

**ECONOMIC ANALYSIS OF PRODUCTION AND
DISPOSAL OF PINEAPPLE (*Ananas comosus* L.)
IN DODAMARG TAHSIL OF SINDHUDURG
DISTRICT (M.S.)**

**By
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B.Sc.(Hons) Agri.

**DEPARTMENT OF AGRICULTURAL ECONOMICS,
FACULTY OF AGRICULTURE,
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DAPOLI - 415 712, DIST. RATNAGIRI (M.S.)**

MAY, 2017

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A thesis submitted to the

**DR. BALASAHEB SAWANT KONKAN KRISHI VIDYAPEETH, DAPOLI
(Agricultural University)**

Dist. Ratnagiri (Maharashtra State), India

In partial fulfilment of the requirements for the degree of

MASTER OF SCIENCE (AGRICULTURE)

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CERTIFICATE

This is to certify that, the thesis entitled “**ECONOMIC ANALYSIS OF PRODUCTION AND DISPOSAL OF PINEAPPLE (*Ananas comosus L.*) IN DODAMARG TAHSIL OF SINDHUDURG DISTRICT (M.S.)**” submitted to the Faculty of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (Maharashtra), in the partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE) in AGRICULTURAL ECONOMICS**, embodies the results of a piece of *bona-fide* research carried out by **Ms. SHILPA MATHEW (Reg. No: 2449)** under my guidance and supervision and that no part of the thesis has been submitted for any other degree or diploma or published in other form. All the assistance and help received during the course of investigation and the sources of literature have been duly acknowledged by him.

Place: Dapoli

Date :

(S.S. Wadkar)
Chairman,
Advisory Committee
and Research Guide

**DEPARTMENT OF AGRICULTURAL ECONOMICS
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THESIS ABSTRACT

Title of Thesis	: Economic analysis of production and disposal of pineapple (<i>Ananas comosus</i> L.) in Dodamarg tahsil of Sindhudurg district (M.S.)
Name of the student	: Ms. Shilpa Mathew
Regd. No.	: 2449
Research Guide:	: Dr. S.S. Wadkar Professor, Department of Agril. Economics, College of Agriculture, Dr. B.S.K.K.V., Dapoli, Dist:Ratnagiri
Degree to be awarded	: M.Sc. (Agri.)

Pineapple is a delicious tropical fruit with a fine flavor and high nutritive value. It is an important horticultural fruit crop with immense export potential. The present study entitled "Economic analysis of production and disposal of pineapple in Dodamarg tahsil of Sindhudurg district (M.S.)" was undertaken with specific objectives viz, 1) To assess the existing pattern of resource use in pineapple. 2) To estimate costs, returns and profitability of pineapple cultivation. 3) To study farm business analysis for pineapple cultivation. 4) To study the disposal pattern of pineapple. 5) To identify the constraints in pineapple production and disposal. After plantation of suckers of pineapple it is possible to continue as ratoon crop during second and third year, hence the results of the study are presented separately for three years.

This study was conducted based on the information collected from a limited number of 20 pineapple tenant growers of the tahsil.

The variety cultivated by all the growers was 'Queen'. It is noticed from the study that, the average size of leased in land was 6.91 ha and the area under pineapple crop was 94.21 per cent of the total gross cropped area. The remaining area of 5.77 per cent was under banana, cashew nut and rubber. This resulted in a cropping intensity of 100.00 per cent.

The per hectare physical input utilization pattern indicated that there was higher utilization of inputs such as hired human labour, fertilizers, plant protection chemicals and lesser utilization of manures and suckers.

The per hectare cost of cultivation was worked out to ₹ 588220 for the three years out of which the total labour cost accounted to 42.51 per cent and remaining 57.49 per cent was constituted by material cost. The net returns was ₹ 993511 with an overall benefit cost ratio of 2.68.

The per hectare total production of pineapple for three years was 742.34 q with a marketable surplus of 730.41q. The produce was disposed off through various agencies i.e., wholesaler, commission agent and retailer. The income measures such as farm business income, farm investment income, family labour income and net income for farm business analysis were found to be higher in second year as compared to first and third years.

As regards constraints in production and disposal, non availability of hired human labour, high cost of planting material and fertilizers, non availability of water for irrigation, lack of technical know how, destruction of crop by wild animals, fluctuations in market prices, lacunas in weighing and post harvest losses at farm level were the major constraints reported by farmers.

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Lastly, my thanks are to those whose names have not been mentioned but who have , nevertheless played their part in making this research work successful.

Place : Dapoli

(Ms. Shilpa Mathew)

Date:

APPENDIX II

Abbreviation used

%	: per cent
₹	: Rupees
@	: at the rate of
B:C ratio	: benefit-cost ratio
BSNL	: Bharat Sanchar Nigam Limited
°C	: degree celcius
<i>et al.</i>	: and other
g	: gram (s)
Ha	: hectare (s)
HYV	: High Yielding Variety
hrs.	: hour (s)
<i>i.e.,</i>	:that is
IU	: International Unit
K ₂ O	: Potassium
Kcal	: kilo calorie(s)
kg	: kilogram (s)
ltr:	litre(s)
m	: metre(s)
mg	: milligram (s)
mm	: millimetre
MMT	: MetricMillionTonne (s)
MT	: Metric Tonnes
N	: Nitrogen
P ₂ O ₅	: Phosphorous
qt.	: quintal (s)
RDA	: Recommended Dietary Allowance
t	: tonne(s)
Vit	: Vitamin

CHAPTER 1

INTRODUCTION

Agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. Agriculture, with its allied sectors, is unquestionably the largest livelihood provider in India. More than 65 per cent of the total rural population is engaged in it. Mahatma Gandhi said “India lives in villages and agriculture is the soul of Indian economy”. Traditionally, agriculture is followed as the simplest method of obtaining food for the family. Agriculture in India is 'more a way of life' than 'a mode of business'.

India has witnessed voluminous increase in horticulture production over the last few years. The Working Group on Horticulture Plantation Crops and Organic Farming for the Eleventh Five Year Plan (2007-12) redefined horticulture as “science of growing and management of fruits, vegetables including tubers, ornamentals, medicinal, aromatic crops, spices, plantation crops their processing, value addition and marketing”. Fruits and vegetables account for nearly 90 per cent of the total horticultural production in the country. India is now the second largest producer of fruits and vegetables in the world after China. Out of the six categories, that is fruits, vegetables, flowers, aromatic, spices and plantation crops, the highest annual production of 9.5 per cent was seen in fruit production during 2013-14 (Horticulture Statistics At A Glance 2015). But it is estimated that, the per capita fruit availability in our country is less than 200 gms per day which is far below the recommended quantity of 230 gms per day.

Fruits are nature's wonderful gift to mankind. Production and consumption of high quality fruits allow us to maintain a healthy,

balanced, daily diet. Commercial importance of fruits have been increased all over the world as they contribute significantly to the country's economy besides their social and nutritional importance. Fruit production plays an important role in employment, income generation, export and meets household's nutritional security. Fruits provide several times more calories of energy and cash income than cereals. Indeed, they are life enhancing medicines packed with vitamins, minerals, antioxidants and many phytonutrients. Even from the environmental viewpoint, the horticultural practices, particularly fruit cultivation practices have become a part of social forestry and it maintains ecological balance.

General description of Pineapple

Pineapple (*Ananas comosus* L.) is one of the commercially important fruit crops of India. It is one of the choicest fruit all over the world because of its pleasant taste and flavour. The name pineapple comes from the similarity of the fruit to a pine cone; *Ananas* comes from "anana" the Tupi word for the fruit meaning "excellent fruit" and *comosus* means "tufted" and refer to the stem of the fruit. In addition to serving as a food, with its natural sweetness the pineapple has served in history as a symbol and an artistic motif. It is also used as an ornamental symbolising, welcome, high living and opulence. The rarity, reputation, visual attractiveness have made pineapple as an ultimate exotic fruit.

Pineapple is believed to have originated in South America. By the end of 16th Century, Portuguese and Spanish explorers introduced pineapple into many of their Asian, African and South Pacific colonies. Presently, pineapple is widely grown in countries like Philippines, Thailand, Costa Rica etc.

Pineapple is grown and yields the best in areas with relatively uniform climate year around. Current production remains restricted to the tropical regions of the world. Presently the total global production in the world is 23 MMT which is produced by approximately 80 countries around the world.

World trade of fresh pineapple has shown 100 per cent increase during the last one decade. Globally the most widely grown varieties are Smooth Cayenne, Queen and MD2.

About 60 per cent of the world's fresh pineapple exports come from Costa Rica, Ivory Coast and Philippines. On the import side, the main importers are USA (20 per cent), Belgium (17per cent), France (9 per cent), Italy (8 per cent), Germany (7per cent), Canada (5 per cent), UK (5 per cent) and Netherlands (4 per cent). India's main export market for pineapple was Middle East for about 58 per cent of total fresh pineapple export during 2012-13. The other major destinations were Nepal (18 per cent) and Maldives (15 per cent) [NHB 2013]. India is the sixth largest producer of pineapple with an annual output of 1.2 MT and the most popular variety in India is Giant Kew.

Pineapple fruits are primarily used in three segments, namely, fresh fruit, canning and juice concentrate with characteristic requirements of size, shape, colour, aroma and flavour (Joy 2010).In India pineapples are processed in to a number of value added products like jam, jelly, cheese, chutneys and canned halves.

Pineapples are actually not just one fruit but a composite of many flowers whose individual fruitlets fuse together around a central core. Each fruitlet can be identified by an "eye", the rough spiny marking on the surface. They have a wide cylindrical shape, a scaly green brown or yellow skin and a regal crown of spiny, blue-

green leaves. The fibrous flesh of pineapple is yellow in colour and has a vibrant tropical flavour. The area closer to the base of the fruit has more sugar content and therefore a sweeter taste and more tender texture. Pineapples are naturally drought tolerant since they are CAM (crassulacean acid metabolism) plants. They are commonly propagated through suckers and slips.

Agro-climatic requirements

Pineapple is suitable for cultivation in humid tropics. The fruit grows well near the sea coast as well as in the interior, so long the temperatures are not exterior. The optimum temperature required for successful cultivation is 22°-32°C. It can be grown upto 1000 m above mean sea level and can be planted in all months except the months of heavy rainfall like June-July. Sandy loam soil with pH between 5.0-6.0 is ideal for the growth of the plants. A 4°C temperature difference between day and night is desirable for suitable growth.

Nutritional profile

Pineapples are delicious tropical fruits that have been celebrated for centuries not only for their distinct and unique taste, but also for their wide miraculous health benefits.

Pineapple is a store house of huge health benefits, due to its wealth of nutrients, vitamins and minerals including potassium, sodium, phosphorus, magnesium, zinc, thiamine, riboflavin pyridoxine etc. It is also a good source of manganese, dietary fibre and folates. Pineapple fruit contains a proteolytic enzyme Bromelain that digests food by breaking down proteins. It also has anti-inflammatory, anti-clotting and anti-cancer properties.

Pineapple is a good source of antioxidant as well as vitamins like vit A and vit C, where vit A is essential for vision and vit C is

required for collagen synthesis in the body. Pineapple consumption also helps to reduce risk of arthritis, heal wounds and protect against infections, improves oral and eye health, prevents cancers of mouth, throat, boosts immune system, protects against constipation, diarrhoea and avoids conditions like atherosclerosis, heart attacks and strokes

Table 1.1: Nutritive value of Pineapple

Sr. No.	Elements	Nutrient value (per 100 g)	Percentage of RDA
1	Energy	50 Kcal	2.5%
2	Carbohydrates	13.52g	10%
3	Protein	0.54 g	1%
4	Fat	0.12 g	<1%
5	Dietary Fibre	1.40 g	4%
6	Niacin	0.500 mg	4%
7	Riboflavin	0.018 mg	1.5%
8	Thiamine	0.079 mg	6.5%
9	Pyridoxine	0.112 mg	9%
10	Vitamin A	58 IU	2%
11	Vitamin C	47.8 mg	80%
12	Sodium	1 mg	0 %
13	Potassium	109 mg	2.5%
14	Magnesium	12 mg	3%
15	Phosphorus	8 mg	1%
16	Manganese	0.927 mg	40%

17	Zinc	0.12 mg	1%
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(Source:<http://www.nutrition-and-you.com/pineapple.html>)

Commercially grown varieties

Kew or Giant Kew- Fruit is big in size, deep yellow to coppery yellow in colour with T.S.S of 12-14° brix, widely cultivated in regions of West Bengal.

Queen- Fruit is small in size, golden yellow in colour with a T.S.S of 15-16° brix, widely grown in Tripura, partially in Assam, Meghalaya and selected areas of Maharashtra.

Mauritius-Fruit is medium in size, deep yellow and red in colour. This variety is ideal for table purposes. It is cultivated in some parts of Kerala.

World scenario

The total area under pineapple production in the world is 1015264 ha with an annual production of 23614625 MT and productivity of 23.3MT/ha. (Source- National horticultural database 2014)

Table 1.2: Area, production and productivity of major pineapple producing Countries in the world (2013-14)

Sr. No.	Country	Area (in HA)	Production (in MT)	Productivity (MT/HA)
1	Thailand	105000	2650000	25.2
2	Costa Rica	42000	2484729	59.2
3	Brazil	60653	2478178	40.9

4	Philippines	58442	2397628	41.0
5	Indonesia	14300	1780889	124.5
6	India	109876	1736739	15.8
7	Nigeria	180000	1420000	7.9
8	China	53000	1000000	18.9
9	Mexico	17708	759976	42.9
10	Colombia	13916	551133	39.6
11	Others	360369	6355353	17.6
	World+(Total)	1015264	23614625	23.3

(Source-NHB Database 2014)

Pineapple production is highest in Thailand (2650000 MT) followed by Costa Rica (2484729 MT) and Brazil (2478178 MT). Productivity is highest for Indonesia (124.5 MT/ha) followed by countries such as Costa Rica (59.2 MT/ha), Mexico (42.9 MT/ha), Philippines (41 MT/ha) and Brazil (40.9 MT/ha). India has a total area of 109876 ha with annual production of 1736739 MT and productivity (15.8 MT/ha).

Indian scenario

In India, the leading pineapple producing states are West Bengal (320 thousand tonnes) followed by Assam (290.21 thousand tonnes), Kerala (255.90 thousand tonnes) and Karnataka (158.12 thousand tonnes). Whereas the productivity is highest for Karnataka (62.49t/ha) followed by West Bengal(29.54 t/ha), Bihar (27.64 t/ha) and Kerala (27.36 t/ha).

