ECONOMICS OF PRODUCTION AND DISPOSAL OF COCONUT IN SINDHUDURG DISTRICT (MAHARASHTRA)

THESIS

Submitted in partial fulfilment of the requirements
for the Degree of

MASTER OF SCIENCE
IN
AGRICULTURE
(AGRICULTURAL ECONOMICS)

By
MS. DUSANG PRERNA MARIA
(ADPM/20/2775)

DEPARTMENT OF AGRICULTURAL ECONOMICS
COLLEGE OF AGRICULTURE, DAPOLI

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VIDYAPEETH, DAPOLI, RATNAGIRI (M.S.) 415 712

NOVEMBER, 2022

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Under the Guidance of

Dr S. S. Wadkar

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DECLARATION OF STUDENT

I hereby declare that the experimental work and its interpretation of the Thesis entitled **"ECONOMICS OF PRODUCTION AND DISPOSAL OF COCONUT IN SINDHUDURG DISTRICT (MAHARASHTRA)"** or part thereof has neither been submitted for any other degree or diploma of any University, nor the data have been derived from any thesis/publication of any University or scientific organization. The source of materials used and all assistance received during the course of investigation have been duly acknowledged and that no part of the thesis has been submitted for any other degree or diploma.

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Date : 23/ 01/2023

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CERTIFICATE

This is to certify that the thesis entitled, **"Economics of Production and Disposal of Coconut in Sindhudurg District (Maharashtra)"** submitted for the degree of M.Sc. (Agricultural Economics) of the College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, is a bonafide research work carried out by **Ms. Dusang Prerna Maria (ADPM/20/2775)** under my supervision and that no part of this thesis has been submitted for any other degree. The Student had completed all the Course and Research requirement as per the norms in regular mode and has published one research paper from her M.Sc. work.

The assistance and help received during the course of investigation have been fully acknowledged.

Chairman
Student Advisory Committee

Place: Dapoli
Date: 23/ 01 /2023

Countersigned

Head
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THESIS APPROVAL BY THE STUDENT'S ADVISORY COMMITTEE INCLUDING EXTERNAL EXAMINER

This is to certify that the thesis entitled, **"Economics of Production and Disposal of Coconut in Sindhudurg District (Maharashtra)"** submitted by **Ms. Dusang Prerna Maria (ADPM/20/2775)** to the College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, in partial fulfillment of the requirements for the degree of M. Sc. (Agricultural Economics) in the subject having Agriculture Extension as Minor subject of Department of Extension Education has been approved by Student's Advisory Committee, Board of Studies of the Department and Evaluated by One External Examiner after an open Viva Voice examination in the presence of External Examiner on the same held on dated 17 /01 / 2023

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(Dusang Prerna Maria)

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Abbreviations

PBP	Pay-Back period
B:C Ratio	Benefit-Cost Ratio
NPV	Net Present Value
IRR	Internal Rate of Return
mm	millimeter
ml	milliliter
ha	hectare
N	Nitrogen
P	Phosphorus
K	Potassium

INTRODUCTION

CHAPTER I : INTRODUCTION

1.1 Background information.

The coconut palm (Cocos nucifera), also known as "Kalpavriksha," is one of the beneficial trees found throughout the world (trees of paradise). It also goes by the name "Tree of Life." Coconuts are a significant crop in the tropics and are believed to have originated in Indo-Malaya. It is a crop with several uses, including those of food, medicine, health drinks, fuel, fibre, and timber. The three face-like openings in the coconut shell are referred to as "coconut grinning faces" in Portuguese. Since more than 4500 BC, coconuts have been grown in tropical places, but their flavour, culinary applications, and potential health advantages have recently enhanced their popularity. The high-fat coconut meat can be dried, eaten raw, or made into coconut milk or oil. The harvested coconut also produces copra, the dried extracted meat from which coconut oil, a significant source of vegetable oil, is derived, in addition to the edible kernels and the drink made from green nuts.

Copra is one of the most significant export items throughout the South Pacific and is produced in the largest quantities in the Philippines and Indonesia. In order to make coconut milk, which may be used in cooking and as a substitute for cow's milk, the meat can also be grated and combined with water. Coir, a fibre that is highly resistant to sea water and is produced from the dry husk, is used to make ropes, mats, baskets, brushes, and brooms. The export of products made from coconuts, cash income that increases demand for other goods and services, a broad tax base for the collection of government revenue, and an abundance of raw materials and opportunities for downstream industrial development all result from the use of coconut as a source of food components.

1.1.1 Physical description of coconut

A single coconut palm, on an average yields 100 coconuts annually, and each fruits requires a year to get ripen fully. Mature coconuts are ovoid or ellipsoid in shape, are 300-400 mm (12 to 18) inches in length and 150-200 mm (6 to 8) inches in diameter which have a thick fibrous husk surrounding the familiar single seeded nut of commerce. The insignificant embryo is enclosed by a hard shell with its abundant endosperm, composed of both meat and liquid. Coconut fruits readily floats and are dispersed widely through ocean currents and by humans throughout the tropics.

1.1.2 Nutritional properties of coconuts.

The coconut has high nutrient content which is shown in Table 1.1. Coconut is a highly adaptable and necessary food item for most residents of tropical regions. It is a complete food that is high in nutrients, vitamins, and calories. Nearly all of an average-sized person's daily

requirements for key minerals, vitamins, and energy can be met by ingesting of edible meat and about 30-150 ml of water.

Table 1.1 Nutritional properties of coconut

Nutrient content per 100 g	
Carbohydrates	5.23 g
Energy	354 Kcal
Sugar	2.61 g
Fat	33.49 g
Dietary fiber	1.1 g
Protein	3.3 g
Vitamins	
Thiamine (B1)	0.03 mg (3 %)
Riboflavin (B2)	0.057 mg (5 %)
Niacin (B3)	0.08 mg (1 %)
Pantothenic acid (B5)	0.043 mg (1 %)
Vitamin B6	0.032 mg (2 %)
Folate (B9)	3 µg (1 %)
Vitamin C	2.4 mg (3 %)
Trace Metals	
Calcium	24 mg (2 %)
Iron	0.29 mg (2 %)
Magnesium	25 mg (7 %)
Phosphorus	20 mg (3 %)
Potassium	250 mg (5 %)
Zinc	0.1 mg (1 %)
Other Constituents	
Water	94.99 g
Units µg = micrograms, mg = Milligrams	
Percentage are approximated roughly using recommendations of US for adults	

Source: USDA Nutrient Database (2014)

354 calories are included in 100 g of kernel. The lipids and protein are a large part of this. Although coconut meat has a higher proportion of saturated fats than other commonly consumed nuts, it nevertheless contains several bioactive components that are vital for optimal health.

Lauric acid is a significant saturated fatty acid found in coconuts (1:12 carbon fatty acid). The blood's good-HDL cholesterol levels rise as a result of lauric acid.

To quench your thirst during the hot summers in the tropics, try some coconut water. Simple sugar, electrolytes, minerals, bioactive substances like cytokinin, and enzymes like acid phosphatase, catalase, dehydrogenase, peroxidase, and polymerases are all present in abundance in the juice. These enzymes work together to support metabolism and digestion. Copra, the dried kernel of the coconut, is used to make coconut oil, which is a great emollient. It is utilized in food preparation, applied to the scalp to feed the hair, and used in pharmaceuticals.

The kernel is a fantastic supply of minerals such as zinc, copper, manganese, magnesium, calcium, and iron. Additionally, it is an excellent source of B-complex vitamins including pyridoxine, riboflavin, niacin, folates, and thiamin. These vitamins are necessary because the body needs them to sources from outside to replenish.

1.1.3 Cultivation in Coconut

Coconut palm best flourishes near to the sea generally on low lying areas a few feet above high water where there is ample rainfall and circulating groundwater. World's most of the coconuts are produced on small native plantations. Propogation in coconuts is by unhusked riped nuts. These nuts are laid close together on their sides in nursery beds and covered with soil. The seedlings are transplanted into the field after 4 to 10 months, where they are spaced at a distance of 8 to 10 meters. Coconut palms usually starts bearing after 5 to 6 years. Fruits require almost a year to get ripen. Annually palm may yield nearly 100 nuts.

1.1.4 Coconut production at global level

In 2020, 61,520,382 metric tons of coconuts were expected to be produced globally, a 1.0 per cent decrease from 62,159,626 tons in 2019. Around 70 per cent of the world's copra is produced in the Philippines, Indonesia, and India, and the Philippines and Indonesia are also the two countries that export the most coconut oil.

Table 1.2 Top five coconut producing Countries with their production

Rank	Country/ Region	2020	2019	2018
1	Indonesia	16,824,848	17,074,536	17,200,000
2	India	14,695,000	14,682,000	16,413,000
3	Philippines	14,490,923	14,765,057	14,726,165
4	Brazil	2,458,839	2,348,663	2,345,400
5	Srilanka	2,233,600	2,468,800	2,098,400

1.1.5 Coconut production in India

Despite having a smaller area dedicated to coconut farming than other significant growing nations, India tops the list of countries that cultivate coconuts in terms of production and productivity.

21,207 million nuts were produced in 2020–21, which is more than 34 per cent of the world's total production. The highest productivity ever measured in the world is 9,687 nuts per acre. Many farmers are given more employment prospects as a result of the introduction of new products to the market and the expansion of the coconut industry, which also has a significant impact on the country's economy.

There are currently 120 million palm trees owned by 10 lakh coconut growers covered by 9785 Coconut Producer Societies, 747 Federation, and 67 Coconut Producer Companies. By expanding the manufacture and export of value-added products, coconut can be included in the "Make in India" initiative.

The goal of the Coconut Development Board is to make India the world leader in value addition and processing in the coconut sector by creating a globally competitive coconut sector that contributes to food security, health, nutrition, fair prices for coconut farmers, and increased export revenues for the nation.

During the 2020–21 fiscal year, exports of coconut products other than coir products reached Rs 2,294.82 crore, an increase of almost 30 per cent from the previous year.

Table 1.3 Top Ten Coconut producing states in India

2017-18			
Sr.no	**State**	**Production (tons)**	**Share %**
1	Kerala	5,289.00	35.14
2	Karnataka	4,326.75	26.08
3	Tamil Nadu	4,152.01	25.03
4	Andhra Pradesh	963.37	5.81
5	West Bengal	260.45	1.57
6	Orissa	235.66	1.42
7	Gujarat	166.32	1.00
8	Assam	116.01	0.70
9	Maharashtra	88.22	0.53
10	Bihar	52.88	0.32

1.1.6 Coconut production in Maharashtra

Maharashtra produces 209.87 million nuts annually, placing it ninth in terms of production and seventh in terms of area. The area planted with coconuts expanded from 6900 hectares to 43,320 hectares over the course of 33 years, from 1986–1987 to 2018–19, and production increased from 76.32 million nuts to 209.87 million nuts. Sindhudurg has most land covered by coconuts followed by Ratnagiri district.

Table 1.4 District wise area, production and productivity of coconut in Maharashtra state

Sr.No	Districts	Area(ha)	Production (lakh nuts)	Productivity
1	Sindhudurg	17929	1457.0	4845.0
2	Ratnagiri	5556.0	406.0	
3	Raigad	2248	107.0	
4	Thane	1161.7	8.0	
5	Palghar	1473.9	16.0	
6	Other	14852	96.0	
	Total	**43320**	**2098**	

1.2 Importance and need of the study

Despite the fact that Sindhudurg district is well known for producing coconuts, relatively little work has been done to date to examine the economic aspects of coconut production and disposal in this area. Numerous production and marketing issues have evolved as a result of the quickly expanding area planted with this crop and require careful examination. Additionally, it's important to understand the upfront costs associated with setting up a coconut grove, typical production and return costs, marketing costs, marketing trends, and production and marketing limits. The capital cost and ongoing expenses make up the two components of the cost of coconut farming. The term "recurring cost" refers to all non-capital costs associated with palm tree annual upkeep. It comprises labourer salaries, the cost of inputs including weeding, intercropping operations, herbicides, fertilizers, and irrigation, as well as the upkeep and repairs of capital equipment.

It's been claimed that production isn't over until the product is delivered to the customer. It was correctly noted by the Royal Commission on Agriculture that "Indian farmers are good producers but terrible marketers." It is true that intermediaries and commission brokers that work in the marketing process syphon off the majority of the profit. Therefore, it was deemed important to look at the establishment cost of production, the current marketing system and channels, marketing costs, as well as other general production and marketing issues that coconut

growers confront. Therefore, in order to gather scientific data on the many economic aspects of coconut production in the Sindhudurg area, the following objectives were set.

1.3 Objectives

1. To estimate costs, returns and profitability in coconut production.

2. To assess financial feasibility of investment in coconut cultivation.

3. To study disposal pattern of coconut.

4. To identify constraints in production and disposal of coconut.

1.4 Scope and utility of the study

The study's scope is constrained to the aforementioned goals and only includes the two coastal tehsils of Deogad and Malvan. As a result, the study's scope is constrained to the particular subject chosen for investigation. However, the results of this study are useful in formulating recommendations for coconut growers in the study area to get around the constraints on coconut production and disposal. In order to use these resources effectively, producers would benefit from knowing the productivity of various resource inputs. The findings of this study will be useful in determining the optimal population in orchards as well as the productive life of coconut orchards. Financial institutions in the research area can use the study's findings to assist them decide how much money to lend for both planting coconut crops and investing in coconut plantations.

1.5 Limitations of the study

The survey of 90 chosen coconut growers from the main coconut-growing villages in Sindhudurg district for the agricultural year 2020-21 served as the foundation for the current study. The personal interviews about cultivation and production methods from their recalled memories were used to get data on expenses and returns. Therefore, the information they present could have some memory bias.

REVIEW OF LITERATURE

CHAPTER II : REVIEW OF LITERATURE

Review of literature published elsewhere related with the topic under study is useful to the research workers to outline the problem of research, formulate the objectives select methodology and avoid unnecessary duplication of efforts. It also provides a general orientation about the topic of investigation by creating an insight and senses of integration about the subject as a whole. An attempt is made to review the literature on the problem in this chapter. The review of literature is grouped under the following heading.

2.1 Costs, returns and profitability

2.2 Financial feasibility of investment in coconut cultivation

2.3 Disposal pattern of coconut

2.4 Constraints in production and disposal of coconut

2.1 Costs, returns and profitability

Kunhiraman *et al*. (1974) worked out the cost of production of coconut from 0.62 ha plot, at the Central Plantation Crop Research Institute, Kasargod, which was planted with the west coast tall variety and managed under the recommended dose of fertilizers. Accordingly the cost of cultivation for the entire plot during 1972-73 was Rs 771.00. This worked out to Rs 1243.55 per hectare production of 100 nuts worked out to Rs 156.15.

Latha Bastin & Radhakrishnan (1988), in their study on, "Economics of plantain (Banana) cultivation in Kerala" found that cost of cultivation per ha was Rs 36,249. The returns worked out to be Rs 45,068 and the main items of expenditure were cost of the family, hired labour and manure per hectare of plantain cultivation. The study illustrated that the contribution of family labours was 30.50 per cent of the cost expenditure for labour. The contribution of family labour showed a decreasing trend as the size of holding increased.

Yadukumar *et al.* (2003) reported that, the per hectare total cost of production of cashew nut was worked out to Rs 90,227, Rs 85,195, Rs 99,946, Rs 1,85,925 and Rs 1,51,512 under different planting densities of 7.5m × 7.5m (175 plants), 8m × 8m (156 plants), 10m × 10m (200 plants), 4m × 4m (625 plants), 5m × 5m (400 plants) respectively. The yields of raw nuts per tree were 28 kg. (4900 kg/7ha), 28 kg (4368 kg/ha), 28 kg (5600 kg/ha), 17.5 kg (10939 kg/ha) and 21.5 kg (9000 kg/ha) for the respective planting densities. The gross income per hectare of above said different planting densities worked out to Rs 1,97,750 , Rs 1,79,400, Rs 2,30,000, Rs 4,28,185 and Rs 3,60,000. The Net Income per hectare obtained for above mentioned respective planting densities were Rs 1,07,523, Rs 94,205, Rs 1,30,054, Rs 2,42,260, and Rs 2,08,488.

Veerkar (2004), studied on " Economic Analysis of Coconut based cropping systems in Konkan Region (M.S)" and three main coconut based cropping systems identified are: (i) System- I: Sole cropping of coconut followed by 48 growers (27%), (ii) System- II: coconut+ arecanut, 81 growers (45%), and (iii) System- III: Coconut + arecanut + black pepper, 25 growers (14%). Six more coconut based cropping system have been observed with the remaining 26 growers (14%). The per hectare total cost of cultivation has been worked out as Rs 53856 in System-I, Rs 70641 in System- II, Rs 75577 in System –III and Rs 70738 in System- IV. In all the cropping systems, the share of input cost (cash expenses) has been found about 35 % of the total cost of cultivation. The net profit has been found as Rs 20,724 in System- I, Rs 33249 in System- II, Rs 36118 in System- III and Rs 41237 in System- IV. In the mixed cropping systems of coconut (i.e. System II, III, and IV), 62 to 65 per cent income is received from coconut alone. The results of long linear production function have indicated the variations in total returns per orchard to the extent of 92 per cent in System- I and System- III and 83 per cent in System- II.

Chavhan (2006) in his study on "Economic analysis of Mango orchards in Deogad tehsil of Sindhudurg district", revealed that, per hectare cost of cultivation (cost C) worked to Rs 49,708 of which share of cost A and cost B was about 44 per cent and about 91 per cent respectively. Per hectare yield of mango orchards at overall level was 32.56 quintals. The per quintal cost of production worked out to Rs 1527 including per quintal marketing charges of Rs 90. The total cost of production came to Rs 2427 per quintal.

Kalathiya *et al.* (2007) in their study carried size wise analysis of the cost of cultivation for bearing coconut plantation and it indicated that the cost of investment (including maintenance) was Rs 7896.43, Rs 7159.37, Rs 8220.00, Rs 6603.10 and profit was Rs 14225.71, Rs 13066.06, Rs 9372.07, Rs 13413.50 per hectare for marginal, small, medium and large farmer respectively. The average total cost also worked out to Rs 7365.33/ha and profit Rs 12702.97/ha. Input wise cost of cultivation showed that more than 50 percent of the cost was incurred on manures and fertilizers followed by labours. No much variation was observed in total cost on different sizes of coconut holding. The average total cost of production worked out to Rs 9180.50 and profit Rs 14205.12/ha. The lowest yield of 5317 nuts/ha was observed in medium size and highest yield 6446 nuts/ha in marginal size holding.

