PERFORMANCE OF OIL PALM GROWERS

IN KOLASIB DISTRICT, MIZORAM

A dissertation submitted in partial fulfilment of the award of the degree

of

Master of Philosophy in Economics

By

KHAWLSIAMTHANGA KHAWLHRING

To

DEPARTMENT OF ECONOMICS

SCHOOL OF ECONOMICS, MANAGEMENT AND INFORMATION SCIENCES

MIZORAM UNIVERSITY : AIZAWL – 796004

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CERTIFICATE

This is to certify that Khawlsiamthanga Khawlhring has worked under my supervision and guidance on a research topic entitled, **"Performance of Oil Palm Growers in Kolasib District, Mizoram"** for the degree of Master of Philosophy in Economics, Mizoram University, Aizawl. The work embodies a record of original investigations and no part of it has been submitted for any other degree in other Universities.

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December, 2016

DECLARATION

I, Khawlsiamthanga Khawlhring, hereby declare that the subject matter of this dissertation is the record of work done by me, that the contents of this dissertation did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the dissertation has not been submitted by me for any research degree in any other University/Institute.

This is being submitted to the Mizoram University for the degree of Master of Philosophy in Economics.

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ACRONYM

3F	Food, Fats and Fertilizers
ADP	Agricultural Development Programme
ANOVA	Analysis of Variance
BMP	Best Management Practice
BOPP	Benso Oil Palm Plantation (Ghana)
CAGR	Compound Annual Growth Rate
CG	Control Group
CHG	Greenhouse Gas
CPO	Crude Palm Oil
DOPR	Directorate of Oil Palm Research
EU-27	European Union-27
FAO	Food and Agriculture Organisation
FAOSTAT	Foods and Agriculture Organisation Corporate Statistical
FELDA	Federal Land Development Authority (Malaysia)
FFB	Fresh Fruit Bunch
HCVA	High Conservation Value Area
ICAR	Indian Council of Agricultural Research
IG	Intervention Group
IIOPR	Indian Institute of Oil Palm Research
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
ISOPOM	Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize
IUF	International Union of Food and Allied Workers
KAP	Knowledge, Attitude and Practices
LGA	Local Government Area (Nigeria)
LTD	Limited
MACS	Maharashtra Association for Sciences
MANR	Ministry of Agriculture and Natural Resources (Nigeria)
MD	Musculoskeletal Disorder
MES	Mizoram Economic Survey
MM-II	Mini Mission II
MOFA	Ministry of Food and Agriculture (Ghana)

MOTI	Ministry of Trade and Industry (Ghana)
MSMES	Micro, Small and Medium Enterprises
MT	Metric Tonne
N,P,K,	Nitrogen, Phosphorus and Potassium
NA	Not Available
NGO	Non-Governmental Organization
NIB	NLUP Implementing Board
NIFOR	National Institute for Oil Palm Research (Nigeria)
NLUP	New Land Use Policy
NMOOP	National Mission on Oilseeds and Oil Palm
NR	Not Reported
OPAE	Oil Palm Area Expansion
OPDP	Oil Palm Development Programme
OPP	Oil Palm Plantation
PH	Potential of Hydrogen
POTICO	Palm Oil, Timber, Carbon Offset
PPC	Plant Protection Chemicals
PSI	Presidential Special Initiatives (Ghana)
REDSD+	Reducing Emissions from Deforestation and Forest Degradation
REF	The Research Excellence Framework
RKVY	Rashtriya Krishi Vikas Yojana
RSPO	Roundtable on Sustainable Palm Oil
SAU	State Agricultural Universities
SRR	Seed Replacement Ratio
TBO	Tree Borne Oilseeds
TMO	Technology Mission on Oilseeds
TOPP	Twifo Oil Palm Plantation (Ghana)
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USA	United States of America
USDA	United States Department of Agriculture
VAT	Value Added Tax
WWF	World wide Fund for Nature
YG	Yield Gap

Chapter 1

INTRODUCTION

1.1. Background

The cultivation of oil palm was first illustrated by Nicholas Jacquin in 1763, and it was named, *Elaeis guineensis jacq.* It is native to West African humid tropics. It has high oil content and the highest potential of oil yield per acre when compared to other vegetable oils (Anyane 1961). It produces two distinct oils, i.e., palm oil and palm kernel oil, which have culinary and industrial uses. Palm oil is derived from fleshy mesocarp of the fruit, which contains about 45-55 percent of oil. The palm kernel oil is obtained from the kernel of stony seed. Oil palm produces 4 to 6 tonnes of crude palm oil/ha and 0.4 to 0.6 tonne of palm kernel oil from 4^{th} to 25^{th} year of its productive life span. It is the crop that has a greater advantage in terms of productivity and much higher than that of other major oil seed crops. Oil Palm had been confined to the West and Central Africa till the end on the nineteenth century. The oil was extracted with traditional method. However, with the increase in the global oil requirement, commercial plantations were started and the first commercial plantations were established in Sumatra in 1911 which were full bearing in 1917. The commercial cultivation then spread to West Africa in the 1920s and to the Far East in the 1930s. At present, the commercial variety of oil palm *Tenera,* a hybrid between *Dura* and *pisifera,* is developed.

Oil palm (*Elaeis guineensis*) is cultivated on approximately 15 million hectares across the world (FAO 2009, Fitzherber and others 2008; Koh and Ghazoul 2008; Koh and Wilcove 2008). The area of cultivation increases

rapidly to meet the global demand for palm oil. Since the 1990s, the area occupied by oil palm cultivation has expanded worldwide by around 43 per cent, driven mainly by demand from India, China and the European Union (RSPO 2011). The tremendous growth of international demand for vegetable oil during the last few decades impulses the expansion of oil palm plantations in the Southeast Asian countries such as Indonesia, Malaysia, Thailand, etc. Indonesia has been the world's largest producer and exporter of palm oil since 2008 (Feintrenie L, et al). Out of the total global agricultural land area of 258.9 million hectares cultivated, oil palm occupies 5.5 per cent. (Oil World, October 2014).

Oil palm is the top-selling vegetable oil in the world and is found in 50 percent of all consumer goods (UNEP 2014). Oil palm provides one of the leading vegetable oils produced globally, accounting for one-quarter of global consumption and approximately 60 percent of international trade in vegetable oils (World Bank 2010). The oil extracted from these palms is included in several common products used all over the world such as margarine, baked goods and sweets, detergents and cosmetics (UNEP and UNESCO 2007). The reason behind the increase in the global vegetable oil demand is the increased consumption for domestic purpose, bio-fuel and cosmetic industries (McCarthy, 2010). Production has risen from 10 million metric tonnes per year in 1990 to 50 million metric tonnes in 2011 and further increased to more than 62 million metric tonnes in 2015. This has helped lift millions of people in emerging market economies, particularly Indonesia and Malaysia, out of poverty (WWF, 2012).

1.2. An Overview of Oil Palm Cultivation

There are different studies on the Oil Palm cultivation throughout the world. Studies confirmed that Oil Palm farmers made profit and improved their income (Owolarafe, et al. 2007; Damoah, 2012; Beggs, et al. 2013; Ibitoye, et al. 2014). Socio-economic benefits of sustainable Oil Palm plantation could include poverty alleviation and long-term employment opportunities (UNEP, 2011). However, the sizes of most plantations are generally small (Owolarafe, et al. 2007; Damoah, 2012; Ajieh, et al. 2013). It was found that the age of plantation has significant effect on yield of Fresh Fruit Bunch (Owolarafe, et al. 2007). It was estimated that at least 8 hectares of Oil palm cultivation is required for a producer to enjoy luxuries like home improvement projects or pick-up truck (Beggs, et al. 2013). Vermeulen, et al. (2006) found that more of family labour than hired labour was used in Johor State of Malaysia to meet the labour requirement.

The performances of the Oil Palm cultivators are impeded by various constraints. The overall adoption of improved technologies was found very low among the smallholder Oil Palm farmers (Agwu, 2006; Onoh, et al., 2012; Ajieh, et al. 2013). Low Price of Oil Palm is also found to be one of the problems faced by the farmers (Damoah, 2012). Delayed payment by the company and non-payment of minimum support price by the government was observed to be among the constraints faced by the farmers (Madhavi, et al. 2015).

Some researchers observed poor and inadequate transportation as major constraint (Akangbe, et al. 2011; Ibitoye, et al. 2011) and considerable amount

of transportation cost was incurred which increases with the distance from the Oil Palm processing plant and the condition of the road (Beggs, et al. 2013).

1.2.1. World Scenario:

The Global Palm Oil production during 2015-2016 was 59.4 million tonnes. The production during 2016-2017 is estimated to be 64.5 million metric tonnes (USDA, November, 2016). Indonesia and Malaysia are the largest producers of palm oil and contribute to about 89 percent as of 2011-12, of the world's exports. Indonesia and Malaysia have increased palm oil acreage by a CAGR of 8 percent and 3 percent respectively over 2005 to 2010. The world's consumption of palm oil is increasing at a fast rate impelling the surge in imports of different countries. The top ten importers of Palm Oil in 2016 are India, EU-27, China, Pakistan, Egypt, Bangladesh, United States, Myanmar, Russian Federation and Vietnam.

1.2.2. Oil Palm Cultivation in India

Oil palm was introduced in India at the National Botanical Gardens, Kolkata in the year 1886. The Maharashtra Association for Cultivation of Sciences (MACS) later introduced African *dura* palms along canal bunds, home gardens and, to some extent, in forest lands in Pune during 1947 to 1959. Large scale planting of oil palm was launched from 1971 to 1984 in Kerala by Plantation Corporation of Kerala Ltd., (subsequently taken over by Oil Palm India Ltd.,) and by Andaman Forest and Plantation Development Corporation in Andaman and Nicobar Islands during 1976 to 1985.

The Indian economy is the world's fourth largest oil economy. More than 50 per cent of the total consumption of the nation is met through imports, which accounts for around 10 million metric tonnes of edible oils. India is also the largest importer of palm oil amounting to 44 per cent of world imports. The Indian palm oil import in 2015 reached 9.525 million metric tonnes and an import for the year 2016 is estimated to be 10.25 million metric tonnes (indexmundi.com). The import requirement for domestic consumption necessitates the government to pursue programmes that help for the increase in palm oil cultivation in India. Some of the well known programmes or schemes meant for oil palm production are:

1. **Technology Mission on Oilseeds (TMO):** It was the first programme on Oilseeds and launched in 1986. The core idea was to increase the production and productivity of Oilseeds to make the country self-reliant in this vital sector. Oil Palm was brought within the purview since 1991-92 as **Oil Palm Development Programme (OPDP)** with a focus on area expansion in the states of Andhra Pradesh, Karnataka, Tamil Nadu, Orissa, Gujarat and Goa.

2. **Integrated Scheme of Oilseeds, Pulses, Oil Palm & Maize (ISOPOM):** Technology Mission on Oilseeds was restructured in 2004-2005 which includes Oilseeds Production Programme, **Oil Palm Development Programme**, National Pulses Development Projects and Accelerated Maize Development Programme of the IXth Five Year Plan. ISOPOM is implemented during the Xth Five Year Plan effective from 1st April, 2004 and it provides support for Oil Palm cultivation in 12 states viz.**,** Andhra Pradesh, Assam,

Gujarat, Goa, Karnataka, Kerala, Maharashtra, Mizoram, Orissa, Tamil Nadu, Tripura and West Bengal. However, Assam, Maharashtra and West Bengal did not undertake Oil Palm cultivation though Maharashtra has now undertaken Oil Palm Area Expansion with effect from 2010-11. Under ISOPOM, support is provided for planting material, cultivation cost, installation of drip irrigation system, diesel pump sets, training, development of waste land and technology transfer through demonstration and publicity. The area under Oil Palm increased from 8585 hectares at the end of 1991-92 to 26178 hectares in 2008-09. Actual production of FFBs during 2008-09 is 355480.36 metric tonnes yielding around 59,007.40 metric tonnes of Crude palm Oil.

3. Oil Palm Area Expansion Programme (OPAE): It is rolled out to bring an additional 60,000 hectares area under Oil Palm cultivation **under Rasthrya Khrishi Vikash Yojana (RKVY)** since 2011-2012 in order to augment the production of Palm Oil by 2.5 to 3.00 lakh tonnes in the next 5 years**.** It is proposed to provide incentives to growers for identified critical interventions viz; planting material, compensation for loss of income of the farmers during the gestation period, pump set, drip irrigation system, support for intercropping, vermin-compost pit, bore wells/water harvesting tanks/fertigation tanks, PP chemicals, INM/IPM/fertigation/tree guards, etc. It is proposed to provide subsidy to entrepreneurs @ 50 percent subsidy of the cost of processing plant and equipment limited to Rs. 250.00 lakh per unit of 5MT/hr FFBs capacity through the State Department of Agriculture. State/Agency wise proposed outlay in lakh are Andhra Pradesh- Rs. 19200.00, Karnataka – 3360.00, Tamil Nadu – 3360.00, Gujarat – 480.00, Orissa – 1776, Mizoram – 1840, Chattisgarh – 48.00, Maharastra – 96.00 and ICAR – 200.00 with a total

proposed outlay of Rs. 30000.00 lakh. The outlay of the programme will be utilised for interventions like – Planting Materials, Cost of Cultivation, Supply of Drip Systems, Inter-cropping, INM/IPM, etc , Vermi-compost, etc, Water harvesting/Borewell, Processing Units and ICAR/ SAUs. The proposed area expansion target for OPAE under RKVY are: Andhra Pradesh – 40000 hectare with Rs. 6400.00 lakh, Karnataka- 7000 hectares with Rs. 1120.00 lakh, Tamil Nadu – 7000 hectares with Rs. 1120.00 lakh, Gujarat – 1000 hectares with 160.00 lakh, Orissa 3700 hectares with Rs. 592.00 lakh, Mizoram 1000 hectares with Rs. 160.00 lakh, Chattishgarh – 100 hectares with Rs. 16.00 lakh and Maharashtra – 200 hectares with Rs. 32.00 lakh.

4. National Mission on Oilseeds and Oil Palm (NMOOP): It is to be implemented during the XIIth Five Year Plan with effect from 2014-15, aims at enhancing production of traditional Oilseeds and tree-borne oilseed with allocation is Rs.3,507 crore for the purpose. Under Mini-Mission II, an additional area of 1.25 lakh hectares under Oil Palm cultivation productivity enhancement is aspired through the area expansion approach in the States including utilisation of wastelands with increase in productivity of FFBs from 4927 kg per hectare to 15000 kg per hectare. The States covered under MM-II are Andhra Pradesh, Chattisgarh, Goa, Gujarat, Maharashtra, Mizoram, Karnataka, Kerala, Odisha, Tamil Nadu, Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

1. 3. Oil Palm Cultivation in Mizoram

The geo-climatic condition of the State is found to be favarourable for development of oil palm cultivation. A high level committee headed by Dr. K. L. Chadha identified potential areas of 61,000 ha with gentle slope (25-33 per cent) with favourable climatic condition and the state government decided to undertake cultivation of Oil Palm in a large scale from 2004-05 during the X Plan period. Dr. P Rethinam Committee later identified an additional area of 40,000 ha for Oil Palm cultivation, and thus, the total identified potential area for Oil Palm cultivation became 1,01,000 ha in Mizoram. It was initiated in Rotlang, Lunglei District and Thingdawl, Kolasib District of Mizoram in 1999-2000 with 5,000 and 7,000 seedlings respectively with promising results.