Table 1.3: Area, production and productivity of major pineapple producing states in India (2014-15 advanced estimate)

Sr. No.	State	Area ('000' HA)	Production ('000' T)	Productivity Tonnes/ha
1	West Bengal	10.83	320	29.54
2	Assam	16.56	290.21	17.52
3	Kerala	9.35	255.90	27.36
4	Karnataka	2.53	158.12	62.49
5	Tripura	11.59	150.00	12.94
6	Nagaland	9.50	142.50	15.00
7	Manipur	14.28	142.16	9.95
8	Bihar	4.21	116.37	27.64
9	Arunachal Pradesh	13.00	70.00	5.38
10	Andhra Pradesh	2.79	41.82	14.98
11	Tamil Nadu	0.72	25.07	34.81
12	Orissa	0.90	11.15	12.38
13	Goa	0.30	4.98	16.6
14	Andaman & Nicobar islands	0.12	2.31	19.25
	Total	96.68	1730.59	17.9

(Source-Horticultural statistics at a glance 2015)

Maharashtra is one of the prominent horticulture producing state and largest producer of fruits in India. The area under total fruits in the state was (1565 thousand ha) with a production of (13457.9 thousand MT) and productivity (8.6 MT/ha) for the year 2013-14 (Source-National horticulture database-2014). The area and production of pineapple in Maharashtra is very less compared to other producing states of India.

For the past 7 years, people from Kerala after conducting deep study on land, water and environment of Dodamarg tahsil, they started plantation of pineapple along with banana in this area. Now pineapple is one of the major produce of the tahsil and is being cultivated on leased in land on a large scale. Therefore, a study on “Economic analysis of production and disposal of pineapple in Dodamarg tahsil of Sindhudurg district” was undertaken with the following objectives.

Objectives

1. To assess the existing pattern of resource use in pineapple
2. To estimate costs, returns and profitability of pineapple cultivation.
3. To study farm business analysis for pineapple cultivation.
4. To study the disposal pattern of pineapple.
5. To identify the constraints in pineapple production and disposal.

Scope and utility of the study

The results on economics of pineapple production will preferably help the producers as well as farm financing institutions. The findings of the research related to returns and profitability will motivate the farmers to further enhance the area under pineapple cultivation. The results of the study will also be helpful to extension agencies to improve the scientific knowledge of the farmers by guiding for better cultivation and farm management practises. The findings of the study will also facilitate research in the study area in future.

Limitations of the study

1. Due to the non availability of sufficient number of pineapple growers in the study area, for the completion of study, the required data was collected only from a sample of 20.

2. The economics of pineapple intercropping was not considered due to the absence of the same in the study area and the findings are completely based on pineapple monocropping system on the farms.

CHAPTER II

REVIEW OF LITERATURE

Review of literature acts as a stepping stone towards achievement of objectives of the study. It presents all the analysis and findings of previous studies and helps in the assessment of the current state of research on a topic. A review of the research work done in the past related to the present study has been presented in this chapter.

The review of literature is presented under the following subheads:

1. To assess the existing pattern of resource use in pineapple
2. To estimate cost, returns and profitability of pineapple cultivation.
3. To study farm business analysis for pineapple cultivation.
4. To study the disposal pattern of pineapple.
5. To identify the constraints in pineapple production and disposal.

1. To assess the existing pattern of resource use in pineapple

Barve (1996) in his study on, "Economics of production and marketing of cashew in Ratnagiri district" found that total per hectare labour used for establishing cashew orchard for five years was 384.44 man days. In the first five years irrigation required maximum labour (114.42 man days) followed by cleaning of land (72.31 man days) and fencing (13.46 man days). The quantity of manure used was 5326.90 kg in first year and found to be increased from second to fifth year. Total quantities of N, P, K applied upto fifth year were 359.44 kg, 213.20 kg and 97.57 kg respectively.

Gopal (1998) studied the economics of production and marketing of capsicum in Sangamner and Narayangan tahsils of

Western Maharashtra. According to him, the resources used in the cultivation of capsicum during kharif season were human labour (390.31 man days), bullock labour (53.39 pair days), seed (1.17 kg), manures (₹ 3508.20), fertilizers (₹ 4943.02), irrigation (₹ 2592.70) and plant protection (₹1954.09). In the case of rabi season, those were human labour (34.43 days), bullock labour (46.06 pair days), seed (1.12 kg), manures (₹3702.87), fertilizers (₹ 5182.38) and plant protection (₹ 2262.12). The levels of input varied between the seasons.

Wankhede (1998) in his study on, "Economics of production and disposal of sapota in Thane district", revealed that after establishment of sapota orchards growers have to incur annual cost during the production stage. The labour was found to be one of the important inputs used consisting about 458.90 man days. The maximum labour (57.91 per cent) were used for harvesting followed by watching and supervision (34.28 per cent), digging of trenches and manuring (4.28 per cent). Per hectare quantity of manures used was 41.83 quintals and quantities of N,P,K applied were 281.38, 390.43 kg and 134.45 kg respectively.

Naikade (1999) studied the comparative economics of production and marketing of potato in rabi season in Khed tahsil of Pune district. In case of potato, at the overall level, the per hectare use of human labour was 201.5 man days, the per hectare bullock labour, machine labour, seed and plant protection were 9.0 pair days, 4.60 hrs, 8.10 kg and ₹ 120.50 respectively, while the use of manures and fertilizers was ₹ 5079.03. The per hectare use of fertilizers for onion was 8.60 kg N, 51.40 kg P₂O₅ and 23.80 kg K₂O, which was lower than recommended 10:50:50 level of N,P,K.

Korikanthimath and Gowardhan Rao (2000) conducted an economic analysis on the resource use productivity and its optimum

utilization in chilli based mixed cropping system. They observed that the use of nitrogen fertilizers were found to be positive and significant. That is there was further scope for increasing the yield by additional application of nitrogenous fertilizer. Other resources such as seed, human labour, potash fertilizer and bullock labour were found to be excessively used which implies irrational behavior of farmers following the system.

Chavan (2006) in his study on, “Economic analysis of mango orchards in Deogad tahsil of Sindhudurg district” revealed that per hectare labour utilized for maintenance of a mango orchard at overall level were 1469.03 human days, out of total labour, maximum labour utilized for harvesting (31.68 human days) followed by watching (27.98 human days) and plant protection (27.83 human days) .The per hectare quantity of manures applied at overall level was 25.969 q, chemical fertilizer 122.59 kg, bio fertilizer 48.16 kg and expenses on plant protection and cultar were ₹ 5383 and ₹ 1560 respectively.

Yadukumar (2007) in his study on “Organic farming in Cashew” reported that, hardly 15.00 per cent of the total area under cashew cultivation receives chemical fertilizers and plant protection measures in India. The remaining 85.00 per cent of area did not receive any kind of manures and plant protection measures.

Mandape (2009) in his study on “Resource use efficiency in mango production in Ratnagiri district (M.S.)” revealed that at overall level, per hectare total labour utilized for different operations was 252.48 days out of that maximum labour was found to be used for harvesting (72.16 per cent). The per hectare quantity of manures used was 45.62 quintals. The per hectare quantities of N,P₂O₅ and K₂O used were 194.81 kg, 75.05 kg and 95.35 kg respectively. At overall level, the per hectare plant protection chemicals used on

large scale was sulphur based fungicides (1.69 lit) followed by carbamate (1.38 kg), cyclonite compound (1.38 lit), copper based fungicide (1.36 lit) and organophosphate (0.91 lit).

Patil (2010) in her study on “Economics of production and disposal of Cashew nut in South Konkan region” revealed that in the cashew nut cultivation, inputs viz, labour, manure, fertilizer, plant protection etc play a vital role. The per hectare input utilized for local varieties of cashew were 59.15 human days, 19.20 quintal manures, 192 kg Nitrogen, 96 kg P₂O₅ and endosulfan 0.5 litre. In case of high yield varieties of cashew nut per hectare inputs utilized were 86.86 human days, 37.8 quintal manures, 432 kg Nitrogen, 216 kg P₂O₅, 54 kg K₂O and 1.50 litres of endosulfan.

Gavit (2015) studied the economics of production and disposal of onion in Sindhudurg district. He observed that 132.39 days of human labour were utilized for per hectare cultivation of onion, out of which 72.87 human days and 59.41 human days were found to be of male and female. At overall level, the per hectare fertilizer used was 22.53 kg of N, 13.10 kg of P and 13.15 kg of K. The per hectare FYM used was 15.35 q and per hectare seed used was 9.19 kg. Out of the total labour days 83.14 days were found to be of hired labour, remaining 49.15 days were of family labour. While per hectare bullock labour used was 5.46 days.

2. Cost, returns and profitability of pineapple cultivation.

Jose (1993) conducted a study to find out the benefits of growing pineapple as an intercrop, to work out the BCR and to study its feasibility when compared to other cropping systems in Kerala. The net returns per ha were ₹ 7038 (Mauritius), ₹ 5832 (Kew) for the first year, ₹ 58596 (Mauritius), ₹ 10825 (Kew) for second year, ₹ 77272 (Mauritius) ₹ 14230 (Kew) for the third year.

The B:C ratio was worked out to be 1.27, 2.41 and 2.48 respectively for Mauritius for first, second and third year. The B:C is estimated as 0.73, 1.33 and 1.30 for Kew in the first, second and third year.

Sarker (1996) in his study on "A study of pineapple marketing in some selected areas of Moulavi Bazar district" showed that on an average the income from fruit was ₹ 18159.80 per acre per year and average net return per year of the producing pineapple was ₹ 10183.44.

Islam (1998) conducted a study named "An economic analysis of pineapple production in Madhupur Thana of Tangail district". He showed the relative profitability of growing pineapple under small, medium and large farmers. He found that average net return of pineapple per hectare under small, medium and large farmers were ₹27186.75, ₹ 28553.25 and ₹ 31866.50 respectively.

Padmini (2002) estimated the cost and returns from pineapple cultivation in Kerala. The study estimated cost of producing one tone of pineapple as ₹ 4280 for small farmers, ₹ 3992 for medium farmers and ₹ 3754 for large farmers in the first year of cultivation. In the second year, the cost of production amounts to ₹ 2526 for small farmers, ₹ 2362 for medium farmers and ₹ 2248 for large farmers and in the third year, cost of production amounts to ₹1248 for small farmers, ₹1097 for medium farmers, ₹ 1033 for large farmers. The returns from pineapple cultivation ascertained at ₹ 10977, ₹ 26964 for small, medium and large farmers in first year respectively. ₹ 97905, ₹101100, ₹107450 for small, medium and large farmers in second year. ₹121955, ₹124900 and ₹128925 for small, medium and large farmers in the third year.

Nagpure *et. al.* (2004) in their study on economics of sugarcane production in Vidarbha region of Maharashtra state

estimated the per hectare cost of cultivation. Cost A, Cost B and Cost C were estimated to ₹35178.86, ₹ 53207.91 and ₹ 54011.11 respectively. In case of ratoon it was estimated to ₹ 25612.88, ₹ 42326.52 and ₹ 43162.62 respectively. The net income per hectare of ₹15766 was worked out higher in case of ratoon crop. Rahman (2005) conducted a research on pineapple marketing in Madhupur Thana under Tangail district. He analysed the profitability of pineapple and its marketing system in the study area. It was found that per acre cost of production per year was ₹ 4596 per acre. Net return for the pineapple producer was found to be ₹ 1332.

Umesh *et.al.*(2005) in their study on, “Business opportunities in Cashew industry” observed that, maintenance cost per hectare from fourth year onwards varied from ₹ 5881 to ₹ 8254 in Chintamani-1, ₹ 5640 to ₹ 8254 in Ullal-4, ₹ 5812 to ₹ 7882 in Ullal-3 and ₹ 5821 to ₹ 7229 in Ullal-1. The net returns from Cashew orchard per hectare being fairly high were in order of ₹ 61314, ₹ 62425, ₹ 49672 and ₹ 34231 in Chintamani-1, Ullal-4, Ullal-3 and Ullal-1 respectively.

Chavan (2006) in his study on, “Economic analysis of mango orchards in Deogad tahsil of Sindhudug district”, revealed that, per hectare cost of cultivation (Cost C) worked out to ₹ 49708 of which share of Cost A and Cost B was about 44 per cent and 91 per cent, respectively. Per hectare yield of mango orchards at overall level was 32.56 q. The per quintal cost of cultivation worked out to ₹1527 including per quintal marketing charges of ₹ 90. The total cost of production came to ₹ 2427 per quintal.

Patil (2010) in her study on “Economics of Production and disposal of Cashew nut in South Konkan region” revealed that, the per hectare capital investment for establishing HYV cashew orchard

for the first five years was ₹116830 and that of local varieties cashew orchard was ₹ 89663. The annual per hectare cost of cultivation (Cost C) for local variety and HYV cashew orchard was worked out to ₹ 28013 and ₹ 46908, respectively. The amortization cost was ₹ 8750 in local variety and ₹11400 in HYV cashew orchard. For local variety of cashew nut, profit at cost C was ₹ 163399 and for the HYV, it was ₹43978. In both groups benefit cost ratio were 1.56 and 1.94, respectively.

Rymbai et.al (2012) conducted a study on pineapple cultivation in Ri-Bhoi district of Meghalaya. In small farms, the first year cost was ₹ 23125.8, second year it was ₹ 13987.5 and in the third year it was ₹ 32692.26. In medium farm it was found to be ₹ 30334.69, ₹ 16020.78 and ₹ 38348.23 in I, II and III year and in large farms it was ₹ 44080.09, ₹ 15965.27 and ₹ 41612.88. Net returns on small, medium and large farms were found to be ₹ 50795.07, ₹ 51637.23, and ₹ 63401.94. The returns in pineapple orchard increased with increase in size of orchard. The B:C ratio was estimated as 1.61:1 for small farms, 1.48:1 for medium farms and 1.49:1 for large category with an average of 1.52:1.

3. To study farm business analysis for pineapple cultivation.

Anonymous (1971) revealed that the value of all individual assets tends to increase by and large, with the size of holdings. Overall value of assets on business account came to ₹ 41,944.01. Farm returns per hectare for the sample as a whole was ₹ 587.31 per hectare. Farm business income estimated to be ₹ 1982.31 per holding and ₹ 579.31 per hectare. Farm business income per holding tends to increase substantially with the size of holding. Farm labour earnings per holding and per hectare came to ₹ 1927.14 and ₹ 563.19 respectively. For all sample holdings taken together, total capital investment worked out to ₹ 10529.00 per

hectare. Of this fixed capital amounted to ₹ 9980.58 and operating capital came to ₹ 548.42 per hectare. Net returns on capital investment for the whole sample worked out to ₹ 546.17 per hectare or 5.19 per cent. The average profit came to ₹ 432.81 per holding or ₹ 126.49 per hectare. For the sample holding as a whole the input output ratio worked out to 0.97.

Singh and Singh (1975) in the study on “Income, employment and cropping pattern in Meerut district” estimated, on an average, a net income of ₹1600.75 per hectare with an average input of ₹ 1695.17 and output of ₹ 3289.71. The average family labour income and farm business income per hectare came to ₹1699.75 and ₹ 1823.61 respectively. The values of input, output and net income per hectare, in general, showed an increasing trend with the increase in the size of holdings, mainly because of higher cropping intensity, higher percentage area under irrigation, high yielding varieties and higher investment on inputs like seed, fertilizers etc. made by the large farmers. The average input output ratio came to 1:1.94, which also showed an increasing trend with the increase in size of the farms, mainly because of relatively higher output on large sized farm.

