughages promoting digestion (Vyas,1994).

Fruit tree farming being highly intensive and skillful enterprise, generate employment even for trained persons. It reduces soil erosion, silting of tanks and air pollution. Importance of fruits in human diet is well known that the man cannot live on cereals alone. Fruit and vegetables are essential for balance diet and good health. Nutritionists advocate at least 60 gm of fruits and 360 gm vegetable per capita per day in addition to cereals, pulses, egg etc.

Fruit and vegetables are good sources of vitamins and minerals without which human body cannot maintain proper health and develop resistance to disease. They also contain pectin, cellulose which stimulate intestinal activities and energy giving substances like oils, fats and proteins. Most of the fruits have medicinal properties (Sabale,1993).

1.06 Role of agro-industries in Indian economy :

Agriculture development is the keystone of industrial and economic development. We may appreciate the importance of crops for human food and

livestock feed, but rarely do we properly connect them with industry. As pointed out in the beginning that agriculture is the source of world economy (Negi , Agricultural Geography-second edition).

Agro industries make optimum use of agricultural resources. These industries can add a substantial amount of value to primary produce. The development of food and agricultural industries has beneficial to agriculture through backward linkage effect. The excess population of India has potential to get jobs in agro based industries. The industries which are directly or indirectly linked with the agriculture called as agro industries. Agro industries creates and develops most of fields. Base of agro (Figure no. 1.3) industries is as fallows-

Base of Agro Industries

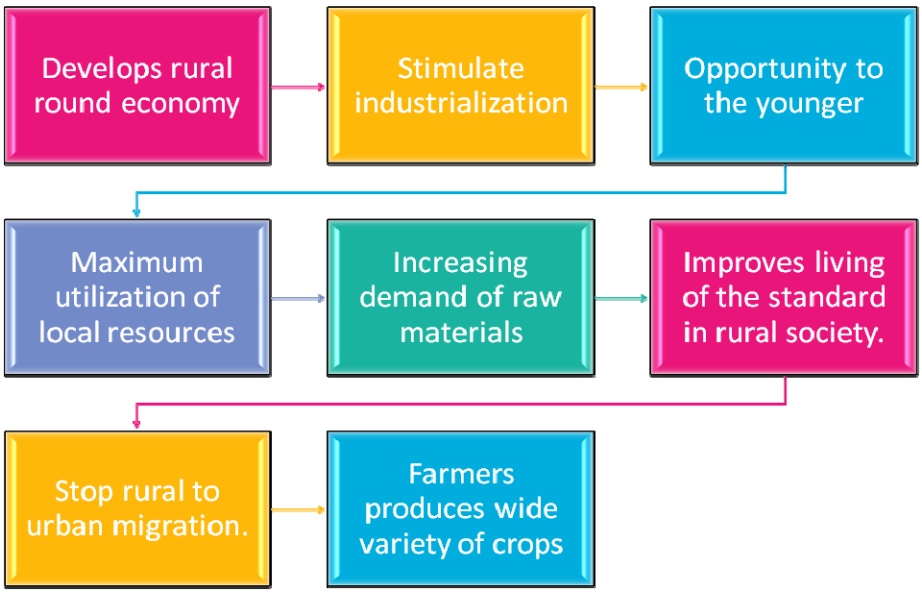


Figure no.1.3

Even after so much of industrial progress, country depends on agricultural sector for employment generation. For another 100 years, our major employment is going to come from agricultural sector. Development of agro based industries to generate employment is a must to keep our economy on sound footings. Market surveys in European and other markets have revealed that there is good scope for export of grapes, mango, cashew to gulf and European markets.

The availability of these export markets would help to increase area under these fruits. Fruits farming provides raw materials for various agro based industries. Development of cashew and mango plantations on hill slopes in Konkan where even ragi or nachani can not be grown, have brought additional revenge to the growers (Sabale,1993).

1.07 Classification of industries :

Agriculture sector helps industry by various ways, it supplies raw material to industry, it provides food to people engaged in industry. It increases purchasing power of the farm community. The industrial development helps modernization of agriculture. Agro industries make optimum use of agricultural resources. Indian population has potential to get jobs in agro based industries.

Fruit Processing Industries have products like Juice, Jam, Jelly, Pickle, Sarbat, Squash, Cashew burfi, Cashew fenny, Cashew Modak etc.

1.08 Concept of fruit processing industry :

A large variety of fruits grown in India. India accounts for about 10 % of the production of fruits in the world. Cashew nut assumes on important place in the Indian economy. India produces 45 % of the global production of cashew. Besides, India is the largest producer, consumer and exporter of cashew in the world. The production of cashew nut has increased from 0.36 million tonnes in 1997-98 to 0.47 million tonnes in 2001-2002. (K.Sagar,2004).

1.09 Choice of the Study Area :

Sustainable and equitable economic its growth depends largely on the development of agriculture, and allied sector. Government of India (GOI) in eleventh five year plan beginning from 2007-08 has set the targets of 4 % growth for agriculture and 9 % for the economy. The Planning Commission has directed to the State Government to initiate steps for preparing comprehensive District Agriculture plans during 2007-08.

National Bank for Agricultural and Rural Development (NABARD) has prepared credit plan, reflecting the current priorities set by GOI in the areas of agriculture and rural development. Agriculture extension programme and support services have been useful for the farmers to increase their income.

Much of the poverty in India is found in rural areas. One of the methods to eradicate poverty may be development of the agriculture. The study area with hot and humid summers, pleasant winters, abundant rainfall, lateritic and coastal alluvial soils provides favourable condition for plantation and

horticulture. In the district 55.30 % of the total area under cultivation of fruit crops is covered by cashew and 26.06 % under mango. The following Figure no. 1.4 shows that the study region of the cashewnut processing industry in the district.

THE STUDY AREA SINDHUDURG DISTRICT

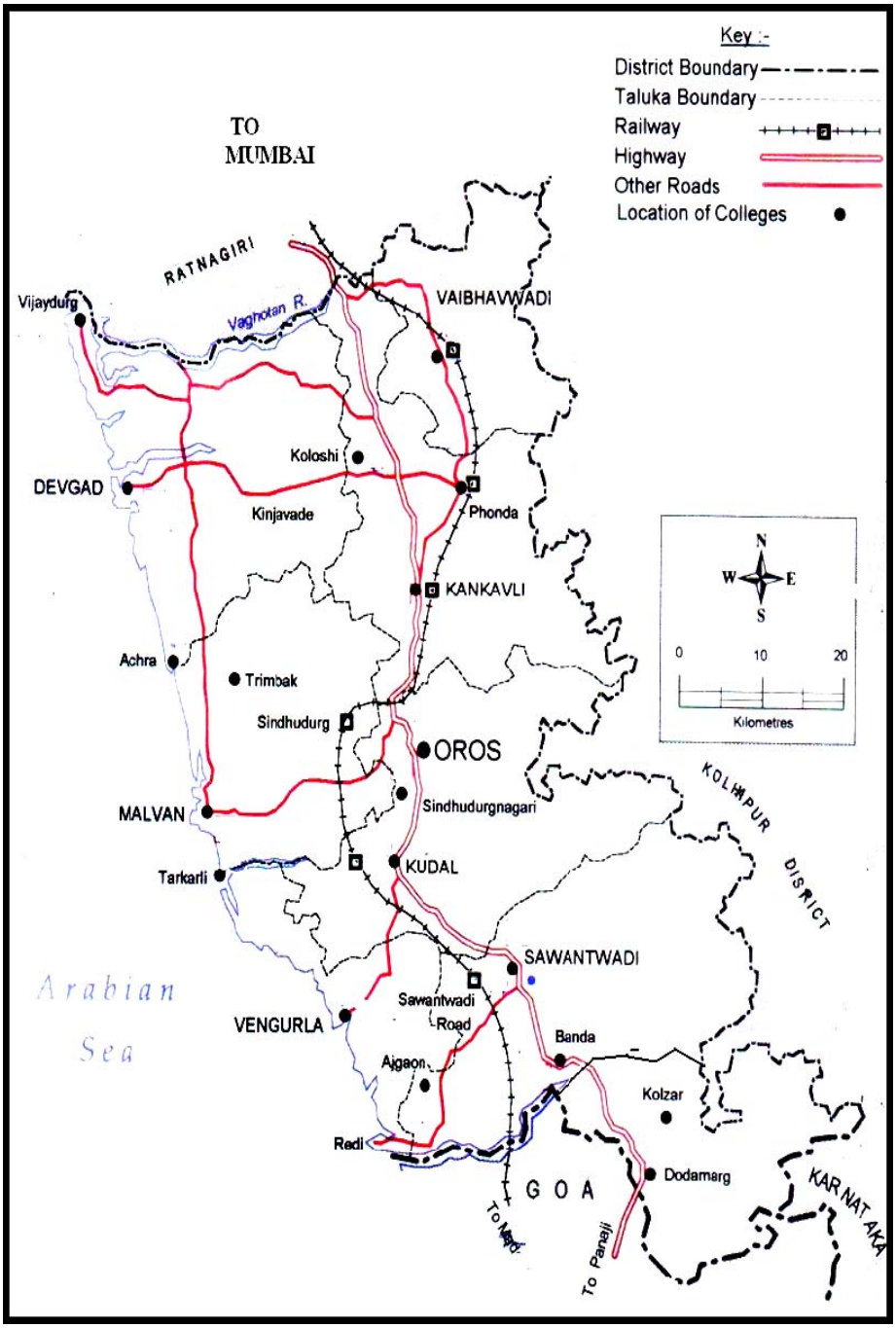


Fig. no. 1.4

Mango, Cashew and coconut are the major horticulture crops and district economy has a major share of income from processing and marketing of horticulture produce, which is also main source of income for about every household. Initiatives being launched under National Horticulture Mission, and by few corporate towards contract farming, certification process for organic cashew will help in sustaining enhanced credit flow to the sector.

NABARD is implementing Cashew Cluster Development Programme in the district In co-operation with Government and BAIF Pune. The programme envisages promotion of micro enterprises in cashew processing to be run by cultivators, which will provide gainfull employment to the womenfolk nearer to their place of residence. The cashew kernels processed by units holders are sold under brand name 'Gopuri' value added products from cashew like cashew modak, cashew burfi, cashew apple syrup are sold in the markets at Sindhudurg, Mumbai and pune.

Training in cashew processing is being provided on regular basis at Gopuri Ashran at Kankavli and M/S Hedgewar Seva Prakalpa (HSP). There is a lack of awareness and enterprise among cashew farmers about agriculture management practicals to be followed by improving yield existing plantation. Thus the favourable geographical condition and Government policies are suitable to this cashew nut processing industry in the district (PLP,2008-09).

1.10 Agricultural Scenario Of Sindhudurg District :

Dr. Babasaheb Sawant Konkan Krishi Vidyapeeth,(BSKK) Dapoli has been doing research and extension work in agriculture, animal husbandry and dairy and fisheries for about last three decades. The State department of agriculture and other line departments have been rendering necessary co-operation in these endeavours. It would be appropriate to examine technological adoption scenario in this background. Majority of the farmers have already adopted a part of the improved package. Hence, it may not be appropriate to conduct demonstrations of training programems on the full package of technology. There is need to identify gaps in adoption, so that it could be used as basis for technical planning of demonstrations/training programmes.

Mango and cashew are the major rainfed fruit crops grown in the district. The main problem faced by the mango growers in the districts are alternate bearing, spongy tissue and heavy infestation by hoppers. In the case of cashew crop, cultivation of local varieties, heavy infestation of Tea Mosquito is the main problems. There are also marketing problems for mango and cashew which are main fruit crops in the district. There is need to have post processing units /industry in the district.

In this context extension education programmes in the distinct may focus on the use of Cultar and its economics in mango production, cultivation of high yielding and bold seeded varieties of cashew, integrated Pest management in mango and cashew, formation of cooperative societies/associations for

marketing of mango and cashew fruits as well as establishment of fruit processing industries in the district.

Some other important issues which need to be tackled on priority basis for the economic upliftment of the farmers are, utilisation of irrigation potential created, conservation of soil and water, diversification of cropping pattern, promotion of mixed cropping system, dairy, poultry, social forestry and medicinal and aromatic plantation and problems of small fishermen, etc.

1.11 Relevance of the Study Area :

Agriculture system of Konkan mainly based on pro commercial products like mango, cashew etc. In the south Konkan cash significant production. The introduction of new processing technology of cashew nut is responsible for change in the cash flow and change in case of farmers economy. It is necessary to understand the cashew processing as a system and to analyze the system for knowing the quantity and recipients of the benefits. These kinds of study can be useful to develop policy instrument in such a way that the benefits of cashew nut processing should reach to the farmers nearing there by maximum cost should be paid for local soil, water, and human resources in the region. It is in the sense study has academic as well as social relevance.

1.12 Hypothesis of the Research :

The study mainly focuses on cost structure of cashewnut production in the district. This exercise may be useful to understand to what extent farmers would be benefited due to processing activity. The study mainly aims at

understanding the effect of “Value addition” by way of cashewnut processing activity. Therefore the hypothesis of the study may be outlined as below.

“The cashewnut processing industry in the Sindhudurg district is useful to improve the income of the farmers and thereby the standard of living.”

1.13 Database and Research Methodology :

The study has been carried out to completed by acquiring data through primary as well as secondary data source. Required information collected from the concerned area.

1.13.1 Secondary Data :

Secondary data collected from related books, government agencies, research articles, University library, reports of fruit processing industries is as fallows:

i. District Statistical Abstract
ii. District Census Handbook
iii. Agricultural Bulletin
iv. Fruit Processing Reports
v. Map of Sindhudurg District from authentic source like SOI.

The data will be collected from the above mentioned source to understand:

i. The distribution of cashewnut
ii. The growth of cashewnut production from 1991-2006
iii. To identify tahsils of high production of cashewnut

1.13.2 a) Primary Data :

Using questionnaire method the data regarding following parameters, Cost Structure of cashewnut cultivation, processing, transportation, marketing. For understanding problems and prospects of the cashewnut production, processing, marketing knowledgeable persons will be interviewed. For the data collection survey method, structured interview and observation method was adopted.

b) Selection of cashew growers

From each tahsil, a sample of 20 cashew growers was selected randomly, after preparing a list of cashew growers in the village from the revenue records. Thus, the final samples have been consisted of 8 tahsil and 160 cashew growers from study area.

In addition to this, from each tahsils 10 cashew growers, one each for 1st to 5th year plantation have been selected to collect information on investment in establishment of new cashew orchard. Thus, in all 80 additional cashew growers have been selected for financial feasibility analysis.

c) Cashewnut Processing

1. Background information : List of cashew processing units was obtained from D.I.C. of Sindhudurg districts. According to this information, there have been 50 units in Sindhudurg district and only four units have been in Ratnagiri district. To obtain adequate sample size, Sindhudurg district was

selected purposively. At the time of data collection, it was observed that some of the units have been not in existence as they have been closed. To overcome this problem, personal discussion was made with office bearer of the Konkan Cashew Processors and Exporters Association at Vengurle. According to them, 18 units have been in operation. All these units have been selected and contacted personally. The information related to various aspects have been recorded in a well designed schedule. The information so collected pertained to the year 2008-2009.

2. Nature and source of data

The detailed information required for the study was collected from primary and secondary sources in order to accomplish the various objectives of the study.

The primary data relating to the procurement and processing of cashewnut, marketing of cashew kernels and problems faced by the processors have been collected through pretested schedule from the processors. The processors have been personally interviewed to ensure the data made available by them have been appropriate, comprehensive and reasonably correct.

The secondary data regarding capital investment and organisation structure was obtained from the records of the processing unit. Similarly the data relating to performance of the processing units like current assets and liabilities, owned funds, fixed assets, liquid assets, inventory, total sales, borrowed capital and profits or losses have been obtained from Trading

Account, Profit and Loss Account and Balance Sheet of each processing unit for 5 years.

1.13.3 Analysis of Data :

The data base thus formed will be analysed using statistical and computer techniques.

i. Correlation analysis will be used find out physiographic and socio-economic determinants of cashewnut cultivation and processing.

The selected sample cultivators have been categorized into two heads viz.

i. Cashew growers having local varieties plantation (local)

ii. Cashew growers having high yielding varieties plantation (high yielding)

On the basis of classification of sample cashew growers, comparative economics of cashew production and its disposal was studied. Similarly, estimating the establishment cost of cashew orchard and financial feasibility analysis was carried out separately.

Considering the objectives, the collected data have been analysed by adopting following procedure:

1. Estimation of initial investment (Establishment cost) :

Item wise cost incurred in each year for establishment of cashew orchards for first to fifth years was considered and the cumulative cost incurred in the period of five years is considered as cost of establishment or initial investment cost.

2. Estimation of annual cost of maintenance :

Once the cashew orchard short bearing the fruits, the growers have to incur an expenditure on the maintenance of orchards every year. The maintenance cost of cashew orchard was worked out by using standard cost concepts used in farm management studies.

3. Following Standard cost concept was used :

i) Cost 'A'

The items considered in Cost-A are as under:

i. Value of hired human labour
ii. Value of manures (owned and purchased)
iii. Value of fertilizers and bio fertilizers
iv. Value of plant protection chemicals and grown regulators
v. Depreciation on implements and machinery
vi. Land revenue including other cesses
vii. Interest on working capital

ii) Cost 'B'

Cost B = Cost A + Rental value of owned land + Interest on fixed capital + Amortized cost of orchard

iii) Cost 'C'

Cost C = Cost B + imputed value of family labours + Supervision charges

4. Valuation of the costs

The procedure adopted for valuation of cost of different items is given as under

i) Hired human labour :

Actual amount paid to hired labour for performing different farm operations is considered as cost of hired human labour.

ii) Other inputs :

Purchased inputs such as manures, fertilizers, pesticides, etc. are valuated on the basis of actual market price. However, for farm produces inputs, opportunity cost is considered.

iii) Family human labour :

The cost of family human labour is imputed on the basis of wage rates paid to hired human labour.

iv) Depreciation :

The depreciation on farm assets used in cashew production is worked out by using straight line method

v) Revenue and other cesses :

Actual amount paid to Revenue Department on account of land revenue, Zilla Parishad cess plus other local cesses are taken into consideration as land revenue and other cesses.

vi) Interest on working capital :

It is charged @ 6 per cent on all paid out expenses for a period of one year.

vii) Interest on fixed capital :

It is worked out @ 10 per cent on the present value of farm assets. The estimated interest amount is allocated on the gross cropped area basis.

viii) Rental value of owned land :

The rental value of the owned land is estimated by using following formula

$$\text{Rental value of owned land} = \left[\frac{\text{Gross Value of produce net of marketing cost}}{6}\right] - \text{Land revenue}$$

ix) Amortized cost of orchard :

This is worked out by using following formula

$$A = \frac{C \times r - (1+r)^{t}}{T}$$

Where,

A = Amortized cost (Rs./hect.)

C = Initial investment (Rs./hect.)

r = Rate of interest (%)

t = Economic life of the orchard (years)

$T = (1+r)^{t} - 1$

Economic life of cashew orchard is considered as 40 years

x) Supervision charges

They are considered @ 10 per cent of Cost A

Analytical techniques employed : In order to fulfill the objectives of the study, the collected data have been analysed by using appropriate techniques.

Tabular analysis :

The data collected have been presented in tabular form to facilitate easy comparisons. The investment pattern, cost of processing, and overall cost and return structure in the processing business have been presented in the form of tabular analysis. The data have been summarized with the help of statistical tools like averages and percentages to obtain meaningful results.

5. Cash flow estimation:

i) Cash Outflow

Cash outflows are calculated by using cost of establishment up to gestation period (upto 5^{th} year) and after 6 year by using operating cost annually.

ii) Cash Inflow

Cash inflows determined by using value of main produce and by-produce after sale.

6. Financial feasibility analysis (Economic evaluation of investment):

The economic evaluation of investment in cashew orchard was carried out by developing yearwise cash outflows and cash inflows for the life period of the orchard (i.e. 40 years) for new plantation (high yielding).

In case of local plantations all the cost incurred for HYV plantation have been considered except cost of grafts and the cost of seedlings have been added.

The financial feasibility of investment in cashew orchard for both the categories viz. local and high yielding is judged with the help of following financial feasibility tests:

i) Pay Back Period (PBP)

ii) Benefit Cost Ratio (BCR)

Following procedure is used for developing these tests

i) Pay Back Period (PBP):

It is number of years the project takes to recover its cost from its return. The payback period is calculated by successively deducting the initial investment from the net returns until the initial investment is fully recorded. The productive life of cashew is assumed to be 40 years and returns starts from 6^{th} year onwards.

ii) Benefit Cost Ratio (BCR) :

It is the ratio of the discounted value of all cash inflows to the discounted value of cost outflows during life of project. It is computed as

$$BCR = \frac{\sum_{t=0}^{n} Bt(1+r)^{-t}}{\sum_{t=0}^{n} Ct(1+r)^{-t}}$$

If BCR is grater than one, the investment is considered feasible

1.13.4 Definitions of terms used in costing :

A) Capital investment :

a. **Fixed capital :** The item included under the capital have been the value of land, building, machinery and equipment, infrastructure facilities and other fixtures.

b. **Working capital :** The working capital includes cost of raw cashewnut, utilities (like power, fuel and water cost), packing material (tin) cost, wages, salaries, unit overheads (like security, lighting, repairs and maintenance cost) and administrative overheads (like stationary expenses, office communications and insurance premium cost).

c. **Investment on building :** This includes investment on building for processing, storage, office and drying yard.

d. **Investment on machinery and equipment :** Under this investment made on roaster, hot chamber, cutter, grading table, packing machine, generator and utensils used in processing of cashewnut was included.

e. **Investment on infrastructure facility :** Here the investment incurred on providing roads, water, fencing and power supply to the cashew processing unit was considered

f. **Investment on other fixtures :** It includes investment on fan, tube light and furniture in the cashew processing unit.

g. **Interest on working capital :** It is worked out at the rate of 16 per cent. Part of the working capital used on cashewnut procurement was computed while remaining part of the working capital was computed separately to include other operating cost of production.

B) Cost of processing : This is computed by adding the costs incurred on utilities, packing material and wages.

C) Cost of production : It is calculated by adding cost of raw cashewnut, cost of procurement, cost of carrying inventory, cost of processing, salaries, unit overhead, administrative overhead, interest on working capital, fixed capital, depreciation on building, machinery and equipment.

D) Value addition : It is calculated by subtracting the purchase value of one quintal of cashewnut from the sale value of two tins of cashew kernel. (Approximately two tins of cashew kernels are recovered from one quintal of cashewnut).

E) Cost of marketing : It is calculated by adding sales tax, turnover tax, transport and handling charges, commission etc.

F) Sales realization : It is calculated by adding the sale value of main product, that is, kernel and by-products, that is, shell, testa (husk) and rejection.

G) Benefit cost ratio : It is calculated by dividing gross returns by total cost. This indicates the actual benefit realized per rupee of investment.

1.14 Limitations of the Study :

Cashew nut processing industry in the Sindhudurg district is main economic activity, and in future it will be tremendous growth and development. State Government and Agriculture department gives various facilities and 100% grants to the farmers. Land under cashew cultivation in increasing but in this study there is limitations. The study has been carried out from 1991 to 2006 and Sindhudurg district region.

1.15 Previous Literature :

Mr. Tawade M. D. has been studied on "Fruit Farming in Ratnagiri District A Geographical Analysis of Present Status and Future Prospects". Where as Mr. Nalawade D. B. worked on "Market Structure of Cashew Products in South Konkan of Maharashtra". The study of problems and prospects of fruit processing industry with special reference to Ratnagiri Sindhudurg resource region (Khamkar S.A.,2002) states that highlighted problems in shortly like i.g.

i. Fruit processing industry requires large amount to be invested
ii. Essential bank security of owners with guarantors, NOC and provisional certificates, education and experience certificates
iii. Gets unmatured and low quality of raw material and variations in material

iv. Raw material depends on climatic condition and region

v. Needs scarcity of labour for the shelling work

vi. Female labours more than 75% and after marriage substantial loss of trained and skilled labour force

vii. Prices of packing material are very high

viii. Fruit processing units paying Octri at the rate of 8% in Mumbai

ix. Seasonal production and seasonal consumption in this industry.

1.16 Résumé:

This chapter includes the reasons for the fruit and vegetable processing activities have been set up, or have to be established in developing countries, importance of agriculture, concept and classification of horticulture crops, It is necessary to adopt appropriate methods and procedure for conducting any research. For this purpose researcher should follow appropriate steps involved in carrying out research to obtain desirable results. The research methodology adopted for the present study is given in this chapter.

This chapter also includes Importance of Fruit, Role of agro-industries in Indian economy, Classification of industries, Concept of fruit processing industry and Agricultural Scenario of Sindhudurg District. The production of cashew nut has increased from 0.36 million tonnes in 1997-98 to 0.47 million tonnes in 2001-2002. Dr. Babasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli has been doing research and extension work in agriculture, animal husbandry and dairy and fisheries for about last three decades. There is need to

identify gaps in adoption, so that it could be used as basis for technical planning of demonstrations/training programmes.

It is necessary to understand the cashew processing as a system and to analyze the system for knowing the quantity and recipients of the benefits. These kinds of study can be useful to develop policy instrument in such a way that the benefits of cashew nut processing should reach to the farmers nearing there by maximum cost should be paid for local soil, water, and human resources in the region. It is in the sense study has academic as well as social relevance.

Training in cashew processing is being provided on regular basis at Gopuri Ashran at Kankavli and M/S Hedgewar Seva Prakalpa (HSP). There is a lack of awareness and enterprise among cashew farmers about agriculture management practicals to be followed by improving yield existing plantation. Thus the favourable geographical condition and Government policies are suitable to this cashew nut processing industry in the district. “The cashewnut processing industry in the Sindhudurg district is useful to improve the income of the farmers and thereby the standard of living.”

Cashew nut processing industry in the Sindhudurg district is main economic activity, and in future it will be tremendous growth and development. State Government and Agriculture department gives various facilities and 100% grants to the farmers.

Land under cashew cultivation in increasing but in this study there is limitations. In next chapter deals with physio-socio-economic setting of the region.

Chapter II

PHYSIO-SOCIO-ECONOMIC SETTING OF THE REGION

2.01 Introduction :

The study has been carried out the physiography, social and economic profile of the district. The various components like location, topography, soil, climate, irrigation and others facilities determine the suitability of a particular area for certain enterprises in the area. Therefore, the physiography, social and economic factors are the major hidden basic components of farmers and fruit processing industries in the district.

2.02 Physical Profile of the Sindhudurg District :

The land of Culture and Natural beauty. Sihdhudurg is famous for it's natural beauty like Beache's, Backwater, Waterfalls and Pilgrimage centers. The major attraction here is the long and narrow stretch of beaches. On clear day, you can see the sea-bead through a depth of 20 feet. Then if course, the there are the forts, Sindhudurg one of the Maharashtra's more popular and important sea forts built in 17th century and the famous Padmagarh fort.The name of the fort is given to the Sindhudurg district. Tourist from all over the world visits through out the year to see this Maratha glory.

Sindhudurg is the Konkan area of Maharashtra having stretch of land on the west coast of India, endowed with the beautiful seashore, picturesque Mountains and scenic natural beauty and known for tropical fruits like the world famous Alphonso mangoes, cashews, Jamuns etc (www.Sindhudurg Govt. in)

The study has been carried out that the background and information of the region is necessary to understand the implication of the physical details for cashew nut cultivation and cashew nut processing industry. The various geographical components are affecting on this industry.

2.02.1Geographical Location :

Geographical location of the Sindhudurg district is lies from 15.37 N to 16.40 North Latitudes and 73.19 E to 74.18 East Longitudes. The district is surrounded by the Arabian Sea on the west, the Belgaum District (Karnataka) and Goa on the South and the Ratnagiri District on the North and Sahyadri hill ranges to the East. Sindhudurg district is spread over an area of around 5,287 sq km. The modern township of Sindhudurg Nagri is the headquarters of the district. Sindhudurg being a coastal district.