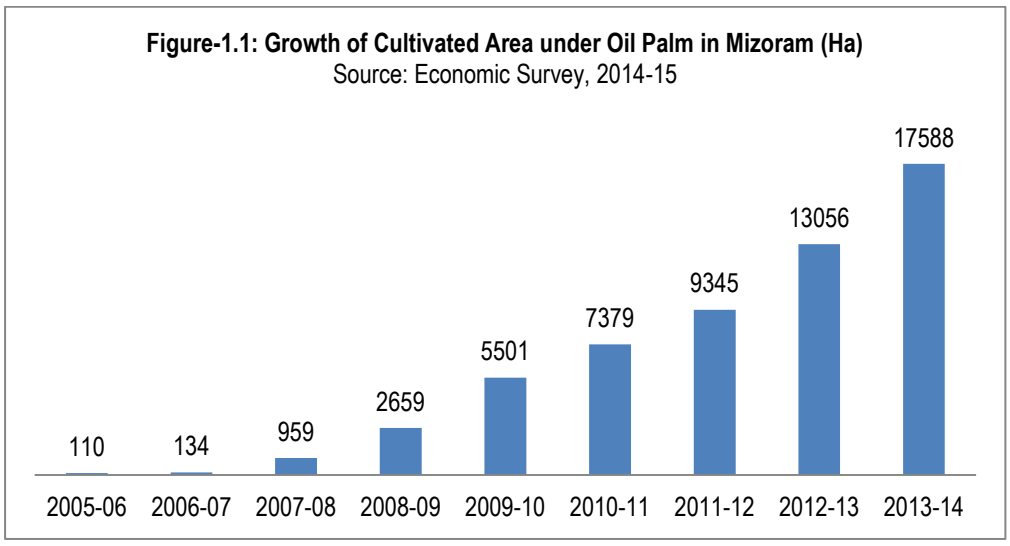
To promote oil palm cultivation in Mizoram, the Ministry of Agriculture & Cooperation has sanctioned Oil Palm Development Programme under **Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize** (ISOPOM) since 2005-2006 at the cost sharing of 75:25 between Central and State Government till 2011-12. The Oil Palm Development Programme has also been taken up under **Rashtriya Krishi Vikas Yojana** (RKVY for **Oil Palm Area Expansion**) from 2011-12 to 2012-13 and **National Mission on Oilseeds and Oil Palm** (NMOOP) from the year 2014-2015. In addition, The Mizoram Oil Palm (Regulation of Production & Processing) Act, 2004 was passed in Mizoram Legislative Assembly on 2nd December, 2004 with a provision for the emergence of contract system for seed supply and marketing of the produces.

Under the Oil Palm Act, 2004, The Government of Mizoram signed Memorandum of Understanding with three Companies for Oil Palm

Development (seedlings supply and marketing of the produces). They are (1) Godrej Agrovet Ltd. for Kolasib & Mamit District (Signed on 14th Sept, 2005), (2) Ruchi Soya Industries Ltd. for Lunglei & Lawngtlai District (on 3rd October, 2006), and (3) 3F Oil Palm Agrotech Pvt. Ltd. for Aizawl, Serchhip & Saiha District (singed on 7th March, 2006). These Companies have established their own nurseries in their respective districts supplying the planting materials to the growers, while they buy back the produce of the growers from their respective districts allotted to them. Under the Oil Palm Act, 2004, there are established Price Fixation Committee to fix the rate of Fresh Fruit Bunch. Presently, it is fixed at Rs. 5.50 per Kg and the price of the exotic seedling is Rs. 85.00 while that of the indigenous is Rs. 65.00 per seedling.

Mizoram has shown significant growth in oil palm cultivation since 2004. As presented in Figure-1.1, the area under cultivation in Mizoram has increased from 110 hectares in 2005-06 to 17588 hectares in 2013-14.

Figure 1.1: Growth of Cultivated Area under Oil Palm in Mizoram (Ha)



Source: Economic Survey, 2014-15

Meanwhile, the Government of Mizoram is giving assistance to the farmers from the financial allocation for State's flagship programme, ***New Land Use Policy (NLUP)***. The total number of beneficiaries covered under the New Land Use Policy for cultivation of Oil Palm is 2290 and the area under cultivation is 2759 ha, which accounts for 15.60 per cent of the total area under Oil Palm cultivation till 2013-2014. In addition, the proposed area for Oil Palm Cultivation for the year 2014-15 to 2016-17 under the **National Mission on Oil Seeds and Oil Palm** are 5700 ha for 2014-15, 5400 ha for 2015-16 and 4600 ha for 2016 -17. At the end of the 12th Five Year Plan additional area of 25,000 ha will be under Oil Palm cultivation. Estimated production of Fresh Fruit Bunch (FFB) of Oil Palm at the end of 12th Plan is 1,35,000 MT with a value of about Rs.100 crore (MES, 2014-15).

1.4. Significance of the Study

In order to meet the domestic requirement and to curtail imports of edible oil, the Indian Government is taking various steps to increase the production of Palm Oil. In line with this, the State Government of Mizoram is also giving efforts to increase the area under Oil Palm plantation to create income generation opportunities for small and marginal farmers, to reverse the degradation process and achieve ecological balance to sustain land and water use and to motivate farmers to switch over from shifting cultivation to permanent settlement. In this backdrop, this research attempts to find out the actual conditions of oil palm cultivation in Mizoram, such as, benefits accrued to the farmers, impact on the environment, problem and prospects of the Oil Palm farmers, etc. This research, besides academic purpose, will be useful for guiding the Government in formulation of development programmes.

1.5. Study Area

The present study analyses the performance of the Oil Palm growers in Kolasib District. Kolasib District is the northernmost district of Mizoram, bordering the Assam. It has a total geographical area of 1,472.2 km^2 or 17,55,000 ha. The potential area for Oil Palm cultivation is 17350 hectares which is the second largest area next to Mamit with 18500 hectares. The District has a total population of 83,054 as per Census 2011and the density is 61 per km^2.

The district came under the purview of the contracting company, Godrej Agrovet Ltd. which had already established Palm Oil Mill at Bukvannei, and extraction of palm oil was started from 2014. Fresh Fruit Bunches (FFBs) had been procured from the growers (Kolasib and Mamit) since 2012 and total purchase up to 2014 amounted to 8,742 Metric Tonne. However, extraction of oil started from 2014 only. For a period of two years, i.e. 2014 and 2015, a total quantity of 5,718 MT was procured, out of which, 5,500 MT was processed in the Mill for extraction of Palm Oil. A total quantity of Palm Oil extracted by the Mill is 650 MT only during the last two years.

Figure 1.2: Palm Oil Mill of Godrej Agrovet Ltd. At Bukvannei.

The District has occupied notable position in Oil Palm cultivation as it was the State's first "Oil Palm District" as declared by the Government on 9th May, 2014. It is divided into 7 Agriculture Circles (Strata) with 35 Oil Palm Branches (Clusters). The number of Branches grows with the number of villages cultivating Oil Palm. From the records of the District Agriculture Office, at present, there are 2,47432 standing plants with 1,514 active farmers from 31 villages within Kolasib District. The number of standing plants per grower ranges from as low as 5 to as high as 2,800. Many of the farmers are already reaping the harvest and started selling the FFB to the Mill at Bukvannei. Thus, selection of Kolasib District as a case area for the study is considered most appropriate for the study on the performance of oil palm growers in Mizoram.

1.6. Objectives of the Study

The major objectives of the study are as follows:

1. To study the socio-economic condition of growers
2. To examine the growers' performance on plant management and farming practices.
3. To study the institutional and infrastructural conditions for Oil Palm cultivation and marketing in Mizoram.
4. To analyse the impact of Oil Palm cultivation on the income of the growers.

1.7. Hypotheses

The following hypotheses are proposed to be tested:

1. Oil Palm provides substantial and sustainable income for the growers.
2. Transportation problem remains the main setback for development of Oil Palm cultivation in Mizoram.

1.8. Methodology

1.8.1 Collection of Empirical Data

Primary data were collected by conducting sample survey during the months of September - October, 2016. As there are two RD Blocks in the study area (i.e. Kolasib district), stratified random sampling was adopted using the two RD Blocks as strata. The next stage is selection of villages from each block. A total number of 3 villages were randomly selected from Thingdawl RD Block and 4 villages from Bilkhawthlir RD Blocks. From each of the selected villages, households who are actively involved in oil palm cultivation were selected

randomly. Initially, 110 growers were interviewed. However, for analytical purpose, only those growers with production of FFBs were taken into account making the sample size (households) at 90. The total number of family members covered was 508. This is given in Table 1.1

Table 1.1: Number of Growers and Persons covered in the Sample Survey, September – October, 2016

Village/Town	RD Block	No. of Growers	No. of Growers per Block	No. of family members
Bairabi	Bilkhawthlir	14	42	78
Buhchangphai	Bilkhawthlir	13		89
Bukvannei	Bilkhawthlir	5		18
Phaisen	Bilkhawthlir	10		54
Khamrang	Thingdawl	14	48	62
Kolasib	Thingdawl	25		160
Thingdawl	Thingdawl	9		47
Total		**90**	**90**	**508**

Secondary data were collected from sources like official publications, Census, Directorate of Economics & Statistics, Agriculture Department, NLUP Implementing Board, Oil Palm Mill (Godrej Agrovet Ltd.), etc. Journals, articles, academic literatures, published and unpublished research works in the field were also consulted.

1.8.2 Measurement of Performance of Oil Palm Growers

During the survey, relevant data were collected using interview schedules on the Socio-Economic Conditions of the Oil Palm Growers; Land Ownership Status; Cultivation Practice; Marketing; General Perceptions & Problems of the Oil Palm Growers. The initial costs and annual costs on

cultivation of Oil Palm were obtained. At the same time, Sales of FFBs were calculated on the basis of one year.

1.8.3 Methods of Analysis

The data collected from the survey and other sources were analysed using statistical measures like mean, percentage, standard deviation, etc. To prove the proposed hypotheses, z-test was adopted. Various aspects of Oil Palm cultivation in the study areas including the socio-economic background of the growers, landholding status, cultivation practices, labour, marketing, problems and general perceptions of the respondents were analysed.

1.9. Chapterisation Plan

The present study is organised into 5 chapters as follows:

Chapter 1: Introduction

Chapter 2: Review of Literature

Chapter 3: Growth of Oil Palm Cultivation and Production of Palm Oil

Chapter 4: Performance of Oil Palm Growers in Kolasib District: An analysis

Chapter 5: Major Findings and Conclusions.

Chapter 2

REVIEW OF LITERATURE

The oil palm tree (Elaeis guineensis jacq) is native to west and Southwest Africa and spread to Southeast Asia, Latin America and other tropical countries. It is the most efficient oil crop in terms of land use that produces not one but two different oils; palm oil and palm kernel oil, which are of much industrial use. With the rapid growth of population the consequential increased demand for edible oil and bio-diesel, the area under oil palm plantation increased rapidly during the last few decades, Indonesia and Malaysia being the major producers accounting for about 85 percent of world's production. World production of palm oil and palm kernel oil increased from about 2 million metric tonnes in 1961 to over 56 million metric tonnes in 2012 (IUF 2015). The World Bank estimated that world consumption will double by 2020. The global area harvested increased from about 10 million hectares in 2000 to 17 million hectares in 2013 (FAOSTAT, 2014).

Despite the economic advantages, the impact of oil palms growing on a High Conservation Value Area (HCVA), peat land and tropical rainforests invites the attentions of Social Scientists, NGOs and Environmentalists on the social and environmental consequences. The need to produce palm oil with sustainable technology leads to the establishment of the Roundtable on Sustainable Palm Oil (RSPO) in 2004. However, the scope of the present study will limit to the economic aspect of oil palm cultivation whereas the social and environmental issues will also be taken into account as these are closely interrelated topics. Brief outlines of review of some related literatures are presented in this chapter.

2.1 Brief Review of Global Studies:

Soyebo, et. al (2005) examined the "Constraints of Oil Palm production in Ife Central Local Government area of Osun State, Nigeria" covering one hundred and two farmers from eight villages, which were selected using random sampling techniques. Structured interview schedules were framed to elicit information from the farmers on the farmers' socio-economic characteristics, problems inhibiting oil palm plantation, method of production and uses. Key informant interviews of the head of villages were also carried out to obtain information on the fundamental problems still persisting after the social survey. The data collected were analyzed using descriptive statistics.

They found that out of the total 90 farmers interviewed, 85 were engaged in tree crop production and the rest were engaged in annual crops production. Further, they found that amongst the tree crop producers, 79 (92.9 percent) were producing oil palm. However, all the oil palm farmers were engaged in having wild oil palm groves (Dura variety) implying underlying factors preventing the farmers from cultivating oil palm. Major problems faced by the farmers were land problem (81 percent), lack of improved planting materials and government support (54.4 percent), inadequate information and cultivation knowledge (53.2 percent) and fund problem (34.2 percent). They also found that amongst the farmers producing oil palm, 59.5 percent were involved in processing their oil palm products personally and all of them used traditional processing techniques which produced minimal output. Most farmers were in their active period, i.e. between 31 and 60 years. 83.3 percent of the respondents were married which implies that people practised agriculture to make both ends meet and cater for their children. Most of the respondents (28.4 percent) had 11-20 years of experience in farming. About 56.9 percent had farming experience of more than 20

years and 14.7 percent had less than 10 years of farming experience. They recommended that extension workers should intensify effort to educate the farmers on improved oil palm production management practices and farmers should be encouraged to form cooperative societies to solve the tripartite problems of inadequate information and cultivation knowledge about oil palm, lack of funds and lack of land, by pooling their resources together.

Agwu (2006) studied the adoption of improved oil palm production and processing technologies in Arochukwu LGA of Abia State, Nigeria. Out of the 12 autonomous communities, 5 town communities were randomly selected for the study and 10 oil palm farmers were randomly selected from each community, giving a total of 50 respondents. Structured interview schedule were used to collect information. To determine the extent of adoption, seven-step adoption model was used. Likert-type scale was used to find out major constraints to adoption of the practices, making 2.0 as a cut-off point.

With respect to the adoption of improved oil palm technologies it was found that the percentage of farmers above 50 adopted 4 technologies like improved varieties, application of fertilizers, ring weeding and mulching. The overall adoption of improved oil palm technologies was found very low. The survey confirmed that extension agents were the most important source of information on the adoption of improved oil palm technologies. It was further observed that there were 6 major constraints to the adoption of improved oil palm production and processing technologies such as, high cost of agro chemicals (insecticides and herbicides), high cost of fertilizers, unavailability of necessary chemicals (insecticides and herbicides), unavailability of fertilizers, high cost of processing palm fruits in mechanised mills and high cost of labour to carry out farming necessary actions. Besides, there were

some minor constraints. It was concluded that there were needs for provision of subsidies on agro chemicals as well as financial support to farmers to remove the constraints faced by the farmers.