Mishra *et.al.* (1976) studied farm business analysis in Basti district (U.P.) and observed that, on an average, the investment in fixed capital per hectare including land came to ₹13275.23. Land alone accounted for higher percentage (85.86) to the total investment. It was followed by livestock (6.0 per cent) and irrigation structure (3.53 per cent). The investment on livestock showed a decreasing trend with the increase in size of the farms while a reverse trend was observed in case of irrigation structure. The reasons for decreasing investment on livestock on the farms of larger size groups was due to the fact that the big farmers did not

maintain number of cattle in proportion to their size of farms. On an average, the net income per hectare, on the sample farms came to ₹1332.62. It showed an increasing trend with the increase in the size of holdings mainly because of higher investment resulting into higher output and net income. On an average, input-output ratio came to 1:1.8 which showed an increasing trend with the increase in size of holding. On an average crop production contributed 84.40 per cent of the total input and 87.37 per cent of the total output. In the farm business as a whole, milk production contributed only 15.60 per cent and 12.63 per cent to total input and output respectively.

Dhongade and Dangat (1985) studied the cost and income structure of farm business in Sina Command Area (Maharashtra). The per hectare cost of irrigated Kharif hybrid Sorghum worked out to be ₹ 4334.90. The average per hectare yield was 23.75 quintals. The gross value of produce was ₹ 6327.87 and the profit at Cost C was found to be ₹ 2024.47. The per hectare total cost of cultivation of irrigating Rabi Sorghum was ₹ 2144.10, the yield of grain was 8.15 quintals and the profit at cost C was ₹ 586.05.

Singh *et. al.* (1985) studied the economics of pulse cultivation in Bundelkhed region of Uttar Pradesh. The data were based on farm level pertaining to crop enterprise of sample 35 farmers spread over three villages. The data were collected for the period 1981-82. The per hectare cost of cultivation in small and large size farm was ₹ 616.23 and ₹ 704.68 respectively. In the two farm categories Cost A, Cost B and Cost C were higher in case of large size farm than the small size farm. Cost A accounted for about 61 per cent (₹ 37605.7) and 75 per cent (₹ 526.18) of Cost C (₹ 616.13 and ₹ 704.68) in case of small and large size farms respectively. The gross per hectare income for the small and large sizes worked out to

₹ 1351.25 and ₹ 1612.37 respectively. The net income (gross income-Cost C) for corresponding farm sizes were ₹ 735.12 and ₹ 907.69 respectively.

Bhatia (1991) evaluated cost of cultivation and returns of major pulses in Andhra Pradesh and Madhya Pradesh states, related to the year 1984-85. The cost of cultivation of green gram per quintal in the states were ₹ 1693.59 and ₹ 1723.69 respectively. The net income was calculated to ₹ 156.06 and ₹ 398.82 per q in the states, respectively. In case of urad, the per hectare cost of cultivation, gross income and net income in Andhra Pradesh was found to be ₹ 1986.72, ₹ 2679.67 and ₹ 692.95 and in Madhya Pradesh it was ₹ 1451.14, ₹ 1724.33 and ₹ 269.33 respectively.

Hiremath (1994) analysed the cost and returns of dry chillies in Dharwad district. The total cost of cultivation of chilli per acre was ₹ 5942.64, while Cost A, ₹ 3865.90 and Cost B, ₹ 5110.39. The value of gross output was ₹ 5531.72. The farm business income was ₹ 466.08 per acre and family labour income was ₹ 221.33 per acre.

AbhijithSen and Bhatia (2004) studied the economics of production of principal crops in Gujarat. The study shows that the economics of rainfed crops in the state was fairly good as net income from all the crops were reasonably high being ₹ 6161 per ha in case of tur and ₹ 7300 and ₹ 7500 for groundnut and cotton, respectively per ha farm business income was in the range of ₹ 10000-14000 except for Bajra, which was around ₹ 6000. It was observed that cotton, groundnut and wheat were of high cost than bajra and tur.

Bhatia (2005) studied the economics of crop production in India. Estimated cost of cultivation of principal rainfed crops i.e.

jowar, tur, moong, soyabean, groundnut and cotton. It was observed that the level of net income per ha for tur ₹ 7126, groundnut ₹ 3179 and soyabean ₹2787 were reasonably high and low in jowar ₹1611, moong ₹1963 respectively. Per ha cost of cultivation of jowar, tur, moong, groundnut, soyabean and cotton were ₹ 7841, ₹ 7626, ₹ 6649, ₹15704, ₹ 9558, and ₹12030 respectively. Per ha cost of cultivation of cotton and groundnut were greater than tur, moong, soyabean and jowar. The same hold good for farm business income which was highest for tur as ₹11480 per ha followed by groundnut and soyabean. The farm business income was low in the cultivation of moong, jowar and cotton in the range of ₹ 4500-6000 per hectare.

Jomy (2015) computed the income measures of pineapple cultivation in Kerala for first, second and third year. In the first year gross income was worked out at ₹ 25716 per ha for small farms, ₹ 355515 per ha for medium farms and ₹ 328496 per ha on aggregate level. The various income measures in the first year pineapple cultivation show that medium farms receive more returns than small farms. In the second year, gross income for the small farms was computed at ₹ 216038 per ha, ₹ 280291 per ha for medium farms and ₹ 260038 per ha for all farms. In the third year gross income was worked out at ₹ 160045 per ha for small scale, ₹ 228353 per ha for medium scale and ₹ 204696 per ha for all farms. The net income is about 15 per cent of the gross income of small farms and 32 per cent of the gross income of medium farms. He concluded that both farm business income and net income are more in medium farms than in small farms in all the three years of cultivation.

4. Disposal pattern of pineapple.

Anonymous (1984) conducted a study on major fruit crops of Meghalaya which includes pineapple, grapes, apricot, peach and pomegranate. Production and marketing of pineapple in Meghalaya, discussed in the report mainly included sale of hanging crop to contractor, special care during harvesting, sorting and packaging of good quality pineapple fruit of highlands of Meghalaya.

Singh *et.al.* (1990) conducted study on marketing of pineapple in north Tripura. They identified different marketing channels in marketing of pineapple namely,

1. Producer → village cooperative → TSIC (processing) wholesalers → retailers → consumers.
2. Producers → traders → retailers → consumers.
3. Producers → local beoparis → wholesaler (82-miles market) → retailers → consumers.
4. Producers → traders → commission agents → wholesalers → retailers → consumers.

Majority of the farmers marketed through channel III.

Wankhede (1998) found that majority (99.59%) of sapota fruits were sold in market. The maximum farmers (54.29%) sold their produce through wholesaler as it was the most convenient way of selling the produce in the area.

Mishra *et.al.* (2000) in their study on “Production and marketing of banana in Gorakhpur district of Uttar Pradesh” outlined the disposal pattern of Harichal banana, they observed that there were five marketing channels. The small farmers were selling their produce to wholesalers, village traders, pre-harvest contractor, direct sale in local market and commission agent cum wholesaler. Medium farmers sold their produce 15 per cent to the

wholesalers, 20 per cent to the village traders, 25 per cent to the pre-harvest contractors, 20 per cent direct sale in local market and 20 per cent commission agent cum wholesalers. In case of large farmers, disposal pattern of their produce through wholesaler, village trader, pre-harvest contractor, direct sale in local market and commission agent was 10, 15, 25, 30 and 25 per cent respectively.

Wadkar *et. al.* (2001) studied distribution pattern of kokum products at household level. Generally, three distribution methods were followed to dispose the kokum products viz. home consumption, distribution between relatives, friends and for sale. In south Konkan region of Maharashtra it was observed that 48.88 per cent dried kokum rind, 50 per cent Amrit kokum and 19.75 per cent kokum butter were used at home and remaining quantities of different kokum products were sold in the local and distance market.

Subbaraj and Singh (2003) in their study on “Marketing of Coconuts: The disposal strategies of farmers in Dingul district of Tamil Nadu observed that coconut farmers have two channels for disposal of their coconuts, the direct channel and other indirect channel. Indirect channel was the most prominent channel among coconut farmers. Direct channel was very simple while indirect was very complex.

Sandhya Rani, Bhavani, *et. al.* (2005) examined the existing marketing aspects of pineapple in Vishakapatnam district of Andhra Pradesh. It was observed that in the study area, the following two marketing channels were identified in marketing of pineapple fruits.

Channel 1: Producer → wholesaler → retailer → consumer.

Channel 2: Producer → retailer → consumer.

The study further revealed that channel II was relatively efficient over channel I.

Ingale (2007) conducted study on “Production and disposal of jackfruit in South Konkan region” observed that jackfruit passed through following three different channels upto consumer. (I). Producer → consumer (II). Producer → pre harvest contractor → consumer (III). Producer-retailer-consumer. In all the three channels, maximum number of growers marketed their quantity through pre-harvest contractor. She also observed that jack fruit growers were in better position for per kg price realization in channel II.

Jangam (2008) in his study on “Economics of production and disposal of coconut in Ratnagiri district” observed that at overall level 91.44% nuts were sold in market and only 8.56% were utilized for wage payment, home consumption, gift to relatives and losses in storage. Maximum growers sold their produce through Commission agents (53.5%) followed by village merchant (28.17%) and direct to consumers (18.32%). The whole quantity of tender nuts were sold through commission agents whereas direct sale to consumer was restricted to mature nuts only.

5. Constraints in pineapple production and disposal.

Aziz (1976) conducted a small scale study on pineapple in Mymensingh town for his master degree term paper. His findings was that 5 per cent of fruit was wasted due to the operation level of every intermediaries who carried the fruit from producers to consumers. Grading practices were followed only at the retailer level at Mymensingh town market.

Husain *et. al.* (1979) conducted a research on production and marketing of pineapple in Chittagong hill tracts. They revealed that

it was a profitable enterprise but a large number of producers were compelled to sell their immatured fruit because of their shortage of money. In case of marketing of pineapple the other problems faced were related to transportation, storage, processing in the secondary and terminal market.

Saha (1989) conducted an “Economic study of pineapple marketing in Madhupur thane under Tangail district”. The study identified various problems in the production and marketing of pineapple. Majority of the producers sold their product before harvest and many of them did not follow grading practices. Due to lack of adequate transport, storage and processing facilities, a large volume of the product was destroyed causing huge loss to the producers.

Baten (1992) conducted a study on “An economic analysis of the production and marketing of pineapple in some selected areas of Tangail district”. The study identified various problems like bad communication system, lack of adequate transportation facilities, lack of capital and lack of storage and marketing facilities.

Sarkar (1996) in his study title “A study of pineapple marketing in some selected areas of Moulavi Bazar district” identified some production problems such as lack of capital, huge price of inputs and inadequate supply of fertilizers, lack of scientific knowledge regarding the production of pineapple technology and inefficient management of farming.

Wankhede (1998) in his study ascertained “The problems of production and disposal of sapota faced by the growers in Thane district of Maharashtra state” as non availability of labour for work in time (80%). The market price received was non remunerative (61.43%). The major problems were on marketing and transporting.

Malcom (1999) expressed that the perishable nature of pineapple is the major constraint in production and marketing of pineapple and the analysis of fruit losses during marketing shows the percentage of post-harvest losses upto 70 per cent. In addition pineapple marketing cannot be over-emphasized considering the number of industries springing up which make use of pineapple as raw material for their production. However, it is characterised mainly by the problem of perishability, seasonality of production and bulkiness.

Mishra *et.al.* (2000) identified problems in the production and marketing of banana in Gorakhpur district of Uttar Pradesh. The constraints faced by the banana growers were identified as non-availability of quality suckers, high cost of suckers, costly transportation of the produce, non remunerative prices and non availability of inputs like fertilizers and pesticides at reasonable rates.

Padmini (2002) in her study identified the problems faced by pineapple cultivators in Kerala. The study revealed major problems faced by pineapple cultivators as high cost of chemical and bio fertilizers, lack of financial assistance, high cost of labour, inadequacy of fertile land.

Hiremath (2005) expressed that the absence of processing facility, absence of cold storage facility, fluctuation in price are the major problems expressed by farmers and other problems are absence of cooperative marketing, non availability of packaging material at reasonable price, difficulties in transportation and non availability of right inputs. The shortage of affordable credit constraints the agricultural growth of pineapple production.

Rahman *et.al.* (2005) examined the constraints in pineapple production in Edo state Nigeria. A number of constraints such as inadequate credit facilities, weather and disease, poor network of roads, high transportation cost, lack of land, inputs and poor extension services were perceived by farmers as hindrances to pineapple production in the study area.

Olainka (2013) conducted a study on economics of pineapple cultivation in Osun state, Nigeria. The major constrains to pineapple production in study area were shortage of high quality planting materials, high fruit perishability, low scale price, lack of access to credit, and plant diseases like heart rot.

CHAPTER-IV

METHODOLOGY

Adoption of appropriate scientific methods, steps and procedures are necessary requirements for systematic study of research problem. The basic objective of the present study was to investigate the economic aspects of production and disposal of pineapple in selected area. The methodology adopted to arrive at the final estimates of the study are described in this chapter.

4.1. Sampling Design

4.1.1. Selection of study area

Dodamargtahsil of the Sindhudurg district was selected purposively as pineapple cultivation is concentrated in the study area and area under this crop is rapidly increasing since the last seven years.

4.1.2. Selection of villages

Since pineapple cultivation is undertaken at the banks of Tilaririver, all the villages having pineapple cultivation were considered for the study.

Table No. 4.1 List of selected villages and sample growers

Sr.No.	Name of villages	No. of tenant growers
1	Bhike-Konal	2
2	Konalghatta	5
3	Kudase	3
4	Parme	4
5	SateliBhedsi	6
	Total	20

4.1.3 Selection of pineapple cultivators

Since the cultivators were limited in number in Dodamargtahsil, all the available tenant growers of pineapple were included in the sample for study.

4.2 Collection of data

The data required for the study were collected by survey method. All the available tenant growers were interviewed personally with the help of schedule specially designed for the purpose. The detail information needed for the research work was collected from the total available 20 tenant growers in the study area during data collection period.

4.2.1 General information

Particulars of the pineapple tenant growers about age, education, main and subsidiary occupation, operational holding, cropping pattern, inventory of farm assets, irrigation, implements, cost and returns of cultivation, grading, disposal of produce and constraints faced by the farmers were collected.

4.2.2 Reference period

The information and data for the present study are pertained to the years 2013-16. Selected pineapple growers were interviewed during the month of November, 2016.

4.3 Analysis of data

4.3.1 Tabular analysis

The data was processed for arriving at desired conclusion and it is arranged in suitable tables and cross tables. Simple statistical tools like arithmetic mean, percentages and ratios were used.

