Agro-Economic Research Centre, Andhra University, Research Study Report No. 148

PERFORMANCE OF INDIGENOUS AND IMPORTED SEEDLINGS OF OIL PALM IN ANDHRA PRADESH

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Research Associate

Study Sponsored by Ministry of Agriculture & Farmers Welfare
Government of India
Agro-Economic Research Centre
Andhra University, Visakhapatnam
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Preface

India has rich diversity of annual Oil Seed crops on account of diverse Agro-Ecological conditions being the fourth largest oil seed producing country in the world. Oilseeds in India account for the second largest agricultural commodities after cereals. During the last few years, the domestic consumption of edible oils has increased substantially and is likely to increase further. Our country has been mainly dependent on importing Oil from other countries to meet its domestic Oil requirements. India would need to raise oilseeds production to meet the growing demand of edible oils based on calorie requirements. This necessitates formulating and implementing action plan for growth of oil seeds. However only Oil Palm cultivation has shown promising results for commercial cultivation under Indian conditions.

Oil Palm plays a significant role to meet the vegetable oil requirement in India. India is the largest consumer of Palm Oil in the world, consuming around 18 per cent of total world consumption. India is the largest importer of Palm Oil amounting to 45 per cent of world imports. Oil Palm is being cultivated commercially since 1990 in India.

The present study analyses the differences between Indigenous and Exotic varieties of Oil Palm. Though the cultivations are growing both Indigenous and Exotic varieties, but prefer the Exotic varieties to cultivate in the future because of its higher production than the production of Indigenous varieties. More over the present study discusses the differences in the cost of cultivation and net returns between Indigenous and Exotic varieties of Oil Palm and provides necessary policy suggestions for better cultivation of Indigenous varieties in future.

In conducting the present study, the team involved had taken meticulous care at every stage of work starting from sample selection to report writing. I take this opportunity to thank them all, especially Dr K.V. Giri Babu, Research Associate and B. Krishna, Research Fellow. I appreciate Sri K. Ramesh in word processing of the report neatly. I also thank Prof. Parmod Kumar, Agricultural Development and Rural Transformation Centre, Institute for Social and Economic Change, Bengaluru for timely guidance and coordinating the study.

I thank, all the Government officials from Commissionerate of Horticulture, Guntur and the Deputy Directors of Horticulture West Godavari and Visakhapatnam districts for providing all the necessary information. I also thank, The Director and all the Principal Scientists, Directorate of Oil Palm Research, Pedavegi.

Prof. T. Koteswara Rao
Honorary Director

PROJECT TEAM

Project Leader	**:**	**Prof. T. Koteswara Rao**
Analysis and Drafting of the Report	**:**	**Dr. K. V. Giri Babu**
Data Processing and Statistical Analysis	**:**	**Dr. K. V. Giri Babu** **Sri B. Krishna**
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I: Introduction

India is one of the major oils seeds grower and importer of edible oils. The nine oilseeds presently grown in about 29 million ha in India are unable to meet the demand for edible oil in India. During 2013, production of vegetable oil in India was about 9 million tonnes whereas the consumption was about double the amount of production. So India has been mainly depending on import of oil from other countries to fulfil its requirements. During 2009-10, India imported 8.82 million tonnes of vegetable oil of which palm oil accounted for about 6.44 million tonnes (73 per cent of total import), which implies that the country is dependent on palm oil imports for about 40 per cent of its annual edible oil requirement.

Oil palm cultivation has to be further increased keeping in view the alarming situation of Oil imports in India with an expansion of more area to meet the domestic demand of oil consumption. In this connection the ministry of Agriculture, Government of India has asked its Agro Economic Research Centres to take up a study on the "Performance of Indigenous and Imported seedlings of Oil Palm" in respective states with the following objectives. The Agro Economic Research Centre, Andhra University, Visakhapatnam has taken up the study in Andhra Pradesh, the reference year being 2015-16.

Main Objectives of the Study:

The Main objectives of the study are:

1) To delineate the total area under indigenous and exotic seedling plantation of oil palm crop in the selected states.
2) To study the resource usage and productivity differences between the indigenous and exotic seedling plantation of oil palm
3) To compare profitability of indigenous and exotic seedling plantation and their feasibility in the long run and
4) To provide the policy suggestions for the promotion of prefer variety of palm oil.

Data Base and Methodology:

The present study on oil palm is based on both primary as well as secondary data collected from 100 farmers growing Indigenous variety and 100 farmers growing Exotic

variety surveyed in the two districts. Further the Marginal, Small, Medium and Large size categories of farmers are selected as per the probability proportion to the area under Oil Palm.

To identify the growth trends in Area and Yield of various crops, the Exponential growth rates are estimated using the form of equation

$L_nY=a+bt+u_t$ Where 'b' is the Growth rate.

Overview of the Report:

The present study is divided into 5 chapters. The First chapter being the introductory chapter, the second chapter deals with the role of Oil Palm in Oilseeds sector. The third chapter provides the details of household characteristics, cropping pattern and value of output while the fourth chapter presents the production structure and resource use under Horticultural crops. Finally, the fifth chapter gives the summary, concluding remarks and policy implications.

II: Role of Oil Palm in Oilseeds Sector: Prospects in Andhra Pradesh:

Glancing over the performance of the oil seed production in Andhra Pradesh from TE 1990-91 to TE 2014-15, it is observed that the production showed an increasing trend up to TE 1995-96; from there a continuous steep fall in the production is observed up to TE 2003-04. During the period TE 2004-05 to TE 2014-15 the production showed a fluctuating trend.

The first decade i.e., 1980-81 to 1989-90, no significant growth is recorded in case of area under rice, while a significant negative growth was recorded in the area under coarse cereals. The impact of negative growth in case of area under rice and coarse cereals reflected on the area under food grains. The reason for negative growth in the area of rice and coarse cereals may be attributed to the erratic nature of rain fall. The area and yield of oil seeds showed a positive significant growth during the same decade.

During the period 1990-91 to 1999-2000 slight increase in the growth of area under rice is observed, while negative growth is observed in the area under coarse cereals. The negative impact of growth in area under coarse cereals reflected in the area under food grains. A significant negative growth was observed in the area and yield of oilseeds.

During the period 2000-01 to 2009-10, there is no significant but negative growth observed in the areas of coarse cereals and pulses. On the other hand a positive significant

growth in yields in case of coarse cereals and pulses is observed. No significant negative growth in the area and positive growth in the yield of oil seeds is observed during the period. A positive significant growth is observed in the area and yield of palm oil. The reason for decrease in the area under oil seeds is due to introduction of oil palm and the diversification of area under oil seeds to oil palm.

During 2010-11 to 2014-15 the impact of negative growth in the areas of rice and pulses is reflected as a negative significant growth in area under food grains. A negative significant growth in the area of oil seeds and a positive not significant growth in the area under oil palm is observed. No positive significant growth in the yields of oil seeds, horticultural crops and oil palm is observed.

Glancing across the districts, the growth of area under Oil Palm is reported to be negative in East Godavari and S.P.S. Nellore, while the positive growth is reported in five districts ranging from 1.03 per cent in West Godavari district to 1.38 per cent in Visakhapatnam district. On the other hand, all the districts reported a positive growth of yield of Oil Palm between the two Triennia (TE 2005-06 and TE 2014-15). Observing across the districts the share of area under Oil Palm showed a tremendous increase between TE 2005-06 and TE 2014-15 except in East Godavari district. The Area and production of Oil seeds have decreased from TE 2005-06 to TE 2014-15 in Andhra Pradesh. Observing across the districts, all the districts except West Godavari showed a significant decrease in Area under Oil Seeds in TE 2014-15, compared to TE 2005-06. On the other hand, except three districts Viz., Vizianagaram, West Godavari and S.P.S. Nellore, the remaining districts reported a decrease in production in TE 2014-15 than the TE 2005-06. It is observed that a tremendous increase in Area, Production and Yield of Oil Palm from TE 2005-06 to TE 2014-15 in the State of Andhra Pradesh. The similar trend is observed across the districts.

III: House hold Characteristics, Cropping Pattern and Value of Output:

The average size of the house hold is reported to be 4.01. Across the groups of farmers the average size ranged between 3.90 in case of marginal farmers and 4.06 in case of large farmers. Across the size groups of farmers, the per household operated area ranged from 1.81 acres in case of Marginal farmers to 20.97 acres in case of large farmers. The major sources of irrigation in the study area are Bore-wells and Dug-wells. On an average the per acre borrowed amount from all sources is reported to be Rs. 34,619. Across the groups the Per acre borrowed amount from all sources is varied from Rs.12,179 in case of large farmers to Rs.1,19,436 in case of marginal farmers. The per household

amount of borrowed credit is reported to be Rs. 3,01,425, observing across the groups all the Households utilized the higher percentage of borrowed amount on seasonal crops. Observing across the groups, marginal farmers have grown Oil Palm crop only, while small, medium and large farmers have grown paddy and maize on smaller percentages of area. Except marginal farmers the small, medium and large farmers reported to have grown perennial crops including inter cropping of all crops. The per household value of output is reported to be Rs. 4,13,189, while the per acre value of output is reported to be Rs. 47,469. Observing the costs of production, the per acre material cost of production is reported to be Rs. 17,904 while the per acre labour cost is reported as Rs. 13,366. On an average the per house hold farm business income is reported to be Rs. 1,41,007, while the per acre farm business income is Rs. 16,200.

IV: Production Structure and resource use under Horticultural crops:

On an aggregate the area under Oil Palm per household is reported to be 6.03 acres. All the marginal farmers have grown only Oil Palm crop. The production of Fresh Fruit Bunch per acre on aggregate is reported to be 9.89 tonnes. The value of output per acre is reported as Rs. 64,262 while the value of output per household is Rs. 3,90,585.

The per household area under exotic variety of Oil Palm is reported as 4.90 acres. On an average the production of Fresh Fruit Bunch per acre is reported to be 10.35 tonnes and the value of output received per acre is Rs. 67,280. On an average per acre value of output is reported to be Rs. 67,280 while the value of output received per household is Rs. 3,29,680. Glancing over the indigenous variety of Oil Palm and the average area under Oil Palm per household is reported to be 7.26 acres. The production of Fresh Fruit Bunch per acre on an average is reported to be 9.57 tonnes. On an average the value of output per acre is reported as Rs. 62,223, while the value of output received per household is Rs. 4,51,490.

The value of paddy being a food crop is reported Rs.38,041 per acre while the perennial crops exceeded the value of Oil Palm per acre. The reason for growing Oil Palm than other commercial crops is due to its low cost of production and better commercial value than other Oilseed crops. On an aggregate the productivity of Oil Palm in the peak season is reported to be 7.73 tonnes per acre, while it is 2.19 tonnes per acre in the lean season. The difference of productivity between two seasons is about 252.78 per cent. Glancing over individual varieties, the productivity per acre for Exotic variety is reported to

be 8.08 tonnes in peak season while it was 2.27 tonnes per acre in the lean season. The productivity of Indigenous variety of Oil Palm is reported to be 7.29 tonnes per acre in the peak season while it was 2.3 tonnes per acre in the lean season.

Glancing over the individual varieties the net returns from exotic variety after deducting the total cost from total revenue is reported as Rs.27,640 while in case of indigenous variety it is Rs.25,463. Though there is marginal difference in net returns (Rs. 2,277) between two varieties, the farmers are attracted towards Exotic varieties of Oil Palm due to attraction of higher quantity of production in case of Exotic variety than the Indigenous variety.

The sale of produce of Oil Palm is a pre-arranged contract. This pre-arranged contract system is common for both Indigenous and Exotic varieties of Oil Palm.

On an average all the sample Households irrespective of the size of the holding received subsidy for establishment of seed gardens/ provision of seed, Establishment of drip irrigation and Inputs for intercropping like seed, Fertilizer etc.,. The reason to have received subsidy by all the large farmers may be attributed to the popularization and multiplicity of the crop in the future. All the sample households reported to have received training within the village by state Horticulture Department. More over all sample households reported to have received training by Fresh Fruit Bunches procuring agency with in the village.

Among the sample farmers higher percentage of medium farmers reported to have the benefit of promotion of INM and IPM. Similar situation is observed in the provision of training and capacity building. Out of the total sample of 200, 90 per cent of the farmers were motivated by private company. All the total sample farmers reported to have received Government support through subsidy inputs and INM & IPM. About 97 per cent of total sample reported to have received training facilities through government. All the total sample farmers invariably expressed to have received support from oil palm procuring company for fertilizers.

On an average 55 per cent of farmers of total sample received help by government to increase the area under oil palm by providing Seedling/Nursery. 20 per cent of the sample farmers received governments help by under growing training. About 25 per cent of sample farmers were provided pre harvest contract through by back by a company.

Glancing across the groups' higher percentage of small and medium farmers received government help towards capacity building and pre harvest contract facility.

All the groups of farmers reported to have satisfied with the present variety because of the support by Government and private companies.

Among the 200 sample households, 53.75 per cent of farmers suggested that the Minimum Support Price range should be from Rs.8000 to Rs.9000 per tonne. On the other hand 36.25 per cent of farmers suggested providing 90 per cent subsidy for all items for all groups of farmers. Only 10 per cent of farmers reported to improve harvesting technology.

V: Policy Suggestions:

From the above analysis it can be observed that there is no much variation in cost of cultivation and net returns between Indigenous and Exotic varieties of Oil Palm. But a marginal variation in production is observed. The farmers have inclined to grow Exotic variety than Indigenous varieties, because of higher production in Exotic varieties than Indigenous varieties. To popularise the Indigenous varieties of Oil Palm the following points may be adopted in future cultivation.

1. Since all the farmers are not fully aware of the varieties, the extension staff of the department of Horticulture should conduct special training programmes in the villages at frequent intervals to make the farmers thoroughly acquainted with the varieties.
2. The improved seed technology must be introduced to popularize the Indigenous varieties for dewing higher production to compete with the production of Exotic varieties.
3. Full subsidy must be provided for all inputs of Indigenous varieties until the varieties are popularized.
4. As per the norms of Andhra Pradesh Micro Irrigation Project (APMIP), Drip Irrigation subsidy has been provided up to 70 per cent so far. This percentage of subsidy must be extended to 80-85 per cent.
5. All the farmers invariably are of the opinion that the minimum support price should be increased to Rs. 8,000 per tonne.
6. The New Modern Harvesting Machinery must be provided to all the farmers at subsidized rates.

CHAPTER – I

INTRODUCTION

1.1 Back ground:

Oils extracted from plants have been used since ancient times and in many cultures. India is the fourth largest oil seed producing country in the world, next to USA, China and Brazil with 21 % of world's area and 15% of world's production. Oil seeds in India account for the second largest agricultural commodities after cereals sharing 13% of the country's gross cropped area, nearly 5% of gross national product and 10% of the value of all agricultural products.

During the last few years, the domestic consumption of edible oils has increased substantially, and has touched the level of 18.90 million tonnes in 2011-12 and is likely to increase further. The growth in production of domestic edible oil has not been able to keep pace with the growth of consumption. Continuous increase in the gap between demand and supply has forced India to go for huge import from leading exporter countries of edible oil. The demand supply gap is becoming wider mainly due to limited availability of oil seeds, shifting of acreage to other crops and increase in demand of edible oil. This necessitates formulating and implementing strategic action plan for the growth of edible oils. During the last two decades, efforts have been made to introduce and exploit a number of new oil bearing tree crops but only oil palm has shown promise for commercial cultivation under Indian conditions.

1.2 Importance of Oil palm in Providing Food Security in Edible Oils:

Oil palm is the crop of the present and future vegetable oil economy of the world as well as in India. Palm oil is widely used as cooking oil and has excellent health attributes. It is a good raw material for manufacturing Oleo chemicals used in making soaps, candles and plasticizers etc. Broadly it can be mentioned that palm oil is a source of health and nutrition, value addition, waste utilization, eco-friendly, diversification, import substitution, cogeneration and sustainability. Palm oil can also be used for the manufacture of biscuits, ice-creams, detergents and shampoos, processing noodles, potato chips, French fries, dough-nuts.

Oil palm plays a significant role to meet the vegetable oil requirements in India. India is the largest consumer of palm oil in the world, consuming around 18 per cent of total world consumption. Increasing demand and low production of oil seeds in the country has necessitated the import of vegetable oil, so as to meet the demands of ever growing

population. India is the largest importer of palm oil amounting to 45 per cent of world imports. In India oil palm is being cultivated commercially since 1990. Estimated area under palm oil cultivation is about 1,92,000 hectares producing approximately 72,000 tonnes of crude palm oil (2012)[1].

It is observed that there is an increase in imports of edible oils from year to year since 2006-07 in India. The year to year increase in imports of edible oils in India can be observed from the following Table 1.1.

Table 1.1-Imports of Edible Oils in India

Year	Imports (lack tonnes)	% increase over previous year
2006-07	42.70	
2007-08	49.00	14.75
2008-09	67.20	37.14
2009-10	74.64	11.14
2010-11	72.42	-3.03
2011-12	99.43	37.29
2012-13	106.05	6.65
2013-04	109.76	3.49

Source: "The Indian Oilseed scenario: Challenges and opportunities"-Dr. R.S.Paroda, Chairman Trust for Advancement of Agricultural sciences (TAAS) Avenue – II, Indian Agricultural Research Institute, PUSA Campus, New Delhi -110012, India.

It can be seen from the table that the increase in Edible oil imports from year to year are fluctuating between 2006-07 to 2013-14. On the whole, the imports of Edible oils increased from 42.70 lakh tonnes in 2006-07 to 109.76 lakh tonnes in 2013-14. There is a continuous increase in imports from 2006-07 to 2009-10. But a decrease of -3.03 per cent is recorded in 2010-11. A tremendous increase in imports was recorded in 2011-12. From there a continuous decrease is observed in the subsequent two years i.e., during 2012-13 and 2013-14.

Moreover cooking oil imports are all set to touch a record of 15 million tonnes in 2015-16 oil year ending October. Out of the 15 million tonnes palm oil imports alone account for 9 million tonnes i.e., 60 per cent of the total cooking oil imports[2].

1.Prof.N.Narasimharao – " Oil palm cultivation in AP State – a study of the problems and prospects", Indian journal of applied research, Volume3, Issue: 7, July, 2013.

2. Dinesh Sahahra – "Why the Central Government should go all out to expand oil palm cultivation" The Hindu, Business line, dated 25th February, 2017.

1.3 Government Support for Oil Palm[3]

The role of Government is the most vital in the establishment and success of oil palm industry in India. Without its participation in the initial periods by way of appointing a separate district level officer for this crop, by giving seedling subsidy, cultivation subsidy for the first three years i.e., during the unproductive period (Juvenile period) and later on fixing the price for FFBs with the consultation of farmers and company officials in the form of oil palm price fixation committee wherein the officials representing the TMOP and the Director of the National Research Centre for Oil Palm are members.

1.3.1 Market Intervention Scheme:

When the palm oil prices crashed internationally, the Government has come into the rescue of the farmers as well as the processors to save the Indian oil palm industry. By adopting the Market Intervention Scheme (MIS), Government has purchased the FFBs from farmers at profitable prices to both farmers and processors. For this it had to pay higher prices, which were given, in the form of subsidy. This really saved the oil palm industry of India to a large extent.

1.3.2 Research support:

In the initial periods of oil palm development in the country during 1970-90, research was mainly confined to rainfed oil palm at CPCRI Research Centre, Palode. Work on pepper was carrying out at this centre initially and later on it was shifted to oil palm where breeding and pest management aspects were given priority. Seed gardens using the mother palms from Thodupuzha seed garden was established at this centre which has later become a big source for indigenous seed sprouts.

1.3.3 Establishment of National Research Centre for Oil Palm, Pedavegi:

By establishing the NRC for Oil Palm at Pedavegi by ICAR, the Government created research facilities for this unique crop, which further created confidence in the farming community. Since growing of oil palm by giving irrigation is a new venture in the world, the palms can have lot of variation by showing diseases and disorders. This needs detailed

3.Oil Palm cultivation in India: Past, Present and Future Scenario, P.Kalidas, principal scientist, DOPR, Pedavegi, S. Chander Rao, Principal Scientists, DOR, Hyderabad, K J Prabhakara Rao, General Manager, Ruchi soya oil palm Ltd., Amalapuram, Andhra Pradesh.

studies to draw the control measures. Systematic research at National level only can solve these problems and establishment of National Research Centre will definitely cater the needs of the growers.

1.3.4 Role of United Nations Development Programme (UNDP):

UNDP extended its support to the Indian oil palm industry by sanctioning two mega projects viz., training of trainers in oil palm production and oil palm breeding for seed production worth 140 lakhs to NRCOP, Pedavegi. Ten members representing research, development and processing sectors visited Malaysia and underwent training on all the aspects of oil palm. After returning, these persons acted as trainers and trained 6000 farmers and 600 officers on oil palm cultivation. Apart from this, two scientists of NRCOP visited PNG and got trained in advanced seed production technologies that helped the industry in minimizing the losses and increased the productivity of seed sprouts. Two advanced breeding materials (elite Duras) were also procured from ASD Costa Rica to utilize them as mother palms and further use in breeding programme.

1.3.5 Support from TMOP:

Technology Mission on Oilseeds and Pulses, Ministry of Agriculture, Government of India has supported the Indian oil palm industry in a big way by giving the seedling subsidy, cultivation subsidy in way of fertilizers, sanction of new posts in the State Departments of Horticulture exclusively for the sake of oil palm development, establishment of leaf analysis laboratories in both Andhra Pradesh and Karnataka states for the use of oil palm growers, establishment of processing mills under the aegis of public sector undertaking of State Government of Andhra Pradesh at Pedavegi and also subsidy on the establishment of processing mills by private entrepreneurs in all the potential states. Apart from these the TMOP also spared funds for arranging the training programmes for farmers in the form of tours to the already established gardens located in other areas and also for planting material of intercrops for rising in the oil palm gardens. The scheme on oil palm training sanctioned by TMOP during 1991 to the CPCRI, RC, Palode made a dent in the development of Oil Palm industry by giving training to many officers all over the country. However it was mainly on rainfed oil palm practices as no work was carried out on irrigated oil palm by that time.