Vermeulen et al (2006) studied the practice in smallholder palm oil production. A sample of 300 independent smallholders in Johor, the largest palm oil producing state in Malaysia, showed that palm oil farmers were at the older age group (45-76 years), with little opportunity for off-farm employment; greater use of family labour than hired labour, little use fertilizers due to the capital required; only 7 percent used mechanised in-field collection, but owners of power carts also benefitted from hiring them out; lower yield than plantations or counterpart smallholders in FELDA. But lower production costs than plantations mainly due to the absence of 'joint estate cost' and of fertilizers. Risk is a major factor for independent smallholders, at least part of which could be shared with the company or the government in the case of supported smallholders. Lack of capital and collateral can be a serious impediment for the independent growers. Theft of FFB could also be a menace to the independent smallholders. The major constraints faced by smallholders are ownership status, cash requirements for meeting upfront expenses to grow palm oil, access to reliable information and the need to balance subsistence security with cash crop production. Additional problem could be the risk associated with global price fluctuations.

Zen, et al (2005) recommended the following ways forward: allow intercropping around immature oil palm, supported by advice on cash cropping, cattle and marketing; provide training for nucleus plantation staff on technology transfer, effective land transfer and sustaining good community relation; provide oil palm cooperatives with greater guidance and monitoring; increase flexibility and interest

and loan repayments by plasma smallholders to nucleus companies; set up a government-run loan fund for independent growers; a district level focus on effective micro–interventions such as nurseries of subsidised high-yield planting materials, backed by a technical advisory service. The RSPO recognises a critical need to engage with legitimate representative smallholders' organisations (RSPO Secretariat 2006). This engagement may in many cases need to be bolstered by building organisational capacity. There may also be space, within the RSPO or in broader policy processes, for political alliances between smallholders and larger producers. Globally, governments are in some cases trying out new policies to support smallholders without creating perverse incentives within the broader market.

Feintrenie, et al (2010) examined the reason for preference of oil palm by the farmers of Bungo district, Indonesia. They selected 3 villages. The land-use profitability analysis consisted of the comparison of economic indicators and labour calendars of wet rice cultivation, rubber agro forestry, rubber monoculture plantation of improved clones and oil palm independent smallholding. From the 3 villages 100 farmers (males and females) were randomly selected. Plots of each cropping system were visited with farmers to obtain more technical details and confirm information. The description obtained during group discussions were compared to the descriptions from individual interviews of 15 households for every crop, on the management and production of their plots. Interviews included discussions on the advantages and drawbacks of each crop. Economic indicators such as return to land, return to labour and maximum workable area for one person (in relation to labour needs) were calculated.

In spite of quick expansion of oil palm plantation in Bungo district, rubber agro forest and rubber mono-specific plantations still dominated the landscape.

Different plantation types could be compared using the length of unproductive plantation period as one of the parameter. Oil palm can produce in the 4th year, rubber trees can be tapped in the 7th year while improved rubber clones can be tapped from the 6th year. Local rubber seedlings of Bungo could not be tapped before 10 or 11 years. Rubber agro-forest needs 15 years to reach a tap-able size. The shorter unproductive period of oil palm is particularly important where land shortage is already felt. However, there were many farmers who were not willing to give up rubber for oil palm, and wanted to keep plots for rubber as well as plot for oil palm. Rubber trees could not be tapped in rainy days whereas oil Palm produces more during rainy season. As such, the two commodities are complimentary in terms of labour use. It was found that wet rice cultivation was disregarded by farmers due to the high profitability of alternative land uses. At 2008 prices, the returns to land on a full cycle of plantation were highest for cloner rubber plantation followed by oil palm, rubber agro forest and paddy field in the last. In terms of return to labour the performance of oil palm stood first followed by rubber agro forest, cloner rubber and paddy field. With this situation, farmers shift from upland rice cultivation to rubber agro forest and then from rubber agro forest to mono-specific plantations of rubber and oil palm. During the financial crisis of 2008-09 also, an average return to land was highest for clonal rubber followed by oil palm and rubber agro forest. The average return to labour is highest for oil palm followed by rubber agro forest and clonal rubber which were much higher than that for paddy fields. In the context where land is still available and labours are scarce, farmers logically favour the return to the scarcest factor. Thus they will tend to favour crops with the highest possible return to labour rather than a high return to land. This partially explained the trend of rubber agro forest conversion to oil palm plantations.

Akangbe, et al (2011) examined the constraints and training needs of oil palm fruit processors in Nigeria by taking Afijio Local Government Area of Oyo State, Nigeria as a case study. A two stage sampling technique was used to select 160 household involved in palm oil extraction activities from four towns. Data were analysed using the descriptive statistical tools of frequency distribution, percentages, mean and the need analyses. Need analyses comprised of task and gap analyses. The study found that the oil palm extractors were aged women with little or no formal education with the mean age of 54. They had an average experience of 35 years. Majority among them were involved in petty trade activities as subsidiary occupation. The most important source of farmland is by inheritance accounting for 60 percent and about 50 percent accessed less than 30 bunches for each extraction activity. Almost all the respondents (80 percent) conveyed their palm fruit from the farm to the palm oil extraction sites by head portage. Other means are vehicle (18.7 percent) and bicycle (1.3 percent). All of the palm oil extractors used traditional methods, which are inefficient and unhygienic. The training needs analysis showed that training requirements on mixing, clarification, skimming, stripping as well as sterilisation operations during oil palm extraction. The total mean score for these activities is 6. However, the result showed that no training is necessary for chopping, boiling of fruits, digestion and storage operations. The gap results showed that all the task deficiencies can be addressed through training the performers of the task, as all tasks scores were below average. The major constraint reported was poor and inadequate transportation. The second problem was water related problems followed by shortage of labour supply and no contact with extension agents. The study recommended for rehabilitation of infrastructures, trainings, provision of finance and formation of cooperatives.

Ibitoye, et al (2011) studied factors affecting Oil Palm production in Ondo State of Nigeria as the discovery of crude oil and the civil war adversely affected oil palm production in Nigeria. The state was stratified into three sub-groups or strata according to the three major ecological zones – rain forest, derived savannah and mangrove swamp. Mangrove swamp zone was purposively eliminated as it does not have substantial oil palm. Two LGAs from rain forest zone were selected and one from savannah zone. Out of which, 10 percent of the villages were purposively selected based on predominant production of oil palm. Data for the study were collected through the use of structured questionnaires. Fifty oil palm farmers were purposively selected from each of the three selected LGAs making a total of one hundred fifty oil palm farmers selected purposively. Simple descriptive statistics such as frequency counts, means, standard deviation and percentages were used to analyse and summarise the data. Inferential statistics such as chi-square, Pearson correlation and t-test were used to determine the significance of the relationship among the selected variables compared and to test the differences between groups of variables. In addition, regression analysis was used to determine the significance of relationships of several factors perceived to effect yield of oil palm in the study.

The results showed that majority of the farmers (76.0 percent) were male, most of the oil palm farmers (60.7 percent) were of the ages between 41-60 years, majority of the farmers (90.7 percent) were married, majority of the farmers (98.0 percent) were having dependents within the range of 0-4; majority of the oil palm farmers (77.0 percent) cultivated less than 10 ha of oil palm plantations; most respondents (74.0 percent) did not belong to any cooperative(s); among the farmers interviewed, majority (75.0 percent) completed one form of formal education or the other and 22 percent of the respondents that had trainings fell within the range of 1-3

times, 7.3 percent had 4 times and above while 70.7 percent had no training at all. About the source of information on extension, 26.0 percent indicated that they always had information on extension services from Agricultural Development Programmes (ADPs). It was found that ADPs, Radio and neighbours were the main sources of information for extension services to oil palm farmers. Among the constraints encountered to obtain seedlings from MANR/ADP/NIFOR nurseries, transportation of seedlings was the major problem encountered by 23.3 percent of the oil palm farmers. More than half (53.3 percent) transplanted seedlings less than 10 months of age. Regression analysis showed that only two of the variables; level of education attained (0.043) and number of times the respondents attended training (0.054) were predicted to have significant relationship with the yield of oil palm at 0.05 probability level. They recommended that farmers should be educated on the benefits of transplanting only well established seedlings in the nursery which are of the age 10 months and above.

Damoah (2012) studied the effects of Benso Oil Palm Plantation small holder farmers' scheme on rural poverty reduction in the Mpohor Wassa East district of Ghana. The BOPP smallholder project was to settle oil palm smallholder farmers on BOPP available land concession of 1650 ha involving 438 farmers with each farmer having an average of 4 ha plot. The study adopted a descriptive design and a cross-sectional design. The target population consisted of 438 smallholder oil palm farmers and one Scheme Manager. The study employed the use of primary and secondary questionnaires were used to collect data on the effect of the scheme on their income access to food security, health and their children's education. Secondary data on the yield and income of farmers was solicited from the scheme manager. Statistical tools like frequencies, percentages, chi-square values and p-values, etc were employed.

The study found that there were no statistically significant association between the employment status of smallholders and their ownership of smallholdings. Regression analysis revealed that farmers yield (R-Square=0.888) explained upto 88.8 percent of variations in income of farmers. It is also found that the yield (R=0.942) had a strong positive correlation with the income of farmers. That confirmed the assertions that farmers' income can be linked to their crop yield. Another regression model showed that deductions from the gross income of smallholders explained about 82.1percent of the variations in incomes of smallholders and the effects of deductions (t=6.425; p-value=0.00) on the variations in smallholders net income was statistically significant at an alpha of 0.05. The model also indicated with a correlation co-efficient of 0.906 that deductions were strongly and positively associated with incomes of the farmers. It was also observed that there were statistically significant differences in the contribution that smallholdings made to the incomes of male and female smallholders and confirmed that females relied more on income from smallholdings than their male counterparts. A multiple response cross-tabulation showed that farmers had a high level of confidence in the programme and had positive perceptions about the scheme. There was statistically significant difference (at alpha of 0.05) in harvest of FFBs before and after farmers joined the scheme as a result of applied technology and modern knowledge on cultivation. The study concluded that incomes of farmers were being improved through their participation in the scheme which had translated into higher access to health care, education and food security for the households of smallholders. However, several challenges like low understanding of technical detail, low pricing of oil palm etc. confronted the scheme.

Onoh, et al (2012) studied the adoption of improved oil palm production technology among the farmers in Aboh Mbaise Local Government Area of Imo State, Nigeria in 2010. Aboh Mbaise was purposively chosen because of its popularity in oil palm production. Two villages were selected from each of the four communities to give a total of eight villages. Further, ten farmers were selected from each village to give a total of eighty farmers for the study. Interview schedules were used to elicit information from the farmers. Simple percentages and regression analysis were used for analysis of data. They found that oil palm production was dominated by male farmers (60 percent). The mean household size was 6 with the mean age of farmers at 45.87 years. The mean farm size is 4.66 ha while majority of the farmers (73.75 percent) acquired their land through inheritance. Only 2.5 percent of the respondents had no formal education. Adoption of improved oil palm production technology was poor due to various reasons like lack of fund (75 percent) poor extension contact (50 percent), poor access to land (37 percent), scarcity of farm inputs (29 percent) and unawareness of improved farm technology (15 percent).

The regression results showed that gender, educational level, total farm size amongst other variables had positive relationship to the adoption of improved technology, while age and household size had negative effects. They recommended that the government should take action to strengthen informal education programmes, motivate extension personnel for increased efficiency, organisation of farmers into cooperatives and cause banks to increase its lending to the agricultural sub-sector.

Ezealaji (2012) studied the palm oil marketing and distribution pattern in Imo State, Nigeria with an application of linear programming model. Purposive sampling was adopted in selecting the Local Government Areas and the villages while random sampling was adopted to collect information from the list of marketers involved in

palm oil marketing. The sampling frame was respondents who moved more than 10 drums of palm oil in the state while the sample design was a list of randomly selected marketers. The questionnaire method was used to collect information from the respondents augmented by personal observation. Variables on which data were collected included: respondents' socio-economic characteristic, profitability of palm oil enterprise, demand and supply pattern of palm oil in the state. The study therefore covered 3 zones of the state, 9 local government area, 27 villages and 108 respondents. Descriptive and linear programming model were employed for analysis of data. Descriptive statistical tool comprised frequency counts, percentages, means and modes used to analyse the socio-economic characteristics of the respondents. The linear programming model was used to determine the optimal pattern of palm oil shipment from the supply regions to the demand regions. The study problem was to find the marketing and transportation scheme in palm oil marketing in Imo state of Nigeria which minimises the total cost of transportation of palm oil while satisfying regional demands for the produce. A comparison of the marketers' actual net income and the optimal income derived from the linear programming model for the activities recommended showed that the actual incomes of the recommended locations are far less than the optimal incomes. It was found that the minimised objective of the overall transportation cost of shipping the commodity to the recommended routes was much lower than the actual total transportation cost. On the basis of the findings, it was suggested that the government should provide conducive environment for the distribution of commodities across the regions by developing the transportation systems such as rail to enhance movement at lower cost.

Beggs, et al (2013) in their study, "The social landscape of African Oil Palm Production in the Osa and Golfito Region, Costa Rica" explored the social and

economic importance of oil palm in the region and identified the incentives and processes driving its continued expansion. Structured interviews were used to gather household and livelihood information from palm producing families, along with plantation management practices and producer's view on the role of oil palm in local economies, communities and ecosystems. Snowball sampling procedure was used to interview 25 producers from 4 cantons, cooperative and association leaders and one farmer who choose not to grow oil palm.

The observations included that the strong economic incentives for independent producers caused the spread of oil palm production in the absence of consistent markets and economically viable alternatives. The high price of palm oil, availability of generous financing for start-up costs, less labour-intensive nature of work attracts the farmers. In spite of the problems of agriculture plantation, farmers were opting for oil palm plantation. Independent producers were willing to take risk as it offered better economic reward with consistent income. Considerable amount of transportation cost (as high as 19 percent of gross income) was incurred which increases with the distance from the palm processing plant and the condition of the road; economic stability increases as one's plantation matures; oil palm cultivation on seven hectares or less incurs many of the same cost as larger farms without the capacity to generate the same profits; it was estimated that at least 8 ha of oil palm cultivation required for a producer to enjoy luxuries like home improvement projects or pick-up truck. However, oil palm cultivation was profitable for small, medium and large farmers in the region. Oil Palm cultivation among farmers in the region had transformed the livelihoods and agricultural landscapes. The oil-producing households as well as those who provided labour and transportation increased earnings and economic outputs for the region. Little could compare with the earnings

from Oil Palm cultivation and surely none of the historical mainstays of Old-Golfito smallholder production (cattle, maize, rice, other fruits). The cost-sharing assistance of 12-14 year contract from Palma Tica was playing a considerable role in increasing areas being converted into Oil Palm cultivation.

Ajieh, et al (2013) assessed farmers' perception of priority areas in oil palm production and processing in Aniocha South Local Government Area (LGA) of Delta State, Nigeria. 20 oil palm farmers were randomly selected from each of the 8 communities within Aniocha LGA. The total number of respondents is 160 farmers. Structured interview schedules were used for data collection. Respondents' level of adoption of oil palm production and processing technologies and their perception of priority areas in oil palm production and processing were studied. Descriptive statistics such as mean scores, percentage, standard deviation and frequency counts were used to summarise data generated for the study. Males dominated oil palm production activity consisting of 74 percent. Majority of respondents (81 percent) were within the age range of 40 years and above while the mean age of oil palm farmers in the area was found to be 46 years. Most of the respondents (92 percent) had one form of education or the other ranging from primary education to post secondary education. The mean farming experience of the farmers was 14 years. The mean farm size of oil palm in the area was 2.6 hectares. This indicates small scale farmers dominated the area. With regards to respondents' adoption of oil palm production and processing technologies, the overall mean adoption score was 2.41 showing low adoption of oil palm production and processing technologies. The study identified nine priority areas that are crucial to increase oil palm production and processing which include credit facilities for oil palm farmers, favourable land tenure

policy, establishment of agrochemical and fertiliser companies; building of mechanised processing mills at strategic locations, providing ready markets for oil palm product, favourable pricing system for oil palm products, sponsoring of research on high yielding varieties and low-cost processing techniques.