4.3.2 Cost concepts used in analysis

The cost of cultivation of pineapple for the three years was worked out by using the A,B and C Cost measures followed by the Commission of Agricultural Costs and Prices (CACP). The ABC measures of costs and their components are: Cost A₁, Cost A₂, Cost B₁, Cost B₂, Cost C₁, Cost C₂ and Cost C₃. The items included under each category of cost are given below.

i) **Cost A₁**: Actual paid out cost by the owner cultivator for items like hired labour, hired machinery, suckers, manures, fertilizers, plant protection chemicals, irrigation charges, electricity charges, depreciation on farm implements, farm buildings and interest on working capital.

ii) **Cost A₂**: Cost A₁ + rent paid for leased in land.

iii) **Cost B₁**: Cost A₁ + interest on fixed capital.

iv) **Cost B₂**: Cost B₁ + rental value of owned land + rent paid for leased in land.

v) **Cost C₁**: Cost B₁ + imputed value of family labour.

vi) **Cost C₂**: Cost B₂ + imputed value of family labour.

vii) **Cost C₃**: Cost C₂ + supervision charges.

Since the entire cultivation is carried out on leased in land, the Cost A₂, Cost B₂, Cost C₂ and Cost C₃ measures of cost were used for the computation of per hectare cost of cultivation of pineapple. Since the rent paid for leased in land is already added in Cost A₂ the cost for the same is taken as zero in Cost B₂.

4.3.3 Farm business analysis

The following measures of farm income were used to estimate the income efficiency of selected farms.

1. Farm business income = Gross income – Cost A₂

2. Farm investment income = Gross income - (Cost A₂ + Value of family human labour).
3. Family labour income = Gross income - Cost B₂
4. Net income = Gross income - Cost C₃

4.4 Terms and concepts used in the study

i) Hired human labour

The wages paid by the cultivators to the labourers hired from outside the family for performing different cultivation practices is the cost of hired human labour.

ii) Family human labour

The actual wages paid to the hired human labour is considered here to calculate the cost of family human labour.

iii) Other inputs

Cost of procured inputs such as plantlets, manures, fertilizers, herbicides, pesticides, fungicides, GR hormone etc are calculated with actual prevailing market price.

iv) Interest on fixed capital

It is worked out at the rate of 10 per cent per annum on fixed investment made on the farm.

v) Interest on working capital

It is worked out at the rate of 12 per cent per annum on the working capital used for the cultivation.

vi) Depreciation

The depreciation of the implements, machinery and tools used in pineapple cultivation is calculated using straight line method.

$$\text{Annual depreciation} = \frac{\text{Original cost} - \text{junk value}}{\text{Expected life in years}}$$

vii) Irrigation charges

The payments made by the farmers for the water procured from sources like canals and dams are considered here.

viii) Supervision charges

They are considered @ 10 per cent of total input cost.

ix) Benefit-cost ratio (B:C) Ratio

The B:C ratio is calculated for judging the profitability of pineapple cultivation on the farm. It was calculated using the formula,

$$\text{Benefit - cost ratio} = \frac{\text{Total returns}}{\text{Total cost}}$$

x) Cost of cultivation per-quintal

$$\text{Per quintal cost of cultivation} = \frac{\text{Total cost} - \text{value of by produce}}{\text{Total output (q)}}$$

xi) Farm business income

The farm business income was obtained by deducting Cost A₂ from gross income. This measure of income depicts the profitability of firm after considering the lease rent paid by the farmer.

xii) Farm investment income

The farm investment income was obtained by deducting value of family human labour from farm business income.

xiii) Family labour income

It is a return to family labour and profit to entrepreneur. Family labour income was estimated by deducting Cost B₂ from gross income.

xiv) Net income

Net income was obtained after the imputation of all expenses. It is computed by deducting Cost C₃ from gross income.

CHAPTER VI

SUMMARY AND CONCLUSIONS

6.1 Introduction

In the light of discussion made in the earlier chapters, a summary of the results, conclusion and policy implications to improve the existing status of pineapple production are presented in this chapter.

6.2 Summary

The importance of horticulture lies not only in its potential of income and employment generation in the economy, but also its vital role in satisfying the nutritional requirements of the body. Fruits are deemed, as a perfect source for providing all the necessary nutrients required for the growth and development of the human body leading to a healthy physique and mind. Pineapple (*Ananas comosus* L.) is considered to be the healthiest and most demanded fruit all over the world. Pineapple is one of the important dessert fruit of millions of people.

For the past 7 years, farmers from Kerala who have settled in Dodamarg tahsil are cultivating pineapple on a large scale in the leased lands. The pineapple variety cultivated by all the farmers was Queen. The pineapple produced by these farmers have got a wide demand in markets of Goa, Mumbai and Delhi. No systematic efforts have been made so far to study the economics of production and disposal of pineapple in Dodamarg tahsil of Sindhudurg district. Therefore a pioneer study is done to analyse the above aspects with the following objectives.

1. To assess the existing pattern of resource use in pineapple
2. To estimate cost, returns and profitability of pineapple cultivation.

3. To study farm business analysis for pineapple cultivation.
4. To study the disposal pattern of pineapple.
5. To identify the constraints in pineapple production and disposal.

All the available pineapple tenant cultivators, counted to a number of 20 were interviewed personally for the study. Since pineapple is a ratoon crop, the data for the study pertained to the years 2013-2016. The data was analysed with statistical tools like arithmetic mean, percentages and ratios. Standard cost concepts recommended by CACP and farm income measures were also used for arriving at the results.

The findings of the study are summarized as follows:

The average size of leased in land was 6.91 ha. The proportion of the cultivated area was 100.00 per cent, out of which 95.07 per cent was irrigated and 4.93 per cent unirrigated. Regarding cropping pattern, 94.21 per cent of the total area was dominated by pineapple. Remaining area was under banana (0.86 %), cashew nut (2.17%) and rubber (2.74%). The per farm investment was highest in solar fence (58.47%) followed by irrigation structure (21.16%), buildings (16.56%) and implements, machinery (3.79%). The total per farm investment amounted to ₹ 850974.

The per hectare hired labour days utilized in the first year was 308.91 (93.85 per cent) and family days was 20.24 (6.14 per cent). In the second and third year 235.31 (91.98 per cent) and 200.25 (92.72 per cent) hired labour days were used whereas the number of family labour days utilized in these years was 20.49(8.01 per cent) and 15.70 (7.27 per cent). The labour utilization was found to be intensive in operations like planting, weeding, earthing up and harvesting. The total machine hours used particularly for the land preparation was 31.78 in first year.

As regards the utilization of other inputs, the total quantity fertilizers used for the three years were 1387.61 kg N, 329.06 kg P and 1348.38 kg K. The per hectare manures, plant protection chemicals, growth regulators used for three years in total was 19.46 tonnes, 16.15 kg and 0.95 litre. A number of 19074 suckers were planted per hectare. The irrigation and electricity charges for the three years amounted to ₹ 8413 and ₹ 3576.

The year wise cost of cultivation was calculated, the highest cost was incurred by the farmers in first year (₹ 323495) followed by lesser cost in second year (₹ 145347) and third year (₹119378). The overall per quintal cost was calculated to be ₹ 579 and the overall benefit cost ratio was 2.68. The various income measures were used to study farm business analysis. The gross income from main and by-produce was found to be a total of ₹1581731 for the three years.

The total farm business income, farm investment income, family labour income and net income for the three years were ₹ 1103764, ₹ 1085312, ₹ 1051336 and ₹ 993511.

Wholesaler, commission agent and retailer were the three agencies involved in the disposal of produce in study area. The marketing channels identified were, (A) Producer → wholesaler → retailer → consumer (B) Producer → commission agent → wholesaler → retailer → consumer (C) Producer → retailer → consumer. In constraint analysis, the major problems reported by the growers were non availability of hired labour, high cost of planting material and fertilizers, non availability of water for irrigation, non availability of quality suckers, lack of technical know how, attack from animals, fluctuation in market prices, lacunas in weighment and post harvest losses at farm level.

CONCLUSIONS

1. The total gross cropped area was occupied by biannual (95.07%) and perennial crops (4.91%) which resulted in cropping intensity of 100.00 per cent.
2. Pineapple was found to be a labour intensive crop. The total per hectare labour utilized for the three years was 800.90 out of which the proportion of hired labour days (92.95%) was more than family labour days (7.04%).
3. The total cost, returns and profitability for the total cultivation was ₹588220, ₹1581731 and ₹ 993511 for the first, second and third years respectively which indicated that pineapple cultivation was highly profitable for the tenant cultivators with an overall benefit cost ratio of 2.68.
4. The net income received by the tenant cultivators in second year i.e. ₹ 495193 was higher compared to first year (₹139205) and third year (₹359113). This was due to the upper yield obtained from first ratoon and higher marketed surplus with better price.
5. The production was noticed to be highest in the first ratoon (286.93 q) when compared to the yield from first year harvest (264.40 q) and second ratoon (191.01q).
6. The marketable surplus was observed to be higher, greater than 95 per cent in all the three years with a negligible per cent used for family consumption, wages in kinds.
7. The farmers depended on agencies like wholesaler, commission agent and retailer for disposal of the produce
8. The major constraints perceived by the cultivators were non availability of hired labour, high cost of planting material and fertilizers, non availability of water for irrigation, non availability of quality suckers, lack of technical know how, attack from

animals, fluctuation in market prices, lacunas in weighment of produce and post harvest losses at farm level.

POLICY IMPLICATIONS

Based on results of the study, imperative policy implications are highlighted below.

1. Majority of the tenant growers lacked proper scientific knowledge of pineapple cultivation. Agricultural experts and extension officers needs to undertake initiatives to provide training so that deviation of input use from the recommended level could be avoided.
2. Availability of quality planting material and following higher planting density can enhance the yield potential in the study area.

SCOPE FOR FURTHER RESEARCH

The economics of pineapple intercropping and marketing aspects of pineapple are the other areas where further research can be initiated.

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Fig. 2: Per farm investment in farm assets