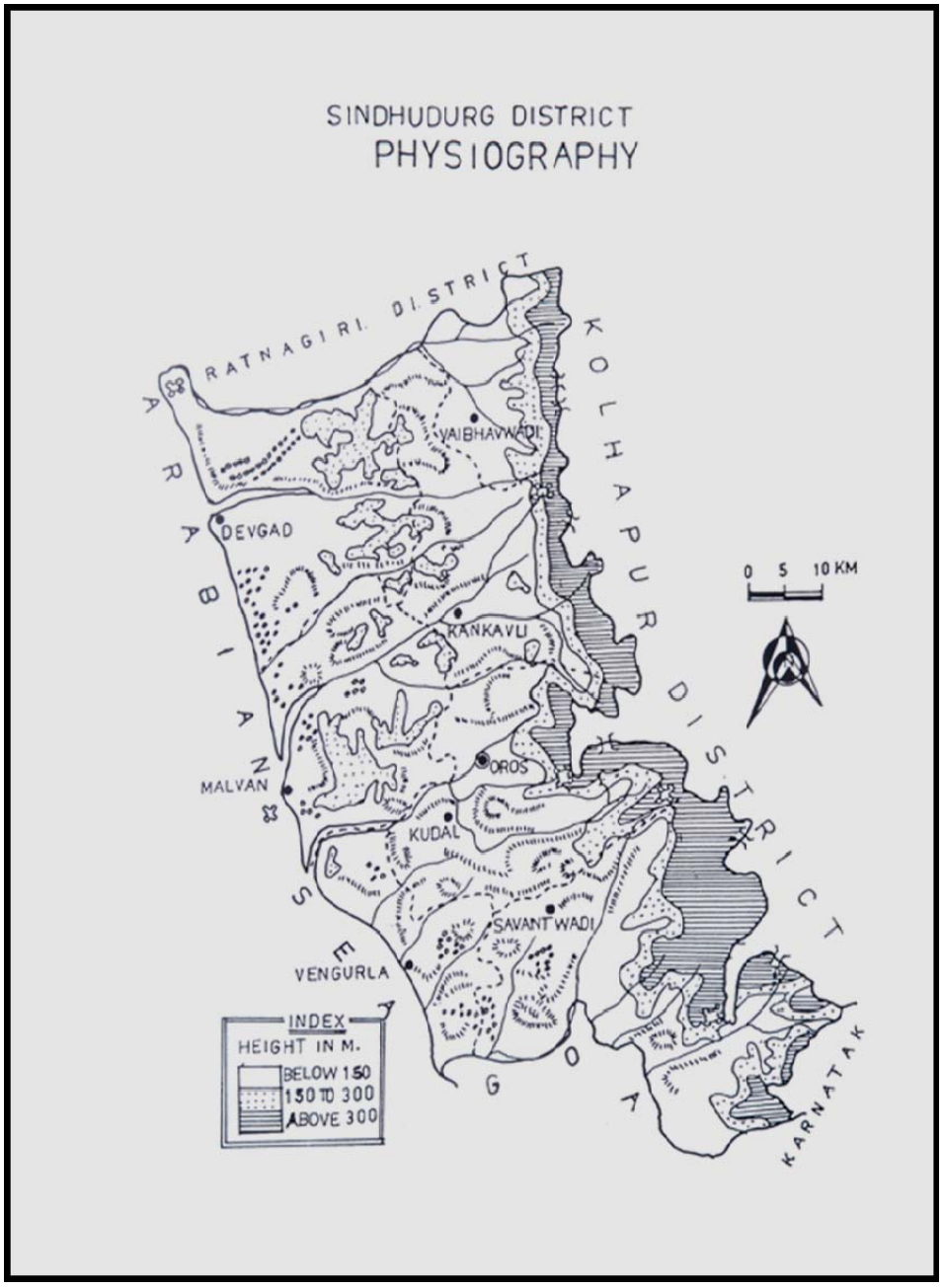

SINDHUDURG DISTRICT
PHYSIOGRAPHY
RATNAGIRI DISTRICT
KOLHAPUR DISTRICT
ARABIAN SEA
GOA
KARNATAK
VAIBHAVWADI
DEVGAD
KANKAVLI
ORos
MALVAN
KUDAL
SAVANTWADI
VENGURLA
0 5 10 KM
INDEX
HEIGHT IN M.
BELOW 150
150 TO 300
ABOVE 300

Fig no. 2.1

Sindhudurg is accessible by road on the NH 17 which passes through major towns of Kankavli, Kudal and Sawantwadi or by the picturesque journey on the Konkan Railway which stops Kankavli, Sindhudurgnagri, Kudal and Sawantwadi. With 7 railway stations, a 103 km. stretch of Konkan Railway line passes through this district. It has good road and rail links with Goa and Bombay.

Sindhudurg district was earlier a part of the Ratnagiri district. For administrative convenience and industrial and agricultural development Ratnagiri district was divided into Ratnagiri and Sindhudurg with effect from 1st May,1981.Sindhudurg district now comprises of 8 tahsils of Sawantwadi, Kudal, Vengurla, Malvan, Devgad, Kankavli, Vaibhavwadi and Dodamarg.743 villages are situated in various tahsils of the district. Tahsils of sindhudurg district depicted in (Fig.No. 2.2).

BLOCKWISE TAHSILS IN THE DISTRICT

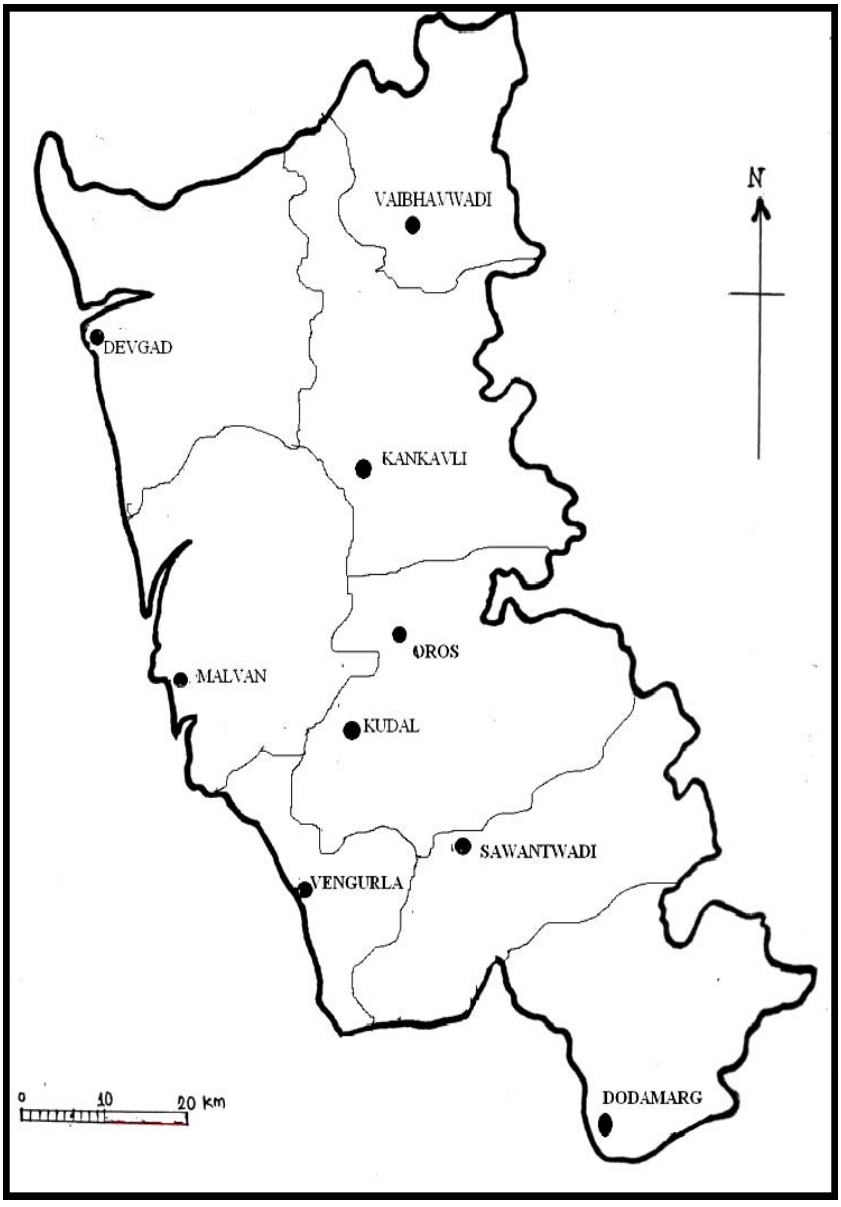


Fig no. 2.2

The following table 2.1 shows that tahsilwise numbers of villages in the district.

Table no. 2.1

TAHSILWISE VILLAGES IN THE SINDHUDURG DISTRICT

Sr. No.	Tahsils	Villages
01	Devgad	97
02	Dodamarg	56
03	Kankavli	104
04	Kudal	124
05	Malvan	135
06	Sawantwadi	85
07	Vaibhavwadi	59
08	Vengurla	83
	Total	743

Source: Social and economical report of Sindhudurg District 2005-2006

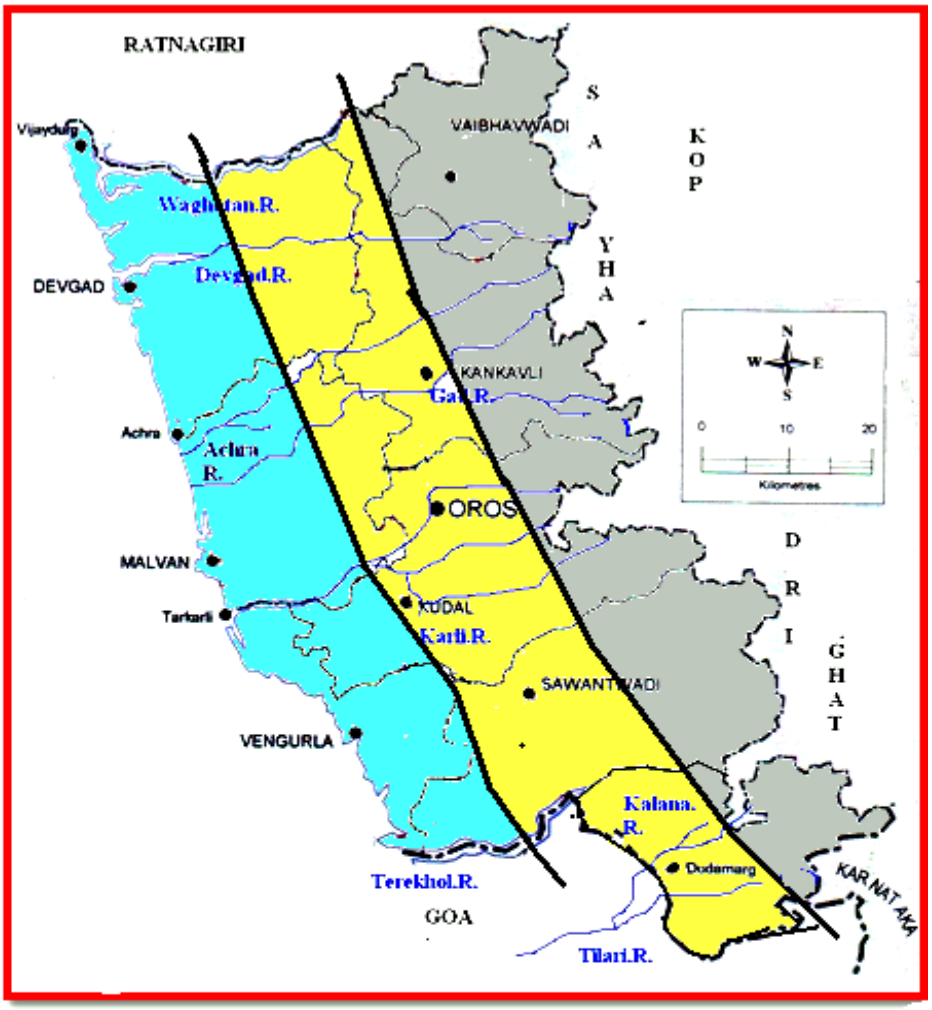
2.02.2 Topography :

Sindhudurg district falls in west coast plain and Ghat Region in Sub Tropical Zone and is predominantly agrarian economy. The small hilly ranges running the east-west and north-south, dividing the whole district in 6 rivers and 14 creeks. It creating some plateaus nearer the coastline. The various features which govern the physiography and landscape of the district.

The rocky basaltic slopes and plateaus, lateritic tracts and sandy beaches mostly governed by open landscape, while several forests trees especially teak, ain, kinjal, jamun, phanas, cashews, mangoes, coconut and betel nut trees

govern the tree scape along the water bodies of the region. The length of the district is 121km and width 40 to 60km from Sahyadri to Arabian Sea. It is observed that (figure no.3) shows that the geographical zones in the district divided into 3 division like as sahyadri mountain, valati and khalaty.

GEOGRAPHICAL ZONES OF THE DISTRICT



	coastline khalati
	slope of sahyadri mountain valati
	sahyadri mountain

Figure no. 2.3

a. Sahyadri Mountain : On the eastern side of the Sindhudurg district mostly steep slopes of Sahyadri ranges. The rivers flowing east to westward direction and join in the Arabian Sea. The hight of the east-west mountain ranges from the Sahyadri up to 45 to 50 mt .

b. Slopes of Sahyadri Mountains (valati) : Middle belt of the district locally known as valati. Konkan railway National highway main trade centers towns are located in the middle part of the district.

c. Coastline (Khalati) : It is also known as lower strip of the region. About 8 to 10 km from the sea coastline, because of the sandy soil cover and sea coast, supporting the horticulture and fishing activities in the district.

2.02.3 Climate :

Sindhudurg being a coastal district. Climate is generally moist and humid. Climate throughout the year is found humid and salty. Due to the proximity of the Arebiean Sea region has humid climate and relative humidity normally ranges between 63 percent to 88 percent. This range of humidity is useful for the fruit crops as like Mango, Cashewnut, Jackfruit, Kokam, Jambhool, Avala etc.

a) Rainfall :

The district occurs rainfall from South-west monsoon. 90 % rainfall occurs from June to September. On an average 101 days are the rainy days and heaviest is in the Ghat area. The rainfall increases rapidly from the coast towards the Western Ghats. The average rainfall of the district is 3000 to 4000

mm high but almost all the rainwater causes surface run off, due to undulating topography and lack of any water impounding major and medium structures.

b) Temperature :

There is not much fluctuation in the temperature. Along the coast the maximum temperature rarely goes beyond 38 degree Celsius but away from coast it reaches to 40 to 41 degree celsius. The minimum is 19 degree Celsius in the month of January. The temperature variations during the day and throughout the seasonsare not large. May is the hottest month. There are few places like as Phondaghat, Shivgad, Amboli etc. which are located on the hill stations of Sahyadri(Sharma).Climate information of the Sindhudurg district depicted in (Table no. 2.2).

Table no. 2.2

CLIMATE INFORMATION OF THE SINDHUDURG DISTRICT FROM 2001-2006

Year	**2001**		**2002**		**2003**	
Rainfall in mm.	Total Rainfall	Total Rainy Days	Total Rainfall	Total Rainy Days	Total Rainfall	Total Rainy Days
	2693.8	117	2600.1	90	2750.1	108
Temp.Oc	Mini.	Maxi	Mini.	Maxi	Mini.	Maxi
	12.8	36.7	13.2	36.5	13.1	36.2
Humidity %	Mini.	Maxi	Mini.	Maxi	Mini.	Maxi
	28	96	20	96	22	97
Year	**2004**		**2005**		**2006**	
Rainfall in mm.	Total Rainfall	Total Rainy Days	Total Rainfall	Total Rainy Days	Total Rainfall	Total Rainy Days
	2996.1	112	3554.9	99	3433.8	123

Temp.Oc	Mini.	Maxi	Mini.	Maxi	Mini.	Maxi
	14	39	12.5	38.8	15	38.2
Humidity %	Mini.	Maxi	Mini.	Maxi	Mini.	Maxi
	25	98	31	99	29	98

2.02.4 Drainage pattern :

There are 8 westwardly fast flowing rivers, which normally go dry during summer. Vaghotan, Devgad, Karli, Tillari, Khadi, Terekhol, Jog, Jagbudi are the major rivers in the district. All these rivers originate in Sahyadri and empties in Arabian Sea on the west. The basic feature of all these rivers is that they flow in rainy season and in summer these are almost dry. The basins in width, depth and length are short and not navigable. The Yalgat, Kalaval, Achara, Mochemand and Devgad creeks are navigable for small water vehicles and useful for fishery(Sharma, 2001). The figure no. 2.4 shows that rivers and talav/projects in the district.

DRAINAGE PATTERN IN THE DISTRICT

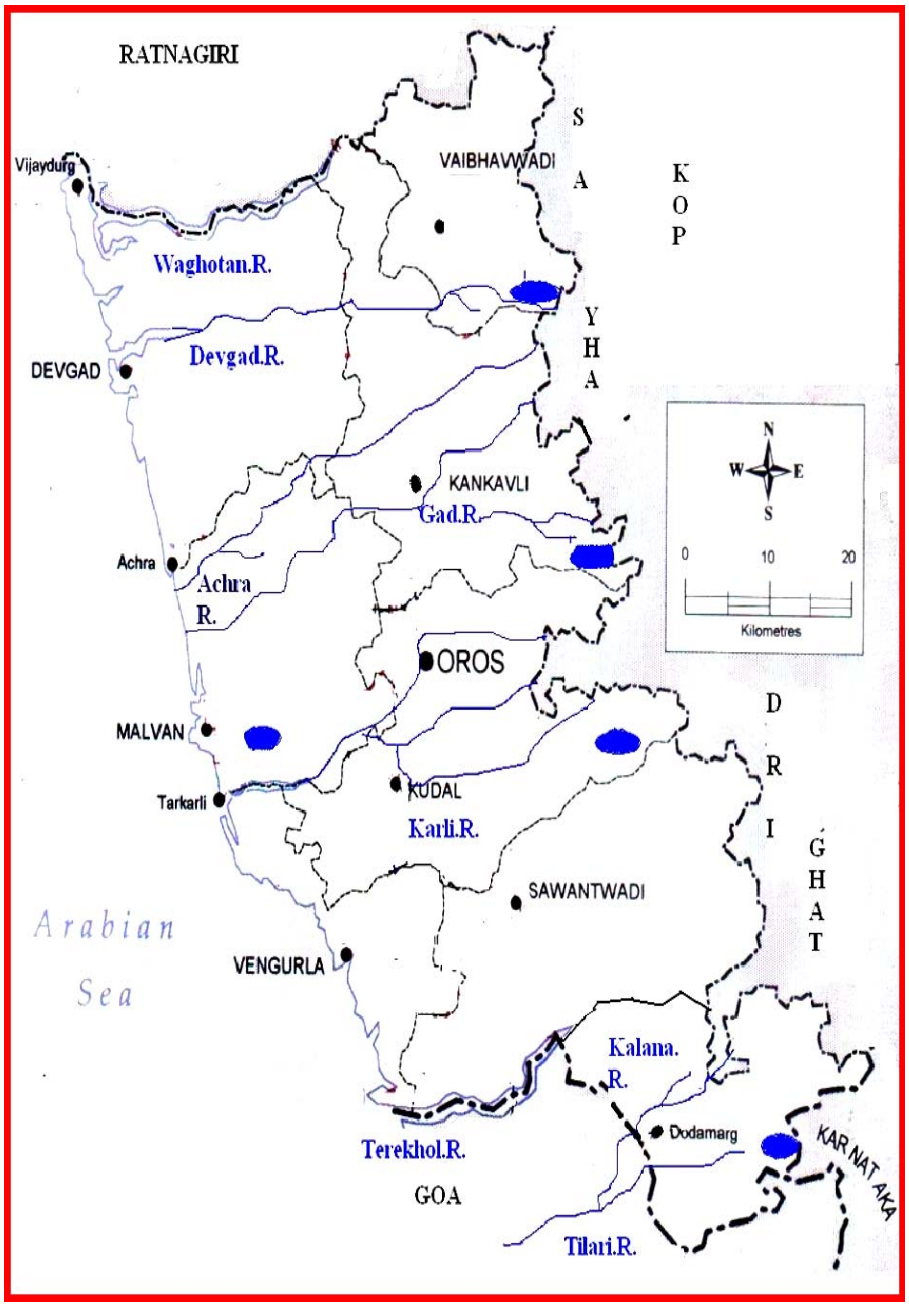


Figure no. 2.4

The Table no. 2.3 represents the length of the river, river basin, backwater and availability of water resources in hectare.

Table no. 2.3

RIVER BASIN AND AVAILABILITY OF WATER RESOURCES IN THE DISTRICT

Sr. No.	River Basin	Length of the river. km.	Backwater panlot area	Availability of water resources in hect. mt.
01	Vaghotan	95	903	140
02	Devgad	70	455	59
03	Aachra	53	275	50
04	Gad	84	890	154
05	Karli	92	753	117
06	Terekhol	69	621	118
07	Tilari	53	530	255

Source: Sindhudurgatil jalsampanti v sinchan Vikas-Jayanand Mathkar.

2.02.5 Soil :

The district has mainly lateritic, coastal alluvial and salty land. Most of the region is covered by lateritic soil. The lateritic soil is rich in organic matter and consequently in nitrogen content. It contains high percentage of iron and aluminum oxide. The lateritic soil is good for paddy, groundnut and horticultural crops.

The coastal alluvial soils are clay and loam. They have good fertility and support garden crops like as coconut, arecanut etc. The coastal alluvial land locally also known as khar or khajan land.

2.02.6 Irrigation :

Sindhudurg district fall in konkan area of which an important feature is that the terrain has comparatively high slope towards west from eastern side where runs Sahyadri. All the rivers of the district empties into Arabian Sea and almost all the rivers are dry in and after February. In rainy seasons these rivers have tremendous velocity. Due to rocky surface the rivers have less wide basins and length is also short.

Due to heavy rainfall the water flows fast with immense gravity carries the soil deposits without depositing along the banks. Considering all these factors not much was done as regards the damming of the water or building bandharas.

Soil conservation with the help of bunding, leveling of the land is being done by soil conservation dept of state government. The concentration is laid over the land which is utilized mainly for mangoes, cashew and rice. In the year of 1998-99 the area receiving facilities of irrigation is lessened than the previous year. It was 22368 hectares land in 1997-98 irrigated by surface means and 807 hectares by well.In1997-98, 38.29 % area of the total cultivated land was irrigated(Sharma, 2001).

Table no. 2.4

GROUND LEVEL ACTIVITY AND PHYSICAL UNITS IN THE DISTRICT

Sr.No.	Activity	2004-05	2005-06	2006-07
01	Dug Well	106	90	105
02	Bore Well	05	12	09
03	IP Sets	34	39	15
04	Drip sets	04	01	05
05	Sprinkler Sets	00	04	04
06	Lift Irrigation	01	01	02
07	MI Misc.	162	62	551

Source: Potential Linked Credit Plan(PLP) 2008-09 Sindhudurg district Maharashtra. pp 23

Table no, 2.5 shows that the small irrigation project and their capacity of irrigation in the district.

Table no. 2.5

SMALL IRRIGATION PROJECT AND CAPACITY OF IRRIGATION IN THE DISTRICT

Sr. No.	Name of the Project	Irrigation Capacity in hect.	Actual use of irrigation in hect.
1	Madkhol	180	70
2	Adeli	104	22
3	Pavshi	97	79
4	Vapholi	104	38
5	Shirval	200	60
6	Pulas	73	08
7	Chorgewadi	210	54
8	Talewadi	184	58
9	Nileli	100	47
10	Oros	180	18
11	Chafeli	68	22
12	Dabhaciwadi	164	12

13	Kudal Bandhara	235	35
14	Amboli	162	36
15	Sanam Temb	177	19
16	Karivde	110	08
17	Harkul	106	12
18	Shirgaon	70	32
19	Ozaram	65	07
20	Dhamapur	114	50
21	Tithavali	133	33
22	Lore	115	07
23	Poiep	---	---
Total		2951	727

Source-Sindhudurgatil jalsampanti v sinchan Vikas-Jayanand Mathkar.

2.02.7 Forest Cover :

The district has good potential for development of farm forestry and bamboo as most of the forest land is owned privately. The Ghat area is still forested and it lessens towards coast. The forest is characterized by (1)Bombay subtropical evergreen forest (2) South Indian tropical moist deciduous forest further divided into viz (i)forest having laterite red soil and (ii) forest with sandy looms. More than 200 species of trees, shrubs, climbers, bamboos and grasses are listed from this area. About 38600 hectares area is under forest. Land utilization of the district is as fallows.

Table no. 2.6

LAND UTILIZATION OF THE SINDHUDURG DISTRICT

Sr. No.	Land Utilization	In hectare.
A	Geographical area	503950
B	Net sown area	141388
C	Forest	38643
D	Fallow land	85901
E	Land not available for cultivation	143028
F	Cropping intensity	103%
G	Area brought under high yielding variety seeds	75500

Source: Potential Linked Credit Plan(PLP) 2008-09 Sindhudurg district Maharashtra.

2.03 Social profile of the District :

2.03.1 Introduction :

The study has been carried out the social profile of the district. The various components like population, health, culture, education, tourism, banking, transport and communication and others facilities determine the suitability of a particular area for certain enterprises in the area. Therefore, the social factors are the major hidden basic components of farmers and fruit processing industries in the district. Located on the southernmost fringe of Konkan and the last district of Maharashtra on the coast, the district is not much known for its history or any other aspect. It has a composite social structure as similar to that of remaining Konkan area. The majority of the people are farmers and there is hardly any industry of greater consequence that

provides employment to the locals. Fishing is a flourishing business because of coast and creek.

The society is composed of Hindu, Muslims and Christains and live with harmony. Marathi is the main language with local language called malvani language. Few if the people talk in Konkani language. Because of poverty and lack of development in the field of education people migrated on large scale more to Mumbai and less to Goa-Karnataka states and procured any kind of job for living.

2.03.2 Population :

The total geographical area of the district is 5207 sq.kms. The area is largely rural populated with 91 % of rural population of the total population. The density of the population is very low i.e.167 persons/sq.km. The proportion of female per thousand males is 1079.The percentage of literacy of the district is 80.30 %. The modern township of Sindhudurg Nagri is the headquarters of the district. The population of the district is 8, 68, 825 as per census of 2001.As compare to census of 1991 the growth of population is increased 3.55%.The following table shows that the growth of population in the district.

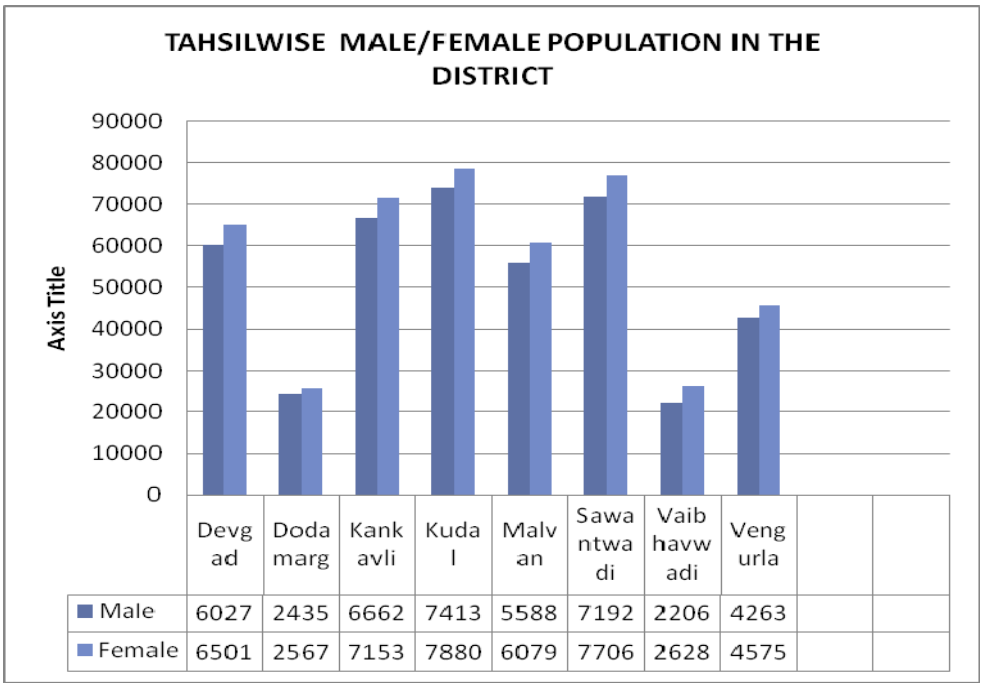
As per 2001 census the other tahsil wise detail demographic information (Table no.2.7) of the district is follows.