The study recommended that priority areas identified should guide future efforts by the government in revitalising oil palm production and processing. It also suggested that oil palm farmers should be sensitised by the agricultural extension agency on the need to use improved production techniques.

Gilbert (2013) studied oil palm and palm oil industry in Ghana, highlighting the importance of oil palm to the economy of Ghana, policy interventions of central governments. The key actors and operations in the oil palm sector, trends and constraints as well as prospects for commercial oil palm cultivation and palm oil industry. The Ministry of Food and Agriculture (MoFA), in collaboration with doners supported a large out grower scheme for Twifo Oil Palm Plantation (TOPP), The Presidential Special Innitiatives (PSI) secretariat was in charge of implementing the oil palm initiatives. Micro, small and medium enterprises (MSMES) was funded by the world bank and implemented by a separate project positioned within the Ministry of Trade and Industry (MoTI) paid for value chain studies, including one on palm oil with an eye to creating interventions in that industry with no linkages to what the PSI did. The PSI portfolio has subsequently been moved to the Ministry of Trade and Industry. The Industrial sub sector consists of medium and large scale oil palm plantations and mills. However the volume of CPO produced in Ghana is not enough to meet the needs of the factories, so they import crude palm oil or substitutes. The Industry is supported with scientific research and innovations by the Oil Palm Research Institute. The prospect of the oil palm plantation and industry are great.

However the anticipated gains from the industry should be balanced against the potential social and environmental impact of commercial oil palm development and palm oil industry in Ghana.

Ojemade, et al (2013) examined Policy Interventions and Economic Benefits for a Market Driven Oil Palm Industry. The authors opined that effective policies and management systems relating to environmental and social performance are one of the major challenges to sustainable oil palm development at various levels. It was observed that the output market of oil palm sector in Nigeria was undermined by issues of policy uncertainty. They also highlighted types of market failures being faced by the underdeveloped economies. They are of the opinion that smallholders need to improve production practices and need to follow standard set by the Round Table on Sustainable Palm Oil to meet the stringent certification requirements of RSPO, as the Palm Oil Industry move towards production of certified sustainable palm oil. In order to meet the requirements, government intervention should be directed towards re-allocation of resources which could make some better off without making others any worse off. Transformational partnerships with companies to improve the sustainability of supply change, development and promotion of sustainable investment have to be ascertained. In the present liberalised market, prices depend on supply and local demand as well as international demand. In Nigeria, the current imposition of 35 percent duty on the import of palm oil provided the local industry with significant protection. The authors put forward various suggestions for the government intervention in the oil palm industry to strengthen the sector. Government intervention aims to make producers to pay or absorb the spilled over cost in some way which could be achieved through legislation, imposition of taxes

and provision of subsidies. The authors suggested shift from command and control policies to those that work through the markets.

Guan, et al (2014) studied the effectiveness of Participatory Action Oriented Training intervention approach among harvesters in oil palm plantation. Two Oil Palm Plantations (OPP) in Malaysia employing Indonesian male workers were selected. One of the OPP was allocated as Intervention Group (IG) whereas the other as Control Group (CG) with 49 participants and 21 participants in respective groups. Using real-time scenario during harvesting tasks in OPP, the storyboard of the video focuses on hazards, risks and health effect which harvesters commonly encounter. Ergonomics issues during cutting and lifting and FFB as well as testimonial of experienced harvesters were highlighted. Mann Whitney U test were used comparing variables of socio demographic background occupational information. Musculoskeletal Disorders (MD) and Knowledge Attitude and Practices (KAP) between both IC and CG. The categorical outcomes of MSD within group were compared using Cochran's Q test. Continuous KAP score were analysed using Friedman test. Both the analyses were followed by post-hoc analysis with Bonferroni correction in order to determine which of the pair among Pre-Intervention Post-1-Intervention or Post-2-Intervention were significantly different of the other.

The results of the analysis showed that there were no significant differences of the self reported prevalence of MSD between both groups. Self reported prevalence of lower back (in the past two months), neck, upper back, arms and thigh (in the past seven days) increased significantly at the end of follow up period instead of decreasing among the IG. Similar increase among the CG during the past seven years was witnessed. The result revealed that the items in the check list were in fact counter-productive as harvesters were being paid based on the total weight of daily

harvested FFBs. The results of the study indicated that PAOT were ineffective being applied on the OPP setting in the study, despite being consistently reported successful in mitigating risks and improving work place environment particularly among smallholders and farms.

Ibitoye, et al (2014), analysed palm oil marketing in Dekina Local Government Area of Kogi State, Nigeria. A purposive random sampling technique was used in the study. 5 markets were purposively selected out of the 8 available markets in the area based on their sizes and volume of trade in palm oil. From each of the market, 25 oil sellers were randomly selected making a total of 125 respondents. Primary data were collected by the use of questionnaires and by personal interviews. The secondary data were also used. Simple descriptive statistics such as mean, standard deviation, frequency distribution and percentages were employed. The gross margin was used to determine the profitability of palm oil marketing. The Shepherd-Futrel model was used to analyse the efficiency and performance of palm oil marketers. Bivariate Correlation was used to determine the level of market integration. The 5-point Likert-scale was employed to analyse the constraints faced by palm oil markets. The study found that 96 percent of palm oil marketers were female while male constitute only 4percent. Among the palm oil sellers 42.4 percent were in the age group of 41-50 years which is active and productive age group. Most of the palm oil sellers consisting of 88 percent were married. Majority of the palm oil sellers constituting 88.9 percent had formal education. The mean years of marketing experience is 15, out of which 48.8 percent had a marketing experience of 11-20 years. Wholesaler-retailer constitutes only 8 percent, as a result of the fact that they require substantial amount of capital to start the business. The Bivariate correlation of palm oil prices in the selected markets revealed a high price correlation between the

markets showing a great flow of information and price communication. It was found that palm oil marketing in the study area was profitable as the total revenue is greater than the total variable cost. Marketing efficiency of the sellers was observed to be low due to low Capital investment as only 18.93 percent of the business yielded profit. The major constraints militating against palm oil marketers are found to be price fluctuation (4.18), inadequate capital (4.32) and too many retailers (3.5). However, low quantity production, high cost of transportation, poor communication, poor storage facilities and poor market information had no significant effect on palm oil marketing.

The study concluded that palm oil marketing in the area was highly integrated, profitable and viable. The study recommended governments involvement in promoting agricultural marketing activities through the provision of physical infrastructures. Setting up of financial institutions to provide soft agricultural credit and rural finance to palm oil marketers at very low interest rates, enforcement of rules and regulations for the protection of the interests of retailers and administration of prices at different levels of marketing by government were suggested.

Anwar, et al (2014) conducted an experiment on the technical culture and productivity of Oil Palm in East Kalimantan Province with a research objects of 5 oil palm enterprises selected through purposive sampling. The primary data were collected by means of observation and measurement while secondary data were obtained from reports of the economic activities of the enterprises. Ten per cent (10 percent) of the total areas of the five plantations were taken as samples to be observed and or measured. Evaluation on the technical application of agronomy was divided into 3 groups of activities, namely: nursery, Immature Plants and Mature Plants. Estimated values of losses incurred due to the technical faults on the production were

measured. Suitability classification data and soil types were collected from the results of suitability evaluation conducted by the companies. Data on production and productivity were collected by observation and studies on the plantation production reports and oil palm factories. A research on the productivity of the production of Fresh Fruit Bunches (FFB) and crude palm oil (CPO) was conducted and limited to young oil palm trees aged from 3 to 8 years.

Evaluation results of key technical culture application at the nursery stage was found not complying the technical standards recommended, resulting in an estimated loss of yields between 15 percent in year 1 and 40 percent in year 4 with an error value of 2.44 percent to 7.58 percent. In the case of immature plants, failure in application of technical culture caused an error value ranging between 0.05 percent - 1.61 percent causing losses of FFB yields between 0.96 percent in year 1 and 65 percent in year 7. Misapplication of technical culture at harvest and transport of the harvest yields resulted in an error value between 0.34 percent and 1.80 percent which could result in yield losses between 3 percent and 15percent. From the research results on the productivity of FFB and CPO of each plantation, it was found that average productivity of the plantations was 12.66 tons/ha/ye or 78.96 percent of the baseline productivity potential of FFB at the Land Suitability Classification (MPA) of Marginally Suitable Land (S3). The CPO productivity was 3.87 tons/ha/yr or 76.63 percent of the baseline of the productivity potential of CPO. Productivity of the FFB and the CPO in the research areas was still low compared to the potential standard of productivity of the land with same land suitability classification, which was assumed to be caused by non-compliance of the recommended standards of technical culture.

Schwarze, et al (2015) analysed factors influencing small-holders' crop choice in Jambi, Indonesia with respect to rubber and oil palm. The methods applied for this

paper included participants' observations, semi-structured interviews with stakeholders at village level, problem-centred interviews with household, focussed group discussions with key informants, participatory tools like mapping, timelines and comparative cultural study. Various econometric methods were applied to analyse data. The importance of inputs in oil palm and rubber production was investigated by estimating a translog production function. Logit model was used to estimate the effect of risk attitude on production decisions and a left-censored Tobit model to assess the effect on oil palm acreage.

Extension of oil palm cultivation areas contributed considerably to the land-use changes in the Jambi's lowlands. Oil palm acreage increased more than tenfold between 1992-2012. Rubber plantation still occupied 52 percent of the total area whereas, the area covered by oil palm was 13 percent and forest cover decreased to 10 percent in 2012 from 28 percent in 1992. Out of the 697 farmers interviewed, 247 (35 percent) cultivated oil palm in 2012. The average age of rubber plots was 19 years compared to 12 years in case of oil palm. Expenditures for oil palm production were almost four times higher than for rubber due to higher fertilizer and herbicides applications. In terms of labour use, rubber plot was more than four times higher than an oil palm plot. However, labour use in rubber was much more flexible than in oil palm due to the perishable nature of the FFBs of oil palm. The advantages of oil palm over rubber cultivation were higher returns to labour and the shorter immature phase of oil palm. At the same time, returns to land for rubber were one-third higher than for oil palm. Econometrical estimate showed an increasing returns to scale of oil palm cultivation which indicated that oil palm production is capital-intensive while rubber production is labour-intensive. Oil palm farmers were found to be moderate risk-averse (or risk neutral) farmers. It was found that compared to rubber farmers, oil

palm farmers cultivated more area and own more land, and also have more formally titled land. Agricultural expertise, lacking flexibility in labour requirements, availability of seedlings and investment costs were identified as the major constraints for farmers cultivating oil palm. They found that important reasons for oil palm cultivations were the higher returns to labour and the shorter immature phase of oil palm. However, they also identified constraints of oil palm cultivation which prevent small-holders to cultivate oil palm. They concluded that lack of access to formal credit and high investment costs associated with palm oil production posed considerable barrier to the farmers. The high requirement for agricultural expertise negatively affects the decision to cultivate oil palm. In many cases, rubber cultivation appears to be the more viable and secure choice as it had been an established crop for many decades.

Rhebegen, et al (2015) examined the effects of climate, soil and oil palm management practices on yield in Ghana. They obtained data from three plantations (86 samples) and twenty smallholder farms (54 samples). Prolonged dry spell of 4-5 months, typically coinciding with a period of high insolation is one among the major constraints in oil palm cultivation. Water stress during the period determined the yield. The soil organic matter had been depleted in the plantations, probably due to poor crop residue utilisation and soil erosion, and soil pH had been reduced due to the application of ammonia-based Nitrogen (N) fertiliser. Soil P level is relatively high in plantations while it is very small in smallholder soil. K status is quite high in plantation and is extremely low in smallholders' farm. Smaller amount of magnesium in plantation in comparison to smallholder farms indicated that it had been depleted due to unbalanced fertiliser application. Smallholder productivity was constrained by low soil nutrients status, especially P and K. Yield gaps are examined and the yield

gap YG1 (Yw- caused by water stress) is the most relevant benchmark in Ghana. YG 2 (Ymey- deficiencies in plantation establishment), YG3 (Ynd – failure to diagnose nutrients), YG4 (Yam – failure to implement fertiliser), YG5 (Ya – incomplete crop recovery). Best Management Practices (BMP) was implemented since 2012 and due to time-lagged yield response of oil palm, the study focussed only on YG5, caused by incomplete crop recovery. Blocks were selected for BMP treatment and control reference plots. The average yield in smallholder BMP fields in the first year of implementation was 10.9 t ha FFB compared with 8.4 t ha in REF fields, a difference of 2.5 t ha. Improved crop recovery through installation of proper access (weeded circle and paths, pruning) resulted in a greater number of bunches and larger average bunch weight (mainly due to complete collection of loose fruit). Across all production phases, the gap between Yw and Ya was largest in smallholder farms. It was confirmed that there was a large potential to increase yields in smallholder fields simply by improving crop recovery with installation of proper in-field access and tight control of harvest interval. Sub-optimal management of plantation in the smallholder farms implied that there was a significant potential for improvement in yield.

Farmers' preference for oil palm was explained by three main categories of factors: the direct profitability of small holdings as the main driver of farmers' choices, the technical characteristics of the crop including less labour, the high return on investment; and the partnership with big companies and banks that bring a number of advantages with some constraints. Oil palm development brought new jobs and income opportunities to local people, and the possibility to vary their cash crops. Independent oil palm smallholdings are highly profitable but farmers lack the technical knowledge and some important inputs including high quality seedlings. The

increasing return to land gave an opportunity to release pressure on land and forest. The agrarian transition was witnessed with rural society evolved into a more urban and industrialised one.

World Growth (2011) made a report on the economic benefits on palm oil to Indonesia. The report stated that approximately 49 percent of palm oil plantations were owned by private plantations, 41 percent by smallholders and the remaining 10 percent by government plantations in 2008. Private plantations represent the largest producers of palm oil in Indonesia, producing over 9.4 million tonnes of palm oil, smallholder plantations produce 6.7 million tonnes of palm oil and government plantations produced 2.2 million tonnes of palm oil in 2008. During the same year, Indonesia exported over 14.5 billion dollars in palm oil related products. In 1997, the average net income of oil palm small holders was seven times that of farmers involved in subsistence production of food crops. World Growth (2009) found that there was considerable potential for smallholders in Indonesia to expand output on existing acreages through the use of new genetic stock. Land use returns from oil palm are significant as compared with many other forms of land use. By 2020, global consumption and production of palm oil is expected to increase to almost 60 million tonnes. The health characteristics and cost competitiveness of palm oil, coupled with its potential contribution to renewable energy, is expected to contribute to the growth of over 30 percent in the next decade. By 2020, FAPRI estimates that Indonesia will produce almost 30 million tonnes of palm oil, including exports of almost 23 million tonnes. This growth will be achieved through increased yields and further land conversion. At the same time, there are various challenges like environmental challenges, land availability constraints, conversion of degraded lands, land rights and degradation closing the productivity gap and bio diesel industry.