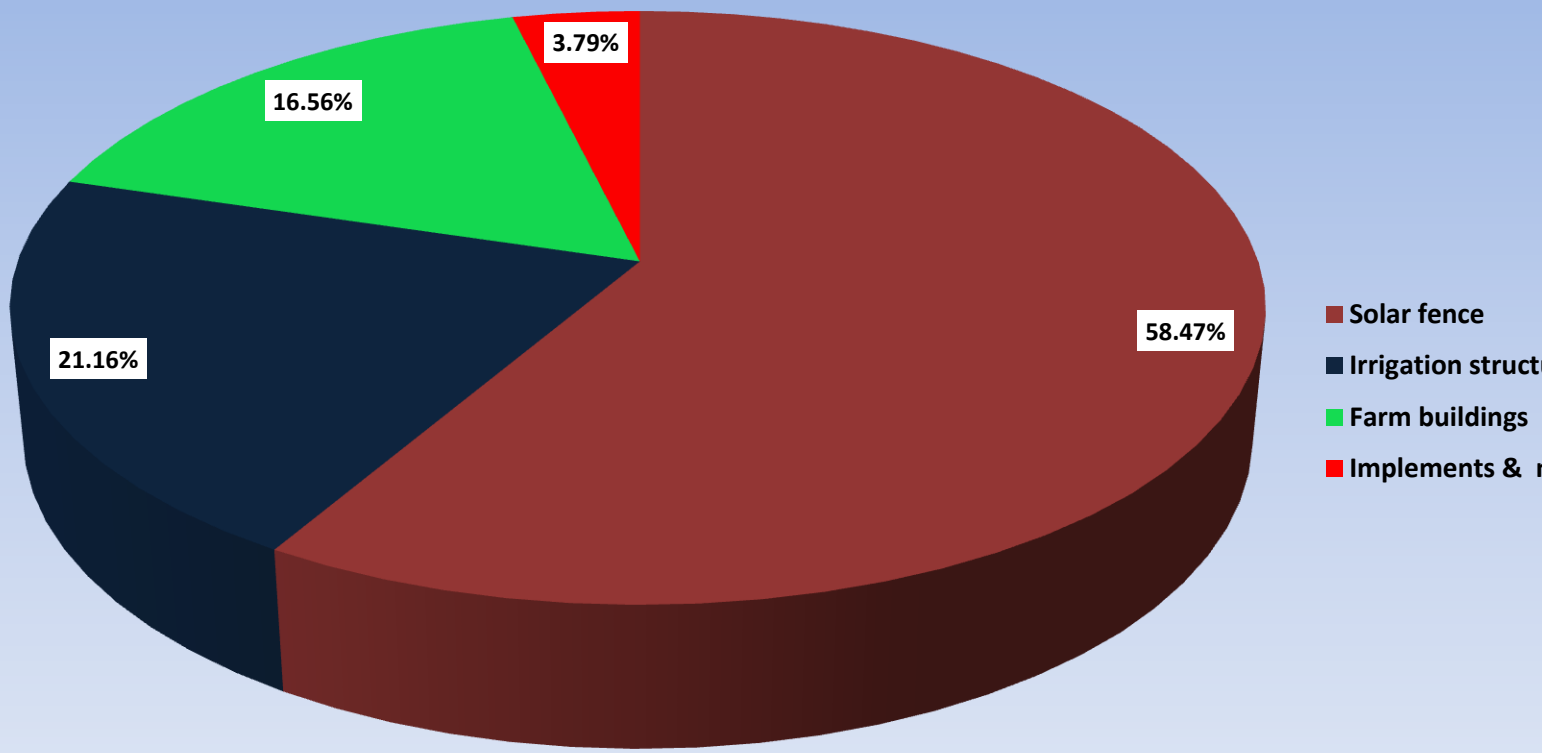


Fig.3: Per hectare costs, returns and profitability of Pineapple

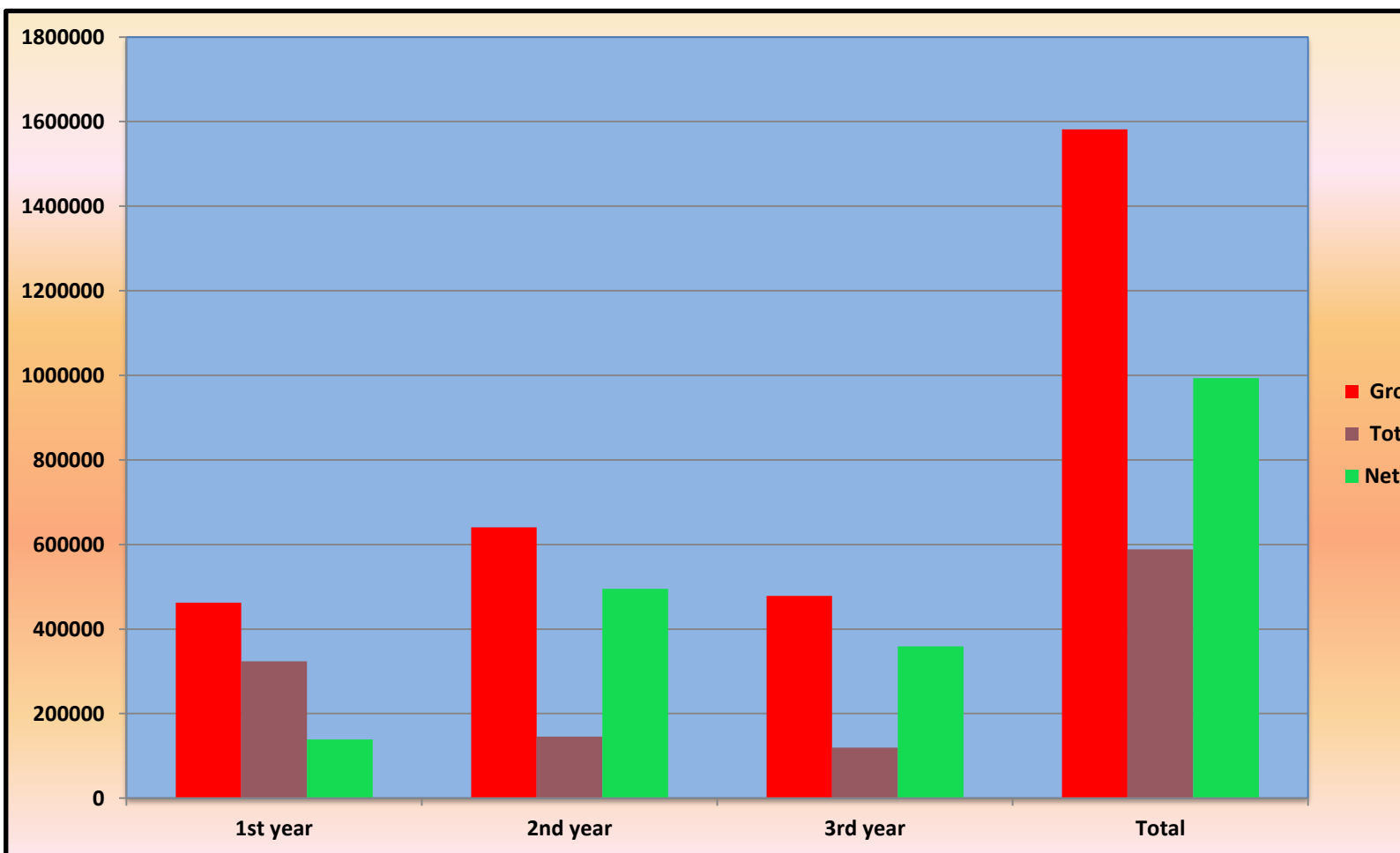
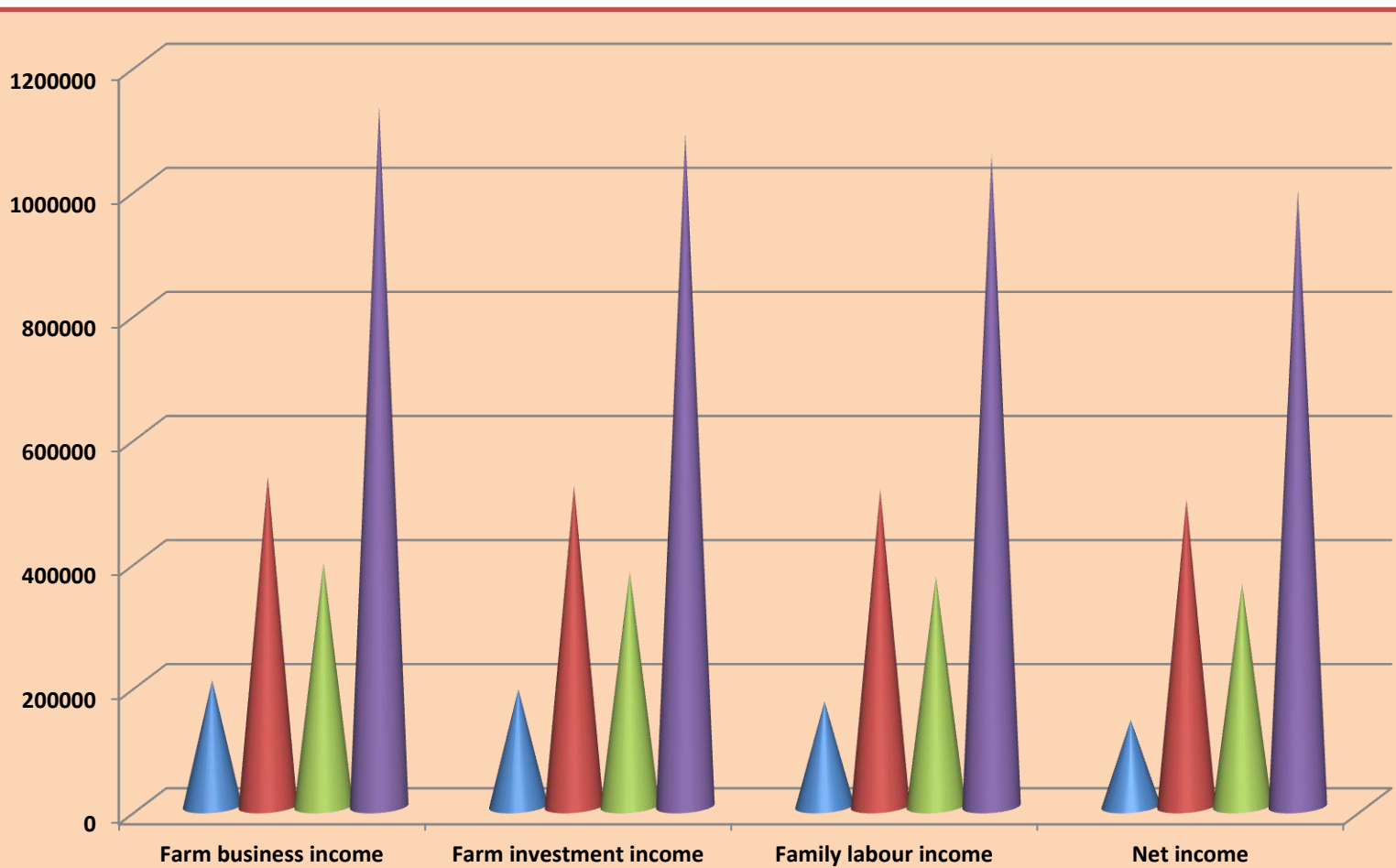


Fig.4: Per hectare farm business analysis



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Plate 1: Planting of suckers in the field



Plate 2 : Pineapple farm



Plate 3: Pineapple fruiting in the field



Plate 4: Harvesting of pineapple



Plate 5: Harvested pineapple fruits in the field



Plate 6: Transporting of harvested fruits

IV) CROPPING PATTERN

Sr. No.	Season and crop	Variety	Area (ha)		Yield(qt)		
			Irrigated		Unirrigated	irrigated	unirrigated
			Well (1)	Well (2)			
1.	KHARIF a) b)						
2.	RABI a) b)						
3.	SUMMER a) b)						
4.	PERRENIALS/ANNULS a) b)						

A) Sources of irrigation: Well/Canal/Bandhara/Lift/Any other(specify)

B) Permanent structure for irrigation

Sr. No.	Types of irrigation	Years of construction/years of purchase	Cost of construction / purchase value (RS)	Present value (RS)	Area irrigate (ha)	Expected life (yrs)	Expenses on maintains & Repairing during the years (RS)
1.	Well a)Open b) Bore						
2.	Oil engine						
3.	Electric motor pump						
4.	Pipe line						
5.	Anyother (specify)						

V) INFORMATION OF FARM ASSETS

A) Farm building

Sr. No.	Type of building	Years of construction	Cost of construction(Rs)	Expected life(yrs)
1.	Farm House			
2.	Cattle byre			
3.	Godown			
4.	Engine shed			
5.	Any other (specify)			

B) Livestock

Sr. No.	Type of animal	No. of animal	Year of purchase	Purchase value (Rs.)	Expected life (Rs.)
1.	Bullock				
2.	Cows : i) Milch ii) Dry iii) Heifers				
3.	Buffaloes i) Milch ii) Dry iii) Heifers				
4.	Goats				
5.	Sheep				
6.	Poultry				
7.	Any other (specify)				

C) Implements and machinery

Sr. No.	Kind	No.	Years of purchase /prepare	Expected life (yrs.)	Purchase Value (Rs)	Repair during the year
A)	Implements 1) Iron plough 2) wooden plough 3) leveller 4) Harrow 5) Hoe					
B)	Machinery 1) Tractor 2) Power tiller 3) Oil engine 4) Electric motor 5) Sprayer 6) Duster 7) Pipe line 8) Sprinkler 9) Drippers					

	10) Bullock carts					
C)	Hand tools 1) Iron basket 2) Spade 3) Pick axe 4) Sickles 5) Weeding hook 6) Buckets 7) Wooden basket					

VI) Details of Pineapple Cultivation on Farm

Sr. No.	Type of land	Area (ha)	Month of sowing	Month of harvest
1.	a) Heavy b) Medium c) Light			
2.	Variety a) b)			

VII) Details of Pineapple Production on Farm

Sr. No.	Month	Area (ha)	Production(kg)	Productivity(kg/ha)
1.				
2.				

VIII) Loan Borrowed

Sr. No.	Source	Amount	Rate of Interest	Duration
1.				
2.				

IX). Season wise input utilization for pineapple

Sr. No.	Name of input	Quantity	Rate(Rs./kg/lit)	Total cost(Rs.)
1.	Suckers Variety			
2.	F.Y.M. (Qt.)			
3.	Fertilizers Urea S.S.P M.O.P			

XI) DISPOSAL OF PRODUCE

Sr.no	Particulars	Pineapple (Kg)
A)	Production	
B)	Disposal	
1.	Family consumption	
2.	Gift to relative and friends	
3.	Wages in kind	
4.	Losses (physical, biological)	
5.	Seed production	
6.	Any other (specify)	
	Total:	
C)	Marketable surplus:	

XII) FUNCTIONARIS/AGENCISE INVOLVED IN PINEAPPLE MARKETING: -

Sr. No.	To whom the produce sold?(functionaries /agency)	Where does the produce sold?		How much quantity/cost?		
		At farm/local market/distant market	Place with distance in (km.)	Quantity sold (kg.)	Rate (Rs./kg.)	Value (Rs.)
1.	Directly to consumer					
2.	Wholesaler					
3.	Commission agent					
4.	Village merchant					
5.	Retailer					
6.	Cooperative					
7.	Other....					
Total						

XIII) GRADING OF PINEAPPLE

A) Do you grade your Pineapple? Yes/No

B) If yes, give the procedure of grading

Sr. No.	Grade	Quantity			Price received (Rs/kg)	Qty. sold (q.)
		Size	No. of fruits	Other criteria		
1.	I					
2.	II					
3.	III					
	Total					

C) Cost of grading

Sr. No.	Grade	Labour (days)									
		Skilled				Unskilled				Total	
		Family		Hired		Family		Hired		M	F
		M	F	M	F	M	F	M	F		
1.	I										
2.	II										
3.	III										
4.											

D) Problem faced in grading of produce

- i) Not aware about the grading techniques
- ii) High labour cost
- iii) Shortage of space and time
- iv) Any other (specify)

E) If grading is not done at all, what are the reasons?

- i) Non-availability of labour
- ii) High labour cost
- iii) No economic gain

XIV) PACKAGING OF PINEAPPLE

Sr. No.	Container type	Capacity	No. of units	Price/unit(Rs.)	Total cost (Rs.)
1.	Plastic crates				
2.	Any other				

B) Other expenses on packaging materials

Sr. No.	Material used	Qty.(kg)	Price (Rs./kg)	Amount (Rs.)
1.				
2.				
3.				

C) Cost of labour for packaging

Sr. No.	Type of container	No. of units	Labour						Wage rate per (Rs.)	Total cost (Rs.)	Qty packed(q)
			Family		Hired		Total				
			M	F	M	F	M	F			
1.	Bag										
2.	Basket										
3.	Other										

XV). Constraints faced during cultivation of pineapple

1. Do you face difficulties regarding availability & high cost of farm inputs. Yes/No
If yes, Specify
2. Is there any difficulty regarding availability of good quality suckers Yes/No
If yes, what type of difficulties?
3. Are there any problems regarding the availability of labour? Yes/No
If yes, what are the problems?
4. Is irrigation water timely available from particular source? Yes/No
 - i. What is interval between two irrigation?
 - ii. What alternative arrangements made to irrigate the crop?
5. Did you apply fertilizers for pineapple? Yes/No
If no, why?
6. Whether production of pineapple is satisfactory? Yes/No
If no, what are the reasons?
7. Are there any difficulty regarding disposal of produce? Yes/No
If yes, Specify?
 - a. Market price
 - b. Storage
 - c. Transport
 - d. Any other
8. Do you want to increase area under pineapple Yes/No
If no, why?
Please give the reason:
9. Whether there was any incidence of pest and disease? Yes/No
If yes, State type of pest/disease?
Whether control measure were adopted?
Percentage of loss?
10. Is there proper extension & advisory services Yes/No
11. Whether loan/ Credit easily available? Yes/No
12. Did you face any other difficulty? (Please specify)

CHAPTER V

RESULTS AND DISCUSSION

The data for the present study were collected from tenant growers in Dodamarg tahsil of Sindhudurg district. The data were analysed as per the methodology and the final results are presented and discussed in this chapter.

5.1 General information about the pineapple growers

An attempt has been made in the present study to analyse some of the important characteristics of the sample pineapple tenant growers. The general information regarding age, education, occupation and size of the family are given in Table 5.1

5.1.1 Age

It is seen from the Table 5.1.1 that the average age of growers was 44.27 years. This indicated that the tenant growers were middle aged with good experience in pineapple farming.

5.1.2 Education

The educational qualification of tenant growers were classified into three groups such as secondary, higher secondary and graduation. It is observed from the table that 30 per cent of the pineapple growers were having secondary education followed by growers with higher secondary education (10 per cent) and graduation (4 per cent). This showed that all the tenant growers were literate.

Table 5.1: General information of pineapple tenant growers

Sr. No.	Particulars	Average
	Number of tenant growers	20
1.	Average age (years)	44.27
2.	Education (No)	
	i. Secondary	6 (30.00)
	ii. Higher secondary	10 (50.00)
	iii. Graduation	4 (20.00)
3.	Occupation (No.)	
	a) Main	
	i. Farming	20
	b) Subsidiary	
	i. Service	2 (10.00)
	ii. No subsidiary occupation	18 (90.00)
	Total	20 (100.00)
4.	Size of family	
	a) Below 6 years	
	Male	0.15 (4.16)
	Female	0.25 (6.94)
	b) 6 to 14 years	
	Male	0.2 (5.55)
	Female	0.35 (9.72)
	c) 14 and above	
	Male	1.55 (43.05)
	Female	1.10 (30.55)
	d) Total	
	Male	1.9 (52.77)
	Female	1.7 (47.22)
	Total (Average size of family)	3.6 (100.00)

(Figures in the parentheses indicate percentage to total)

5.1.3 Occupation

The occupation of the pineapple tenant growers were categorized as main and subsidiary. It is observed from the table that all the sample tenant cultivators (100 per cent) had farming as the main occupation. The 10 per cent of the growers had service as subsidiary occupation and there was no subsidiary occupation for the remaining 90 per cent farmers.

5.1.4 Size of the family

Size of the family is a prime factor which influences the labour supply on farm and marketable surplus. The family size was divided into three classes, viz, below 6 years, 6-14 years, 14 years and above. It is observed from the table that the average size of family was 3.6, out of which 1.9 (52.77 per cent) were males and 1.7 (47.22 per cent) were females.