Patil (2010) worked on, "Economics of production and disposal of cashew nut in South Konkan region" and revealed that, per hectare capital investment for establishing HYV cashew orchard for period of first five years was Rs 1,16,830 and that of local varieties cashew orchard was Rs 89,663. The annual per hectare cost of cultivation (Cost C) for local variety and HYV cashew orchard was worked out to Rs 28,013 and Rs 46,908 respectively. The amortization cost was Rs 8,750 in local variety and Rs 11,400 in HYV cashew orchard. For local variety of cashew nut, profit at Cost C was Rs 16,339 and for HYV, it was Rs 43,978. In both groups B: C ratio were 1.5 and 1.9 respectively.

Surwase *et al.* (2015) in their study on Costs, returns, and profitability of sapota in Thane district revealed that the per ha cost of maintenance (Cost C) of sapota orchard in group I was worked out to Rs 1,20,138. The per ha total cost of maintenance (Cost C) of sapota orchard in group I (Near sea shore) was Rs 1,25,330 and Rs 1,14,452 in Group II at overall level.

The per ha gross returns at overall level received was Rs 1, 80,572 and profit at different cost level was Rs 1, 27,408, Rs 69,350, and Rs 60,434 respectively. The per ha gross returns was Rs 2,01,260 in Group I and Rs 1,55,901 in Group II. Overall net profit received at different cost levels were Rs 1,45,338, Rs 84,644, and Rs 75,924 respectively. Input Output ratio was 1.50 at overall level.

Ramani M *et al.* (2019) estimated the cost of cultivation and profitability of Kesar Mango cultivation in Saurashtra region of Gujarat, India. The results of the study revealed that, the total investment per hectare amounted to Rs. 95,097 which mainly consisted of investment on maintenance cost (36.20 %), planting materials (13.30 %) and rental value of land (10.39 %). The cost of cultivation details revealed that Kesar-mango was highly a capital intensive crop. On an average, the total cost per hectare was found to be Rs. 1,03,571 in which the human labour component alone accounted for 29.70 per cent. Further, the average yield was found to be 100.56 qtl / ha and the average farm harvest price realized was Rs. 2026/qtl.

Kolar *et al.* (2020) studied on, "Economic analysis of costs, returns and profitability of groundnut across leading states of India". The study found that Cost A1, Cost A2, Cost B1 and Cost C1 of Groundnut in Gujarat and Cost B2, Cost C2 and Cost C2 revised in Andhra Pradesh were found to be increased at higher annual growth rate during the study period than any other states.

Kolar *et al.* (2021) studied on the dynamics of costs, returns and profitability of soybean across leading states of India. The results revealed that the cost concepts of soybean were increased at highly significant growth rates. Net income was positive and the B: C ratio was more than one in the base year. Which indicated that soybean was profitable in base year.

2.2 Financial feasibility of investment in Coconut cultivation

Gupta and George (1974) reported that cultivation of Nagpur Santra (orange) was very desirable from the consumer's point of view. Excluding the land cost, investment in this project had a pay back period of seven years and yielded an internal rate of return of 29.3 to 45.9 per cent depending upon the size of the grove, the net present value and the benefit cost ratio at high discount rate as 12 percent varied from Rs 4260 to Rs 7910 per acre and 1.85 and 2.64 respectively.

Remold (1999) worked out the cost benefit analysis of coconut cultivation under irrigated and rainfed condition. The result shown that annual expenditure incurred per hectare of irrigated coconut was Rs 52,573 and the annual income deprived was Rs 78,750. The annual expenditure incurred per hectare of rainfed coconut under rainfed condition was Rs 46,370 and the annual income deprived was Rs 47,250. Under irrigated condition the Benefit-cost ratio was 1:1.5 where as under rainfed condition it was 1:1.02.

Khunt *et al.* (2003) studied the economic feasibility of coconut orchard in Saurashtra region of Gujarat and reported that the positive net present value i.e Rs 2,60,000 at 10% discount, the higher value of benefit cost ratio than unity (2.72) and higher value of internal rate of return (41.55%) than normal bank rate of interest indicated the financial soundness of the investment on mature nut orchard. The pay-back period was 5 years and 6 months. In varying situation of cost and return too, NPV was positive. The value of BCR was more than unity. The value of IRR was more than prevailing bank rates and the estimated value of economic feasibility parameters, for tender nut orchard are in normal cost and return and at 10 per cent rate of discount, value of NPV was found positive (Rs2,50,166). The value of IRR also greater (30.10 %) than the prevailing bank rate. The pay-back period was six year and two month. On the whole, considering the value of all feasibility criteria, in the investment on mature nut rather than tender nut orchard was found more viable.

Bastine (2004) worked out the financial feasibility of coconut orchard in eleven district of state of Kerala which covered 792 farmers. The Net Present Value for cultivation was Rs 5286.31 at 7 per cent discount rate and benefit cost ratio was 1.02. The internal rate of return was worked out to be 7.26 as against an opportunity cost of 7 per cent. Though the project worth measures showed positive indicators the value are marginal.

Surwase *et al.* (2015) in analysis of investment in sapota orchard showed that the investment made in sapota plantation is economically viable with Benefit Cost Ratio (BCR) greater than unity (1.87). Net Present value (NPV) was positive (Rs 4, 95,835) and IRR was higher than prevailing rate of interest (12%). The Pay Back Period also desirable considering the total economic life of sapota orchard.

Chavhan *et al.* (2017) studied the productivity and financial feasibility of mango cultivation in Deogad tehsil of Sindhudurg District. The analysis of economic cultivation of investment in mango orchard showed that the investment made in mango plantation in economically viable with B:C ratio greater than unity (1:2.07). Net Present Value (NPV) was positive (Rs 1, 65,960) and IRR was higher (23.18 %) than prevailing rate of interest (13 %). The Pay Back Period was also desirable (9 yrs.) considering the total life of mango orchard.

Ferdison S.M *et al.* (2017) conducted study on "Financial Feasibility Analysis of Organic Vegetables farming at CV Rahayu in village of Sidera Sub District of Sigi Biromaru regency of Sigi. The results indicated that NPV during the period 2014 to 2018 was IDR 543,674,792. The Net B:C was 1.65. IRR was 35.09 per cent and Pay-back period was 2 years and 3 months. The results of calculation using sensitivity analysis in the organic vegetable farming company of CV Rahayu by assuming the organic vegetables attacked by pest and diseases were a decreased 33 per cent from total production with the acquisition of NPV decreased to IDR 8,587,415. Net B:C decreased to 1.01. IRR decreased to 12.42 per cent. Pay Back period became 3.6 years. In other hand NPV decreased to IDR 7,276,181. Net B:C decreased to 1.01. IRR decreased to 12.36 per cent. Pay Back Period became 3.6 years if the assume was an increased production cost until 74 per cent.

Kishore M.S *et al.* (2017) studied on economic feasibility of coconut cultivation in Karnataka. The results revealed that initial investment on coconut plantation worked out to Rs 63,708 per hectare. The total maintenance cost during gestation period was found to be Rs 4, 68,760 and total cost of establishing one hectare of coconut end was Rs 5, 37,266. The total cost of cultivation of coconut during bearing period was Rs 1, 61,827 per hectare. The total cost of cultivation of copra was Rs 1, 67,580 per hectare. The net return from copra was Rs 22,856 per hectare. The B: C ratio of coconut plantation was found to be 1.18.

Shruti K *et al.* (2017) studied, "Financial feasibility on precision farming in paddy". The results showed that the Net Present Value at 12 per cent discount rate at the end of 10 years was found to be positive. B: C ratio was more than one and IRR was more than discount rate (12%). It was also revealed that Pay Back period was 6.84 months and profitability index due to adoption of precision farming was found to be 8.83.

Lokappa *et al* (2018) carried out study on, "Financial feasibility of fig cultivation in north eastern Karnataka, India". Data was collected from 60 fig cultivators. The results revealed that the Pay Back Period was3.44 years. BCR was greater than utility (3.01), NPV was positive and IRR was higher than prevailing rate of interest (12%). Hence fig cultivation was found to be feasible.

Praveen K.V *et al.* (2018) studied the "Economic feasibility of vegetable production under polyhouse." The study concludes that under the current scheme of subsidy on the establishment of polyhouses, the farmer's investment in polyhouse was found to be economically feasible as NPV was positive (Rs 1,31,801), B: C ratio (2.17) and IRR (37.51 %).

Saleh W *et al.* (2018) studied on, "An analysis of the feasibility of the copra business in the village of Pendowo Harjo, sub district of Sungsang, Banyuasin Regency". The result of analysis showed that the production cost incurred was Rs 1,198,076.12 and the income earned

was Rs 4,14,598.88 per unit of the production process. Financially the value of NPV obtained was Rs 19,668,343.86, the value of IRR was 60.75 per cent and the value of the net B: C ratio was 1.74. Therefore economically the copra business was feasible.

Farida Nursahib *et al.* (2021) studied on financial Feasibility analysis of Hydroponic Vegetable Business (A case study on Serua farm, Kota Depok). The results showed that the total production cost was Rs 319,420,734 per hectare. Its profit was Rs 688,579,266 or 68.31per cent from gross income. R:C ratio was 3.16 means that the business efficiency was good. B:C was 2.16 means that business is profitable and financially feasible. NPV was Rs 552,162,558 and IRR was 107.5 per cent. PP value is 5 months 6 days.

2.3 Disposal pattern of coconut

Thampan (1990) observed that in India consumption of coconut as tender nut was around 5 per cent of total production and 95 per cent nuts were harvested at the stage of maturity. 56.14 per cent nuts were utilized at house hold level out of 95 per cent matured nuts. The civilization for edible copra, milling copra, dessicated copra, seed nuts were 6.45 per cent, 35.62 per cent, 1.63 per cent and 0.16 per cent respectively.

Patil *et al.* (1992) in their study on marketing of coconut in Thane district of Maharashtra observed that, per farm production of matured nuts were 436 out of which 66.28 per cent nuts were sold and 33.72 per cent nuts were retained for consumption at home. Per farm production of tender nuts was 2427 of which 95.47 per cent nuts were sold and only 4.53 per cent were retained for home consumption. This showed that the marketable surplus was more in tender nuts because tender nuts are harvested mainly for marketing in Thane district of Maharashtra.

Cherigappa *et al.* (1993) found that majority (85.72%) of the farmers whose coconut holding were less than one hectare, disposed there produce as fresh nuts, 5.71 per cent of the farmers sold it as copra and 8.33 per cent of the producers disposed both as coconut and copra. Among the farmers who owned one to two hectares of garden, 52 per cent of them disposed their produce as fresh nuts, 8 per cent in the form of copra and the remaining 40 per cent disposed their produced both as fresh nuts and copra. In the third group, where the size was above 2 hectares, 60 per cent farmers marketed their produce both as fresh nuts and copra, 20 per cent sold their produce as fresh nuts. In general, 58.75 per cent of the farmers sold their produce as fresh nuts, 10 per cent after making copra and the remaining 31.25 per cent marketed fresh nuts as well as copra.

Subburaj & Singh (2003) in their study on “Marketing of coconuts: Disposal strategies of farmers in Dingul district of Tamil Nadu.” observed that coconut farmers have two channels i.e Direct channel and Indirect channel. Indirect channel is the most prominent channel among

coconut farmers. Direct channel was very simple while indirect channel was very complex. Based on their code of disposal of coconut there were four types of coconut farmers. They include lesser farmer (55%), opportune farmer (25%), mixed practice (5%) and debt-bonded farmers (15%).

Namasivayan and Richard Paul (2006) studied the price spread in marketing of Coconut in Tamil Nadu. For marketing three channels were chosen by the Coconut growers i.e. Channel I (Producer-Preharvest, contractors-commission agents-wholesalers-retailers-consumers) and Channel II (Producers-commission agents- wholesalers-retailers-consumers) and Channel III (Producers-wholesalers-retailers-consumers). The Channel III was the most favoured channel in the study area as maximum (47%) quantity was passed through this channel. The producers share in consumers rupee was maximum in Channel III (58.73) followed by Channel II (58.32) and Channel I (50.20). It is revealed that the marketing efficiency was higher in Channel III (3.17) followed by Channel II (2.87) and Channel I (2.81).

Jangam (2008) in his study observed that at overall level 91.44 % nuts were sold in market and only 8.56 per cent were utilized for wage payment, home consumption, gift to relatives, used for seedlings and losses in storage. Maximum growers sold their produce trough commission agents (53.51 %) followed by village merchants (28.17%) and direct to consumers (18.32%). The whole quantity of tender nuts was sold through commission agent whereas, direct sale to consumer was restricted to matured nuts only.

Sindhu R.S *et al.* (2010) studied on supply chain analysis of Onion and Cauliflower of Punjab. The study revealed that more than 90 per cent of the produce was disposed of through commission agents / wholesalers and a small proportion was sold through retailers and directly to consumers.

Pokharkar *et al.* (2016) studied "Economics of production and marketing of guava in Western Maharashtra". In the process of marketing the most popular channel was observed to be producer- preharvest contractor – wholesaler – retailer – consumer. Channel – I has the highest marketing cost per quintal (Rs 286.34) followed by the channel II (Rs 228.23) and Channel III (Rs 165.65). The price paid by the consumer per quintal was highest in Channel I (Rs 1199.26) and lowest in channel – III (Rs 557.71).

Borah S (2017) studied on pattern of marketing and disposal of Potato in lower Brahmaputra valley zone of Assam. The study revealed that quantum taken to the specified market increases from size group I (78.08 q) to size group III (176 q) farmers. It was also observed that the quantity of potato sold to specified market was more that quantity sold to retail market in all size groups of farmers in the zone. Cost of production of potato increases from Group I (Rs 25.343.90) to size Group III (Rs 58,366.00) farmers. Margins per quintal of potato

sold was observed to be highest to size Group III (Rs 259.35) followed by size Group II (Rs 244.91) and size Group I (Rs 216.14) respectively. Study on marketing channels reflected that the producers share in consumer rupee was 72.83 per cent in channel I, 63.66 per cent in channel II and 55 per cent in channel III respectively. Likewise retailers share in consumers rupee was 12.25 per cent in channel I, 7.96 per cent in channel II and 13.06 per cent in channel III for the LBVZ of Assam.

Khirari S.J (2018) studied "Existing cultivation practices followed by sapota growers in Palghar district". The disposal pattern of sapota it is observed that 58 per cent of respondents graded their produce according to size of sapota, while remaining 42 per cent of the respondents did not follow the practice of grading. It is observed that majority of respondents marketed their sapota immediately after harvesting and also found to sell their produce in ' tehsil market ', while only 7 per cent of the respondents had used their produce for processing.

Mathew S *et al.* (2018) studied on disposal pattern and constraints in Pineapple production in Konkan region of Maharashtra. The study has found that more than 90 per cent of produce were marketed in all three years. The problem of high cost of planting material, non-availability of hired labour are felt by majority of pineapple growers as constraints in production followed by fluctuation in marketing prices, post-harvest losses in case of disposal of produce.

Singh P.K *et al.* (2021) studied on disposal pattern of vegetables in district Varanasi. The study revealed that total disposal of Cauliflower was 38.85 quintals, of tomato it was 140.22 quintals, brinjal was 38.85 quintals and pea was 11.84 quintals. Maximum disposal of all selected vegetables was found maximum through the channel III in case of both marginal and small farmers. It's how the efficient involvement of the intermediaries in the marketing produce.

2.4 Constraints in production and disposal

Deshmukh (1981) in his study on "Study of coconut growers to assess the technical gap, level of adoption and causes of non-adoption of recommended practices of coconut cultivation in Maharashtra". According to him lack of labour (82%), coconut seedling were not ready available at the time of planting (81%), nuts of dwarf varieties were usually stolon (44%), shortage of water in summer (39%), stray cattle menaces to newly planted seedlings (34%), irrigation equipments are in adequate (9.19%), severe incidence of pest and diseases (14%), lack of finance for general maintainance (10%), agro chemicals are not available on time (5%) were the major problems faced by the cultivators in adoption of recommended practices of coconut cultivation.

Mulliyar (1983) in the study "Transfer of technology in plantation crops pointed out that lack of irrigation facilities, lack of timely and inadequate supply of inputs and poor contact of extension workers added to the poor response of the farmers towards adoption of improved

technology. He also observed constraints in support system as lack of processing and marketing facilities, unfavorable price policies of the government, non-availability of inputs and lack of co-ordination between the different input agencies.

Kulkarni *et al.* (1990) reported that high cost of planting material (34.66 %), non-availability of planting material (24.33 %) and lack of risk taking ability (24.88 %) were the major constraints faced by growers of horticultural crops.

Morkose and Poduval (1993) studied the problem associated with coconut processing sectors related to transportation, storage, handling and preliminary processing of nuts. The bulky nature of coconut causes transport problems and thereby results, in huge handling and transportation costs. In the absence of mechanical devices for preliminary operations are to be reported leading to huge labour copra.

Naik (2000) in his study observed that 75.55 per cent of growers faced problems of labour for different operations, frequent failure of electricity and non- availability of fertilizers were the next major problems faced by about 40 per cent of coconut growers. There were some problems related to marketing as part of coconut and major among them was non-remunerative prices for coconut as opined by 54.44 per cent coconut growers.

Burman *et al.* (2006) studied status of coconut cultivation and strategies for improving the productivity in Assam. Farmers are facing some technical and socio-economic problems *viz.*, management problems, pest and disease problems, nutritional disorder, infrastructural problem.

Nguyen T (2006) studied "Constraints faced by the farmers in Rice production and export". The study showed that dependence on monsoon, land / soil problems, environmental pollution, lack of water, small land holdings were some agro-ecological constraints. Under technical constraints, it was found that diseases & pest, lack of proper varieties, post-harvest technology, and storage problems were serious. Fertilizer problems, plant protection constraints, weed problems, lack of labours and poor processing were found to be other constraints faced by the farmers. Poor infrastructure, high cost of input, credit problems, low rice price, inadequate inputs and lack of training were the socio economic constraints. Other constraints included poor extension services, lack of information, and lack of helpfulness from local authorities / government.

Chahal S.S (2010) studied on "Constraints in the production and marketing of maize in Punjab". Sample consisted of 300 maize growers from three districts of Punjab by using multistage random sampling technique on the basis of concentration of area under maize. More specifically farmers suffered on account of non-availability of credit, poor marketing facilities, lack of storage facilities, non- availability of seeds suitable to local needs, late sowing of crop etc.