1.3.6 Support from Union Government:

After identifying the potentiality of the oil palm, the Union Government of India also extended its support by offering the subsidy for erecting the drip system for the oil palm

gardens. Similarly the State Government of Andhra Pradesh also extended its support for oil palm cultivation by sanctioning the electricity connection on priority to oil palm growers. All these efforts made the Indian oil palm industry in to a successful launching in the initial years. Having good resources of ground water for irrigation, congenial weather conditions necessary for cultivation, farmers awareness on the crop's potentiality, extension activities carried out by the State Departments of Horticulture in promoting the crop, issuing of subsidy for seed material as well as cultivation practices during the juvenile stage, active participation of private as well as state government undertakings in the development and processing, zonalization of the area, formation of project management committee and price fixation committee and reviewing them at quarterly interval are the few reasons for its successful launching. Establishment of Research Centres, low production cost, obtaining higher yields with good management practices, low pest and disease problems, establishment of processing factories in each zone, opening of collection centres by the processing industries and lifting the FFB for processing and making the payment to the producers within the stipulated time are the few reasons for its take off in a big way.

1.4: Area under Oil Palm in Major States:

The Area covered under the oil palm development programme in India is accounted for 2,50,763 ha., excluding the uprooted area of 17,944 ha., in four states (Andhra Pradesh, Karnataka, Tamilnadu and Odisha). Observing across the states Andhra Pradesh ranks 1st in Area followed by Karnataka, Tamilnadu, Mizoram and Odisha. Kerala and Gujarat represent about 2 percent of the total Area under Oil palm in India. Negligible percentages of Area are reported by Maharashtra, Goa, Tripura, Andaman & Nicobar and Chattishgarh. On the whole, out of 14 states in India 13 states excepting West Bengal are cultivating Oil palm crop. The details of the area covered under Oil palm development programme are presented in Table 1.2.

Table 1.2: Area covered under Oil Palm Development Programme (Area in Hectare)

State	Net Area up to March, 2014	% of Area in Total
Andre Pradesh	145327	57.95
Karnataka	31549	12.58
Tamil Nadu	22854	9.11
Gujarat	4196	1.67
Odisha	16225	6.47
Goa	882	0.35
Tripura	530	0.21
Assam	10	0.00
West Bengal@	0	0.00
Kerala	5740	2.29
Maharashtra	1474	0.59
Andaman & Nicobar	1593	0.64
Mizoram	19971	7.96
Chhattisgarh*	412	0.16
Total	250763	100.00

Source: Dept. of Agriculture and Cooperation, Government of India.

1.4.1 Indigenous and Exotic Seedling Plantation:

The Department of Agriculture and Cooperation (DAC), Government of India launched a special programme on Oil Palm Area Expansion (OPAE) during 2011-12 in identified eight States viz., Andhra Pradesh, Chhattisgarh, Gujarat, Karnataka, Maharashtra, Mizoram, Odisha and Tamil Nadu to bring an additional area of 60,000 hectares with an allocation of Rs. 300 crore. A Mission on Oilseeds and Oil Palm is proposed to be launched during XII Plan period (2012-13 to 2016-17) by subsuming on-going Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM), Central Sector Scheme on Tree Borne Oilseeds (TBOs) and Oil Palm Area Expansion (OPAE).

To achieve the targets proposed in Oil Palm Development Programme (OPDP) efforts were made by the Government of India to meet the requirement of planting materials through both establishments of seed gardens for enhancing the indigenous hybrid seed production and identification of exotic sources for imports. The first seed garden established at Palode (near Trivandrum, Kerala) with base material from OPIL, Thodupuzha (basic breeding materials introduced from Malaysia and Nigeria) started seed production from the year 1982. Subsequently to boost the indigenous production of planting material, TMOP encouraged establishment of oil palm seed gardens in the country. Accordingly, five more seed gardens one at Directorate of Oil Palm Research (DOPR, Pedavegi), two under State Departments of Horticulture (in Andhra Pradesh at Rajahmundry and in Karnataka at Taraka), one under Oil Palm India Limited at Thodupuzha (joint venture of Governments of India and Government of Kerala State) and one under private sector (M/s Navabharat Agro

Products Limited, Andhra Pradesh at Lakshmipuram, Near Jangareddygudem, West Godavari Dist., A.P.) were established.

Owing to the ambitious Oil Palm Area Expansion (OPAE) programme proposed by the Government of India, it has become necessary to augment the indigenous seed production by establishing more seed gardens. Three more seed gardens were planted at Kabini (Department of Horticulture, Govt. of Karnataka); Morampudi (Department of Horticulture, Govt. of Andhra Pradesh) and at Taraka (Taraka – II, Department of Horticulture, Govt. of Karnataka) during 2012 which were expected to come in to production from the year 2020.

1.5 Need for the Study:

The nine oilseeds presently grown in about 29 million ha in India are unable to meet the demand for edible oil in India. During 2013, production of vegetable oil in India was about 9 million tonnes whereas the consumption was about double the amount of production. Consumption of palm oil in India is the highest compared to that of other edible oils, followed by soybean, rapeseed-mustard and groundnut oil. India has been mainly depending on import of oil from other countries to meet its vegetable oil requirements. During 2009-10, India imported 8.82 million tonnes of vegetable oil of which palm oil accounted for about 6.44 million tonnes (73 per cent of total import), which implies that the country is dependent on palm oil imports for about 40 per cent of its annual edible oil requirement. In addition, the total demand for edible oils is expected to increase further. Among the highest palm oil importing countries during 2009-10, India leads followed by China, EU-27 and Pakistan. In 2006, Chadha Committee identified 10.4 lakh ha., as potential area for Oil Palm growing in the identified states. The total area existing under Oil Palm at the end of 2011-12 (XI Plan) was 2.08 lakh hectares. Andhra Pradesh ranks first in the area coverage followed by Karnataka, Tamil Nadu and Mizoram states. The Oil Palm Development Programme under ISOPOM provides assistance to encourage oil palm. In addition to the Oil Palm Development Programme, a special programme of Oil Palm Area Expansion Programmme (OPAE) under Rashtriya Krishi Vikas Yojana (RKVY) is under implementation from 2011-12 onwards with the focus to bring an additional area of 60,000 ha per annum under Oil Palm. Under OPAE Programme, assistance for planting material i.e. Oil Palm Area Expansion, cost of cultivation during gestation period of four years, supply of Drip Irrigation systems, supply of Diesel/Electric Pumpsets for drip systems, Inputs to inter-cropping in Oil Palm fields, INM, IPM, Fertigation, Plant Protection Chemicals & tree guard etc., construction

of Vermi-compost units, bore-wells at Oil Palm farm and setting up of Oil Palm processing units is being provided to promote the Oil Palm cultivation.

Keeping in view the alarming situation of Oil imports in India the oil palm cultivation has to be further increased with an expansion of more area to meet the domestic demand of oil consumption. In this connection the ministry of Agriculture, Government of India has asked its Agro Economic Research Centres to take up a study on the "Performance of Indigenous and Imported seedlings of Oil Palm" in respective states with the following objectives. The Agro Economic Research Centre, Andhra University, Visakhapatnam has taken up the study in Andhra Pradesh, the reference year being 2015-16.

1.6 Main Objectives of the Study:

The Main objectives of the study are:

1) To delineate the total area under indigenous and exotic seedling plantation of oil palm crop in the selected states.
2) To study the resource usage and productivity differences between the indigenous and exotic seedling plantation of oil palm.
3) To compare profitability of indigenous and exotic seedling plantation and their feasibility in the long run and
4) To provide the policy suggestions for the promotion of prefer variety of palm oil.

1.7: Data Base and Methodology:

The present study is based on both primary as well as secondary data. The secondary data is collected from various published and unpublished sources and also collected from Department of Agriculture in state as well as in District Offices. The primary data is collected with a structured questionnaire prepared for the purpose of this study. The details of Palm Oil Area under Indigenous and Exotic varieties in each district are collected from the department of Agriculture. Two Districts Viz., West Godavari and Visakhapatnam are selected basing on the probability proportion to the area of Oil Palm in the State. Since two varieties Indigenous and Exotic varieties are not available in the East Godavari District, alternatively Visakhapatnam District is selected for the purpose of the study. Since the total number of sample households is not available in one Taluk, alternatively two taluks from each district are selected in which both indigenous and exotic varieties are grown. Thus a total number of 100 Indigenous variety farmers and 100 Exotic variety farmers are surveyed

in the two districts. Further the Marginal, Small, Medium and Large size categories of farmers are selected as per the probability proportion to the area under Oil Palm. To identify the Growth Trend in Area and Yields, the Exponential growth rates are estimated using the form of equation

$L_n y = a + bt + u_t$, Where 'b' is the Growth Rate.

The details of District wise selected sample farmers in Andhra Pradesh are presented in Table 1.3.

Table 1.3 The District wise Selected Sample size of Farmers in Andhra Pradesh

District	Selected crop	Selected Mandal	Name of the selected villages	Indigenous Farmers				
				Marginal	Small	Medium	Large	Total
West Godavari	Oil Palm	Dwaraka Tirumala, Bheemadolu	Thimmapuram, Amber peta, M.Nagulapalli	4	5	8	8	25
			Mahadevapuram, Gumanampalli, Rajupalem	4	5	8	8	25
Visakha-patnam	Oil Palm	V.Madugula, Devarapalli	Kintali, Krishnapalem	5	4	8	8	25
			Kasipuram, Boddupalli	4	5	8	8	25
Total:				**17**	**19**	**32**	**32**	**100**
				Exotic Farmers				
West Godavari	Oil Palm	Dwaraka Tirumala, Bheemadolu	Kappalagunta, Venkatakrishna-puram komarakala	6	7	8	4	25
			Ramannapadu, Kodurupadu, Juttadapalem	7	7	8	3	25
Visakha-patnam	Oil Palm	V.Madugula	Somapuram, Tatiparthi	6	7	8	4	25
			Taruva, Bhavanipalem	7	7	8	3	25
Total:				**26**	**28**	**32**	**14**	**100**
Grand Total:				**43**	**47**	**64**	**46**	**200**

Source: Field Survey

1.8 Overview of the Report:

The present study is divided into 5 chapters. The First chapter being the introductory chapter, the second chapter deals with the role of Oil Palm in Oilseeds sector. The third chapter provides the details of household characteristics, cropping pattern and value of output while the fourth chapter presents the production structure and resource use under Horticultural crops. Finally the fifth chapter gives the summary, concluding remarks and policy implications.

* * *

CHAPTER – II

Role of Oil Palm in Oilseeds Sector: Prospects in Andhra Pradesh

Introduction:

Though the country has made a good progress in oil seeds production, yet the supply is short of the demand. As a result, edible oil is being imported involving considerable Foreign exchange. In view of these facts it became necessary to exploit new sources of edible oil in order to augment oil production in the country. One of the recognized potential sources of oil at present is oil palm of tropical world which can yield tremendous quantity of oil per hectare. Not only oil palm is the highest yielder of oil but its cost of production is amongst the lowest. That is the reason why the cultivation of oil palm is expanding rapidly in tropical parts East Asia, Africa, Latin America where favourable agro climatic conditions for its growth exist.

Realising that commercial production of oil palm would help in achieving self-sufficiency in edible oils; The Department of Biotechnology (DBT) was entrusted with the oil palm cultivation by initiating Oil Palm Demonstration Project (OPDP) during 1988-89 in three states viz., Andhra Pradesh, Karnataka and Maharashtra. The objective was to demonstrate the possibility of oil palm cultivation under irrigated conditions. This was launched in East Godavari, West Godavari and Krishna districts in Andhra Pradesh, Shimoga District in Karnataka and Sindhu durg in Maharashtra. The DBT in collaboration with the regional Department of Horticulture had chosen the farmers in both Karnataka and Andhra Pradesh, while in Maharashtra, the project was implemented through the Department of Industries by the Development Corporation of Konkan limited (DCKL). The present chapter deals with the role of oil palm in oilseeds sector in Andhra Pradesh.

2.1: Oilseeds Production in Andhra Pradesh:

The Nine Oil Seed crops growing in Andhra Pradesh are Groundnut, Sesamum, Safflower, Sunflower, Rape & Mustard, Soyabean, Castor, Linseed and Niger seed. The total production during the Triennium ending 2014-15 is accounted for 20.45 lakh tonnes in Andhra Pradesh. Glancing over the performance of the oil seed production in Andhra Pradesh from TE 1990-91 to TE 2014-15, it is observed that the production showed an increasing trend up to TE 1995-96; from there a continuous steep fall in the production is observed up to TE 2003-04. From TE 2004-05 to TE 2014-15 the production showed a fluctuating trend. The reason may be attributed to the seasonal and climatic conditions. All the details of the production of Oil seeds can be observed in the following Table 2.1.

Table 2.1: Oil Seeds Production in Andhra Pradesh (divided AP)*

(Production in lakh tones)

Year	Production
TE 90-91	23.47
TE 91-92	25.50
TE 92-93	26.70
TE 93-94	29.25
TE 94-95	28.68
TE 95-96	28.46
TE 96-97	25.93
TE 97-98	23.10
TE 98-99	19.92
TE 99-00	13.95
TE 00-01	14.47
TE 01-02	12.27
TE 02-03	12.53
TE 03-04	9.38
TE 04-05	11.03
TE 05-06	11.45
TE 06-07	9.66
TE 07-08	14.44
TE 08-09	15.70
TE 09-10	20.25
TE 10-11	18.24
TE 11-12	19.58
TE 12-13	20.35
TE 13-14	19.91
TE 14-15	20.45
TE 15-16	NA

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, Government of Andhra Pradesh.

Note: NA - Data Not Available

* : Divided Andhra Pradesh consisting of 13 districts

2.2: Share of Oilseeds in Gross Cropped Area in Andhra Pradesh:

The total Oil Seeds area in Andhra Pradesh has showed a fluctuating trend from TE 1990-91 to TE 2014-15. From TE 1995-96 to TE 2014-15 the area showed a declining trend excepting in two or three years in the middle. The percentage of Oil Seeds area in Gross cropped area recorded an increasing trend from TE 1990-91 to 1993-94 and from there a continuous decrease is reported up to TE 2000-01. The reason for decline may be attributed to the attraction of low price off palm oil than other oils influenced the people to inclined to purchase palm oil. As a result the demand for other oils has decreased. Again an upward trend is observed from TE 2001-02 to TE 2005-06 and from there a steep fall is observed up to TE 2014-15.The fluctuating trend of the percentage of Oil seeds area in Gross Cropped

area is due to the year to year changes in Gross Cropped area. The details can be observed from Tables 2.2 & 2.2.1.

Table 2.2: Percentages of area of Major Crops in Gross Cropped Area in Andhra Pradesh*

Year	Rice	Coarse Cereals	Pulses	Food grains	Oilseeds	Horti-cultural crops	Palm Oil	Other crops	Gross Cropped Area (in lakh hectares)
TE 90-91	32.06	11.89	10.72	54.67	26.46	--	--	18.87	78.91
TE 91-92	32.59	25.77	11.17	69.53	27.90	--	--	2.57	81.86
TE 92-93	31.48	24.72	11.50	67.70	28.87	--	--	3.43	82.34
TE 93-94	31.03	23.91	11.37	66.31	29.46	--	--	4.22	82.65
TE 94-95	30.92	7.39	11.42	49.73	28.86	--	--	21.41	82.7
TE 95-96	30.95	6.87	11.52	49.34	28.63	--	--	22.04	83.07
TE 96-97	31.43	6.42	11.66	49.51	27.62	--	--	22.86	83.99
TE 97-98	31.82	6.05	11.68	49.54	26.82	--	--	23.64	82.78
TE 98-99	32.54	5.54	11.39	49.46	25.03	11.55	0.29	13.66	82.93
TE 99-00	43.79	5.28	11.43	48.94	23.82	11.94	0.33	14.97	82.52
TE 00-01	43.50	5.28	12.21	49.65	23.77	11.94	0.34	14.31	84.06
TE 01-02	43.29	5.19	13.60	50.52	24.22	12.36	0.35	12.55	82.41
TE 02-03	29.94	5.20	15.83	50.97	25.02	13.27	0.39	10.36	78.80
TE 03-04	27.59	5.69	16.88	50.17	25.26	14.10	0.43	10.04	76.59
TE 04-05	26.17	5.95	16.33	48.45	28.73	14.26	0.46	8.10	77.09
TE 05-06	27.88	4.93	14.67	47.49	29.33	13.72	0.51	8.94	80.16
TE 06-07	30.13	3.93	14.30	48.36	25.73	14.05	0.61	11.25	80.73
TE 07-08	31.01	3.78	15.18	49.97	21.80	14.67	0.73	12.83	82.20
TE 08-09	31.48	4.82	15.04	51.33	21.01	15.55	0.87	11.23	82.84
TE 09-10	30.83	5.41	15.05	51.29	22.71	16.11	0.99	8.90	82.15
TE 10-11	31.50	5.35	14.96	51.81	21.26	16.84	1.00	9.08	82.47
TE 11-12	30.56	5.66	16.03	52.25	19.20	17.84	0.98	9.73	81.21
TE 12-13	29.71	6.24	16.31	52.26	18.76	18.25	0.90	9.83	82.21
TE 13-14	29.57	7.11	15.57	52.25	18.53	19.26	0.91	9.05	80.48
TE 14-15	30.22	7.24	14.67	52.14	17.07	19.22	1.07	10.49	79.26
TE 15-16	NA	NA	NA	NA	NA	NA	NA	NA	NA

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, Government of Andhra Pradesh

Note: NA - Data Not Available

* : Divided Andhra Pradesh consisting of 13 districts

Table 2.2.1: Area and production of major crops in the state – Andhra Pradesh*

(Area in lakh hectares, production in lakh tones)

Year	Rice		Coarse cereals		Pulses		Foodgrains		Oilseeds		Horticultural crops		Palm Oil		Other Crops	GCA
	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	
TE 90-91	25.30	59.51	9.39	8.10	8.46	4.59	43.14	72.20	20.88	23.47	-	-	-	-	14.89	78.91
TE 91-92	26.68	63.51	21.10	25.87	9.14	5.09	56.92	94.47	22.84	25.50	-	-	-	-	2.10	81.86
TE 92-93	25.92	63.23	20.35	25.43	9.47	5.22	55.74	93.87	23.77	26.70	-	-	-	-	2.83	82.34
TE 93-94	25.65	66.26	19.76	25.18	9.40	4.95	54.81	96.39	24.35	29.25	-	-	-	-	3.49	82.65
TE 94-95	25.57	67.53	6.11	4.18	9.45	4.45	41.12	76.16	23.87	28.68	-	-	-	-	17.71	82.7
TE 95-96	25.71	67.68	5.71	3.79	9.57	4.48	40.98	75.95	23.78	28.46	-	-	-	-	18.31	83.07
TE 96-97	26.40	67.52	5.39	3.83	9.80	4.97	41.59	76.32	23.20	25.93	-	-	-	-	19.20	83.99
TE 97-98	26.34	66.95	5.01	5.92	9.67	4.99	41.01	77.87	22.20	23.10	-	-	-	-	19.57	82.78
TE 98-99	26.98	70.82	4.60	5.68	9.44	5.12	41.02	81.61	20.76	19.92	9.58	63.59	0.24	0.45	11.33	82.93
TE 99-00	36.13	71.62	4.36	5.38	9.43	4.86	40.39	81.86	19.66	13.95	9.85	62.85	0.27	0.88	12.35	82.52
TE 00-01	36.56	76.97	4.44	6.25	10.26	6.20	41.74	89.42	19.98	14.47	10.03	72.54	0.28	1.01	12.03	84.06
TE 01-02	35.68	77.42	4.28	6.49	11.20	7.15	41.63	91.06	19.96	12.27	10.18	72.07	0.29	1.18	10.34	82.41
TE 02-03	23.59	70.60	4.10	6.62	12.47	8.03	40.16	85.26	19.71	12.53	10.46	75.40	0.31	0.96	8.16	78.80
TE 03-04	21.13	63.98	4.36	7.84	12.93	7.89	38.43	79.70	19.35	9.38	10.80	79.61	0.33	1.07	7.69	76.59
TE 04-05	20.17	62.87	4.59	9.18	12.59	7.38	37.35	79.44	22.15	11.03	11.00	83.55	0.35	1.18	6.24	77.09
TE 05-06	22.35	69.45	3.95	11.01	11.76	8.03	38.06	88.48	23.51	11.45	11.00	88.10	0.41	1.52	7.17	80.16
TE 06-07	24.33	76.22	3.18	12.00	11.54	9.11	39.04	97.33	20.77	9.66	11.34	96.99	0.49	1.90	9.08	80.73
TE 07-08	25.49	80.85	3.11	13.99	12.48	10.69	41.07	105.52	17.92	14.44	12.06	110.57	0.60	2.88	10.55	82.20
TE 08-09	26.08	86.15	3.99	17.76	12.46	10.79	42.52	114.70	17.41	15.70	12.88	123.92	0.72	3.96	9.31	82.84
TE 09-10	25.33	84.43	4.44	18.87	12.37	10.87	42.14	114.18	18.66	20.25	13.23	132.04	0.81	4.86	7.31	82.15
TE 10-11	25.98	81.11	4.42	20.72	12.34	10.15	42.73	111.99	17.54	18.24	13.89	142.48	0.82	7.23	7.49	82.47
TE 11-12	24.81	77.32	4.59	20.45	13.02	9.98	42.43	107.74	15.59	19.58	14.49	151.38	0.80	9.42	7.90	81.21
TE 12-13	24.43	74.97	5.13	23.00	13.41	10.10	42.97	108.07	15.42	20.35	15.00	181.78	0.74	11.78	8.08	82.21
TE 13-14	23.80	75.33	5.72	24.50	12.53	10.48	42.05	110.31	14.91	19.91	15.50	214.44	0.74	12.46	7.29	80.48
TE 14-15	23.96	77.71	5.74	24.98	11.63	10.54	41.33	113.23	13.53	20.45	15.60	216.87	0.85	14.68	8.32	79.26
TE 15-16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, government of Andhra Pradesh.

Note: NA - Data Not Available, * : Divided Andhra Pradesh consisting of 13 districts

2.2 a: Growth Rate analysis:

To have a comparative picture of growth of major crops in the state, the growth rates estimated on the basis of semi log trend and the growth rates based on annual averages (End Period growth rates) for major crops in the state for the given respective periods are presented in Table 2.2.2.

a) Growth Rates based on Semi log Trend:

The total time series data from 1980-81 to 2014-15 of area and yield of major crops is divided in to four sub periods consisting 10 years of each period. The first decade i.e., 1980-81 to 1989-90, no significant growth is recorded in case of area under rice, while a significant negative growth was recorded in the area under coarse cereals. Moreover the area under pulses should a positive significant growth. The impact of negative growth in case of area under rice and coarse cereals reflected on the area under food grains. On the other hand the yield of rice and pulses showed a positive significant growth which impact is reflected into the yield of food grains. The reason for negative growth in the area of rice and coarse cereals may be attributed to the erratic nature of rain fall. The area and yield of oil seeds showed a positive significant growth during the same decade.