5.1.5 Operational holding and land utilization

The information about per farm operational holding and land use pattern of selected sample growers is presented in Table 5.2

Table 5.2: Per farm operational land leased in and land use pattern of tenant cultivators.

Sr. No	Particulars	Land leased (ha)
1. a)	Cultivated	
	i) Irrigated	6.57 (95.07)
	ii) Unirrigated	0.34 (4.93)
	Sub Total (a)	6.91 (100.00)
2. b)	Uncultivated	-
	Total (a + b)	6.91 (100.00)

(Figures in the parentheses indicates percentage to total)

It is seen from the Table 5.2 that average land leased in by tenant cultivators was 6.91 ha. Out of the average land leased in, area under irrigated crops was 6.57 ha (95.07 per cent) and 0.34 ha (4.93 per cent) constituted area under unirrigated crops. Since all the farmers were cultivating on leased in land, the uncultivated area was not observed. This indicated that there was 100 per cent land utilization in the case of selected tenant growers.

5.1.6 Cropping pattern of tenant growers

Cropping pattern is an important factor which influences the level of total annual expenses on the farm as well as returns from farm business. The cropping pattern of an area is highly influenced by the personal, social, cultural and economic factors of the farmers. The cropping pattern of sample farms are given in Table 5.3.

Table 5.3: Cropping pattern of tenant growers

Sr. No.	Particulars	Area (ha)
1.	Biannual/perennial	
	a) Pineapple	6.51 (94.21)
	b) Banana	0.06 (0.86)
	c) Cashew nut	0.15 (2.17)
	d) Rubber	0.19 (2.74)
2.	Gross cropped area	6.91 (100.00)
3.	Net cultivated area	6.91 (100.00)
4.	Cropping intensity (per cent)	100.00

(Figures in the parenthesis indicate percentage to gross cropped area)

It is seen from the Table 5.3 that the per farm gross cropped area was 6.91 ha. Out of the total gross cropped area, pineapple was the dominating crop which was under cultivation in an area of 6.51

ha (94.21%). An area of 0.06 ha (0.86%) was under banana cultivation. Perennial crops like cashew nut and rubber were cultivated on an area of 0.15 ha (2.17%) and 0.19 ha (2.74%). This indicated that ratoon and perennial crops were preferred by the tenant cultivators and no seasonal crops were cultivated on the selected farms. The net cultivated area was calculated to be the same as gross cropped area which was 6.91 ha. Therefore the cropping intensity of the selected farms was estimated to be 100.00 per cent. But this figure of cropping intensity does not give a clear picture of the cropping pattern.

5.1.7 Per farm investment in farm assets

An account of farm assets possessed, gives a broad view on the financial status of the farmers. The farm assets owned by the selected pineapple growers included farm buildings [farm house, engine shed and godown], irrigation structures, solar fence, implements, machinery and hand tools. The investment on farm assets is given in the Table 5.4.

Table 5.4: Per farm investment in farm assets

(Figures in ₹)

Sl. No.	Particulars	Overall (20)
1.	Solar fence	497625 (58.47)
2.	Irrigation structure	180072 (21.16)
3.	Buildings [Farm house + engine shed + godown]	140950 (16.56)
4.	Implements, machinery and hand tools	32327 (3.79)
	Total investment	850974 (100.00)

(Figures in the parentheses indicate percentages to total)

It is observed from the Table 5.4 that the total investment in farm assets was ₹ 850974. Out of the total investment, the share of

solar fencing was maximum (58.47%) followed by irrigation structure (21.16%) and buildings (16.56%). The least share contributed by implements, machinery and hand tools to the total farm assets was found to be 3.79 per cent.

5.2 Resource use pattern:

5.2.1 Input utilization

The details regarding per hectare operation wise labour utilization and per hectare physical input utilization for I, II and III year are discussed below.

5.2.2 Labour use pattern

The pineapple cultivation is labour intensive. The extent of human labour availability to the cultivators is one of the important factors which determine the profitable production of pineapple in the farms. The details on per hectare operation wise human labour utilized for pineapple cultivation in first, second and third years are presented in the Tables 5.5, 5.6 and 5.7.

It is seen from the Table 5.5 that the per hectare total human labour days used for cultivation of pineapple in first year was 329.15 of which the major component of labour use was the weeding operation i.e. 59.82 human days (18.17%). This was followed by labour days, for planting 48.63 (14.77%), harvesting 36.48 (11.10%), fertilizer application 25.97 (7.89%), irrigation 25.67 (7.79%), mulching 25.14 (7.63%), manuring 22.67 (6.88%), digging 20.09 (6.10%), hormonal application 15.82 (4.81%), 14.47 (4.39%) for treatment of suckers, transporting 12.91 (3.92%), plant protection 12.15 (3.69%). The least share of labour use was in the case of construction of solar fence i.e. 9.33 labour days (2.83%). In case of land preparation 31.78 machine hrs was used. Out of the

total labour days, family labour constituted 6.14 per cent and the remaining 93.84 per cent were hired labour.

Table 5.5: Per hectare operation wise labour utilized for pineapple cultivation in first year

Sr. No.	Operations	Human labour (days)						Total human labour (days)	Total machine Labour (Hrs.)
		Family labour		Hired labour		Total			
		M	F	M	F	M	F		
1.	Land preparation	-	-	-	-	-	-	-	31.78
2.	Digging	-	-	18.45	1.64	18.45	1.64	20.09 (6.10)	
3.	Fencing	-	-	9.33	-	9.33	-	9.33 (2.83)	
4.	Treatment of suckers	-	-	9.21	5.26	9.21	5.26	14.47 (4.39)	
5.	Planting			37.42	11.21	37.42	11.21	48.63 (14.77)	
6.	Fertilizer application	3.77	-	14.95	7.25	18.72	7.25	25.97 (7.89)	
7.	Manuring	3.24	-	10.49	8.94	13.73	8.94	22.67 (6.88)	
8.	Irrigation	4.3	-	15.79	5.58	20.09	5.58	25.67 (7.79)	
9.	Mulching	2.88	-	11.28	10.98	14.16	10.98	25.14 (7.63)	
10.	Weeding	-	-	22.3	37.52	22.3	37.52	59.82 (18.17)	
11.	Plant protection	-	-	12.15	-	12.15	-	12.15 (3.69)	
12.	Hormonal application	1.85	-	13.97	-	13.97	-	15.82 (4.81)	
13.	Harvesting	4.2	-	13.35	18.93	17.55	18.93	36.48 (11.10)	
14.	Transporting	-	-	7.29	5.62	7.29	5.62	12.91 (3.92)	
	Total	20.24 (6.14)	-	184.81 (56.14)	124.10 (37.70)	205.05 (62.29)	124.10 (37.70)	329.15 (100.00)	31.78

(Figures in parentheses indicate percentage to total labour consumed)

5.2.3 Per hectare operation wise human labour utilized for pineapple cultivation in second year

Table 5.6 represents the operation wise human labour utilized for pineapple cultivation in second year. It is observed from the table that as in the first year the labour used for weeding 64.13 labour

days (25.07%) was the major segment in second year also. The second major activity of labour use was in harvesting operation, 36.91 labour days (14.42%) followed by earthing up 9.92 (25.4%), irrigation 25.10 (9.81%), mulching 23.89 (9.33%) and fertilizer application 19.8 (7.74%) respectively.

Table 5.6: Per hectare operation wise labour utilized for pineapple cultivation in second year

Sr. No.	Operations	Human labour (days)						Total human labour (days)
		Family labour		Hired labour		Total		
		M	F	M	F	M	F	
1.	Ratooning	2.55	-	11.16	5.66	13.71	5.66	19.37 (7.57)
2.	Earthing up	2.48	-	15.79	7.13	18.27	7.13	25.4 (9.92)
3.	Fertilizer application	3.1	-	9.94	6.76	13.04	6.76	19.8 (7.74)
4.	Irrigation	3.17	-	18.28	3.65	21.45	3.65	25.10 (9.81)
5.	Mulching	2.8	-	11.27	9.82	14.07	9.82	23.89 (9.33)
6.	Weeding	-	-	27.4	36.73	27.4	36.73	64.13 (25.07)
7.	Plant protection	-	-	11.82	-	11.82	-	11.82 (4.62)
8.	Hormonal application	2.15	-	14.71	-	16.86	-	16.86 (6.59)
9.	Harvesting	4.1	-	14.24	18.57	18.34	18.57	36.91 (14.42)
10.	Transporting	-	-	6.52	5.86	6.52	5.86	12.38 (4.83)
	Total	20.49 (8.01)	-	141.13 (55.17)	94.18 (36.81)	161.62 (63.18)	94.18 (36.81)	255.8 (100.00)

(Figures in the parentheses indicate percentage to total labour consumed)

For hormonal application and transporting, 16.86 (6.59%) and 12.38 (4.83%) labour days were utilized respectively. The least labour use was in plant protection operation i.e. 11.82 labour days (4.62%). An average of 255.80 labour days were utilized in second year, out of which 20.49 (8.01%) was of family labour and remaining 235.31 days (91.99%) were constituted by hired labour.

Table 5.7: Per hectare operation wise labour utilized for Pineapple cultivation in third year

Sr. No.	Operations	Human labour (days)						Total human labour (days)
		Family labour		Hired labour		Total		
		M	F	M	F	M	F	
1.	Ratooning	2.73	-	11.15	5.33	13.88	5.33	19.21 (8.89)
2.	Earthing up	2.95	-	16.19	7.44	19.14	7.44	26.58 (12.31)
3.	Fertilizer application	2.34	-	10.83	6.76	13.17	6.76	19.93 (9.22)
4.	Irrigation	2.91	-	9.39	3.13	12.30	3.13	15.43 (7.14)
5.	Weeding	-	-	19.8	39.6	19.8	39.6	59.4 (27.51)
6.	Plant protection	-	-	10.97	-	10.97	-	10.97 (5.07)
7.	Hormonal application	1.65	-	14.24	-	15.89	-	15.89 (7.35)
8.	Harvesting	3.12	-	13.92	17.97	17.04	17.97	35.01 (16.21)
9.	Transporting	-	-	7.77	5.76	7.77	5.76	13.53 (6.26)
	Total	15.70 (7.27)	-	114.26 (52.91)	85.99 (39.81)	129.96 (60.18)	85.99 (39.81)	215.95 (100.00)

(Figures in the parentheses indicate percentage to total labour consumed)

It is seen from the Table 5.7 that the human labour used for weeding 59.4 labour days (27.51%) constituted the major share in total labour use in third year also. The labour use observed in other operations were harvesting 35.01 (16.21%), earthing up 26.58 (12.31%), fertilizer application 19.93 (9.22%), ratooning 19.21 (8.89%), hormonal application 15.89 (7.35%), irrigation 15.43 (7.14%), transporting 13.53 (6.26%) and plant protection 10.97 (5.07%). The total human labour use in third year was 215.95, out of which 15.70 days (7.27%) were supplied by family and 200.25 days (82.73%) by hired labour.

The labour use pattern indicates that in first, second and third year labour used for weeding were constituted the major segment in total labour use, about 18.17 per cent in first year, 25.07 per cent

in second year and 27.51 per cent in third year. Other major labour oriented operations were planting 14.77 per cent in first year, earthing up 9.92 per cent and 12.31 per cent in second and third year and harvesting 11.10 per cent, 14.42 per cent and 16.21 per cent in all the three years respectively.

5.2.4 Per hectare physical input utilization

Apart from labour, many other physical inputs are also utilized in pineapple cultivation. The per hectare physical input utilization on pineapple farms for the first, second and third years are presented in Table 5.8.

It is observed from the Table 5.8 that the total labour days utilized for first, second and third years was 800.90 out of which 744.47 days were found to be of hired labour and remaining 56.43 days were of family labour. The total machine hours utilized was 31.78 and total number of suckers planted were 19074. These two inputs were utilized at the time of establishment of pineapple farms. As regards other inputs, 19.46 tonnes of manure was used particularly in first year. A total of 1387.61 kg, 329.06 kg and 1348.38 kg of N, P₂O₅ and K₂O fertilizers were used for the three years. For plant protection, 7.1kg of fungicides and 9.05 kg of weedicides were used. The per hectare growth regulator use was 0.95 litre. The electricity and irrigation charges amounted to ₹ 8413 and ₹ 3576 for the three years

Table 5.8: Per hectare physical input utilization for pineapple cultivation in first, second and third year.

Sr. No.	Particulars	1st year	2nd year	3rd year	Total
1.	Hired labour (days)				
	Male	184.81	141.13	114.26	440.20
	Female	124.10	94.18	85.99	304.27
	Total	308.91	235.31	200.25	744.47
2.	Family labour (days)				
	Male	20.24	20.49	15.70	56.43
	Female	-	-	-	-
	Total	20.24	20.49	15.70	56.43
3.	Total labour (days)				
	Male	205.05	161.62	129.96	496.63
	Female	124.10	94.18	85.99	304.27
	Total	329.15	255.80	215.95	800.90
4.	Machine power (hrs)	31.78	-	-	31.78
5.	Suckers (No)	19074	-	-	19074
6.	Manures (tonnes)	19.46	-	-	19.46
7.	Fertilizer (kg.)				
	a) N	574.63	548.25	264.73	1387.61
	b) P ₂ O ₅	109.49	132.33	87.24	329.06
	c) K ₂ O	535.42	529.67	283.29	1348.38
8.	Fungicides (kg.)	2.91	2.40	1.79	7.1
9.	Weedicides (kg)	3.26	3.12	2.67	9.05
10.	Growth regulators (ltr)	0.28	0.32	0.35	0.95
11.	Irrigation charges (₹)	2716	2967	2730	8413
12.	Electricity charges (₹)	1266	1205	1105	3576

Considering year wise, in the first year 308.91 days were found to be of hired labour and 20.24 days were of family labour. Out of the total hired labour days, 184.81 and 124.10 days were found to be of male and female. Since the tenant cultivators were staying without family in the study area, there was no female labour participation and therefore the total family labour was constituted by male only. In first year the per hectare N, P₂O₅ and K₂O used

was 574.63 kg, 109.49 kg and 535.42 kg followed by 548.25 kg, 132.33 kg and 529.67 kg in second year, 264.73 kg, 87.24 kg and 283.29 kg in third year. An average of 2.91 kg, 2.40 kg, 1.79 kg fungicides and 3.26 kg, 3.12 kg, 2.67 kg weedicides were utilized for first, second and third years respectively. The usage of growth regulator varied as 0.28 litre in first year, 0.32 litre in second year and 0.35 litre in third year.

While comparing level of input utilization in the three years, it can be concluded that inputs like suckers and manures were used lesser than the recommended level. While in case of fertilizers, there was over utilization in first and second years while the usage was comparatively lesser in the third year. Fungicides and weedicides were also used slightly higher than the recommended dosage. The growth regulator application was in par with the recommendation. Since in second and third year, the fruit bearing is from ratoon of original plant, there was no further planting material utilization in the above years.