Phuge (2010) studied technology adoption in rice cultivation in saline soils. (M.S). Study revealed that practices like Ulkatni, Vidhani and excavation of challis and non- availability of capital was constraints faced by the farmers during the tillage operation. While more expenditure for raising of seedling in nursery, lower germination percentage of nursery seedlings, costly seed treatment and bio-fertilizers, non-availability of bio-fertilizers was major constraints in nursery management. During transplanting costly Awatni transplanting method, required more labour and is time consuming. Non-availability of FYM, Compost, and Green manuring crops, non-availability of specific fertilizers like Calcium ammonium nitrate, Ammonium sulphate nitrate, Di-ammonium Phosphate briquettes were the constraints related to nutrient management.

Periasami G (2015) studied "Problems and Prospects of coconut cultivation in Erode district of Tamil Nadu". He observed that farmers face problems due to pest incidence. Reduction in yield occurs due to failure. There was also shortage of tree climbers.

Dhara *et al.* (2016) pointed out that lack of market facilities for coconut, lack of cooperative marketing system, scarcity of labour for transportation were the major problems faced by the farmers.

Tiwari G *et al.* (2016) studied on constraints faced by the farmers and their remedies in Technological adoption of Rice, Wheat- Cropping system in eastern Uttar-Pradesh. Constraints faced by the farmers were general illiteracy, poor socio- economic conditions, lack of technical knowledge and awareness, small land holdings, low precipitation and underdeveloped physical infrastructure associated with high cost of agricultural inputs.

Kumar A *et al.* (2019) studied on "Constraints faced by farmers in production and marketing of vegetables in Haryana." Production related constraints expressed by vegetable growers were lack of information about cultivation of vegetables, higher cost of fertilizers, seeds and labour and their unavailability. Lack of cold storage facilities, high cost of storage, costly weedicides, spurious plant protection chemicals and lack of credit. Marketing related constraints include lack of market information, higher price fluctuation, high amount of price spread, malpractices in weighing and storing of vegetables, high cost of labour, transportation, delay in payments.

Jayshankar *et al.* (2019) conducted study on constraints perceived and suggestions offered by the Indian cashew growers in adoption of high density planting. The study was conducted in Cuddalore district in Tamil Nadu. 120 farmers were selected for the study. Constraints faced by the farmers were fear from natural disaster (100%), non-availability of labour (89.20%), high cost of labour (71.60%), inadequate credit facilities (70%), pest and disease problems (58.30%), non-availability of inputs in required quantity (55%), complexity of new practices (48.30%), and non-availability of inputs in right time (48.80%). Similarly lack of

confidence towards various HDP practices (28.30%), and lack of interest (14.20%) were secondary constraints experienced by farmers in the study area.

Kumari *et al.* (2020) analyzed the demand supply and production constraints in major fruits and vegetables in Bihar. The study also found that 90 per cent of farmers faced problems related to insufficient knowledge of market information system, dissatisfaction with the price of the fruits and major constraints identified for vegetables were the inability to use cold storage facility; the lack of processing plants in the state, lack of adequate knowledge, the lack of resources and input were highly significant constraints for production of this crops in state.

METHODOLOGY

CHAPTER III : METHODOLOGY

3.1 General

It is necessary to adopt appropriate methods and procedures for conducting any research. For this researcher should follow appropriate steps involved in carrying out research to obtain desirable results. The research methodology obtained for present study is given in this chapter.

3.2 Selection

For present study three stage sampling method was followed with tehsil as a primary unit, villages as secondary unit and coconut growers as ultimate unit.

Sindhudurg district was selected for present investigation as the area under Coconut cultivation was higher in Sindhudurg district and study on similar aspects on coconut was carried out in other districts of Konkan region earlier, hence Sindhudurg district was selected purposively.

3.2.1 Selection of tehsils

There are nine tehsils in Sindhudurg district. Out of these nine tehsils two tehsils *viz* having maximum area under coconut cultivation were selected purposively.

3.2.2 Selection of Villages

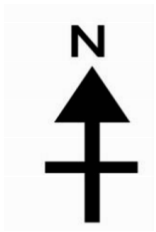
A list of villages along with area under coconut plantation was obtained from the revenue records of the concerned tehsils.

For selection of villages the selected tehsils were divided into three strata's or groups as shown in Table below.

Group	Location
Group – I	Near Sea Shore (up to 5 km)
Group – II	Away from Sea Shore (Between 5 to 10 km)
Group -III	Away from Sea Shore (Beyond 10 km)

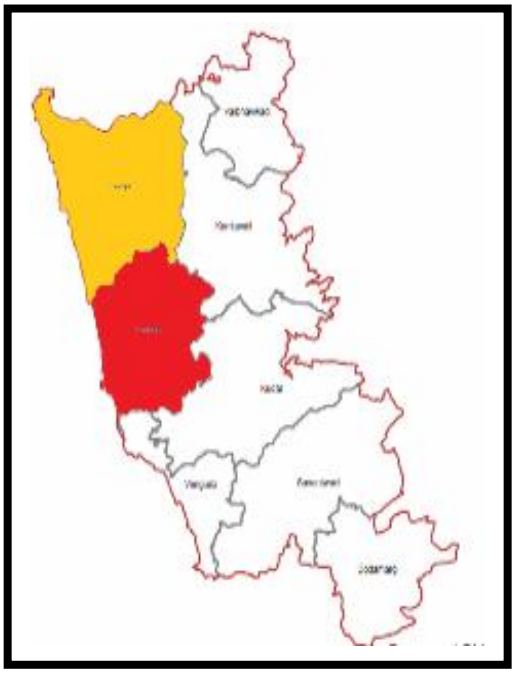
3.2.3 Selection of Coconut growers

A list of Coconut growers was obtained from the revenue record of the selected village. From these Coconut growers 15 coconut growers were selected randomly. Thus the final sample consisted of two tehsils, six villages and 90 coconut growers as shown in Table 3.1.



Map of India

Map of Maharashtra state



Map of Sindhudurg District
Along with Study Area

Fig 3.1 : Map of Sindhudurg district showing study area

Table 3.1 Selection of tehsils and villages

Group	Name of tehsil		No of selected Coconut growers
	Malvan	Deogad	
Group I	Tarkarli	Mithmumbri	30
Group II	Sukalwad	Kunkeshwar	30
Group III	Katta	Jamsande	30
Total			**90**

3.3 Collection of Data

The data was collected with the help of specially designed schedule by personal interview with the coconut growers. (Schedule is given in Appendix II).

3.4 Analysis of data

For the purpose of achieving specific objectives of the study, the collected data were analyzed separately for each group to draw the conclusions. Further the pooled analysis was carried out for whole sample to draw overall conclusions for the study area. The data was arranged in suitable tables and cross tables. Simple statistical tools such as arithmetic mean, averages, frequency distribution, percentages and ratios were used for analysis.

3.4.1 Estimation of establishment cost of coconut orchard

A separate sample of 35 growers whose orchards were in the stage of establishment and of different age groups were selected to calculate the establishment cost of the coconut plantation considering period of establishment as seven years.

The cost of establishment is the cost incurred during the period from plantation to the first bearing. This period in coconut is considered as seven years. The data on inputs used and cost incurred were collected at one point of time. On the basis of establishment cost, the amortization cost was worked out assuming that the rate of interest was 12 percent and expected life of orchard was 70 years. Therefore the following compounding cost equation was used to calculate the annual amortization cost.

$$A = \frac{P\ \frac{r}{100}\left(1+\frac{r}{100}\right)^{70}}{\left(1+\frac{r}{100}\right)^{70}-1}$$

Where,

A- Annual amortized cost in rupees.

P- Total capital investment in seven years.

r- Discount rates (Rate of interest).

n- Productive life of orchards in seven years.

3.4.2 Estimation of Annual cost of maintenance

After the establishment stage is over the coconut grower have to spend the expenses every year for maintenance of coconut orchard. For working out the cost of maintenance the expenses on items like family and hired labour, manures and fertilizers, plant protection, irrigation, depreciation on hand tools and irrigated machinery, land revenue, interest on capital, rental value of land and amortization cost was considered.

3.4.3 Cost concept used in the analysis

Standard cost concepts used in farm management studies were used for calculating the cost of cultivation of coconut orchard.

i) Cost 'A'

Cost 'A' includes expenses incurred on hired labour, manures, fertilizers, plant protection, irrigation, land revenue and other ceases, repairing charges, depreciation on implements and machinery and interest on working capital.

ii) Cost 'B'

Cost 'B' includes cost 'A' plus interest on fixed capital, rental value of owned land and amortization cost.

iii) Cost 'C'

Cost 'C' includes cost 'B' plus imputed value of family labour and supervision charges.

The input-output ratio was also worked out for judging the economic efficiency of coconut cultivation for different groups of orchard.

3.5 The economic evaluation of investment of coconut cultivation

The economic evaluation of investment on coconut cultivation was judged by calculating.

i) Net Present Value (NPV)
ii) Payback period (PBP)
iii) Benefit cost ratio (BCR)
iv) Internal rate of return (IRR)

The definitions of these investment criteria is given below.

i) Net present value

It is discounted value of net cash flow of the coconut orchard during its life time. It is computed as

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

Where,

Rt = Returns in period 't'

Ct = Costs in period 't'

r = Discount rate

t = Life of orchard

For viability of investment NPV should be positive.

ii) Payback period (PBP)

It is the no of years the project takes to recover its cost from its returns.

$$P = \frac{I}{E}$$

Where,

P = Payback period of orchards in years

I = Investment of the orchards in rupees

E = Annual net cash revenue in rupees

For any investment PBP should be shorter.

iii) Benefit cost ratio (BCR)

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

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

If BCR is greater than one, then the investment is considered as feasible.

iv) Internal rate of return

The internal rate of return is that rate of discount at which NPV is zero. It is calculated by using the following formula.

$$IRR = \sum Bt\ (1+r)^{n} - \sum Ct\ (1+r)^{-n} = 0$$

If IRR is greater than rate of interest then investment is feasible.

SOCIO-ECONOMIC BACKGROUND OF DISTRICT

CHAPTER IV : SOCIO-ECONOMIC BACKGROUND OF SINDHUDURG DISTRICT

This chapter is devoted to give the socio-economic background information of the study area that is Sindhudurg district. It is important to know the socio-economic background to have a better understanding of the region and to help interpretation of results and for drawing the conclusion after the study.

Various factors like topography, location, climate, rainfall, soils and irrigation, marketing, transport and communication facilities were discussed in this chapter which will help us to understand the area under study.

4.1 Location:

Sindhudurg district comes under the South Konkan Coastal Zone of the Konkan Region. It spreads between 15º37' and 16º40' North latitudes and between 73º27' east longitudes. The total area of South Konkan region is 1320.40 thousand hectare which is 4.37 per cent of the total area of Maharashtra. Sindhudurg district occupies an area of 5,207 sq.km (2010 sq. mi) that is around 1.7 per cent of the total area of the state.

4.2 Boundaries:

Sindhudurg district is bordered on South by Belgaum District (Karnataka) and Goa State, North by Ratnagiri district, to East across the crest of the Western Ghats or Sahyadri's that is Kolhapur district, on the West it is bordered by the Arabian Sea. Sindhudurg is a part of South Konkan region, a narrow coastal plain in western Maharashtra which lies between Western Ghats and the Arabian Sea. The headquarters is located at Oros which is located in tehsil of Kudal. The tehsils of Sindhudurg district are Malvan, Kudal, Devgad, Sawantwadi, Vengurla, Kankavli, Vaibhavwadi and Dodamarg.

4.3 Area:

South Konkan region has 1320.40 thousand hectare of the total area which is 43.70 per cent of Maharashtra. Sindhudurg district occupies 520.7 thousand hectare that is about 5207 sq. m. area out of it, which is 1.7 per cent of the total area of Maharashtra state.

4.4 Administrative:

The district comprises of 8 tehsils, 8 Panchayat samitis, 4 Nagar Palikas, 3 Nagar Parishads and 433 Gram Panchayats for about 743 villages and 5 towns, 13 police stations, police outposts are 23.

Fig 4.1: Map of Sindhudurg district

4.5 Topography:

Sindhudurg district is broadly divided into three small subdivisions based on the topography and elevation.

1. The Sahyadri hills cover the eastern portion of the district under three parts. The first part occupies Vaibhavwadi tehsil, the second occupies Kankavli, Sawantawdi, and Kudal and the third occupies part of Dodamarg tehsil.
2. Sindhudurg Plateau extends in a North-South direction through the central portion of the district and covers parts of all tehsils of the district except Vaibhavwadi tehsil. Rice and Ragi are the principal crops in the region. Cashewnut grows plenty in the area and the world Alphonso or Hapus mangoes are also grown mainly in Malvan, Vengurla and Devgad.
3. Sindhudurg Coast is situated along the extreme western fringe of the district and comprises of parts of Malvan, Vengurla, Devgad and Sawantwadi tehsils. Strip rice, coconut and arecanut gardening is practiced in the upper part of the district.

4.6 Rivers:

Sindhudurg district has 6 main rivers namely Vaghotan, Devgad, Karli, Gadnadi, Tilari and Terekhol. All the 6 rivers originate from Sahyadri mountain ranges and they merge into the Arabian Sea. Rivers are used as means of transport in limited extent.

4.7 Soil type:

The soils of the district are divided into three parts: Laterite soil, Coastal alluviums and Salty soil.

1. The predominant soils in district are laterite soil and extensive spread of it is spread throughout the district. The pH of the soil ranges from 5.5 to 6.5, calcium carbonate is absent completely and is poor in phosphorus content. The lateritic soil is rich in organic matter and consequently in nitrogen content. The soil is found in several grades like the rice soil and *varkas* soil. Paddy which is the main crop is grown on such type of soil. Other crops grown are Mango, Cashewnut, Coconut, Kokum, Jackfruit, Arecanut, pulses and spices like pepper are also cultivated on the coastal areas.
2. Khar or Khajan soils are found in Malwan, Vengurla and Devgad tehsils and the entire western strip are salty while other tehsils have only small patches. More than 3 per cent of total soluble salt is found in coastal saline soils and pH of 7.5 to 8.0.
3. In Coastal alluvium soils Arecanut and coconut garden thrive well. These soils have pH of 7.0 to 7.5 and total soluble salt 0.1 to 0.2 per cent.

4.8 Climate:

The combined effect of rainfall, temperature and humidity determine the agricultural development and the characteristics responsible in this respect should be analyzed in detail. Sindhudurg has a semi tropical climate and remains humid and warm for the most of the year. The temperature of Sindhudurg district varies between a maximum of 32ºC and monsoon winds brings heavy rains. The temperature variation throughout the seasons is not large.

4.9 Temperature:

Sindhudurg has a semi tropical climate and remains humid and warm for the most of the year and it is a characteristic feature of the coastal belt. The mean daily temperature is above 20^0C throughout the year. May is the hottest month of the year with mean maximum temperature around 22^0C. April to October has high humidity in association with warm temperature which makes the weather uncomfortable for people due to the absence of wind. Temperature after May till August is 4ºC to 5^0C the diurnal range in temperature which is small compared to during April to October being less than 7^0C due to maritime influence. There is an increase by 10ºC to 11^0C during November to March due to the influence of northerly dry winds. The mean annual range of temperature throughout the year is only 5^0C.

4.10 Rainfall:

There are three seasons: Summer season (Mid-February-May), Rainy season (June-October) and Winter season (November-Mid-February) and the monsoon winds bring heavy rainfall to the district with the average rainfall of 3240.10 mm. June, July, August and September are the important months of rainfall and 97 per cent of the rainfall is during these months. In the month of July there is maximum level of rainfall (33.37%) and intensity (49.4 mm/hr), the south-west monsoon is about 25 per cent. The total rainfall ranges from 2500 mm to 5000 mm distributed in 90 to120 days in different parts. It is observed that the month of September has the maximum dry spells followed by June.

4.11 Humidity:

During the rainy season, humidity is somewhat high up to 90 to 98 per cent, whereas it is least during the winter afternoon when it comes down to about 60 per cent.

4.12 Demographics:

According to the 2011 census Sindhudurg district has a population of 849,651 of which 4,32,319 were female and 4,17,332 were male. The district has a population density of 163 inhabitants per square kilometre (420/sq.m). The population growth rate over the decade 2001-2011 was 2.21 per cent. 87.41 per cent of the total area largely consists of rural population.

During the 2011 Census of India, 91.22 per cent of the population spoke Marathi, 1.54 per cent spoke Urdu, 2.29 per cent spoke Malvani, 1.16 per cent Konkani as their first language and 1.33 per cent spoke Hindi.

The literacy rate in Sindhudurg district is 85.56 per cent and the sex ratio is 1037 females for every 1000 males which is second highest in Maharashtra. The population of Sindhudurg District in 2019-2020 according to Aadhar estimates is 9,09,167.

4.13 Land utilization:

There is a good scope for increasing area under cultivation by bringing the fallow land and cultivable waste land under cultivation which can be seen from the Table 4.1. Particularly, cashewnut and mango cultivation can be taken up with the help of Employment Guarantee Scheme under Horticultural Development program in this area. The area under forest is also very low about 11.23 per cent which needs to be increased. As a result, high proportion of cultivable waste land as well as barren and uncultivable land and fallow land was 34.76 per cent and the proportion of net area sown to total geographical area was very low 34.86 per cent. Similarly, we can see that the area under forest was 11.23 per cent, land put to non-agricultural uses was 16.37 per cent, area sown more than once was 0.99 per cent, gross cropped area was 35.86 per cent, net area under irrigation was 2.78 per cent, gross area under irrigation was 2.98 per cent.

Table 4.1 Land Utilization of Sindhudurg district

Sr. No.	Land use category	Area (in ha)	Area (%)
1	Total geographical area	503.95	(100.00)
2	Area under forest	56.60	(11.23)
3	Land put to non-agricultural uses	82.5	(16.37)
4	Barren land and land unsuitable for cultivation	70	(13.89)
5	Cultivable waste land	NA	-
5	Current fallows	58.8	(11.67)
6	Other fallows	46.35	(9.2)
7	Net area sown	175.7	(34.86)
8	Area sown more than once	5	(0.99)
9	Gross cropped area	180.7	(35.86)
10	Net area under irrigation	14	(2.78)
11	Gross area under irrigation	15	(2.98)

(Figures in parentheses indicate percentages to total geographical area.)

(**Source:** Socio-Economic Review and District Statistical Abstract of Sindhudurg 2020).