During the period 1990-91 to 1999-2000 slight increase in the growth of area under rice is observed, which negative growth is observed in the area under coarse cereals. The negative impact of growth in area under coarse cereals reflected in the area under food grains. No significant positive growth in area under pulses while there is no significant negative growth in the yield of pulses is observed. A Significant negative growth was observed in the area and yield of oilseeds.

During the period 2000-01 to 2009-10, there is no significant but negative growth observed in the areas of coarse cereals and pulses. On the other hand a positive significant growth in yields in case of coarse cereals and pulses is observed. The positive impact of growth in yields of rice, coarse cereals and pulses is reflected in the yield of food grains. No significant negative growth in the area and positive growth in the yield of oil seeds is observed during the period. A positive significant growth is observed in the area and yield of palm oil. The reason for decrease in the area under oil seeds is due to introduction of oil palm and the diversification of area under oil seeds to oil palm.

During 2010-11 to 2014-15 the impact of negative growth in the areas of rice and pulses is reflected as a negative significant growth in area under food grains. Moreover that

the yields of pulses only showed a positive significant growth compared to other food grain crops. A negative significant growth in the area of oil seeds and a positive not significant growth in the area under oil palm is observed. No positive significant growth in the yields of oil seeds, horticultural crops and oil palm is observed.

b) Growth Rates based on Annual Averages:

The Growth Rates based on Annual Averages indicate a decrease in the growth of area under Rice, Coarse Cereals and Food Grains in the four continuous periods. While the yield of Rice, Coarse Cereals and food grains showed a continuous negative growth in the four periods. More over the area under pulses showed a positive increase in the growth in the four periods except in the period 2010-11 to 2012-13. On the other hand the yield of pulses showed a positive growth except in the period 2010-11 to 2013-14.

The area under Oil Seeds showed a continuous increase in the growth across the four periods. While the fluctuating trend is observed in the case of yield of Oil Seeds and area and yield of Horticultural crops across the periods.

The area under Oil Palm showed a negative growth in the period 2010-11 to 2011-12 and improved to 0.55 per cent in the period 2010-11 to 2012-13. But a steep fall in the growth is observed in the period 2010-11 to 2013-14 and finally the area under Oil Palm showed a growth of -0.83 per cent in the period 2010-11 to 2014-15. On the other hand the yield of Oil Palm showed a continuous negative growth across the four periods.

Table2.2.2: Growth rate in area and yield rate of major crops in the state (%)*

Period	Rice		Coarse cereals		Pulses		Foodgrains		Oilseeds		Horticultural crops		Palm Oil	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield
1980-81 to 1989-90	-1.06 (0.99726)	1.66* (5.06709)	-7.02* (5.06709)	2.03 (1.35722)	3.01* (3.89570)	4.12* (4.2021)	-2.11** (2.7265)	2.18* (4.3647)	5.68* (8.2684)	6.54* (3.7457)	N.A	N.A	N.A	N.A
1990-91 to 1999-00	4.50*** (2.0243)	-2.76 (1.2244)	-85.86*** (2.13660)	0.6818 (0.47344)	1.17 (0.5592)	-0.16 (0.0980)	-3.36 (1.4970)	2.30** (2.7761)	-2.52 * (4.3933)	-8.76 ** (3.2601)	N.A	N.A	N.A	N.A
2000-01 to 2009-10	1.02 (0.6979)	1.24 *** (2.0955)	-0.5387 (0.16655)	14.15* (4.45325)	-0.19 (0.1968)	4.74 * (3.3804)	0.45 (0.6168)	3.36 * (3.5811)	-2.30 (0.8883)	4.99 (0.9391)	3.30 (0.004185)	4.64 (0.003076)	13.75 * (13.4183)	8.68 * (7.1319)
2010-11 to 2014-15	-1.99 (0.6538)	3.69 (1.8073)	6.21 (1.43437)	-2.85 (0.90612)	-7.20 * (3.9956)	8.31 * (3.5716)	-2.54 ** (2.2470)	4.57 * (4.0113)	-7.52 ** (3.1775)	5.64 (1.2145)	1.49 (0.08657)	5.81 (0.94038)	7.12 (1.2648)	3.75 (1.4830)
2010-11-2011-12@	1.14	-12..49	-1.83	15.13	0.33	3.23	0.57	-7.80	0.20	-45.24	-0.17	-0.01	-0.26	-0.00
2010-11-2012-13@	0.77	-3.98	-1.48	8.56	0.09	45.29	0.30	-2.35	0.23	17.54	0.02	-6.92	0.55	-3.21
2010-11-2013-14@	0.16	-2.56	-0.92	3.75	0.51	-72.33	0.14	-4.20	0.24	-3.51	-0.22	-4.95	0.05	-2.15
2010-11-2014-15@	0.25	-4.60	-0.48	2.64	0.49	39.28	0.23	-5.09	0.60	-6.35	0.05	-1.00	-0.83	-0.87
2010-11-2015-16@	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Note: For the periods 1980-90 (1st Period), 1990-2000(2nd period), 2000-10(3rd period) and 2010-15(4th period) growth rates are estimated on semi log trend and the figures in brackets are 't' values. @ Growth rates based on annual averages, * denotes 1% level of Significance, ** denotes 5% level of Significance, *** denotes 10% level of Significance

N.A: Data not available for those periods.

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, government of Andhra Pradesh& Commissioner of Horticulture Department, Govt., of A.P

* : Divided Andhra Pradesh consisting of 13 districts

2.3: Share of Oil Palm Area in Horticultural crops in Andhra Pradesh:

Since Oil Palm is classified as a plantation crop under Horticultural crops category, the share of Oil Palm area in Horticultural crop area is presented. More over the percentage of area under Horticultural crops in Gross Cropped Area is presented in Table 2.2 and the share of Oil Palm area in the Horticultural crops area is presented in Table 2.3, it can be observed from the Table 2.3, that the share of Oil Palm area showed a continuous increasing trend from TE 1998-99 to TE 2009-10 and from there a continuous slow decrease is observed till TE 2014-15. The reason may be attributed to the uprooted area in some districts owing to the price changes.

Table 2.3 Share of Oil palm Area in Horticultural crop Area in Andhra Pradesh*

Period	Area under Horticulture crop(Area in Lakh Hectares)	Palm Oil Area (in lakh hectares)	Share of Oil Palm in Horticulture crop
TE 90-91	N.A	N.A	--
TE 91-92	N.A	N.A	--
TE 92-93	N.A	N.A	--
TE 93-94	N.A	N.A	--
TE 94-95	N.A	N.A	--
TE 95-96	N.A	N.A	--
TE 96-97	N.A	N.A	--
TE 97-98	N.A	N.A	--
TE 98-99	9.58	0.24	2.53
TE 99-00	9.85	0.27	2.74
TE 2000-01	10.03	0.28	2.81
TE 01-02	10.18	0.29	2.85
TE 02-03	10.46	0.31	2.93
TE 03-04	10.80	0.33	3.02
TE 04-05	11.00	0.35	3.22
TE 05-06	11.00	0.41	3.75
TE 06-07	11.34	0.49	4.32
TE 07-08	12.06	0.60	4.98
TE 08-09	12.88	0.72	5.62
TE 09-10	13.23	0.81	6.12
TE 10-11	13.89	0.82	5.93
TE 11-12	14.49	0.80	5.50
TE 12-13	15.00	0.74	4.94
TE 13-14	15.50	0.74	4.75
TE 14-15	15.64	0.85	5.41

Source: Various statistical Abstract of Andhra Pradesh, Department of Economics and Statistics, Government of Andhra Pradesh. N.A: Data not available for those periods

* : Divided Andhra Pradesh consisting of 13 districts

2.4: Area, Production and Yield of oil seeds in Andhra Pradesh:

The details of Area, Production and Yield of Oil Seeds are presented in Table 2.4, for the Time Series Data from TE 1990-91 to TE 2014-15. Glancing over a period of 25 years, it is observed a fluctuating trend in Area and Production of Oil Seeds. Accordingly the yields of oil seeds showed a similar trend. More over a continuous decrease in Area and Production from TE 1990-91 to TE 2014-15 is observed. The reasons for the decrease or fluctuations may be attributed to not only to the seasonal conditions but also to the year to year variations in prices.

Table 2.4: Area and production and Yield of Oilseeds in Andhra Pradesh*

(Area in lakh hectares, production in lakh tones, Yield in Kg/ha)

Period	Area	Production	Yield
TE 90-91	20.88	23.47	1124.00
TE 91-92	22.84	25.50	1116.42
TE 92-93	23.77	26.70	1123.06
TE 93-94	24.35	29.25	1201.13
TE 94-95	23.87	28.68	1201.71
TE 95-96	23.78	28.46	1196.78
TE 96-97	23.20	25.93	1117.58
TE 97-98	22.20	23.10	1040.42
TE 98-99	20.76	19.92	959.65
TE 99-00	19.66	13.95	709.96
TE 2000-01	19.98	14.47	724.06
TE 01-02	19.96	12.27	614.55
TE 02-03	19.71	12.53	635.40
TE 03-04	19.35	9.38	485.04
TE 04-05	22.15	11.03	497.94
TE 05-06	21.36	21.83	1022.00
TE 06-07	20.77	9.66	464.92
TE 07-08	17.92	14.44	805.48
TE 08-09	17.41	15.70	901.90
TE 09-10	18.66	20.25	1085.30
TE 10-11	17.54	18.24	1040.28
TE 11-12	15.59	19.58	1255.71
TE 12-13	15.42	20.35	1319.16
TE 13-14	14.91	19.91	1335.40
TE 14-15	13.53	20.45	1510.94

Source: Commissioner of Horticulture Department, Govt., of Andhra Pradesh

* : Divided Andhra Pradesh consisting of 13 districts

2.5: Area, Production and Yield of Oil palm in Andhra Pradesh:

Since the data on Area, Production and Yield of Oil Palm in Andhra Pradesh is available form 1996-97, the Triennium averages are presented for Area, Production and Yield

from TE 1998-99 to TE 2014-15, observing the time series data from TE 1998-99 to TE 2014-15, continuous increasing trend is observed in Area and Production of Oil Palm up to TE 2010-11. From there slight fluctuations appeared in the area up to TE 2014-15 while a continuous increasing trend is observed in case of production. On the other hand a continuous increasing trend is observed from TE 1998-99 to TE 2014-15, resulting an yield of 17.34 tonnes per hectare by TE 2014-15. The details are presented in Table 2.5.

Table 2.5: Area and production and Yield of Oil Palm in Andhra Pradesh*

(Area in lakh hectares, production in lakh tones, Yield in tonnes/ha)

Period	Area	Production	Yield
TE 90-91	--	--	--
TE 91-92	--	--	--
TE 92-93	--	--	--
TE 93-94	--	--	--
TE 94-95	--	--	--
TE 95-96	--	--	--
TE 96-97	--	--	--
TE 97-98	--	--	--
TE 98-99	0.24	0.45	1.87
TE 99-00	0.27	0.88	3.24
TE 2000-01	0.28	1.01	3.58
TE 01-02	0.29	1.18	4.07
TE 02-03	0.31	0.96	3.14
TE 03-04	0.33	1.07	3.28
TE 04-05	0.35	1.18	3.34
TE 05-06	0.41	1.52	3.67
TE 06-07	0.49	1.90	3.87
TE 07-08	0.60	2.88	4.80
TE 08-09	0.72	3.96	5.46
TE 09-10	0.81	4.86	6.00
TE 10-11	0.82	7.23	8.77
TE 11-12	0.80	9.42	11.83
TE 12-13	0.74	11.78	15.91
TE 13-14	0.74	12.46	16.93
TE 14-15	0.85	14.74	17.34

Source: Commissioner of Horticulture Department, Govt., of A.P

* : Divided Andhra Pradesh consisting of 13 districts

2.6: District wise Cropping pattern in Andhra Pradesh:

2.6 a: District wise Geographical, Cultivable and Oil Seeds area in Andhra Pradesh:

The district wise details of cultivable area under oil seeds in Andhra Pradesh are presented in Table 2.6. To identify the difference in cultivable area and area under Oil seeds, two Triennia viz., TE 2005-06 and TE 2014-15 are selected for the purpose of analysis. On

an average the percentage of cultivable area in Andhra Pradesh has increased from 54.85 per cent in TE 2005-06 to 55.92 per cent in TE 2014-15. Across the districts the percentage of cultivable area to Geographical area has increased in all districts except Srikakulam, West Godavari, Krishna and Kurnool. The reason for the decrease in cultivable area may be attributed to the urbanization in those districts. On the other hand the percentage of oil seeds are in cultivable area in Andhra Pradesh has decreased from 24.9 per cent in TE 2005-06 to 15.02 per cent in TE 2014-15. The reason for the glaring decrease in area is due to decrease in area under oil seeds in all districts except in West Godavari. In West Godavari district due to introduction of oil palm cultivation many farmers inclined to grow oil palm converting their oil seeds area in to area under oil palm.

2.6 b: District wise Cropping Pattern in Andhra Pradesh:

The District wise Area and Production of major crops for the year TE 2005-06 and TE 2014-15 are presented in Tables 2.6(a) & 2.6 (b) respectively. Observing the two periods TE 2005-06 and TE 2014-15, the percentage of Area under oil seeds in Gross cropped area is decreased in TE 2014-15 while the percentage of area under Horticultural crops is increased in TE 2014-15, when compared to TE 2005-06. This inferences that the increase in area under Horticultural crops may be attributed to the increase in area under Oil Palm.

Table 2.6: District wise geographical, cultivable and oilseeds crop area in the state – Andhra Pradesh ('000 hectares)

Name of the district	Geographical area	Cultivable area during		% age cultivable area to geographical area		Area under oilseed crops		% age oilseeds area to cultivable area	
		TE 2005-06	TE 2014-15	TE 2005-06	TE 2014-15	TE 2005-06	TE 2014-15	TE 2005-06	TE 2014-15
Srikakulam	583.70	370.85	363.28	63.53	62.24	58	21	15.64	5.78
Vizianagaram	653.90	358.58	378.63	54.84	57.90	69	33	19.24	8.72
Visakhapatnam	1116.10	421.54	432.33	37.77	38.74	40	19	9.49	4.39
East Godavari	1147.31	520.53	528.82	45.37	46.09	56	11	10.76	2.08
West Godavari	799.69	533.43	532.25	66.71	66.56	35	40	6.56	7.52
Krishna	872.70	596.39	497.38	68.34	56.99	15	11	2.52	2.21
Guntur	1139.10	756.20	767.86	66.39	67.41	25	13	3.31	1.69
Prakasam	1762.60	868.45	911.75	49.27	51.73	77	37	8.87	4.06
S.P.S. Nellore	1307.60	573.18	611.85	43.83	46.79	46	19	8.03	3.11
YSR. Cuddapah	1535.90	607.40	622.15	39.55	40.51	266	93	43.79	14.95
Kurnool	1765.80	1203.99	1152.22	68.18	65.25	433	208	35.96	18.05
Ananthapur	1913.00	1323.70	1393.26	69.20	72.83	883	702	66.71	50.39
Chittoor	1515.10	704.13	718.95	46.47	47.45	200	148	28.40	20.59
Andhra Pradesh	16112.50	8838.37	9010.73	54.85	55.92	2201	1353	24.90	15.02

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, government of Andhra Pradesh.

Table 2.6 (a): Area and production of major crops at districts level in Andhra Pradesh (TE 2005-06)

(Area in lakh hectares, production in lakh tones)

Name of the district	Rice		Coarse cereals		Pulses		Foodgrains		Oilseeds		Horticultural crops		Palm Oil		Other crops	GCA
	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.		
Srikakulam	1.80 (44.52)	3.87	0.09 (2.34)	0.21	0.85 (21.10)	0.36	2.75 (67.96)	4.45	0.58 (14.26)	1.18	0.56 (13.85	2.22	0.01 (0.20)	0.03	0.15 (3.73)	4.05
Vizianagaram	1.13 (27.41)	2.25	0.23 (5.60)	0.53	0.56 (13.52)	0.19	1.92 (46.54)	2.98	0.69 (16.75)	0.68	0.74 (17.93)	5.67	0.02 (0.52)	0.08	0.75 (18.26)	4.12
Visakhapatnam	0.92 (24.39)	1.47	0.74 (19.63)	0.78	0.23 (6.24)	0.12	1.88 (50.06)	2.37	0.40 (10.58)	0.53	0.86 (22.80)	4.53	0.02 (0.45)	0.06	0.61 (16.10)	3.76
East Godavari	3.92 (52.62)	14.30	0.13 (1.76)	0.54	1.17 (15.69)	0.32	5.22 (70.08)	15.17	0.56 (7.46)	4.55	1.58 (21.24)	10.28	0.11 (1.42)	0.39	0.00	7.44
West Godavari	4.25 (62.20)	15.64	0.28 (4.06)	1.53	0.18 (2.58)	0.09	4.71 (68.85)	17.26	0.35 (5.07)	1.71	1.31 (19.21)	6.46	0.17 (2.51)	0.63	0.30 (4.36)	6.84
Krishna	2.81 (42.47)	8.30	0.14 (2.10)	0.68	1.55 (23.42)	1.03	4.50 (67.99)	10.00	0.15 (2.23)	0.31	0.95 (14.38)	7.47	0.04 (0.61)	0.15	0.98 (14.79)	6.63
Guntur	2.53 (32.12)	8.03	0.49 (6.25)	2.61	1.52 (19.27)	1.01	4.53 (57.64)	11.65	0.19 (2.37)	0.23	0.88 (11.23)	6.14	0.01 (0.11)	0.03	2.25 (28.65)	7.87
Prakasam	0.96 (15.26)	3.07	0.41 (6.43)	0.71	1.99 (31.55)	2.01	3.36 (53.24)	5.80	0.77 (12.24)	0.59	0.52 (8.29)	5.08	0.01 (0.11)	0.03	1.65 (26.12	6.32
S.P.S. Nellore	1.83 (53.13)	6.05	0.02 (0.48)	0.03	0.27 (7.92)	0.17	2.12 (61.54)	6.26	0.46 (13.49)	0.46	0.56 (16.31)	6.21	0.03 (0.95)	0.12	0.27 (7.71)	3.45
YSR. Cuddapah	0.51 (10.66)	1.29	0.14 (2.90)	0.14	0.62 (12.84)	0.51	1.27 (26.40)	1.94	2.66 (56.43)	1.42	0.87 (18.14)	8.01	0.00 (0.00)	0.00	0.00	4.80
Kurnool	0.74 (7.65)	2.40	1.41 (14.62)	2.71	1.75 (18.12)	1.76	3.90 (40.39)	6.87	4.33 (44.79)	3.63	0.67 (6.97)	7.57	0.00 (0.00)	0.00	0.76 (7.85)	9.66
Ananthapur	0.37 (3.32)	1.01	0.36 (3.25	0.63	0.88 (7.96)	0.39	1.60 (14.52)	2.03	8.83 (79.87)	4.64	0.62 (5.62)	9.58	0.00 (0.00)	0.00	0.00	11.05
Chittoor	0.58 (1342)	1.43	0.19 (4.32)	0.23	0.19 (4.53)	0.05	0.96 (22.27)	1.71	2.00 (46.38)	1.91	0.86 (20.06)	8.89	0.00 (0.00)	0.00	0.49 (11.29)	4.30
Andhra Pradesh	22.35 (27.88)	69.12	4.62 (5.77)	11.34	11.76 (14.67)	8.03	38.73 (48.32)	88.48	21.36 (26.64)	21.83	11.00 (13.72)	88.10	0.41 (0.51)	1.52	8.66 (10.80)	80.16

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, government of Andhra Pradesh & Commissioner of Horticulture Department. Govt., of A.P

Note: figures in brackets are percentages to Gross Cropped Area

Table 2.6 (b): Area and production of major crops at districts level in Andhra Pradesh (TE 2014-15)

(Area in lakh hectares, production in lakh tones)

Name of the district	Rice		Coarse cereals		Pulses		Foodgrains		Oilseeds		Horticultural crops		Palm Oil		Other crops	GCA
	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.		
Srikakulam	2.07 (49.54)	4.44	0.13 (3.22)	0.66	0.82 (19.68)	0.44	3.03 (72.45)	5.55	0.21 (4.92)	0.29	0.79 (18.79)	16.78	0.02 (0. 44)	0.32	0.14 (3.41)	4.19
Vizianagaram	1.22 (33.28)	3.15	0.31 (8.30)	1.31	0.40 (10.91)	0.21	1.93 (52.49)	4.66	0.33 (9.02)	0.99	0.90 (24.58)	11.37	0.06 (1.65)	0.97	0.45 (12.27)	3.68
Visakhapatnam	1.05 (28.81)	1.71	0.45 (12.31)	0.50	0.27 (7.28)	0.21	1.76 (48.40)	2.43	0.19 (5.28)	0.50	1.18 (32.44)	22.87	0.05 (1.39)	0.76	0.45 (12.48)	3.64
East Godavari	4.00 (57.98)	12.92	0.13 (1.93)	0.91	0.45 (6.49)	0.16	4.58 (66.40)	14.00	0.11 (1.60)	2.15	1.59 (23.03)	23.89	0.10 (1.52)	1.66	0.51 (7.45)	6.90
West Godavari	4.17 (58.26)	14.19	0.54 (7.57)	3.57	0.16 (2.30)	0.14	4.88 (68.13)	17.89	0.40 (5.52)	7.61	1.40 (19.52)	17.76	0.49 (6.83)	9.20	0.00	7.17
Krishna	3.05 (43.49)	10.42	0.29 (4.07)	1.90	1.44 (20.51)	1.45	4.78 (68.07)	13.76	0.11 (1.51)	1.04	1.23 (17.50)	12.51	0.11 (1.60)	1.63	0.79 (11.32)	7.02
Guntur	2.66 (33.06)	9.49	1.02 (12.64)	7.74	0.98 (12.20)	1.24	4.65 (57.90)	18.46	0.13 (1.57)	0.23	1.59 (19.80)	12.28	0.00 (0.000)	0.00	1.67 (20.73)	8.03
Prakasam	0.99 (15.27)	3.76	0.60 (9.22)	2.07	1.59 (24.63)	2.11	3.17 (49.12)	7.95	0.37 (5.70)	0.39	0.78 (12.13)	8.66	0.00 (0.000)	0.00	2.13 (33.05)	6.46
S.P.S. Nellore	2.39 (60.15)	9.69	0.05 (1.15)	0.20	0.36 (9.15)	0.33	2.80 (70.44)	10.22	0.19 (4.68)	0.55	0.68 (17.23)	9.37	0.01 (0.31)	0.20	0.29 (7.33)	3.97
YSR. Cuddapah	0.46 (11.27)	1.42	0.23 (5.47)	0.55	1.13 (27.33)	0.75	1.82 (44.07)	2.72	0.93 (22.67)	0.73	1.37 (33.15)	18.97	0.00 (0.000)	0.00	0.00	4.12
Kurnool	1.10 (10.98)	4.13	1.38 (13.78)	4.07	2.45 (24.51)	2.67	4.92 (49.28)	10.87	2.08 (20.79)	1.75	1.32 (13.16)	24.43	0.00 (0.000)	0.00	1.68 (16.77)	9.99
Ananthapur	0.33 (3.05)	0.82	0.51 (4.76)	1.15	1.38 (12.81)	0.74	2.22 (20.62)	2.72	7.02 (65.16)	2.88	1.53 (14.20)	25.52	0.00 (0.00)	0.00	0.00	10.78
Chittoor	0.46 (11.56)	1.58	0.12 (3.02)	0.26	0.20 (4.83)	0.09	0.78 (19.50)	1.92	1.48 (36.98)	1.34	1.28 (32.19)	16.78	0.00 (0.000)	0.00	0.45 (11.33)	3.99
Andhra Pradesh	23.96 (30.22)	77.71	5.74 (7.24)	24.98	11.63 (14.67)	10.54	41.33 (52.14)	113.23	13.53 (17.07)	20.45	15.64 (19.73)	221.19	0.85 (1.07)	14.74	7.91 (9.98)	79.26

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, government of Andhra Pradesh & Commissioner of Horticulture Department, Govt., of A.P

Note: figures in brackets are percentages to Gross Cropped Area

Observing across the districts the area under oilseeds in TE 2005-06 ranged from 0.15 lakh ha in Krishna district to 8.82 lakh ha in Ananthapur district. On the other hand the area under Horticultural crops in TE 2005-06 reported low of 0.52 lakh ha in Prakasam district and high of 1.58 lakh ha in East Godavari district. More over the area under Oil Palm reported a high of 0.17 lakh ha in West Godavari district, while the second place is occupied by East Godavari with an area of 0.11 lakh ha under Oil Palm.