Table no. 2.7

DEMOGRAPHIC INFORMAITON OF THE SINDHUDURG DISTRICT

Sr. No.	Name of the Tahsil	Popu'n 2001cen	Male	Female
1	Devgad	125288	60272	65016
2	Dodamarg	50032	24353	25679
3	Kankavli	138137	66628	71539
4	Kudal	152939	74134	78805
5	Malvan	116682	55885	60797
6	Sawantwadi	148980	71920	77060
7	Vaibhavwadi	48350	22067	26283
8	Vengurla	88387	42631	45756
Total		868825	417890	450935

Source: Strategic Research and Extension Plan of Sindhudurg District Agricultural Technology Management Agency,Sindhudurg.



Graph no. 2.5

2.03.3 Culture :

The district Sindhudurg came into being on 1st May 1981 by bifurcating Ratnagiri district.The taluka's of Kankavli, Kudal, Sawantwadi, Vengurla, Malvan and Devgod of old Ratnagiri district, Vaibhavwadi of Kolhapur district have been brought together to form sindhudurg district. Sawantwadi taluka was rearranged and Dodamarg taluka was created.

The Sindhudurg district is bounded on the south by Karnatka and Goa States.The history of northwestern Karnataka which was the corridor for historical dynasties to enter into Kokan area.Goa area has equal import ace in the historical upheavals of southern Kokan.

During the Silahar rule temples have been built in this region. Second important cultural phase is of Peshwas when number of temples came up. People lived in tiled- roofed houses having sharp slopes due to heavy rainfall. Kiln burnt bricks and bricks obtained from lateritic stones are the main house building material besides wood for roof and other parts. The habitations are normally shaded with coconut, mangoes, jack, tamarind, trees.

Now a days cashew nut is grown on commercial basis besides condiments and spices especially black pepper.

The dresses varies to some extent according to caste but generally speaking similar to Maharashtra. Dhotar-Sadra is the comman dress for male and 9 yards/5yards sari with blouse for female. Female ornaments include earrings,bhikbalis, finger rings, kanthi and goph as necklace. Dietry and food

habits are different from Desh area. Rice, Nagli and fish are the staple food. Wheat is still less favoured (Sharma,2001).

2.03.4 Health :

State Govt., Zilla Parishad, Nagar Parishad and Grampanchyat have been provides health services in the district. Up to the end of 2006 there are 11 hospitals, 8maternity hospitals and 38 primary health centers runs by the various agencies. 121 Doctors and 435 nurses have been working in above hospitals. Other than private Doctors and Institutions are provides heath services to the society (Social and Economical report of Sindhudurg district 2005-06).

2.03.5 Education :

With the progress in education, educated middle class began to play an important role in the development of the district. Following the lead given by Pune and Mumbai private initiative was responsible for a considerable number of social and made their appearance.

The Patwardhan High school which was established in 1902, Malvan Education Society (1911), Karachi Shikshan Prasarak Mandal (1921) are the prominent education socities which have contributed in the social reformation. K.A.Keluskar, B.G.Kher, G.K.Gokhale, Rajaram Shastri, Ramkrishna Bhagvat, Lokmanya Bal Gangadhar Tilak and so many others who belong to this region and have contributed a lot in reforming the society by educating the peoples(Sharma, 2001).

The district is well above the average of population norm for state in respect of availability of both primary and secondary schools. The position regarding there are 7 ITI , 1 Govt. Polytechnic, 11 degree colleges, 5 B.ed colleges, 2 medical colleges, 1 engineering college, 1469Zilla Parishad and Private 49 primary schools and 206 secondary schools, Junior colleges 43 are dominant in the district. Percentage of literacy (Table no. 2.8) in the district is 80.52% to the total population.

Table no. 2.8

TAHSILWISE PERCENTAGE OF LITERACY IN SINDHUDURG DISTRICT

Sr. No.	Tahsils	Villages
01	Devgad	79.74 %
02	Dodamarg	76.55 %
03	Kankavli	78.56 %
04	Kudal	81.45 %
05	Malvan	83.52 %
06	Sawantwadi	81.71 %
07	Vaibhavwadi	68.82 %
08	Vengurla	85.27 %

Source: Social and economical report of Sindhudurg District 2005-2006 .

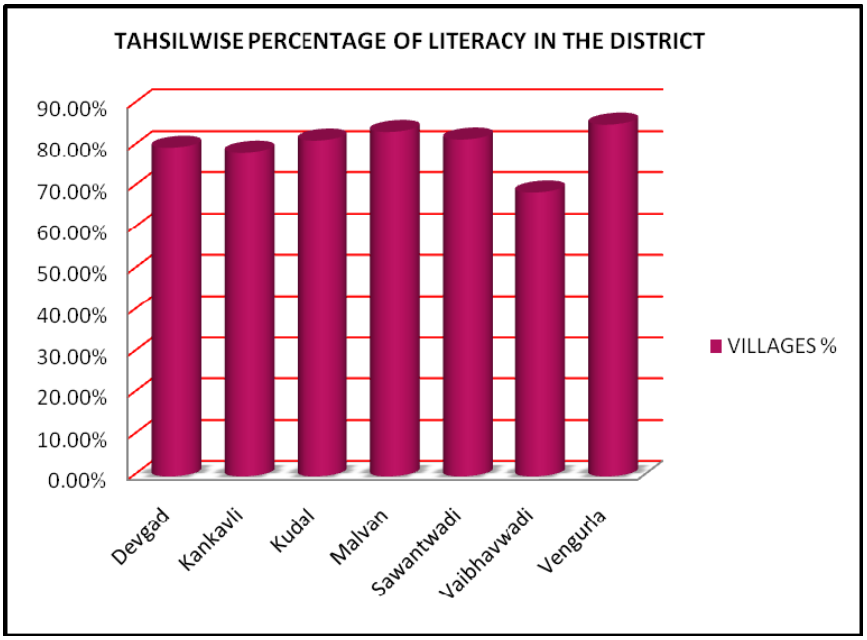


Figure no. 2.6

2.03.6 Tourism :

Due to the natural beauty, coastal beaches, ancient forts, old temples, specific culture and foods the govt. of Maharashtra declared that Sindhudurg district is tourism district. Thus the Sindhudurg district is a California of Maharashtra. Now a days National and International tourists are increasing in the district.

Sindhudurg is accessible by road on the NH 17 which passes through major towns of Kankavli, Kudal and Sawantwadi or by the picturesque journey on the Konkan Railway which stops Kankavli, Sindhudurgnagri, Kudal and Sawantwadi. With 7 railway stations, a 103 km. stretch of Konkan Railway line passes through this district. It has good road and rail links with Goa and Bombay.

Achara (Rameshwar temple), Amboli, Bahiravgad, Terelkjol creek, Bhagwatgad, Devagad and Kunkeshwar temple, Kunkeri, Mahadevgad, Sindhudurg fort, Ramdurg, Vijaydurg, Moti talav, Shivgad, Phondaghat, Sahyadri butterfly country, Flora and Fauna rich region of Sahyadri and other natural californiya attracted to the people. Major tourism centers in the district depicted in (figure no. 2.7).

TOURISM PLACES IN THE DISTRICT

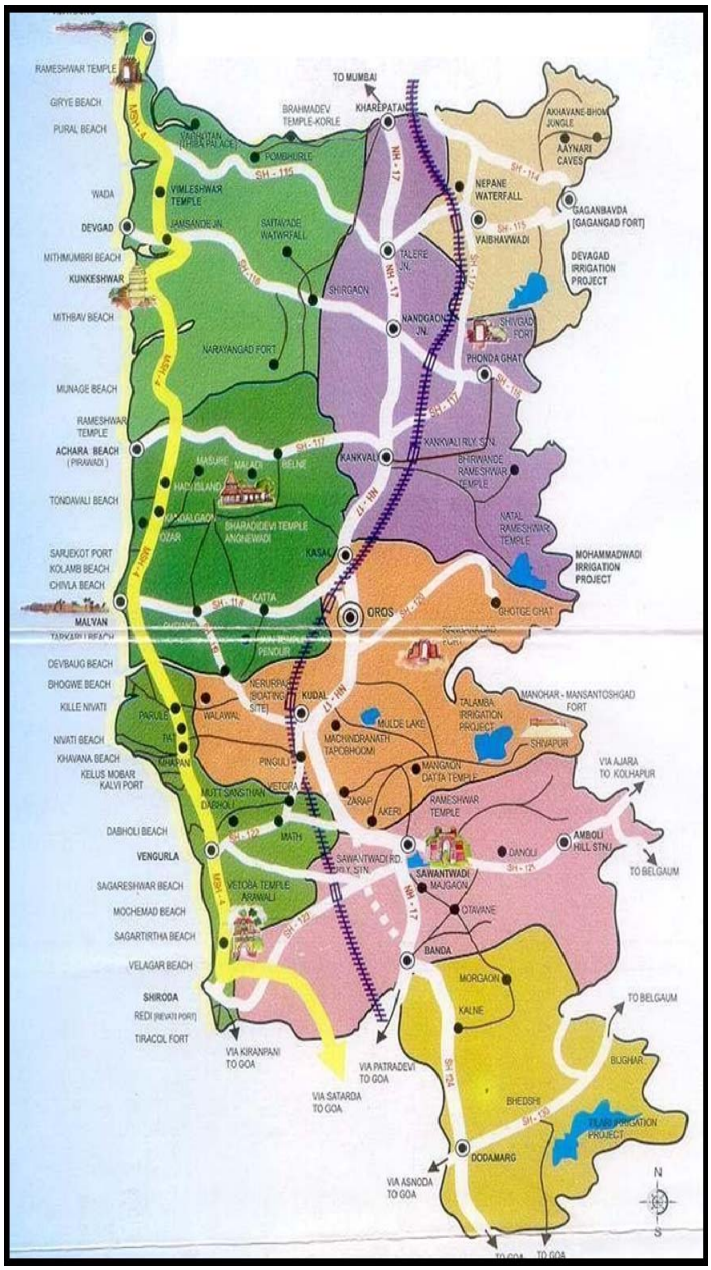


Fig no. 2.7

2.03.7 Banking :

The district has well spread banking network with 9 commercial banks, one Gramin Bank and a District Central Cooperative Bank operating with total 159 branches. There are 226 Primary Agriculture Cooperativ Societies (PACs).Crdit Ratio of the district was normally below 40% for all the banks has reached the level of 52% during the year 2006-07. Lendings under priority sector have been showing growth at an average rate of 23 % during the last three years.

2.03.8 Transport and communication :

The Konkan railway has become a key factor in the development of this region. Recently Konkan railway came in operation which has a Mumbai-Manglore route from Diva Junction of Thane district via Sawantwadi of Sindhudurg district further running through Goa state to Manglore in South Canara District of Karnataka. It is a broad-gauge single route passing along the coast.

This has reduced considerable distance and time for the commuters playing between Mumbai and South Indian regions. This route is proposed to be of double line. This railway is governed by Konkan Railway Corporation established in October 1990 and it has 800 crore Rs. Capital in which central government has 51% share and 49% of state government. Land was given by State Govt. free of cost. Konkan railway provides employment to 30000

employees and equally are benefited indirectly. From 20.01.1997 rail began in Sindhudurg district.

The length of konkan railway in this region is 103 kms, National High-way No 17 is 107 kms, total road length is 46 to 40kms, state highway 668kms,District roads 1473kms and villages connected by roads have been 743. The buses, trucks, tempos, and bullock carts are used for transportation.

Passengers and goods transport service is started by railway. Transport and communication are important in the development of the region. Transport network in the district were given in (Figure no. 2.8).

TRANSPORT NETWORK IN THE DISTRICT

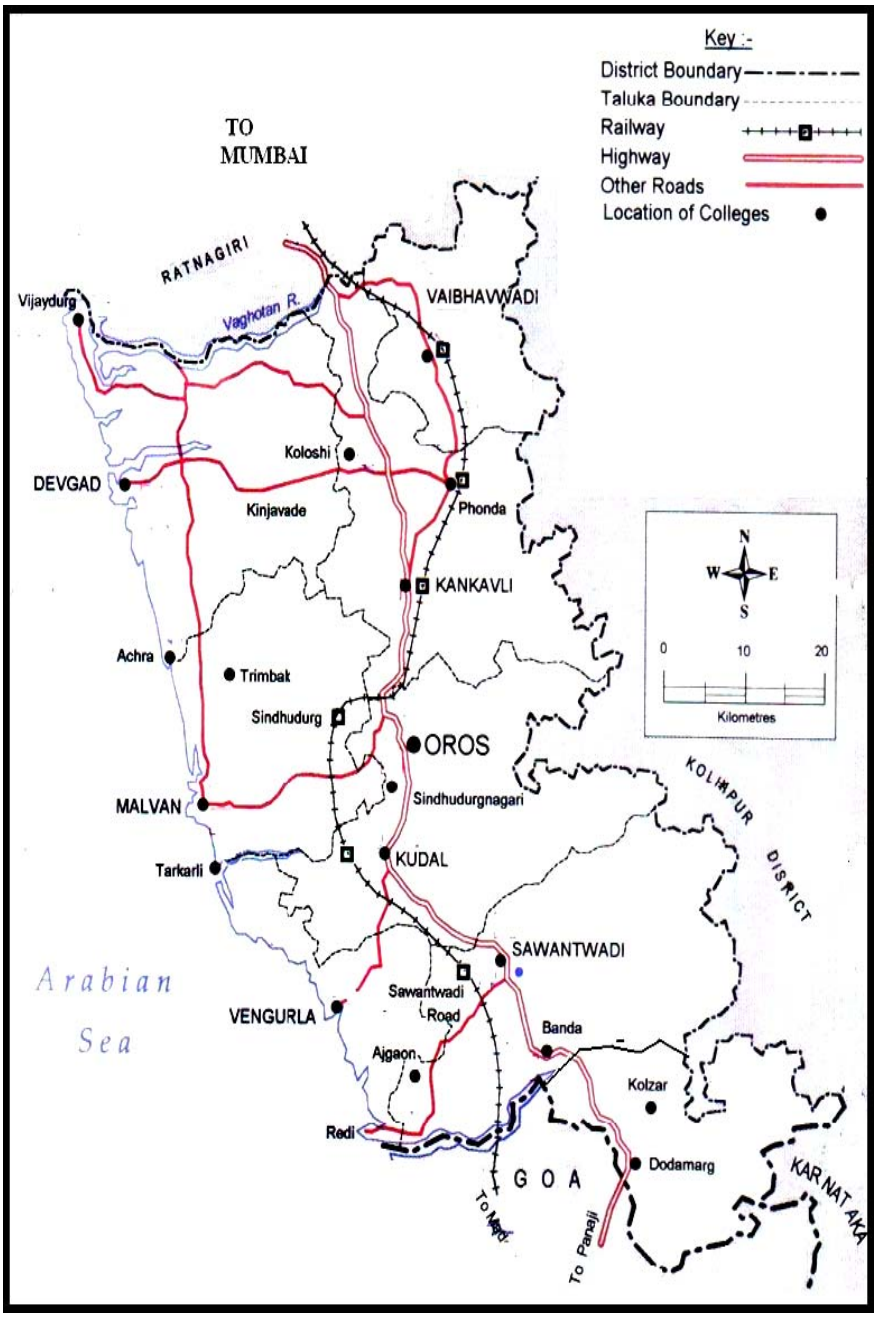


Fig no. 2.8

2.04 Economic profile of the district :

2.04.1 Introduction :

Cultivation, plantation, processing, fishing are the predominant traditional economic activities and fruit processing, pickle and papad are also new economic activities in the district. The major occupation is agriculture with paddy, Nachani & Kuleeth as field crops and Mango, Cashew, Kokam, Coconut, Arcanut as plantation/ horticulture crops. The area under horticulture crops is more than total area under field crops.

The district has huge resource base and enjoys distinction of producing best qualities of mango, cashew and kokam. Besides agriculture and horticulture, people are also engaged in agro/ fruit processing, forest based products, village and cottage industries and other service industries. During 2004-05 per capita income of the district was at Rs.28278/-as against State's per capita income of Rs.32170/-.The district is industrially backward and placed in D+ zone index by the State Govt (PLP,2008-09).

2.04.2 Agriculture: cropping pattern, workers :

Paddy is the main food grain crop with 91% of the area under kharif and 31.7% under Rabi is under its cultivation of the total cropped area. Of the total cropped area 88.7% of the area is under kharif crops. Groundnut is also taken on 4.2% of the total cropped area. Other food grain crops include Italian Millet (Nachani) with 3.6% area (mostly kharif) and Horse gram (Kulith) with 3.4% (Rabi) of area under cultivation.

About 80% of the paddy produced is for self-consumption purpose. Groundnut as well as Nachani is mostly consumed by farmers themselves.

Kulith, besides for self consumption, is also processed on homescale basis to make kulith pithi for market purpose. About18% of paddy is sold to local traders/ agent for further sale / use for poha making industry in Kolhapur and Belgaum.

The district is blessed with famous Alphanso variety of Mango, high yielding bigger nut varieties of Vengurle 4 & 7 in Cashew and also the single largest producer of local kokum variety which are major fruit crops suitable for processing. For Kokum only about 25 to 30% of fruits are processed on account of very short period of span of harvesting and absence of availability of proper harvesting devices/techniques.

About 60% of Jamun fruits are marketed as table fruits through traders/dealers and the rest wasted due to lack of processing arrangements/techniques at field level. Coconut is basically used for self-consumption purpose. Most of the other fruits like Jackfruit, Karavnda goes as waste on account of lack of awareness on processing/harvesting techniques. It is also observed that (Table no. 2.9) cropping pattern and production according to the types of crop.

Table no. 2.9

Cropping pattern and production in Sindhudurg district (2006-07)

Sr. No.	Type of Crops	Area sown in hectare	Annual production in MTs
Foodgrains			
01	Paddy	75000	217500
02	Kulith	3500	2200
Horticultural crops			
01	Mango	23283	62000
02	Cashew	40072	43400
03	Jamun	16000 (Trees)	3200
04	Coconut	16237(Lakh nuts)	1440
05	Kokum	1200	12500

Source: Potential Linked Credit Plan(PLP) 2008-09 Sindhudurg district Maharashtra.

2.04.3 Cashew cultivation :

Cashew was brought to East Africa and India by the early Portuguese setters more than 500 years ago. The cashew tree is hardly and drought resistant tree thriving in a variety of soil and climatic condition and was originally introduced into the coastal regions of East Africa and South West India mainly for the purpose of checking soil erosion. The main cashew growing states in India today are Kerala, Karnataka, Tamilnadu, Andhra Pradesh, Goa, Maharashtra, and Orissa.

Plate No. 1

1) Nature of Waste land use for cashew plantation

2) Cashew plantation of two years age (orchard)

3) Fully grown cashew plant

80 years ago cashew processing industry started in Goa state and Vengurla in Sindhudurg district. Now in cashew processing industry 3.50 lakh workers engaged in India. Maharashtra Govt. giving 100 % grants to the farmers for cashew cultivation from 1990.

Konkan Agricultural University creates new verities of cashew and provides to the farmers. Due to this cashew cultivation area is increasing in the district. Thus the cashew processing industry is dominant from ancient period.

Cashew plays an important role in Indian economy. India exports 127227 Metric tones cashew to foreign countries and gets 2006 crores rupees from it (Sakpal B.B.2004). Sable (1993) stated that the climatic zones and fruit crops of Maharashtra in horticulture (Table no.2.10)

Table no. 2.10

CLIMATIC ZONES AND FRUIT CROPS OF MAHARASHTRA

Sr.	Name of the Zone	Districts	Crops grown
1.	Warm coastal region (rainfall 200-250 inches) with humid climate	Sindhudurg, Ratnagiri, Raigad, Thane.	Mango, Cashewnut, Chiku, Banana, Pineapple, Coconut, Jackfruit, Arcanut.
2.	Warm coastal region partly dry and humid with 75-125 inches rainfall.	Parts of Kolhapur,Satara, Sangli, Nashik, Pune.	Mango, Banana, Chiku, Limes, Guava, Jackfruit.
3	Eastern Deccan region fairly dry and hot with 37-62 cm. rainfall	Talgaon, Dhule, Ahamadnagar, Solapur, Aurangabad, Beed, Osmanabad, east part of pune.	Mosambi, Limes, Guava, Papaya, Banana, Fig, Phalsa Pomegranate.

4.	Western Vidharba and Eastern Maharashtra (fairly hot with 50-75 cm. rainfall during monsoon)	Buldhana, Akola, parts of Yeotmal, Parbhani, Nanded, Aurangabad and parts of east Khandesh	Mango, Banana, Grapes, Mosambi, Santra, Custard Apple, guava, Fig, And Phalsa.
5.	North East region of vidharbha hot and dry with partly humid region with 75-100 cm rainfall	Amravati, Wardha, Nagpur, Bhandara, Chandrapur, parts of Akola.	Orange (Santra), Mango, Mosambi, Papaya, Guava, and Limes.

Source: Sable(1993) Horticulture .

The table no. 2.11 and 2.12 shows that cashew cultivation area, cashew production and productivity of cashew per hectare.

Table no. 2.11
STATEWISE CULTIVATION AREA OF CASHEW, PRODUCTION AND PRODUCTIVITY
As on 1998-99

State	Cultiv. area in 000 hect.	Prod'n. in 000 MT	Productivity in kg/hect.
Andrh Pradesh	127	80	630
Goa	53	20	380
Karnataka	89	40	480
Keral	122	130	1070
Maharashtra	119	85	710
Orissa	114	50	440
Tamilnadu	83	35	420

Source: Karale A, (2005)

Table no. 2.12

STATEWISE CULTIVATION AREA, PRODUCTION AND PRODUCTIVITY

As on 2002-03

State	Cultiv. area in 000 ha	Prod'n. in 000 MT	Productivity in kg/ha.
Andrh Pradesh	136	90	740
Goa	50	30	660
Karnataka	92	40	470
Keral	100	90	890
Maharashtra	148	110	1000
Orissa	120	70	810
Tamilnadu	92	50	570

Source: Bhandare S. B. (2005)

STATEWISE CULTIVATION AREA, PRODUCTION AND PRODUCTIVITY
As on 2002-03

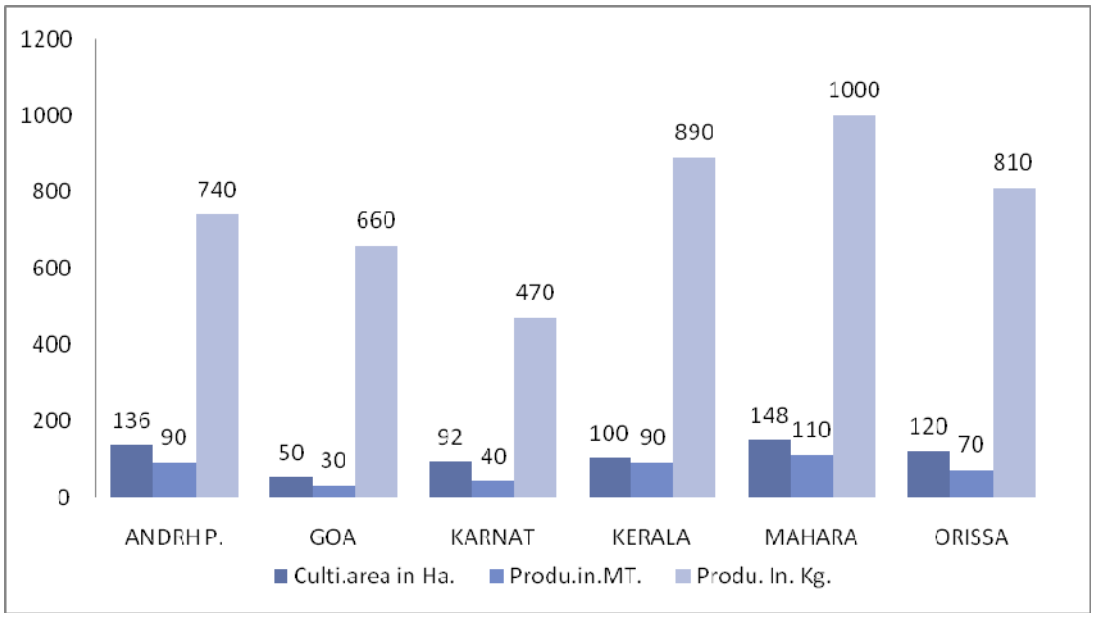


Figure no. 2.9

Table no. 2.13

AREA, PRODUCTION AND PRODUCTIVITY OF IMPORTANT COMMODITIES IN SINDHUDURG DISTRICT-1995

Sr. No.	Name of the commodity	Area in hect	Prod'n. in MT	Productivity in kg/hect
1	Rice	67800	169364	2498
2	Nagli	2600	2465	948
3	Groundnut	3100	5530	1784
4	Mango	9400	18142	1930
5	Cashewnut	34400	30616	890
6	Coconut	5900	4.60crore	52nuts tree

Table no. 2.14

AREA, PRODUCTION AND PRODUCTIVITY OF IMPORTANT COMMODITIES IN SINDHUDURG DISTRICT-2000

Sr. No.	Name of the commodity	Area in hect	Prod'n. in MT	Productivity in kg/hect
1	Rice	69000	173259	2511
2	Nagli	2800	3077	1099
3	Groundnut	3400	6759	1988
4	Mango	11800	25724	2180
5	Cashewnut	37800	37271	986
6	Coconut	6300	5.48crore	58nuts tree

Source: Strategic Research and Extension Plan of Sindhudurg District-Agricultural Technology Management Agency,Sindhudurg.

Table no. 2.15

AREA, PRODUCTION AND PRODUCTIVITY OF IMPORTANT COMMODITIES IN SINDHUDURG DISTRICT-2005

Sr. No.	Name of the commodity	Area in hect.	Prod'n. in MT	Productivity in kg/hect.
1	Rice	74400	196862	2646
2	Nagli	2900	3434	1184
3	Groundnut	3600	7952	2209
4	Mango	19100	47616	2493
5	Cashewnut	40000	43360	1084
6	Coconut	9800	9.56crore	65nuts tree

Source: Strategic Research and Extension Plan of Sindhudurg District-Agricultural Technology Management Agency ,Sindhudurg.

Hot and humid summers, pleasant winters and abundant rainfall alongwith lateritic coastal saline alluvial soil has made plantation and horticulture as the main traditional economic activity of the district.

Govt. of Maharashtra had launched Employment Guarantee Scheme (EGS) under Horticulture Development Programme in 1990-91 wherein cultivable wastelands and fallow lands have been brought under cultivation of horticulture crops like mango, coconut, cashew, kokum, jackfruit, sapota, bamboo and medicinal plants and spices like clove cinnamon, Black pepper etc as inter crops.

During the year 2006-07, 1398.75 ha. Of additional area has been brought under horticulture crops to 99983 ha. Which is more than the area covered under Kharif crops of food grains and pulses. 55.30 % of the total area under cultivation of fruit crops is coverd by cashew and 26.2 % under mango. The crop wise data in respect of major horticultural crops is as under (PLP,2008-09).

Table no. 2.16
HORTICULTURE CROPS AND CULTIVATION AREA IN SINDHUDURG DISTRICT
Position as on 31/03/2007

Sr. No.	Horticultural Crop	Area in hect.
01	Mango	26244
02	Cashew	55292
03	Coconut	16333
04	Kokum	158
05	Jack-fruit	146
06	Arcanut	824
07	Sapota	185
08	Spices	607

Source: Potential Linked Credit Plan(PLP) 2008-09 Sindhudurg district Maharashtra.

2.04.4 Livestock :

There is growing awareness among farmers that through Dairy development, Polutry farming & Goatry their income could be supplemented and agriculture operations could be sustained.

As compare to western Maharashtra in Sindhudurg district has very small account of livestock. The position of animals in the district as on 31/03/2007 is depicted in (Table no. 2.17).

Table no. 2.17

ANIMAL HUSBANDRY IN THE DISTRICT-31/03/2007

Sr. No.	Animals/ Livestock	Numbers
01	Plough Animals	157214
02	Dairy Animals	
	a.Cows b.Buffaloes	75871 89852
03	Sheep/Goat/Pigs	36326
04	Poultry Birds	747000

Source:- Potential Linked Credit Plan(PLP) 2008-09 Sindhudurg district Maharashtra.