The per hectare human labour use was decreased in second and third year compared to first year since many labour intensive farm establishment operations were required in the first year. Overall per hectare labour utilization was seemed to be higher for sample farms.

5.3 Per hectare cost of cultivation of pineapple

The year wise per hectare cost of cultivation of pineapple is given in Table 5.9

It is observed from the Table 5.9 that the total cost of cultivation, Cost C₃ for the first, second and third year was worked out to be ₹ 588220. The Cost C₃ was found to be maximum in first year (₹ 323495), than in second year (₹ 145347) and third (₹

119378) year respectively. The Cost C_3 (₹ 323495) in first year indicated the high value of expenditure incurred for establishment of pineapple farms. The Cost C_2 for the three years was worked out to ₹ 548847, out of which the maximum cost was found in first year ₹ 299770 and comparatively lesser in second and third years i.e. ₹ 136448 and ₹112629. The proportion of Cost B_2 for the three years was worked out to ₹ 530395, of which Cost B_2 in first, second and third years were ₹ 293151, ₹129748 and ₹ 107496 respectively. The proportion of Cost A_2 was worked out to ₹ 477967 in total, out of which a cost of ₹ 266867, ₹ 116676 and ₹ 94424 were found to be in first, second and third years respectively. It is indicated from the Table 5.9 that, for the three years, the item wise maximum cost was incurred on hired labour (34.41%), followed by cost of suckers (12.97%), cost of fertilizers (6.37%), cost of machine hours (4.95%) and cost of manures (3.96%). The per cent of cost of other inputs on total cost of cultivation were, plant protection chemicals (1.99%), irrigation charges (1.43%), electricity charges (0.61%) and growth regulatory hormone (0.21%). The proportion of cost of these inputs were found to be comparatively lesser to the total cost. The per cent share of family human labour for the three years was 3.13 per cent. In the item wise cost of cultivation, maximum cost for N (2.64%), P_2O_5 (1.09%) and K_2O (6.55%) were found to be in second year compared to first and third years. This is attributed to high yield expectations of farmers in the first ratoon. The maximum cost for plant protection chemicals (2.80%) were also in second year with respect to first year (1.33%) and third year (2.77%). In Cost A_2 for the three years, depreciation of implements, machinery, farm buildings and solar fencing accounted to 4.77 per cent. The per cent share on interest on working capital was 5.33 per cent and the rent paid for leased in land was about 4.20 per cent.

The high value of depreciation is attributed to the high cost of solar fencing in farms. The interest on fixed capital for the first year was higher since the cost of labour (machine and human labour) for establishment operations like land preparation, planting, digging, fencing were also included along with the cost of suckers and value of fixed assets of the cultivators. For second and third year, the value of fixed assets used in the farms were alone considered.

It is evident from the Table 5.9 that Cost A₂, Cost B₂, Cost C₂ and Cost C₃ were found to be higher in first year and comparatively lesser in second and third years. This was due to the labour intensive establishment operations and higher input usage in first year. The cost per quintal was worked out to be ₹1223 in first year which was higher than second year (₹ 224) and third year (₹ 220). This was due to the absence of by-produce (suckers) in the first year. The overall per quintal cost was worked to be ₹ 579.

The average yield of the pineapple in first year was 264.40 q, followed by 286.93 q and 191.01 q in second and third years. The total yield for the three years was 742.34 q. The yield was observed to be higher in the ratoon harvest in second year when compared to the yield obtained in first year and third year. The total number of by-produce was 79198 and the total returns was worked out to be ₹1581731 for the three years.

Table 5.9: Per hectare cost of cultivation of pineapple for first, second and third year. (Figures in ₹)

Sr. No.	Particulars	1 st year	2 nd year	3 rd year	Total
1.	Hired labour				
	a) Male	60433 (18.68)	46149 (31.75)	33776 (28.29)	140358 (23.86)
	b) Female	25316 (7.82)	19213 (13.21)	17542 (14.69)	62071 (10.55)
	Total	85749 (26.50)	65362 (44.96)	51318 (42.98)	202429 (34.41)
2.	Machine hrs.	29174 (9.01)	-	-	29174 (4.95)
3.	Suckers	76296 (23.58)	-	-	76296 (12.97)
4.	Manures	23352 (7.21)	-	-	23352 (3.96)
5.	Fertilizers				
	a) N	3161 (0.97)	3838 (2.64)	1853 (1.55)	8852 (1.50)
	b) P ₂ O ₅	1204 (0.37)	1588 (1.09)	1047 (0.87)	3839 (0.65)
	c) K ₂ O	9638 (2.97)	9534 (6.55)	5666 (4.74)	24838 (4.22)
6.	Plant protection chemicals	4320 (1.33)	4074 (2.80)	3312 (2.77)	11706 (1.99)
7.	Growth regulatory hormones	373 (0.11)	426 (0.29)	465 (0.38)	1264 (0.21)
8.	Irrigation charges	2716 (0.83)	2967 (2.04)	2730 (2.28)	8413 (1.43)
9.	Electricity charges	1266 (0.39)	1205 (0.82)	1105 (0.92)	3576 (0.61)
	Input cost	237249 (73.33)	88994 (61.22)	67496 (56.53)	393739 (66.93)
10.	Depreciation on machinery and implements	9365 (2.89)	9365 (6.44)	9365 (7.84)	28095 (4.77)
11.	Interest on working capital @ 12 per cent.	12615 (3.89)	10679 (7.34)	8099 (6.78)	31393 (5.33)
12.	Rent paid for leased in land	7638 (2.36)	7638 (5.25)	9464 (7.92)	24740 (4.20)
	Cost A₂	266867 (82.49)	116676 (80.27)	94424 (6.78)	477967 (81.25)
13.	Interest on fixed capital @ 10 per cent	26284 (8.12)	13072 (8.99)	13072 (10.94)	52428 (8.91)
	Cost B₂	293151 (90.62)	129748 (89.26)	107496 (90.04)	530395 (90.16)
14.	Family human labour				
	Male	6619 (2.04)	6700 (4.60)	5133 (4.30)	18452 (3.13)

	Female	-	-	-	-
	Cost C₂	299770 (92.66)	136448 (93.87)	112629 (94.34)	548847 (93.30)
15.	Supervision charges	23725 (7.33)	8899 (6.12)	6749 (5.65)	39373 (6.69)
	Cost C₃	323495 (100.00)	145347 (100.00)	119378 (100.00)	588220 (100.00)
16.	Per quintal cost	1223	224	220	579
17.	Yield				
	a) Main produce (q)	264.40	286.93	191.01	742.34
	b) By-produce (No)	-	40513	38685	79198
18.	Total returns (₹)				
	a) Main produce	462700	559514	401121	1423335
	b) By-produce	-	81026	77370	158396
	Total	462700	640540	478491	1581731

(Figures in the parentheses indicate percentage to cost C₃)

5.3.1 Per hectare profitability of pineapple cultivation

The selected tenant pineapple growers of the present study attained the first crop yield in the eleventh month after planting. The reason for the same was due to the climate and soil characteristics of the study area which favoured early maturation of the crop along with proper cultivation practices followed by the pineapple tenant growers. The year wise per hectare profitability of pineapple is given in Table 5.10.

It is seen from the Table 5.10 that the gross returns in the first year was ₹ 462700. There was a steep rise to a gross return of ₹ 640540 in the second year followed by a reduced return of ₹ 478491 in the third year. The total gross return was amounted to be ₹ 1581731. The total net returns at Cost A₂ was ₹1103764, Cost B₂ was ₹ 1051336, Cost C₂ ₹ 1032884 and Cost C₃ ₹ 993511 for the three years. The net returns at Cost C₃ was ₹139205 in first year, ₹ 495193 in second year and ₹ 359113 in third year. The net returns were found to be higher in second and third years due to the lesser cost incurred in the above years. The benefit-cost ratio was worked out to be 1.43 in first year, 4.41 in second year and

4.00 in the third year. The overall benefit-cost ratio was 2.68. The first and second ratoon enabled the cultivators to attain higher returns when compared to the first year production.

The analysis of profitability indicated that pineapple cultivation was highly profitable for the farmers at all costs i.e. at Cost A₂, Cost B₂, Cost C₂ and Cost C₃ in all the three years particularly in second and third year. The high consumer demand and good quality of produce favoured the farmers in securing better price for the fruits throughout the production period. The above results give a true picture on the profitability of horticultural fruit production and marketing.

Table 5.10: Per hectare profitability of pineapple cultivation

(Figures in ₹)

Sr. No.	Particulars	1 st year	2 nd year	3 rd year	Total
1.	Gross returns	462700	640540	478491	1581731
2.	Costs				
	a) Cost A ₂	266867	116676	94424	477967
	b) Cost B ₂	293151	129748	107496	530395
	c) Cost C ₂	299770	136448	112629	548847
	d) Cost C ₃	323495	145347	119378	588220
3.	Net returns				
	a) Cost A ₂	195833	523864	384067	1103764
	b) Cost B ₂	169549	510792	370995	1051336
	c) Cost C ₂	162930	504092	365862	1032884
	d) Cost C ₃	139205	495193	359113	993511
4.	Benefit-cost ratio	1.43	4.41	4.00	
5.	Overall Benefit-cost ratio	2.68			

5.4 Farm business analysis

Table 5.11 presents the various income measures computed on per hectare basis for ascertaining the profitability of pineapple cultivation in the three years. For the three years, gross income

from main produce and by-produce was ₹1423335 and ₹158396. The total gross income amounted to ₹ 1581731. The farm business income in first year was ₹195833, ₹ 523864 in second year and ₹ 384067 in third year. The total farm business income amounted to ₹1103764. The farm investment income was calculated as ₹189214, ₹517164 and ₹ 378934 in first, second and three years. The family labour income was worked out to be ₹169549, ₹ 510792 and ₹ 370995 in the three years respectively. The net income for first year was ₹139205, ₹495193 in second year and ₹ 359113 in third year. The total net income was amounted to ₹ 993511.

Table 5.11: Per hectare farm business analysis

(Figures in ₹)

Sr. No.	Particulars	1 st year	2 nd year	3 rd year	Total
A.	Gross income-main produce	462700	559514	401121	1423335
B.	Gross income-by-produce	-	81026	77370	158396
	Total	462700	640540	478491	1581731
1.	Farm business income	195833	523864	384067	1103764
2.	Farm investment income	189214	517164	378934	1085312
3.	Family labour income	169549	510792	370995	1051336
4.	Net income	139205	495193	359113	993511

It is evident that the four measures of income showed a rising trend in second and third year with respect to first year. This was mainly due to the absence of farm establishment operations especially land preparation, digging and planting in second and third years. The four income measures attained maximum values in second year. This was due to the higher yield procured from first ratoon and better market price availed by farmers. The above farm

business analysis proved the higher profitability of pineapple growers.

5.5 Disposal pattern of produce

To know the final quantity of farm produce marketed after meeting other requirements of the farmer, the per hectare disposal pattern for the three years were studied and the results of the same are presented in the Table 5.12.

Table 5.12: Per hectare disposal pattern of pineapple and suckers.

Sr. No.	Particulars	1 st year	2 nd year		3 rd year	
		Pineapple (q)	Pineapple (q)	Sucker (No)	Pineapple (q)	Sucker (No)
1.	Total quantity produced	264.40 (100.00)	286.93 (100.00)	40513 (100.00)	191.01 (100.00)	38685 (100.00)
2.	Disposal					
	a) Family consumption	0.09 (0.03)	0.14 (0.04)	-	0.20 (0.10)	-
	b) Gift to relatives and friends	0.41 (0.15)	0.80 (0.27)	-	1.01 (0.52)	-
	c) Wages in kinds	0.71 (0.26)	1.31 (0.45)	-	1.39 (0.72)	-
	d) Losses in the farm	1.93 (0.72)	1.87 (0.65)	-	2.07 (1.08)	-
	e) Retention of suckers as ratoon	-	-	19074 (47.08)	-	-
	f) Suckers of poor quality	-	-	860 (2.12)	-	1780 (4.60)
	g) Marketable surplus	261.26 (98.81)	282.81 (98.56)	20579 (50.79)	186.34 (97.55)	36905 (95.39)
	Total	264.40 (100.00)	286.93 (100.00)	40513 (100.00)	191.01 (100.00)	38685 (100.00)

(Figures in the parentheses indicate percentages to total)

Table 5.12 depicts that the total quantity of pineapple produced in the first year was 264.40 q. Out of the total produce, a negligible quantity was used for family consumption (0.03%), gifts (0.15%), wages in kinds (0.26%). The post harvest losses in farm was 1.93 q (0.72%). The final quantity sold was 261.26 q (98.81%).

In second year, there was production of suckers from the mother plant. The total quantity of pineapple and suckers produced were 286.93 q and 40513 numbers. Similar to first year, the quantity used for family consumption and others were less. Out of the total number of suckers produced, 47.08 per cent were used in farm as ratoon and 2.12 per cent of them were discarded due to poor quality. The quantity of pineapple sold was 282.81q (98.56%) and 20579 (50.79%) number of suckers were sold. In the third year total quantity of pineapple and number of suckers produced were 191.1 q and 38685. The post harvest losses of pineapple was 2.07 q which was comparatively higher than the previous years. An average of 4.6% suckers were removed due to poor quality. The final quantity of pineapple sold was 186.34 q (97.55%) and 36905 suckers (95.39%). The above analysis indicates that the marketable surplus for the produce is higher in all the three years which is a major reason for the profitability of pineapple growers in the study area.

5.5.1 Grading of pineapple

The grading of pineapple fruits were done on the basis of weight of the fruits. Grade A (>1 kg), Grade B (700gm-1 kg) and Grade C (<700 gm). The information regarding quantity of fruits graded in each year based on above grading strategy are presented in Table 5.13.

It is seen that, in the first year, out of the total produce harvested, 216.84 q (82.9 %) were of Grade A, 28.74 q (11%) were of Grade B and 15.68 q (6.01 %) were of Grade C. In second year an average of 250.28 q (88.49%) of pineapples were of Grade A, 20.07 q (7.10%) Grade B and 12.16 q (4.29%) Grade C. In the third year, 143.48 q of total produce were of Grade A, followed by Grade B 28.88 q (15.51%) and Grade C 13.97 q (7.49). It can be concluded

that, more than 75 per cent of the total produce harvested were of Grade A.

Table 5.13: Per hectare grade wise fruits harvested.

Sr. No.	Grade	I year	II year	III year
		Weight in (q)	Weight in (q)	Weight in (q)
1.	Grade A (>1 kg)	216.84 (82.9)	250.28 (88.49)	143.48 (77.00)
2.	Grade B (700 gm-1 kg)	28.74 (11.00)	20.07 (7.10)	28.88 (15.51)
3.	Grade C (< 700 gm)	15.68 (6.01)	12.16 (4.29)	13.97 (7.49)
	Total	261.26	282.81	186.34

(Figures in the parentheses indicate percentages to total)

5.5.2 Agency wise mode of disposal

The agency wise disposal of pineapple fruits were studied and the results of first year are given in Table 5.14

Table 5.14: Agency wise mode of disposal of pineapple fruits in first year.