Glancing over TE 2014-15 across the districts the area under Oil Seeds reported a high of 7.02 lakh ha in Ananthapur district and a low of 0.11 lakh ha in Krishna and East Godavari districts. The area under Horticultural crops reported a high of 1.59 lakh ha in East Godavari and low of 0.68 lakh ha in S.P.S Nellore district. More over the area under Oil Palm maintained its highest status as in case of TE 2005-06. To be specific the area under Oil Palm increased from 0.17 lakh ha in TE 2005-06 in West Godavari to 0.49 lakh ha in TE 2014-15. It means the increase is around 3 folds from TE 2005-06. The variations in area under other major crops between TE 2005-06 and TE 2014-15 across the districts can be observed from the tables 2.6 (a) and 2.6(b).

2.6 (c) District wise Average Annual Growth Rates of Area and Yield of Horticultural crops TE 2005-06 to TE 2014-15 in Andhra Pradesh:

The Average Annual Growth Rate of Area under Oil seeds in Andhra Pradesh is reported to be -0.32 per cent from TE 2005-06 to TE 2014-15, while the growth in yield is reported as 34.19 per cent. On the other hand the Area under Horticultural crops showed a positive growth of 0.25 per cent, while the yield reported a positive growth of 2.45 per cent. More over the area under Oil Palm reported a positive growth of 0.66 per cent between the two Triennia, while the growth of yield of Oil Palm reported to be 8.17 per cent.

Excepting West Godavari District All the Districts in Andhra Pradesh reported negative growth in area under Oil seeds ranging from -0.17 in Ananthapur to -1.59 in East Godavari district between the two periods. On the other hand the yield of Oil seeds showed a positive growth ranging between 3.33 per cent in Ananthapur to 12.85 per cent in Visakhapatnam district. All the districts reported a positive growth area under Horticultural crops ranging between 0.05 per cent in West Godavari and 0.79 per cent in Ananthapur district. While the yield of Horticultural crops reported a high growth rate of 8.33 per cent in Srikakulam District. The growth of yield ranged from 0.28 per cent in Ananthapur to as high as 8.33 per cent in Srikakulam district. Glancing across the districts the growth of area under Oil Palm is reported to be negative in East Godavari and S.P.S. Nellore, while the positive growth is

Table 2.6(c): Average annual growth rate in area and yield of horticultural crops at districts level in Andhra Pradesh from TE 2005-06 to TE 2014-15 (percent per annum)

Name of the district	Rice		Coarse cereals		Pulses		Foodgrains		Oilseeds		Horticultural crops		Palm Oil	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield
Srikakulam	0.11	-0.04	0.38	6.97	-0.03	-3.36	0.08	2.34	-0.98	-6.66	0.30	8.33	1.16	8.16
Vizianagaram	0.07	3.19	0.27	5.73	-0.30	-4.83	0.01	7.21	-0.68		0.18	2.19	1.28	7.83
Visakhapatnam	0.12	0.40	-0.45	6.85	0.15	-10.00	-0.05	3.31	-0.71	12.85	0.28	5.93	1.38	7.63
East Godavari	0.02	-0.99	0.02	3.06	-0.85	-2.55	-0.10	0.45	-1.59	3.51	0.000042	3.77	-0.01	7.86
West Godavari	-0.01	-0.62	0.64	1.01	-0.07	-12.50	0.03	-0.000004	0.13	6.35	0.05	4.78	1.03	8.44
Krishna	0.06	1.27	0.73	1.81	-0.06		0.05	2.86	-0.35	12.17	0.22	1.20	1.18	7.48%
Guntur	0.04	0.97	0.65	1.99	-0.37		0.02	3.87	-0.40	11.87	0.50	0.53		
Prakasam	0.02	1.44	0.35	8.39	-0.19	38.92	-0.05	5.36	-0.68		0.36	0.56		
S.P.S. Nellore	0.22	1.59	1.28	8.68	0.28	-13.81	0.22	1.81	-0.89		0.18	0.86	-1.26	7.96
YSR. Cuddapah	-0.09	1.90	0.49		0.53	8.55	0.30	-0.54	-0.87	-8.93	0.39	1.72		
Kurnool	0.35	1.20	-0.02	5.19	0.28	26.48	0.18	3.41	-0.58	-0.28	0.59	1.90		
Ananthapur	-0.10	-0.97	0.34	3.55	0.39	-2.82	0.27	-1.51	-0.17	3.33	0.79	0.28		
Chittoor	-0.21	3.10	-0.45	13.06	0.01	-4.69	-0.18	4.51	-0.25	8.17	0.34	0.98		
Andhra Pradesh	0.05	0.42	0.16	5.06	-0.01	-12.65	0.04	2.01	-0.32	34.19	0.25	2.45	0.66	8.17

Note: Growth rates are annual averages

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, government of Andhra Pradesh& Commissioner of Horticulture Department, Govt., of A.P

reported in five districts ranging from 1.03 per cent in West Godavari district to 1.38 per cent in Visakhapatnam district. On the other hand all the districts reported a positive growth of yield of Oil Palm between the two Triennia. The variations in growth rates in Area and Yield of other major crops can be observed from the Table 2.6(c).

2.7 District wise share of Oil Palm Area in Horticultural crop in Andhra Pradesh:

As said earlier the Oil Palm is classified as a plantation crop under Horticultural crop category, the share of are under Oil Palm in Horticultural crops is presented for the purpose of the analysis of the study. The district wise share of Area under Oil Palm in Horticultural crops between the two periods Viz., TE 2005-06 and TE 2014-15 are presented in Table 2.7. The share of Oil Palm area in Horticultural crops in Andhra Pradesh increased from 3.75 per cent in TE 2005-06 to 5.43 per cent in TE 2014-15. Observing across the districts the share of area under Oil Palm showed a tremendous increase except in East Godavari district TE 2005-06 to TE 2014-15. The share of Oil Palm area ranged from 0.99 per cent in Guntur district to 13.04 per cent West Godavari district in TE 2005-06. On the other hand the share of Oil Palm area ranged from 1.82 per cent in S.P.S. Nellore to 34.98 per cent in West Godavari in TE 2014-15. Since the Oil Palm plantations are uprooted in Guntur and Prakasam by TE 2014-15, their respective shares are not presented in TE 2014-15. The details can be observed from the Table 2.7.

Table 2.7 District wise share of area under Oil Palm in Horticultural crops in Andhra Pradesh

(Area in Lakh Hectares)

S.NO.	Name of the district	TE 2005-06		Share of Oil palm area in Horticultural crops	TE 2014-15		Share of Oil palm area in Horticultural crops
		Oil Palm Area	Area under Horticultural Crop		Oil Palm Area	Area under Horticultural Crop	
1	Srikakulam	0.01	0.56	1.44	0.02	0.79	2.33
2	Vizianagaram	0.02	0.74	2.90	0.06	0.90	6.70
3	Visakhapatnam	0.02	0.86	1.98	0.05	1.18	4.29
4	East Godavari	0.11	1.58	6.71	0.10	1.59	6.58
5	West Godavari	0.17	1.31	13.04	0.49	1.40	34.98
6	Krishna	0.04	0.95	4.22	0.11	1.23	9.17
7	Guntur	0.01	0.88	0.99		1.59	
8	Prakasam	0.01	0.52	1.33		0.78	
9	S.P.S. Nellore	0.03	0.56	5.80	0.01	0.68	1.82
10	YSR. Cuddapah		0.87	0.00		1.37	
11	Kurnool		0.67	0.00		1.32	
12	Ananthapur		0.62	0.00		1.53	
13	Chittoor		0.86	0.00		1.28	
	Andhra Pradesh	0.41	11.00	3.75	0.85	15.64	5.43

Source: Commissioner& Director, Horticulture Department, Government of Andhra Pradesh

2.8 District wise Area, Production and Yield of Oilseeds in Andhra Pradesh:

The District wise Area, Production and Yield of Oil Seeds in Andhra Pradesh are presented in Table 2.8. The Area and production of Oil seeds have decreased from TE 2005-06 to TE 2014-15 in Andhra Pradesh. Observing across the districts, all the districts except West Godavari showed a significant decrease in Area under Oil Seeds in TE 2014-15, Compared to TE 2005-06. On the other hand, except three districts Viz., Vizianagaram, West Godavari and S.P.S. Nellore, the remaining districts reported a decrease in production in TE 2014-15 than the TE 2005-06. More over the yields of Oil Seeds reported low in Ananthapur and Chittoor district in TE 2014-15 than the TE 2005-06. All the remaining districts reported a considerable increase in the yield of Oil seeds in TE 2014-15 than the TE 2005-06, On the whole the yield of Oil seeds increased from 1.02 lakh tonnes in TE 2005-06 to 1.51 lakh tonnes in TE 2014-15 in the State of Andhra Pradesh.

Table 2.8 District wise Area, Production and Yield of Oilseeds in Andhra Pradesh

(Area in lakh hectares, production in lakh tones)

S.No.	Name of the District	TE-2005-06			TE 2014-15		
		Area	Production	Yield	Area	Production	Yield
1	Srikakulam	0.58	1.18	2.04	0.21	0.29	1.43
2	Vizianagaram	0.69	0.68	0.99	0.33	0.99	2.98
3	Visakhapatnam	0.40	0.53	1.33	0.19	0.50	2.61
4	East Godavari	0.56	4.55	8.19	0.11	2.15	19.47
5	West Godavari	0.35	1.71	4.94	0.40	7.61	19.23
6	Krishna	0.15	0.31	2.07	0.11	1.04	9.85
7	Guntur	0.19	0.23	1.22	0.13	0.23	1.86
8	Prakasam	0.77	0.59	0.76	0.37	0.39	1.05
9	S.P.S. Nellore	0.46	0.46	1.00	0.19	0.55	2.94
10	YSR. Cuddapah	2.66	1.42	0.53	0.93	0.73	0.78
11	Kurnool	4.33	3.63	0.84	2.08	1.75	0.84
12	Ananthapur	8.83	4.64	0.53	7.02	2.88	0.41
13	Chittoor	2.00	1.91	0.96	1.48	1.34	0.91
	Andhra Pradesh	21.36	21.83	1.02	13.53	20.45	1.51

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, Government of Andhra Pradesh& Commissioner of Horticulture Department, Govt., of A.P

2.9 District wise Area, Production and Yield of Oil Palm in Andhra Pradesh:

It is observed that a Tremendous increase in Area, Production and Yield of Oil Palm from TE 2005-06 to TE 2014-15 in the State of Andhra Pradesh . The similar trend is observed across the districts. The reason for massive increase in yield of oil palm is due to increase in area in all districts except in East Godavari and S.P.S. Nellore. As the plantation

of Oil Palm is uprooted in Guntur and Prakasam districts the changes cannot be analysed for TE 2014-15. All the details can be observed from the following Table 2.9.

Table 2.9 District wise Area, Production and Yield of Oil Palm in Andhra Pradesh

(Area in lakh hectares, production in lakh tones)

S.No.	Name of the District	TE-2005-06			TE 2014-15		
		Area	Production	Yield	Area	Production	Yield
1	Srikakulam	0.01	0.03	3.68	0.02	0.32	17.30
2	Vizianagaram	0.02	0.08	3.70	0.06	0.97	16.07
3	Visakhapatnam	0.02	0.06	3.66	0.05	0.76	15.02
4	East Godavari	0.11	0.39	3.66	0.10	1.66	15.88
5	West Godavari	0.17	0.63	3.69	0.49	9.20	18.80
6	Krishna	0.04	0.15	3.66	0.11	1.63	14.45
7	Guntur	0.01	0.03	3.70	--	--	--
8	Prakasam	0.01	0.03	3.72	--	--	--
9	S.P.S. Nellore	0.03	0.12	3.64	0.01	0.20	16.10
10	YSR. Cuddapah	--	--	--	--	--	--
11	Kurnool	--	--	--	--	--	--
12	Ananthapur	--	--	--	--	--	--
13	Chittoor	--	--	--	--	--	--
	Andhra Pradesh	0.41	1.52	3.67	0.85	14.74	17.35

Source: Various Statistical Abstracts of Andhra Pradesh, Directorate of Economics and statistics, Government of Andhra Pradesh& Commissioner of Horticulture Department, Govt., of A.P

2.10: Summary:

Glancing over the performance of the oil seed production in Andhra Pradesh from TE 1990-91 to TE 2014-15, it is observed that the production showed an increasing trend up to TE 1995-96; from there a continuous steep fall in the production is observed up to TE 2003-04. During the period TE 2004-05 to TE 2014-15 the production showed a fluctuating trend. The reason may be attributed to the seasonal and climatic conditions. The percentage of Oil Seeds area in Gross cropped area recorded an increasing trend from TE 1990-91 to 1993-94 and from there a continuous decrease is reported up to TE 2000-01. The reason for decline may be attributed to the attraction of low price off palm oil than other oils influenced the people to inclind to purchase palm oil. As a result the demand for other oils has decreased. Again an upward trend is observed from TE 2001-02 to TE 2005-06 and from there a steep fall is observed up to TE 2014-15.The fluctuating trend of the percentage of Oil seeds area in Gross Cropped area is due to the year to year changes in Gross Cropped area.

The total time series data from 1980-81 to 2014-15 of area and yield of major crops is divided in to four sub periods consisting 10 years of each period. The first decade i.e., 1980-81 to 1989-90, no significant growth is recorded in case of area under rice, while a

significant negative growth was recorded in the area under coarse cereals. Moreover the area under pulses should a positive significant growth. The impact of negative growth in case of area under rice and coarse cereals reflected on the area under food grains. On the other hand the yield of rice and pulses showed a positive significant growth which impact is reflected into the yield of food grains. The reason for negative growth in the area of rice and coarse cereals may be attributed to the erratic nature of rain fall. The area and yield of oil seeds showed a positive significant growth during the same decade.

During the period 1990-91 to 1999-2000 slight increase in the growth of area under rice is observed, which negative growth is observed in the area under coarse cereals. The negative impact of growth in area under coarse cereals reflected in the area under food grains. No significant positive growth in area under pulses while there is no significant negative growth in the yield of pulses is observed. A Significant negative growth was observed in the area and yield of oilseeds.

During the period 2000-01 to 2009-10, there is no significant but negative growth observed in the areas of coarse cereals and pulses. On the other hand a positive significant growth in yields in case of coarse cereals and pulses is observed. The positive impact of growth in yields of rice, coarse cereals and pulses is reflected in the yield of food grains. No significant negative growth in the area and positive growth in the yield of oil seeds is observed during the period. A positive significant growth is observed in the area and yield of palm oil. The reason for decrease in the area under oil seeds is due to introduction of oil palm and the diversification of area under oil seeds to oil palm.

During 2010-11 to 2014-15 the impact of negative growth in the areas of rice and pulses is reflected as a negative significant growth in area under food grains. Moreover that the yields of pulses only showed a positive significant growth compared to other food grain crops. A negative significant growth in the area of oil seeds and a positive not significant growth in the area under oil palm is observed. No positive significant growth in the yields of oil seeds, horticultural crops and oil palm is observed.

The Growth Rates based on Annual Averages indicate a decrease in the growth of area under Rice, Coarse Cereals and Food Grains in the four continuous periods. While the yield of Rice, Coarse Cereals and food grains showed a continuous negative growth in the four periods. The yield of pulses showed a positive growth except in the period 2010-11 to 2013-14. While the fluctuating trend is observed in the case of area and yield of Horticultural crops across the periods. A steep fall in the growth of Oil Palm is observed in the period

2010-11 to 2013-14 and finally the area under Oil Palm showed a growth of -0.83 per cent in the period 2010-11 to 2014-15. On the other hand the yield of Oil Palm showed a continuous negative growth across the four periods.

It is observed that the share of Oil Palm area showed a continuous increasing trend from TE 1998-99 to TE 2009-10 and from there a continuous slow decrease is observed till TE 2014-15. The reason may be attributed to the uprooted area in some districts owing to the price changes. A continuous decrease in Area and Production of Oil Seeds from TE 1990-91 to TE 2014-15 is observed. The reasons for the decrease or fluctuations may be attributed to not only to the seasonal conditions but also to the year to year variations in prices. Continuous increasing trend is observed in Area and Production of Oil Palm up to TE 2010-11 and from there slight fluctuations appeared in the area up to TE 2014-15 while a continuous increasing trend is observed in case of production. On the other hand a continuous increasing trend is observed from TE 1998-99 to TE 2014-15, resulting an yield of 17.34 tonnes per hectare by TE 2014-15. The inclination of farmers towards growing Oil Palm resulted in the decrease of area under Oil Seeds. The percentage of Area under oil seeds in Gross cropped area is decreased in TE 2014-15 while the percentage of area under Horticultural crops is increased in TE 2014-15, when compared to TE 2005-06. This inferences that the increase in area under Horticultural crops may be attributed to the increase in area under Oil Palm. The area under Oil Palm reported a high of 0.17 lakh ha in West Godavari district, while the second place is occupied by East Godavari with an area of 0.11 lakh ha under Oil Palm. The area under Oil Palm increased from 0.17 lakh ha in TE 2005-06 in West Godavari to 0.49 lakh ha in TE 2014-15. It means the increase is around 3 folds from TE 2005-06. The Area under Horticultural crops showed a positive growth of 0.25 per cent, while the yield reported a positive growth of 2.45 per cent between the two Triennia's. More over the area under Oil Palm reported a positive growth of 0.66 per cent, while the growth of yield of Oil Palm reported to be 8.17 per cent.

Glancing across the districts the growth of area under Oil Palm is reported to be negative in East Godavari and S.P.S. Nellore, while the positive growth is reported in five districts ranging from 1.03 per cent in West Godavari district to 1.38 per cent in Visakhapatnam district. On the other hand all the districts reported a positive growth of yield of Oil Palm between the two Triennia. Observing across the districts the share of area under Oil Palm showed a tremendous increase between TE 2005-06 and TE 2014-15 except in East Godavari district. The Area and production of Oil seeds have decreased from TE 2005-06 to TE 2014-15 in Andhra Pradesh. Observing across the districts, all the districts except West Godavari showed a significant decrease in Area under Oil Seeds in TE 2014-15, Compared to TE 2005-06. On the other hand, except three districts Viz., Vizianagaram, West Godavari and

S.P.S. Nellore, the remaining districts reported a decrease in production in TE 2014-15 than the TE 2005-06. It is observed that a Tremendous increase in Area, Production and Yield of Oil Palm from TE 2005-06 to TE 2014-15 in the State of Andhra Pradesh . The similar trend is observed across the districts.

CHAPTER – III

House hold Characteristics, Cropping Pattern and Value of Output

As said in the introductory chapter two districts namely West Godavari and Visakhapatnam are selected for the analysis of the study a total of 100 sample farmers growing the two varieties viz., Indigenous and Exotic varieties of Oil Palm in each district. Thus a total of 200 sample farmers are selected for the analysis of the study. These selected farmers are classified as Marginal, Small, Medium and large categories depending upon the probability proportion of the area of operational holdings of the House Holds. All these sample farmers are canvased with a structured questionnaire prepared for the purpose of the study.

3.1. Socio-Economic characteristics of the selected farmers:

The demographic profile includes the average size of house hold, average number of working persons in a house hold, Gender and age, education status of the Head of the Household, caste composition and main occupation of the Head of the household are discussed in this section.