4.14 Land holding pattern:

According to 2011 Census of India, the total number of land holders in the district was 2,78,552 with total land holdings of 2,79,080 hectare. The number of marginal farmers was the highest amongst the total land holders that is 87.61 per cent, followed by small farmers (8.70 %), medium farmers (2.63 %) and large farmers (1.06 %).

Table 4.2: Land holding pattern of farmers in the Sindhudurg district

Sr. No.	Size of land holding	No. of land holders	Percentage to total land holders	Area possessed (ha)	Percentage to total area
1.	Up to 2 ha	244,039	87.61	96,757	34.68
2.	2 to 5 ha	24,234	8.70	74,347	26.62
3.	5 to 10 ha	7,326	2.63	49,816	17.85
4.	Above 10 ha	2,953	1.06	58,160	20.85
	Total	**278,552**	**100**	**279,080**	**100**

(**Source:** Socio-Economic Review and District Statistical Abstract of Sindhudurg District, 2020.)

4.15 Cropping pattern:

The different crops in Sindhudurg occupy different area which is given in Table 4.3.

Table 4.3: Cropping pattern of Sindhudurg district

Sr. No.	Crop	Area in ha. (0.00)	Area (%)
1	Rice	54.238	(30.24)
2	Other cereals	1.378	(0.76)
3	Total cereals	55.616	(31.00)
4	Total pulses	0.479	(0.27)
5	Total food grains (cereals + pulses)	56.095	(31.28)
6	Total fruits	1,15.872	(64.60)
7	Total vegetables	1.276	(0.71)
8	Spices and condiments	3.621	(2.02)
9	Total oil seed crops	0.900	(0.50)
10	Total medicinal crops	0.230	(0.13)
11	Net cropped area	179.357	(100)
12	Area cropped more than once	5.410	(3.02)
13	Gross cropped area	184.767	(103.02)

(Figures in parentheses indicate percentages to total geographical area.)
(**Source:** Socio-Economic Review and District Statistical Abstract of Sindhudurg 2020).

It is seen that the cereal crops dominate the cropping pattern of Sindhudurg. Among the cereal crops, rice is a predominating crop during *kharif* accounting for 54.238 ha. (30.24 %) on a limited area, where water is available, the rice is grown in *rabi*-hot weather season, usually the mono cropping of rice is practiced. The proportion of pulses in the total area is only 0.27 per cent. The spices and condiments are grown on 3.621 ha. (2.02 %), fruits and vegetables occupied 117.148 ha. (65.31%). Fruit crops mainly consisted of cashew and mango.

Looking to the cropping pattern, it was observed that cropping pattern of South Konkan region was directed towards cash crops such as mango, cashewnut, coconut, spices and condiments, which results into the higher returns per hectare to the cultivators of this region.

4.16 Horticulture:

The development of the district is dependent on the growth of horticultural area and production of horticultural crops. The agro-climatic conditions of the region are favourable for cultivation of arecanut, cashew, mango, coconut, and also spices. Some farmers have taken up large-scale plantation of mango and cashew. From the year 1990-91, the Government of Maharashtra has undertaken massive program of plantation of horticulture crops under Employment Guarantee Scheme Since then, large area of the region has been covered under horticultural plantations. About 2.80 lakh hectares area came under horticultural plantation out of which 1,07,000 hectare was under mango, 1,43,000 hectare was under cashewnut and about 21,000 hectare under coconut. Considering the export potential of alphonso mango, recently government has declared Sindhudurg region as Agri-Export Zone for alphonso mango.

4.17 Agro-industries:

Cashewnut, Kokum, Paddy, Nagli, Mango, Arecanut and Jackfruit are the main agricultural products in Sindhudurg district. In addition to these, the major forest products like timber wood, bamboo, catechu (*katha*), grass and some plants of medicinal value are found in the region. The South Konkan region is famous for production of best quality of Alphonso mango and also for cashew, coconut and arecanut. Alphonso mango and cashew gives seasonal employment to local peoples for operations such as harvesting, grading, assembling and distribution of mangoes, drying of cashew nut, separation of apples and nuts, preparation of wooden boxes for mango packaging, marketing and transportation, cashew processing, etc. There are nine cashew processing factories and 78 household level cashew processing units in these regions. Cashewnut from this district fetches a substantial foreign exchange. Kokum fruit are also collected in the season, processed and sold in the form of kokum syrup and amsul, kokum oil is also extracted from seeds. This has good demand in cosmetics industry. Paddy straw is useful for manufacturing paper and paperboard and there are some units operating in the region.

4.18 Livestock:

Livestock makes substantial contribution to the economy by providing subsidiary occupation and income to the rural population, employment to small farmers and landless labour and food to human population. The livestock population in South Konkan region as per livestock census 2010-11 is given in Table 4.4 and it can be seen that the total livestock population in Sindhudurg was 9,70,171, of which 22.09 per cent was bovine population, cattle and buffalo population was 14.55 per cent and 6.60 per cent respectively of the total livestock population.

Table 4.4: Livestock population of Sindhudurg district.

Sr. No.	Category	Numbers	Per cent
1	Cattle	147410	(14.55)
2	Total Bovine	214345	(22.09)
3	Buffalo	66935	(6.60)
4	Poultry	769151	(75.90)
5	Sheep	11	(0.00001)
6	Goat	28125	(2.78)
7	Other livestock	1732	(0.18)
8	Others	970171	(100)

Source: Socio-Economic Review and District Statistical Abstract of Sindhudurg Districts, 2020)

As per the report of nutrition experts, per capita consumption of milk was very less compared to other zones which need to be boosted. The milk production can be increased through increase in the number of productive animals, by growing of the grasses on waste lands, by setting up veterinary aid centres and by taking care of the stray cattle for which Gram Panchayat act needs to be enforced vigorously.

4.19 Co-operative and banking sector:

Various aspects of agricultural needs such as extension of agricultural credit and supply of agricultural inputs are covered through co-operative societies. By the end of March 2018, there were 1296 co-operative societies in Sindhudurg district, of which, 228 (17.59 %) were Primary Agricultural Co-operative Credit Societies. In addition to this various cooperative, commercial and schedule bank branches were in operation in this region and the total number of branches was 298.

In year 2019-20, short term credits worth Rs.72.62 lakh, medium term credits worth Rs.64.75 lakh and long-term credits of worth Rs.36.89 lakh were distributed through District Central Co-operative Bank in the district.

(**Source:** Socio-Economic Review and District Statistical Abstract of Sindhudurg District, 2020.)

4.20 Marketing of Agricultural Produce:

There are number of functioning co-operative societies in this region which cater the needs of market. However, long distanced markets such as Mumbai, Pune and other big cities hilly undulating terrain hamper the transportation of goods produced in the region. Inadequate transport facilities and lack of ready market are the major bottlenecks in the production and marketing of certain commodities. Most of the mangoes are sent to Mumbai market and some quantities are marketed to Pune, Kolhapur, Nagpur and other cities in the state. Sometimes, mangoes are also sent to Ahmedabad, Indore, Rajkot, New Delhi, but the quantity is very less compared to other districts.

There is no surplus food grain production in the region and hence, marketing of food grain is not developed. Where there is availability of irrigation facilities the area under groundnut has increased and hence few oil mills/ghanis are in operation.

4.21 Connectivity:

Sindhudurg district is well connected by number highways. NH.66 passes through Banda in the south to Kankavali in the north. District is connected by Konkan Railway to Mumbai, Goa, Thane, Mangalore, Karwar, Thiruvananthapuram, Coimbatore, Hapa, Ernakulam, New Delhi, Jodhpur, Veraval, Porbundar by Konkan Railway. Nearest airport is Dabolim in Goa which is 100 km from Sawantwadi and Kudal.

It is also well connected with State highway Road. Cities like Devgad, Kudal, Kankavli, Malvan, Sawantwadi, and Vengurla have good road connectivity to the remote villages and major towns. Passenger transportation in the district is carried out by State Transport buses. Till the end of 2019-20, State Transport buses were providing services on 886 routes in the district.

There were total 240053 registered vehicles in the district, out of which 12697 were three-wheeler, 185031 were two wheelers, three-seated rickshaws, 95 were taxies, 18715 were four wheelers, 2113 were buses, 16100 were goods carriers and there were 136 ambulances.

(**Source:** Socio-Economic Review and District Statistical Abstract of Sindhudurg District, 2020.)

4.22 Fishery:

There are eight main fisheries centres and they are Devgad, Achara, Malvan, Nivati, Vengurla, Sarjekot, Shiroda, Vijaydurg. In year 2019-20, about 18,713 tons of fish production was done from these marine fisheries centres. In the district, about 16.70 tons of fresh water fish production was done in year 2019-20, which fetched income of Rs.5.01 lakh.

(**Source:** Socio-Economic Review and District Statistical Abstract of Sindhudurg District, 2020.)

RESULTS AND DISCUSSION

CHAPTER V: RESULTS AND DISCUSSION

The data collected for the present investigation is analyzed as per the methodology, keeping in view the objectives of the study. The results of the analysis are presented and discussed in this chapter.

5.1 General information of coconut growers.

The general information of the sample farmers (coconut growers) with respect to age, education, family size, average size of coconut orchard (ha), number of palms per orchard, average age of palms etc. is presented in Table 5.1.

Table 5.1 General information of coconut growers

Sr No	Particulars	Group I	Group II	Group III	Overall
1	Average Age (years)	53.43	47.7	54.2	51.77
2	Education (Std)	9.14	10.04	9.11	9.41
3	Family size				
I	Below 14 years				
a)	Male (No)	1.01 (49.50)	1.5 (51.54)	1.33 (53.41)	1.08 (51.18)
b)	Female (No)	1.03 (50.49)	1.41 (48.45)	1.16 (46.58)	1.03 (48.81)
c)	**Total (No)**	**2.04 (100)**	**2.91 (100)**	**2.49 (100)**	**2.11 (100)**
II	Above 14 years				
a)	Male (No)	1.96 (47.57)	1.9 (52.34)	1.8 (47.87)	1.88 (49.08)
b)	Female (No)	2.16 (52.42)	1.73 (47.65)	1.96 (52.12)	1.95 (50.91)
c)	**Total (No)**	**4.12 (100)**	**3.63 (100)**	**3.76 (100)**	**3.83 (100)**
	Total family members (No)	**6.16**	**6.54**	**6.25**	**5.94**
4	Avg. size of coconut orchard (ha)	0.9	0.67	0.54	0.7
5	No of palms per orchard				
a)	Bearing (No)	124.05	89.69	71.76	95.16
b)	Non Bearing (No)	18.57	15.4	13.7	14.23
	Total (No)	**142.62**	**105.09**	**85.46**	**109.39**
6	Avg. age of palms (years)	52.02	43.6	38.02	44.54

(Figures in parentheses indicates percentage to total)

Plate 1 : Collection of data from the farmer

Plate 2 : Coconut orchard along with other spice crops

5.1.1 Age

Age is one of the important factor influencing enterprising attitude of a farmer through various ways, ultimately affecting managerial ability, skill and judgement required in the organization of business efficiently. It is observed from the Table 5.1 that the average age of the farmers of Group I was 53.43 years, Group II was 47.7 years and Group III was 54.2 years. At overall level the average age of farmers was 51.77 years respectively, indicating farmer has enough experience in agriculture.

5.1.2 Education

It is observed from the Table 5.1 that the average education score of sample farmer was 9.14 in Group I, 10.04 in Group II, and 9.11 in Group III. At overall level the average education score was observed to be 9.41.

5.1.3 Family size

The total family members of the sample coconut growers in Group I were 6.16 of which 2.04 members were below 14 years of age and 4.12 members were above 14 years of age. The total family members in Group II were 6.54 and 6.25 in Group III. The total family members at overall level were found to be 5.94 out of which 2.11 were below 14 years of age and 3.83 were above 14 years of age.

5.1.4 Orchard details

It was observed that the size of the coconut orchard ranged from 0.9 ha in Group I to 0.54 ha in Group III. At overall level the size of the coconut orchard was observed to be 0.7 ha. The total no of palms per farm in Group I was observed to be 142.62 which gradually went on decreasing to 105.09 in Group II and 85.46 in Group III. The total no of palms per farm at overall level was observed to be 109.39 out of which 95.16 were bearing and 14.23 were non-bearing. The average age of palms ranged from 52.02 years in Group I to 43.6 years in Group II and 38.02 years in Group III. The average age of palms at overall level was observed to be 44.54 years.

5.2 Per farm investment in farm asset

It is seen from the Table 5.2 that the total investment in Group I was found to be Rs 15,53,593.00, however in Group II it was Rs 13,83,545.00, and in Group III it was Rs 13,44,255.00. The total investment at overall level was Rs 14,45,846.00 out of which 41.74 per cent was contributed by buildings, 16.43 per cent was contributed by livestock and 41.82 per cent was contributed by implements, machines and hand tools.

Table 5.2 Per farm investment in farm asset

Sr No	Particulars	Group I	Group II	Group III	Overall
1	Buildings				
A	Residential Buildings	4,67,167	3,53,833	3,72,333	3,97,778
B	Farm house	1,44,286	1,46,000	1,26,667	1,32,500
C	Pump shed	5,417	7,500	5,313	5,653
D	Mangar (back shed)	62,500	53,503	56,072	58,811
E	Cattle shed	9,554	8,250	8,754	8,853
	Total	**6,88,924.00 (44.34)**	**5,69,086.00 (41.13)**	**5,69,139.00 (42.33)**	**6,03,595.00 (41.74)**
2	Livestock	2,56,438 (16.50)	2,14,396 (15.49)	1,71,500 (12.75)	2,37,656 (16.43)
3	Implements, machines, hand tools	6,08,231 (39.16)	6,00,063 (43.37)	6,03,616 (44.91)	6,04,595 (41.82)
	Total Investment	**15,53,593.00 (100)**	**13,83,545.00 (100)**	**13,44,255.00 (100)**	**14,45,846.00 (100)**

(Figures in parentheses indicates percentage to total)

5.3 Information about land holding of sample coconut cultivators.

The information of per farm land holding is depicted in Table No 5.3.

Table 5.3 Per farm size of land holding of sample farmers.

Sr No	Particular	Group I	Group II	Group III	Overall
1	Cultivated (ha)				
a)	Irrigated (ha)	1.11 (82.83)	0.80 (80.80)	0.65 (53.80)	0.89 (76.06)
b)	Unirrigated (ha)	0.04 (2.98)	0.08 (8.08)	0.08 (6.62)	0.07 (5.98)
	Sub-total (A) (ha)	**1.15 (85.82)**	**0.88 (88.88)**	**0.73 (60.43)**	**0.96 (82.05)**
2	Uncultivated (B) (ha)	0.19 (14.17)	0.11 (11.11)	0.47 (38.90)	0.21 (17.94)
	Total (A+B) (ha)	**1.34 (100)**	**0.99 (100)**	**1.208 (100)**	**1.17 (100)**

(Figures in parentheses indicates percentage to total)

It is seen from the Table 5.3 that the total land of farmers in Group I was found to be 1.34 ha out of which 85.82 per cent was cultivated and remaining 14.17 per cent was uncultivated. The total land in Group II was observed to be 0.99 ha out of which 88.88 per cent was cultivated and 11.11 per cent was uncultivated. The total land in Group III was observed to

be 1.208 ha out of which 60.43 per cent was cultivated and 38.90 per cent was uncultivated. At overall level the total land was found to be 1.17 ha out of which 82.05 per cent was cultivated and 17.94 per cent was uncultivated.

5.4 Information about cropping pattern followed by sample coconut growers

The information of cropping pattern of sample coconut farmers is presented in Table 5.4.

Table 5.4 Cropping pattern followed by sample coconut growers

Sr No	Particulars	Group I	Group II	Group III	Overall
1	*Kharif* Season				
	a) Paddy (ha)	0.15 (13.04)	0.13 (14.77)	0.11 (15.06)	0.13 (14.28)
2	Rabi Season				
	a)vegetables and pulses	0.09 (7.82)	0.08 (9.09)	0.08 (10.95)	.0.08 (8.79)
3	Perennial				
	a) Coconut and arecanut (ha)	0.9 (78.26)	0.67 (76.13)	0.54 (73.97)	0.7 (76.92)
	b) Banana (ha)	0.0013 (0.11)	0.0019 (0.21)	0.0018 (0.24)	0.0016 (0.17)
	Sub-total (ha)	**0.9113 (79.24)**	**0.6719 (76.35)**	**0.5418 (74.21)**	**0.7016 (77.09)**
4	Gross cropped area (ha)	1.15 (100)	0.88 (100)	0.73 (100)	0.91 (100)
5	Net Cultivated area (ha)	1.06	0.80	0.65	0.83
6	Cropping Intensity (%)	108.49	110.01	112.30	109.63

It is observed from the Table 5.4 that the Cropping intensity of the farmers in Group I was found to be 108.49 per cent, in Group II it was 110.01 per cent, in Group III it was 112.30 per cent and at overall level the cropping intensity was found to be 109.63 per cent. The gross cropped area in Group I was accounted to be 1.15 ha and the net cultivated area was 1.06 ha. Similarly the gross cropped area in Group II was found to be 0.88 ha and the net cultivated area was 0.80 ha. The gross cropped area in Group III was estimated to 0.73 ha and the net cultivated area was 0.65 ha. However the gross cropped area at overall level was found to be 0.91 ha and the net cultivated area was accounted to 0.83 ha.

5.5 Information about orchards according to different locations

The classification of coconut orchards according to different locations is given in Table 5.5. It is seen from the Table 5.5 that, out of 90 sample orchards, 30 orchards were located near the sea shore having an average area of 0.91 ha per orchard, 30 orchards were located between 5 to 10 km away from the sea shore having an average area of 0.67 ha per orchard, and

Table 5.5 Classification of orchards according to location of orchards

Group No	Location wise group	No of cultivator	Average size of the orchard (ha)	No of palms / orchard			Average age of orchard
				Bearing	Non bearing	Total	
G-I	Near Sea Shore	30	0.91	124.05 **(86.98)**	18.57 **(13.02)**	142.62 **(100)**	52.02
G-II	5 to 10 km away from sea shore	30	0.67	89.69 **(84.68)**	15.4 **(15.32)**	105.09 **(100)**	43.6
G-III	Beyond 10 km away from sea shore	30	0.54	71.76 **(83.98)**	13.7 **(16.02)**	85.46 **(100)**	38.02
	Overall	90	0.70	95.16 **(85.21)**	14.23 **(14.79)**	109.39 **(100)**	44.54

(Figures in parentheses indicates percentage to total)

Plate 3 : Coconut orchard near sea shore

Plate 4 : Coconut orchard far away from sea shore

30 orchards were located 10 km away from the sea shore with an average area of 0.54 ha per orchard. At overall level the average area per orchard was observed to be 0.70 ha and the average number of palms per orchard ranged from 142.62 in Group I to 85.46 in Group III. At overall level the average number of palms per orchard was observed to be 109.39. Regarding the proportion of bearing palms, it was highest in Group I (86.98 %) and lowest in Group III (83.98 %). The analysis also indicated that the per hectare number of palms decreased as the coconut orchard located away from the sea shore.