Sr. No.	Mode of disposal	No. of farmers	Qty. sold (q)	Price per kg (₹)
1.	Wholesaler	14 (70)	176.88 (67.70)	17
2.	Commission agent	6 (30)	84.38 (32.29)	18
	Total	20 (100.00)	261.26 (100.00)	

(Figures in the parentheses indicate percentages to total)

In the first year 70 per cent of the farmers sold 182.88 q (69.99) per cent of the produce through wholesaler at a price of ₹17

per kg. Remaining 30 per cent sold 78.38 q (30%) through commission agent at a price of ₹ 18 per kg.

Table 5.15: Agency wise mode of disposal of pineapple fruits in second year.

Sr. No.	Mode of disposal	No. of farmers	Qty sold (q)	Price per kg (₹)
1.	Wholesaler	12 (60)	165.68 (58.58)	19.5
2.	Commission agent	5 (25)	71.53 (25.29)	19
3.	Retailer	3 (15)	45.60 (16.12)	20
	Total	20 (100.00)	282.81 (100.00)	

(Figures in the parentheses indicate percentages to total)

From the Table 5.14 it is observed that in second year there were three modes of disposal i.e. wholesaler, commission agent and retailer. As in first year majority (60%) of the farmers sold their produce to wholesaler followed by (25%) to commission agent. Remaining (15%) of the total sample farmers preferred retailer for disposal. The maximum price per kg was offered by the retailer (₹ 20) among the three agencies.

Table 5.16: Agency wise mode of disposal of pineapple fruits in third year.

Sr. No.	Mode of disposal	No. of farmers	Qty sold (q)	Price per kg (₹)
1.	Wholesaler	12 (60)	115.80 (62.14)	20
2.	Commission agent	6 (30)	50.91 (27.32)	21
3.	Retailer	2 (10)	19.63 (10.53)	23
	Total	20 (100.00)	186.34 (100.00)	

(Figures in the parentheses indicate percentages to total)

In the third year, 60 per cent of the farmers marketed the produce (115.80 q) to wholesaler. The commission agent agency was preferred by 30 per cent of the farmers and only 10 per cent marketed the produce to retailer. The price given by retailer (₹ 23) was higher than that of wholesaler (₹ 20) and commission agent (₹ 21).

5.5.3 Marketing channels

The agency wise mode of disposal provided a picture on the existing marketing channels in the study area. The three channels identified for the marketing of pineapple from producers to consumers were,

Channel 1 : Producer → wholesaler → retailer → consumer.

Channel 2 : Producer → commission agent → wholesaler → retailer → consumer.

Channel 3: Producer → retailer → consumer.

5.6 Constraints in production and disposal of pineapple

The pineapple tenant growers in the study area expressed the constraints faced by them in production as well as disposal of the pineapple fruits. The information pertaining to the problem faced by them are presented in Table 5.17.

A. Constraints in production

The problem of high cost of planting material was the major constraint faced by 75 per cent of the pineapple tenant growers. Since the planting materials were availed from Kerala, the cost per sucker varied from ₹ 4 to ₹ 5 due to high transportation cost.

Non availability of hired labour was another constraint reported by 65 per cent of the respondents. They opined that

labour availability was not at par with the actual labour requirement.

The problem of high cost of fertilizers especially that of mixed fertilizers were reported by 50 per cent of the tenants. About 40 per cent of them faced the problem of non availability of water for irrigation during the months of March, April and May. This problem was experienced by the cultivators only in the summer period.

Non availability of quality suckers in the study area was another constraint faced by 35 per cent of the respondents. It is also observed from the table that 30 per cent of the tenant cultivators experienced the problem of lack of technical know how. They reported that they lack scientific knowledge and the cultivation was done according to the methods and practices followed by other leading farmers in the study area.

About 25 per cent, faced the problem of attack from animals This constraint was in the case of those cultivators who lacked solar fencing in their field due to its high cost.

B. Constraints in disposal

Majority of pineapple tenant cultivators (95%) in the study area expressed that wide fluctuation of prices in market hindered their profitability in certain seasons. The price per kg of a fruit varied from an average of ₹ 15 to ₹ 25 and the price was reported to be at the bottom during glut in the market.

Improper weighment of the produce was another problem indicated by 60 per cent of the cultivators. The reason for the same is attributed to the involvement of unskilled labour hired by market intermediaries as well owner farmers for weighment and grading.

About 45 per cent pointed out the problem of post harvest losses at farm level which occurred mainly due to the perishable nature of the pineapple fruits.

Table 5.17: Constraints in production and disposal of pineapple

Sr. No.	Constraints	Number of growers (N=20)
A.	Constraints in production	
1.	High cost of planting material	15 (75)
2.	Non availability of hired labour	13 (65)
3.	High cost of fertilizers	10 (50)
4.	Non availability of water for irrigation	8 (40)
5.	Non availability of quality suckers	7 (35)
6.	Lack of technical know how	6 (30)
7.	Attack from animals	5 (25)
B.	Constraints in disposal	
1.	Fluctuation in market price	19 (95)
2.	Improper weighment of produce	12 (60)
3.	Post harvest losses at farm level.	9 (45)



INTRODUCTION



REVIEW

OF



**SOCIO- ECONOMIC
BACKGROUND OF
STUDY**



METHODOLOGY



RESULTS

AND



SUMMARY

AND

CONCLUSIONS



APPENDICES



LITERATURE

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CHAPTER III

SOCIO-ECONOMIC BACKGROUND OF DODAMARG TAHSIL

The environmental and socio-economic factors of a study area play a key role in the development of agriculture in that region. Therefore it is necessary to focus on the physical and socio-economic factors to understand the agricultural scenario of the particular research area. The present study was conducted in Dodamarg tahsil of Sindhudurg district. A brief account of geophysical and socio-economic conditions prevailing in Dodamarg tahsil is given in this chapter.

3.1 Location

Dodamarg is the smallest tahsil in Sawantwadi Subdivision of Sindhudurg district. It lies in between 15° 37' North latitude and 73° 19' East longitude. The total area of tahsil is 49573 ha.

3.2 Boundaries

Dodamarg is surrounded by the Goa state to the South, Arabian Sea to the West and Sahyadri ranges to the East.

3.3 Topography

Dodamarg is basically a hilly region broken by valleys and surrounded by mountains. Ridges and hills are common occurrences in the region which belong to the Sahyadri hill range to the East and Goa state to the South. The tahsil has three major physiographic divisions from East to West: (i) The eastern part close to the Western Ghats is hilly with deep valleys. (ii) The middle part of the tahsil is occupied by flat-topped hills with undulating plateau and elevations upto 300 meters above mean sea level (MSL) covered by laterite soil. (iii) The physiographic features have given rise to five characteristic landforms viz. (a) The estuarine alluvial plains

(b) The lateritic plateau 27 (c) Highly eroded remnant hills (d) Scarp faces of Sahyadri hill ranges (e) The drainage system of the major rivers in the tahsil is mostly of sub-parallel type and the tributaries form a drainage pattern of sub rectangular type Major joints in the basalt rock.

The main rivers flowing across the tahsil are the Terekhol, the Kalana and Tilari. These rivers flow along the east- west direction and form southern border of the tahsil.

3.4 Soils

The soil of the tahsil is of good quality. The soil is red and yellow in colour and there is existence of modular pieces of iron and manganese ore. Soil of Dodamarg can be classified into three categories i.e. alluvial soil, saline soil, and lateritic soils. The soil formation in the tahsil is controlled mainly by climate. Most of the soils are derived from lateritic rocks.

3.5 Climate

The climate of this tahsil is generally moist and humid. The tahsil falls under the 'Assured and High Rainfall Zone'. The cold season is from December to February followed by summer from March to May. June to September is the period of southwest monsoon, while October and November constitute the post-monsoon season. During summer the maximum temperature goes up to 40°C. During winter the average minimum temperature recorded is as low as 12°C. The relative humidity during the southwest monsoon is very high (86 to 90%). The relative humidity during winter and summer months is above 57%.

3.6 Rainfall

The monsoon bursts over the entire tahsil generally at the beginning of the June and the rain continues with little intermission

till about the middle of October. Rainfall increases rapidly from the coast towards Western Ghats on the eastern border of the tahsil and in and around the Ghats, rainfall is very heavy. Practically the entire annual rainfall occurs during the months from June to October. Dodamarg witnesses 3287 mm average rainfall for four months June, July, August, and September.

3.7 Area and Population

The area of Dodamarg tahsil is 49573 hectares out of which 15722 hectares of land is under agriculture and in that rice is the main crop, along with coconut, fruits, vegetables and ground nut. The tahsil has 64 villages. The total number of households were 11805 (rural). Total population of the tahsil was 50,032, out of which male and female population were 24353 and 25679 respectively. Sex ratio of girls in tahsil per 1000 boys was recorded 1054. The total number of literate persons were 36589, which constitutes (73.13%) of total population. [Source: District Census Handbook Sindhudurg District-2011].

3.8 Land utilization

Information of land use is important for planning and management of the activities in the study area. The land use gives idea about the multifaceted use of land and misuse of land as well as development process of the study area. The natural, social, cultural, historical, economical and potential factors play a great role in the land use pattern of the study area. The details of land use pattern are given below,

Table 3.1: Land utilization pattern of Dodamarg tahsil (2013-14)

Sr. No.	Land use	Area (ha)	Percentage
1	Cultivated area	15722	34.9
2	Uncultivated area	9151	20.31
3	Forest area	2901	8.66
4	Other area	16378	36.13
	Total	45053	100

(Source: Tahsil Office Dodamarg)

It is seen from the table 3.1 that, total geographic area of tahsil is 45053 ha, of which 34.9 per cent of the area is cultivated land. The proportion of uncultivated area is about 20.31 per cent. The area under forest is only 8.66 per cent. Remaining 36.13 per cent of the total area is used for other purposes.

Table 3.2: Cropping pattern of Dodamarg tahsil (2013-14)

Sr. No.	Crops	Area (ha)	Percentage
1	Rice	10000	63.6
2	Coconut	667	4.2
3	Rubber	1179.99	7.5
3	Fruits	3751	23.8
4	Spices	123	0.078
5	Ground nut	0.18	0.001
6	Vegetables	0.83	0.0052
	Total	15722	100

(Source: Tahsil Office Dodamarg)

Rice is the main crop in Dodamarg tahsil and the area under rice is about 10,000 hectares (63.6%), followed by cash crops like coconut (4.2%), Rubber (7.5%) fruit crops (23.8%), spices (0.078%) The production of vegetables has started recently which is around (0.0052%).

3.9.1 Plantation crops

Coconut and Betelnut trees are main cash crops in the tahsil. Betel nut is also called as *pophali*. Betel nut is grown at Kudase, Kumbra, Shirval, Kalane, Zolambe, and Bhikekonal.

3.9.2 Cashew nut

Dodamarg is famous for cashew nuts. Government provides 100% subsidies to cashew products and hence export has increased. Matane, Mangeli Kudase areas are famous places for the cashewnut plantations.

3.9.3 Banana

During past few years, people of Kerala acquired land on lease and started large scale plantation of banana. Other farmers also started cultivation of banana, and now it is one of the main crop of tahsil.

3.9.4 Pineapple

Since last 7 years, people from Kerala after understanding about land, water, and environment of this area, started plantation of pineapples along with banana. Now pineapple is one of the main crop of the area.

3.9.5 Rubber

The area is suitable for Rubber plantation and since seven years people from Kerala are carrying out production of rubber in this region.

3.10 Livestock

Few farmers of Dodamarg tahsil have recently undertaken animal husbandry as a supporting activity to the farming.

Dodamarg is at the border of Goa state, which is an international tourist centre. Hence the demand for chicken and eggs is more from Goa. Demand for milk is also more and hence dairy farming is also developing in this tahsil.

It is seen from the Table 3.3 that, the total livestock population in Dodamarg tahsil was 17752, out of which 44.52 per

cent was Bovine population. The population of sheep was only 0.3 per cent and that of goat was 9.00 per cent. The other livestock constituted 46.14 per cent. The population of poultry birds was 38054.

Table 3.3: Livestock population in Dodamarg tahsil (2013-14)

Sr. No.	Category	Number	Percentage
1.	Cattle	4731	26.65
2.	Buffalo	3173	17.87
	Total bovine	7904	44.52
3.	Sheep	59	0.33
4	Goats	1598	9.00
5.	Other livestock	8191	46.14
	Total livestock	17752	100.00
	Total poultry birds including other birds	38054	

(Source: Tahsil Office Dodamarg)

3.11 Transport and Communication

Transport provides the basis for economic, social and commercial progress. Transport is considered as an index of gearing of local and regional development. The Dodamarg tahsil is known for its hilly terrain, uneven topography, plateaus and limited plain area. These natural barriers affect the development of transportation and communication network in the tahsil. The state highway No.124 i.e. Mumbai – Goa road passes through Dodamarg.

The tahsil is well connected by BSNL telephone and a few of the mobile services. In general the transport and communication is moderately developed in the study area.

3.12 Mining

Mineral wealth and mining occupations are developing in the tahsil. Minerals like Manganese chromite, bauxite, iron are found in the villages of Dodamarg Kalane, Sasoli, Ughade, Kumbral, Kolzer and Talkat. More than 50 million tonnes of mineral have procured in the Dodamarg tahsil. The mining is going on at Kalane Village because they found more than 32-25 hectares area of mineral accumulations and this work is going on continuously. Mining operations are carried out upto the depth of about 40m. About 55 to 60% minerals found in this area are of high quality. Mining operation is carried out with the help of specialized machines.

3.13 Tourism

From the above facts and situations, it is clear that Dodamarg tahsil has natural beauty and scenery. There is an influence of Goan culture and art on the culture and art of this tahsil. Springs and waterfalls situated at Mangeli, Viridi, Tervan, caves at Sasoli, orchards, farm land at Talkat Fort and at Usap are some of the tourist spots in Dodamarg tahsil. Besides Nagnath temple at Tervan, Shantadurga temple at Usap, Kasainath hill are some of the religion sites in Dodamarg tahsil. Also some historic spots like Pargad, Fukeri are special attractions. Tilar Dam, view Point at Tilar Ghat and Power house are some of the Picnic spots and the Tourists visit these places in large number. All this natural scenery and historic places make Dodamarg tahsil of Sindhudurg beautiful and attractive. The number of tourists visiting the above referred tourism spots, picnic spots are increasing considerably day by day.

3.14 Conclusion

From the above socio-economic background, it is clear that Dodamarg tahsil has natural beauty and scenery. Pineapple, and

cashew nut produced in this tahsil have good demand from Goa and other districts because of its good quality. Malvani and Marathi languages spoken in the district have got impression of Konkani language. There is an influence of Goan culture on the art and culture of this tahsil. Water is available to Dodamarg, Sawantwadi and Goa from the Tilari Dam. Dodamarg can be made a sanctuary because there are several wild animals and elephants and that will be added attraction to the tourists. The following places like Tilari Dam and Garden point, Medhe, Bokarwadi, Kasainath hill, Mangeli, Viridi waterfalls, Sasoli field, Van bag in the tahsil can play an important role in the development of tourism.

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