The average size of the house hold is reported to be 4.01. Across the groups of farmers the average size ranged between 3.90 in case of marginal farmers and 4.06 in case of large farmers. The average number of work per house hold is reported to be 1.63, and the average number of workers per house hold is reported as 1.70 in case of marginal farmers 1.66 by small farmers, 1.72 by medium farmers and 1.41 by large farmers. The average number of years of farming experience ranged from 21 to 25 years and on the whole the years of farming experience is accounted for 24 years. Of the total farmers 83.50 per cent are male heads of the families while 16.50 per cent are female head of the family. On an average 68.50 per cent of head of the households are reported under the age group of 16-60. While canvasing, all the respondents have reported to be the heads of the house hold. Among the sample heads of the households, reported 11.50 per cent are illiterate, 16.50 per cent of the households reported to have studied up to 5^{th} class, 44.50 per cent studied up to 10^{th} class, 9.50 per cent studied up to 12^{th} class, 14.50 per cent reported to be graduates and 3.50 per cent reported to be post graduates. Looking over the caste composition of the sample households, 74.00 per cent of the households are reported to be General category, 25.00 per cent of the farmers reported under OBC category and 1.00 per cent of the farmers are from ST category. All the sample heads of the households reported

to be engaged in Agriculture and allied activities, which is their main occupation. The details can be observed from the following Table 3.1

Table 3.1: Demographic profile of the selected farmers (% of households)

Characteristics		Marginal	Small	Medium	Large	Total
No of HH		43	47	64	46	200
Household size (average)		3.90(168)	4.00(188)	4.04(259)	4.06(187)	4.01(802)
Average number of working persons		1.70	1.66	1.72	1.41	1.63
Years of farming experience		21	22	25	25	24
Gender of head (%)	Male	88.37	76.60	84.38	84.78	83.50
	Female	11.63	23.40	15.63	15.22	16.50
age of the head (%)	<16		22.34			
	16-60	95.35	82.98	92.19	84.78	68.50
	>60	4.65				
Identity of respondent (%)	Head	100	100	100	100	100
	Others					
Education status of head, number of years of education (%)	Illiterate	25.58	12.27	9.38		11.50
	Up 5	18.61	25.53	17.19	4.35	16.50
	Up to 10	39.53	38.30	54.69	41.30	44.50
	Up to 12	4.65	8.51	10.94	13.04	9.50
	Up to 15 (graduate)	6.98	14.89	6.25	32.61	14.50
	Above graduate	4.65		1.56	8.70	3.50
Caste (% of households)	SC					
	ST			1.56	2.17	1.00
	OBC	41.86	34.04	20.31	6.52	25.00
	General	58.14	65.96	78.13	91.30	74.00
Main occupation of head (%)	Agriculture and allied	100	100	100	100.00	100.00
	Agricultural labour					
	Non-agricultural labour					
	Self-business					
	Salaried/pensioners					
	Others					

Source: Field Survey

3.2 Characteristics of Operational holdings:

The details of Operational Holdings of sample farmers are presented in Table 3.2. On an average the per household operated area is reported to be 8.71 acres. Across the size groups of farmers the per household operated area ranged from 1.81 acres in case of Marginal farmers to 20.97 acres in case of large farmers. The medium and large farmers have reported to have taken land lease, and the per house hold leased in areas are reported as 0.19 acres and 0.22 acres respectively by medium and large farmers. Since there is no practice of growing second crop the GCA is reported to be the same as the Net Operated Area by all groups of farmers. More over the intensity of cropping is reported to be 100 per cent by all size groups of farmers. The details can be viewed from the table as follows.

Table 3.2: Characteristics of operational holdings (per household)

(in acres)

Farm size	Owned land	Non cultivable	Leased-in	Leased - out	NOA	GCA	Cropping intensity (%)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Marginal	1.81	--	--	--	1.81	1.81	100.00
Small	3.97	--	--	--	3.97	3.97	100.00
Medium	7.82	--	0.19	--	8.01	8.01	100.00
Large	20.76	--	0.22	--	20.97	20.97	100.00
Total	8.60	--	0.11	--	8.71	8.71	100.00

Source: Field Survey

3.3. Sources of Irrigation:

The major sources of irrigation in the study area are Bore-wells and Dug-wells. On an average 55.50 per cent of households reported to have bore well as a source of irrigation while 44.50 per cent of household reported to have irrigated their lands under Dug-wells. Observing across the size groups of farmers around 62.00 per cent of marginal and small farmers reported to have irrigated their lands by Dug-wells, whereas around 78.00 per cent medium farmers and around 59.00 per cent of large farmers reported to have irrigated their lands by bore wells. The details can be observed from the following Table 3.3

Table 3.3: Source of irrigation of net operated area (%)

Farm size	Only canal	Bore-well	Dug-well	Tank	Others	Rainfed area	Total operated area
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Marginal	--	37.21	62.79	--	--	--	77.95(100.00)
Small	--	38.30	61.70	--	--	--	186.4(100.00)
Medium	--	78.13	21.88	--	--	--	512.76(100.00)
Large	--	58.70	41.30	--	--	--	964.75(100.00)
Total	--	55.50	44.50	--	--	--	1741.86(100.00)

Source: Field Survey

3.4 Sources and Purpose of credit:

3.4.1: Details of borrowing sources:

The per household Borrowed amount from all sources is reported to be Rs. 3,01,425 of which 53.29 percent of amount is borrowed from institutions (Banks), 0.50 per cent of amount from traders/commission agents and 46.22 per cent of amount is reported to have borrowed from friends/relatives. Observing across groups about 67.13 per cent of loans barrowed by marginal farmers from friends/relatives and only 32.87 per cent of amount was borrowed from Institutions. Moreover the small, medium and large farmers reported to have borrowed larger amounts from institutions than the amounts borrowed from friends/

relatives. Only 2.56 per cent of per household borrowed amount is reported to have borrowed from Traders/Commission agents by large farmers.

On an average the per acre borrowed amount from all sources is reported to be Rs. 34,619. Across the groups the Per acre borrowed amount from all sources is varied from Rs.12,179 in case of large farmers to Rs.1,19,436 in case of marginal farmers. All the above details can be viewed in Table 3.4.1.

Table 3.4.1: Details of source of borrowing by the selected households

Farm size	Number of House Holds	Institutional loan by banks	Traders/ Commission agents	Money Lenders	Friends/ relatives	Others	Total
			(Rs. per household)				
Marginal	43	71163(32.87)			145349(67.13)		216512(100.00)
Small	47	137766(52.50)			124681(47.50)		262447(100.00)
Medium	64	241250(57.42)			178906(42.58)		420156(100.00)
Large	46	155435(60.85)	6522 (2.56)		93478(36.59)		255435(100.00)
Total	200	160625(53.29)	1500 (0.50)		139300(46.22)		301425(100.00)
	Area		**(Rs. per acre)**				
Marginal	77.95	39256			80180		119436
Small	186.40	34737			31438		66175
Medium	512.76	30112			22330		52442
Large	964.75	7411	311		4457		12179
Total	1741.86	18443	172		15994		34619

Source: Field Survey

3.4.2: Details of Purposes of Credit:

Generally the farmers spend the borrowed amount of credit on productive and non-productive uses. The per household amount of borrowed credit is reported to be Rs. 3,01,425. Of which 88.32 per cent of amount is spent on seasonal crops, 0.84 per cent is spent towards purchase of livestock, 7.99 per cent of amount towards consumption 2.19 per cent of amount towards social ceremonies and 0.84 per cent was utilized on other purposes. Observing across the groups all the Households utilized the higher percentage of borrowed amount on seasonal crops. Negligible percentage of borrowed amount was spent towards purchase of livestock by medium farmers. The details can be observed from the following Table 3.4.2.

Table 3.4.2: Details of purpose of credit by the selected households

Farm size	Productive uses				Non-productive uses			
	Seasonal crop	Purchase of tractor	Purchase of livestock	Non-farm activity	Consumption	Social ceremonies	Others	Total Credit
(Rs. per household)								
Marginal	137442				60465	18605		216512
Small	259490				2957			262447
Medium	392031		3125		9375	7813	7813	420156
Large	225000				30435			255435
Total	266230		2500		23695	6500	2500	301425
% of total								
Marginal	63.48				27.93	8.59		100.00
Small	98.87				1.25			100.00
Medium	93.31		0.74		2.23	1.86	1.86	100.00
Large	88.08				11.92			100.00
Total	88.32		0.84		7.99	2.19	0.84	100.00

Source: Field Survey

3.5 Asset Holdings:

The Per Household total value of assets is reported to be Rs. 4,91,233. On the other hand the total value of assets per acre is reported to be Rs. 56,403. All the groups of farmers reported to have Pump sets. Only large farmers category reported to have owned Tractor, Trolleys, Harrow, tiller, plank, threshing machine and combine harvester. The details per household value of assets and the value of assets per acre are presented in Table 3.5.

3.6 Cropping Pattern:

The details of the cropping pattern of the selected farmers are presented in Table 3.6. Out of the total area of 1741.86 acres, 80.59 per cent of area is under Oil Palm. Paddy is grown in an area of 8.23 per cent and 1.84 per cent of area is under maize crop. The remaining 9.34 per cent of the area is under other perennial crops like citrus, coconut, cashew nuts and Eucalyptus. Observing across groups marginal farmers have grown Oil Palm crop only, while small, Medium and large farmers have grown paddy and maize on smaller percentages of area. Except marginal farmers the small, medium and large farmers reported to have grown perennial crops including inter cropping other than Oil Palm.

Table 3.5: Ownership of productive assets

Assets		Rs. Per household					Rs per acre				
		Marginal	Small	Medium	Large	Total	Marginal	Small	Medium	Large	Total
Tractor					157609	36250				7515	4162
Trolley					46087	10600				2197	1217
Harrow					14457	3325				689	382
Tiller					9783	2250				466	258
Plank					6087	1400				290	161
Threshing machine					5978	1375				285	158
Combine harvester					4348	1000				207	115
Other reaper (specify)											
Pumpset		126977	185745	309219	578913	303050	70027	46835	38595	27603	34796
Bullock cart											
Fodder Chaffer					3913	900				187	103
Spray Pump			809	3084	9641	3395		204	385	460	390
Storage Bin											
Poultry Sheds											
Dairy Sheds		6977	8723	14203	22826	13345	3848	2200	1773	1088	1532
Animals	Cows	28372	32085	42188	58152	40515	15647	8090	5266	2773	4652
	Buffaloes	22093	66064	47969	68478	51375	12184	16658	5987	3265	5899
	Calves	6837	5723	7047	12109	7855	3771	1443	880	577	902
Any Other		11209	11755	15859	18913	14598	6182	2964	1979	902	1676
Total		202465 (8224000)	310904 (14060000)	439568 (27117400)	1017293 (45925500)	491233 (95326900)	111658	78393	54864	48506	56403

Source: Field Survey Note: figures in parenthesis in total row represent the actual value of total assets.

Table 3.6: Cropping pattern of selected farmers (% of GCA for the reference year 2015-16)

Name of the crop	Marginal	Small	Medium	Large	Total
Kharif crops July to Nov 2015					
Paddy		5.36	11.82	7.54	8.23
Maize		2.15	4.10	0.73	1.84
Rabi crops Nov 2015 to March 2016					
Summer crops Nov 2015 to March 2016					
Perennial crops including inter cropping other than palm oil					
Oil palm	100.00	88.73	74.70	60.12	69.25
New Oil Palm			2.25	19.12	11.29
Citrus			1.76	5.23	3.42
Coconut		2.41	5.37	4.20	4.16
Cashew Nuts		0.54			0.06
Eucalyptus		0.81		0.62	0.43
Coco				2.38	1.32
Gross cropped area	100.00 (77.95)	100.00 (186.4)	100.00 (512.76)	100.00 (964.75)	100.00 (1741.86)

Source: Field Survey, Note: figures in brackets represent Gross Cropped Area of respective size groups.

3.7. Production, Cost and Returns by Farm Size:

The details of per household and per acre value of output cost and net returns (aggregating for all crops) are presented in Table 3.7. The per household value of output is reported to be Rs. 4,13,189, while the per acre value of output is reported to be Rs. 47,469. More over observing the costs of production the per acre material cost of production is reported to be Rs. 17,904 while the per acre labour cost is reported as Rs. 13,366. On an average the per household farm business income is reported to be Rs. 1,41,007 while the per acre farm business income is Rs. 16,200. The per household Non-Farm income is reported as Rs.3,768. The total income per household, on an average is reported as Rs. 1,44,775. Across the groups the total income per Household varied form Rs. 75,161 in case of marginal famers to Rs. 2,23,525 in case of large farmers. The variations of value of output cost production, net returns, Non-Farm Income and Total Income across the groups can be observed from the following Table 3.7.

Table 3.7: Value of output, cost and net returns for the survey year – aggregate of all crops (Rs.)

	Value of output (main + by product)		Cost of production per acre		Net returns (Farm business income)		Non-farm income per household	Total income per household
	Per household	Per Acre	Material cost	Labour cost	Per household	Per acre		
Marginal	124547	68704	20641	12768	63982	35295	11179	75161
Small	248987	62781	22757	13311	105942	26713	2374	108317
Medium	411409	51450	18545	12956	159522	19950	2197	161719
Large	853253	40684	16405	13642	223075	10636	450	223525
Landless								
Total	413189	47469	17904	13366	141007	16200	3768	144775

Note: Labour cost includes the imputed value of family labour
Source: Field Survey

3.8 Summary:

The average size of the house hold is reported to be 4.01. Across the groups of farmers the average size ranged between 3.90 in case of marginal farmers and 4.06 in case of large farmers. All the sample heads of the households reported to be engaged in Agriculture and allied activities. On an average the per household operated area is reported to be 8.71 acres. Across the size groups of farmers the per household operated area ranged from 1.81 acres in case of Marginal farmers to 20.97 acres in case of large farmers. The major sources of irrigation in the study area are Bore-wells and Dug-wells. The small, medium and large farmers reported to have borrowed larger amounts from institutions than the amounts borrowed from friends/ relatives. On an average the Per acre borrowed amount from all sources is reported to be Rs. 34,619. Across the groups the Per acre borrowed amount from all sources is varied from Rs.12,179 in case of large farmers to Rs.1,19,436 in case of marginal farmers. The per household amount of borrowed credit is reported to be Rs. 3,01,425, observing across the groups all the Households utilized the higher percentage of borrowed amount on seasonal crops. The Per Household total value of assets is reported to be Rs. 4,91,233. On the other hand the total value of assets per acre is reported to be Rs. 56,403. Observing across groups marginal farmers have grown Oil Palm crop only, while small, Medium and large farmers have grown on small percentages of area paddy and maize. Except marginal farmers the small, medium and large farmers reported to have grown perennial crops including inter cropping other than Oil Palm. The per household value of output is reported to be Rs. 4,13,189, while the per acre value of output is reported to be Rs. 47,469. Observing the costs of production the per acre material cost of production is reported to be Rs. 17,904 while the per acre labour cost is reported as Rs. 13,366. On an average the per house hold farm business income is reported to be Rs. 1,41,007, while the per acre farm business income is Rs. 16,200.

CHAPTER – IV

Production Structure and resource use under Horticultural crops

Oil Palm is considered as one of the best options for Bio-Energy production in different agro-ecological conditions as the plantation is maintained for 35 years without tillage, which adds to soil fertility and provide permanent coverage by avoiding the direct impact of heavy rains. That causes erosion and leaching. It also has a great capacity for carbon sequestration, high efficiency in energy convention and also generates energy using various products.

The Technology Mission on Oilseeds and Pulses (TMOP) set up by the Ministry of Agriculture, Government of India during 1986 launched a massive Oil Palm Development Programme (OPDP) during the VIIIth Five Year Plan (in the year 1991-92). From 2004-05 onwards, The scheme is being implemented as a part of the "Integrated Scheme of Oil Seeds, Pulses, Oil Palm and Maize" (ISOPOM) and provided support for Oil Palm cultivation in 12 states viz., Andhra Pradesh, Assam, Gujarat, Goa, Karnataka, Kerala, Maharashtra, Mizoram, Odisha, Tamilnadu, Tripura and West Bengal. Under ISOPOM support is provided for planting material, cultivation cost, installation of drip irrigation system, diesel pumpsets, training, development of waste lands and technology transfer threw demonstration and publicity. The Government support in the Farm of subsidy for planting material in the State of Andhra Pradesh is presently in the following table*.

Sl.No.	Item	DOPR Pedavegi	Private Companies	Cost of the farmer	Government subsidy
1	Sprouts	20	20	NA	NA
2	Seedlings				
	a) Indigenous	55	60	5	55
	b) Imported	-	90	10	80

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*Crop plants with low cost" – Quality Planting material Of Oil Palm thrush seed gardens – Krishisewa dated 11th December, 2013.P. Naveen Kumar[2], Ram Kumar[2], Matur K. Sunil Kumar[1] and G. Ravi Chandran[1],
1. Senior Scientists and 2. Principal Scientists, DOPR, Pedavegi

The Actual support however depends on the component (whether it is planting material or farm inputs or irrigation etc.,) and the state taking up the Oil Palm development programme. Identified areas are allocated to private entrepreneurs for overall development of the sector i.e., from plantation to procurement Fresh Fruit Bunches (FFB's) at the prices fixed by the Project Management Committee (PMC) constituted under Oil Palm Development Programme. At present Andhra Pradesh, Tamilnadu, Mizoram and Goa have connecting Oil Palm Act while other states are yet to initiate such regulatory provision. The Department of Agriculture and Co-operation (DAC), Government of India launched a special programme on Oil Palm Area Expansion (OPAE) during 2011-12 in identifies 8 states viz., Andhra Pradesh, Chattishgarh, Gujarat, Karnataka, Maharashtra, Mizoram, Odisha and Tamilnadu to bring an addition area of 60,000 ha., with an allocation of Rs. 300/- crores. To achieve the targets developed in Oil Palm Development Programme (OPDP) efforts were made by the Government of India to meet the requirement of planting material through establishment of Seed gardens for enhancing the indigenous hybrid seed production and identification of Exotic sources for imports.

The present chapter deals with the production structure and resource use for the indigenous and exotic varieties of Oil Palm grown by the selected sample farmers.

4.1. Area, Production and Productivity of Oil Palm – Indigenous versus Exotic varieties:

The details of area and production of exotic and indigenous variety of Oil Palm are presented in Table 4.1. On an aggregate the area under Oil Palm per household is reported to be 6.03 acres. Across the groups the per households area under Oil Palm varied from 1.81 acres in case of marginal to 12.61 acres in case of large farmers. All the marginal farmers have grown only Oil Palm crop. The production of Fresh Fruit Bunch per acre on aggregate is reported to be 9.89 tonnes. The value of output per acre is reported as Rs. 64,262 while the value of output per household is Rs. 3,90,585. No difference is observed between recommended MSP and Actual Price obtained.

The per household area under exotic variety of Oil Palm is reported as 4.90 acres. On an average the production of Fresh Fruit Bunch per acre is reported to be 10.35 tonnes and the value of output received per acre is Rs. 67,280. Across the groups the production of Fresh Fruit Bunch per acre varied from 9.80 tonnes in case of medium farmers to 10.78 tonnes by large farmers. Marginal and Small farmers have reported a higher production per

acre than the average production. On an average per acre value of output is reported to be Rs. 67,280 while the value of output received per household is Rs. 3,29,680. No difference is observed between recommended and actual price received per acre.

Glancing over the indigenous variety of Oil Palm and the average area under Oil Palm per household is reported to be 7.26 acres. Across the groups the area under Oil Palm ranged from 1.86 acres in case of marginal farmers to 13.67 acres in case of large farmers. The production of Fresh Fruit Bunch per acre on an average is reported to be 9.57 tonnes. Across the groups the production of Fresh Fruit Bunch per acre varied from 9.29 tonnes in case of large farmers to 11.21 tonnes by small farmers. On an average the value of output per acre is reported as Rs. 62,223, while the value of output received per household is Rs. 4,51,490. As in case of exotic variety, no difference is observed between recommended MSP and actual price received per tonne in case of indigenous variety also.

Table 4.1: Area and production under Oil palm - variety wise

Farm size	Area under oil palm (per hh) (Acres)	Area under oil palm as % of NOA	No of plants per acre	No of bunches per plant	Production of FFB per acre (Tones)	Value of Output per acre (Rs)	Value of output per hh (Rs)	Recommended MSP (Rs per tonne)	Actual price obtained Rs per tonne
Exotic variety									
Marginal	1.78	98.34	57	13	10.59	68865	122500	6500	6500
Small	3.68	92.69	57	13	10.61	68980	253500	6500	6500
Medium	5.89	73.54	55	13	9.80	63702	374969	6500	6500
Large	10.89	51.93	57	13	10.78	70072	763296	6500	6500
Total	4.90	56.25	56	13	10.35	67280	329680	6500	6500
Indigenous variety									
Marginal	1.86	100.00	57	13	10.38	67461	125794	6500	6500
Small	3.29	82.87	57	12	11.21	72845	222368	6500	6500
Medium	6.06	75.65	57	13	9.82	63827	386750	6500	6500
Large	13.67	65.19	57	13	9.29	60365	825297	6500	6500
Total	7.26	83.35	57	13	9.57	62223	451490	6500	6500
Aggregate									
Marginal	1.81	100.00	57	13	10.51	68294	123802	6500	6500
Small	3.52	88.73	57	13	10.53	65458	240915	6500	6500
Medium	5.97	74.70	57	13	9.81	63765	380859	6500	6500
Large	12.61	60.12	57	13	9.67	62874	806424	6500	6500
Total	6.03	69.25	57	13	9.89	64262	390585	6500	6500

Source : Field survey

4.2: Productivity comparison of Oil Palm with other major crops grown:

Along with Oil Palm the sample farmers have grown other crops like paddy and perennial crops like Lemon, Coconut, Cashew nut and Coco. A comparison of productivity of Oil Palm with other crops grown is presented in Table 4.2. On an average the productivity of

Paddy is reported to be 25.31 Quintals, Lemon 13.36 quintals, Cashewnut 16.00 quintals and Coco 0.13 quintals per acre while the productivity of Oil Palm per acre is 98.90 quintals.

Glancing over the value of these above crops per acre, paddy being a food crop is reported Rs.38,041 per acre while the perennial crops exceeded the value of Oil Palm per acre. As mentioned in previous Table the marginal farmers only have grown Oil Palm reporting 105.10 quintals per acre. The reason for growing Oil Palm than other commercial crops is its low cost of production and better commercial value than other Oilseed crops.

Table 4.2: Productivity comparison of palm oil with other crops grown

Farm Size	Marginal	Small	Medium	Large	Total
Quantity Quintals per acre					
Main kharif crops – Paddy		26.00	24.84	25.60	25.31
Oil Palm	105.10	105.30	98.10	96.70	98.90
Perennial Crops					
Lemon			19.44	12.28	13.36
Coconut					
Cashew nut		16.00			16.00
Coco				0.13	0.13
Main summer crops -					
Any other plantation crop -					
Value Rs per acre					
Main kharif crops – Paddy		40050	37297	38384	38041
Oil Palm	68294	65458	63765	62874	64262
Perennial Crops					
Lemon			87667	77228	78807
Coconut		100000	77364	88765	85138
Cashew nut		80000			80000
Coco				2173	2173
Main summer crops -					
Any other plantation crop -					

Source: Field survey

4.2 a: Productivity difference between Exotic and Indigenous varieties of Oil Palm:

On an aggregate the productivity of Oil Palm in the peak season is reported to be 7.73 tonnes per acre, while it is 2.19 tonnes per acre in the lean season. The difference of productivity of between two season is about 252.78 per cent. Across the groups the difference of productivity between two seasons varied from 5.11 tonnes per acre for medium farmers to 5.86 tonnes per acre in case of small farmers.