5.6 Establishment cost of coconut orchard

5.6.1 Utilization of labour and inputs

The variety grown in the study area was 'West Coast Tall' which generally starts bearing seven years after planting. The coconut grower have to invest considerable amount in the form of inputs for establishment of coconut orchard upto its bearing stage. During this period the growers do not get any returns in the form of nuts. Therefore, the investment made by the farmers for establishing coconut orchard during the period from planting to the first bearing (upto 7 years) is regarded as the establishment cost. The information regarding year wise per hectare labour utilization and inputs utilization for establishment of coconut orchard is given in Table 5.6.1 and 5.6.2 respectively.

It is seen from the Table 5.6.1 that the per hectare labour utilized for establishment of orchard were 1029.53 out of which maximum labour i.e 30.46 per cent were utilized for irrigation, followed by manuring of young plants (25.49 %), 21.11 per cent for cultural operation, 13.38 per cent for plant protection, 3.03 per cent for digging and filling of pits, 2.42 per cent for preparation of land, 2.19 per cent for planting, 1.88 per cent for after care. Considering the year wise utilization of labour, the maximum labour (17.32 %) were utilized during first year. This was because of major important operations like preparation of land, digging of pits, planting of seedlings etc. were performed in the first year. The labour utilization increased from 127.56 from second year to 157.3 labours in the seventh year. It was also observed that throughout the establishment period the utilization of male labour was more than female labour.

In case of physical inputs utilization, it was seen from the Table 5.6.2 that the per hectare utilization of physical inputs for establishment of coconut orchard worked out to be 124.76 coconut seedlings, 250.16 quintals of manures, 1039.28 kg of 'N', 620.88 kg of 'P_2O_5' and 869.69 kg of 'K_2O'. The year-wise analysis of utilization of physical inputs showed that as the period of establishment increased, the quantity of all inputs increased steadily, except the quantity of human labour and planting material. This was because in the first year the operation like preparation of land, digging of pits, and planting required maximum labour. The planting material used in the second and the third year was only for gap filling of coconut seedlings.

Table 5.6.1: Per hectare year wise labour utilized for establishment of coconut orchard

Sr. No	Name of operation	1st year		2nd year		3rd year		4th year		5th year		6th year		7th year		Total		Total
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
1	Preparation of land	19.18	5.08													19.44	5.5	24.94 (2.42)
2	Digging and filling	27.34		2.83		1.05										31.22		31.22 (3.03)
3	Planting	15.48	4.05	1.38	0.49	0.66	0.51									17.52	5.05	22.57 (2.19)
4	After care	10.07	4.15	3.35	1.99											13.42	6.14	19.56 (1.88)
5	Irrigation	30.27	15.6	36.02	18.5	28.62	19.98	26.13	14.12	34.18	14.18	24.85	16.8	21.95	12.67	202.02	111.85	313.87 (30.46)
6	Cultural Operation	14.57	7.17	20.4	9.79	15.54	12.52	16.62	10.79	17.56	10.46	26.4	16.61	25.06	14.06	136.15	81.4	217.55 (21.11)
7	Manuring of young plants	15.1	10.4	16.01	16.8	23.49	22.54	25.4	17.51	21.48	12.03	20.79	16.5	25.7	18.9	147.96	114.64	262.6 (25.49)
8	Plant protection					12.73	6.89	18.51	5.9	12.5	6.53	25.13	10.7	26.28	12.68	95.15	42.7	137.85 (13.38)
Sub Total		**132.01**	**46.45**	**79.99**	**47.57**	**82.09**	**62.44**	**86.66**	**48.32**	**85.72**	**43.2**	**97.17**	**60.61**	**98.99**	**58.31**	**662.63**	**366.9.**	**1029.53**
	Total	**178.46**		**127.56**		**144.53**		**134.98**		**128.92**		**157.78**		**157.3**		**1029.53**		
	Percentage to total	**(17.32)**		**(12.38)**		**(14.02)**		**(13.10)**		**(12.50)**		**(15.31)**		**(15.26)**		**(100)**		

(Figures in parentheses indicates percentage to total**)**

Table 5.6.2: Per hectare physical input utilized for establishment of coconut orchard

Sr No	Inputs	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	Total
1	Labour (days)								
	Male	132.01	79.99	82.09	86.66	85.72	97.17	98.99	662.63
	Female	46.45	47.57	62.44	48.32	43.2	60.61	58.31	366.9
	Total	**178.46**	**127.56**	**144.53**	**134.98**	**128.92**	**157.78**	**157.3**	**1029.53**
2	Planting material (No)	109.39	11.32	4.05	-	-	-	-	124.76
3	Organic manures (qtl)	48.05	24.56	31.17	37.79	28.58	36.07	43.94	250.16
4	Fertilizers (kg)								
	N	23.43	28.60	39.25	53.68	209.05	322.50	362.77	1039.28
	P	12.24	13.65	14.51	21.33	160.58	189.01	209.56	620.88
	K	21.03	28.46	40.38	55.96	199.07	250.13	274.66	869.69

5.6.2 Cost of establishment

The per hectare year wise cost incurred on various items was worked out and given in Table 5.6.3.

It is observed from the Table 5.6.3 that, from planting of orchard to the first stage of bearing the total cost incurred was Rs 3,15,710.00, out of which the maximum cost was incurred on the labour wages (59.40 %). Other important items of cost were manures (19.80 %), chemical fertilizers (8.19 %), planting material (4.34 %), irrigation (3.91 %), fencing (2.21 %) and plant protection (2.10 %). In case of per hectare year wise cost of establishment, out of total cost, the maximum cost of Rs 67,236 (21.29 %) was incurred during the first year. The cost incurred during the second year was lowest (10.36 %). However the cost steadily increased from 10.36 per cent in the second year to 16.51 per cent in the seventh year.

5.7 Cost of maintenance of coconut orchard.

Once the coconut palm starts bearing from eighth year onwards the growers incurred the expenditure on the maintenance of the orchards every year.

5.7.1 Labour utilization

Labour is an important input in the cultivation practices of coconut. therefore, operation wise hired as well as family labour utilization was worked out and presented in Table 5.7.1.

It is seen from the Table 5.7.1 that the per hectare labour utilized at overall level were estimated to 234.7 out of which maximum labour were utilized in Group I (249.24) followed by Group II (229.3) and Group III (225.7). The operation wise labour utilization showed that maximum labour were utilized for irrigation (27.44 %), followed by harvesting of coconut (23.89 %), preparation of water channel and basin (19.77 %), weeding (15.15 %), manuring and fertilization (13.28 %), mulching (0.43 %).

5.7.2 Physical input utilization

In the cultivation of coconut, inputs like labour, manures, fertilizers, irrigation etc play a vital role. Therefore, per hectare input utilization for different location wise groups of orchard was analyzed and presented in Table 5.7.2.

Table 5.6.3 Per hectare year wise total cost incurred for establishment of coconut orchard

Sr.No	Inputs	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	Total	Percentage to total
1	Labour	33369.5	23133.5	25784.01	24580.02	23624	28525.5	28544.5	**187561.03**	**(59.40)**
2	Planting material	12033.16	1245.2	445.5	-	-	-	-	**13723.86**	**(4.34)**
3	Manures	12012.5	6140.00	7793.00	9448.00	7145.00	9018.00	10985.00	**62541.5**	**(19.80)**
4	Fertilizers									
	N	138.23	168.74	231.57	316.71	1233.39	1902.75	2140.34	**6131.73**	**(1.94)**
	P	97.92	109.2	116.08	170.64	1284.64	1512.08	1676.48	**4967.04**	**(1.57)**
	K	357.51	483.82	686.46	951.32	3384.19	4252.21	4669.22	**14784.73**	**(4.68)**
5	Plant protection	927	-	-	1080.5	1390.8	1550.5	1700	**6648.8**	**(2.10)**
6	Fencing	7000	-	-	-	-	-	-	**7000**	**(2.21)**
7	Irrigation	1300	1433.3	1548.28	1699.7	1722.2	2230.87	2415.4	**12349.8**	**(3.91)**
	Total	**67,236.00**	**32,714.00**	**36,605.00**	**38,247.00**	**39,785.00**	**48,992.00**	**52,131.00**	**3,15,710.00**	**(100)**
	Percentage to total	**(21.29)**	**(10.36)**	**(11.59)**	**(12.11)**	**(12.60)**	**(15.51)**	**(16.51)**	**(100)**	

(Figures in parentheses indicates percentage to total)

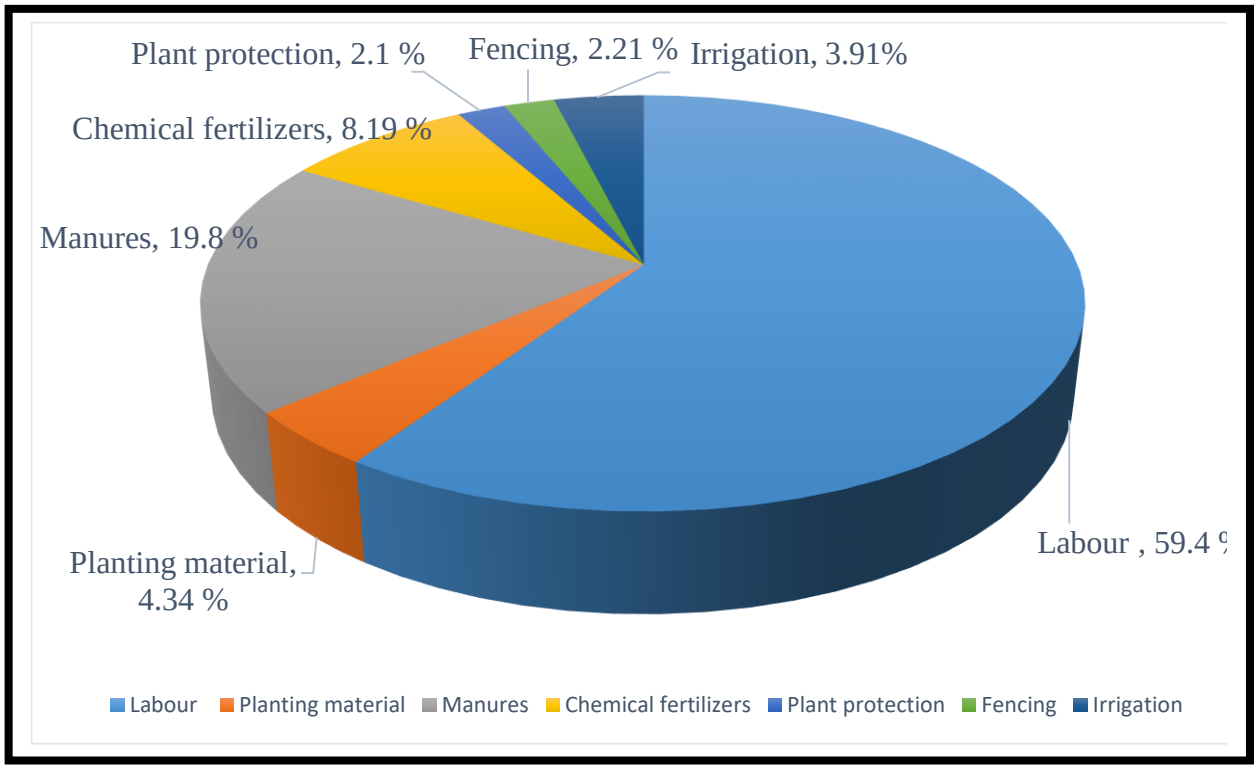


Fig 5.1: Item wise cost incurred for establishment of coconut orchard

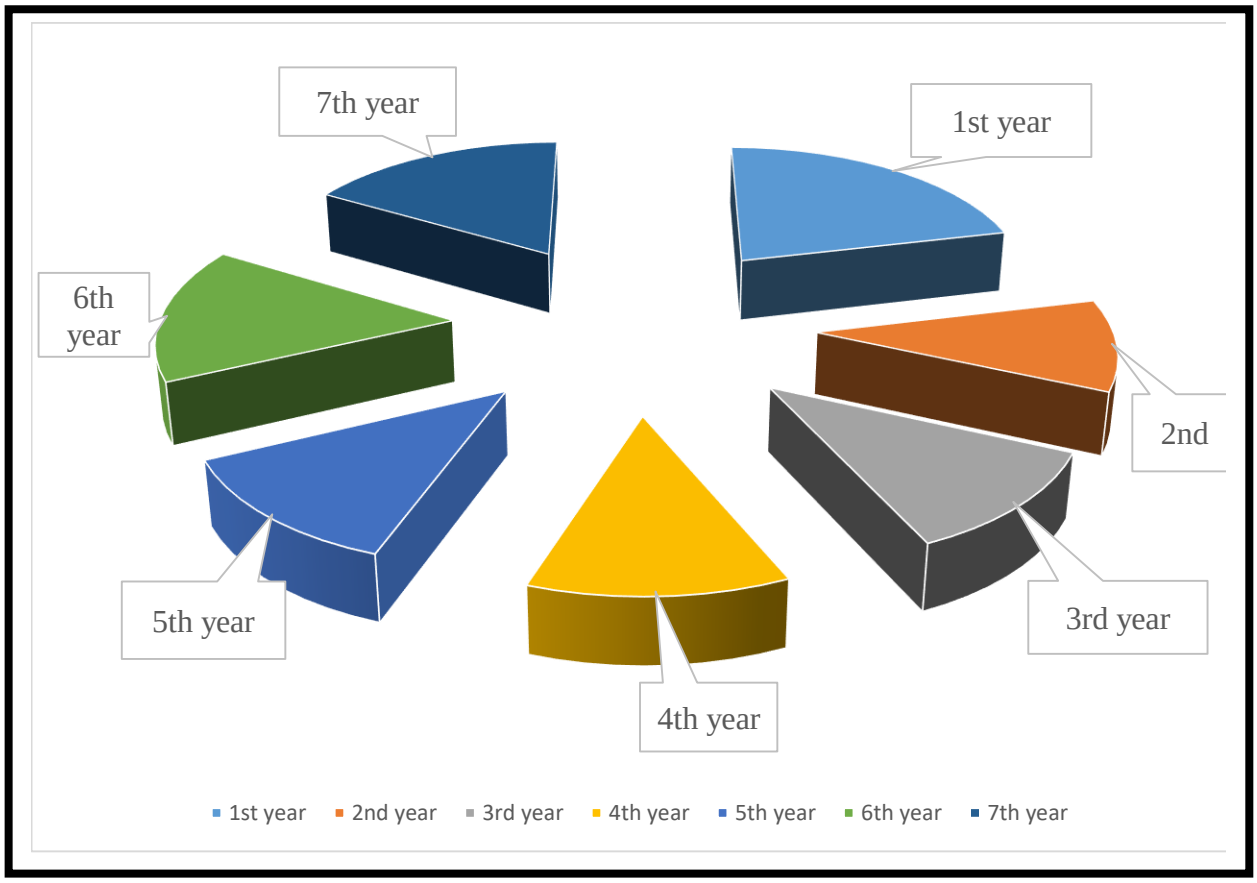


Fig 5.2 : Year wise cost incurred on establishment of coconut orchard

Table 5.7.1 Per hectare group wise labour utilized for bearing orchard

Operation	Group-I				Total	Group-II				Total	Group-III				Total	Overall				Total
	Male		Female			Male		Female			Male		Female			Male		Female		
	F	H	F	H		F	H	F	H		F	H	F	H		F	H	F	H	
Weeding	1.1	3.35	9.1	28	**41.55 (16.67)**	1.1	2.4	9.7	23.3	**36.52 (15.92)**	0.18	0.8	13.2	14.51	**28.7 (12.71)**	0.8	2.2	10.7	21.9	**35.58 (15.15)**
Mulching	0.3	1.11			**1.42 (0.5)**		1.1		0.2	**1.28 (0.55)**	0.34				0.34 **(0.15)**	0.22	0.7		0.06	**1.01 (0.43)**
Irrigation	30	36	2.1		**68.45 (27.47)**	38	23	2.8	0.31	**63.89 (27.86)**	34.6	26.3			**60.95 (27.00)**	34.2	29	1.63	0.1	**64.42 (27.44)**
Preparation of water channel and basin	6.6	26.3	1.58	6.51	**40.93 (16.42)**	12	28	4.5	5.1	**49.48 (21.57)**	15.9	26.7	3.22	3.04	**48.88 (21.65)**	11.5	27	3.1	4.88	**46.42 (19.77)**
Manuring and fertilization	4	12.4	1.91	13.3	**31.68 (12.71)**	5.8	8.4	4.6	5.06	**23.81 (10.38)**	8.36	11.8	6.56	11.37	**38.1 (16.88)**	6.05	11	4.34	9.92	**31.18 (13.28)**
Harvesting		65.2			**65.21 (26.16)**	1	53			**54.3 (23.68)**	0.52	48.2			**48.74 (21.59)**	0.52	56			**56.08 (23.89)**
Total	**42**	**144**	**14.7**	**47.8**	**249.24 (100)**	**57**	**116**	**22**	**34**	**229.3 (100)**	**60**	**114**	**23**	**28.92**	**225.7 (100)**	**53.3**	**125**	**19.8**	**36.9**	**234.7 (100)**

(Figures in parentheses indicates percentage to total)

Table 5.7.2 Per hectare inputs utilized for maintenance of coconut orchards

Sr No	Inputs	I	II	III	Overall
1	Hired labour				
	Male	144	116	114	124.67
	Female	47.8	34	28.92	36.90
	Total	191.8 (77.18)	150 (65.50)	142.92 (63.26)	161.57 (68.90)
2	Family labours				
	Male	42	57	60	53
	Female	14.7	22	23	19.8
	Total	56.7 (22.81)	79 (34.49)	83 (36.73)	72.9 (31.09)
3	**Total labour (Hired + Family)**	**248.5 (100)**	**229 (100)**	**225.92 (100)**	**234.47 (100)**
4	Organic manure (quintal)	58.98	47.74	38.46	51.39
5	Fertilizers (kg)				
	N	31.41	22.69	18.03	25.04
	P	15.73	12.96	8.88	13.51
	K	27.54	20.37	16.41	22.48
6	Plant protection (lit)	0.21	0.15	0.12	0.16

(Figures in parentheses indicates percentage to total)

It is seen from the Table 5.7.2 that at overall level per hectare input utilized were estimated to 234.47 labour, 51.39 quintals of manure, 25.04 kg of 'N', 13.51 kg of 'P_2O_5', 22.48 kg of 'K_2O' and 0.16 litres of plant protection. Out of the total labour utilized 68.90 per cent were hired and only 31.09 per cent were provided by the family. Among the different groups, the use of labour varied from 248.5 in Group I to 225.92 in Group III. In case of use of manures, Group I utilizes higher quantity of manures i.e 58.98 quintals followed by Group II (47.74 quintals) and Group III (38.46 quintals). Whereas to the use of plant protection, Group I utilizes maximum quantity of plant protection i.e 0.21 liters followed by Group II (0.15 liters) and Group III (0.12 liters) and at overall level 0.16 liters of plant protection was used.