2.04.5 Fishing:

The district has huge potential in view of 121 km coastline and 14 creeks. Construction of jetties, landing centers will facilitate intense marine fishing activities through bank credit. Fishermen's income could also be supplemented by encouraging group processing of low value fish catch

Fishery is main business in the area and fish is the staple food. Creeks, sea are the main sources but rivers are also helpful for fishing at certain extent. There are 25 producers cooperative societies of fishermen. There are large number fish species identified. From these Mushi, Sonmushi, Ranja, Waghali, Bijali, Chiral, Kanti, Tarli, Mandeli, Toak, Karli, Bombil,Shingala, Wam, Ghoda masa, Boi, Kamboda, Bangada, Surmai, Paplet, Rawas and Gui are more comman.

Out of total fish catch of 1647 MTs, around 90% is consumed locally (PLP,2008-09). There is one processing unit in private sector at Tarkarli which undertakes canning, salting of fish. One more unit with modern technologies and export orientation is coming up at Kudal to process sea products. There is good scope for processing of low value fish catch which goes as waste and many times thrown by fishermen back into sea. Small processing facilities upto 0.5 MT per day by group of fish farmers could be set up at the investment of about Rs.4 lakh per unit at about 5 to 6 places in coastal blocks of Vengurla, Malvan and Devgad The figure no 2.10 shows that the fishing coastline of the district and fishing field.

FISHING COASTLLINE IN THE DISTRICT

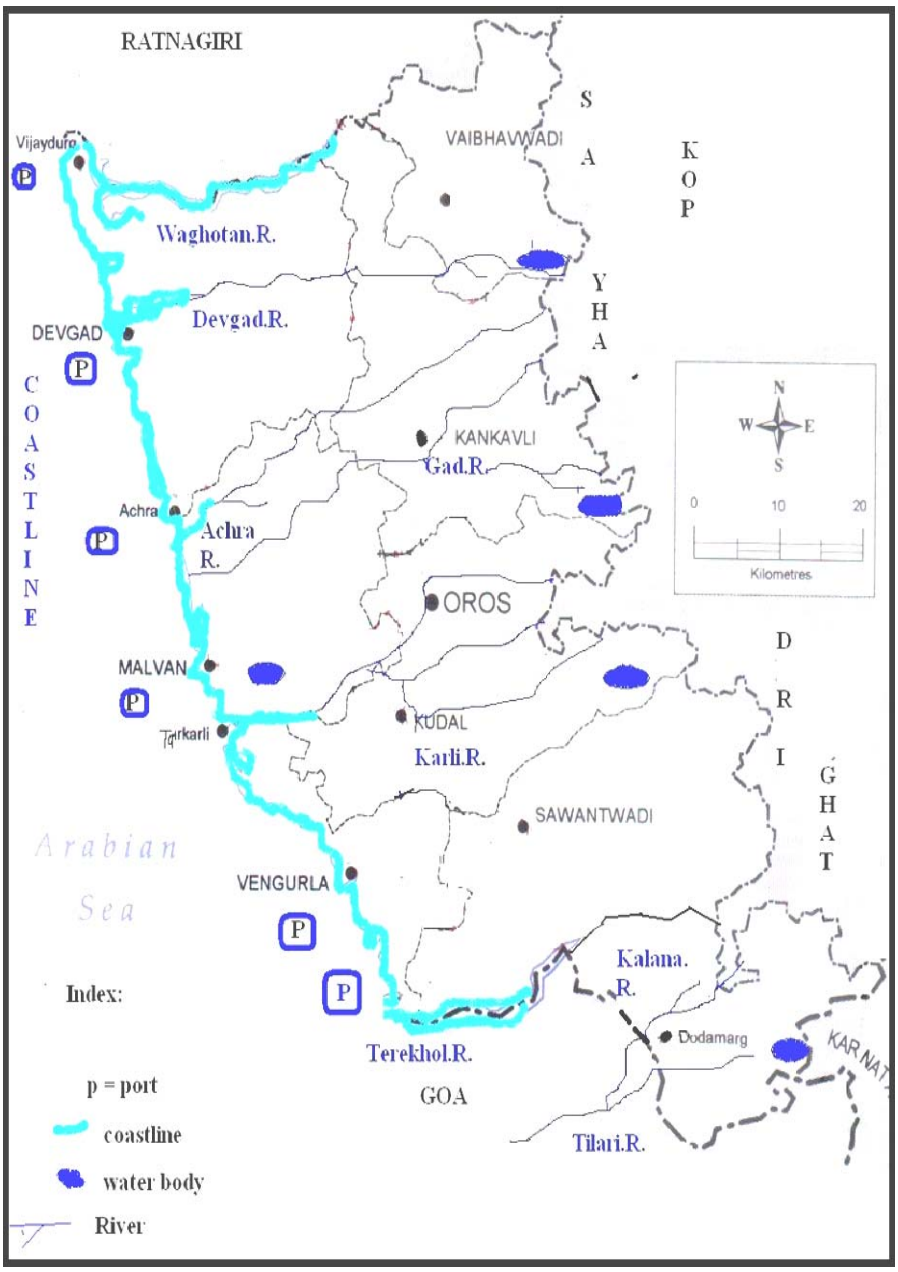


Figure no. 2.10

2.04.6 Industries :

The district is industrially backward and placed in D+ zone index by the State Government.

The district has huge resource base and enjoys distinction of producing best qualities of mango, cashew and kokam. Besides agriculture and horticulture, people are also engaged in agro/ fruit processing, forest based products, village and cottage industries and other service industries. 30-35 fruit processing industries are dominant in the district. Home scale and small scale cashew processing industries are started in the district. Iron and Steel industry runs by the Usha Ispat company at Reddy (Vengurla).It produces 1.74 lakh tone pig Iron per year. Mining industries are also dominant at Phondaghat Panchcroshi and Kudal places.

2.5 Résumé:

This chapter is devoted to give the socio-economic background information about the area under study. The study of background information necessary to understand the economic implications of the physical conditions under which production is carried out. The various factors like topography, location, climate, rainfall, soil, irrigation, marketing, and communication facilities decide the stability of particular enterprise in the area. Therefore a brief account of socio-economic conditions prevailing in the selected area is given so as to have better understanding of the region and the interpretation and implications of findings of the study. Therefore, the physiography, social and

economic factors are the major hidden basic components of farmers and fruit processing industries in the district.

Sindhudurg is the Konkan area of Maharashtra having stretch of land on the west coast of India, endowed with the beautiful seashore, picturesque Mountains and scenic natural beauty and known for tropical fruits like the world famous Alphonso mangoes, cashews, Jamuns etc. Sindhudurg district was earlier a part of the Ratnagiri district. For administrative convenience and industrial and agricultural development Ratnagiri district was divided into Ratnagiri and Sindhudurg with effect from 1st May,1981.Sindhudurg district now comprises of 8 tahsils of Sawantwadi, Kudal, Vengurla, Malvan, Devgad, Kankavli, Vaibhavwadi and Dodamarg.743 villages are situated in various tahsils of the district.

The study has been carried out the social profile of the district. The various components like population, health, culture, education, tourism, banking, transport and communication and others facilities determine the suitability of a particular area for certain enterprises in the area. Therefore, the social factors are the major hidden basic components of farmers and fruit processing industries in the district. Located on the southernmost fringe of Konkan and the last district of Maharashtra on the coast, the district is not much known for its history or any other aspect. It has a composite social structure as similar to that of remaining Konkan area. The majority of the people are farmers and there is hardly any industry of greater consequence that

provides employment to the locals. Fishing is a flourishing business because of coast and creek.

Konkan Agricultural University creates new verities of cashew and provides to the farmers. Due to this cashew cultivation area is increasing in the district. Thus the cashew processing industry is dominant from ancient period. The next chapter deals with distribution of cashewnut processing units.

CHAPTER III

DISTRIBUTION OF CASHEWNUT PROCESSING UNITS

3.01 Introduction :

The study has been carried out the distribution of cashew nut cultivation area. and cashew nut processing units in the district. The various components like establishment of the units, form of ownership, scale wise distribution of the processing units, technology for the processing, cashew and by products are the major components. During the last two decades, the scenario in rural and urban areas has significantly changed and it is having a major bearing on the existing farming systems. There are also new farming systems, innovations being integrated by the innovative farmers in their overall farming systems. It is well known that farmers not only have technological needs but other needs also namely inputs, credits, social marketing, facilitation for group activities, conflict resolution, community organization, etc. The public sector alone is not able to meet all these needs in an effective manner (SREP,)

During World War II, the cashew tree became highly prized as the source of a valuable oil drawn from the shell. The cashew tree has been cultivated for food and medicine for 400 years. Cashew have served nutritional, medicinal and wartime needs. More recently, they have been used in the manufacture of adhesives, resins and natural insecticides. International trade in raw cashew nuts has traditionally involved shipments from East Africa to India. India was the first country to built up a processing industry, but domestic production has long been insufficient to meet the requirements of the country's hundreds of small and medium-scale processing outlets. The imports from East Africa generally took place from December to May, which complemented the

national harvest from May through to July. Thus the Indian processors have been able to operate over a prolonged period without having to maintain large stores of raw nuts. Almost all of the world's raw cashew nuts are sent to India for processing, since India has an inexpensive labour force and does not produce adequate quantities of cashews to fulfill its domestic processing capacity. Approximately 25 to 40 percent of nuts processed in India originate in foreign countries. India also has a long tradition and good reputation as a high quality processor of cashew. A number of countries therefore prefer to export their raw nuts to India for processing rather than to process themselves and produce lower quality kernels (www.small scale cashew nut processing).

The cashew tree is evergreen. It grows up to 12 meters high and has a spread of 25 meters. Its extensive root system allows it to tolerate a wide range of moisture levels and soil types, although, commercial production is advisable only in well-drained Sandy loam or red soils. Cashew trees are most frequently found in coastal areas. The main commercial product of the cashew tree is the nut. In the main producing areas of East Africa and India,95% or more of the apple crop is not eaten, as the taste is not popular (www.ITD group).

3.02 History and origin of cashew :

The cultivated cashew is a low spreading ever green tree of the tropics. It is presumed that cashew was originally introduced into India mainly for checking soil erosion. But gradually it gained commercial importance and not it is one of the ten top foreign exchange earners. In the earlier years of cashew production India, the apple was considered valuable and it was only in

the beginning of the twentieth century that the cashew kernel, the cashew nut of commerce, found favor among the consumers. Small quantities of cashew kernels have been exported from India to USA even before the First World War.

The French, Portuguese and Dutch seafarers described cashew from Brazil in the sixteenth century and the first illustrative description of cashew was given by a French naturalist Thevet in 1558 A.D. Cashew was introduced to the Malabar Coast of India in the sixteenth century by the Spaniards, and probably served as a locus of dispersal to other centers in India and south east Asia. The Spaniard who have been aware of the use of cashew in medicine, foods and beverages, probably visualized the potential importance of this crop to India.

"Acaju" is the name given to cashew by the native Tapi Indians of Brazil and the French name "Acajou" is the nearest equivalent of the original. The Portuguese dropped the letter 'A' and "Acaju" became "Caju" in Portuguese. The Kashmiri, Panjabi, Hindi, Marathi and Gujarati lexicons in India also refer to the cashew as "Caju". It is probable that the use of kernel spread from Goa to Maharashtra, thence to Gujarat, Rajasthan, Punjab and Kashmir and other Hindi speaking areas. In Kerala is called "**Parangi Andi**" meaning foreign or "Portuguese nut". It is also known as "**Kasu Andi**" , "Kasu" meaning money and "Andi" the nut. In Tamil it is known as "**Mundiri**" indicating the position and shape of the nut. In Oriya it is known as "**Lanka Beeja**" indicating that cashew reached Orissa by sea from Sri Lanka.

The Bengalis know cashew as "**Hijli badam**" and Assamese refer to the nut as "**Caju Badam**". Thus, most of the names used in India are derived from the Portuguese "Caju" for cashew. This serves as a piece of evidence that the cashew originated in Brazil (Nambiar,1979).

When the price of the nuts is attractive it is not uncommon to see some cashew growers harvesting immature nuts, the apple of which has not even started developing, such nuts five shriveled kernels and also will be light in weight. In the absence of a market for cashew apple farmers do harvest nuts early causing loss both to themselves as well as to the processors. Some intelligent farmers harvest nuts from the fully ripened cashew apple or ripe fallen cashew apples, so these matured nuts give good quality bold kernels on processing it is profitable for both farmers and processors (Vaidehi,2000).

3.03 Historical Background of the District :

Sindhudurg District is the southern part of the greater tract famous for its long coast line and safe harbors' having basically agriculture oriented economy. It receives rainfall for about four months from June to September. It comprises of includes eight talukas. The district has a total geographical area of 5.03 lakh hectares and its total cultivable areas is 4.65 lakh hectares out of which net sown area is 1.39 lakh hectares. The area under irrigation is 0.42 lakh hectares. Table no. 3.1 shows that tahsil wise Cashew Cultivation Area in Sindhudurg District under Rojgar hami yojana from 1990-91 to 2007-2008 and tahsilwise percentage of cashew cultivation area in the district (Figure no.3.1).

Table no. 3.1

Tahsil wise Cashew Cultivation Area in Sindhudurg District
(under Rojgar hami yojana from 1990-91 to 2007-2008).

Tahsils	**Average Area under cashew cultivation from 1990 to 2008 (in Hectare)**	**Tahsil contribution are in %**
Deogad	1849.17	4.40 %
Dodamarg	1148.09	2.73 %
Kankavli	8569.91	20.36 %
Kudal	8081.94	19.20 %
Malvan	6070.52	14.42 %
Sawantwadi	10823.35	25.73 %
Vaibhavwadi	3754.81	8.93 %
Vengurla	1782.44	4.23 %
Total	42080.23	100 %

Source : Zilla Krishi Adhikshak office Sindhudurg.

TAHSILWISE PERCENTAGE OF CASHEW CULTIVATION IN THE DISTRICT

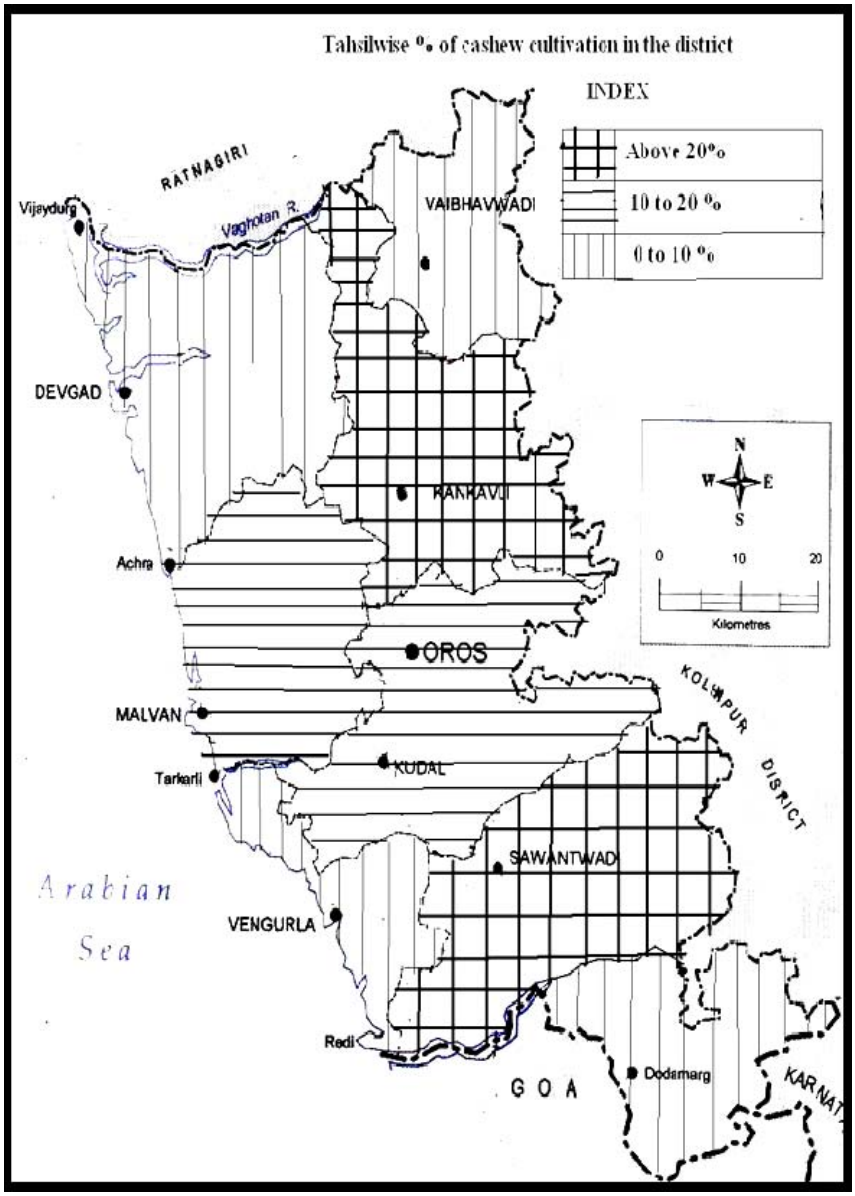


Fig. 3.1

The district is blessed with famous Alphanso variety of mango, high yielding bigger nut varirties of Vengurla 4 and 7 in cashew. Coconut is basically used for self consumption purpose. Most of the other fruits goes as waste on account of lack of awarness on processing and harvesting techniques. Basic trainig in cashew processing is provided by Ratnagiri Zilla Khadi Sangh (Gopuri Ashram Kankavli) and M/S Hedgewar Smriti Seva Prakhalpa (HSSP) Mangaon. As per the requirement M/S Sagar Engineering Works Kudal provided machineries to cashew processors (PLP,2008-09).

Table no. 3.2

TAHSIL WISE CASHEW CULTIVATION AREA IN SINDHUDURG DISTRICT (UNDER ROJGAR HAMI YOJANA FROM 1990-91 TO 2007-2008)

Tahsils	Kanka-vali	Vaibhav-wadi	Devgad	Malvan	Kudal	Vengurla	Sawant-wadi	Dodamarg
Years								
1990-91	410.96	105.22	36.75	142.39	205.74	87.79	336.24	-
1991-92	979.75	384.95	227.81	401.12	544.66	204.60	750.46	-
1992-93	950.48	408.14	197.41	543.59	741.24	256.98	1029.34	-
1993-94	833.78	533.42	122.15	577.89	711.50	207.10	1146.76	-
1994-95	400.14	249.38	122.28	364.73	704.23	112.53	755.88	-
1995-96	591.33	237.47	151.35	471.71	756.14	138	1053.88	-
1996-97	668.98	234.76	178.05	589.38	903.80	224.18	1276.86	-
1997-98	682.56	162.06	147.25	587.47	665.62	133.05	921.27	-
1998-99	587.57	284.12	106.79	500.62	727.43	57.93	940.41	-
1999-00	724.39	270.71	114.21	470.50	591.43	59.13	711.09	-
2000-01	789.15	300.95	133.75	520.89	657.72	100.42	602.56	434.18
2001-02	376.12	248.63	53.10	227.67	296.41	47.47	381.18	196.35
2002-03	103.60	97.83	27.98	71.45	72.46	9.17	53.18	59.20
2003-04	108.29	54.94	25.12	90.342	106.93	38.95	219.61	67.43
2004-05	69.28	36.60	29.08	63.18	80.07	10.51	93.30	89.13
2005-06	113.56	57.47	37.50	124.23	91.11	28.46	210.98	116.90
2006-07	113.24	42.65	46.67	165.67	122.30	25.72	165.99	99.33
2007-08	66.23	45.51	41.92	157.55	113.15	40.45	174.27	87.57

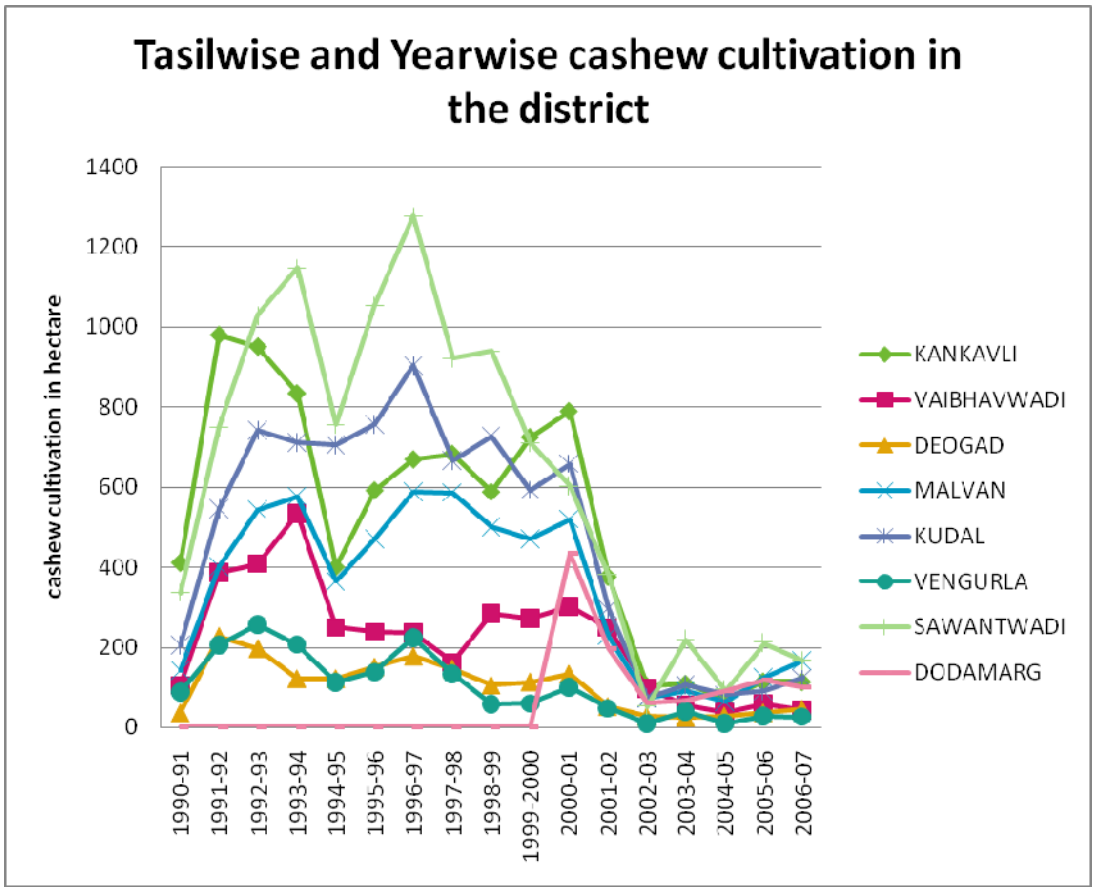

Tasilwise and Yearwise cashew cultivation in the district
cashew cultivation in hectare
1400
1200
1000
800
600
400
200
0
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999 2000
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
KANKAVLI
VAIBHAVWADI
DEOGAD
MALVAN
KUDAL
VENGURLA
SAWANTWADI
DODAMARG

Figure no. 3.2

Sindhudurg District enjoys warm and humid climate throughout the year. The year can be divided into 3 seasons. Winter season is from November to February, March to May Summer season and Kharif season is from June to October. Most of the rainfall received during the south west monsoon season in from June to October. The district is a land of paddy, Cashew and Mango. The major crops of the district are Cereals, Pulses, Oilseeds, Fruits and Vegetables are grown in the district. During the last fifteen years large area is being brought under perennial horticultural crops through employment guarantee scheme. Thus the traditional ranted agricultural land are being brought under more remunerative Agri + Horticulture and Paddy + Vegetable systems.

Table no. 3.3
TREND OF CASHEW CULTIVATION IN THE DISTRICT

Sr .No.	Year	Planned area (hectare)	Actual area (hectare)	x	y	xy	X2
1	1990-91	2871.00	3308.06	-7.5	33	-247.5	56.25
2	1991-92	6454.00	6272.75	-6.5	62	-403	42.25
3	1992-93	5900.00	6322.55	-5.5	63	-346.5	30.25
4	1993-94	6100.00	6376.07	-4.5	63	-283.5	20.25
5	1994-95	6000.00	4566.64	-3.5	45	-157.5	12.25
6	1995-96	7000.00	4909.66	-2.5	49	-122.5	6.25
7	1996-97	5100.00	5681.59	-1.5	56	-84	2.25
8	1997-98	6645.00	4752.18	-0.5	47	-23.75	0.25
9	1998-99	4658.00	4946.64	0.5	49	24.5	0.25
10	1999-00	4686.00	4627.69	1.5	46	69	2.25
11	2000-01	4765.00	4955.19	2.5	49	122.5	6.25
12	2001-02	3900.00	2860.57	3.5	28	98	12.25
13	2002-03	1550.00	959.69	4.5	09	40.5	20.25
14	2003-04	1500.00	1342.24	5.5	13	71.5	30.25
15	2004-05	1477.00	1147.21	6.5	11	71.5	42.25
16	2005-06	1405.00	1345.60	7.5	13	97.5	56.25
	Total	70011.00	64366.33	0	636	-1073	340

$$b = \frac{n\Sigma xy - \Sigma x\,\Sigma y}{n\,\Sigma x2 - (\Sigma X)2}$$

$$= \frac{16 \times (-1073) - 0 \times 636}{16 \times 340 - (0)2}$$

$$= \frac{-17168}{5440}$$

$$b = -315$$

If $x = x$ $y = y$

Y = a + b X x

39.75 = a + (-3.15) X 7.5

39.75 + 3.15 X 7.5 = a

a = 39.75 + 3.15 X 7.5

a = 298.12

y = a + b x for

1990-91 = 63.37 + (-3.15) x 0 =	63.37
1991-92 = 63.37 + (-3.15) x 1 =	60.22
1992-93 = 63.37 + (-3.15) x 2 =	57.07
1993-94 = 63.37 + (-3.15) x 3 =	53.92
1994-95 = 63.37 + (-3.15) x 4 =	50.77
1995-96 = 63.37 + (-3.15) x 5 =	47.62
1996-97 = 63.37 + (-3.15) x 6 =	44.47
1997-98 = 63.37 + (-3.15) x 7 =	41.32
1998-99 = 63.37 + (-3.15) x 8 =	38.17
1999-00 = 63.37 + (-3.15) x 9 =	35.02
2000-01 = 63.37 + (-3.15) x 10 =	31.87
2001-02 = 63.37 + (-3.15) x 11 =	28.72
2002-03 = 63.37 + (-3.15) x 12 =	25.27
2003-04 = 63.37 + (-3.15) x 13 =	22.42
2004-05 = 63.37 + (-3.15) x 14 =	19.27
2005-06 = 63.37 + (-3.15) x 15 =	16.12

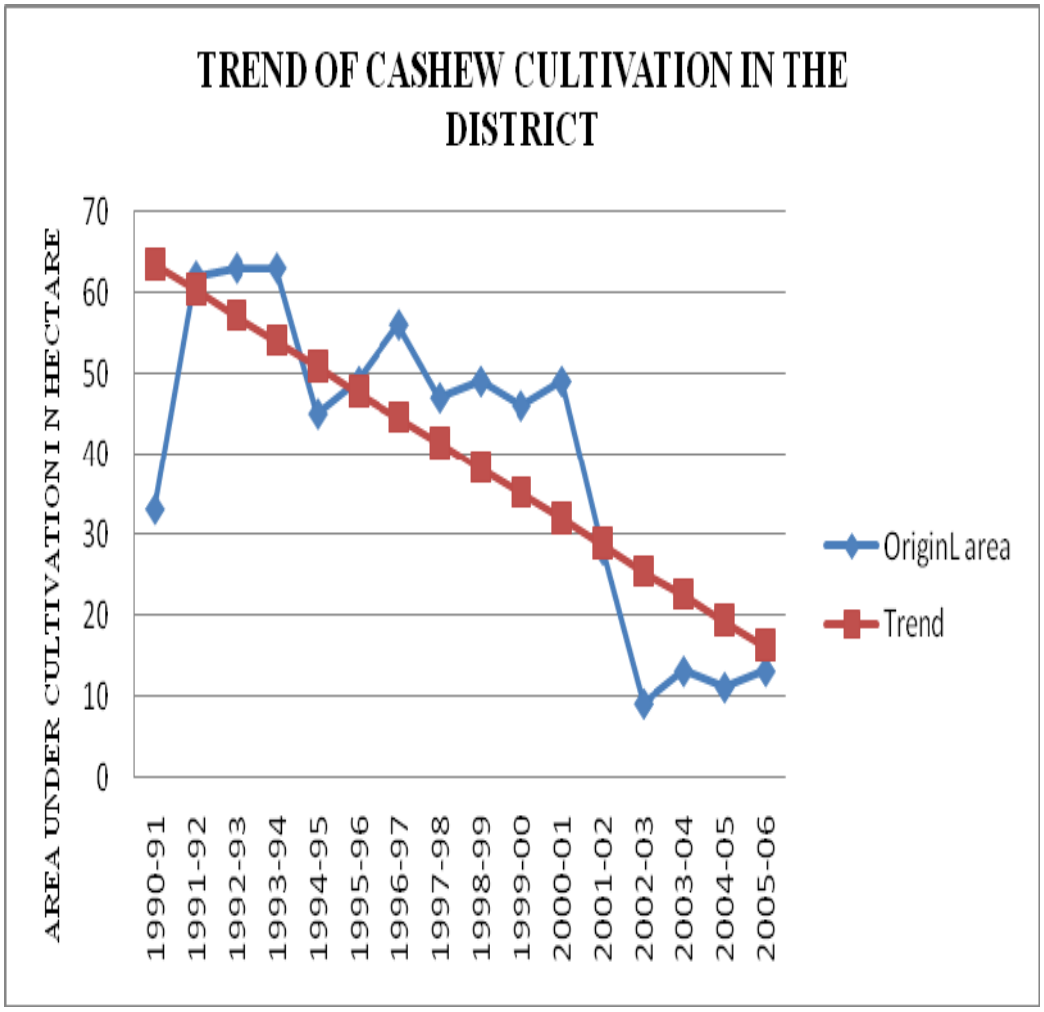

TREND OF CASHEW CULTIVATION IN THE DISTRICT
AREA UNDER CULTIVATION I N HECTARE
70
60
50
40
30
20
10
0
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
OriginL area
Trend

Figure No. 3.3

The value of slope is negative. This means that the trend is negative. Field inquiry has suggested that downward trend of area under cashewnut cultivation in mainly caused due to the fact that farmers are not able to receive the subsidy, This may be due to non availability of land for cultivation. However, it may be noted here that cashewnut cultivation has no competition with other horticultural crops as it has no specific constraints of soils.