Glancing over individual varieties, the productivity per acre for Exotic variety is reported to be 8.08 tonnes in peak season while it was 2.27 tonnes per acre in the lean season. The difference between two seasons ranged between 5.08 tonnes per acre in case

of medium farmers and 6.70 tonnes per acre in case of large farmers. On an average the percentage of difference from peak season is reported as 256.12 per cent.

The productivity of Indigenous variety of Oil Palm is reported to be 7.29 tonnes per acre in the peak season while it was 2.3 tonnes per acre in the lean season. Across the groups the productivity difference between two seasons ranged from 5.15 tonnes per acre in case of medium farmers to 5.88 tonnes per acre in case of small farmers. On an average the difference of productivity from peak season is reported to be 231.71 per cent. All the above details can be viewed from the following Table 4.2 a.

Table 4.2 a: Productivity difference in palm during peak and lean season

(tonnes per acre)

Farm Size	Marginal	Small	Medium	Large	Total
Exotic variety					
Productivity in the peak season	7.91	8.36	7.44	8.74	8.08
Productivity in the lean season	2.68	2.25	2.36	2.04	2.27
Productivity difference in the two season	5.23	6.10	5.08	6.70	5.81
% difference from peak season	195.16	270.69	214.83	328.62	256.12
Indigenous variety					
Productivity in the peak season	7.92	8.59	7.51	7.06	7.29
Productivity in the lean season	2.46	2.71	2.36	2.23	2.30
Productivity difference in the two season	5.46	5.88	5.15	5.38	5.33
% difference	221.79	217.20	217.90	241.33	231.71
Aggregate					
Productivity in the peak season	8.02	8.21	7.47	7.71	7.73
Productivity in the lean season	2.62	2.35	2.36	1.98	2.19
Productivity difference in the two season	5.40	5.86	5.11	5.74	5.54
% difference	206.37	249.10	216.39	290.31	252.78

Source : Field survey

4.2 b: Percentage Area under Oil Palm age wise:

The percentage of varieties in area in different ages of Oil Palm plants are presented in Table 4.2 b. On the whole the percentage of area of Oil Palm plants varied from 7.92 per cent in case of 3 to 5 years age of plants to 54.77 per cent for the plants bearing the age of 6 to 10 years. Observing across the groups all most all groups reported higher percentage of age under plants bearing the period 6 to 10 years. Across the groups the percentage of area varied from 44.38 per cent in case of small to 59.19 per cent in case of medium.

The productivity of Oil Palm reported as high as 9.81 tonnes per acre by the age of the plants bearing 6 to 10 years, while 9.68 tonnes per acre by the plats bearing 11 to 15

years. The productivity of Oil Palm varied from 9.25 tonnes per acre in case of plants bearing 16 to 20 years to 9.36 tonnes per acre in case of plants bearing period of 3 to 5 years. Across the groups the higher productivity is reported by the plants bearing the period 6 to 10 years and 16 to 20 years.

Table 4.2 b: Percentage area under oil palm age wise

Farm Size	Marginal	Small	Medium	Large	Total
Age wise difference in area					
Percentage area with bearing period up to 2 years					
Percentage area with bearing period 3 to 5 years	10.90	22.97	13.60	2.03	7.92
Percentage area with bearing period 6 to 10 years	50.29	44.38	59.19	54.41	54.77
Percentage area with bearing period 11 to 15 years	19.25	15.42	11.78	3.73	9.27
Percentage area with bearing period 16 to 20 years	19.56	17.23	15.43	39.83	28.03
Percentage area with bearing period above 20 years					
Total	100.00 (77.85)	100.00 (186.40)	100.00 (512.76)	100.00 (964.75)	100.00 (1741.86)
Age wise difference in productivity (tonnes per acre)					
Productivity with bearing period up to 2 years					
Productivity with bearing period 3 to 5 years	8.94	9.66	9.67	9.17	9.36
Productivity with bearing period 6 to 10 years	10.97	10.93	10.12	9.20	9.81
Productivity a with bearing period 11 to 15 years	9.13	9.65	9.87	11.59	9.68
Productivity with bearing period 16 to 20 years	10.62	11.02	10.02	8.75	9.25
Productivity with bearing period above 20 years					

Source : Field survey

4.3: Economics of Production Cost and Resource Use - Indigenous versus Exotic Varieties:

The details of economics of production cost and resource use of Indigenous and Exotic varieties of Oil Palm are presented in Table 4.3. Observing the production costs of both varieties of Oil Palm, on an aggregate the production is reported as 989 quintals per acre, deriving a total revenue of Rs. 64,262. The total cost is reported to be Rs.37,921 per acre. The net returns after subtracting the total cost from total revenue is reported to be Rs.26341 per acre. On the other hand the net returns subtracting the variable cost from total revenue is accounted for Rs.31,751. Glancing over the individual varieties the net returns from exotic variety after deducting the total cost from total revenue is reported as Rs.27,640 while in case of indigenous variety it is Rs.25,463. On the other hand the net returns subtracting the variable cost form total revenue is reported to be Rs. 33,773 in case of Exotic variety, while it is Rs.30,385 in case of Indigenous variety. Though there is marginal difference in net returns (Rs. 2,277) between two varieties, the farmers are attracting towards Exotic varieties of Oil Palm due to attraction of higher quantity of production in case of Exotic variety than the Indigenous variety.

Table 4.3: Net returns per acre from oil palm

(Rs per acre)

Farm Size	Exotic variety	Indigenous variety	Total
Average Area Planted (acres)	490.01	725.60	1215.60
Preparatory tillage	(0.0)	(0.0)	(0.0)
Manure & FYM	4856 (12.25)	4388 (11.94)	4577 (12.07)
Major and minor nutrients	11825 (29.83)	10409 (28.32)	10980 (28.95)
Transplanting and gap filling	(0.0)	(0.0)	(0.0)
Irrigation charges	2751 (6.94)	3161 (8.60)	2996 (7.90)
Inter cultural operations	(0.0)	(0.0)	(0.0)
Plant protection chemicals	954 (2.41)	1047 (2.85)	1010 (2.66)
Weeding and plant protection measures	313 (0.79)	279 (0.76)	293 (0.77)
Harvesting and collection	(0.0)	(0.0)	(0.0)
Pruning	(0.0)	(0.0)	(0.0)
Grading, storage, transport, packing	188 (0.47)	193 (0.52)	191 (0.50)
Market/mandi fee etc.	(0.0)	(0.0)	(0.0)
Interest on Working Capital#	(0.0)	(0.0)	(0.0)
Variable labour cost	12620 (31.84)	12361 (33.63)	12466 (32.87)
Total Variable Cost	33507 (84.53)	31838 (86.61)	32511 (85.73)
Fixed cost including planting material, field preparation cost, supporting material and irrigation setup (Amortized over the life time)##	6134 (15.47)	4922 (13.39)	5410 (14.27)
Total Cost	39641 (100.0)	36760 (100.0)	37921 (100.0)
Total Revenue	67280	62223	64262
Total Revenue - Total Cost	27640	25463	26341
Total Revenue - Variable Cost	33773	30385	31751
Output produced per acre (quintals)	1035	957	989

Note: All variable cost items consist of two components:

(i) Bearing period cost - that is already during the reference period (i.e., 2015-16)
(ii) Cost during the plantation year/gestation period - that has been brought into the 2015-16 prices from the year of plantation/gestation, using the wholesale price index of all commodities for Andhra Pradesh state.

@ Repair, maintenance and depreciation is 10% discounted value of agricultural assets holdings including tractor & implements and tube-well motor etc. that is divided in proportionate to each crop sown during the year.

Interest on working capital is interest paid on the loans/borrowing divided in proportionate to each crop sown during the year.

For amortization refer to the literature Subrahmanyam and Mohandas (1982), Mishra (1992), Sharma (1996), Chand (1994) – the details given in Chapter Plan References

Source : Field survey

4.4: Net Returns from Indigenous versus Exotic Varieties of Oil Palm:

4.4 a: Exotic Variety:

The production per acre of Exotic variety is reported to be 1035 quintals. Across the groups the per acre production varied from 980 quintals in case of medium farmers to 1078 quintals in case of large farmers. More over the average total cost per acre is reported to be Rs. 39641. Across the groups the total costs per acre varied from Rs. 38,586 in case of large farmers to Rs.42,174 in case of small farmers. The Net returns on an average after deducting total costs from total revenue is reported to be Rs. 27,640 and across the groups the net returns varied from Rs.24,663 in case of medium farmers to Rs.31,487 in case of large farmers. On the other hand the net returns after subtracting variable costs from total revenue varied from Rs.30,646 in case of medium farmers to Rs.38,929 in case of large farmers. More over larger amounts of labour costs are reported by marginal and small farmers than medium and large farmers. All the above details can be viewed from Table 4.4 a.

4.4 b: Indigenous variety:

The production per acre of indigenous variety of Oil Palm is reported as 957 quintals. Glancing over groups the production per acre varied from 929 quintals in case of large farmers to 1121 quintals for small farmers. The total cost per acre is reported to be Rs.36,760 and across groups the per acre total cost varied from Rs.36,569 in case of large farmers to Rs.38,990 in case of marginal farmers. The Net returns after deducting total cost from total revenue is reported to be Rs. 25,463. On an average and across groups the net returns varied from Rs.23,796 in case of large farmers to Rs.30,407 in case of small farmers. On the other hand the net returns after deducting variable cost from total revenue is accounted for Rs.30,385 and across groups, the net returns ranged from Rs.29,344 in case of medium farmers to Rs.34,578 in case of marginal farmers. Higher amounts of labour costs per acre were reported by medium farmers than other groups. All the above details can be viewed from Table 4.4b.

Table 4.4 a: Net returns per acre from oil palm – Exotic variety

(Rs per acre)

Farm Size	Marginal	Small	Medium	Large	Total
Average Area Planted (acres)	46.25	102.90	188.36	152.50	490.01
Preparatory tillage	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Manure & FYM	4512 (11.30)	5898 (23.26)	4868 (19.30)	4242 (16.09)	4856 (12.25)
Major and minor nutrients	11668 (29.22)	14113 (33.47)	11757 (30.12)	10412 (26.98)	11825 (29.83)
Transplanting and gap filling	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Irrigation charges	2638 (6.61)	2876 (6.82)	2893 (7.41)	2524 (6.54)	2751 (6.94)
Inter cultural operations	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Plant protection chemicals	1131 (2.83)	1039 (2.47)	952 (2.44)	844 (2.19)	954 (2.41)
Weeding and plant protection measures	403 (1.01)	344 (0.82)	311 (0.80)	268 (0.70)	313 (0.79)
Harvesting and collection	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Pruning	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Grading, storage, transport, packing	192 (0.48)	187 (0.44)	177 (0.45	200 (0.52)	188 (0.47)
Market/mandi fee etc.	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Interest on Working Capital#	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Variable labour cost	13227 (33.13)	13255 (31.43)	12098 (30.99)	12652 (32.79)	12620 (31.84)
Total Variable Cost	33771 (84.58)	37715 (89.43)	33056 (84.67)	31143 (80.71)	33507 (84.53)
Fixed cost including planting material, field preparation cost, supporting material and irrigation setup (Amortized over the life time)##	6158 (15.42)	4458 (10.57)	5983 (15.33)	7442 (19.29)	6134 (15.47)
Total Cost	39928 (100.0)	42174 (100.0)	39040 (100.0)	38586 (100.0)	39641 (100.0)
Total Revenue	68865	68980	63702	70072	67280
Total Revenue - Total Cost	28936	26805	24663	31487	27640
Total Revenue - Variable Cost	35094	31264	30646	38929	33773
Output produced per acre (quintals)	1059	1061	980	1078	1035

Note: All variable cost items consist of two components:

(i) Bearing period cost - that is already during the reference period (i.e., 2015-16)

(ii) Cost during the plantation year/gestation period - that has been brought into the 2015-16 prices from the year of plantation/gestation, using the wholesale price index of all commodities for Andhra Pradesh state.

@ Repair, maintenance and depreciation is 10% discounted value of agricultural assets holdings including tractor & implements and tube-well motor etc. that is divided in proportionate to each crop sown during the year.

Interest on working capital is interest paid on the loans/borrowing divided in proportionate to each crop sown during the year.

For amortization refer to the literature Subrahmanyam and Mohandas (1982), Mishra (1992), Sharma (1996), Chand (1994) – the details given in Chapter Plan References

Source : Field survey

Table 4.4 b: Net returns per acre from oil palm – Indigenous variety

(Rs per acre)

Farm Size	Marginal	Small	Medium	Large	Total
Average Area Planted (acres)	31.70	62.50	193.90	437.50	725.60
Preparatory tillage	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Manure & FYM	4593 (11.78)	5224 (14.05)	4884 (13.31)	4033 (11.03)	4388 (11.94)
Major and minor nutrients	11920 (30.57)	14014 (37.68)	11669 (31.81)	9226 (25.23)	10409 (28.32)
Transplanting and gap filling	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Irrigation charges	2650 (6.80)	2456 (6.60)	3662 (9.98)	3077 (8.41)	3161 (8.60)
Inter cultural operations	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Plant protection chemicals	1050 (2.69)	1053 (2.83)	989 (2.69)	1072 (2.93)	1047 (2.85)
Weeding and plant protection measures	386 (0.99)	347 (0.93)	304 (0.83)	250 (0.68)	279 (0.76)
Harvesting and collection	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Pruning	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Grading, storage, transport, packing	183 (0.47)	184 (0.49)	192 (0.52)	195 (0.53)	193 (0.52)
Market/mandi fee etc.	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Interest on Working Capital#	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Variable labour cost	12099 (31.03)	12261 (32.97)	12782 (34.84)	12208 (33.38)	12361 (33.63)
Total Variable Cost	32882 (84.34)	35538 (95.55)	34483 (93.99)	30061 (82.21)	31838 (86.61)
Fixed cost including planting material, field preparation cost, supporting material and irrigation setup including that of gestation period (Amortized over the life time)##	6107 (15.66)	1654 (4.45)	2203 (6.01)	6507 (17.79)	4922 (13.39)
Total Cost	38990 (100.0)	37193 (100.0)	36686 (100.0)	36569 (100.0)	36760 (100.0)
Total Revenue	67461	67600	63827	60365	62223
Total Revenue - Total Cost	28471	30407	27141	23796	25463
Total Revenue - Variable Cost	34578	32062	29344	30303	30385
Output produced per acre (quintals)	1038	1121	982	929	957

Note: All variable cost items consist of two components:

(i) Bearing period cost - that is already during the reference period (i.e., 2015-16)

(ii) Cost during the plantation year/gestation period - that has been brought into the 2015-16 prices from the year of plantation/gestation, using the wholesale price index of all commodities for Andhra Pradesh ka state.

@ Repair, maintenance and depreciation is 10% discounted value of agricultural assets holdings including tractor & implements and tube-well motor etc. that is divided in proportionate to each crop sown during the year.

Interest on working capital is interest paid on the loans/borrowing divided in proportionate to each crop sown during the year.

For amortization refer to the literature Subrahmanyam and Mohandas (1982), Mishra (1992), Sharma (1996), Chand (1994) – the details given in Chapter Plan References

Source : Field survey

4.5: Use of Human Labour in Oil Palm by Activities:

The total man days in cultivation of Oil palm are reported to be 40 days per acre, an in case of the main kharif crops the total man days per acre are accounted for 36. On the other hand the total man days for main rabi crops are reported to be 33 days per acre. More over the total man days for other perennial crops are reported as 37 per acre. Across the groups the total man days for oil palm cultivation ranged from 38 days per acre in case of medium farmers to 40 days per acre for marginal, small and large farmers. On an average the total man days for harvesting and collection are reported to be 17 days per acre. Similarly the man days utilized for irrigation are 6 days for transplanting and gap filling 4 days and major and minor nutrient application are reported as 4 days per acre. The details can be observed form the following Table 4.5.

Table 4.5: Use of human labour in palm oil by activities (man days per acre)

Farm Size	Marginal	Small	Medium	Large	Total
Preparatory tillage	2	3	2	3	3
Manure & FYM	2	2	2	2	2
Major and minor nutrients	5	5	4	4	4
Transplanting and gap filling	4	3	5	5	4
Irrigation	6	6	5	6	6
Inter cultural operations					
Plant protection					
Weeding and plant protection measures	2	2	2	2	2
Harvesting and collection	17	17	16	16	17
Pruning	1	1	1	1	1
Grading, storage, transport, packing	1	1	1	1	1
Total man days (palm oil)	40	40	38	40	40
Total man days (main kharif crops)	35	37	38	34	36
Total man days (main rabi crops)	33	32	33	32	33
Total man days (main summer crops)					
Total man days (other perennial crops)	38	38	35	37	37

Note: # Man-days are calculated by dividing the labour cost by the prevailing wage rate during the year in which cost was incurred for example, for the bearing period wage rate is for 2015-16

Source: Field survey

4.5 a: Marketing channels through which Oil Palm sold:

The sale of produce of Oil Palm is a pre-arranged contract. All the farmers have to sell their entire produce they have derived to a contractor. This pre-arranged contract system is common for both Indigenous and Exotic varieties of Oil Palm. The details can be viewed from the following Table 4.5 a.

Table 4.5 a: Marketing channels through which oil palm sold by the selected households (percentage of output)

	Wholesale market	Local market	Village directly	Co-operative	Govern-ment agencies	Inter medaries at farm gate	Merchant or pre-arranged Contract	Others	Aggre-gate
Exotic variety									
Marginal							100.0		100.0
Small							100.0		100.0
Medium							100.0		100.0
Large							100.0		100.0
Total							100.0		100.0
Indigenous variety									
Marginal							100.0		100.0
Small							100.0		100.0
Medium							100.0		100.0
Large							100.0		100.0
Total							100.0		100.0

Source: Field survey

4.6: Subsidy received by Households Growing Oil Palm:

On an average all the sample Households irrespective of the size of the holding received subsidy for establishment of seed gardens/ provision of seed, Establishment of drip irrigation and Inputs for intercropping like seed, Fertilizer etc.,. On the other hand 80 per cent of the Households received subsidy for machinery and other tools. Across the groups the percentage of Households received subsidy for machinery and other tools varied from 60 per cent in case of marginal to 100 per cent in case of large farmers. The reason to have received subsidy by all the large farmers may be attributed to the popularization and multiplicity of the crop in the future.

On an average the amount of subsidy received per household is Rs. 22,546 for establishment seed gardens/provision of seed, Rs. 9875 for Establishment of drip irrigation, RS.16,043 for inputs for inter cropping like seed, fertilizer etc., and Rs.7,051 for machinery and other tools. Glancing over groups, higher amount of subsidy for establishment of seed gardens/provision of seed is received by large farmers, while higher amount of subsidy is received by marginal and small farmers for the establishment of drip irrigation. Moreover higher amounts of subsidy are received by large farmers for inputs for inter cropping like seed, fertilizer etc., machinery and other tools.

On an average the amount of subsidies received per acre of oil palm planted are Rs.3,709 for establishment of seed gardens/provision of seed, Rs.1,625 for establishment of drip irrigation, Rs.2,629 for inputs for inter cropping like seed, fertilizer etc., and Rs.1,160

for machinery and other tools. Across the groups higher amounts of subsidies per acre are received by marginal and small farmers than medium and large farmers for establishment of seed gardens/provision of seed. Similarly higher amounts of subsidies were received by marginal and small farmers for Establishment of drip irrigation and inputs for inter cropping than medium and large farmers. The small and large farmers received comparatively higher amounts of subsidy than marginal and medium farmers for machinery and other tools. The details can be observed from the following Table 4.6.

Table 4.6: Subsidy received for growing palm oil (Rs per acres)

Sl No	Details of subsidy received	Marginal	Small	Medium	Large	Total
Details of activities for which subsidy received (% of households)						
1	Establishment of seed gardens/provision of seed	100.00	100.00	100.00	100.00	100.00
2	Planting material					
3	Installation of pump set					
4	Bore well/water harvesting structure/ponds					
5	Establishment of drip irrigation	100.00	100.00	100.00	100.00	100.00
6	Establishment of sprinkler irrigation					
7	Inputs for intercropping like seed, fertilizer etc.	100.00	100.00	100.00	100.00	100.00
8	Construction of vermi-compost unit					
9	Machinery and other tools	60.00	75.00	86.00	100.00	80.00
10	Tree guard					
11	Maintenance cost during gestation period					
12	Harvesting incentives					
13	Oil palm processing unit					
14	Farmer's training and information provision					
15	Demonstration, farmers visit etc.					
16	Miscellaneous and others.					
Amount of subsidy received (Rs per household)						
1	Establishment of seed gardens/provision of seed	7216	14152	22919	44934	22546
2	Planting material					
3	Installation of pump set					
4	Bore well/water harvesting structure/ponds					
5	Establishment of drip irrigation	11880	11880	9240	6500	9875
6	Establishment of sprinkler irrigation					
7	Inputs for intercropping like seed, fertilizer etc.	6081	11489	15766	30391	16043
8	Construction of vermi-compost unit					
9	Machinery and other tools	1818	4261	6739	15228	7051
10	Tree guard					
11	Maintenance cost during gestation period					
12	Harvesting incentives					
13	Oil palm processing unit					
14	Farmer's training and information provision					
15	Demonstration, farmers visit etc.					
16	Miscellaneous and others.					

Amount of subsidy received (Rs per acre of palm oil planted)						
1	Establishment of seed gardens/provision of seed	3980	4022	3837	3503	3709
2	Planting material					
3	Installation of pump set					
4	Bore well/water harvesting structure/ponds					
5	Establishment of drip irrigation	6579	3376	1547	507	1625
6	Establishment of sprinkler irrigation					
7	Inputs for intercropping like seed, fertilizer etc.	3355	3265	2640	2369	2639
8	Construction of vermi-compost unit					
9	Machinery and other tools	1003	1211	1128	1187	1160
10	Tree guard					
11	Maintenance cost during gestation period					
12	Harvesting incentives					
13	Oil palm processing unit					
14	Farmer's training and information provision					
15	Demonstration, farmers visit etc.					
16	Miscellaneous and others.					

Source: Field survey

4.7: Capacity Building Programme under Oil Palm:

On an average the training provided to the farmers 3 times in a year by the State Horticulture Department, 2 times the training provided by Krishi Vignan Kendras, 4 times by Fresh Fruit Bunches procuring agency, 2 times by input dealers and 2 times by special research stations set up by the Government. All the groups of farmers have taken training from Fresh Fruit Bunches procuring agency in all the 4 times during the year.