5.7.3 Cost of cultivation

The per hectare item wise cost incurred for the production of coconut is worked out separately for each group and presented in Table 5.7.3.

Table 5.7.3 Per hectare group wise cost of maintenance of coconut plantation

Sr No	Items	G I	G II	G III	Overall	Percentage to overall
1	Hired labour					
	a) Male	28,800	23,200	22,800	24,933.33	(15.99)
	b) Female	7,170	5,100	4,338	5,535	(3.55)
	Total	**35,970**	**28,300**	**27,138**	**30,468.33**	**(19.55)**
2	Manures	14,745	11,935	9,615	12,848	(8.24)
3	Fertilizers					
	N	186	134	107	148	(0.09)
	P	126	104	72	109	(0.06)
	K	469	347	279	382	(0.24)
	Total	**781**	**585**	**458**	**639**	**(0.41)**
4	Plant protection	684.6	489	391.2	521.6	(0.33)
5	Irrigation	1050.74	1350.74	1650.74	1350.74	(0.86)
6	Interest on W.C @13%	6920.07	5545.76	5102.88	5957.59	(3.82)
7	Land revenue	150	150	150	150	(0.09)
8	Depreciation on irrigation structure and implements	2601.21	2446.21	1946.81	2331.41	(1.49)
	Cost A	**62,903 (35.66)**	**50,802 (34.04)**	**46,453 (33.97)**	**51,936 (33.32)**	**(33.32)**
9	Rental value of land (1/6 of gross produce-land revenue)	55,329	35,771.95	28,751.26	43,292.15	(27.78)
10	Interest on fixed capital	3344.9	4962.63	3530.96	3946.16	(2.53)
11	Amortization cost	37,884.01	37,884.01	37,884.01	37,884.01	(24.31)
	Cost B	**1,59,461 (90.41)**	**1,29,420 (86.74)**	**1,16,619 (85.30)**	**1,37,058 (87.94)**	**(87.94)**
12	Family labour					
	a) Male	8400	11400	12000	10600	(6.80)
	b) Female	2205	3300	3450	2985	(1.91)
13	Supervision charges @ 10% of Cost A	6290.26	5080.17	4645.26	5193.52	(3.33)
	Cost C	**1,76,356 (100)**	**1,49,201 (100)**	**1,36,714 (100)**	**1,55,836 (100)**	**(100)**

(Figures in parentheses indicates percentage to total)

It is seen from the Table 5.7.3 that at overall level the total cost 'Cost C' worked out to be Rs 1,55,836 of which share of 'Cost A' was 33.32 per cent, share of 'Cost B' was 87.94 per cent. As regards to the item wise cost incurred, the maximum cost was recorded for rental value of land (27.78%) followed by amortization (24.31%). The cost incurred on other items ranged from 0.09 per cent for land revenue to 19.55 per cent for hired human labour.

Similarly the per hectare total cost (Cost C) of production of coconuts for different location wise group of orchard was worked out. It was Rs 1,76,356 in Group I, Rs 1,49,201 in Group II and Rs 1,36,714 in Group III. This indicated that the cost of production decreased from Group I to Group III as the coconut orchards located away from the sea shore.

5.8.1 Yield and returns from coconut

On the basis of per hectare production of coconut and its by-product, gross return were worked out for different location wise group of orchard. The gross returns included the value of mature and tender nuts, value of by-products like *zaps, brooms, madi* (syrup collected from inflorescence), *husks*. The results of the analysis are presented in Table 5.8.1

It is seen from the Table 5.8.1 that the gross returns obtained at overall level was Rs 2,60,653.00 out of which 87.28 per cent were obtained from matured nuts and 5.71 per cent were obtained from tender nuts. Therefore it is seen that 92.99 per cent returns were from main produce only. The remaining proportions of returns were obtained from *Zaps* (0.97%), Broom (0.17%), *Madi* (5.01%), husks (0.83%). As regards to the total gross returns maximum returns were obtained from Group I i.e. Rs 3,32,875 followed by Group II i.e. Rs 2,15,532 and Group III i.e. Rs 1,73,408 .This showed that as the distance of the orchard increases from the sea shore the yield and returns decreases.

The yield of main produce also showed a decreasing trend as the distance of the location of orchard increased from the sea-shore. Among the various by-product the contribution of *madi* was the highest in all the three groups.

The gross returns were worked out on the basis of per hectare production of coconut, its by-product and price received by the growers. The profitability at various cost level *viz.,* Cost A, Cost B, Cost C was worked out by deducting costs from gross returns. The per nut cost of production was also worked out and presented in Table 5.8.2.

Plate 5 : Harvesting of coconuts

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Plate 6 : Harvesting of coconuts

Table 5.8.1 : Per hectare group wise yield and returns from coconut

Sr No	Item of returns	Group I		Group II		Group III		Overall	
		Qty	value (Rs)	Qty	value (Rs)	Qty	value (Rs)	Qty	value (Rs)
1	Nuts								
	a) Mature nuts (no)	14874	2,97,472 (89.36)	9091	1,81,817.00 (84.35)	7163	1,43,263.00 (82.61)	11376	2,27,518.00 (87.28)
	b) Tender nuts (No)	1023	15,349.00 (4.61)	988	14,821.00 (6.87)	957	14,346.00 (8.27)	993	14,886.00 (5.71)
	Total Nuts (No)	**15,897**	**3,12,821.00 (93.97)**	**10,079**	**1,96,638.00 (91.23)**	**8,120**	**1,57,609.00 (90.88)**	**12,369**	**242404.00 (92.99)**
2	*Zaps* (byproduct)		2945.26 (0.88)		2502.18 (1.16)		2191.61 (1.26)		2546.35 (0.97)
3	Broom		477.53 (0.14)		453.06 (0.21)		427.19 (0.24)		452.59 (0.17)
4	*Madi*		14411.13 (4.32)		13763.15 **(6.38)**		11021.4 (6.35)		13065.22 (5.01)
5	husks		2219.54 (0.66)		2175.46 (1.00)		2158.62 (1.24)		2184.54 (0.83)
	Total		**3,32,875.00 (100.00)**		**2,15,532.00 (100.00)**		**1,73,408.00 (100.00)**		**2,60,653.00 (100.00)**

(Figures in parentheses indicates percentage to total)

Table 5.8.2 Per hectare group wise profitability of coconut orchard

Sr.No	Particulars	Group I	Group II	Group III	Overall
1	Gross returns (Rs)	3,32,875	2,15,532	1,73,408	2,60,653
2	Costs (Rs)				
	Cost A	62,903	50,802	46,453	51,936
	Cost B	1,59,461	1,29,420	1,16,619	1,37,058
	Cost C	1,76,356	1,49,201	1,36,714	1,55,836
3	Profit at (Rs)				
	Cost A	2,69,972	1,64,730	1,26,955	2,08,717
	Cost B	1,73,414	86,112	56,789	1,23,595
	Cost C	1,56,519	66,331	36,694	1,04,817
4	Per nut cost of production (Rs)	9.83	12.92	14.89	11.12
5	Input Output ratio	1:1.88	1:1.44	1:1.26	1:1.67

5.8.2 Profitability of coconut orchard

It is seen from the Table 5.8.2 that at overall level the per hectare profit of coconut orchard at Cost A, Cost B, Cost C was Rs 2,08,717, Rs 1,23,595 and Rs 1,04,817. This indicated that the profit at different cost level was minimum in Group III and maximum In Group I. This was due to the yield levels were low in Group III as compared to Group I. The per nut cost of production in Group I was accounted Rs 9.83, whereas in Group II and Group III it was accounted to be Rs 12.92 and 14.89. At overall level the per nut cost of production was recorded to be Rs 11.12. The input-output ratio was also worked out and it was observed to be 1:1.88 in Group I, 1:1.44 in Group II and 1:1.26 in Group III. At overall level the input-output ratio was observed to be 1:1.67. This indicated that coconut production in all groups in the Konkan region was profitable venture.

5.9 Economic evaluation of investment in coconut plantation

Investment in coconut orchards demand vast resources in terms of capital and the flow of income is spread over in large number of years. No retrieval is possible once the investment is made on resources for establishing coconut orchard. Hence it is necessary to evaluate such a huge investment for its worthiness.

Considering the yearly cost of establishment of first seven years and maintenance cost upto 70 years age of orchard, series of cash outflow (costs) was also prepared. Similarly considering the per hectare returns received the series of cash inflow was also prepared. With the help of this series flows and by using the economic parameters namely i) Pay-back period,

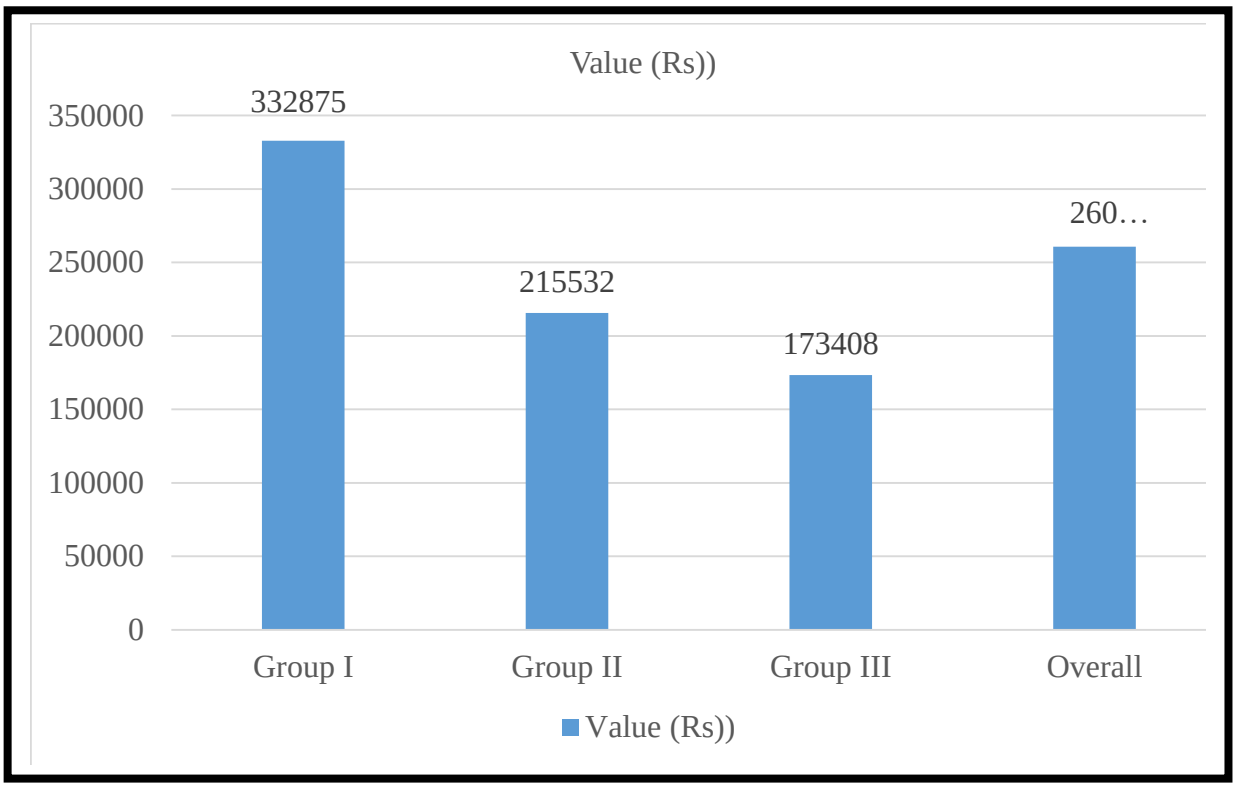

Fig 5.3 : Per hectare group wise yield and returns from coconut plantation

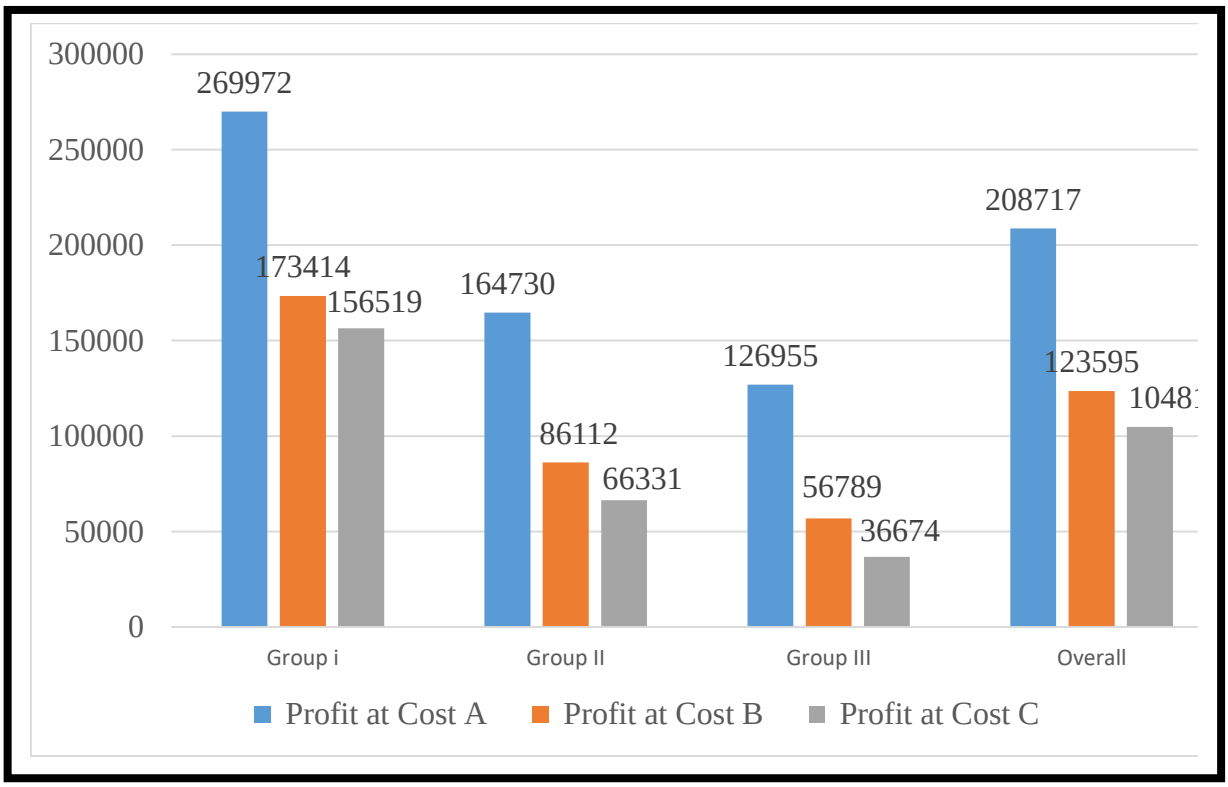

Fig 5.4 : Per hectare group wise profitability of coconut orchard

ii) Net Present Value, iii) Benefit - Cost ratio, iv) Internal rate of return as per the procedure outlined in the chapter of methodology the economic feasibility of investment in coconut plantation was tested. The estimated value of these parameters are presented in Table 5.9.1.

It is revealed from the Table 5.9.1 that in case of Group I, the payback period with discounting at 12 and 14 per cent discount rates recorded to be 9 and 10 years, whereas without discounting, the payback period observed to be 9 years respectively. Similarly the payback period in Group II with 12 and 14 per cent discount rates observed to be 11 and 12 years whereas without discounting the payback period recorded to be 10 years respectively. In Group III the payback period was observed to be 13 and 14 years with 12 and 14 per cent discount rates, and 10 years without discounting. At overall level the payback period recorded to be 10 and 11 years with 12 and 14 per cent discount rates and 9 years without discounting.

At overall level the Net present value with 12 per cent and 14 per cent discount rates were estimated and it was Rs 2,78,298.87 and Rs 200,127.10 whereas it was Rs 4,97,830.74 and 3,76,141.00 in Group I, Rs 1,71,,912.10 and Rs 1,13,610.3 in Group II and Rs 1,15,983.29 and Rs 65,577.90 in Group III.

The group wise B:C ratio was also estimated and it was 1.96 and 1.86 at 12 and 14 per cent discount rates in Group I, whereas it was 1.33 at 12 per cent discount rate and 1.26 at 14 per cent discount rate in Group II, similarly it was 1.25 at 12 per cent discount rate and 1.16 at 14 per cent discount rate in Group III. At overall level the B:C ratio recorded to be 1.54 and 1.45 at 12 and 14 per cent discount rates.

The group wise IRR was also estimated and it was recorded to be 30.23 per cent in Group I, whereas it was 20.96 per cent in Group II, and 18.46 per cent in Group III. At overall level the IRR was recorded to be 24.92 per cent.

The results revealed that the Benefit-Cost ratio with both discount rates was greater than unity, Net Present Value was also positive and the Internal Rate of return was much more higher than the prevailing borrowing rate of interest. The Pay-back period was also desirable considering the life of the coconut orchard. All financial feasibility test were positive indicating profitability in the coconut plantation. Hence considering all these economic parameters, it can be concluded that the coconut plantation is quite profitable venture and investment in coconut orchard is worthwhile.