3.04 Cashew and by products :

Over the last two decades, increasing concerns about health risks related to diets have had significant impacts on food consumption patterns in the USA and Europe. The desire to improve diets in general and nutrient intake in particular and the accompanying difficulties have received much attention among economists, nutritionists, health professionals, food producers and policy makers.

Cashew is grown both for its fruit (cashew apple) as well as for its nuts, mainly for the latter. The crop is grown chiefly in peninsular India, particularly along the coast. There are very few regular plantations of this crop. Cashew cannot tolerate the severe summers or winters of northern India. Even in the south, it does not grow satisfactorily at elevations higher than 300mt.It is not very exacting in soil requirements, as it grows even in very gravelly soils. However, it needs a free draining soil. It grows in areas having rainfall varying from 50 to 400 cm. Continued adequate soil moisture is , however, necessary for the success of a cashew plantation. There are no distinct varieties of cashew

and it exhibits a marked variation in fruit and nut characters when grown from seed. Some of the superior variants can be multiplied or perpetuated through vegetative propagation (Sharma R.P,2004).

a. Varieties of Cashew in India :

Selection of suitable cashew varieties for the specific region and appropriate package of practices determines the final yield. More than 30 varieties which are having exportable grade of cashew kernels are released from different research institutes in India and details are furnished

(Table no.3.4).

Table no. 3.4

NOMINATED MODERN VARIETIES OF CASHEW FOR VARIOUS STATES

Sr. No.	States	Nominated varieties of cashew
01.	Karnataka	Selection-1, Selection-2, Ullal-1, Ullal-2, Ullal-3, UN-50, VRI-1, Vengurla-1,Vengurla-4
02.	Keral	Madakattar-1, Madakattar-2, K-22-1, Dana Priyanka
03.	Maharashtra and Goa	Vengurla-1, Vengera-4, Vengurla-6, Vengurla-7, Vengurla-8
04.	Tamilnadu	VRI-1, VRI-2,VRI-3
05.	Andhra Pradesh	BPP-4, BPP-6, BPP-8, VRI-2
06.	Orissa	VRI-2, Bhuvneshwar-1
07.	West Bengal	Zargram-1
08.	Madhya Pradesh	No.40, Vengurla-4

Source: Kaju Lagwad v Prakriya Udhog, Dr. Shivajirao Thombare, Krishidoot Prakashan-Pune,2005.

Plate no. 2

SOME VARIRTIES OF CASHEW IN INDIA

Ullal

UN50

Vengurla 4

Vengurla 7

Vrid 3

Priyanka.

Bbp 8

Mada

Table no. 3.5

Modern varieties of Cashew and their significances
(produced by regional horticulture research center vengurla)

Sr. No.	Variety	Year	Average Yield Kg/tree	Maxi. Yield Kg/tree	Average Nut wt.gm	Shelling %	Export grade
01	Vengurla 1	1974	15.47	20.35	6.25	31	240
02	Vengurla 2	1979	23.10	45.22	4.35	32	320
03	Vengurla 3	1982	16.66	23.58	9.9	27	210
04	Vengurla 4	1982	19.08	27.34	7.69	31	210
05	Vengurla 5	1984	25.06	31.26	4.54	30	210
06	Vengurla 6	1492	17	269.28	7.90	28	320
07	Vengurla 7	1996	14.94	33.50	10	30.5	210
08	Vengurla 8	2001	16.5	-	11.5	28	180

Source: Kaju Lagwad v Prakriya Udhog, Dr.Shivajirao Thombare, Krishidoot Prakashan-Pune,2005.

b. Cashew apple :

Harvesting is generally done by collecting the nuts from the fallen fruits, by hand picking and with a long bamboo pole to which a hook is fitted at the tip. No fruit harvesting devices sere reported for cashew in the literature.

Harvesting and collection of nuts is done almost every day. Harvesting of cashew crop is not done at a time because from flowering to harvest nearly 2.5 to 3 months time is required since flowering occurs in two to three waves harvesting of fruits and nuts also varies. The duration of the harvest extends from 45 to 60 days, April-May is the peek season in and around Bangalore.

Plate No.3

7) Cashew plantation

6) Flowering and fruiting stage

5) Separating Cashew nut from cashew apple.

In other parts of the country duration of the harvest is slightly more extending from 45 to 70 days.

Besides the nut, tree gives apple shaped swollen peduncle to which the nut is attached. This false fruit is called cashew apple which is fleshy, juicy, sweet with a pleasant flavor and edible in nature. Ripe cashew apples are eaten as such or sprinkled with salt and sugar, otherwise it gives throat irritation due to its higher tannin content. The apple also posses keeping quality, undergo fermentation with in 24 hours of harvesting.

Cashew apple is 8 to 10 times heavier than nut and its yield is 8 to 10 times more than the nut. Roughly one tone of cashew nut yields 5 tones of cashew apple. Based on this estimation our annual production of cashew apples is about 18,00,000 mt. However most of the produce goes as waste.

However, only 10 to 15 % of the fruits are used to produce country mode liquor called Cashew Fenny in Goa. The fruit wastage is mainly due to its disliking qualities such as astringency and acrid principles since the fruits are rich in tannins (0.33% or 60 to 382.5 mg/100 ml) it cause tongue and throat irritation after eating. The fruits can be made suitable for consumption by removing the undesirable tannins and value added products listed in following chart.

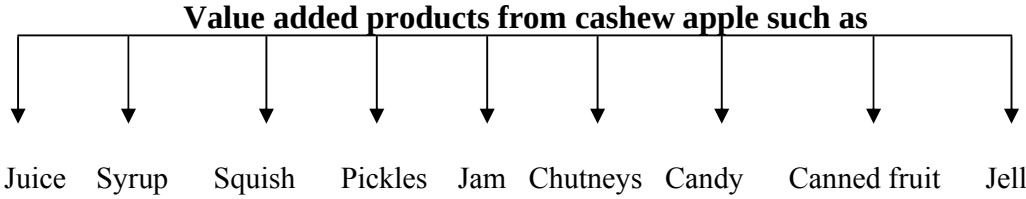


Figure No. 3.4

The wastage of this rich nutritious cashew apple is a great economic loss. We cannot afford to waste such a valuable fruit. In addition to this, development of processing techniques could generate additional income to the farmers and to our economy as well as employment opportunities for the rural youth (Vaidehi,2000).

Cashew apple, a product which is abundantly available in the country every year and much of which is wasted, could be biofuel that could be effectively used for the production of ethanol. Dr. M. Abdul Salam, Professor and Chairman, Dept. of Agronomy, Kerala Agriculture University, Vellayani, Kerala. Who has done extensive research on cashew, both in developing high yielding varieties and various products from cashew apple, said that from 40.11 lakh tones of cashew apple, there was a potential to produce 3.21 lakh tones of ethanol. “It may be possible to utilize at a least 50 percent of cashew apple generated in the country which can yield about 1.60 lakh tones of ethanol”, he said. Realising the great significance of cashew apple in the production of bio-fuel, the governments of cashew growing states need to initiate appropriate

action to utilize this resource in a big way, as they have larger area under cashew (Cashew bulletin,2007).

c. Cashew nut :

Most fruits contain their seeds with in the pulp or fleshy part of the fruit. This is not so with the cashew. The nut is on the outside of the pulp and is located at the distil end of the fruit, the point furthest away from its attachment to the stem. This usual location of the nut gives the fruit on interesting and unique appearance.

Cashewnut is generally kidney shaped with a fibrous notch, it has a mean size of 30mm long x22mm wide x17mm thick. It corresponds to edible kernel which is covered by areddish brown skin called testa and a shell. The kernel which fits tightly into the shell has a mean size of about 24mm long x 16mm wide x 12mm thick which indicates fairly uniform shell thickness of about 3mm(Vaidehi,2000).It is also observed that (Table no 3.6) that, gradation of cashew kernel, according to the trade name total numbers of cashew kernel in one pound (484 gm).

Plate No.4

8) Cashew nut in Godown

9) Sun drying

10) Dry Cashew nut

Table no. 3.6
GRADATION /SPECIFICATIONS OF CASHEW KERNEL

Sr. No.	Grade	Trade Name	Total numbers of cashew kernel in one pound (484 gms)
01.	W-180	White Wholes	170-180
02.	W-210	White Wholes	200-210
03.	W-240	White Wholes	220-240*
04.	W-280	White Wholes	260-280*
05.	W-320	White Wholes	300-320*
06.	W-400	White Wholes	350-400*
07.	W-450	White Wholes	400-450*
08.	W-500	White Wholes	450-500
09.	SW-180	Scorched wholes	170-180
10.	SW-210	Scorched wholes	200-210
11.	SW-240	Scorched wholes	220-240
12.	SW-280	Scorched wholes	260-280
13.	SW-320	Scorched wholes	300-320*
14.	SW-400	Scorched wholes	350-400*
15.	SW-450	Scorched wholes	400-450*
16.	SW-500	Scorched wholes	450-500*
17.	SSW	Scorched wholes seconds	N.A.
18.	DW	Desert wholes	N.A.
19.	R	Butts	N.A.
20.	S	Splits	N.A.
21.	DWP	Large white pieces	N.A.
22.	SWP	Small white pieces	N.A.
23.	BB	Baby bites	N.A.
24.	SB	Scorched butts	N.A.
25.	SS	Scorched splits	N.A.
26.	SP	Scorched pieces	N.A.
27.	SSP	Scorched small pieces	N.A.

*Available in the study area

Source: Udhojak November 2005, and Gopuri Asharam Workshop,2004.

3.05 Technology for processing :

Cashew nut processing is generally done on a home scale and factory scale. In the home scale the dried nuts are burnt in an open fire and hand shelled. In this method maximum over burnt and chard kernels are recovered and the valuable cashew nut shell liquid is wasted completely.

The nut are graded into three or more groups and the graded nut are conditioned to about 16 per cent moisture by socking or spraying water. Then the nuts are roasted either by drum, or oil bath or steam roasting methods.

3.05.1Processing of raw nuts at factories :

The nuts which are required to be processed at factory should be dried again for 1 to 2 days to reduce and maintain the moisture level of 7 to 8 percent. Processing of cashew nuts can be defined as the recovery of edible meat portion the kernel from raw nuts, by manual/mechanical means.

In Maharashtra and Sindhudurg district, the processing is mostly manual. The process is highly labour intensive and the work force consists mainly of women. It consists of moisture conditioning roasting, shelling, drying, peeling, grading and packing.

a. Roasting :

Roasting is designed to make the shell brittle. This is achieved effectively by a moisture absorption step preceding the roasting. The raw nuts

Plate No. 5

13) Steam Process

12) By product CSNL from cashew waste

11) Machine grading of Cashew Kernel

are sprinkled with water and allowed to remain in moist condition for 24 to 48 hrs. This step is known as conditioning. The optimum moisture level at the end of conditioning is reported to be 15 to 25%. Two important points to be taken care of during conditioning are (i) the water should not seep through the brown testa and (ii) the water should be free from iron contaminations. Iron contamination in the water can interact with polyphenolic materials of testa and the resultant bluish –black complex may give patches on the white kernel.

The earliest process was the pan roasting wherein the nuts are heated on a metal pan over an open fire. Due to the heat and slight charring the shells become brittle. The pan roasting is not followed in organized sectors of the industries. The three important methods of processing not adopted are (a) Drum roasting and (b) Oil bath roasting (c) Steam roasting.

i. Drum roasting :

The nuts are fed into a rotating red-hot drum, which ignites the shell portion of the nut and the ignition starts. The drum maintains its temperature because of the burning of the oil oozing out of the nuts. The drum is kept in rotation by hand for about 2 to 4 minutes. The roasted nuts which are still burning are covered with wood ash to absorb the oil on the surface. The rate of shelling and the outturn of whole kernels are very high in this method. However, the main disadvantage is the loss of CNSL which has very good export potential.

In addition there will be considerable heat and acrid fumes in the vicinity of this operation.

ii. Steam roasting :

In conditioned nuts are steam cooked in a specially built steam cooker at about 120 to 140 ibs/sq inch pressure for 8 to 10 minutes. In this process the cashew nut shell liquid comes out and gets collected in the cooker. The oil is separately removed and cooked nuts have been air dried and shelled by hand cum leg operated machine. In this method quality white whole kernel recovery is 80 to 90 percent and the valuable oil (CNSL) is recovered completely**(No).A general comparison of the above methods would show the oil bath method and steam roasting systems require more initial investment and higer maintenance costs, the drum roasting method being the cheapest. From the point of view of environmental pollution the safest is the steam roasting method.

iii. Oil bath roasting :

The conditioned raw nuts are passed for 1 to 3 minutes through a bath of heated cashewnut shell oil maintained at a temperature of 190 to 200 oc by means of screw or belt conveyer. The vessel is embedded in brick work and heated by a furnace which uses spent shells as fuel. During the roasting, the shell gets heated and cell walls get separated releasing oil into bath. As the level rises, the oil is recovered by continuous overflow arrangement. The roasted nuts are then conveyed into a centrifuge. The residual oil adhering to

the surface of the nuts is removed by centrifuging. The roasted nuts are mixed with wood ash and sent for shelling. This method is fairly automatic, and the technique followed in different factories varies to some extent with regard to temperature and time of roasting.

In addition to the above two methods, in some places where hand and leg shelling machines are used, only a mild(either oil bath or drum) roasting is carried out.

During the mild roasting only a small quantity of oil is recovered. The ideals to give a heat treatment without bothering about the recovery of CSNL. Drum roasting is usually carried out at about 100 to 120 oc. No CSNL is lost due to ignition. The choice of mild oil bath or mild drum roasting depends on the built-in facility of a particular factory.

In Panruti (Tamilnadu) the conventional roasting is completely avoided. The raw nuts are exposed to the intense sun that is prevalent in the region. The well dried nuts are hand shelled. In this method complete CSNL remains in the shell until shelling in complete. CSNL is later recovered by heating the shells in special tall mud pots referred to as kilns with holes at the bottom(Cashew bulletin).

b. Shelling :

The nuts after roasting are shelled manually except in some units where hand-and leg operated shelling machines are used. The manual shelling is an operation which requires some amount of dexterity. The nuts are knocked 2 to

3 times on each of the long edge by wooden mallets or light hammers taking care to see that the whole kernels are released without damage or breakage as far as possible. The workers in the shelling units in cashew factories have acquired the skill through practice and the out-turn is more than 90% of the whole kernels in most of the factories. Individual workers output is about 7 to 10 kg per hour working day. As the shell oil is highly corrosive the workers smear ash or clay on their hands to prevent contact of the oil with the skin.

The mechanical shelling gadget consists of two blades, between which a raw nut is inserted. The gap is adjustable and therefore, it will be advantageous if the raw nuts are pre-graded on the basis of size. By means of a lever operated by leg, the blades are brought which will cut into the shell without damaging the kernel inside.

When the level is operated, the halves of the concave blades are opened which in turn opens the shell. The kernel is scooped out by means of a sharp needle. The output per worker per 8 hrs shift in this method of shelling is estimated to be 15 to 18 kg of kernel.

Plate No.6

14) Sorting machine for Cashew nut

15) Cashew nut cutting process by manual.

16) Cashew nut cutting process by manual.

Plate No. 7

17) Roasting

18) Sorting of Cashew Kernel

19) Grading according to quality of Cashew Kernel

c. Drying :

After the kernels are removed from the shells they have to be dried to reduce moisture and loosen the adhering testa. Most commonly sued one is Broma Drier. The chambers of the drier are indirectly heated by flue gases from a furnace at the bottom. Cashew shells are burnt as a spirce of heat. There are 4 to 6 chambers and in each chamber six-wire-mesh trays of 90 x 45 cm and 10 to 15 cm depth are loaded. Air vents are provided at the top and sides for the moisture to escape.

Each tray can hold 10kg of material to a depth of 5 to 7 cm. Temperature ranging from 70 to 100 oc of the upper trays to 40 to 70 oc in the lower trays will be prevailing.

In order to get uniform drying, the position of trays is changed at intervals of 10 to 30 min. The normal duration of heating is 6 to 12 hrs. During this step despite precautions excessive scorching is likely to occur. To minimize the losses, a through-flow drier has been designed and fabricated at CFTRI Mysore with a capacity of 250kg in a 4 hrs shift to work at a temperature of 80 oc . The scorching of cashew kernels is totally avoided and the drying time is reduced to 4 hrs. The moisture content of the dried samples will be in the range of 2 to 4.5%.

d. Peeling :

Peeling is the operation of removal of the testa (seed coat) from the kernels. The skin would be loosened from the kernels by the drying which

enables easy peeling off. Peeling is done by hand. Manual peeling is done by gentle rubbing with the fingers. One person can peel about 10 to 12kg of kernels per day. In a small percentage of kernels, pieces of testa may still be adhering and these are removed with the help of sharp bamboo sticks/other devices. The testa which had been hitherto wated has been found to be an excellent source of tannin.

e. Grading :

Kernels are graded according to the size manually. In the international market bold whole kernels fetch premium price. The grading standards developed in India refer to white whole (undamaged) kernels and indicate the number of kernels per lb of weight. The largest kernel come in the grade W210 (440 to 460/kg) and the smallest of the seven grades is W500 (1000 to 1100/kg). Generally, Brazilian kernels have a relatively high proportion of large wholes, with the extra attraction of the 180"s grade, known as Special Large Wholes. The white whole kernels are priced according to size. Further classification refers to broken kernels, butts, splits, pieces, small pieces and whether kernels are white of scorched.

The next stage in the processing is the grading of kernels on the basis of specifications for exportable grades. There are 27 exportable grades of cashew kernels. The kernels are sorted into wholes, splits and broken primarily on the basis of the visual characteristics. The wholes are again size-graded on the basis of the number of kernels per 1 lb. the entire grading operation is done

manually. However for size-grading mechanical operation is also practiced (www.cashew coca/process).

The highest price is paid for better quality kernels of the W180 and W210 grades which are the largest and heaviest grades. In order to safeguard and guarantee quality, producers and exporters have introduced quality standards which must be met by cashew exporters. The ISO 6477 standard was introduced in 1988 on order to unite the Brazilian and Indian classifications and to give one single classification scheme for quality control.

f. Packing :

Final operation is packing in 10 kg capacity tins which are subsequently evacuated and filled with carbon dioxide. In some parts to overcome the possible over-drying a re humidification step is introduced before packing. The practice of filling with an inert gas is mainly to combat infestation during transit. It may be pointed out that with high quality nut, free from infestation, storing with or without carbon dioxide makes very little difference particularly with reference to rancidity. The importance of inert gas appears to be more for circumventing a possible insect attack from an occasional insect egg entering the tin while packing.

Plate No. 8

22) Oven treatment for Cashew Kernel

21) Close view of grading

20) Cashew Kernel ready for marketing.

The normal packaging for export of kernels is in air-tight tins of 25lbs in weight. The packing needs to be impermeable as cashew kernels are subject to rancidity and go stale very quickly.

The tin will be familiar to most tropical countries as it is a replica of the four gallon kerosene or paraffin oil tin. If possible the tins are made locally as movement of empty tins overseas is expensive. Alternatively, it might be arranged to purchase components and finish the manufacturing locally. This may be done by arrangement with tin manufacturers. The output of a tin manufacturing line is usually too large for one consumer but some cashew nut processors have in fact installed their own tin making plant and supply other processors. Some processors do not have vacuum pumps and displace the air in the tin by feeding in carbon dioxide through a small hole in the bottom of a side of the tin. The carbon dioxide value is turned off when all the air has been replaced. The holes in the tin are then sealed, with the hole at the bottom of the side of the tin being done first, and the one on the top last (www.ITD group).

3.05.2 Processing at Orchard Level :

The processing of cashew in the orchard is mainly confines to removal raw nuts from cashew apple and drying. Harvest only fully matured nuts. Usually, nuts are picked when they fall off from the tree. Best quality nuts are obtained, fresh fallen fruits are collected. The apples are removed and the nuts are sun dried for 2-3 days to reduce moisture from 25 percent to below 9 percent. It is very essential to dry the nuts after harvest to prevent spoilage during subsequent storage. This helps the kernel to retain their quality,

particular the flavor. However, if cashew apples are used for processing, it is better to harvest them from the tree without damaging the apples. The mature nuts will sink in water while the immature/unfilled ones will float. This test could be used to find out whether the nuts are mature or nut18.

3.05.3 Cashew Nut Shell Liquid- A versatile industrial raw material :

Cashew nut shell liquid is a valuable raw material obtained as a by product during the isolation of cashew kernel. The nut has a shell of about 1/8 inch thickness inside which is a soft honeycomb structure containing a dark reddish brown viscous liquid. It is known as cashew nut shell liquid, which is present in the pericarp of the cashew nut. In India annual production of CNSL will be around 15000 tonnes where as the potentiality available is around 45000 tonnes and the world production of CSNL will be around 1.25lakh tones. This raw material is used for a number of polymer based industries like paints and varnishes, resins, industrial and decorative laminates, break lining and rubber compounding resins.

3.06 Résumé :

In this chapter, an attempt has been made to critically review the distribution of cashew nut cultivation area and cashew nut processing units in the district. The various components like establishment of the units, form of ownership, scale wise distribution of the processing units, technology for the processing, cashew and by products are the major components. Sindhudurg

District is the southern part of the greater tract famous for its long coast line and safe harbors' having basically agriculture oriented economy. It receives rainfall for about four months from June to September.

Sindhudurg District enjoys warm and humid climate throughout the year. The year can be divided into 3 seasons. Winter season is from November to February, March to May Summer season and Kharif season is from June to October. Selection of suitable cashew varieties for the specific region and appropriate package of practices determines the final yield. More than 30 varieties which are having exportable grade of cashew kernels are released from different research institutes in India and details are furnished.

Harvesting is generally done by collecting the nuts from the fallen fruits, by hand picking and with a long bamboo pole to which a hook is fitted at the tip. No fruit harvesting devices sere reported for cashew in the literature. Harvesting and collection of nuts is done almost every day. Harvesting of cashew crop is not done at a time because from flowering to harvest nearly 2.5 to 3 months time is required since flowering occurs in two to three waves harvesting of fruits and nuts also varies. The duration of the harvest extends from 45 to 60 days, April to May is the peek season in and around Bangalore. In other parts of the country duration of the harvest is slightly more extending from 45 to 70 days.

Cashew nut processing is generally done on a home scale and factory scale. In the home scale the dried nuts are burnt in an open fire and hand shelled. The nuts which are required to be processed at factory should be dried

again for 1 to 2 days to reduce and maintain the moisture level of 7 to 8 percent. Processing of cashew nuts can be defined as the recovery of edible meat portion the kernel from raw nuts, by manual/mechanical means.

In Maharashtra and Sindhudurg district, the processing is mostly manual. The process is highly labour intensive and the work force consists mainly of women. It consists of moisture conditioning roasting, shelling, drying, peeling, grading and packing.

The highest price is paid for better quality kernels of the W180 and W210 grades which are the largest and heaviest grades. The processing of cashew in the orchard is mainly confines to removal raw nuts from cashew apple and drying. Harvest only fully matured nuts. Cashew nut shell liquid is a valuable raw material obtained as a by product during the isolation of cashew kernel.

The next chapter contains establishment and maintenance cost of cashew orchard, financial feasibility of investment in orchard, investment pattern and organization structure of cashew processing units, cost of processing and constraints

CHAPTER IV

COST STRUCTURE

4.01 Introduction

In the present age of competition, the success of any enterprise in the business of agriculture can be judged on the basis of economic benefits accured to entrepreneur from a particular crop or livestock enterprise. It has become necessary for the farmers to look towards agriculture as a commercial proposition, particularly fruit crops like cashew which has long economic life of almost 40 years. Returns from cashew are spread over longer period, on the other hand during development stage of orchard, large investment is made in establishment of orchard. This has to be judged economically from the point of view of profitability over life period. This cannot be achieved unless the farmers are conscious about various aspects of production and disposal such as yields, prices of inputs and outputs, costs, returns and profitability etc. and unless the tries costs are minimized and returns are maximized.

The selected cashew growers for this study have been classified into two broad categories viz. i.) Cashew growers having local varieties plantation (local) and ii.) Cashew growers having high yielding varieties plantation (high yielding) as mentioned in the methodology.

The data pertinent to the present study have been collected from various sources and analysed using appropriate technique. The results of the analysis are presented under the following headings.

1. Production Performance of Raw Cashewnut
2. Investment pattern in cashew processing unit.

3. Cost and return structure in cashew processing unit.
4. Performance of cashew processing unit.
5. The problems faced by the unit and to suggest measures for effective functioning of the unit.

4.02 Production performance of raw cashewnut:

4.02.1 General information of cashew growers

The general information of the sample farmers having bearing orchards with respect to age, educational score, occupation and family size is presented in Table 4.1.

Table no. 4.1

General information of sample cashew growers

Sr. No.	Particulars	N = 160	Percentage
1.	Age (years)	48.70	-
2.	Educational score	10.64	-
3.	Occupation		
	a) Main (No. of growers)		
	i) Agriculture ii) Business iii) Service	124 22 14	77.50 13.75 8.75
	Total	**160**	**100.00**
	b) Subsidiary (No. of growers)		
	i) Agriculture ii) Business iii) Service iv) Without subsidiary	34 16 24 86	21.25 10.00 15.00 53.75
	Total	**160**	**100.00**
4.	Family size (No.)		
	a) Male	3.65	56.41
	b) Female	2.82	43.59
	Total	**6.47**	**100.00**
5.	a) Working members	2.94	45.44
	b) Non -working members	3.53	54.56
	Total	**6.47**	**100.00**

Source : Result of data analysis

4.02.1.1 Age

It is revealed from the Table 4.1 that, the average age of the cashew grower is **48.70 years**. This indicated that, cashew growers have been in adult age group.

4.02.1.2 Education

The educational status is evaluated giving zero point to illiterate cashew grower and one point for every sub sequent standard of education attained by the sample respondent. It is observed from the Table 4.1 that, overall educational score is **10.64**. This indicates that by and large the cashew growers in the study area have been educated from 10^{th} to 11^{th} standard.