UNEP (2011) in the study 'Oil Palm Plantations; threats and opportunities for tropical ecosystem' points out the economic importance of oil palm which provides one of the leading vegetable oils produced globally, accounting for one quarter of global consumption and approximately 60 percent of international trade in vegetable oils (World Bank, 2010). High-yielding oil palm varieties developed by breeding programmes can produce over 20 tonnes of FFB/ha/yr under ideal management, which is equivalent to 5 tonnes of oil/ha/yr (excluding the palm kernel oil) (FAO 2002). The global demand for oil palm is expected to double by 2020. An estimated 47 percent of global palm oil usage is for food products and 24 percent is for industrial purposes (USDA 2010). Socio-economic benefits of sustainable oil palm plantation could include poverty alleviation and long-term employment opportunities.

Oil palm is cultivated on approximately 15 million ha across the world and causes environmental threats due to expansion of oil palm plantations. The modern oil palm monoculture with intensive use of fertilisers and herbicides is causing pollution of soil and water, adversely affecting the ecosystem leading to habitat fragmentation and biodiversity loss. Drainage of peat land contributes significantly to greenhouse gas emission. It was also found that the rapid expansion of oil palm plantation is frequently linked with problems related to land tenure systems and land use-rights and in the exploitation of local communities and abuse of human rights. Addressing the problems such as the inequalities between small scale and large trans-national oil palm enterprises is found to be a major challenge. Bio-diesel from palm oil contributes more GHG emission to the atmosphere than gasoline it replacing when the plantations producing the palm oil were established by deforestation. In order to safeguard the vulnerable communities and environments, organisations like Roundtable on Sustainable Palm Oil (RSPO), Reducing Emissions from

Deforestation and Forest Degradation (REDD +) and the Palm Oil, Timber, Carbon Offset (POTICO) project came up. Mapping and monitoring, supported by an appropriate regulatory framework are necessary to achieve sustainable management of oil palm production and to protect the remaining tropical forests, conserving biodiversity and promoting economic growth in developing countries.

2.1.1 Summary of Global Studies

Observations from the above studies could be summarised as follows:

Oil Palm cultivation is more capital-intensive than that of rubber plantation. Important reasons for oil palm cultivations were the higher returns to labour and the shorter immature phase of oil palm. A Land use return from Oil Palm was significant as compared with many other forms of land use.

Level of education and trainings have significant relationship with the yield of oil palm. The overall adoption of improved oil palm technologies was found very low and results in low productivity. Incomes of farmers were being improved through their participation in the Government schemes for promotion of Oil Palm.

Poor and inadequate transportation, land tenure problem, financial problems, etc. were among the major constraints being faced by the smallholders and in some cases lack the technical knowledge, water and some important inputs including high quality seedlings were among the constraints. Credit facilities need to be provided and banks could play vital roles. Development of transportation system to enhance movement at lower cost is advocated.

Socio-economic benefits of sustainable oil palm plantation could include poverty alleviation and long term employment opportunities. However, the anticipated gains from the industry should be balanced against the potential social and environmental impact of commercial oil palm development and palm oil industry

2.2 Brief Review of Indian Studies

Owolarafe, et al (2007) assessed the Oil Palm fruit plantation and production under the contract-growers scheme in Andhra Pradesh and Tamil Nadu States of India. Information was collected mainly using well-structured questionnaires. A total of 100 plantations were visited out of which data were collected from 96 plantations on the age of plantation, size of plantation, cost of establishment, maintenance practices and cost, yield of fresh fruit bunches, profitability of the scheme for the farmers and so on. It was observed that most of the plantations (69.80 percent) were in the range of 6-10 years of age while most of the plantations visited were small scale with the size of 1-5 ha dominating the sample (76.8 percent). Further, about 62.5 percent of the farmers acquired land for the plantation by inheritance while the rest purchased the land. The effect of the plantation size on the cost of establishment was observed to be significant at 95 percent. Field observation indicated that the cost of plantation establishment also depends on location which influences easy access to land and labour availability. They observed that the frequency of weeding depends on the age of the trees. Farmers also performed maintenance activities (irrigation, weeding and fertilizer application) satisfactorily, though incurred considerable cost on the activities. A cross-tabulation of effect of fertilizer application on maintenance cost indicated that it was significant at 90 percent level using chi-square test whereas weeding was also observed to be significant at 99.99 percent. However, the effect of irrigation was not significant. Fertiliser application was observed to take a lion share of the total maintenance cost. It was also observed that some of the farmers apply excess fertilisation that affects the trees. About 99 percent of the farmers used manual labour for the farm operations. Majority of the farmers obtained fund to establish the plantations from personal savings and subsidy from the government also account for a

big percentage. Harvesting and haulage of fruit were well organized to ensure prompt processing of fresh fruit bunches for the mills to achieve the desired quality of palm oil. The effect of plantation size on quantity of fresh fruit bunch harvested was observed to be significant at 99.99 percent. Further, the effect of age of plantation on yield of fresh fruit bunch was observed to be significant at 99.0 percent. The farmers made profit from the scheme but some farmers were faced with the problems of pest infestation of the fruit, water stress and lack of fund.

The farmers supplied fruits to the mill in which they were attached under the scheme and not to the other mill. Thus, the section of "Oil Palm Act" relating to that was adhered to. Majority of the plantations were within the range of 30 km from the mill and enabled the farmers to transport the fruits to the mill easily as soon as the fresh fruit bunches were harvested. Collection centres were located at strategic points where the plantations were far away from the mill. Majority of farmers (94 percent) were satisfied with the contract-growers scheme and were ready to continue with it. Bird menace constituted the major problem faced by the farmers. Other problems included water stress in some areas, finance and non-availability of labour in very few cases.

Intercropping was found by some researchers and planting of timber trees with oil palm had been observed to be successful. However, about 90 percent of the farmers made more profit in oil palm cultivation than the other crops. The fact that the farmers made profit and had improvement in income was in agreement with the reviews of major contract farming projects as reported by Glover and Ghee (1992) and Glover and Kusterer (1990). From their study, they suggested that farmers should be trained regularly on proper maintenance of plantation as well as on new techniques in plantation management. At the same time, they claimed that the extension workers

need to put in more efforts in guiding and monitoring the farmers. Introduction of adequate techniques for scaring birds and assistance with irrigation facilities for farmers with high degree of water stress were recommended. They were of the opinion that with all those problems properly addressed, the sustainability of the scheme will be guaranteed.

Rao (2013) studied the problems and prospects of Oil Palm Cultivation in Andhra Pradesh State. He obtained information and data from both primary and secondary sources. Primary data were compiled based on the responses obtained from selected oil palm cultivators in Krishna and Godavari districts. The data collected for the study were analysed using statistical techniques like ANOVA, Chi-Square, Grouped Correlation, etc. From the results, it was found that the application of fertilizers and number of splits have shown significant effect on yield of oil palm. There was a positive correlation between the age of oil palm and income. He suggested that entrepreneurs should play an important role in oil palm development in their respective allotted zones for effective transfer of production technologies. Oil palm cultivators were of the opinion that harvesting machines were to be made available as harvesting becomes difficult with the length of oil palm which increases with the increase in age. It is also suggested that oil palm should be exempted from VAT. Further, they recommended cooperation of all agencies in taking care of the thrusts.

Madhavi, et al (2015) studied Marketing problems and prospects of oil palm sector with special reference to Krishna District of Andhra Pradesh. The study explored the social and economic basis of oil palm cultivation. Both primary and secondary data were used. Primary data were collected using a questionnaire survey of 200 farmers who cultivated oil palm. The social background of farmers and their

attitudes towards oil palm cultivation were explored by empirical analysis and cross tabulation of questionnaire data. Secondary data pertaining to the study were obtained from various related offices. The total area covered under oil palm cultivation in Krishna District is 12,355 ha. The district was divided into 2 zones, major part of the district was covered by Ruchhi Soya Industries Ltd, Ampa Puram and a minor part was covered by Godrej Agrovet Ltd. Under the scheme, during 1999-2000 minimum support price was fixed at Rs.2750/ton. The company paid Rs.2300/ton whereas the government of India and the government of Andhra Pradesh paid the rest. In 2008, the international market price fell sharply and many farmers started uprooting their palm gardens due to non-remunerative price. The government of India increase minimum support price to Rs.5000/ton from March, 2009.

The farmers were facing with various kinds of constraints like non availability of skilled labour, perishable nature of FFBs. Periodic collection of FFBs, zonal system for the processing of oil palm bunches, inadequate minimum support price, imposition of VAT on the oil palm FFBs, inability to cope with monthly price fluctuation, high transportation cost of FFBs, increasing cost of cultivation, delayed payments by the company and non payments of minimum support price by the government. They made recommendations for continuation and strengthening of support price from the government as well as strict enforcement of quality regulation: Harvesting machines should be made available to oil palm cultivators; import duty should be levied during the peak seasons to safeguard the interest of local producers; VAT imposed on the FFB of oil palm should be wiped off; government should take measures to control price fluctuation of FFBs. Farmers stated that minimum support price should be Rs.7000-8000 irrespective of the output; zonal system, giving monopoly to entrepreneurs should be stopped by establishment of more than one

processing unit and continuous collection of oil palm bunches was required due to perishable nature of the fruit; problems of non payment and delayed payment must be resolved by the government in order to attract farmers towards cultivation of oil palm. The authors are of the opinion that the imbalance between demand and supply of edible oil requirements could be corrected by giving support to the oil palm cultivators.

2.2.1 Summary of Indian Studies

In India, Oil Palm is grown under the contract farming system. Most of the plantations are small scale. Most farmers used manual labour for farm operation. Subsidy plays an important role in establishment of plantations. The effects of age and size of plantation on yields of the FFBs are found significant.

Pest infestation, water stress and lack of funds were being faced by the farmers. Bird menace constituted the major problem faced by the farmers and in some cases, water stress, perishable nature of FFBs, high transportation cost, increasing cost of cultivations, finance and unavailability of skilled labour were among the problems. The sharp decline in international market price caused many farmers to uproot their palm gardens due to non-remunerative price. Delayed payments by the company and non payments of minimum support price by the government are among the constraints faced by the farmers in some cases.

Inter-cropping with timber trees were also observed in some areas. Regular training on proper maintenance of plantation as well as on new techniques in plantation management is required.

Entrepreneurs should play an important role in oil palm development in their respective allotted zones for effective transfer of production technologies. Harvesting machine for oil palm is required as the height of the tree increases with age. Government's intervention in controlling the price fluctuations and exemption from VAT is suggested.

2.3 Comments:

The above various studies highlight the world and Indian studies about oil palm. It shows the present trends in the cultivation of oil palm and production of palm oil. The following points may be mentioned related to the study:

First, various methodologies were applied in the study and most of the researchers used random sampling technique. Scheduled questionnaire and semi-structured interview schedule were commonly used for collection of data. Analytical tools like simple statistical tools and descriptive statistics are also used (Soyebo, et al, 2005; Akangbe, et al, 20011; Ibitoye, et al 2011; Damoah, 2012; Onoh, et al, 2012; Ezealaji, 2012; Ajieh, et al, 2013; Ibitoye, et al, 2014;) For testing of hypothesis, chi-square is also used (Ibitoye, et al 2011; Damoah, 2012; Rao, 2013).

Second, Oil palm is a plantation crop with long gestation period requiring proper maintenance for long immature phase and comparative study had also been conducted with rubber plantation (vide Feintrenie, et al, 1963; Schwarze, et al, 2015). Returns to labour is found to be more in oil palm than that of rubber. Conversion of rubber plantation to oil palm plantation is also found in some parts of Indonesia (vide Feintrenie, et al, 2010).

Third, various constraints in oil palm plantation development which affect the farm maintenance include access to land (Owolarafe, et al, 2007; Olagunju, 2008;

Akangbe, et al, 20011; Onoh, et al, 2012; Beggs, et al, 2013; Madhavi, et al, 2015; Rhebergen, et al, 2015), and development of skills and capacity building (Akangbe, et al, 20011; Ibitoye, et al 2011; Damoah, 2012).

Fourth, for marketing oil palm and palm oil, road transport, proper storage, etc are found to be required (vide Ibitoye, et al 2014; Akangbe, et al, 2011).

Fifth, micro-level extraction profitability required to be enhanced. Cost of cultivation and profitability is a challenge. Requirement for improved technology is stated. In this effect, farm extension services play an important role on training and capacity building (vide Soyebo, et al, 2005; Agwu, 2006; Akangbe, et al, 2011; Ajieh, et al, 2013).

Sixth, alternative livelihood activities were also taken up by the oil palm farmers (vide Feintrenie, et al, 2010) and intercropping can improve the income of the farmer (vide Zen, et al, 2005; Owolarafe, et al, 2007). It is found that oil palm cultivation is found more remunerative than other subsidiary income activities (Beggs, et al, 2013).

Last, but not the least, Oil palm plantation in India is well organised under contract farming system. Andhra Pradesh is the leading producer of palm oil. Maintenance activities are performed by the farmers. All the FFBs are sold by the farmers to the processing mills to which they are attached. No farmers are allowed to process FFB. The price of FFB is fixed by the Price Fixation Committee which is revised at regular interval. Likewise, the cultivation of Oil Palm was implemented under the contract farming system and the Mizoram Oil Palm Act was passed on 2nd December, 2004. Mizoram has started cultivation only in 2005 and is still at the initial stage and farmers started harvesting Fresh Fruit Bunches, which are being sold to their respective allotted mill.

2.3.1 Literature Gap:

From the above studies, it can be seen that growers' economic condition, farm management practice, marketing, cropping and land use pattern can be of an academic area of interest or area of investigation. The performance in various plantations observed from the study could be applied as criteria for performance observation in our present study. Improvement of the cultivation practices are expected to be identified for the case of Mizoram through this study.

To conclude, we have not come across the study on the cost-benefit analysis of the oil palm plantations from the above studies, this may also form an important area of research gap which needs to be filled.

Chapter 3

AN OVERVIEW OF OIL PALM PRODUCTION

3.1. Introduction

The ever increasing global population results in the increased demand for vegetable oils. According to McCarthy (2010), the reason behind the increase in the global vegetable oil demand is the increased consumption for domestic purpose, bio-fuel and cosmetic industries. Oil Palm is one of the most efficient oil producing crop and the demand for palm oil rises over the years. Oil Palm produced varieties of products such as crude palm oil, palm kernel oil, palm kernel cake, oleo-chemical as well as new bio-fuel products to fulfil the demand from food and non-food industry in the world, Mahat (2012). The rising global demand for production of biodiesel, which is expected to quadruple by 2020, would create a massive increase in demand for palm oil, with expansion in the area under the crop, particularly in Indonesia (Monbiot, 2005). However, there is also concern about the adverse socio-economic and environmental impact of the Oil Palm cultivation. If the production of bio-fuels is big enough to affect climate change, it will be big enough to cause starvation (Monbiot, 2005). The *New Climate Economy* (Sep 2014) advocated adoption of "climate-smart" agriculture techniques, restoring degraded farmland, and curbing deforestation and forest degradation to raise productivity and boost rural incomes while reducing GHG emission. In order to promote the use of sustainable palm oil through credible global standards and engagement of stakeholders, the Round Table on Sustainable Palm Oil (RSPO), a non-profit organisation, was formed in 2004 (Greenpeace International, 2013).

3.2. World Scenario

The United States Department of Agriculture (USDA) estimated that the Global Palm Oil Production during 2016-2017 will be 65.5 million metric tonnes. The production during 2015-2016 was 59.4 million tonnes. An increase by 6.09 million tonnes or a 10.25 percent was anticipated during the current year around the globe.