The State Horticulture department have given training 2 days per household from all groups of farmers, while Krishi Vignan Kendras given training 1 day per household to all groups of farmers, training is provided 3 days per household by Fresh Fruit Bunch procuring agency, While 1 day per household by input dealers and 1 day per household by special research stations set up by the Government.

All the sample households reported to have received training within the village by state Horticulture Department. On an average 21 per cent of households reported to have taken training by Krishi Vignan Kendras with in the village and the percentage of households reported to have received training varied from 10 per cent in case of large households to 30 per cent in case of marginal households. More over all sample households reported to have received training by Fresh Fruit Bunches procuring agency with in the village. About 36 per cent of households reported to have received training by input dealers with in the village,

while 11 per cent of the households reported to receive by special research stations set up by the Government with in the village.

About 18 per cent of households reported that the training session was organised with in the town by state horticulture department, while 35 per cent of households reported to be received training with in the town organized by Fresh Fruit Bunch procuring agency. About 12 per cent of households reported that the training session was organised by special research stations setup by the Government with in the town. The details can be seen from the following Table 4.7.

4.7 a: Government help Household to increase the area under the Oil Palm:

On an average of the total sample of 200, 36.82 per cent of Medium, 23.98 per cent of small, 20.92 percent of marginal and 18.48 per cent of large farmers reported to have benefited through Government support. Out of the 200 total number of sample households 21.50 per cent of Marginal, 23.50 per cent of small, 32.00 per cent of medium and 23.00 per cent of large farmers reported that the government made available good quality of seedling. About 42.74 per cent of medium farmers followed by 22.22 per cent of small, 19.66 per cent of marginal and 15.38 per cent of large farmers explained that the government provided drip /sprinkler irrigation facilities to their lands. Moreover 21.50 per cent of marginal, 23.50 per cent of small, 32.00 per cent of medium and 23.00 per cent of large farmers reported to have the provision of buy back of FFB's through a company. Among the sample farmers higher percentage of medium farmers reported to have the promotion of INM or IPM. Similar situation is observed in the provision of training and capacity building. Observing across the groups the higher percentage of medium farmers compared to other groups of farmers is benefited through government support. All the above details can be observed from the Table 4.7 a.

Table 4.7: Sources of training/dissemination activity provided to the farmers

Details of training	Marginal	Small	Medium	Large	Total
Frequency of the training provided during the year					
State Horticulture Department	3	2	3	1	3
State Agricultural University / Colleges					
Krishi Vignan Kendras	2	3	1	2	2
Kisan Call Centre					
Co-operatives / Local Bodies					
FFB Procuring Agency	4	4	4	4	4
Input Dealers / Private Company Representatives	2	2	2	2	2
Special Research Stations set up by the Government	2	1	2	1	2
Non-Government Organisations (NGOs)					
Any other					
Average number of days per household during the year					
State Horticulture Department	2	2	2	2	2
State Agricultural University / Colleges					
Krishi Vignan Kendras	1	1	1	1	1
Kisan Call Centre					
Cooperatives / Local Bodies					
FFB Procuring Agency	3	3	3	3	3
Input Dealers / Private Company Representatives	1	1	1	1	1
Special Research Stations set up by the Government	1	1	1	1	1
Non-Government Organisations (NGOs)					
Any other					
Training sessions organized within village or nearby village (% of households)					
State Horticulture Department	100	100	100	100	100
State Agricultural University / Colleges					
Krishi Vignan Kendras	30	25	20	10	21
Kisan Call Centre					
Cooperatives / Local Bodies					
FFB Procuring Agency	100	100	100	100	100
Input Dealers / Private Company Representatives	50	40	40	15	36
Special Research Stations set up by the Government	20	10	10	5	11
Non-Government Organisations (NGOs)					
Any other					
Training sessions organized within town/district or state capital (% of households)					
State Horticulture Department	30	20	10	10	18
State Agricultural University / Colleges					
Krishi Vignan Kendras					
Kisan Call Centre					
Cooperatives / Local Bodies					
FFB Procuring Agency	50	50	30	10	35
Input Dealers / Private Company Representatives					
Special Research Stations set up by the Government	20	10	10	10	12
Non-Government Organisations (NGOs)					
Any other					

Source : Field survey

Table 4.7 a: Did government help households to increase their area under oil palm (Percentage of households saying yes to the following questions)

Description	Marginal	Small	Medium	Large	Total
Making available good quality seedling	21.50	23.50	32.00	23.00	100.00 (200)
Making available good quality other planting material					
Making available inter cropping facility like seed, fertilizer for the intercrop					
Making provision for pump house for sufficient irrigation					
Facilitating for drip/sprinkler irrigation	19.66	22.22	42.74	15.38	100.00 (200)
Protected cultivation like green house, shade net, plastic tunnel etc.					
Making provision for buy back of FFB through a company	21.50	23.50	32.00	23.00	100.00 (200)
Promotion of integrated nutrient management or integrated pest management	21.37	23.93	41.03	13.68	100.00 (200)
Post-harvest management through providing transportation /storage facility					
Training and capacity building	19.61	26.47	44.12	9.80	100.00 (200)
Total	20.92	23.78	36.82	18.48	100.00 (200)

Note: Figures in brackets are the total number of sample Households.
Source: Field survey

4.8: Farmers Motivation and their Perception about Oil Palm Cultivation:

4.8 a: Farmers Motivation:

Out of the total sample of 200, 90 per cent of the farmers were motivated by private company and around 3 per cent of farmers were motivated by village farmers, family members and friends and relatives. Negligible percentages (1.50 %) of farmers were motivated by government officials. Glancing over across the groups the motivation of farmers by private company ranged from 78.74 per cent in case of small farmers to 100 per cent of marginal farmers. Next to private companies, higher percentages of small farmers compared to other group were motivated by village farmers, family members' friends and relatives. About 4.35 per cent of large farmers were motivated by government officials.

On an average 91 per cent of the total sample were provided technical knowhow by private companies, for 6 per cent of farmers by progressive farmers and for 3 per cent of farmers by technical knowhow provided by government officials. Across the groups the percentage of farmers provided technical knowhow by private companies ranged from 82.98 per cent in case of small to 100 per cent in case of marginal farmers.

All the sample farmers of all groups well accustom to cultural practices of existing variety and accustom to grow the same quality.

On the whole 97 per cent of sample farmers received training threw government support in growing oil palm. The percentage of farmers received government support ranged between 93.62 per cent of small and 100 per cent of marginal farmers across the groups. More over all sample farmers received government support for providing subsidy inputs INM & IPM. All the sample farmers of all groups received support from oil palm procuring company towards Fertilizer Company. The above details can be viewed from the Table 4.8 a.

Table 4.8 a: What motivated farmers to grow oil palm crop (% of households)

Details of Motivation	Marginal *(43)	Small *(47)	Medium *(64)	Large *(46)	Total *(200)
What motivated farmers to grow oil palm					
1. Private Company	100.00	78.74	89.07	93.48	90.00
2. Village Farmers		10.65	3.12		3.50
3. Family Members, Friends & Relatives		8.51	1.56	2.17	3.00
4. Progressive Farmer		2.13	4.69		2.00
5. Government Officials			1.56	4.35	1.50
Who provided technical knowhow?					
1.Private Company	100.00	82.98	87.47	95.67	91.00
2.Progressive Farmer		17.02	6.25		6.00
3.Government Officials			6.25	4.35	3.00
Farmers knowledge about the existing varieties					
Well accustomed to the cultural practices	100.00	100.00	100.00	100.00	100.00
Why growers prefer particular variety they grow					
Practice of growing same quality	100.00	100.00	100.00	100.00	100.00
The government support received in growing oil palm					
1.Training	100.00	93.62	95.30	100.04	97.00
2.Subsidy Inputs	100.00	100.00	100.00	100.00	100.00
3. INM & IPM	100.00	100.00	100.00	100.00	100.00
Support received from oil palm procuring company					
Fertilizer	100.00	100.00	100.00	100.00	100.00

*: Figures in brackets represent the number of sample farmers of respective groups.
Source: Field survey

4.8 b: Perception of Growers:

On an average 55 per cent of farmers of total sample received help by government to increase the area under oil palm by providing Seedling/Nursery. 20 per cent of the sample farmers received governments help by under growing training. About 25 per cent of sample farmers were provided pre harvest contract threw by back by a company. Glancing across the groups' higher percentage of small and medium farmers received government help towards capacity building and pre harvest contract facility.

About 42.50 per cent of farmers recognized the benefit of training while 57.50 per cent farmers are facilitated by subsidy provision. All the groups of farmers are interested to have subsidy provision than the facility of training camps except in case of large farmers.

About 67.50 per cent farmers reported to have received an increase of 20 to 40 per cent of income after cultivation of Oil Palm. On the other hand 32.50 per cent of farmers reported an increase of 40 to 60 per cent of income after cultivation of oil palm crop. Across the groups it is observed the increase of income is reported in the range of 20 to 40 per cent after cultivation of oil palm.

All the sample farmers of all groups have reported to be satisfied with the government and private company support.

Out of the total sample of 200, 53.75 per cent of farmers suggested that the Minimum Support Price range should be from Rs.8000 to Rs.9000 per tonne. On the other hand 36.25 per cent of farmers suggested providing 90 per cent subsidy for all items for all groups of farmers. Only 10 per cent of farmers reported to improve harvesting technology. Observing across groups the higher percentage of farmers have suggested the increase of range of the Minimum Support Price from Rs.8000 to Rs.9000 and the farmers next preference is to provide 90 per cent subsidy. The details can be observed from the Table 4.8 b.

4.9: Summary:

On an aggregate the area under Oil Palm per household is reported to be 6.03 acres. All the marginal farmers have grown only Oil Palm crop. The production of Fresh Fruit Bunch per acre on aggregate is reported to be 9.89 tonnes. The value of output per acre is reported as Rs. 64,262 while the value of output per household is Rs. 3,90,585.

The per household area under exotic variety of Oil Palm is reported as 4.90 acres. On an average the production of Fresh Fruit Bunch per acre is reported to be 10.35 tonnes and the value of output received per acre is Rs. 67,280. On an average per acre value of output is reported to be Rs. 67,280 while the value of output received per household is Rs. 3,29,680.

Glancing over the indigenous variety of Oil Palm and the average area under Oil Palm per household is reported to be 7.26 acres. The production of Fresh Fruit Bunch per acre on an average is reported to be 9.57 tonnes. On an average the value of output per acre is reported as Rs. 62,223, while the value of output received per household is Rs. 4,51,490.

Table 4.8 b: Perception of growers about the oil palm cultivation (% of households)

Details of training	Marginal *(43)	Small *(47)	Medium *(64)	Large *(46)	Total *(200)
How government has helped you to increase your area under oil palm					
By providing seedling/nursery	58.89	71.03	43.88	67.2	55.00
By providing material inputs					
By capacity building (providing training)	19.61	26.47	24.12	9.80	20.00
By providing processing facilities					
By providing pre harvest contract through buy back by a company	21.50	23.50	32.00	23.00	25.00
By providing procurement facility					
What are the good points in the policy towards palm oil					
Financial assistance					
Building infrastructure					
Capacity Building (awareness camps / training etc.,)	40.00	35.00	30.00	65.00	42.50
Subsidy provision	60.00	65.00	70.00	35.00	57.50
Any other					
Do you think your income has grown up after cultivation of oil palm crop, if yes how much?					
less than 20 %					
20 to 40 %	70.00	65.00	55.00	80.00	67.50
40 to 60 %	30.00	35.00	45.00	20.00	32.50
60 to 100 %					
No increase at all					
Are you satisfied with present variety or you want to shift to other varieties, if yes give details					
Satisfied because of Government and Private company support.	100.00	100.00	100.00	100.00	100.00
What changes do you suggest to increase oil palm cultivation					
1.Minimum Support Price Range (8000-9000) per tone	65.00	55.00	45.00	50.00	53.75
2. Subsidy 90 % for all items for all groups of farmers	25.00	40.00	45.00	35.00	36.25
3.Improve Harvesting Technology	10.00	5.00	10.00	15.00	10.00

*Figures in brackets represent the number of sample farmers of respective groups
Source : Field survey

The value of paddy being a food crop is reported Rs.38,041 per acre while the perennial crops exceeded the value of Oil Palm per acre. The reason for growing Oil Palm than other commercial crops is its low cost of production and better commercial value than other Oilseed crops.

On an aggregate the productivity of Oil Palm in the peak season is reported to be 7.73 tonnes per acre, while it is 2.19 tonnes per acre in the lean season. The difference of productivity of peak season is about 252.78 per cent.

Glancing over individual varieties, the productivity per acre for Exotic variety is reported to be 8.08 tonnes in peak season while it was 2.27 tonnes per acre in the lean season.

The productivity of Indigenous variety of Oil Palm is reported to be 7.29 tonnes per acre in the peak season while it was 2.3 tonnes per acre in the lean season.

Glancing over the individual varieties the net returns from exotic variety after deducting the total cost from total revenue is reported as Rs.27,640 while in case of indigenous variety it is Rs.25,463. On the other hand the net returns subtracting the variable cost form total revenue is reported to be Rs. 33,773 in case of Exotic variety, while it is Rs.30,385 in case of Indigenous variety. Though there is marginal difference in net returns (Rs. 2,277) between two varieties, the farmers are attracting towards Exotic varieties of Oil Palm due to attraction of higher quantity of production in case of Exotic variety than the Indigenous variety.

The production per acre of Exotic variety is reported to be 1035 quintals. The Net returns on an average after deducting total costs from total revenue is reported to be Rs. 27,640. On the other hand the net returns after subtracting variable costs from total revenue varied from Rs.30,646 in case of medium farmers to Rs.38,929 in case of large farmers. More over larger amounts of labour costs are reported by marginal and small farmers than medium and large farmers.

The production per acre of indigenous variety of Oil Palm is reported as 957 quintals. The Net returns after deducting total cost from total revenue is reported to be Rs. 25,463 on an average on the other hand the net returns after deducting variable cost from total

revenue is accounted for Rs.30,385. Higher amounts of labour costs per acre were reported by medium farmers than other groups.

The sale of produce of Oil Palm is a pre-arranged contract. This pre-arranged contract system is common for both Indigenous and Exotic varieties of Oil Palm.

On an average all the sample Households irrespective of the size of the holding received subsidy for establishment of seed gardens/ provision of seed, Establishment of drip irrigation and Inputs for intercropping like seed, Fertilizer etc.,. The reason to have received subsidy by all the large farmers may be attributed to the popularization and multiplicity of the crop in the future. Higher amount of subsidy for establishment of seed gardens/provision of seed is received by large farmers, while higher amount of subsidy is received by marginal and small farmers for the establishment of drip irrigation. The small and large farmers received comparatively higher amounts of subsidy than marginal and medium farmers for machinery and other tools.

All the sample households reported to have received training within the village by state Horticulture Department. More over all sample households reported to have received training by Fresh Fruit Bunches procuring agency with in the village. About 18 per cent of households reported that the training session was organised with in the town by state horticulture department, while 35 per cent of households reported to be received training with in the town organized by Fresh Fruit Bunch procuring agency. About 12 per cent of households reported that the training session was organised by special research stations setup by the Government with in the town.

On an average of the total sample of 200, 36.82 per cent of Medium, 23.98 per cent of small, 20.92 per cent of marginal and 18.48 per cent of large farmers reported to have benefited through Government support. Among the sample farmers higher percentage of medium farmers reported to have the promotion of INM or IPM. Similar situation is observed in the provision of training and capacity building.

Out of the total sample of 200, 90 per cent of the farmers were motivated by private company and around 3 per cent of farmers were motivated by village farmers, family members and friends and relatives. Negligible percentages (1.50 %) of farmers were

motivated by government officials. About 4.35 per cent of large farmers were motivated by government officials.

All the total sample farmers reported to have received Government support through subsidy inputs and INM & IPM. About 97 per cent of total sample reported to have received training facilities through government. All the total sample farmers invariably expressed to have received support from oil palm procuring company for fertilizers.

On an average 55 per cent of farmers of total sample received help by government to increase the area under oil palm by providing Seedling/Nursery. 20 per cent of the sample farmers received governments help by under growing training. About 25 per cent of sample farmers were provided pre harvest contract threw by back by a company. Glancing across the groups' higher percentage of small and medium farmers received government help towards capacity building and pre harvest contract facility.

All the groups of farmers reported to have satisfied with the present variety because of Government and private company support.

Among the 200 sample households, 53.75 per cent of farmers suggested that the Minimum Support Price range should be from Rs.8000 to Rs.9000 per tonne. On the other hand 36.25 per cent of farmers suggested providing 90 per cent subsidy for all items for all groups of farmers. Only 10 per cent of farmers reported to improve harvesting technology.

* * *

CHAPTER – V

Summary, Concluding Remarks and Policy Implication

Vegetable oil is the main source of fat for human consumption. Many vegetable oils are consumed directly, or indirectly as ingredients in food. Vegetable oil is essential for the nutritional security of the people. With the increase in the consumption of edible oil India has been mainly dependent on import of oil from other countries to meet its needs. With per capita consumption of vegetable oils at the rate of 16 kg/year/person for a projected population of 1276 million, the total vegetable oils demand is likely to touch 20.4 million tonnes by end 2017. To bridge the gap between demand and supply efforts have been made to introduce new oil crops in the last two decades. However, for Indian conditions, oil palm has shown promising results for commercial cultivation.

5.1 Need for the Study:

The nine oilseeds presently grown in about 29 million ha in India are unable to meet the demand for edible oil in India. During 2013, Production of vegetable oil in India was about 9 million tonnes whereas the consumption was about double the amount of production. So India has been mainly depending on import of oil from other countries to fulfil its requirements. During 2009-10, India imported 8.82 million tonnes of vegetable oil of which palm oil accounted for about 6.44 million tonnes (73 per cent of total import), which implies that the country is dependent on palm oil imports for about 40 per cent of its annual edible oil requirement. In addition, the total demand for edible oils is expected to increase further. The total area existing under Oil Palm at the end of 2011-12 (XI Plan) was 2.08 lakh hectares. Andhra Pradesh ranks first in the area coverage followed by Karnataka, Tamil Nadu and Mizoram states. The Oil Palm Development Programme under ISOPOM provides assistance to encourage oil palm. In addition to the Oil Palm Development Programme, a special programme of Oil Palm Area Expansion Programmme (OPAE) under Rashtriya Krishi Vikas Yojana (RKVY) is under implementation from 2011-12 onwards with the focus to bring an additional area of 60,000 ha per annum under oil palm. Under OPAE Programme, assistance for planting material i.e. Oil Palm Area Expansion, cost of cultivation during gestation period of four years, supply of Drip Irrigation systems, supply of Diesel/Electric Pumpsets for drip systems, Inputs to inter-cropping in Oil Palm fields, INM, IPM, Fertigation, Plant Protection Chemicals & tree guard etc, construction of Vermi-compost units, bore-wells at Oil Palm farm and setting up of Oil Palm processing units is being provided to promote the Oil Palm cultivation.

Oil palm cultivation has to be further increased keeping in view the alarming situation of Oil imports in India with an expansion of more area to meet the domestic demand of oil consumption. In this connection the ministry of Agriculture, Government of India has asked its Agro Economic Research Centres to take up a study on the "Performance of Indigenous and Imported seedlings of Oil Palm" in respective states with the following objectives. The Agro Economic Research Centre, Andhra University, Visakhapatnam has taken up the study in Andhra Pradesh, the reference year being 2015-16.

5.1.1 Main Objectives of the Study:

The Main objectives of the study are:

1) To delineate the total area under indigenous and exotic seedling plantation of oil palm crop in the selected states.
2) To study the resource usage and productivity differences between the indigenous and exotic seedling plantation of oil palm
3) To compare profitability of indigenous and exotic seedling plantation and their feasibility in the long run and
4) To provide the policy suggestions for the promotion of prefer variety of palm oil.

5.1.2: Data Base and Methodology:

The present study on oil palm is based on both primary as well as secondary data collected from 100 farmers growing Indigenous variety and 100 farmers growing Exotic variety surveyed in the two districts. Further the Marginal, Small, Medium and Large size categories of farmers are selected as per the probability proportion to the area under Oil Palm.

The primary data is collected with a structured questionnaire prepared for the purpose of this study. The secondary data is collected from various published and unpublished sources and also collected from Department of Agriculture in state as well as in District Offices. The details of Palm Oil Area under Indigenous and Exotic varieties in each district are collected from the department of Agriculture. Two Districts Viz., West Godavari and Visakhapatnam are selected basing on the probability proportion to the area of Oil Palm in the State. Since two varieties Indigenous and Exotic varieties are not available in the East Godavari District, alternatively Visakhapatnam District is selected for the purpose of the study. Since the total number of Sample households is not available in one Taluk,

alternatively two taluks from each district are selected in which both indigenous and exotic varieties are grown. Thus a total number of 100 Indigenous variety farmers and 100 Exotic variety farmers are surveyed in the two districts. To identify the growth trends in Area and Yield of various crops, the Exponential growth rates are estimated using the form of equation

$L_nY=a+bt+u_t$ Where 'b' is the Growth rate.

5.1.3 Overview of the Report:

The present study is divided into 5 chapters. The First chapter being the introductory chapter, the second chapter deals with the role of Oil Palm in Oilseeds sector. The third chapter provides the details of household characteristics, cropping pattern and value of output while the fourth chapter presents the production structure and resource use under Horticultural crops. Finally, the fifth chapter gives the summary, concluding remarks and policy implications.

5.2: Role of Oil Palm in Oilseeds Sector: Prospects in Andhra Pradesh:

Glancing over the performance of the oil seed production in Andhra Pradesh from TE 1990-91 to TE 2014-15, it is observed that the production showed an increasing trend up to TE 1995-96; from there a continuous steep fall in the production is observed up to TE 2003-04. During the period TE 2004-05 to TE 2014-15 the production showed a fluctuating trend. The reason may be attributed to the seasonal and climatic conditions. The percentage of Oil Seeds area in Gross cropped area recorded an increasing trend from TE 1990-91 to 1993-94 and from there a continuous decrease is reported up to TE 2000-01. Again an upward trend is observed from TE 2001-02 to TE 2005-06 and from there a steep fall is observed up to TE 2014-15. The fluctuating trend of the percentage of Oil seeds area in Gross Cropped area is due to the year to year changes in Gross Cropped area.

The total time series data from 1980-81 to 2014-15 of area and yield of major crops is divided in to four sub periods consisting 10 years of each period. The first decade i.e., 1980-81 to 1989-90, no significant growth is recorded in case of area under rice, while a significant negative growth was recorded in the area under coarse cereals. Moreover the area under pulses showed a positive significant growth. The impact of negative growth in case of area under rice and coarse cereals reflected on the area under food grains. On the other hand the yield of rice and pulses showed a positive significant growth which impact is reflected into the yield of food grains. The reason for negative growth in the area of rice

and coarse cereals may be attributed to the erratic nature of rain fall. The area and yield of oil seeds showed a positive significant growth during the same decade.