4.02.1.3 Occupation

Most of the sample cashew growers have been engaged in farming as their main occupation. Out of 160 cultivators, 124 (77.50%) having farming as their main occupation, while 22 (13.75%) and 14 (8.75%) cultivators having business and service as their main occupation, respectively. About the subsidiary occupation, 46.25 per cent of the cultivators having either farming, business or service as their subsidiary occupation and remaining 53.75 per cent of the cultivators are not having any subsidiary occupation.

The information collected in the survey gives scope to state that cashew growers have agriculture as their main business. About 99 % sample farmers have agriculture as either main or subsidiary occupation. Secondly, it must be interesting to note that about 53 % farmers have no subsidiary activity. This

means that 53 % of the farmers are dependent entirely on agriculture. They have no other source of income.

4.02.1.4 Family size

Size of the family is the important factor influencing the supply of farm labour. It also affects income generating capacity of farmer's family. It is observed from Table 4.1 that, the average size of family is **6.47 persons** with 3.65 male and 2.82 female members. Out of the total family members, 45.44 per cent persons are working members.

4.03 Details of Cashew orchard :

4.03.1 Bearing cashew orchard

The cashew orchards have been grouped according to the varieties planted, to work out maintenance cost and to compare financial feasibility. The number of sample points in each class is depicted in the table. (Table no. 4.2)

Table no. 4.2
Classification of cashew orchard according to the varieties

Variety of cashew	No. of cultivators	Average size of orchard (hect.)	Average age of orchard (years)	No. of trees/ hect.		
				Bearing fruit	Non-bearing	Total trees
Local	72 (31.58 %)	1.24	32.20	201.70 (92.98)	15.24 (7.02)	216.94 (100.00)
HYV	156 (68.42 %)	2.38	11.70	228.50 (95.24)	11.42 (4.76)	239.92 (100.00)
Total %	**228 (100.00)**	**1.81**	**21.95 -**	**430.20 (94.16)**	**26.66 (5.84)**	**456.86 (100.00)**

Source : Result of data analysis

a) Local varieties

About 72 sample cultivators out of 160 sample have planted local varieties of cashew. It is revealed from the Table 4.2 that, the average age of orchard is about 32.20 years and the average size of orchard 1.24 hect. in case of Traditional variety. The number of trees per hectare is about 216.94 with 92.98 % trees bearing fruit.

b) High yielding varieties (HYV)

It is observed in the survey that majority of the farmers (68.42 %) have opted for HYV. As introduction of this variety is in the recent past average age of orchard is less than that of local variety. It is just 11.70 years. It is also observed that HYV shows higher proportion (95.24 %) of fruit bearing trees than that in case of local variety.

c) Varieties Grown

It is observed from Table 4.3 that the per farm average area under local varieties and HYV is about 1.24 hectare and 2.38 hectare respectively. In study area, the cashew growers preferred V-2, V-4, V-5 and V-7 varieties of cashew for plantation. Among HYV varieties, per farm area under V-4 variety is 2.77 ha, followed by V-7 variety is 2.45 hectare.

Table no. 4.3

Distribution of sample cashew growers according to varieties grown

Sr. No.	Name of variety	No. of farmers	Area (hect.)	Average Orchard size (hect.)
1)	**Local**	72	89.28	1.24
	Total	72	89.28	1.24
2)	**HYV**			
	V-2	32	58.40	1.83
	V-4	74	204.62	2.77
	V-5	18	29.86	1.66
	V-7	32	78.40	2.45
	Total	**156**	**371.28**	**2.38**

Source : Result of data analysis

4.04 Establishment of cashew orchard:

The cashew orchard starts bearing generally after five years from the year of plantation. The establishment cost includes the variable, material and fixed costs. The cashew growers have to invest considerable amount in the form of inputs for establishment of the cashew orchard up to its bearing stage. This period is called as “gestation period”. Therefore, the investment made by the farmers for establishing cashew orchard during the period from planting to the first bearing (up to 5 years) is regarded as establishment cost.

During this period they have to invest the huge amount on payment of wages to labours, purchase of cashew grafts and other necessary inputs. Labour cost comprised of expenses on operations like land preparation, opening of pits, planting and gap filling, manures and fertilizer application, fencing, weeding,

watch and ward and spraying of chemicals etc. Therefore, the capital investment for establishing cashew orchards on different inputs was studied and the results are given below.

4.04.1 Operation wise labour utilization :

The requirement of human labour is observed as woman days and manday. In the study area cost of one manday is Rs. 100/- and that of a womanday is 70/-. The labour cost is computed on the basis average man and womandays per hectare of cashew plantation. It is also observed (Table 4.6) that yearly cost of human labour varies according the age of orchard. The operationwise and yearwise per hectare human labour utilization for establishing cashew orchards was analyzed separately and the results of the analysis are presented in Table 4.4.

Table no. 4.4

Operation wise per hectare labour (Human days) required for establishment of cashew orchard (HYV)

Sr. No.	Operation	1st year	2nd year	3rd year	4th year	5th year	Total
1.	Land preparation	72.34	--	--	--	--	72.34 (15.77)
2.	Layout leveling	16.80	--	--	--	--	16.80 (3.66)
3.	Digging of pits filling with soil	11.42	--	--	--	--	11.42 (2.49)
4.	Planting						
	i) Preparation of basin	7.84	--	--	--	--	7.84 (1.71)
	ii) Providing support and shade	10.96	8.24	4.92	--	--	24.12 (5.26)
5.	Fencing and repairing to fence	17.28	6.56	4.56	4.14	3.28	35.82 (7.81)
6.	Irrigation	62.60	32.80	25.58	--	--	120.98 (26.37)
7.	Intercultural operation	15.14	10.08	10.52	6.96	7.94	50.64 (11.04)
8.	Manu ring and fertilization	11.19	12.38	13.20	14.82	15.20	66.79 (14.56)
9.	Plant protection	3.85	4.76	5.14	5.76	5.28	24.79 (5.40)
10.	Mulching	4.30	3.82	2.82	--	--	10.94 (2.38)
11.	Others	5.25	3.74	3.22	2.78	1.32	16.31 (3.56)
	Total (%)	**238.97 (52.09)**	**82.38 (17.96)**	**69.96 (15.25)**	**34.46 (7.51)**	**33.02 (7.20)**	**458.79 (100.00)**

Source : Result of data analysis

It is seen from the Table 4.4 that, total per hectare labour utilized for establishing graft (high yielding) cashew orchard is 458.79 human days, of which maximum i.e. 120.98 human days (26.37%) have been utilized for irrigation/hand watering followed by 89.14 human days (19.43%) for land preparation i.e. removal of grasses, weeds and bushes, levelling of layout etc., 66.79 human days (14.56%) for manuring and fertilization of young plants, 50.64 human days (11.04%) for intercultural operations, 35.82 human days (7.81%) for fencing and repairing to fence, 31.96 human days (6.97%) for planting i.e. for preparation of basin and providing support and shade, 24.79 human days (5.40%) for plant protection measures, 10.94 human days (2.38%) for mulching, 11.42 human days (2.49%) for digging of pits and filling with soil and 16.31 human days (3.56%) for others i.e. after care or watching etc.

As regards yearwise utilization of labour, maximum labours (52.09%) have been utilized during the first year of plantation. This is because of major important operations like preparation of land, digging of pits, planting of grafts, fencing etc. have been performed in the first year. The labour utilization decreased from second year (17.96%) to fifth year (7.20%). The operation of the mulching and irrigation carried out in second and third year by few growers, however these operations are not done in fourth and fifth year of plantation.

4.04.2 Composition of labour utilization per hectare :

Per hectare composition of labour utilized and the wages paid to the labour are also given in Table 4.5

Per hectare total labour required for establishment of cashew orchard is 458.79 human days, of which 252.52 human days (55.04%) is family labour and 206.27 human days (44.96%) is hired labour. This showed that, generally cashew plantation is done by family members and hired labour have been taken for few operations like harvesting, irrigation, digging of pits etc.

As regards year wise total labour utilization during five years period, it is found that 238.97 human days (52.09%) have been used in the first year, 82.38 human days (17.96%) in the second year, 69.96 human days (15.25%) in the third year, 34.46 human days (7.51%) in the fourth year and 33.02 human days (7.20%) in the fifth year.

Among the total per hectare labour utilization, the composition of male and female is 247.36 human days (53.92%) and 211.43 human days (46.08%) respectively. This showed that, throughout the establishment period the utilization of male labour is more than the female labour.

4.04.3 Cost incurred on labour per hectare :

It is observed from Table 4.5 revealed that total per hectare cost incurred on labour in a period of five years for establishing cashew orchard worked out to Rs. 39536.10. Out of this cost incurred on labour is maximum in the first year Rs. 20594.30 because operation like land preparation, layout levelling and planting is carried out only in first year. After that cost incurred on labour decreased, Rs. 7069.80 in second year, Rs. 6060.60 in third year Rs. 3021.80 in fourth year and Rs. 2789.60 in fifth year.

Table no. 4.5

Per hectare composition of labour used and cost incurred (up to 5th year)

Sr. No.	Particulars	1st year		2nd year		3rd year		4th year		5th year		Total	
		Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost
A)	**Family labour**												
1.	Male	83.24	8324.00	21.27	2127.00	20.54	2054.00	11.20	1120.00	8.62	862.00	144.87	14487.00
2.	Female	49.36	3455.20	22.89	1602.30	16.42	1149.40	6.84	478.80	12.14	849.80	107.65	7535.50
	Total	**132.60**	**11779.20**	**44.16**	**3729.30**	**36.96**	**3203.40**	**18.04**	**1598.80**	**20.76**	**1711.80**	**252.52**	**22022.50**
B)	**Hired labour**												
1.	Male	45.64	4564.00	22.17	2217.00	18.24	1824.00	9.12	912.00	7.32	732.00	102.49	10249.00
2.	Female	60.73	4251.10	16.05	1123.50	14.76	1033.20	7.30	511.00	4.94	345.80	103.78	7264.60
	Total	**106.37**	**8815.10**	**38.22**	**3340.50**	**33.00**	**28570.20**	**16.42**	**1423.00**	**12.26**	**1077.80**	**206.27**	**17513.60**
C)	**Total**												
1.	Male	128.88	12888.00	43.44	4344.00	38.78	3878.00	20.32	2032.00	15.94	1594.00	247.36	24736.00
2.	Female	110.09	7706.30	38.94	2725.80	31.18	2182.60	14.14	989.80	17.08	1195.60	211.43	14800.10
	Grand Total (%)	**238.97 (52.09)**	**20594.30**	**82.38 (17.96)**	**7069.80**	**69.96 (15.25)**	**6060.60**	**34.46 (7.51)**	**3021.80**	**33.02 (7.20)**	**2789.60**	**458.79 (100.00)**	**39536.10**

Source : Result of data analysis

4.04.4 Other physical inputs :

Per hectare quantities and values of different inputs used for establishing cashew orchard are given in Table 4.6 & 4.7

a) Grafts

On an average 242 grafts are planted in a hectare at the cost of Rs. 3630 in the first year. The number of grafts used for gap filling in second year is 32 on which amount spent is Rs. 480. Thus, in the establishment period of five years, totally 274 grafts are used for establishing cashew orchard with an amount of Rs. 4110.

b) Manures

The manures used have been mostly compost or FYM. The total quantity of manures applied for five years worked out to 158.42 quintals on which Rs. 23763 have been invested. Out of total quantity of manures, 18.40 quintals is used during first year, 21.13 quintals during second year, 32.89 quintals during third year and 43 quintals each during fourth and fifth year.

Table no. 4.6

Per hectare quantities of inputs used for establishment of cashew orchard (up to 5th year)

Sr. No.	Particulars	1st year	2nd year	3rd year	4th year	5th year	Total Quantity
1)	Labour (days)						
	a) Family labour	132.60	44.16	36.96	18.04	20.76	252.52
	b) Hired labour	106.37	38.22	33.00	16.42	12.26	206.27
2)	Grafts (No.)	242	32	--	--	--	274
3)	Manures (FYM/ Compost) (quintals)	18.40	21.13	32.89	43.00	43.00	158.42
4)	Fertilizers (Kg.)						
	a) N	117.5	235	352.5	470	470	1645
	b) P	88.12	176.25	235	293.75	293.75	1086.87
	c) K	29.38	58.75	82.25	117.5	117.5	405.38
5)	Plant protection chemicals						
	a) Bordomixture (Kg)	2.00	2.95	3.50	5.00	6.75	20.2
	b) B.H.C. (Kg)	21.64	10.28	2.16	--	--	34.08
	c) Endosulfan (lit.)	1.03	1.14	1.00	1.27	1.06	5.5

Source : Result of data analysis

c) Fertilizers

It is observed that, cashew growers in study area used straight fertilizers like urea, single super phosphate and muriate of potash. Most of the farmers used only urea and single super phosphate only. The quantities of fertilizers have been estimated in terms of nutrients viz. N, P, K. Total quantities of N, P and K applied up to fifth year have been 1645 kg, 1086.87 kg and 405.38 kg, respectively. The yearwise quantities of N, P and K indicated that quantities of

N, P and K increased from first year to third year and remained same in fourth and fifth year.

d) Plant Protection

The yearwise quantities of plant protection chemicals used indicated that the quantities used during first year have been comparatively less, while the quantities increased in subsequent years. The quantities of plant protection chemicals included Bordeaux mixture, B.H.C. and Endosulfan. The B.H.C. used more in the first year and then it was reduced in second and third year. While that of Bordeaux mixture its use increased from first year to fifth year. The Endosulfan used in very negligible quantity and showing that pest and disease occurrence was very less or negligible at younger stage of plant. The total amount of expenditure incurred on plant protection chemicals was about Rs. 3797.08.

e) Fencing

Cashew growers in study area have been found to use barbed wire for the fencing the cashew orchard of grafts. Total expenditure on fencing to orchard was about Rs. 25550 up to fifth year. Another material used was grass for mulching and providing shade, bamboo sticks for supporting to each plant separately. The total expenditure incurred on that was about Rs. 3054.25.

4.04.5 Cost of establishment for high yielding varieties :

Inputwise and yearwise cost incurred in the gestation period for establishing high yielding cashew orchard is given in Table 4.7.

a) Inputwise

It is revealed from the Table 4.7 that, the per hectare total cost incurred in a period of five years for establishing cashew orchards worked out to Rs. 114610.83. Out of this investment, maximum cost incurred on labour 34.50 per cent (Rs. 39536.10) which is followed by fencing and repairing to fence (22.29%), manures (20.73%), fertilizers (12.91%), planting material (3.59%), plant protection chemicals (3.31%), support and providing shade (1.49%). The very merge expenditure is incurred on mulching (1.18%). This revealed that human labour is the important component in the establishment of cashew orchard.

Table no. 4.7

Per hectare values of inputs used for establishment of cashew orchard (up to fifth year)

Sr. No.	Particulars	1st year	2nd year	3rd year	4th year	5th year	Total	
							Amount (Rs.)	Per cent
1	Labour (days)							
	a) Family labour	11779.20	3729.30	3203.40	1598.80	1711.80	22022.50	19.22
	b) Hired labour	8815.10	3340.50	2857.20	1423.00	1077.80	17513.60	15.28
	Total	20594.30	7069.80	6060.60	3021.80	2789.60	39536.10	34.50
2	Grafts	3630.00	480.00	--	--	--	4110.00	3.59
3	Manures	2760.00	3169.50	4933.50	6450.00	6450.00	23763.00	20.73
4	Fertilizers	1100.99	2201.94	3153.81	4171.83	4171.83	14800.40	12.91
5	Plant protection chemicals	1200.65	879.95	670.50	545.49	500.49	3797.08	3.31
6	Support and providing shade	822.50	470.00	411.25	--	--	1703.75	1.49
7.	Mulching	525.00	475.00	350.50	--	--	1350.50	1.18
8.	Fencing and repairing to fence (390 m/45 Rs.)	17550.00	3500.00	2500.00	1000.00	1000.00	25550.00	22.29
	Total (%)	**48183.44 (42.04)**	**18246.19 (15.92)**	**18080.16 (15.78)**	**15189.12 (13.25)**	**14911.92 (13.01)**	**114610.83 (100.00)**	**100.00**

Source : Result of data analysis

b) Yearwise

Further, it is also observed from the Table 4.7 that, out of total cost of establishment 42.04 per cent (Rs. 48183.44) is incurred during the first year, 15.92 per cent (Rs. 18246.19) during second year, 15.78 per cent (Rs. 18080.16) during third year, 13.25 per cent (Rs. 15189.12) during fourth year and 13.01 per cent (Rs. 14911.92) during fifth year. This indicated that maximum expenditure was incurred during the first year and it declined in subsequent years mainly due to decline of labour for different operations.

5.04.6 Cost of establishment for cashew orchard of local varieties :

The local variety plantation is quite old and hence it is difficult to collect information. New cashew plantation using local variety seed is rarely available.

More or less, the same cost of establishment for new HYVs of cashew is considered. Most of the operations would be the same. Only the change in cost of planting material i.e. seedlings instead of grafts of cashew varieties whenever local plantation existed they have been using thorny bushes/cactus for fencing purpose or at the boarder the plot stone wall of 3'×3' is laid. Considering above changes, the approximate cost of establishment of local varieties of cashew orchard is estimated to Rs. 87430.56.

4.05 Cost of cultivation :

4.05.1 Physical inputs utilization

In the utilization of cashew, inputs viz., labour, manures, fertilizers, plant protection, etc. play a vital role. Therefore, per hectare inputs utilization for

variety wise group of cashew orchard (local varieties and HYV) is analyzed and presented in Table 4.8.

It is seen from the Table 4.8 that, the per hectare input utilized for local varieties of cashew have been 63.47 human days, 17.94 quintals manures, 206 kg. Nitrogen and 102 kg. P_2O_5, endosulfan 1.0 lit. In case of high yielding varieties of cashew per hectare inputs utilized have been 89.92 human days, 32.34 quintals manures, 418 kg. Nitrogen, 224 kg P_2O_5 and 62 kg K_2O and 1.50 lit. of endosulfan. As regards the per hectare quantities of physical inputs utilized for HYV cashew orchard more than the local variety of cashew orchard.

Table no. 4.8
Per hectare physical inputs utilized for bearing cashew orchard

Sr. No.	Inputs	Local variety	HYV
1	Hired labour (days)		
	a) Male	12.94	18.72
	b) Female	14.16	21.34
	Total	27.10	40.06
2	Family labour (days)		
	a) Male	19.92	24.49
	b) Female	16.45	22.11
	Total	36.37	49.86
3	Total labour (days) (Hired + Family)	63.47	89.92
4	Manures (quintal)	17.94	32.34
6	Fertilizers (kg.)		
	N	206	418
	P	102	224
	K	-	62
7	Plant protection chemical (lit.)	1.0	1.50

Source :Result of data analysis

4.05.2 Cost of cultivation of local variety and HYV cashew orchard :

The per hectare itemwise cost incurred for the cultivation of cashew orchards is worked out separately for local varieties and high yielding varieties are presented in Table 4.9.

It is seen from Table 4.9 that, per hectare total cost of maintenance of local variety cashew orchard (cost C) worked out to Rs. 30257.40 of which share of cost- A is 26.35 per cent and that of cost- B is 86.98 per cent. As regards the itemwise cost, it is found that the maximum cost (30.01%) was incurred on rental value of land and amortization cost of orchard (28.55%). The contribution of other items of cost ranged from 0.17 per cent for land revenue to 10.39 per cent for family labour.

Table no. 4.9

Per hectare cost of cultivation of cashew orchard

Sr. No.	Item of cost	Local variety (Rs.)	Per cent	HYV (Rs.)	Per cent
1	Hired labour				
	a) Male	1294.00	4.28	1872.00	4.00
	b) Female	991.20	3.28	1493.80	3.19
2	Manures	2691.00	8.89	4851.00	10.37
3	Fertilizers				
	N	1030.00	3.0	2090.00	4.47
	P	408.00	1.35	896.20	1.91
	K	-	-	279.00	0.60
4	Plant protection	485.00	1.60	590.00	1.56
5	Interest on working capital	413.95	1.37	732.59	1.57
6	Land revenue	50.00	0.17	50.00	0.11
7	Depreciation on implements	610.00	2.02	806.50	1.72
	Cost- A	**7973.15**	**26.35**	**13798.89**	**29.49**
8	Rental value of land	9079.43	30.01	15615.11	33.37
9	Interest on fixed capital	624.00	2.06	825.00	1.76
10	Amortization cost	8640.00	28.55	10900.00	23.29
	Cost- B	**26316.58**	**86.98**	**41139.00**	**87.92**
11	Family labour				
	a)Male	1992.00	6.58	2614.00	5.59
	b)Female	1151.50	3.81	1660.40	3.55
12	Supervision charges	797.32	2.64	1379.89	2.95
	Cost- C	**30257.40**	**100.00**	**46793.29**	**100.00**

Source : Result of data analysis

Similarly, the per hectare total cost of maintenance of HYV cashew orchard (cost- C) worked be Rs. 46793.29, out of which share of cost- A was 29.49 per cent and that of cost- B was 87.92 per cent. Among the different

important items of cost, amortization shared 23.29 per cent of the total cost. The maximum cost (33.37%) was incurred on rental value of land. The contribution of other items of cost ranged from 0.11 per cent for land revenue to 10.37 per cent for manures.

Table 4.9 observed that, per hectare cost of maintenance of local variety and HYV, incurred on manures, fertilizers, and plant protection for high yielding variety is almost double than local variety cashew orchard.

4.05.3 Yield, returns and profitability:

On the basis of per hectare production of cashew nut and it's by-product, gross returns have been worked out for local and high yielding variety of cashew. The gross returns included the value of raw nut and value of by-product (cashew apples). The results of the analysis are presented in Table 4.10.

Table no. 4.10
Per hectare yield and returns from cashew

Sr. No.	Particulars	Local variety	HYV
1.	No. of bearing trees	184	208
2.	Main produce: a) Yield of nuts (kg.) b) Price per kg of raw nut (Rs.)	 1198 44.30	 1935.28 47.40
A)	Value of nuts (Rs.)	53071.40	91732.27
3.	By-product: a) Yield of apples (kg.) b) Price per kg. of apples (Rs.)	 2342 0.60	 3264 0.60
B)	Value of apples (Rs.)	1405.20	1958.40
	Total returns A + B	**54476.60**	**93690.67**

Source : Result of data analysis

It is seen from Table 4.10 that, the per hectare gross returns realized have been Rs. 54476.60 from local varieties and Rs. 93690.67 from HYV cashew orchard.

The per hectare gross returns of high yielding variety of cashew have been considerably higher because, per hectare number of trees (208), yield of nuts per tree (9.30 kg.), as well as price per kg of raw nut (Rs. 47.40/kg.) was higher as compared to local variety of cashew viz. Number of bearing trees (184/ha), yield of nuts per tree (6.51 kg/tree), price per kg of raw nut (Rs. 44.30/kg.).

On the basis of per hectare production of cashewnut, its by-products and price received by the growers, gross returns have been worked out for local variety and HYV cashew orchards. The profitability at various costs level viz. Cost A, cost B, cost C was worked out by deducting respective costs from gross returns. The per hectare GroupWise i.e. local variety and HYV profitability of cashew orchard presented in Table 4.11.

Table no. 4.11
Per hectare profitability of cashew orchard

Sr. No.	Particulars	Local variety	HYV
1.	Gross returns (Rs.)	54476.60	93690.67
2.	Costs (Rs.)		
	a) Cost A	7973.15	13798.89
	b) Cost B	26316.58	41139.00
	c) Cost C	30257.40	46793.29
3.	Profit at (Rs.)		
	a) Cost A	46503.45	79891.78
	b) Cost B	28160.02	52551.67
	c) Cost C	24219.20	46897.38
4.	Benefit cost ratio	1.80	2.00

Source : Result of data analysis

It is seen from Table 4.11 that, the per hectare gross returns received is Rs. 54476.60 in local variety and Rs. 93690.67 in HYV of cashew. Profit at different cost levels i.e. cost A, cost B, cost C in case of HYV of cashew is maximum than local varieties. This is because of the higher productivity and price received per kg of raw nut have been comparatively more in high yielding varieties than in local varieties of cashew.

Per hectare net returns obtained from local varieties have been Rs. 24219.20 and the benefit cost ratio is 1.80. In case of HYV, per hectare net returns obtained have been as Rs. 46897.38 and benefit cost ratio is 2.00.

4.06 Economic evaluation of investment in cashew orchards :

Investment in cashew orchards demand vast resources in terms of capital and the flow of income is spread over on large number of years. Similarly, once the investment is made on resources for establishing cashew orchard, no retrieval is possible. Therefore, it is necessary to evaluate such a huge investment for its worthiness with great deal to caution and foresight.

Taking into account the yearly cost of establishment of first five years and maintenance cost for different varietal group i.e. local varieties and HYV upto 40 years age of orchard, a series of cash out flow (costs) was prepared. Similarly, a series of cash inflow (returns) is prepared taking into account the per hectare returns received (net of marketing cost). The outflow and inflow series i.e. cost and returns series for local and high yielding cashew cultivation is given in Table 4.12. With the help of these series of cash flows and by using the economic parameters namely (i) pay back period (ii) net present value (iii) benefit cost ratio and (iv) internal rate of returns as per the procedure outlined in the introduction chapter, the economic feasibility of investment in cashew plantation is tested. The estimated values of these parameters for local variety cashew orchard are presented in Table 4.13.

Table no. 4.12
Per hectare series of cash flows in cashew plantation

a) HYV

Period in years	Cash flows (Rs./hect.)		
	Income	**Expenditure**	**Profit**
1	0	48183.44	-48183.44
2	0	18246.19	-18246.19
3	0	18080.16	-18080.16
4	0	15189.12	-15189.12
5	0	14911.92	-14911.92
6 to 10	48968.00	18164.34	30803.66
11 to 15	61256.34	18164.34	43092.00
16 to 20	69842.26	18164.34	51677.92
21 to 30	89284.64	18164.34	71120.30
31 to 40	108342.42	18164.34	90178.08

b) Local variety

Period in years	Cash flows (Rs./hect)		
	Income	**Expenditure**	**Profit**
1	0	33149.16	-33149.16
2	0	12346.38	-12346.38
3	0	13958.32	-13958.32
4	0	14564.46	-14564.46
5	0	13412.24	-13412.24
6 to 10	25384	10284.78	15099.22
11 to 15	32826	10284.78	22541.22
16 to 20	37862	10284.78	27577.22
21 to 30	45721	10284.78	35436.22
31 to 40	49959	10284.78	39674.22

Source :Result of data analysis

Table no. 4.13

Economic evaluation of investment in local variety cashew orchard

Sr. No.	Parameters	Discount rates		
		9.50 Per cent	**12 Per cent**	**15 Per cent**
1.	Pay back period			
	a) With discounting	10	10	12
	b) Without discounting	8	8	8
2.	B:C ratio	1.76	1.50	1.28

Source : Result of data analysis

Table 4.13 revealed that, pay back period for local variety is 10, 10 and 12 years with 9.50, 12 and 15 per cent discount rates respectively and 8 years for recovery of capital cost only without discounting. The benefit cost ratio at these discount rates have been 1.76, 1.50 and 1.28, respectively.

The estimated value of all financial feasibility parameters for high yielding variety of cashew orchard are presented in given Table 4.14.

Table 4.14 revealed, that pay back period for high yielding variety orchard, is estimated to be 7 years for recovery of capital cost only without discounting and 9, 9 and 10 years at 9.50, 12 and 15 per cent discount rates respectively. The benefit cost ratio for some discount rates are 2.27, 1.98 and 1.72.

Table no. 4.14

Economic evaluation of investment in high yielding cashew variety orchard

Sr. No.	Parameters	Discount rates		
		9.50 Per cent	**12 Per cent**	**15 Per cent**
1.	Pay back period			
	c) With discounting	9	9	10
	d) Without discounting	7	7	7
2.	B:C ratio	2.27	1.98	1.72

Source : Result of data analysis

The foregoing results for local variety and HYV revealed that, the benefit cost ratios have been considerably greater than unity in both cases. Also the pay back period was quite desirable considering the life of cashew orchard in case of high yielding variety.

All finance feasibility tests in both varieties i.e. local variety and HYV are positive, indicating profitability of cashew orchard. On the basis of all these economic parameters, it can be concluded that, the HYV cashew plantation is commercially profitable venture in the Konkan region than existing local variety plantation.