3.2.1. World's Production of Palm Oil

Indonesia and Malaysia are the largest producers of palm oil and contribute to about 89 percent as of 2011-12, of the world's exports. Indonesia and Malaysia have increased palm oil acreage by a CAGR of 8 percent and 3 percent respectively over 2005 to 2010. Acreage under palm oil in Malaysia has now stagnated with no significant additions over the last few years. The world's production of Palm Oil is increasing with the increase in demand. Indonesia is the largest producer as well as exporter of palm oil.

As per the estimates of the United States Department of Agriculture (2016), Indonesia is the only country among the top ten producing countries, which does not import it. However, it shows only 6.06 percentage increase of Annual Growth Rate of production. In terms of Annual Growth Rate of production, Malaysia stood first followed by Honduras showing more than a 10 percent increase. Honduras is followed by Ecuador, Guatemala and Thailand showing 9.80, 9.57 and 9.52 percents respectively. Colombia is having less than 1 percent Annual Growth Rate at 0.09 percent, while the Annual Growth Rate of Nigeria is 0.00 percent. Papua New Guinea is showing a negative Annual Growth Rate of -10.00 percent. These are shown in table 3.1 below.

Table 3.1: Top Ten Palm Oil Producing Countries in 2016

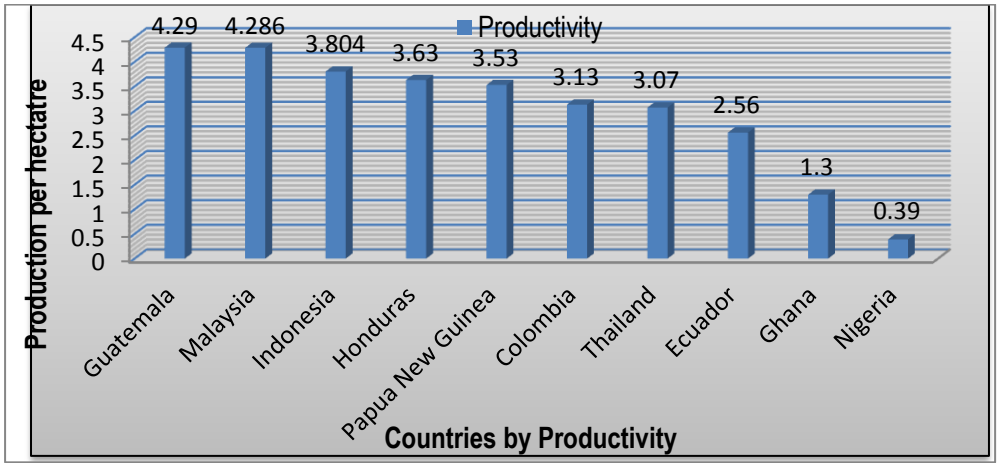
Rank	Country	Production in '000 MT	Annual Growth Rate	Area Harvested '000 ha	Average Production per ha MT*	Export '000 MT	Import '000MT
1	Indonesia	35,000.00	6.06 %	9,200.00	3.804	25,750.00	-
2	Malaysia	21,000.00	12.00 %	4,900.00	4.286	18,000.00	400.00
3	Thailand	2,300.00	9.52 %	750.00	3.07	150.00	25.00
4	Colombia	1,175.00	0.09 %	375.00	3.13	350.00	130.00
5	Nigeria	970.00	0.00 %	2,500.00	0.39	18.00	600.00
6	Ecuador	560.00	9.80 %	219.00	2.56	250.00	10.00
7	Honduras	545.00	11.22 %	150.00	3.63	325.00	20.00
8	Papua New Guinea	522.00	-10.00 %	148.00	3.53	560.00	50.00
9	Ghana	520.00	4.00 %	400.00	1.30	120.00	300.00
10	Guatemala	515.00	9.57 %	120.00	4.29	485.00	20.00

*Source: USDA, Year of Estimate 2016, * Researcher's calculation*

3.2.2 Productivity among the World's Top Ten Producers of Palm Oil

In contrast to the above observation, in terms of productivity per area harvested, Guatemala stood first with an average production of 4.29 Metric Tonnes of Palm Oil per hectare closely followed by Malaysia with 4.286 Metric Tonnes of Palm Oil per hectare. Indonesia stood in the third position in terms of productivity. However, the high production is due to the vast area of cultivation, which is 188 percent more than the area covered by that of Malaysia, the second largest Palm Oil Producing country in the world. Indonesia, Honduras, Papua New Guinea, Colombia and Thailand are in the productivity range of three to four Metric Tonnes of Palm Oil per hectare. Ghana is also very low in productivity with only 1.03 Metric Tonnes of Palm Oil per hectare. Among the top ten Palm Oil producing countries of the world, Nigeria is the least productive, with an average production of 0.39 Metric Tonnes of palm Oil per hectare as shown in the following figure 3.1.

Figure 3.1: Countries by Productivity of Palm Oil per Hectare



Source: Researcher's calculations based on USDA, Year of Estimate 2016

3.2.3 World's Consumption and Imports of Palm Oil

Global edible oil consumption has grown from 123 Million Metric tonnes in 2007 to 158 Million Metric tonnes in 2012. This growth has been fuelled by increased population, incomes and per capita consumption especially in developing countries like India, Indonesia and China. Palm oil is the largest consumed edible oil in the world (USDA Foreign Agriculture Services). The total Palm Oil imports of the four major importers such as, India, EU-27, China and Pakistan in 2016 amounted to 25.9 million Metric Tonnes. The current world production of oil seeds and vegetable oil production is estimated to be sufficient for consumption. However, the increasing demand for bio-diesel and other industrial uses is putting the stocks at pressure.

The world's consumption of palm oil is increasing at a fast rate impelling the surge in imports of different countries. The top ten importers of Palm Oil in 2016 are India, EU-27, China, Pakistan, Egypt, Bangladesh, United States, Myanmar, Russian Federation and Vietnam.

Table 3.2: Palm Oil Imports by Four Top-Importing Countries

(in 1000 Metric Tonnes)

Year	India		China		EU-27		Pakistan	
	'000 T	GR	'000 T	GR	'000 T	GR	'000 T	GR
1999	3300	13.79	1351	1.43	2078	-	1039	5.91
2000	4000	21.21	2028	50.11	2885	38.84	1295	24.64
2001	3400	-15.00	2020	-0.39	2978	3.22	1174	-9.34
2002	3954	16.29	3105	53.71	3006	0.94	1317	12.18
2003	3486	-11.84	3570	14.98	3411	13.47	1296	-1.59
2004	3525	1.12	4319	20.98	4031	18.18	1548	19.44
2005	2899	-17.76	4975	15.19	4276	6.08	1789	15.57
2006	3650	25.91	5139	3.30	4339	1.47	1618	-9.56
2007	5013	37.34	5223	1.63	4967	14.47	1958	12.01
2008	6867	36.98	6118	17.14	5509	10.91	1957	-0.05
2009	6603	-3.84	5760	-5.85	5442	-1.22	1989	1.64
2010	6661	0.88	5711	-0.85	4944	-9.15	2064	3.77
2011	7473	12.19	5841	2.28	5707	15.43	2218	7.46
2012	8364	11.92	6589	12.81	6812	19.36	2246	1.26
2013	7820	-6.5	5573	-15.42	6969	2.30	2758	22.80
2014	9256	18.36	5696	2.21	6718	-3.60	2919	5.84
2015	9500	2.64	5600	-6.69	6700	-0.27	3200	9.63
2016	10250	7.89	5750	2.68	6600	-1.49	3300	3.13

Source: USDA, Year of Estimate 2016

The Palm Oil imports of the four major importing countries are shown in Table 3.2. In terms of absolute quantity of Palm Oil imports and the annual growth rate during the previous year, India is undisputedly in the first position with an amount of 10.25 million metric tonnes and an annual growth rate of 7.89 percent. During the same period, the annual growth rate of China's import is 2.68 percent; the growth rate of EU-27's import is falling at -1.49, while the growth rate of Pakistan is 3.13 percent.

3.3.1 Imports of Palm Oil in India

In India, almost 90% of the palm oil imported and produced domestically is used for food purposes, while the remaining is used for industrial purposes like soap, detergent and cosmetics manufacturing, etc. Palm oil has now become the single largest consumed vegetable oil in India. Palm oil in refined form is used in food

industry, whereas palm stearin, palm fatty acid distillate and refined palm kernel oil are used for industrial applications. Indian edible oil imports had been dominated by palm oil since the mid-1990s. Palm oil import contributed to around 77% of the total imported edible oils in 2011 and 74% in 2012. Apart from human consumption, as RBD palmolein, it also supports many other industries like refining, vanaspati and other industrial sectors (WWF Report, 2013).

Table 3.3: Vegetable Oil Imports of India

Oil Year (Nov – Oct)	Quantity (metric tonne)	Value (Rs. Crore)
2010-2011	8.37	46,060
2011-2012	9.98	56,295
2012-2013	10.38	50,150
2013-2014	11.62	60,750
2014-2015	14.42	62,860
2015-2016*	16.00	75,000

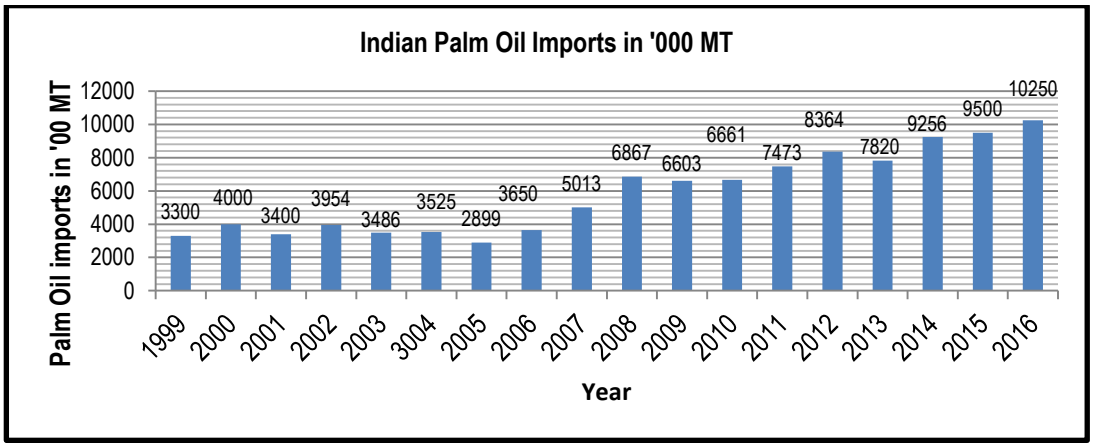
*Source: Solvent Extractors' Association, * Forecast*

Table 3.3 shows the vegetable oil imports of India since 2010-2011 to estimated imports during Oil Year 2015-2016. During the Oil Year 2010-2011, vegetable oil import was 8.37 metric tonnes worth Rs. 46,060 crore which had increased to an import of 14.42 metric tonnes in 2014-2015. This is further forecasted to increase to 16.00 metric tonnes worth Rs. 75,000 crore during the oil year (November – October) 2015-2016. A fall in production from local sources, and a spurt in demand on subdued prices over the past years have widened the deficit in India. India's edible oil import bill is likely to rise by 15-20 percent this oil year (November '15- October '16), on a sharp increase in the price of Crude Palm Oil (CPO) in the global markets and a widening domestic supply deficit. The price rise could be caused by the supply deficit from the two top-producing counties, Indonesia

and Malaysia as supply decreased due to the adverse climatic conditions in the two countries.

India's Palm oil consumption, as a part of the overall global consumption has increased from 13% in 2007 to 15% in 2011-12. India's growth in consumption is outpacing the global rate and hence India plays a vital role in driving the production of Palm oil globally. The growing population of India results in the increased demand for palm oil and the consequent shortage of vegetable oil in India leading to the rise in the imports of Crude Palm Oil. Indian Palm Oil imports rises consistently from 3300 metric tonne in 1999 to an estimated 10250 metric tonne in 2016 while its production is only 200 metric tonne in 2016 from an area of 80,000 hectares (USDA, 2016). The growth rate of import during the period is 210.6 percent. India's increasing demand for Palm Oil stems from its inability to meet its domestic demand for vegetable oil; India produces less than 50 percent of its domestic edible oil requirements (Ministry of Agriculture, Government of India, 2011).

Figure 3.2: Indian Oil Palm Imports since 1999 to 2016



Source : USDA, Year of Estimate 2016

3.4. Oil Palm Development Programmes in India

Oil palm was introduced in India at the National Botanical Gardens, Kolkata in the year 1886. The Maharashtra Association for Cultivation of Sciences (MACS) later introduced African *dura* palms along canal bunds, home gardens and, to some extent, in forest lands in Pune during 1947 to 1959. Large scale planting of oil palm was launched from 1971 to 1984 in Kerala by Plantation Corporation of Kerala Ltd., (subsequently taken over by Oil Palm India Ltd.,) and by Andaman Forest and Plantation Development Corporation in Andaman and Nicobar Islands during 1976 to 1985.

The Indian economy is the world's fourth largest oil economy after USA, China and Brazil. More than 50 per cent of the total consumption of the nation is met through imports. India is also the largest importer of palm oil accounting for about 44 per cent of world imports. The Indian palm oil import in 2015 reached 9.25 million metric tonnes and further increased to 10.25 million metric tonnes in 2016 (indexmundi.com). A substantial portion of the edible oil requirement in India is met through imports. The increasing demands for edible and non-edible oils have been increasing with the rising population and overall increase in the income level of the population. The demand and supply gap is swelling. This necessitates exploitation of domestic resources to maximise production to ensure edible oil security for the country. The high yielding characteristics of Oil Palm makes it a suitable option for meeting the domestic demand for edible oil production. With a view to increase the production of oil seeds, to reduce imports and towards self-sufficiency in edible oils, the Government of India launched "Technology Mission on Oilseeds and Pulses (TMOP)" in 1986. However, the area, production and productivity of Oil Palm is still very low compared to the other producing countries of the world. The large

share of edible oil imports, especially Palm Oil, could have an adverse effect on the overall performance of the economy. It is thus inevitable for the Government of India to promote domestic production of Palm Oil to meet the rising demand even though there is an argument against its adverse social and environmental impacts. However, the cultivation of Oil Palm should be taken up with due care and in conformity with the requirements put forward by the Roundtable on Sustainable Palm Oil (RSPO).

Some of the well known programmes or schemes meant for Oilseeds development and expansion of Oil Palm cultivation in India are summarised below:

1. **Technology Mission on Oilseed (TMO):** It was the first programme on Oilseeds and launched in 1986. The core idea was to increase the production and productivity of Oilseeds to make the country self-reliant in this vital sector.
2. **Oil Palm Development Programme:** It is the first major policy initiatives of the Government of India for promotion of Oil Palm cultivation and was launched in 1991-1992 under the Technology Mission on Oilseeds and Pulses (TMOP). The programme was later implemented under the ISOPOM.
3. **Integrated Scheme of Oilseeds, Pulses, Oil Palm & Maize (ISOPOM):** Technology Mission on Oilseeds was restructured in 2004-2005 which includes Oilseeds Production Programme, Oil Palm Development Programme, National Pulses Development Projects and Accelerated Maize Development Programme of the IXth Five Year Plan. ISOPOM is implemented during the Xth Five Year Plan effective from 1st April, 2004.
4. **Oil Palm Area Expansion Programme (OPAE):** The Special Programme on Oil Palm Area Expansion (OPAE) has a total budget of Rs. 300 crore to

bring an additional 60,000 hectares area under Oil Palm cultivation in 12 states over five years from 2011-20012. The budget will be used for providing subsidies to the farmers – up to 85 percent towards seedling costs and up to 50 % of on chemical inputs, drip irrigation systems, pump sets, bore-wells and setting up of processing units (Ministry of Agriculture, Govt. of India). This will be implemented under RKVY since 2011-2012.