During the period 1990-91 to 1999-2000 slight increase in the growth of area under rice is observed, while negative growth is observed in the area under coarse cereals. The negative impact of growth in area under coarse cereals reflected in the area under food grains. No significant positive growth in area under pulses while there is no significant negative growth in the yield of pulses is observed. A Significant negative growth was observed in the area and yield of oilseeds.

During the period 2000-01 to 2009-10, there is no significant but negative growth observed in the areas of coarse cereals and pulses. On the other hand a positive significant growth in yields in case of coarse cereals and pulses is observed. The positive impact of growth in yields of rice, coarse cereals and pulses is reflected in the yield of food grains. No significant negative growth in the area and positive growth in the yield of oil seeds is observed during the period. A positive significant growth is observed in the area and yield of palm oil. The reason for decrease in the area under oil seeds is due to introduction of oil palm and the diversification of area under oil seeds to oil palm.

During 2010-11 to 2014-15 the impact of negative growth in the areas of rice and pulses is reflected as a negative significant growth in area under food grains. Moreover that the yields of pulses only showed a positive significant growth compared to other food grain crops. A negative significant growth in the area of oil seeds and a positive not significant growth in the area under oil palm is observed. No positive significant growth in the yields of oil seeds, horticultural crops and oil palm is observed.

The Growth Rates based on Annual Averages indicate a decrease in the growth of area under Rice, Coarse Cereals and Food Grains in the four continuous periods. While the yield of Rice, Coarse Cereals and food grains showed a continuous negative growth in the four periods. The yield of pulses showed a positive growth except in the period 2010-11 to 2013-14. A fluctuating trend is observed in the yield of Horticultural crops across the periods. A steep fall in the growth of Oil Palm is observed in the period 2010-11 to 2013-14 and finally the area under Oil Palm showed a growth of -0.83 per cent in the period 2010-11 to 2014-15. On the other hand, the yield of Oil Palm showed a continuous negative growth across the four periods.

It is observed that the share of Oil Palm area showed a continuous increasing trend from TE 1998-99 to TE 2009-10 and from there a continuous slow decrease is observed till TE 2014-15. The reason may be attributed to the uprooted area in some districts owing to the price changes. A continuous decrease in Area and Production of Oil Seeds from TE 1990-91 to TE 2014-15 is observed. The reasons for the decrease or fluctuations may be attributed to not only to the seasonal conditions but also to the year to year variations in prices. Continuous increasing trend is observed in Area and Production of Oil Palm up to TE 2010-11 and from there slight fluctuations appeared in the area up to TE 2014-15 while a continuous increasing trend is observed in case of production. On the other hand, a continuous increasing trend is observed from TE 1998-99 to TE 2014-15, resulting an yield of 17.35 tonnes per hectare by TE 2014-15. The inclination of farmers towards growing Oil Palm resulted in the decrease of area under Oil Seeds. The percentage of Area under oil seeds in Gross cropped area is decreased in TE 2014-15 while the percentage of area under Horticultural crops is increased in TE 2014-15, when compared to TE 2005-06. This inferences that the increase in area under Horticultural crops may be attributed to the increase in area under Oil Palm. The area under Oil Palm reported a high of 0.17 lakh ha in West Godavari district, while the second place is occupied by East Godavari with an area of 0.11 lakh ha under Oil Palm. The area under Oil Palm increased from 0.17 lakh ha in TE 2005-06 in West Godavari to 0.49 lakh ha in TE 2014-15. It means the increase is around 3 folds from TE 2005-06. The Area under Horticultural crops showed a positive growth of 0.25 per cent, while the yield reported a positive growth of 2.45 per cent between the two Triennia's. More over the area under Oil Palm reported a positive growth of 0.66 per cent, while the growth of yield of Oil Palm reported to be 8.17 per cent.

Glancing across the districts, the growth of area under Oil Palm is reported to be negative in East Godavari and S.P.S. Nellore, while the positive growth is reported in five districts ranging from 1.03 per cent in West Godavari district to 1.38 per cent in Visakhapatnam district. On the other hand, all the districts reported a positive growth of yield of Oil Palm between the two Triennia (TE 2005-06 and TE 2014-15). Observing across the districts the share of area under Oil Palm showed a tremendous increase between TE 2005-06 and TE 2014-15 except in East Godavari district. The Area and production of Oil seeds have decreased from TE 2005-06 to TE 2014-15 in Andhra Pradesh. Observing across the districts, all the districts except West Godavari showed a significant decrease in Area under Oil Seeds in TE 2014-15, Compared to TE 2005-06. On the other hand, except three districts Viz., Vizianagaram, West Godavari and S.P.S. Nellore, the remaining districts

reported a decrease in production in TE 2014-15 than the TE 2005-06. It is observed that a Tremendous increase in Area, Production and Yield of Oil Palm from TE 2005-06 to TE 2014-15 in the State of Andhra Pradesh. The similar trend is observed across the districts.

5.3: House hold Characteristics, Cropping Pattern and Value of Output:

The average size of the house hold is reported to be 4.01. Across the groups of farmers, the average size ranged between 3.90 in case of marginal farmers and 4.06 in case of large farmers. All the sample heads of the households reported to be engaged in Agriculture and allied activities. On an average the per household operated area is reported to be 8.71 acres. Across the size groups of farmers, the per household operated area ranged from 1.81 acres in case of Marginal farmers to 20.97 acres in case of large farmers. The major sources of irrigation in the study area are Bore-wells and Dug-wells. The small, medium and large farmers reported to have borrowed larger amounts from institutions than the amounts borrowed from friends/ relatives. On an average the per acre borrowed amount from all sources is reported to be Rs. 34,619. Across the groups the Per acre borrowed amount from all sources is varied from Rs.12,179 in case of large farmers to Rs.1,19,436 in case of marginal farmers. The per household amount of borrowed credit is reported to be Rs. 3,01,425. Observing across the groups all the Households utilized the higher percentage of borrowed amount on seasonal crops. The Per Household total value of assets is reported to be Rs. 4,91,233. On the other hand the total value of assets per acre is reported to be Rs. 56,403. Observing across the groups marginal farmers have grown Oil Palm crop only, while small, medium and large farmers have grown paddy and maize on smaller percentages of area. Except marginal farmers the small, medium and large farmers reported to have grown perennial crops including inter cropping of all crops. The per household value of output is reported to be Rs. 4,13,189, while the per acre value of output is reported to be Rs. 47,469. Observing the costs of production, the per acre material cost of production is reported to be Rs. 17,904 while the per acre labour cost is reported as Rs. 13,366. On an average the per house hold farm business income is reported to be Rs. 1,41,007 while the per acre farm business income is Rs. 16,200.

5.4: Production Structure and resource use under Horticultural crops:

On an aggregate the area under Oil Palm per household is reported to be 6.03 acres. All the marginal farmers have grown only Oil Palm crop. The production of Fresh Fruit Bunch per acre on aggregate is reported to be 9.89 tonnes. The value of output per acre is reported as Rs. 64,262 while the value of output per household is Rs. 3,90,585.

The per household area under exotic variety of Oil Palm is reported as 4.90 acres. On an average the production of Fresh Fruit Bunch per acre is reported to be 10.35 tonnes and the value of output received per acre is Rs. 67,280. On an average per acre value of output is reported to be Rs. 67,280 while the value of output received per household is Rs. 3,29,680. Glancing over the indigenous variety of Oil Palm and the average area under Oil Palm per household is reported to be 7.26 acres. The production of Fresh Fruit Bunch per acre on an average is reported to be 9.57 tonnes. On an average the value of output per acre is reported as Rs. 62,223, while the value of output received per household is Rs. 4,51,490.

The value of paddy being a food crop is reported Rs.38,041 per acre while the perennial crops exceeded the value of Oil Palm per acre. The reason for growing Oil Palm than other commercial crops is due to its low cost of production and better commercial value than other Oilseed crops. On an aggregate the productivity of Oil Palm in the peak season is reported to be 7.73 tonnes per acre, while it is 2.19 tonnes per acre in the lean season. The difference of productivity between the two seasons is about 252.78 per cent. Glancing over individual varieties, the productivity per acre for Exotic variety is reported to be 8.08 tonnes in peak season while it was 2.27 tonnes per acre in the lean season. The productivity of Indigenous variety of Oil Palm is reported to be 7.29 tonnes per acre in the peak season while it was 2.3 tonnes per acre in the lean season.

Glancing over the individual varieties the net returns from exotic variety after deducting the total cost from total revenue is reported as Rs.27,640 while in case of indigenous variety it is Rs.25,463. On the other hand, the net returns subtracting the variable cost form total revenue is reported to be Rs. 33,773 in case of Exotic variety, while it is Rs.30,385 in case of Indigenous variety. Though there is marginal difference in net returns (Rs. 2,277) between two varieties, the farmers are attracted towards Exotic varieties of Oil Palm due to attraction of higher quantity of production in case of Exotic variety than the Indigenous variety.

The production per acre of Exotic variety is reported to be 1035 quintals. The Net returns on an average after deducting total costs from total revenue is reported to be Rs. 27,640. On the other hand the net returns after subtracting variable costs from total revenue varied from Rs.30,646 in case of medium farmers to Rs.38,929 in case of large

farmers. Moreover larger amounts of labour costs are reported by marginal and small farmers than medium and large farmers.

The production per acre of indigenous variety of Oil Palm is reported as 957 quintals. The Net returns after deducting total cost from total revenue is reported to be Rs. 25,463 on an average on the other hand the net returns after deducting variable cost from total revenue is accounted for Rs.30,385. Higher amounts of labour costs per acre were reported by medium farmers than other groups.

The sale of produce of Oil Palm is a pre-arranged contract. This pre-arranged contract system is common for both Indigenous and Exotic varieties of Oil Palm.

On an average all the sample Households irrespective of the size of the holding received subsidy for establishment of seed gardens/ provision of seed, Establishment of drip irrigation and Inputs for intercropping like seed, Fertilizer etc.,. The reason to have received subsidy by all the large farmers may be attributed to the popularization and multiplicity of the crop in the future. Higher amount of subsidy for establishment of seed gardens/provision of seed is received by large farmers, while higher amount of subsidy is received by marginal and small farmers for the establishment of drip irrigation. The small and large farmers received comparatively higher amounts of subsidy than marginal and medium farmers for machinery and other tools.

All the sample households reported to have received training within the village by state Horticulture Department. More over all sample households reported to have received training by Fresh Fruit Bunches procuring agency with in the village. About 18 per cent of households reported that the training session was organised with in the town by state horticulture department, while 35 per cent of households reported to be received training with in the town organized by Fresh Fruit Bunch procuring agency. About 12 per cent of households reported that the training session was organised by special research stations setup by the Government with in the town.

On an average, out of the total sample of 200, 36.82 per cent of Medium, 23.98 per cent of small, 20.92 per cent of marginal and 18.48 per cent of large farmers reported to have benefited through Government support. Among the sample farmers higher percentage

of medium farmers reported to have the benefit of promotion of INM and IPM. Similar situation is observed in the provision of training and capacity building.

Out of the total sample of 200, 90 per cent of the farmers were motivated by private company and around 3 per cent of farmers were motivated by village farmers, family members and friends and relatives. Negligible percentages (1.50 %) of farmers were motivated by government officials. About 4.35 per cent of large farmers were motivated by government officials.

All the total sample farmers reported to have received Government support through subsidy inputs and INM & IPM. About 97 per cent of total sample reported to have received training facilities through government. All the total sample farmers invariably expressed to have received support from oil palm procuring company for fertilizers.

On an average 55 per cent of farmers of total sample received help by government to increase the area under oil palm by providing Seedling/Nursery. 20 per cent of the sample farmers received governments help by under growing training. About 25 per cent of sample farmers were provided pre harvest contract through by back by a company. Glancing across the groups' higher percentage of small and medium farmers received government help towards capacity building and pre harvest contract facility.

All the groups of farmers reported to have satisfied with the present variety because of the support by Government and private companies.

Among the 200 sample households, 53.75 per cent of farmers suggested that the Minimum Support Price range should be from Rs.8000 to Rs.9000 per tonne. On the other hand 36.25 per cent of farmers suggested providing 90 per cent subsidy for all items for all groups of farmers. Only 10 per cent of farmers reported to improve harvesting technology.

5.5: Policy Suggestions:

From the above analysis it can be observed that there is no much variation in cost of cultivation and net returns between Indigenous and Exotic varieties of Oil Palm. But a marginal variation in production is observed. The farmers have inclined to grow Exotic variety than Indigenous varieties, because of higher production in Exotic varieties than

Indigenous varieties. To popularise the Indigenous varieties of Oil Palm the following points may be adopted in future cultivation.

1. Since all the farmers are not fully aware of the varieties, the extension staff of the department of Horticulture should conduct special training programmes in the villages at frequent intervals to make the farmers thoroughly acquainted with the varieties.
2. The improved seed technology must be introduced to popularize the Indigenous varieties for dewing higher production to compete with the production of Exotic varieties.
3. Full subsidy must be provided for all inputs of Indigenous varieties until the varieties are popularized.
4. As per the norms of Andhra Pradesh Micro Irrigation Project (APMIP), Drip Irrigation subsidy has been provided up to 70 per cent so far. This percentage of subsidy must be extended to 80-85 per cent.
5. All the farmers invariably are of the opinion that the minimum support price should be increased to Rs. 8,000 per tonne.
6. The New Modern Harvesting Machinery must be provided to all the farmers at subsidized rates.

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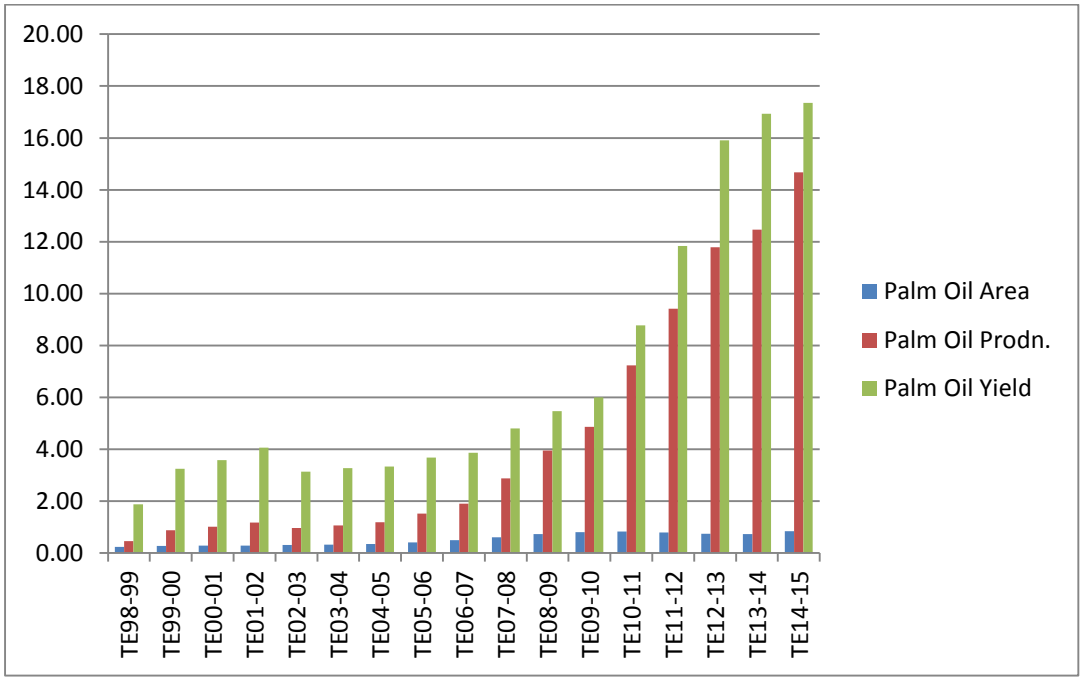
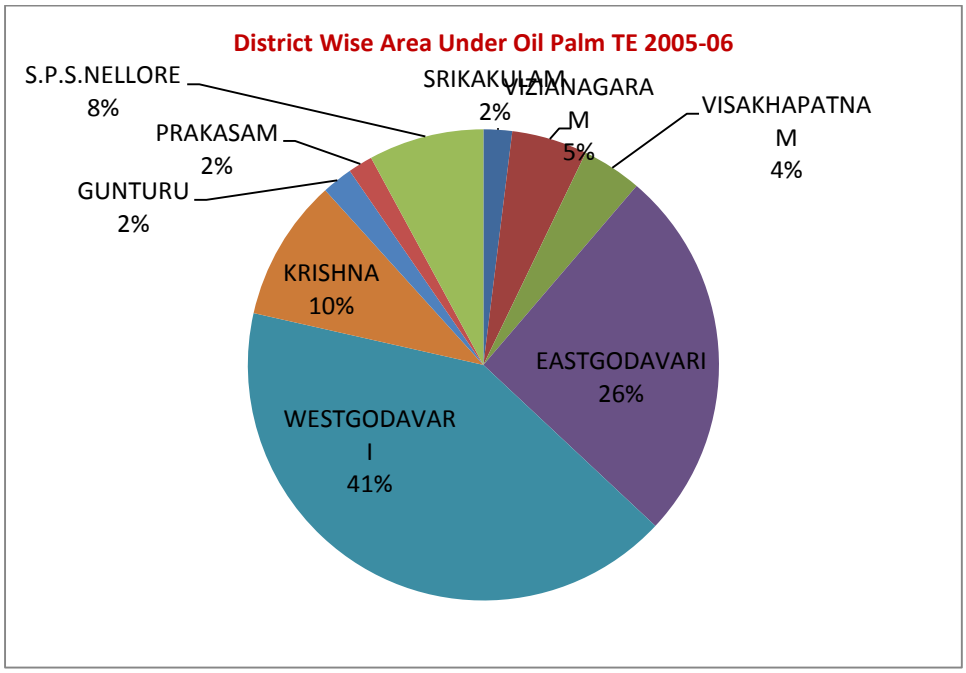
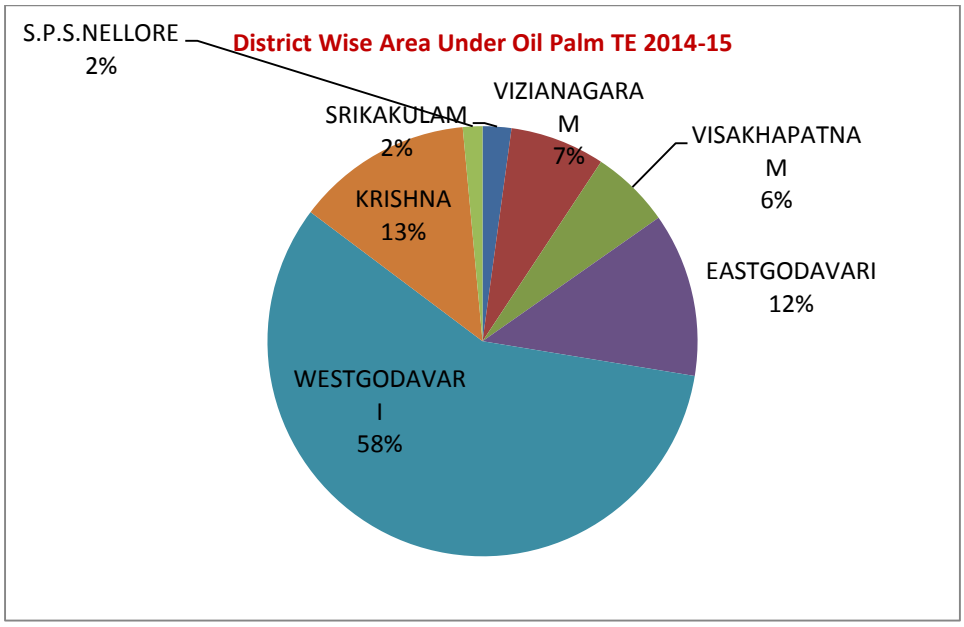
Annexure

Oil Palm – TE 1998-99 to TE 2014-15
(Area, Production and Yield)




District Wise Area Under Oil Palm TE 2005-06
S.P.S.NELLORE 8%
SRIKAKULAM 2%
VIZIANAGARAM 5%
VISAKHAPATNAM 4%
PRAKASAM 2%
GUNTURU 2%
KRISHNA 10%
EASTGODAVARI 26%
WESTGODAVARI 41%


District Wise Area Under Oil Palm TE 2014-15
S.P.S.NELLORE 2%
VIZIANAGARAM 7%
SRIKAKULAM 2%
VISAKHAPATNAM 6%
KRISHNA 13%
EASTGODAVARI 12%
WESTGODAVARI 58%

ACTION POINTS TO BETAKEN

Chapter – 2:		
1	Table 2.2	Suggestion incorporated in the figures
2	Table 2.2.1	The GCA is shown as 82 lack ha for TE 2012-13 is for bifurcated Andhra Pradesh whereas the actual figure 137 lack ha is referred to un-bifurcated Andhra Pradesh. The entire series of GCA from TE 1990-91 to TE 2014-15 are checked and correction incorporated
3	Table 2.6	Suggestion incorporated and corrected accordingly in main Report.
	Table 2.6.(A) & 2.6.(B)	Suggestion incorporated and figures corrected. The reason for decline of area under oilseeds Andhra Pradesh during 1990s and 2000s is mentioned in the main report page No.20
4		As per the suggestion the growth performance during different decades are explained properly in the main report.
5	Table 2.4	Suggestions incorporated and the corrected in Table 2.4 the reason for in the main report accordingly decrease of yield of oilseeds in mid 2000s may be attributed to the introducing of oil palm crop and the area under oilseeds was shifted to area under oil palm.
6	Table 2.9	Suggestion incorporating and the corrected in main report accordingly in Table 2.9 area production and yield of oil palm are presented for two periods TE 2005-06 and TE 2014-15. The massive increase in yield is due to increase in area under oil palm in all districts except in East Godavari and SPS Nellore.
Chapter – 3:		
1.	Table 3.1	Suggestion for main occupation is incorporated
2.	Table 3.5	Suggestion incorporated
3.	Table 3. 6	Suggestion incorporated
Chapter – 4:		
1.	Table 4.1	Suggestion incorporated
2.	Table 4.2(A)	Suggestion incorporated
3.	Table 4.8(A) & 4.8(B)	Suggestions incorporated in table and the interpretation of the tables are also presented accordingly in the main report.

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