4.07 Cashewnut processing:

The cost of processing of cashewnut and other related aspects have been studied and covered in this part. Accordingly 18 cashew processing units have been selected from district. The quantity processed, employment created and capital invested in the units have been the different aspects of measuring the size of factory. Similarly, the size of unit also dependent on working season. In the

present study, working season was taken as basis for classifying selected cashew processing factories.

4.07.1 Classification of cashew units :

The selected cashew processing units have been classified on the basis of their working season as given in Table 4.15

Table no. 4.15

Classification of cashew processing units according to working season

Group	Working season (days)	No. of factories	Average working season (days)	Quantity Processed per season (q)	Quantity of nut per unit per day (q)
I. Small	upto 225 days	5 (27.78)	198.25	628.25	3.17
II. Medium	225 to 275 days	8 (44.44)	255.20	1698.40	6.66
III. Large	More than 275 days	5 (27.78)	302.15	2348.25	7.77
Overall	**-**	**18 (100.00)**	**252.42**	**1581.65**	**6.00**

Source : Result of data analysis

The selected units have been classified as small having working season upto 225 days, medium working season between 225 to 275 days and large, working season above 275 days. The classification of the units on the basis of working season revealed that, five cashew processing units have been in small group, eight cashew processing units have been in medium group and five cashew processing units have been in large group. The average working season is 198.25 days, 255.20 days and 302.15 days in small, medium and large group

respectively, while average working season at overall level was 252.42 days. The per season quantity of nuts processed varied from 628.25 q. in small to 2348.25 q. in large group, while overall average quantity of nuts processed per season is 1581.65 q. The daily quantity of nuts processed by the unit in small, medium and large groups was 3.17 q., 6.66 q. and 7.77 q. respectively, with overall average of 6.00 q. This indicated that not only the per season quantity but per day quantity of nuts processed is also more in units which had longer working season.

4.07.2 General Information :

The general information of the processing units including average of establishment period, average working period, ownership and method of processing is given in Table 4.16.

It is seen from Table 4.16 that, average establishment period is 26.8 years. The units have been also classified on the basis of type of ownership as partnership and individual. There have been 13 units (72.22%) owned and managed by individual, while remaining 5 units (27.78%) in partnership. From the sample, two units (11.11%) have been processing cashew by drum roasting method, while 13 units (83.33 %) have been found to process cashew by steam roasting method' and remaining three units have been using both these methods of processing.

Table no. 4.16

General information of the processing factory

Sr. No.	Particulars	No. of factories
1.	Average establishment period (years)	26.8
2.	Average working period (days)	252.42
3.	Ownership	
	a) Partnership	5
	b) Individual	13
4.	Method of processing	
	1) Drum roasting	2
	2) Steam roasting	13
	3) Both	3

Source : Result of data analysis

4.07.3 Working season, employment and wage rate :

Providing employment opportunities to rural people is one of the objectives of starting agro-based industries. Therefore, employment created by cashew units and the wage rates paid to the workers have been studied and the information regarding employment, wage rates and working season is given in Table 4.17.

The working of the units is seasonal in nature. There is a great variation in the working season from unit to unit which is shown in table 4.17. It was seen that average working season of unit in small, medium and large group was 187.40 days, 261.24 days and 298.76 days, respectively. The per unit male employment was 2.4 days, 4.6 days and 3.2 days in small, medium and large group respectively, while per day female employment was 19.2 days, 40.3 days

and 52.4 days in small, medium and large group, respectively. At the overall level, the per unit per day employment comprised of 3.6 days male and 37.8 days female with a total of 41.4 days. This indicated that out of total labour employment nearly 91 per cent was female labour. It was further observed that, the total employment per unit in a season was 4140 days in small group, 11501 days in medium group and 16966 days in large group with overall average employment of 10650 days. Thus, the estimated labour employment of all the sample units come to 1.92 lakh days. Regarding wage rates to male and female labour, more wages have been given to male labour as compared to female labour. The daily wage rate paid to male labour is Rs. 90.25, Rs. 95.18 and Rs. 98.00 in small, medium and large group, respectively, while wage rate paid to female labour is Rs. 60.40, Rs. 62.14 and Rs. 65.30 by factories, respectively. It is observed that large units had given higher wage rate to their workers than small factories. The overall per day wage rate of male and female worker is Rs. 94.59 and Rs. 62.53, respectively.

Table no. 4.17

Working season, employment and wage rates in processing factories

Sr.No.	Particulars	Small	Medium	Large	Overall
1.	Working season (days)	187.40	261.24	298.76	251.15
2.	Per day per unit employment (days)				
	a) Male	2.4	4.6	3.2	3.60 (8.70)
	b) Female	19.2	40.3	52.4	37.80 (91.30)
		21.6	**44.9**	**55.6**	**41.4**
3.	Per season per unit employment (days)				
	a) Male	490.55	1077.45	1014.26	879.13
	b) Female	3649.69	10423.71	15951.47	9770.90
		4140.24	**11501.16**	**16965.73**	**10650.03**
4.	Wage rate (Rs.)				
	a) Male	90.25	95.18	98.00	94.59
	b) Female	60.40	62.14	65.30	62.53

Source : Result of data analysis

4.07.4 Fixed capital investment pattern in cashew processing units :

The fixed capital investment in different categories of cashew processing units is presented in Table 4.18. The expenditure incurred on the establishment of a cashew processing unit is treated as fixed capital investment. It includes the expenditure on land, buildings, machinery and equipment, infrastructure facilities and other fixtures. It is seen from the Table 4.18 that the total fixed

capital investment was Rs. 5.61 Lakh in case of small processing units. Similarly, Rs. 10.28 lakh and Rs. 17.62 lakh is invested in medium and large processing units respectively. At the overall level, total fixed capital investment is found to be Rs. 11.03 lakh. The investment in buildings accounted highest, that is, 35.54 per cent, at overall level, followed by land (34.45 %), infrastructure facilities (15.32%), machinery and equipments (13.60 %) and other fixtures (1.09%) in the total fixed investment. The proportion of investment on land in the total fixed investment is higher in small size processing units (49.91%) followed by medium (38.33%) and large size (25.88%) units. Similarly the proportion of fixed capital invested on building is higher (39.73%) in large size units, and lower (25.85%) in small size units. The proportion of investment on machinery and equipment is higher in small processing units (15.86%) and lower in large size processing units (12.83%). Investment on infrastructure is higher in large units (20.03%) and lower (6.95%) in small units. Regarding investment on other fixtures it is higher in large units, that is 1.53 per cent and lower in medium units, that is 0.49 per cent.

Table no. 4.18
Fixed capital investment in cashew processing units.

(Rs. in lakh)

Sr. No.	Size of the processing unit	Particulars of Investment					Total
		Land	Building	Machinery and equipment	Infrastructure facilities	Other fixtures	
1.	**Small**	2.80 (49.91)	1.45 (25.85)	0.89 (15.86)	0.39 (6.95)	0.08 (1.43)	**5.61 (100.00)**
2.	**Medium**	3.94 (38.33)	3.53 (34.33)	1.41 (13.72)	1.35 (13.13)	0.05 (0.49)	**10.28 (100.00)**
3.	**Large**	4.56 (25.88)	7.00 (39.73)	2.26 (12.83)	3.53 (20.03)	0.27 (1.50)	**17.62 (100.00)**
4.	**Overall**	3.80 (34.45)	3.92 (35.54)	1.50 (13.60)	1.69 (15.32)	0.12 (1.09)	**11.03 (100.00)**

Source : Result of data analysis

The comparison between the small, medium and large size processing units revealed that, the total fixed capital investment increased with the increase in size of the cashew processing units. In all the three size groups the fixed capital investment on building and land accounted for a major share followed by machinery and equipment, infrastructure and other fixtures.

4.07.5 Working capital investment :

Actual expenditure incurred on purchase of raw nut, salary, wages, packing material, taxes, rent, fuel etc. have been included in working capital

The working capital investment in different categories of cashew processing unit is presented in Table 4.19.

Table no. 4.19
Working capital investment pattern in cashew processing units

(Rs. in lakh)

Sr. No.	Items of cost	Small	Medium	Large	Overall
1.	Raw Nuts	30.41 (93.05)	82.14 (91.62)	114.20 (91.87)	76.66 (91.87)
2.	Handling and drying	0.13 (0.40)	0.36 (0.40)	0.50 (0.40)	0.34 (0.41)
3.	Salary and wages	1.37 (4.19)	4.77 (5.32)	6.27 (5.04)	4.24 (5.08)
4.	Bonus	0.11 (0.35)	0.39 (0.44)	0.50 (0.40)	0.34 (0.41)
5.	Packaging material	0.52 (1.59)	1.72 (1.92)	2.31 (1.86)	1.55 (1.86)
6.	Rent / taxes	0.03 (0.09)	0.07 (0.08)	0.10 (0.08)	0.07 (0.08)
7.	Fuel charges	0.09 (0.28)	0.16 (0.19)	0.36 (0.31)	0.19 (0.25)
8.	Others	0.02 (0.06)	0.03 (0.03)	0.04 (0.03)	0.03 (0.04)
	Total	**32.68** **(100.00)**	**89.65** **(100.00)**	**124.30** **(100.00)**	**83.44** **(100.00)**
	Per quintal working capital investment (in Rs.)	5007.74	5159.89	5184.98	5152.56

Source : Result of data analysis

It is observed from the Table 4.19 that, at the overall level the per unit working capital investment is found to be Rs. 83.44 lakh. Major amount is spent on the purchase of raw cashewnut, from the total working capital investment in running the cashew processing industry. It is found that, purchase of raw nuts shared Rs. 30.41 lakh (93.05%) in small group, Rs. 82.14 lakh (91.62%) in

medium group and Rs. 114.20 lakh (91.87%) in large group. At the overall level, after purchase of raw nut, expenditure on other items of working capital investment have been salary and wages Rs. 4.24 lakh (5.08%), packaging material Rs. 1.55 lakh (1.86%), handling and drying as well as bonus to employees Rs. 0.34 lakh (0.41%) each, fuel charges Rs. 0.21 lakh (0.25%) etc.

Same trend of working capital investment is observed in all the groups. It also indicated that as the working season expanded, the requirement of working capital is observed to increase. The per quintal working capital investment is Rs. 5007.74 in small group, Rs. 5159.89 in medium group and Rs. 5184.98 in large group with the overall per quintal average investment of Rs. 5152.56.

4.07.6 Investment pattern and organizational structure of cashew processing units :

a) Capital investment patterns in cashew processing units :

The total capital investment patterns in cashew processing units is presented in Table 4.20. The average aggregate capital invested per processing unit is Rs. 94.47 Lakh. The investment pattern of the cashew processing units revealed that, there is a direct relationship between total capital invested and size of the processing units. In aggregate, it is found that, in all the units the investment on working capital is more (88.32 %) than the fixed capital (11.68 %). The proportion of investment on working capital is more in medium (89.71 %) units than in large (87.58 %) and small (85.35 %) size processing units.

The capital investment increased with the size of units, because of the increased requirement of fixed and working capital. The major part of the working capital invested was for procurement of cashewnut (raw material) which was seasonal in nature.

Table no. 4.20
Capital investment pattern in cashew processing units.

Rs. in lakh)

Sr. No.	Size of the processing unit	Fixed capital	Working capital	Total
1.	Small	5.61 (14.65)	32.68 (85.35)	**38.29** **(100.00)**
2.	Medium	10.28 (10.29)	89.65 (89.71)	**99.93** **(100.00)**
3.	Large	17.62 (12.42)	124.30 (87.58)	**141.92** **(100.00)**
4.	Overall	11.03 (11.68)	83.44 (88.32)	**94.47** **(100.00)**

Source : Result of data analysis

b) Procurement of raw material :

As the production of raw nuts is seasonal in nature the processors have to purchase the nuts in that season and store them for processing. The monthwise quantity of raw nuts procured by the units is given in Table 4.21.

Table no. 4.21

Frequency of procurement of cashewnut by cashew processing units.

(Figures in quintals)

Sr. No.	Size of the processing unit	Months of procurement					Total
		April	May	June	July	August	
1.	**Small**	246.15 (37.72)	236.11 (36.18)	95.28 (14.60)	46.66 (7.15)	28.39 (4.35)	**652.59 (100.00)**
2.	**Medium**	711.49 (40.95)	663.53 (38.19)	159.15 (9.16)	120.58 (6.94)	82.69 (4.76)	**1737.44 (100.00)**
3.	**Large**	787.27 (32.84)	867.35 (36.18)	530.52 (22.13)	104.29 (4.35)	107.88 (4.50)	**2397.31 (100.00)**
4.	**Overall**	603.28 (37.52)	601.42 (37.14)	244.57 (15.10)	95.52 (5.90)	74.60 (4.61)	**1619.39 (100.00)**

Source : Result of data analysis

Table 4.21 revealed that, at overall level on an average, the quantity of cashewnut procured was highest in the months of April and May, which was 603.28 q. (37.25%) and 601.42 q. (37.14%), respectively. In the months of June, July and August, it is 244.57 q. (15.10 %), 95.52 q. (5.90%) and 74.60 q. (4.61%), respectively. The total quantity procured is 1619.39 q. at the overall level.

When referred to the categories of cashew processing units individually, it is found that the small processing units procured maximum, that is 246.15 q. (37.72%) during the month of April and minimum, that is 28.39 q. (4.35%) in the month of August. Similarly, in case of medium processing units, the quantity of cashewnut procured is maximum, that is 711.49 q. (40.95%) in April and

minimum, that is 82.69 q. (4.76%) during August. In the large processing units, maximum quantity of 867.35 is procured during the month of May and minimum quantity of 104.29 q. during the month of July. This indicated that all the processing units procured maximum quantity of raw cashewnut during April and May month for processing unit. This is because heavy arrivals of cashewnut during the month of April and May and the arrivals of cashewnut decreased in the month of June, July and August. The same trend in frequency of procurement has been found in almost all the size groups of processing units.

4.08 Cost of processing :

The cost of processing is the most important factor on which the success or failure of the unit depends. More the cost of processing, lesser is the profit margin to the unit and vice-versa. The cost of processing per quintal of nuts incurred by the units is shown in Table 4.22.

Handling charges, drying, salary, wages, bonus, packing material, fuel charges, taxes and rent, depreciation, interest on fixed and working capital are the items of cost of processing. It is observed from the table that, the cost of processing per quintal of cashewnut is Rs. 872.65 in small group, Rs. 940.46 in medium group and Rs. 937.95 in large group whereas at overall level per quintal cost of processing is Rs. 938.45. The per quintal cost of processing exhibited positive relationship with the scale of production. This revealed that, processing is costly in the units of large capacities. The major cost is interest on working and fixed capital. At the overall level, it is Rs. 429.21 (45.74%) and Rs. 68.11 (7.26%) respectively. The other important items have been salary and wages

(27.90%), depreciation (2.39%), packing material (10.20%), bonus, handling and drying (2.24% each) and fuel charges (1.28%).

Table no. 4.22
Per quintal cost of cashew processing

(Figures in Rs.)

Sr. No.	Item of cost	Small	Medium	Large	Overall
1.	Handling and drying	19.92	20.72	20.86	21.00
		(2.28)	(2.20)	(2.22)	(2.24)
2.	Salary and wages	209.93	274.54	261.54	261.83
		(24.06)	(29.19)	(27.88)	(27.90)
3.	Bonus	16.86	22.45	20.86	21.00
		(1.93)	(2.39)	(2.22)	(2.24)
4.	Packing material	79.68	99.00	96.36	95.72
		(9.13)	(10.53)	(10.27)	(10.20)
5.	Fuel charges	13.79	9.78	15.85	12.97
		(1.58)	(1.04)	(1.69)	(1.28)
6.	Taxes and rent	4.60	4.03	4.17	4.32
		(0.53)	(0.43)	(0.44)	(0.46)
7.	Depreciation	21.70	19.22	28.34	22.44
		(2.49)	(2.04)	(3.02)	(2.39)
8.	Interest on				
	a) Fixed capital	85.97	59.17	73.50	68.11
		(9.85)	(6.29)	(7.84)	(7.26)
	b) Working capital	417.14	429.82	414.80	429.21
		(47.80)	(45.70)	(44.22)	(45.74)
9.	Other charges	3.06	1.73	1.67	1.85
		(0.35)	(0.18)	(0.18)	(0.20)
	Total	872.65	940.46	937.95	938.45
		(100.00)	(100.00)	(100.00)	(100.00)

Source : Result of data analysis

4.08.1 Quantity of main product and by-product :

The quantity of main product and by-product per quintal of cashewnut processed is presented in Table 4.23. Kernel is the main product while shell, testa (husk) and rejection are the by-products received from cashewnut processing.

At the overall level, one quintal of cashewnut when processed resulted in 24.70 kilograms of kernels (24.70%). 70.00 kilograms of shells (70.00%) and 3.00 kilograms of testa (3.00%) and 2.30 kilograms of rejection (2.30%).

Table no. 4.23
Quantity of main product and by-product per quintal of cashewnut processed

(Figures in kgs.)

Sr. No.	Items of cost	Size of the processing unit			Overall
		Small	Medium	Large	
1.	Kernels	24.33	24.92	24.22	24.70
2.	Shells	70.00	70.00	70.00	70.00
3.	Testa (Husk)	3.00	3.00	3.00	3.00
4.	Rejection	2.67	2.08	2.78	2.30

Source : Result of data analysis

Outturn of main product, is less in small processing units, that is 24.33 kgs. and more in medium processing units, that is 24.92 kgs. Outturn of by-products, that is, shells and testa (husk) is 70 kgs. (70.00 %) and 3 kgs. (3.00 %), respectively in all the sizes of processing units. However the rejections have been high in large units, that is 2.78 kgs. and low in medium processing units, that is 2.08 kgs.

It is noticed that a negative relationship existed between the outturn of kernels and rejection. While outturn of other two products, that is, shell and testa (husk) remained same, in terms of quantity in all the groups.

4.08.2 Quality parameters of cashew kernels :

The quality parameters considered by the cashew processors in grading of cashew kernel are listed below,

a) **Shape and size :** Cashew kernel should be bigger in size and bean shaped

b) **Colour :** Cashew kernel should have white, pale ivory or light ash colour

c) **Moisture percentage :** It should not be more than 4 to 5 per cent

d) **Wholeness :** Cashew kernel should not be broken or damaged either manually or by insects. It should be compact and free from testa.

e) **Counts :** It represents the number of cashew kernels present per pound. Count of 180, is considered as superior quality. Lower the count superior is the quality.

4.08.3 Recovery of kernels as per grade

Table 4.24 indicates the recovery of kernels as per grade from one quintal of cashewnut. The kernels obtained from processing of cashewnut are sorted into different grades as per the specifications as mentioned in export text.

Table no. 4.24
Recovery of kernels as per grade from one quintal of cashewnut processed
(In kgs.)

Sr. No.	Grade designation	Small	Medium	Large	Overall
	I. Wholes				
1.	W180	0.35	0.36	0.47	0.39 (1.58)
2.	W210	0.58	0.66	0.68	0.64 (2.59)
3.	W240	4.46	4.66	4.70	4.60 (18.62)
4.	W320	8.11	8.34	8.30	8.25 (33.40)
5.	SW 320	2.46	3.32	3.00	2.93 (11.86)
6.	SW	1.28	1.85	2.02	1.85 (7.49)
7.	SSW	0.41	0.29	0.84	0.51 (2.06)
8.	DW	0.41	0.63	0.42	0.49 (1.98)
9.	KW	0.42	0.28	-	0.27 (1.10)
	Wholes	**18.48**	**20.49**	**20.43**	**19.93 (80.69)**
	Splits	**1.25**	**1.45**	**1.09**	**1.27 (5.14)**
	Butts	**2.08**	**0.53**	**0.25**	**1.02 (4.12)**
	Pieces	**2.52**	**2.45**	**2.45**	**2.48 (10.05)**
	Grand Total	**24.33**	**24.92**	**24.22**	**24.70 (100.00)**

Source : Result of data analysis

It is observed from the table that, at the overall level the whole kernels obtained, accounted for 80.69 per cent (19.93 kilograms), which is more than

pieces (10.05 per cent), splits (5.14 per cent) and butts (4.12 per cent). Of the cashew kernel grades recovered from one quintal of cashewnut, W320 accounted to 8.25 kilogram (33.40% per cent), followed by W240 accounting to 4.60 kilogram (18.62 per cent), SW 320 according to 2.93 kilogram (11.86 per cent) and SW accounting to 1.85 kilogram (7.49 per cent). Although there have been several other grades, their percentage of recovery is very meager. Totally there have been 26 grades of cashew kernels but only 12 grades have been found to be used for the kernels sorting in the district.

4.08.4 Per unit cost and returns from processing of nuts :

The items of cost included have been working expenses, marketing charges, interest on capital and depreciation charges. It is seen from the Table 4.25 that at the overall level per unit cost of processing is worked out to Rs. 95.95 lakh. Out of the total cost, Rs. 83.44 lakh (86.96%) is incurred as working expenses. The next important item of cost is interest on working capital as well as fixed capital accounted for 6.96 per cent and 1.15 per cent, respectively. Marketing charges accounted for Rs. 4.38 lakh (4.56%) and share of depreciation is very negligible (0.36 per cent).

Regarding group wise per unit total cost incurred on cashew processing in small group, medium group and large group it is Rs. 37.72 lakh, Rs. 102.89 lakh and Rs. 143.11 lakh respectively. The share of different items of cost is more or less similar as that of the overall level. The quantity of kernels received is 158.78 q., 432.97 q., 592.62 q. in small, medium and large processing units, respectively, with the overall average quantity of 399.99 q.

The per unit cost and returns from processing of nuts is given in Table 4.25.

The value received for kernels and value of by products is considered as total returns. The per unit total returns worked out to Rs. 46.05 lakh in small group, Rs. 128.11 lakh in medium group and Rs. 185.91 in large group with the overall average returns of Rs. 119.88 lakh. The net returns worked out to Rs. 8.33 lakh in small group, Rs. 25.22 lakh in medium group and Rs. 42.80 lakh in large group. At the overall level, the net returns worked out to Rs. 23.93 lakh. Considering the total cost of processing and quantity of kernels received, the per quintal cost of production of kernel is worked out. It is Rs. 22418 at the overall level, whereas it is observed that per quintal cost of production of kernel is found to be increase with increase in size of factory, which is Rs. 22156 in small group. Rs. 22175 in medium group and Rs. 22578 in large group.

Table no. 4.25
Per unit cost and returns from processing of nuts

(Figures in lakh rupees)

Sr. No.	Particulars	Small	Medium	Large	Overall
A	**Cost**				
1.	Working expenses	32.68 (86.64)	89.65 (87.13)	124.30 (86.86)	83.44 (86.96)
2.	Marketing expenses	1.74 (4.61)	4.73 (4.60)	6.47 (4.52)	4.38 (4.56)
3.	Interest on working capital @ 16% for 6 months	2.61 (6.92)	7.17 (6.97)	9.94 (6.95)	6.68 (6.96)
4.	Interest on fixed capital @ 10%	0.56 (1.48)	1.03 (1.00)	1.76 (1.23)	1.10 (1.15)
5.	Depreciation	0.13 (0.34)	0.31 (0.30)	0.64 (0.45)	0.35 (0.36)
	Total cost	**37.72 (100.00)**	**102.89 (100.00)**	**143.11 (100.00)**	**95.95 (100.00)**
B	**Returns**				
6.	Quantity of kernels received (q)	158.78 (24.33)*	432.97 (24.92)*	592.62 (24.72)*	399.99 (24.70)*
7.	Returns from (Rs.)				
	a) Main product	43.51	121.23	176.60	113.60
	b) By product	2.54	6.88	9.31	6.28
	Total Returns	**46.05**	**128.11**	**185.91**	**119.88**
8.	Net return (Rs.)	8.33	25.22	42.80	23.93
9.	Per quintal processing cost of kernels (Rs.)	22156	22175	22578	22418

Source : Result of data analysis

* Figures in parentheses indicate recovery percentage in cashewnut processing.

4.09 Cost and return structure involved in cashew processing :

Cost and return from processing of cashewnut is presented in Table 4.26. The total cost incurred by the processing units is Rs. 95.95 lakh at the overall level. It is more in large units (Rs. 143.11 lakh) than in medium (Rs. 102.89 lakh) and small processing units (Rs. 37.72 lakh).

Net returns at the overall level worked out to Rs. 23.93 lakh for cashewnut processed. It is more in large units (Rs. 42.80 lakh) than in medium (25.22 lakh) and small processing units (Rs. 8.33 lakh). It is observed that cashew processing units at the overall level gained profits to the tune of Rs. 23.93 lakh that is, Rs. 1.25 on every rupee of investment. Large processing units gained higher profits, (Rs. 1.30) as compared to medium (Rs. 1.25) and small processing units (Rs. 1.22). This indicated profitability for higher scale of production.

Table no. 4.26
Cost and return structure of cashew processing units.

(Rs. in lakh)

Sr. No.	Particulars	Size of the processing unit			Overall
		Small	Medium	Large	
1.	Sales realization	46.05	128.11	185.91	119.88
2.	Cost of				
	a. Production	35.98 (95.39)	98.16 (95.40)	136.64 (95.48)	91.57 (95.44)
	b. Marketing	1.74 (4.61)	4.73 (4.60)	6.47 (4.52)	4.38 (4.56)
	Total	**37.72 (100.00)**	**102.89 (100.00)**	**143.11 (100.00)**	**95.95 (100.00)**
3.	Net returns	8.33	25.22	42.80	23.93
4.	Benefit cost ratio	1.22	1.25	1.30	1.25

Source : Result of data analysis

4.10 Performance of cashew processing units :

4.10.1 Capacity utilization in cashew processing units :

The installed and utilized capacity of the cashew processing units is presented in Table 4.27. The annual overall installed capacity of the cashew processing unit is 2529.08 q., but these processing units processed only 1619.39 quintals of cashewnuts in the year. Thus, the overall picture of utilized capacity in relation to installed capacity during 2008-2009 indicated that only 64.05 per cent of the total capacity is utilized. On an average the processing units worked for 251.15 days in a year. Thus, their installed capacity per day is 10.07 quintals, but the utilized capacity per day is only 6.45 quintals.

Table no. 4.27

Capacity utilization of cashew processing units.

Sr. No.	Size of the processing units	Installed capacity per day (Qtls.)	Number of working day	Annual installed capacity (Qtls.)	Annual Quantity processed (Qtls.)	Quantity processed per day (Qtls.)	Capacity utilization (Percentage)
1.	Small	5.17	187.40	968.86	652.59	3.48	67.31
2.	Medium	10.24	261.24	2675.10	1737.44	6.65	64.94
3.	Large	14.68	298.76	4385.80	2397.31	8.02	54.63
4.	Overall	10.07	251.15	2529.08	1619.39	6.45	64.05

Source : Result of data analysis

The installed capacity is lower in small processing units, that is 5.17 q. per day as compared to other size groups of processing units. It is higher in large processing units, that is 14.68 q. per day. Similarly the number of working days have been minimum in small processing units, that is 187.40 days per year and maximum in large processing units with 298.76 days per year. This lead to an maximum amount of annual installed capacity (4385.80 quintals) in large processing units, as compared to 2675.10 quintals and 968.86 quintals in medium and small processing units respectively. Similarly the annual quantity of raw nut processed is comparatively higher in large size units, that is 2397.31 quintals as compared to 1737.44 quintals in medium units and 652.59 quintals in small units. However, the proportion of capacity utilization by percentage is higher in small processing units, accounting 67.31 per cent of the installed capacity as compared to small and large processing units, that is 64.94 per cent and 54.63 per cent respectively. This revealed that capacity utilization is better in small size processing units. The installed capacity is high in large processing units and low

in small processing units which is directly related to the amount of fixed capital invested.

4.10.2 Added value :

Due to processing of agricultural produce its sale value increases. This increase in value because of processing over its original value is called as added value. The added value in cashew processing is worked out and given in Table 4.28.

Table no. 4.28
The value addition per quintal of cashewnut processed by the units.