5. **National Mission on Oilseeds and Oil Palm (NMOOP):** It is to be implemented during the XIIth Five Year Plan, effective from 2014-2015 with financial allocation is Rs.3,507 crore for the purpose. This will bring an additional area of 1.25 lakh hectares under Oil Palm cultivation with increase productivity of Fresh Fruit Bunches from 4927 kg/ha to 15,000 kg/ha and increase in collection of tree borne oilseeds to 14 lakh tonnes. It envisage an increased production of vegetable oil sources by 2.48 million tonnes from oilseed (1.70 MT), Oil Palm (0.60 MT) and tree borne oilseeds (0.18 MT) by the end of the XIIth Plan period. Emphasis will be placed on increasing the Seed Replacement Ratio (SRR) with focus on varietal replacement; increasing irrigation coverage under oilseeds from 26 percent to 38 percent; diversification of area from low yielding cereal crops to oilseeds crops; inter-cropping of oilseeds and use of fallow land; area expansion of Oil Palm and TBOs; increasing availability of quality planting materials of Oil palm and TBOs; enhancing procurement of oilseeds and collection and processing of TBOs. Recommended varieties and proven technologies would be demonstrated in a cluster approach through mini kits and frontline/cluster demonstration. The cluster approach would ensure participation of all categories of farmers, irrespective of the size of their holdings, social status

and would demonstrate visible impact of technologies in enhancing productivity and production.

3.5. Identification of Potential Areas for Oil Palm in India

In order to intensify the cultivation of Oil Palm and production of Palm Oil to meet the domestic requirement of cheap and efficient oil, the Government of India felt the need for identification of potential areas for cultivation of Oil Palm in different States of the country. Ministry of Agriculture, Government of India appointed a team headed by Dr. K. L Chadha to identify potential areas for cultivation of Oil Palm in various States and a total area of **10,36,500** hectares had been identified by the Committee. However, the total potential area identified as on 2006 in the country is 10.71 lakh hectares (DOPR Vision 2030).

Table 3.4: Potential Areas Identified in Different States

Sl. No.	State	Potential Area Identified by Chadha Committee Report (Ha)
1	Andhra Pradesh	4,00,000
2	Karnataka	2,50,000
3	Tamil Nadu	1,62,000
4	Gujarat	90,000
5	Mizoram	61,000
6	Chhattisgarh	40,000
7	Orissa	25,000
8	Kerala	6,500
9	Goa	2,000
10	West Bengal	10
11	Andaman & Nicobar	0
12	Assam	0
13	Maharashtra	0
14	Tripura	0
Total		**10,36,500**

Source: Dr. Chadha Committee Report

3.6. Cultivation of Oil Palm in India

Of the 15 million hectares under oil palm cultivation globally, acreage under oil palm in India stands at around 268707 hectares up to 2013-2014 according to the Ministry of Agriculture, Government of India. Andhra Pradesh is having the largest area of Oil Palm cultivation in the country. It accounts for 56.11 percent of the total area of Oil Palm cultivation in India with a total cultivated area of 150784 hectares. Karnataka occupies the second position with 38391 hectares and 10.51 percent of the total area of cultivation. Tamil Nadu came in the third position with an area of 28238 hectares accounting for 10.51 percent of the total cultivated area. Mizoram is in the fourth place with a total cultivated area of 19971 hectares and sharing 7.43 percent. Odisha came in the fifth position with 16225 hectares of cultivated area and accounts for 6.04 percent of the total cultivated area. Kerala was in the sixth place with 5740 hectares and accounts for 2.14 percent of the total cultivated area, followed by Gujarat with 4415 hectares with 1.64 percent of the total cultivated area. The least cultivating states (Maharashtra, Chhattisgarh, Goa, Tripura & others) put together covered an area of 4,943 hectares and accounts for only 1.84 percent of the total cultivated area in India.

Table 3.5: Selected State-wise Area Covered under Oil Palm Development Programme in India (up to 2013-2014)

(Area in hectares)

SIN	States	Coverage of Area	*% to total cultivated area
1.	Andhra Pradesh	150784	56.11
2.	Karnataka	38391	14.29
3.	Tamil Nadu	28238	10.51
4.	Gujarat	4415	1.64
5	Kerala	5740	2.14
6	Odisha	16225	6.04
7	Mizoram	19971	7.43
8	Others (Maharashtra, Chhattisgarh, Goa, Tripura & others)	4943	1.84
India		**268707**	**100**

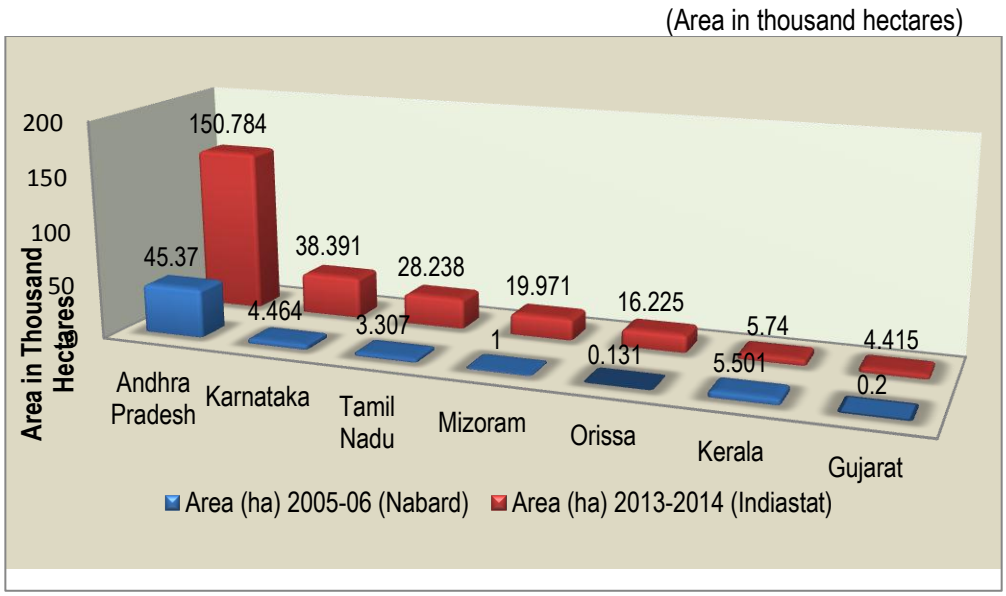
*Source : Ministry of Agriculture, Government of India (16364), * Researcher's calculations*

Oil Palm cultivated areas in India is increasing steadily with the implementation of the programme; however, area coverage is not achieving the target during the period. The reasons may be low price of FFB, poor yield due to adverse weather condition, poor market linkage, etc. It is envisioned to get 3-4 million tonnes of Palm Oil and 0.3-0.4 million tonnes of Palm Kernel Oil by the year 2030 with one million hectare of land under Oil Palm cultivation. As on 2006, various Expert Committees constituted by Ministry of Agriculture, Government of India have identified a total area of 10.71 lakh hectares in 14 states of the country as suitable for oil palm cultivation. Out of the total area of 1.94 lakh hectares already covered under oil palm, about 30,000 ha were uprooted due to various reasons (DOPR Vision 2030).

Comparison of seven states in their performance in terms of area coverage of Oil Palm cultivation is shown in the following figure. The state of Andhra Pradesh occupies the first position in terms of area coverage. In the initial stage in 2005-2006, Kerala was in the second position, which moved down to the sixth position in 2013-2014. Kerala was surpassed by Karnataka, Tamil Nadu, Mizoram and Orissa.

Gujarat remains in the seventh position. Mizoram moved up by one step from the fifth position to the fourth position.

Figure 3.3: Growth of Area Coverage under OPDP (2005-2006 to 2013-14)



Source: Ministry of Agriculture, Government of India

3.7. Production of Fresh Fruit Bunches in India

India's share in palm oil production is small, accounting for about 0.2% only in the total world produce. Of the 15 million hectare under oil palm fruit production globally, acreage under oil palm in India stands at around 268707 hectares up to 2013-2014 according to the Ministry of Agriculture, Government of India. As per the reports of the United States Department of Agriculture, India's Palm Oil production is 5,000 metric tonne in 1991, which rises to 200,000 metric tonne in 2016 (indexmundi.com).

Table 3.6 shows state-wise production of Oil Palm FFBs. In terms of harvest of Fresh Fruit Bunches also Andhra Pradesh occupies the first position with 933981 metric tonnes of FFB during 2013-2014. Andhra Pradesh produced 93.85 percent of

the whole production of FFB during 2013-14. In the second position came Kerala with a mere 3.85 percent and the third position was occupied by Karnataka with just 1 percent of the total produced. The remaining states have less than 1 percent of the total. The three States, viz. Kerala, Karnataka and Goa are showing a declining trend in the production of Fresh Fruit Bunches during the last two reporting years. However, the overall data exhibit an upward trend, which is expected to yield a favourable terms of trade for the country in future. The percentage increase of the total from 2009-10 level to 2013-14 is 250.97.

Table 3.6: Selected State-wise Production of Oil Palm Fresh Fruit Bunches under Oil Palm Development Programme in India (2009-2010 to 2013-2014)

(In metric tonne)

States/UTs	2009-10	2010-11	2011-12	2012-13	2013-14	% to total (2013-14)
Andhra Pradesh	347892	385009	573024	790881	933981	93.85
Kerala	35100	41000	43200	41350	38350	3.85
Karnataka	6387	8337	9942	10112	9917	1.00
Tamil Nadu	2080	2920	4743	5244	5495	0.55
Odisha	3464	5128	12720	2920	3722	0.37
Goa	1591	1878	2229.2	2056	2046	0.20
Mizoram	10.3	88	480	1339	1544	0.16
Gujarat	6	26	91	134	158	0.02
Total	**396551.00**	**444385.00**	**646428.00**	**854036.00**	**995212.00**	**100**

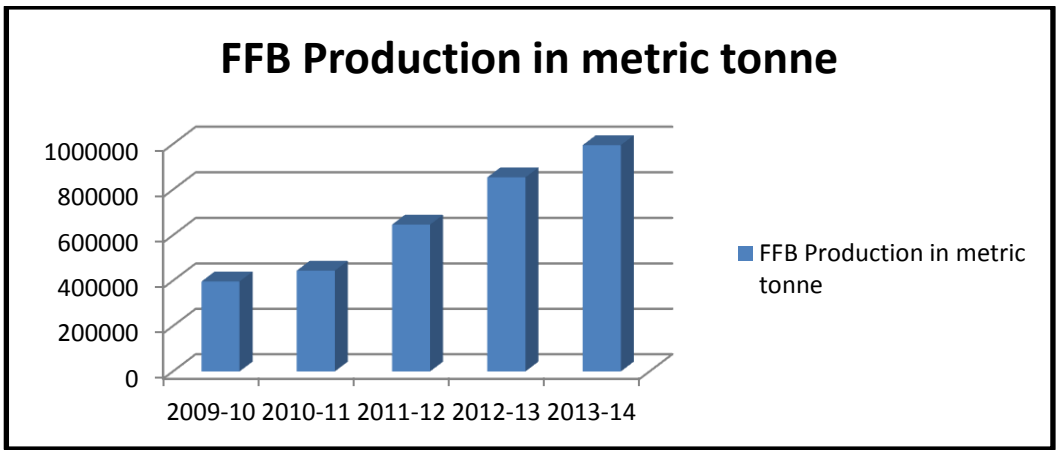
Abbreviation : NR : Not Reported

Source: Ministry of Agriculture and Farmers Welfare Government of India.

The production of Fresh Fruit Bunches (FFB) shows a continuous increase from the year 2009-10 to 2013-14. The production during the last reporting year (2013-14) is 2.51 times higher than the production during the year 2009-10.

Figure 3.4: Growth of FFB production under OPDP (2005-2006 to 2013-14)

(Production in metric tonne)



Source: Ministry of Agriculture and Farmers Welfare Government of India

Crude palm Oil (CPO) is obtained from Fresh Fruit Bunches (FFB) and the production of Fresh Fruit Bunch is closely related to the production of Crude Palm Oil. However, the oil efficiency of the FFB also depends on the treatment and management of the farm, handling of the harvested FFBs, etc. FFBs from the farmers are sold to the Mill where CPO is extracted. Andhra Pradesh again occupies the first position in the production of the CPO. During the period 1993-94 to 2013-14, only nine States are recorded to have been producing CPO. Andhra Pradesh produced a total of 796265.4 metric tonnes of CPO, which accounts for 83.7 percent of the total production. Kerala with a total of 110118.3 metric tonnes come in the second position accounts for 11.57 percent of the total production; Karnataka with 16761.53 metric tonnes of CPO accounts for 1.76 percent and Andaman & Nicobar Islands came in the fourth place with 13817.08 metric tonnes and accounts for 1.45 percent. The percentage share of each of the remaining States -Tamil Nadu, Odhisa, Goa, Tripura and Gujarat are less than unity.

Table 3.7: Selected State-wise Area under OPDP (1999-10 to 2013-14) and Production of FFB (2013-14)

Sl No	States	Coverage of Area (In Ha.)	Production of FFB 2013-2014 (MT)	*Average Production MT/Ha
1.	Andhra Pradesh	150784	933981	6.19
2.	Karnataka	38391	9917	0.26
3.	Tamil Nadu	28238	5495	1.13
4.	Gujarat	4415	158	0.04
5	Kerala	5740	38350	6.68
6	Odisha	16225	3722	0.23
7	Mizoram	19971	1544	0.08
8	Goa	-	(2046)	-
		263764	991394	3.76

*Source: Ministry of Agriculture and Farmers Welfare Government of India; *Researcher's calculations*

Fully matured Oil Palm tree can produce 18 to 30 metric tonnes per hectare in a well treated farm. From the above table, it can be observed that the productivity of all the selected states is very low compared to 18-20 metric tonnes of FFB per hectare in Indonesia and Malaysia. In terms of productivity, i.e. production of FFB per hectare, Kerala (6.68) leads all the states closely followed by Andhra Pradesh (6.19). Tamil Nadu is in the third place with 1.13 metric tonnes of FFB per hectare. All the other states are producing less than 1 metric tonne per hectare. Gujarat is lowest with 0.04 FFB per hectare and the second in the bottom line is Mizoram with very low productivity of 0.08 FFB per hectare.

3.8. Production of Palm Oil in India

In India, the production of Crude Palm Oil is very less compared to the area of Oil Plam cultivation. A record of 171354.50 metric tonnes of CPO is produced in 2013-14. The total recorded production of FFB during the same period is 995212.00 metric tonnes from an area of 268707 hectares. The average production of FFB per

hectare is 3.70 metric tonnes of FFB per hectare. This implies the inefficiency of the farming system in India as compared to those in the Southeast Asian Countries like Malaysia and Indonesia. This also implies that in order to produce 1 metric tonne of Crude Palm Oil, **5.81** metric tonnes of FFB is required. The efficiency of the Oil Palm fruits or the technology of extraction is lower than those in Malaysia or Indonesia, where 5 metric tonnes of FFB could produce metric tonne of CPO.