Table 5.9.1 Economic evaluation of investment in coconut plantation

Discount rates (%)	Parameters								
	Pay-back period (years)				NPV		B:C Ratio		IRR
	12		14		12	14	12	14	
Groups	With discounting (12%)	Without discounting	With discounting (14%)	Without discounting	-	-	-	-	-
Group I	9	9	10	9	4,97,830.74	3,76,141.00	1.96	1.86	30.23
Group II	11	10	12	10	1,71,912.10	1,13,610.3	1.33	1.26	20.96
Group III	13	10	14	10	1,15,983.29	65,577.90	1.25	1.16	18.46
Overall	10	9	11	9	2,78,298.87	200,127.10	1.54	1.45	24.92

Table 5.10.1 Per farm group wise disposal of coconut fruits

Group	Total production of nuts	Wage Payment	Consumed at home	Gift to relatives	Used for seedlings	Losses in storage	Actually marketed
Group I	15,897 (100)	255.51 (1.60)	180.83 (1.13)	55.62 (0.34)	12.45 (0.07)	17.56 (0.11)	15,374 (96.71)
Group II	10,079 (100)	231.13 (2.29)	178.51 (1.77)	51.23 (0.50)	11.31 (0.11)	14.02 (0.13)	9,593 (95.17)
Group III	8,120 (100)	217.83 (2.68)	171.13 (2.10)	51.02 (0.62)	10.01 (0.12)	13.92 (0.17)	7,656 (94.28)
Overall	12,369 (100)	236.79 (1.91)	177.73 (1.43)	53.73 (0.43)	11.26 (0.09)	16.17 (0.13)	11,873 (95.99)

(Figures in parenthesis indicates percentage to total)

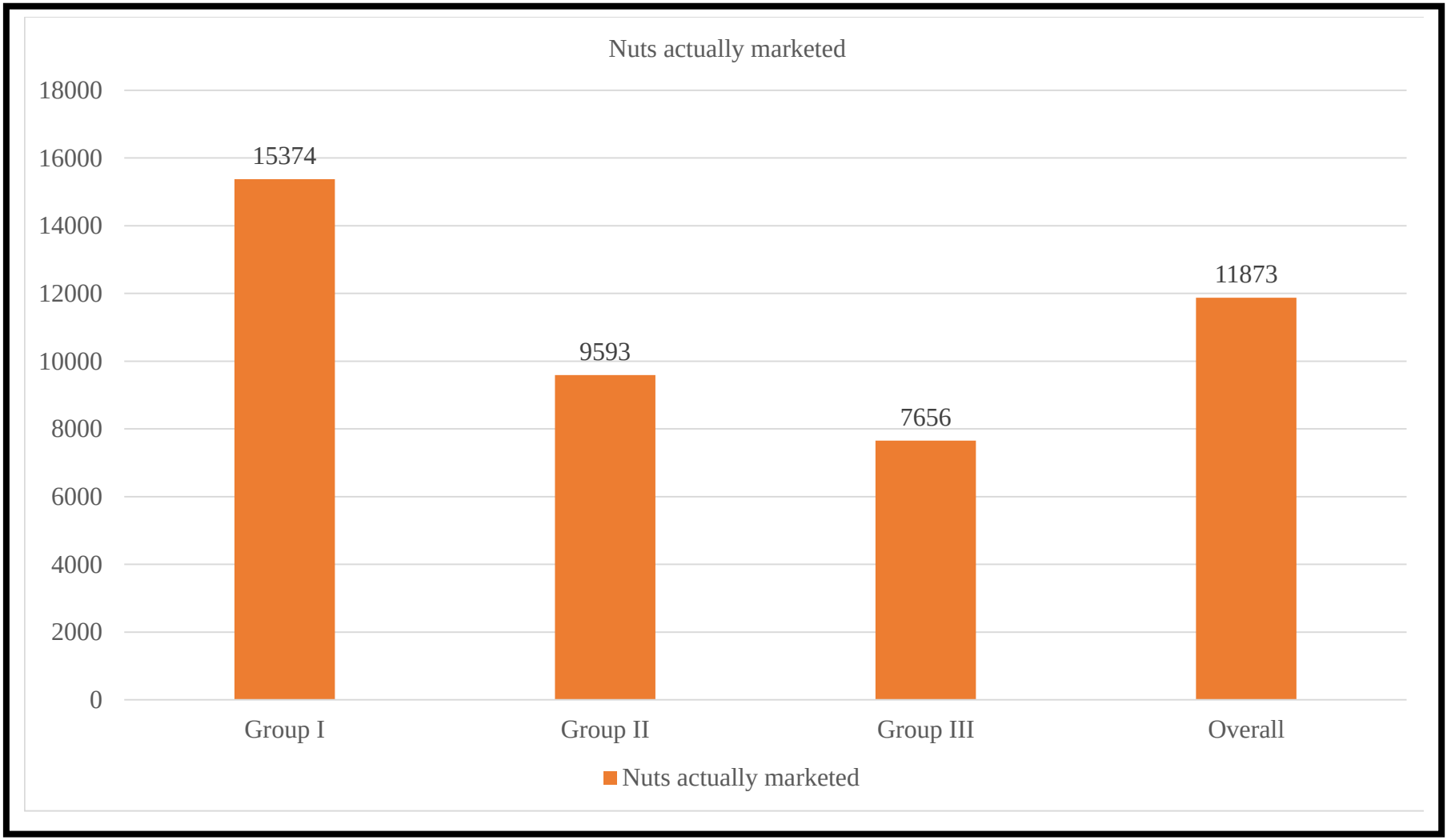

Fig 5.5 : Per farm disposal of coconut fruits

5.10 Disposal pattern

To know the quantity of nuts marketed as well as used for home consumption, the group-wise per farm disposal pattern of nuts was studied and the results are presented in Table 5.10.1

It is seen from the Table 5.10.1 that at overall level, the total production of nuts was 12,369 out of which 1.91 per cent was kept for wage payment, 1.43 per cent were consumed at home, 0.43 per cent were given as gifts to relatives, 0.09 per cent were used for raising of seedlings, 0.13 per cent were lost in storage, and 95.99 per cent were actually marketed. The per farm total production of nuts was maximum in Group I (15,897 nuts) followed by Group II (10,079 nuts), Group III (8,120 nuts). This indicated that the orchards located near the sea shore has maximum production of nuts as compared to the orchards located away from the sea shore.

Table 5.10.2: Information regarding agency wise per farm sale of coconut

Groups	Name of agency						Total
	Direct to consumer		Village merchant		Commission agent/ wholesaler		
	No of growers sold their produce	Average quantity of nuts	No of growers sold their produce	Average quantity of nuts	No of growers sold their produce	Average quantity of nuts	
Group I	17	2540 (16.52)	15	4792 (31.17)	20	8042 (52.31)	15,374 (100)
Group II	14	1671 (17.42)	12	2905 (30.28)	16	5017 (52.3)	9,593 (100)
Group III	16	1258 (16.43)	17	2478 (32.37)	13	3920 (51.2)	7,656 (100)
Overall	47	2115 (17.81)	44	3838 (32.33)	49	5920 (49.86)	11,873 (100)

(Figures in parenthesis indicates percentages to total)

5.10.2 Agency wise disposal of coconuts

The coconut grower in the study area sold their produce through different agencies depending upon their scale of production and need. Commission agents, wholesalers, village merchant were the different agencies in the study area. The direct sale to consumers was also in practice in the study area. The agency wise quantity sold by the growers is worked out and given in Table 5.10.2.

Table 5.10.2 revealed that the total quantity marketed by the farmers of Group I was observed to be 15,374 nuts, followed by Group II (9,593 nuts) and Group III (7,656 nuts). At overall level 11,873 nuts were marketed. Considering all the three groups maximum quantity of nuts were marketed through commission agent/wholesaler (49.86 %). It was also observed that very low quantity of nuts were sold directly to consumer (17.81 %).

Plate 7 : Sorting of nuts according to grade standards

Plate 8 : Filling of nuts in gunny bags

5.11 Constraints faced by the farmers in coconut cultivation

The information regarding the constraints experienced by the coconut growers in cultivation of coconut is presented in Table 5.11.1. The Table revealed that the major constraints faced by majority of the coconut growers were shortage of harvesting labour (98.88 %), 94.4 per cent farmers face the problem of frequent failure of electricity which affected the irrigation. 84.4 per cent farmers faced the problem of non-availability of labour in time. The other constraints were, Non-availability of fertilizers in time (78.88 %), non-availability of fertilizers in required quantity (71.11 %), price received is not remunerative (60.00 %), shortage of water (56.66 %)**,** non-availability of disease free planting material (50.00 %), problem about transport due to non-availability of transporting vehicle on time (34.44 %). Only a small quantity of farmers faced problem of non-availability of specific variety (14.44%).

Table 5.11.1 Constraints faced by coconut growers

Sr No	Constraints faced	No of cultivators (N =90)	Percentage
1	Non availability of specific variety	13	(14.44)
2	Non availability of disease free planting material	45	(50.00)
3	Non availability of fertilizers in time	71	(78.88)
4	Non availability of fertilizers in required quantity	64	(71.11)
5	Non availability of labour in time	76	(84.44)
6	Shortage of harvesting labour	89	(98.88)
7	Shortage of water	51	(56.66)
8	Frequent failure of electricity	85	(94.4)
9	Price received is not remunerative	54	(60.00)
10	Problem about transport due to non-availability of vehicles on time	31	(34.44)

SUMMARY AND CONCLUSIONS

CHAPTER VI : SUMMARY AND CONCLUSIONS

Coconut palm (*Cocos nucifera*) is one of the useful trees all over the world known as "Kalpavriksha" (trees of paradise). It is also known as "Tree of life". Being versatile crop it provides food, medicine, health drink, fuel, fiber, timber etc. The word 'Coconut grinning face' in Portuguese may refer to the three face like holes in coconut shell. Coconut have been growing in the tropical regions for more than 4500 years but recently increased popularity for their flavor, culinary uses and potential health benefits. The estimated total world production for coconuts in 2020 was 61,520,382 metric tons down 1.0 per cent from 62,159,626 tons in 2019.The Philippines Indonesia and India produce around 70 per cent of the world total copra, with the Philippines and Indonesia also being the world's main coconut oil exporters. India leads the coconut growing countries in production and productivity through the area under coconut cultivation is lower than other major growing countries. Production during 2020-21 was 21,207 million nuts which account for more than 34 per cent of global production. The productivity has been recorded at 9,687 nuts per hectare which is the highest in the world. At present there are 9785 Coconut Producer Societies, 747 Federation and 67 Coconut producer Companies covering 120 million palms belonging to 10 lakh coconut growers. Coconut can be made a part of the 'Make in India' campaign by increasing the production and export of value added products. Maharashtra Occupies 7th place in area and 9th place in production with the annual production of 209.87 million nuts. In Maharashtra 95 per cent area under coconut is concentrated in Konkan region alone. Most of the orchards in Konkan region are situated near the sea shore.

Among the different crops grown in Sindhudurg district coconut is one of the major cash crop of the district thriving well under agro-climatic conditions of the district. Though the conditions of the Sindhudurg district is well known for coconut, arecanut, mango production very few efforts have been made so far to study the economic aspects of production and disposal of coconut in Sindhudurg district. Hence the present study will be undertaken with the following specific objectives

1. To estimate costs, returns and profitability in coconut production.

2. To assess financial feasibility of investment in coconut cultivation.

3. To study disposal pattern of coconut.

4. To identify constraints in production and disposal of coconut.

For the present study Malvan and Deogad tehsils were selected purposively as they are located near the sea-shore and has maximum area under coconut cultivation. Three villages from each tehsils were selected randomly. From each village, 15 coconut growers were selected

having bearing orchards and separate sample of 35 coconut growers having orchards of establishment stage (1^{st} to 7^{th} year) were selected randomly.

Thus the final sample consisted of 90 coconut growers of bearing orchards and 35 orchards of coconut growers of establishment stage orchard. The bearing orchards were further grouped according to location of orchard. The data on cost of establishment, cost of maintenance and returns were collected through personal interviews with the growers by survey method with the help of specially designed schedule.

Findings of the study :

The general information of coconut growers revealed that average age of sample cultivator was 51.77 years at overall level, and the educational score was 9.14 in Group I, 10.04 in Group II, and 9.11 in Group III. The total family members at overall level were found to be 5.94 out of which 2.11 were below 14 years of age and 3.83 were above 14 years of age. It was observed that the size of the coconut orchard ranged from 0.9 ha in Group I to 0.54 ha in Group III. The total no of palms in Group I was recorded to be 142.62 which gradually went on decreasing to 105.09 in Group II and 85.46 in Group III. The average age of palms ranged from 52.02 years in Group I to 43.6 years in Group II and 38.02 years in Group III. The average age of palms at overall level was observed to be 44.54 years.

Considering the per farm investment in farm asset, the total investment in Group I was found to be Rs 15,53,593.00, however in Group II it was Rs 13,83,545.00 and in Group III it was Rs 13,44,255.00. In case of information about land holding of sample coconut growers, the total land of farmers in Group I was found to be 1.34 ha out of which 85.82 per cent was cultivated and remaining 14.17 per cent was uncultivated. The total land in Group II was found to be 0.99 ha out of which 88.88 per cent was cultivated and 11.11 per cent was uncultivated. The total land in Group III was 1.208 ha out of which 60.43 per cent was cultivated and 38.90 per cent was uncultivated. At overall level the total land was found to be 1.17 ha out of which 82.05 per cent was cultivated and 17.94 per cent was uncultivated.

As regards to the cropping pattern followed by the sample coconut growers the cropping intensity of the farmers in Group I was found to be 108.49 per cent, in Group II it was 110.01 per cent, and in Group III it was 112.30 per cent and at overall level the cropping intensity was found to be 109.63 per cent. The gross cropped area in Group I was accounted to be 1.15 ha and the net cultivated area was 1.06 ha. Similarly the gross cropped area in Group II was found to be 0.88 ha and the net cultivated area was 0.80 ha. The gross cropped area in Group III was estimated to be 0.73 ha and the net cultivated area was 0.65 ha. However the gross cropped area at overall level was 0.91 ha and the net cultivated area was 0.83 ha.

Out of 90 sample orchards 30 orchards were located near the sea shore having an average area of 0.91 ha per orchard, 30 orchards were located between 5 to 10 km away from the sea shore having an average area of 0.67 ha per orchard, and 30 orchards were located 10 km away from the sea shore with an average area of 0.54 ha per orchard. At overall level the average area per orchard was observed to be 0.7 ha and the average number of palms per orchard ranged from 142.62 in Group I to 85.46 in Group III. At overall level the average number of palms per orchard was observed to be 109.39. Regarding the proportion of bearing palms, it was highest in Group I (86.98 %) and lowest in Group III (83.98 %).

Per hectare capital investment for establishing coconut orchard for a period of seven years worked out to Rs 3,15,70.00. Out of which, 59.40 per cent was labour cost. However the cost incurred on manures was 19.80 per cent, on fertilizers (8.19 %), planting material (4.34 %), irrigation (3.91 %), fencing (2.21 %), and 2.10 per cent on plant protection. Out of this per hectare year wise total investment maximum amount of Rs 67,236.00 (21.29 %) was invested during the first year. The cost incurred during the second year was lowest (10.36 %).

Once the coconut orchard is well established, the grower has to incur expenditure for maintenance of the orchards so as to achieve more production. Considering the expenditure and interest on investment as well as rental value of land the per hectare cost of production at overall level i.e the total cost 'Cost C' worked out to be Rs 1,55,836 of which share of 'Cost A' was 33.32 per cent, share of 'Cost B' was 87.94 per cent. Considering the item wise cost incurred, maximum cost was recorded for rental value of land (27.78 %) followed by amortization (24.31 %). The cost incurred on other items ranged from 0.09 per cent for land revenue to 19.55 per cent for hired human labour. Similarly the per hectare total cost (Cost C) of production of coconuts for different location wise group of orchard was worked out. It was Rs 1,76,356 in Group I, Rs 1,49,201 in Group II and Rs 1,36,714 in Group III.

Regarding the profitability in coconut cultivation, it was observed that the cultivation of coconut was profitable at all the cost level. At overall level the per hectare net profit received by the growers was Rs 1,04,817 with input-output ratio of 1:1.67. This per hectare net profit was decreased as the distance of the orchard from the sea shore increased as indicated by the input-output ratio. This ratio was observed to be 1:1.88 in Group I, 1:1.44 in Group II and 1:1.26 in Group III.

The economic evaluation of investment in coconut orchards revealed that in case of Group I, the payback period with discounting at 12 and 14 per cent discount rates recorded to be 9 and 10 years, whereas without discounting the payback period observed to be 9 years respectively. Similarly the payback period in Group II with 12 and 14 per cent discount rates observed to be 11 and 12 years whereas without discounting the payback period recorded to be

10 years respectively. In Group III the payback period was observed to be 13 and 14 years with 12 and 14 per cent discount rates, and 10 years without discounting. At overall level the payback period recorded to be 10 and 11 years with 12 and 14 per cent discount rates and 9 years without discounting.

At overall level the net present value with 12 per cent and 14 per cent discount rates were estimated and it was Rs 2,78,298.87 and Rs 200,127.10 whereas it was Rs 4,97,830.74 and 3,76,141.00 in Group I, Rs 1,71,912.10 and Rs 1,13,610.3 in Group II and Rs 1,15,983.29 and Rs 65,577.90 in Group III.

The group wise B:C ratio was also estimated and it was 1.96 and 1.86 at 12 and 14 per cent discount rates in Group I, whereas it was 1.33 at 12 per cent discount rate and 1.26 at 14 per cent discount rate in Group II, similarly it was 1.25 at 12 per cent discount rate and 1.16 at 14 per cent discount rate in Group III. At overall level the B:C ratio recorded to be 1.54 and 1.45 at 12 and 14 per cent discount rates.

The group wise IRR was also estimated and it was recorded to be 30.23 per cent in Group I, whereas it was 20.96 per cent and 18.46 per cent in Group II and Group III. At overall level the IRR was recorded to be 24.92 per cent.

. The results revealed that the Benefit-Cost ratio with both discount rates was greater than unity, Net Present Value was also positive and the Internal Rate of return was much more higher than the prevailing borrowing rate of interest. The Pay-back period was also desirable considering the life of the coconut orchard. All financial feasibility test were positive indicating profitability in the coconut plantation. Hence considering all these economic parameters, it was concluded that the coconut plantation was quite profitable venture and investment in coconut orchard was worthwhile.