Sr. No.	Particulars	Small	Medium	Large	Overall
1.	Sale value of kernels obtained per quintal of cashewnut, (Rs.)	6667	6978	7367	7015
2.	Purchase value of cashewnuts (Rs.)	4660	4728	4764	4734
3.	Gross value added (Rs.)	2007	2250	2603	2281
4.	Per quintal processing cost	872.65	940.46	937.95	938.45
5.	Net value added	1134.35	1309.54	1665.05	1342.55
6.	Added value (%)				
	a) Gross	43.07	47.59	54.64	48.18
	b) Net	24.34	27.70	34.95	28.36

Source : Result of data analysis

The per quintal gross added value is worked out by deducting cost of raw material charges from the gross value received and net value added is worked out by deducting processing cost from gross added value received. The gross added value and net added value are given in percentage terms. It is seen form the

Table 4.28, the gross added value in cashew processing is 43.07 per cent, 47.59 per cent and 54.64 per cent in small, medium and large group respectively. Whereas net added value in cashew processing is 24.34 per cent 27.70 per cent and 34.95 per cent respectively. At the overall level the gross added value came to 48.18 per cent and net added value came to 28.36 per cent. It is observed from the table that, as the working season increased the gross added value is found to increase. The overall gross value added by processing unit is Rs. 2281 per quintal of cashewnut processed, which accounted for 48.18 per cent. When the percentage of value addition by processing activity in different sizes of processing unit is considered it is found to be higher in large units (54.64%) than in small units (43.07%). This may be because of higher sale value of cashew kernel obtained by large unit than other units.

4.11 Résumé:

This chapter contains two parts, first part deals with the production of cashewnut and second part with processing of cashewnut. In the present age of competition, the success of any enterprise in the business of agriculture can be judged on the basis of economic benefits accured to entrepreneur from a particular crop or livestock enterprise. It has become necessary for the farmers to look towards agriculture as a commercial proposition, particularly fruit crops like cashew which has long economic life of almost 40 years. Returns from cashew are spread over longer period, on the other hand during development stage of orchard, large investment is made in establishment of orchard.

The chapter contains the production performance of raw cashewnut, investment pattern in cashew processing unit, cost and return structure in cashew processing unit, performance of cashew processing unit and the problems faced by the unit and measures for effective functioning of the unit.

The average age of the cashew grower is 48.70 years. This indicated that, cashew growers have been in adult age group. It is observed that, overall educational score is 10.64. This indicates that by and large the cashew growers in the study area have been educated from 10^{th} to 11^{th} standard. Size of the family is the important factor influencing the supply of farm labour. It also affects income generating capacity of farmer's family.

The cashew orchard starts bearing generally after five years from the year of plantation. The establishment cost includes the variable, material and fixed costs. The cashew growers have to invest considerable amount in the form of inputs for establishment of the cashew orchard up to its bearing stage. Considering above changes, the approximate cost of establishment of local varieties of cashew orchard is estimated to Rs. 87430.56.

As regards the per hectare quantities of physical inputs utilized for HYV cashew orchard more than the local variety of cashew orchard. Per hectare net returns obtained from local varieties have been Rs. 24219.20 and the benefit cost ratio is 1.80. In case of HYV, per hectare net returns obtained have been as Rs. 46897.38 and benefit cost ratio is 2.00.

The selected units have been classified as small having working season up to 225 days, medium working season between 225 to 275 days and large,

working season above 275 days. The average establishment period is 26.8 years. The units have been also classified on the basis of type of ownership as partnership and individual. There have been 13 units (72.22%) owned and managed by individual, while remaining 5 units (27.78%) in partnership.

The working of the units is seasonal in nature. There is a great variation in the working season from unit to unit. It is seen that average working season of unit in small, medium and large group is 187.40 days, 261.24 days and 298.76 days, respectively. The per unit male employment is 2.4 days, 4.6 days and 3.2 days in small, medium and large group respectively, while per day female employment is 19.2 days, 40.3 days and 52.4 days in small, medium and large group, respectively.

The comparison between the small, medium and large size processing units revealed that, the total fixed capital investment increased with the increase in size of the cashew processing units. In all the three size groups the fixed capital investment on building and land accounted for a major share followed by machinery and equipment, infrastructure and other fixtures. Actual expenditure incurred on purchase of raw nut, salary, wages, packing material, taxes, rent, fuel etc. have been included in working capital

At the overall level the per unit working capital investment is found to be Rs. 83.44 lakh. Major amount is spent on the purchase of raw cashewnut, from the total working capital investment in running the cashew processing industry. It is found that, purchase of raw nuts shared Rs. 30.41 lakh (93.05%) in small

group, Rs. 82.14 lakh (91.62%) in medium group and Rs. 114.20 lakh (91.87%) in large group.

The average aggregate capital invested per processing unit is Rs. 94.47 Lakh. The investment pattern of the cashew processing units revealed that, there is a direct relationship between total capital invested and size of the processing units. The capital investment increased with the size of units, because of the increased requirement of fixed and working capital.

At overall level on an average, the quantity of cashewnut procured is highest in the months of April and May, which is 603.28 q. (37.25%) and 601.42 q. (37.14%), respectively. In the months of June, July and August, it is 244.57 q. (15.10 %), 95.52 q. (5.90%) and 74.60 q. (4.61%), respectively. The total quantity procured is 1619.39 q. at the overall level.

The cost of processing is the most important factor on which the success or failure of the unit depends. More the cost of processing, lesser is the profit margin to the unit and vice-versa. Handling charges, drying, salary, wages, bonus, packing material, fuel charges, taxes and rent, depreciation, interest on fixed and working capital are the items of cost of processing. The cost of processing per quintal of cashewnut is Rs. 872.65 in small group, Rs. 940.46 in medium group and Rs. 937.95 in large group whereas at overall level per quintal cost of processing is Rs. 938.45. The per quintal cost of processing exhibited positive relationship with the scale of production. This revealed that, processing is costly in the units of large capacities. The major cost is interest on working

and fixed capital. At the overall level, it is Rs. 429.21 (45.74%) and Rs. 68.11 (7.26%) respectively.

At the overall level, one quintal of cashewnut when processed resulted in 24.70 kilograms of kernels (24.70%). 70.00 kilograms of shells (70.00%) and 3.00 kilograms of testa (3.00%) and 2.30 kilograms of rejection (2.30%).

At the overall level, the net returns worked out to Rs. 23.93 lakh. Considering the total cost of processing and quantity of kernels received, the per quintal cost of production of kernel is worked out. It is Rs. 22418 at the overall level, whereas it is observed that per quintal cost of production of kernel is found to be increase with increase in size of factory, which is Rs. 22156 in small group. Rs. 22175 in medium group and Rs. 22578 in large group.

Due to processing of agricultural produce its sale value increases. This increase in value because of processing over its original value is called as added value. The per quintal gross added value is worked out by deducting cost of raw material charges from the gross value received and net value added is worked out by deducting processing cost from gross added value received. The gross added value in cashew processing is 43.07 per cent, 47.59 per cent and 54.64 per cent in small, medium and large group respectively. Whereas net added value in cashew processing is 24.34 per cent 27.70 per cent and 34.95 per cent respectively. At the overall level the gross added value came to 48.18 per cent and net added value came to 28.36 per cent. It is observed from the table that, as the working season increased the gross added value is found to increase. The next chapter contains problems and prospects of cashewnut processing industry.

CHAPTERR V

PROBLEMS AND PROSPECTS OF CASHEWNUT PROCESSING INDUSTRY

5.01 Introduction :

The Indian Cashew Industry is export oriented and hence called has dollar earning crop of the country. It provides employment to more than 5 lakh people both directly and indirectly, particularly in the rural areas. Although India is largest producer, processor, consumer and exporter in the world accounting for 26.40 per cent and 46.09 per cent of the world production and export respectively during 2006-07. Even though India is importing sizable quantity of raw cashewnut for value addition (processing) in the country. There is huge scope to increase productivity by putting varkas land under cashew plantation and existing local plantation need to be brought under HYVs.

5.02 Problems :

Regarding the problems of processing factories, the bank finance was not easily available and high interest rate of bank have been the most prominent. Shortage of labour, non availability of good quality raw material, frequent failure of electricity, non availability of skilled labour have been the major problems.

The frequency distribution of sample units according to the problems encountered is given in Table 5.1.

Table 5.1

Frequency distribution of sample units according to the problems faced by them

Sr. No.	Problem	Small	Medium	Large	Overall
1.	Shortage of labour	1	7	5	13 (72.22)
2.	Bank finance was not readily available	5	8	5	18 (100.00)
3.	High interest rate of bank	5	8	6	18 (100.00)
4.	Graded and good quality raw material was not available	2	8	5	15 (83.33)
5.	Non imposition of purchase tax	1	6	5	12 (66.67)
6.	Frequent failure of electric supply	5	8	3	16 (88.89)
7.	Non availability of skilled labour	4	6	4	14 (77.78)
8.	Rate for raw material not as per grade	3	4	3	10 (55.56)
9.	Non availability of subsidy from Government	4	-	-	4 (22.22)
10.	Heavy investment for purchase of raw-material	2	4	4	10 (55.56)

(Figures in the parentheses are percentages of total factories)

It is observed from the table that, non availability of bank finance and high interest rate on loan have been the major problem faced by all the sample factories. Frequent failure of electricity supply and graded and good quality raw material is not available have been the problems faced by majority of the sample processing units (more than 80.00 %). Non availability of skilled labour is one of the problems faced by 77.78 per cent units while shortage of labour is the

problem expressed by one unit in small group. Seven units in medium group and five units from large group of processing unit. Ten units (55.56%) express that when there is heavy demand in the market for raw material, the rates for raw material rate have been not appropriate as per grades, and therefore acute loss occurred due to less recovery. About two third units expressed that purchase tax is not imposed by the Government in Maharashtra. Therefore, traders and processors (out of the state) purchase the raw material at lower rate and without tax in Maharashtra. When processors from our state visit markets in Goa and Karnataka State to purchase raw material they had to pay purchase tax. Therefore imposition of purchase tax would safeguard the interest. Four units expressed that the subsidy is not available easily and timely. More than fifty per cent processors expressed that heavy investment in regards for purchase of raw material is required and because of high interest cost, the business become non attractive in some cases.

5.03 Prospects :

The Cashew (Anacardium occidentale Linn.) which belongs to the family Anacardiaceae, is an economically important tropical tree crop. It ranks second only to Almond, among the nine tree nuts of importance in the world trade. In India it soon established itself all along the west coast and later in the east coast. For several centuries cashew is merely regarded as a sturdy perennial tree yielding good soft wood and producing a rather delicious juicy apple. Nuts have been thrown as its hard shell contained corrosive liquid. India is the largest producer of raw cashewnut in the world and accounts for 43 per cent of world

production. As years rolled the interest in the nut slowly developed and extraction of kernel is discovered. More and more people world over have been consuming this unique nut, making the cashew an economic product.

Cashewnut processing on commercial basis was initially started in Mangalore, in Karnataka. In 1927 the business started in Quilon of Kerala, later it became the centre of trade. In India during 1999 there have been 1132 cashew processing units spread over several states employing 3.5 lakh workers. Cashew kernel is the main product, and shell and testa (husk) are the by-products of cashewnut. This unit provides employment to more than 5 lakh workers, 95 per cent of them are women labours.

Maharashtra is one of the leading cashew growing state. In Maharashtra, more than 90 per cent area under cashew is concentrated in Konkan region. Cashew possesses high economical as well as nutritive value. In spite of it's importance it's cultivation has not fetched the careful attention of farmers, due to lack of knowledge about standard package of practices, timely unavailability of good quality planting material and inadequate market infrastructure facility. Cashew is seasonal in nature and price fluctuation due to various agencies involved in marketing of nuts is a major problem in this fruit crop. It is therefore, highly essential to standardize the storage methodology and marketing facility for this crop. If carefully attention is paid towards this crop it would support the economy of farmer and the region sustainability for the long life investment.

Disposal of fruits involves a long chain of middlemen which reduces the share of producer in consumer's price. There is lack of any collective

organization among the producers, while village merchant and retailers are well organized. Cashew is an important fruit crop in South Konkan region. It is the major cash crop of this region thriving well under agro-climatic condition of the districts.

5.04 Suggestions :

The frequency distribution of units according to the suggestions made by the unit owners is given in Table 5.2.

Table 5.2

Frequency distribution of units according to suggestions made by processors of cashewnut

Sr.No.	Suggestions made	Small	Medium	large	Overall
1.	Reasonable and gradewise price for raw nut to be fixed by Govt.	4	4	5	13 (72.22)
2.	Bank finance should be easily available	5	8	5	18 (100.00)
3.	Interest rate should be low	5	8	5	18 (100.00)
4.	Imposition of purchase tax by Govt.	1	6	5	12 (66.67)
5.	Training on cashew processing especially for grading and breaking of nuts be given	4	6	4	14 (77.78)
6.	Retail shops at APMC, Washi be made available	-	2	1	3 (16.67)
7.	Tax relief be given	2	4	4	10 (55.56)
8.	Subsidy be given in time	4	-	-	4 (22.22)

(Figures in the parentheses are percentage to the total factories)

From table 5.2, it is seen that, all the sample unit owners suggested that bank finance should be made easily available and interest rate should be low. Training on cashew processing especially on breaking of raw-nuts and grading need to be arranged by the concerned institute have been the suggestions made by 14 processing units (77.78 %). Reasonable price for raw nut should be fixed by the government and imposition of purchase tax have been the suggestions made by 13 units (72.22%) and 12 units (66.67%) respectively. The suggestion regarding tax relief be given was expressed by 10 units (55.56%). Whereas timely payment of subsidy suggestions made by four units (22.22%).

5.05 Strategy :

On the basis of analysis made and its recapitulation, some strategy had drawn for progress of cashew growers and industry. This will useful to see working of the cashew processing units at micro perspective and put them on the path of balanced and rapid development leading to overall development and prosperity in rural areas and consequential reduction in urban problems. Development of this unit on massive scale is essential for bridging up the widening gap between rural and urban areas.

1. Even though, establishment of cashew orchard involved high capital cost and long gestation period, the investment is considerably more profitable and economically feasible in HYV orchard than local variety cashew orchard. Therefore cultivators should undertake HYV cashew plantation on large scale.

2. It was observed that maintaining a cashew orchard in adult stage is highly profitable, so the farmer need policy support. As per Horticulture Development Programme in the state, new plantation of cashew is to be done by planting grafts of HYVs and new cashew plantation by local varieties should be prohibited.

3. Processing unit requires huge amount of raw material and gives around 90 per cent of female employment in the region. The rapid growth of this unit need to be encouraged. In view of this, wasteland in the region need to brought under plantation crops by inducing large scale cultivation and processing operation as well. It is essential also to promote productivity level also. Due to this benefits that could be derived have been import substitution, development of waste land, improvement of ecology, prevention of soil erosion, employment generation etc.

4. Grading and sorting of raw nuts should be done at the production site. Since grading in vogue was improper. This could help the processors to procure superior quality cashewnut to recover higher percentage of superior grade cashew kernel. It will also reduce the cost incurred on dry age and facilitate to earn more return.

5. All the unit owners are facing the problem of credit. The credit was not available in adequate quantity and at proper time. Because of this problem, they could not purchase sufficient quantity of raw material which was available in nearby area. To overcome this problem, it is

necessary to make modifications in lending policy of financing institute. Another important aspect related with credit was that reduction in the interest rate. This may give good encouragement to the industry.

6. Low capacity utilization by the cashew processors is hindering the progress of this industry. To overcome this problem, Government may improve electricity supply failure, revise credit policy by way of providing easy credit availability and lower interest rate.

7. Co-operative cashew processing units are required to be established in this area for getting additional benefit in income and employment.

5.06 Résumé :

Cashewnut processing on commercial basis was initially started in Mangalore, in Karnataka. In 1927 the business started in Quilon of Kerala, later it became the centre of trade. Maharashtra is one of the leading cashew growing state. In Maharashtra, more than 90 per cent area under cashew is concentrated in Konkan region. Cashew possesses high economical as well as nutritive value. In spite of it's importance it's cultivation has not fetched the careful attention of farmers, due to lack of knowledge about standard package of practices, timely unavailability of good quality planting material and inadequate market infrastructure facility. Cashew is seasonal in nature and price fluctuation due to various agencies involved in marketing of nuts is a major problem in this fruit

crop. It is therefore, highly essential to standardize the storage methodology and marketing facility for this crop

Regarding the problems of processing factories, the bank finance was not easily available and high interest rate of bank have been the most prominent. Shortage of labour, non availability of good quality raw material, frequent failure of electricity, non availability of skilled labour have been the major problems.

On the basis of analysis made and its recapitulation, some strategy had drawn for progress of cashew growers and industry. Processing unit requires huge amount of raw material and gives around 90 per cent of female employment in the region. Grading and sorting of raw nuts should be done at the production site. Since grading in vogue was improper. All the unit owners are facing the problem of credit. The credit was not available in adequate quantity and at proper time. Because of this problem, they could not purchase sufficient quantity of raw material which was available in nearby area. To overcome this problem, it is necessary to make modifications in lending policy of financing institute. Low capacity utilization by the cashew processors is hindering the progress of this industry. To overcome this problem, Government may improve electricity supply failure, revise credit policy by way of providing easy credit availability and lower interest rate. Co-operative cashew processing units are required to be established in this area for getting additional benefit in income and employment.

The next chapter contains conclusions on production of cashewnut and processing of cashewnut.

CHAPTER VI

CONCLUSION

6.01 Introduction :

In Maharashtra state, the production and productivity of cashewnut is highest in the country, as majority of plantation are developed primary by clones of high yielding varieties and also cultivators are adopting better management practices. Maharashtra topped cashew production with 1,83,000 MT followed by Andhra Pradesh at 92,000 MT. Maharashtra also ranked 1st in productivity with 1300 kg/hect followed by West Bengal 950 kg/hECTARE and Kerala 900 kg/hect (Venkatesh, 2007).

The following conclusions on production of cashewnut and processing of cashewnut are drawn from the present study.

6.02 Production :

1. Cashew is the perennial cash crop which is having gestation period of five years. In this period to establish a cashew orchard growers have to incur huge expenditure. It is observed from the study that, on an average an amount of Rs. 114610.83 was required for establishing one hectare of HYV cashew orchard, while the approximate cost of establishment of local cashew orchard was worked out to Rs. 87430.56.
2. In establishing a cashew orchard (HYV) highest amount (34.50%) was incurred on labour wages. Out of total establishment cost, 42.04 per cent was incurred during the first year, 15.92 per cent during second year, 15.78 per cent during third year, 13.25 per cent during fourth year and

13.01 per cent during fifth year. This indicated that, maximum expenditure was incurred during the first year.

3. Regarding group wise cost of cultivation of cashew orchard was observed that per hectare cost of cultivation was considerably maximum, (Rs.46793.29) in HYV cashew orchard than (Rs.30257.40) in local variety cashew orchard. In local variety cashew orchard the share of cost 'A' was 26.35 per cent and cost 'B' was 86.98 per cent. In HYV cashew orchard the share of cost 'A' was 29.49 per cent and cost 'B' was 87.92.
4. Regarding profitability of bearing cashew cultivation, in study area the per hectare net profit was considerably higher in HYV cashew orchard (2.00) than local variety cashew orchard (1.80) as indicated by benefit cost ratio.

6.03 Processing :

1. The cashew processing unit in the region had provided 1.92 lakh day employment. Out of the total employment, nearly 92.00 per cent was female labour employment.
2. The average capital investment per unit was Rs. 94.47 lakhs. The investment on working capital was more (88.32%) than the fixed capital (11.68%) of the total working capital invested, the purchase of raw nuts shared about 91.87 per cent.
3. The per quintal cost of processing was Rs. 938.45 and exhibited positive relationship with the scale of production.

4. One quintal of cashewnut when processed resulted in 24.70 kgs of kernels. The gross and net value added came to 48.18 per cent and 28.36 per cent, respectively. The picture of utilized capacity in relation to installed capacity was to the tune of 64.05 per cent of the total capacity utilized. The cost-benefit ratio for unit was 1.25.

5. Major problems faced by the unit have been mainly related with finance, followed by quality of raw material, labour, electricity supply etc.

6.04 Résumé :

On an average an amount of Rs. 114610.83 was required for establishing one hectare of HYV cashew orchard, while the approximate cost of establishment of local cashew orchard was worked out to Rs. 87430.56. In establishing a cashew orchard (HYV) highest amount (34.50%) was incurred on labour wages. Regarding group wise cost of cultivation of cashew orchard was observed that per hectare cost of cultivation was considerably maximum, (Rs.46793.29) in HYV cashew orchard than (Rs. 30257.40) in local variety cashew orchard. Regarding profitability of bearing cashew cultivation, in study area the per hectare net profit was considerably higher in HYV cashew orchard (2.00) than local variety cashew orchard (1.80) as indicated by benefit cost ratio.

The cashew processing unit in the region had provided 1.92 lakh day employment. Out of the total employment, nearly 92.00 per cent was female labour employment. The average capital investment per unit was Rs. 94.47 lakhs. The investment on working capital was more (88.32%) than the fixed

capital (11.68%) of the total working capital invested, the purchase of raw nuts shared about 91.87 per cent. Major problems faced by the unit have been mainly related with finance, followed by quality of raw material, labour, electricity supply etc.

6.05 **Relevance of the study**:

At the end of this work it is felt that the study is quite relevant. It is useful to understand the cost structure of the cashew plantation and processing activities. This has direct relationship livelihood of the farmers. Some of the results of the study have thrown light on how to save cost of production and improve marketability of the same. In addition to this the study states how advantage of "Value addition" can be sought of by the farmers.

So far as geographical studies are concerned the preset works is in tune with the recent trends in Agricultural Geography. It gives idea about how to use cost-benefit analysis as a tool to understand geographical parameters. The study may be considered as good addition in the knowledge of Agricultural Geography.

6.06 **Limitations** :

Obviously, present work is not free from any limitations. The candidate is aware of the limitations regarding data collection, data analysis and exposition. The cost of production is mainly based field enquiry without any laboratory experiments. However, this may be considered as more realistic data

as it comes from the farmers who are practicing cashew cultivation in the given geographical situation. The cost structure is open for correction in different geographical situations.

The study has not taken into account probable externalities of the problems. Such external economic problems may well be understood if the study of macro-economic aggregates and policies is carried out.

It may be remarked that in depth study may be carried out in future by the same scholar or other researchers in the field of agronomy, agriculture geography and environmental management.

6.07 **Further study**:

The present work has outlined the planning of strategy how to transfer benefits of "Value Addition" to the farmers and to reduce 'risk'. However, it is not completion in the sense that proper ' action plane' suitable to different geographical situations. Therefore it may be suggested to carry out comparative cost-benefit-analysis for different area producing cashewnut.

As a part of further study it may be suggested to integrate this type of work with the scenario of globalization, national policies and environmental aspects of farming. It would be interesting to evaluate cashewnut cultivation in terms of cost, output, quality and marketability if principle of organic farming are adopted. Furthermore, it may be worth studying the impact of environmental degradation on cashew plantation.

The present work has given proper methodology to understand costing of plantation crop. It may be applicable to other plantation crops also. Therefore it may be suggested that the cost-benefit-analysis of other crops like mango, pepper, jambhul etc. may be carried out as further study.

Thus, the present work provides good academic background for various types of further studies.

6.08 **Concluding remarks**:

The present work has outline strategy to achieve development of the farmers cultivating cashew. It also has suggested the strategy that cashewnut processing activity should be carried out by farmers on co-operative basis to achieve improvement of farmers ′economic status'. Thus, the hypothesis stated in the beginning is accepted in the work.

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QUATIONAIRE SCHEDULE FOR CASHEW CULTIVATION FARMERS

"A GEOGRAPHICAL ANALYSIS OF CASHEWNUT PROCESSING INDUSTRY IN THE SINDHUDURG DISTRICT, MAHARASHTRA"

1.GENERAL INFORMATION:

a. Name of the Farmer:----------

b. House No----------Ward No----------

c. Name of the village----------Taluka----------

d. Total no. of family:

Male Female	Age 0-14	Age 15-59	Age 60<	Total
Male				
Female				
Total				

e. Experience in own agriculture : 5 / 10 / 15 / 20 years.

2**.Individual Classification of family :**

Male Female	farmers	Agri. labour	House work	Trade service	others
Male					
Female					
Total					

3.Agricultural Information:

a. Own land : Yes / No

b. Total area of the land : ---------- acare

c. Kharif area---------- acare.

Rabbi area---------- ---------- acare

Waste area----------acare.

4.Cashew cultivation:

a. Cashew cultivation year :----------

b. Varieties of cashew nursery 1 :----------

2:----------

3.----------

c. Total no. of nursery (tree) :----------

d. Cashew cultivation area----------acare.

e. Production of cashew nut per tree/year:----------kg.

e. Market price of cashewnut in Rs./kg. :----------

5.EXPENDITURE of CASHEWNUT CULTIVATION:

St.No.	Particular	1st year In Rs.	2end year In Rs.	3rd year In Rs.
01	To dug land/unit			
02	Cashew nursery/tree			
04	Fertilizer /acare			
05	Water supply /acare			
06	Medicins/ acare			
07	Compund/acare			
08	Power			
09	Labour/acare cultivation			
10	Transportation			
11	Others			

6.Irrigation:

a. Total irrigated area ----------acare.
b. Mode of irrigation : well / talav /canal / drip/other
c. Medium of irrigation: pump set/ diesel engine/other
d. irrigated crops :----------

7.Source of Income: (please tick √)

a. Main source of Income: **agriculture/business/trade/ labour/service/others**
b. Total area of the agriculture: ----------acare
c. Main crops : Mango/ Cashew/ other----------Rs.
e. Total annual income from other source: ----------Rs.

8.Source of Investment:

a. Own fund :Rs. ----------% b. Friends/Relatives :Rs. ----------%
c. Banks :Rs. ---------%
d. Problems to collect fund for cashewnut cultivation :

9.LOAN RETURN: (last three years)

No.	category	2004/05 in Rs.	2005/06 in Rs.	2006/07 In Rs.
1	Banks			
2	Friends			
3	Others			

10. SIGNATURE OF THE FARMER.----------

INTERVIEW SCHEDULE FOR UNITS/INDUSTRY

"A GEOGRAPHICAL ANALYSIS OF CASHEWNUT PROCESSING INDUSTRY IN THE SINDHUDURG DISTRICT, MAHARASHTRA"

a. Name of the unit:----------
b. Address :----------
---
c. Year of Establishment:----------
d. License No :----------
e. Distance from District place :----------km.
f. Type of ownership: (please tick √)
1.Indicidual 2.Partnership
3.Co-operative 4.Govt.undertaking 5.Any other

2.Name of the owner:----------
a. Age:----------
b. Education: S.S.C /H.S.C /Graduate/ P.G.
c. Trained / Untrained :----------
d. Experience in industry : 5 / 10 / 15 / 20 years.

3. Category of the processed cashewnut:

No.	Category Of cashewnut	Price of the cashewnut in Rs/kg	Production in kg.	Total Value In Rs.
1	I			
2	II			
3	III			
4	IV			
5	V			

4.PRODUCTS: (please tick √)
a. Single product: Cashew kernel
b. Multi products: Cashew kernel/modak/juice/jam/others

5.CATEGORY OF THE PROCESSING UNITS:

Sr.No.	Scale of unit	Production Capacity /year kg/tone.
01	Home scale	
02	Small scale	
03	Large scale	

6.SOURCE OF INVESTMENT:
a. Own fund :Rs. ----------%
b. Friends/Relatives :Rs. ----------%
c. Banks :Rs. ----------
%
d. Problems to collect fund:----------

7.FIXED CAPITAL INVESTMENT:

Sr.No.	Equipments	No/parts	Year of purchase	Rs.
01	Machinary Roasting shelling drying grading packing			
02	Land			
03	Building			
04	Furniture			
05	Godawon			
06	Vehicale			
07	Office& phones			

8.EXPENDITURE:(in Rupees)

St.No.	Particular	2004.05	2005.06	2006.07
01	Cashew nut			
02	Cashew apple			
04	Sugar			
05	Salt			
06	Packing bags			
07	Spices			
08	Power			
09	Wages			
10	Transportation			
11	Others			

9.LSBOUR INFORMATION & WAGES:

No.	Nature of Labour	Year	Male	Female	Wages /Day.Rs.
01	Skilled	2004.05			
		2005.06			
		2006.07			
02	Unskilled	2004.05			
		2005.06			
		2006.07			

10.LOAN RETURN: (last three years)

No.	category	2004/05 in Rs.	2005/06 in Rs.	2006/07 In Rs.
1	Banks			
2	Friends			
3	Others			

11. SIGNATURE OF THE OWNER.----------