Regarding disposal of nuts, at overall level 95.99 per cent were sold in the market, 1.91 percent were utilized for wage payment, 1.43 per cent was consumed at home, 0.43 per cent were given as gifts to relatives, 0.13 per cent were lost in storage and a very small quantity 0.09 per cent was used for raising seedlings. Regarding sale of produce, total quantity marketed by the farmers of Group I was observed to be 15,374 nuts, followed by Group II (9,593 nuts) and Group III (7,656 nuts). At overall level 11,873 nuts were marketed. Considering all the three groups maximum quantity of nuts were marketed through commission agent/wholesaler (49.86%). It was also observed that very low quantity of nuts were sold directly to consumer (17.81%).

The major constraints faced by majority of the coconut growers were shortage of harvesting labour (98.88 %), 94.4 per cent farmers faced the problem of frequent failure of

electricity which affected the irrigation. 84.4 per cent farmers faced the problem of non-availability of labour in time. The other constraints were, non-availability of fertilizers in time (78.88 %), non-availability of fertilizers in required quantity (71.11 %), price received is not remunerative (60.00 %), shortage of water (56.66 %)**,** non-availability of disease free planting material (50.00 %), problem about transport due to non-availability of transporting vehicle on time (34.44 %). Only a small quantity of farmers faced problem of non-availability of specific variety (14.44 %).

Conclusions.

The following conclusions are drawn from the present study.

1. Coconut is irrigated plantation crop which is having gestation period of seven years, in this period to establish a coconut orchard growers have to incur huge expenditure. It is observed from the study that on an average an amount of Rs 3,15,710 was required to be invested for establishing one hectare of coconut orchard.
2. For establishing a coconut orchard highest amount 59.40 per cent was incurred on labour wages. Out of total establishment cost, cost of orchard in the first year was 21.29 per cent. Lowest cost was incurred in the second year 10.36 per cent which later increased to 16.51 per cent in the seventh year.
3. Regarding per hectare group wise cost of maintenance of coconut plantation, the per hectare cost of production was maximum (Rs 1,76,356) in Group I and lowest (Rs 1,36,714) in Group III. Out of this total cost the share of Cost A was 35.66 per cent and Cost B was 90.41 per cent in Group I. The share of Cost A was 34.04 per cent and Cost B was 86.74 per cent in Group II. The share of Cost A was 33.97 per cent and Cost B was 85.30 per cent in Group III.
4. Regarding returns, decreasing trend with respect to location of orchard was observed in coconut production. Considering the total returns and costs at different level, coconut cultivation was profitable in the study area as indicated by the input-output ratio of 1:1.88 in Group I, 1:1.44 in Group II, 1:1.26 in Group III. At overall level the input-output ratio worked out to be 1:1.67.
5. Even though, establishment of coconut orchards involved high capital cost and long gestation period; the investment is profitable and economically feasible. Therefore cultivators should take coconut plantation on large scale.
6. Regarding the disposal of nuts the percentage varied from 96.71 per cent in Group I to 94.28 per cent in Group III. This indicated that the marketable surplus was higher in Group I as compared to Group III.
7. Regarding the constraints experienced by the coconut growers, majority of the coconut growers faced problem of shortage of harvesting labour (98.88 %), 94.4 per cent farmers

faced the problem of frequent failure of electricity which affected the irrigation. 84.4 per cent farmers faced the problem of non-availability of labour in time. The other constraints were, non-availability of fertilizers in time (78.88 %), non-availability of fertilizers in required quantity (71.11 %), price received is not remunerative (60.00 %), shortage of water (56.66 %)**,** non-availability of disease free planting material (50.00 %), problem about transport due to non-availability of transporting vehicle on time (34.44 %). Only a small quantity of farmers faced problem of non-availability of specific variety (14.44 %).

IMPLICATIONS

IMPLICATIONS

The following recommendation can be made based on the results of the current study and general observations made throughout the examination.

1. Although the economics of coconut production showed that it was profitable, farmers and growers must be guaranteed a timely supply of vital production materials. To enhance the quality of nuts, several scales of research and development should be conducted.
2. As seen by the low producer price, the current marketing structure exploits coconut growers in order to enhance the current coconut marketing condition in the research area. Co-operative societies must be founded in various locations so that marketing tasks such as produce assembly, de-husking, grading, shipping, packing, processing, and marketing can be carried out. This will be advantageous for both consumers and producers.
3. One of the key cash crops in this area is coconut. Coconut's nutritional and therapeutic properties is widely acknowledged. Processing nuts is necessary since raw nuts do not sell for higher prices in the market. From coconut, more than 100 different value-added goods have been created, however the farmers are unaware of these items. There is a requirement that farmers be encouraged to prepare certain products. The technological know-how and infrastructure resources must be made available to coconut growers.

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LITERATURE CITED

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APPENDICES

APPENDIX – II

QUESTIONNAIRES

DEPARTMENT OF AGRICULTURAL ECONOMICS
COLLEGE OF AGRICULTURE – DAPOLI

"ECONOMICS OF PRODUCTION AND DISPOSAL OF COCONUT IN SINDHUDURG DISTRICT OF MAHARASHTRA"
(Reference Year – 2020-21)

Research Guide : Dr. S.S Wadkar
Name of student : Ms Dusang Prerna Maria
Reg No : ADPM/20/2775

I) General Information of Coconut Grower:

1. Name:
2. Age :
3. Education :
4. Village :
5. Taluka :
6. Occupation : a) Main :
   b) Subsidiary :
7. Size of Coconut garden ---------- ha.
8. Nearest market :
9. Distance of market from village ----------km

II) Size of family

Sr. No	**Age Group**	**Working on farm**		
		Men	Women	Total
1	Upto 14 years			
2	Above 14 years			

III) Information regarding Land

A) Land Holding:

Sr. No	Particulars	Land (ha)	Land leased in (ha)	Land leased out (ha)	Land revenue & other cesses (Rs)	Rent (Received/ Paid (Rs)	Value of land (Rs)

B) Land Utilization :

1) Cultivated land
   a) Irrigated: ha b) Unirrigated: ha c) Total: ha
2) Fallow land
   a) Current: ha b) Permanent: ha c) Total : ha
3) Grazing Land ha
4) Unsuitable for cultivation hs.

IV) Sources of irrigation:

1) Well
   a) Open
   b) Bore
2) Tank
3) Canal
4) Rivers
5) Farm Ponds
6) Others
7) Total irrigated area ha.

V) Information regarding irrigation structure

Sr.No	Types of Construction	Year of Construction or purchase year value (Rs)	Present value (Rs)	Area irrigated	Expenditure on repairing
1	Well				
a)					
b)					
c)					
2.	Oil engine (with pump)				
3	EL motors				
a)					
b)					
c)					
4.					
5					
6					

VI) Expenses incurred on irrigation

Sr. No	Particulars	Fuel and Oil						Electricity	
		Diesel Oil		Mobile Oil		Grease			
		Qty	Value (Rs)	Qty	Value (Rs)	Qty	Value (Rs)	unit	Charges (Rs)

VII) Maintenance cost of owned machine labour

Sr. No	Types of machine	Area Benefitted (0.00)	Expenditure						Total working hours					Per hour maintenance cost in Rs
			Fuel and lubricant	EL consumption	Repairs	Labours	Misc. exp	Total maintenance cost	Crop production	Other farmers	Mining out	Exchange	Total	

VIII) Information of tools and implements

Sr.No	Particulars	Qty of Numbers	Purchase Value	Year of purchase	Present Value
A)	**Implements**				
1	Iron plough				
2	Wooden plough				
3	Harrow				
4	Bullock cart				
5	Others				
B)	**Machinery**				
1	Oil engine				
2	EL engine				
3	Sprayer				
4	Duster				
5	Tractor				
6	Power tiller				
C)	**Hand tools**				
1	Sickle				
2	Pickaxe				
3	Spade				
4	Iron basket				
5	Wooden basket				
6	Koyta				
7	Others				
a)					
b)					

IX) Inventory Livestock

Sr.No	Type	Number	Age	Owned/Purchased	Present Value
1	**Draft**				
a	Bullock				
b	He Buffalo				
2	**Cow**				
a	In milk				
b	Dry				
3	**Buffalo**				
a	In milk				
b	Dry				
4	**Young stock**				
5	**Sheep**				
6	**Goat**				
7	**Poultry**				
8	**Others**				
	a)				
	b)				

X) Inventory of building and other farm structures

Sr.No	Particulars	Area (sq.ft)	Year of construction	Cost of construction (Rs)	Present Value (Rs)	Repairs during last year (Rs)
1						
2						
3						
4						
5						

XI) Cropping Pattern:

A) Crop taken during last season

Sr. No	Crop	Variety	Area in ha		Season	First/Season crop
			Irrigated	Unirrigated		
1						
2						
3						
4						
5						

B) Horticultural Crop

Sr.No	Crop	Area (ha)	Year of plantation	Age	No of Trees		Remarks
					Bearing	Non Bearing	

XII) A) Information of Coconut Orchard:

Sr.no	Variety	Area (ha)	Age (year)	Year of plantation of orchard	No.of palms		
					Bearing	Non Bearing	Total

B) Capital borrowed

I) Do you require finance for coconut cultivation/plantation? Yes/No

If Yes

Sr.No	Sources of finance of borrowing	Purpose of borrowing	Amount borrowed	Period of repayment	Rate of interest
1	Private money lender				
2	Contractor				
3	Commission agent/Traders				
4	Relatives and Friends				
5	Co-operative Society				
6	Co-Operative bank				
7	Government agency				
8	Commercial bank				
9	Any other sources				

XIII) Operation wise wage rates:

Sr.No	Operation	Wage rate per day		
		Male	Female	Bullock pairs
1	Ploughing / digging			
2	Manuring / Fertilizers			
3	Intercultural operations			
4	Harvesting of fruits			
5	Other operations			

XIV) Information of cost of establishment and maintenance of coconut orchard

A) Cost incurred in 1st year

Sr.no	Items	kind	Material used			Hired labour (man days)			Family labour (man days)			Total labour			Machine hours	
			Qty	rate	value	male	female	bullock	male	female	bullock	Male	female	bullock	Type of machine	hours
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Preparation of land for planting															
2	Levelling															
3	Ploughing															
4	Clod crushing															
5	Digging of pits															
6	a)Distance of planting															
7	Filling of pits															
	a)manures															
	b)chemical fertilizers															
8	Planting															
	a)sapling															
	b)planting cost															
	c)Supporting poles															
9	After care															
	a)fencing															
	i)fencing material															
	ii)cost of fencing															

Contd…

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	b)shade															
	c)irrigation															
	d)cultural operation															
	i)removal of weeds															
	ii)preparation of basin															
	iii)Clearing of basin															
	iv)ploughing															
	v)gap filling															
10	Manuring of young plants															
	a)FYM															
	b)Fertilizers															
	i)N															
	ii)P															
	iii)K															
	iv)Application cost															
11	Plant protection															
	a)Spraying															
	i)															
	ii)															
	b)Dusting															
	i)															
	ii)															

B) Cost incurred in 3rd /4th /5th /6th /7th year:

Sr. No	Items	Kind	Material used			Hired labour			Family labour(man days)			Total labour (man days)			Machine hours	
			Qty	Rate (Rs)	Value (Rs)	Male	Female	Labour	Male	Female	Labour					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Weeding															
2	Mulching															
	a)husk															
	b)leaves															
	c)others															
3	Ploughing															
4	Clod crushing															
5	Irrigation															
	a)watering															
	b)Repairing of well basin and water channel															
6	Green manuring crop															
	a)green leaves															
	b)Tank silt															
	c)Sheep penning															
7	Manuring adults palms															
	a)FYM															
	b)chemical fertilizers															
	i)N															
	ii)P															
	ii)K															
	c)Application cost															
8	Harvesting															
	a)harvesting charges															
	i)Cash															
	ii)Kind															
	b)Heaping charges															
	c)carting rate															

C) Cost incurred for Coconut garden after 7th year:

Sr. No	Items	Kind	Material used			Hired labour			Family labour(man days)			Total labour (man days)			Machine hours	
			Qty	Rate (Rs)	Value (Rs)	Male	Female	Labour	Male	Female	Labour					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Weeding															
2	Mulching															
	a)husk															
	b)leaves															
	c)others															
3	Ploughing															
4	Clod crushing															
5	Irrigation															
	a)watering															
	b)Repairing of well basin and water channel															
6	Green manuring crop															
	a)green leaves															
	b)Tank silt															
	c)Sheep penning															
7	Manuring adults palms															
	a)FYM															
	b)chemical fertilizers															
	i)N															
	ii)P															
	ii)K															
	c)Application cost															
8	Harvesting															
	a)harvesting charges															
	i)Cash															
	ii)Kind															
	b)Heaping charges															
	c)carting rate															

XV) Yield and return from coconut orchard
Area

Variety

No of plants

Sr.No	Particulars	Quantity	Rate (Rs)	Amount (Rs)
1	Matured nuts			
	A – Grade			
	B – Grade			
	C – Grade			
2	Tender nuts			
3	Zaps			
4	Madi			
5	Brooms			
6	Husks			
7	Shell			
8	Trunk			
9	Others			

XVI) Disposal of coconut:

1) Total quantity produced on farm
2) Quantity retained for nuts
3) Wage Payment
4) Consumed at home
5) Gift to relatives
6) Retained to seedlings
7) Losses in storage
8) Losses in Transport
9) Actually sold graded quantity sold

A) Channels for sale

Sr.No	Sources of sale	Graded quantity Sold No of nuts		Ungraded nuts		Total
		No	Price	No	Price	
1	Village merchant					
2	Commission agent (Taluka level)					
3	Co-operative society					
4	Ball copra maker					
5	Directly to consumer					

B) Grading

1) Do you grade the Coconuts : Yes / No
2) If Yes, what were the grades assigned to yours coconuts according to different criteria?

Sr.No	Grade	Size	Weights	No of nuts per bag	Others	Price received per 100 nus
1	I					
2	II					
3	III					
4	IV					
5	V					

C) De-husking

1) Do you de-husk the nuts? Yes / No
2) If Yes, cost of de-husking

Sr.No	No of nuts dehusked	Labour			Wage rate	Total
1		**Hired**	**Family**	**Total**		
2						
3						
4						

XVII) Problems faced by Coconut growers

1) Problems regarding plant material
   a. Availability of specific variety Yes / No
   b. Availability of disease free planting material Yes / No
2) Problem regarding fertilizers and pesticides
   a. Timely availability of fertilizers and pesticides Yes / No
   b. Availability of required quantity of fertilizers Yes / No
3) Problem regarding labours
   a. Do you face problem regarding timely availability of labour Yes / No
4) Problem regarding irrigation
   a. Do you face problem regarding scarcity of water Yes / No

THESIS ABSTRACT

a)	Title of the thesis	:	Economics of production and disposal of Coconut in Sindhudurg district (Maharashtra).
b)	Full name of the student	:	Ms. Dusang Prerna Maria
c)	Name and address of the major advisor	:	Dr S. S Wadkar Ex Head Department of Agricultural Economics, Dr. B.S.K.K.V Dapoli
d)	Degree to be awarded	:	M.Sc. (Agri.)
e)	Year of award of degree	:	2022
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g)	Total number of pages in the thesis	:	63
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i)	Signature of student	:	
j)	Signature, Name and address of forwarding authority	:	Dr S. R. Torane Head Department of Agricultural Economics, Dr B.S.K.K.V Dapoli.

The present study entitled "Economics of production and disposal of Coconut in Sindhudurg district of Maharashtra was undertaken with specific objectives such as, to estimate the costs, returns and profitability in coconut cultivation, to study the financial feasibility of investment in coconut cultivation, to study the disposal pattern carried out by the farmers and to study the constraints faced by the farmers.

For selection of sample, three stage sampling was followed with tehsils as primary unit, villages as secondary unit and coconut growers ultimate unit. The total sample consisted of 90 coconut growers 6 villages at Malvan and Deogad tehsils. In addition to this 35 coconut growers of establishment stage were selected. The bearing orchards were grouped according to the location of orchard.

The general information of the coconut growers revealed that average age of sample cultivator was 51.77 years at overall level, the educational score ranged from 9.14 in Group I to 9.11 in Group III. The total family members at overall level were found to be 5.94 out of which 2.11 were below 14 years of age and 3.83 were above 14 years of age. It was observed that the

size of the coconut orchard ranged from 0.9 ha in Group I to 0.54 ha in Group III. The total no of palms in Group I was observed to be 142.62 which gradually went on decreasing to 105.09 in Group II and 85.46 in Group III.

Considering the per farm investment in farm asset, the total investment in Group I was found to be Rs 15,53,593.00, followed by Group II Rs 13,83,545.00, and Group III was Rs 13,44,255.00. At overall level the total land was found to be 1.17 ha out of which 82.05 per cent was cultivated and remaining 17.94 per cent was uncultivated.

The cropping intensity of the farmers ranged from 108.49 per cent in Group I to 112.30 per cent in Group III. The gross cropped area at overall level was 0.91 ha and the net cultivated area was 0.83 ha.

Per hectare capital investment for establishing coconut orchard for a period of seven years worked out to Rs 3,15,70.00, out of which, 59.40 per cent was labour cost. The cost incurred on manures was 19.80 per cent, on fertilizers (8.19 %), planting material (4.34 %), irrigation (3.91 %), fencing (2.21 %), and 2.10 per cent on plant protection. During the first seven years of investment, maximum amount 21.29 per cent was invested during first year and minimum amount was invested during second year (10.36 %).

After the establishment of orchard, growers have to incur expenditure on maintenance of orchard. At overall level, the annual per hectare cost of cultivation i.e 'Cost C' worked out to Rs 1,55,836 of which share of 'Cost A' was 33.32 per cent, share of 'Cost B' was 87.94 per cent. The overall profit at 'Cost A', 'Cost B', 'Cost C' was Rs 2,08,717, Rs 1,23,595 and Rs 1,04,817 respectively. The per-nut cost of production was recorded to be Rs 11.12 at overall level and the input-output ratio was found to be 1:1.67 at overall level.

The analysis of economic evaluation of investment showed that the investment made in coconut plantation was economically viable with Benefit Cost ratio greater than unity i.e 1.54 and 1.45 at 12 and 14 per cent discount rates. Net Present Value (NPV) at overall level was also positive and was found to be Rs 2,78,298.87 and Rs 200,127.10 at 12 and 14 per cent discount rates. The IRR at overall level was higher i.e 24.92 per cent than prevailing rate of interest i.e 14 percent. The Pay-back period was also desirable considering the total life of orchard (70 years).

Regarding disposal at overall level 95.99 per cent fruits were sold in the market. Maximum coconut growers sold their produce through commission agents.

The major constraints faced by coconut growers was shortage of harvesting labour (98.88%).

Keywords: Production, Disposal, investment, establishment, constraints

Ouriginal

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