Only six States are recorded as producing the Crude Palm Oil during 2013-14 with a total recorded production of 171354.50 metric tonnes. Andhra Pradesh is the leading producer with 161566.47 metric tonnes of CPO during the year with an average production of 1 metric tonne of CPO from **5.78** metric tonnes of FFBs, which is implies a marginally higher efficiency as compared to the whole country. Kerala with a total production of 6303.00 metric tonnes of CPO from 38350 metric tonnes of FFBs means that **6.08** metric tonnes of FFBs is required to produce 1 metric tonne of CPO. The productive efficiency is lower than the country's average. Karnataka produce 1736.00 metric tonnes of CPO from 9917 metric tonnes of FFBs meaning that **5.71** metric tonne of FFBs is required to produce 1 metric tonne of CPO. This is more efficient than the overall average. Tamil Nadu with 5495 metric tonnes of FFBs produced 820.35 metric tonnes of CPO. This is not efficient is as it requires **6.70** metric tonnes of FFBs to produce 1 metric tonne of CPO, Odhisa with 3722 metric tonnes of FFBs during the year produces 558.07 metric tonnes of CPO with the productive efficiency of 1 metric tonne of CPO from **6.67** metric tonnes of FFBs. Goa produced 370.60 of CPO from 2046 metric tonnes of FFBs, implying that it requires **5.52** metric tonnes of FFBs to produce 1 metric tonne of CPO. In terms of CPO productivity, Goa came in the first position and Tamil Nadu is having the least productive FFBs.

Table 3.8: Selected State-Wise Quantity of Crude Oil Palm Obtained under Oil Palm Development Programme in India

(1993-1994 to 2013-2014) (Tonne)

Year	Andhra Pradesh	Karnataka	Tamil Nadu	Gujarat	Odisha	Goa	Tripura	Assam	Kerala	Andaman & Nicobar Islands	India
1993-94	150.90	28.92	0.00	0.00	0.00	0.00	0.00	0.00	954.00	0.00	1133.82
1994-95	525.90	163.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2314.00	3003.75
1995-96	862.21	347.91	0.00	0.00	0.00	0.00	0.00	0.00	3955.00	0.00	5165.12
1996-97	1795.71	432.35	0.00	0.00	0.00	0.00	0.00	0.00	4261.00	1426.00	7915.06
1997-98	3710.90	567.21	2.21	0.00	11.19	54.83	0.00	0.00	4428.00	1284.00	10058.34
1998-99	5298.40	535.51	30.10	0.00	19.18	102.95	0.00	0.00	3812.00	1142.00	10940.14
1999-00	9684.00	738.76	82.09	0.06	21.71	150.00	8.00	0.00	5159.15	2314.00	18157.77
2000-01	15729.00	731.97	86.06	3.56	42.35	207.75	20.64	0.00	6667.26	1800.76	25289.35
2001-02	18974.00	573.58	0.00	2.94	0.00	243.00	0.00	0.00	980.00	1840.32	22613.84
2002-03	18960.00	606.00	0.00	2.94	0.00	330.85	0.00	0.00	6572.00	1696.00	28168.43
2003-04	21457.47	646.00	NR	3.00	0.00	324.00	NR	0.00	6387.00	0.00	28817.00
2004-05	23905.00	681.01	110.49	NR	0.00	348.93	NR	0.00	5792.94	0.00	30838.37
2005-06	43500.00	793.00	178.26	NR	0.00	379.00	NR	0.00	6478.00	0.00	51328.66
2006-07	35509.00	974.00	248.66	Nil	0.00	345.00	NR	0.00	6888.00	0.00	43964.66
2007-08	38000.00	1037.46	266.32	Nil	0.00	NR	NR	0.00	5732.40	NR	45036.18
2008-09	50190.39	1081.00	365.51	0.00	NR	NR	0.00	0.00	7370.50	0.00	59007.40
2009-10	57402.00	118.00	365.00	0.00	589.00	279.00	NA	NA	6600.00	NA	66353.00
2010-11	63487.00	1459.00	486.00	0.00	871.00	329.00	NA	NA	6900.00	0.00	73532.00
2011-12	97987.00	1740.00	759.00	0.00	2162.00	394.00	NA	NA	7500.00	0.00	110542.00
2012-13	127570.00	1770.00	1035.00	0.00	443.00	372.00	0.00	0.00	7378.00	0.00	138568.00
2013-14	161566.47	1736.00	820.35	0.00	558.07	370.60	0.00	0.00	6303.00	0.00	171354.49

Abbr. : NR : Not Reported, NA : Not Available, Note : Information based on inputs provided by state Governments and updated to July 2007

Source: India Vanaspati Producers Association (13204)
Ministry of Agriculture, Govt. Of India (14105), (14268), (ON463), (16361), & Lok Sabha Unstarred Question No. 1237, dated on 03.03.2015.

3.9. All India Financial Allocation, Releases and Expenditure of NMOOP

During the year 2015-16, the Government of India allocated an amount of Rs. 6581.105 lakh for Development of Oil Palm Plantation under NMOOP, Mini Mission – II. The States share expected is Rs. 4491.596 lakh out of the total allocation of Rs. 10818.076 lakh. Out of the total Central allocation, the released amount, up to February, 2016, is Rs. 3624.165 lakh; which is 55.07 percent of the Central allocation for the year. The total expenditure of the Central share is Rs. 1982.143 lakhs, which is 54.75 percent of the Central fund released and 30.15 percent of the total central allocation. The total expenditure from the State share is Rs. 1127.387 lakh, out of the total allocation for the share of Rs. 4491.596 lakh, which is 25.10 percent of the total allocation for the State share. The total expenditure during the period is Rs. 3111.530 lakh out of which Rs. 1984.143 lakh (63.77 percent) is Central share and Rs. 1127.387 lakh (36.23 percent) is met from the State share.

The maximum Central release to the State amounting to Rs. 2198.031 lakh is received by Andhra Pradesh where the maximum State share amounting to Rs. 793.60 lakh had been utilised. Eight numbers of States have utilised the fund under NMOOP during the reporting period. Mizoram and Chhattisgarh have not received the State share but depend only on the Central release. With the exception of Andhra Pradesh, Mizoram received the maximum Central release (Rs. 454.798 lakh) and utilised 100 percent of the Central fund released while Chhattisgarh utilised 69.85 percent of the Central release (Rs. 131.360 lakh). States like Andhra Paradesh, Karnataka, Telangana, Tamil Nadu, Gujarat and Kerala also utilised the State share. However, the in the case of Kerala, while there is no record of fund released/available from the Central share, expenditure amount of Rs. 0. 779 lakh is incurred both from the Central as well as the State share making a total expenditure of Rs. 1.558 lakh. .

Table 3.9 Summary of All India Financial allocation, releases and expenditure of NMOOP: Mini Mission-II Oil Palm- 2015-16 up to February, 2016 (Rs. in lakhs)

Sl. No.	State	*Allocation*			*Releases Central*	Total availability of funds	Expenditure			% utilisation against (CS)		Progress reported upto
		Central	State	*Total*			Central Share	State Share	Total	Allocation	Availability	
1	Andhra Pradesh #	3461.850	2307.900	***5769.750***	*2198.031*	2198.031	1190.380	793.600	**1983.980**	34.39	54.16	Feb, 16
2	Arunachal Pradesh	172.515	172.515	***345.030***	*86.258*	86.258	0.000	0.000	**0.000**	0.00	0.00	NR
3	Assam	211.870	211.870	***423.740***	*105.935*	105.935	0.000	0.000	**0.000**	0.00	0.00	Sep, 15
5	Chhattisgargh	262.722	262.722	***525.444***	*131.360*	131.360	91.750	0.000	**91.750**	34.92	69.85	Sep, 15
6	Gujarat #	55.915	37.279	***93.194***	*22.449*	22.449	26.312	17.541	**43.853**	47.06	117.21	Dec, 15
7	Karnataka #	183.686	375.776	***546.837***	*91.840*	91.840	57.834	184.427	**242.261**	31.49	62.97	Jan, 16
8	Kerala	21.126	21.126	***42.252***	*0.000*	0.000	0.779	0.779	**1.558**	3.69	######	Jan, 16
9	Mizoram $	1165.204	129.467	***1052.671***	*454.798*	454.798	454.798	0.000	**454.798**	39.03	100.00	Oct, 15
10	Nagaland	128.440	128.440	***256.880***	*64.220*	64.220	0.000	0.000	**0.000**	0.00	0.00	NR
11	Odisha	437.352	437.352	***874.704***	*218.680*	218.680	0.000	0.000	**0.000**	0.00	0.00	NR
12	Tamil Nadu #	219.828	146.552	***366.380***	*120.297*	120.297	93.751	62.500	**156.251**	42.65	77.93	Feb, 16
13	Telangana	260.597	260.597	***521.194***	*130.299*	130.299	68.540	68.540	**137.080**	26.30	52.60	Jan, 16
	Total	**6581.105**	**4491.596**	***10818.076***	***3624.165***	**3624.165**	**1984.143**	**1127.387**	**3111.530**	**30.15**	**54.75**	

Sharing pattern of fund: *#- 60 Centre : 40 State; $- 90 Centre : 10 State.*

3.10. Oil Palm Development in Mizoram

The geo-climatic condition of the State is found to be favarourable for development of oil palm cultivation. A high level committee headed by Dr. K. L. Chadha identified potential areas of 61,000 ha with gentle slope (25-33 per cent) with favourable climatic condition and the state government decided to undertake cultivation of Oil Palm in a large scale from 2004-05 during the X^{th} Plan period. Dr. P Rethinam Committee later in 2011 earmarked an additional area of 40,000 ha for Oil Palm cultivation, and thus, the total identified potential area for Oil Palm cultivation became 1,01,000 hectares in Mizoram. It was initiated in Rotlang, Lunglei District and Thingdawl, Kolasib District of Mizoram in 1999-2000 with 5,000 and 7,000 seedlings respectively with promising results.

Table 3.10 District-wise Potential Area under Oil Palm in Mizoram (Area in hectare)

Sl. No.	Name of District	Geographical Area	Chadha Comm. Recom.	P.Rethinam Comm. Recom.	Total Potential Area (ha)	Remarks
1	Aizawl	357631	11150	1000	12150	Data interpret based on Remote Sensing and GIS Technique and Field
2	Lunglei	453800	10000	5000	15000	
3	Saiha	139990	2000	7000	9000	
4	Kolasib	138251	11350	6000	17350	
5	Serchhip	142160	9000	3000	12000	Champhai Dist. not included as it fall under Temp. Sub Alpine zone
6	Lawngtlai	255710	7000	10000	17000	
7	Mamit	302575	10500	8000	18500	
8	Champhai	318583	-	-	-	
TOTAL		**2108700**	**61000**	**40000**	**101000**	

Source: Mizoram Economic Survey (2012-13)

3.10.1 Schemes and Missions for Development of Oil Palm in Mizoram

To promote oil palm cultivation in Mizoram, the Ministry of Agriculture & Cooperation has sanctioned Oil Palm Development Programme under **Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize** (ISOPOM) since 2005-2006 at the cost sharing of 75:25 between Central and State Government till 2011-12. The Oil Palm Development Programme has also been taken up under **Rashtriya Krishi Vikas Yojana** (RKVY for **Oil Palm Area Expansion**) from 2011-12 to 2012-13 and **National Mission on Oilseeds and Oil Palm** (NMOOP) from the year 2014-2015.

In addition, The Mizoram Oil Palm (Regulation of Production & Processing) Act, 2004 was passed in Mizoram Legislative Assembly on the 2nd December, 2004 with a provision for the emergence of contract system for seed supply and marketing of the produces. The Act contains 26 sections.

- The Government of Mizoram appointed Secretary, Agriculture Department as ***Oil Palm Officer*** to exercise the power and perform the function for implementation of Oil Palm Act.
- The Government of Mizoram appointed the concerned District Agriculture Officers as ***Oil Palm Inspector*** in their respective jurisdiction as required under Oil Palm Act, 2004.
- As required under Oil Palm Act, 2004, the following Committee is constituted for successful implementation of Oil Palm cultivation in Mizoram:
    1. State Level Oil Palm Advisory Committee.
    2. State Level Standing Committee on National Mission on Oilseeds and Oil Palm (NMOOP)

3. Project Management Committee.

4. Price fixation Committee on Oil Palm.

5. District Level Oil Palm Zonal Committee.

6. Village Level Oil Palm Growers Association

Under the Oil Palm Act, 2004, The Government of Mizoram signed Memorandum of Understanding with three companies for Oil Palm development (seed supply and marketing of produces). The name of the Companies, districts allotted and date of signing MoU are as given below:

Table 3.11 Oil Palm Companies & Districts allotted in Mizoram

Sl. No.	Name of Company	District allotted	Potential Area in Ha	Proposed Site of Mill	Date of signing MoU
1	Godrej Agrovet Pvt Ltd	Kolasib & Mamit	35850	Bukvannei, Kolasib District	14th Sep, 2005
2	Ruchi Soya Industries Ltd	Lunglei & Lawngtlai	32000	Rotlang, Lunglei District	3rd Oct, 2006
3	3F Oil Palm Agrotech Pvt. Ltd	Aizawl, Serchhip & Saiha	33150	Mat Valley, Serchhip District	7th Mar, 2007

These companies have established their own nurseries in their respective districts supplying the planting materials to the growers, while they buy back the produce of the growers from their respective districts allotted to them. The companies have been assisted with Rs 25 crore each for establishment of processing plants. However, only Godrej Agrovet Pvt. Ltd. had made the mill functional and started processing since 2014.

As per the provision of under the Oil Palm Act, 2004, Price Fixation Committee was constituted to fix the rate of Fresh Fruit Bunch. The present price of FFB is fixed at Rs. 5.50 per Kg and the price of the exotic seedling is Rs. 85.00 while that of the indigenous is Rs. 65.00 per seedling. The occupier of the factory should maintain Register of Oil Palm Growers in the Zone attached to the factory and should be updated every year. Oil palm Growers should supply FFBs from the area only to the factory to whom the factory zone is attached and to no one else. The factory should buy all the Oil Palm FFB produced by all the Oil palm growers or their Cooperative Societies in that factory zone as are offered for sale by them at a price which shall not be less than the price fixed by the authority empowered to fix the price under the Act. In addition to penalty with a fine under section 15 of the Act, factory shall be liable to compensate the loss that may have been caused to the grower on account of non-purchase of the Oil palm FFBs in the event of failure to buy the FFBs. Damage, inefficient running, breakdown of plant machinery, failure to use capacities and any other operational problems shall not be treated as valid reasons for refusal of consignment of Oil Palm FFBs. The Oil palm Officer shall be the authority to decide whether there are valid reasons for the failure to buy Oil Palm FFBs and his decision thereon shall be final.

The price of Oil Palm FFBs should be paid within fourteen days of delivery. The Government may levy tax with a rate not exceeding rupees one hundred per metric tonne on the purchase of FFBs required for use, consumption or sale in factory. The tax payable shall be levied and collected from the occupier of the factory or from person receiving Oil Palm FFBs or the Oil Palm Processing Factory. The Tax on Oil Palm levied and collected shall be used for the following purposes-

1) For the overall development of Oil Palm plantations;

2) To bring more areas under Oil Palm cultivation;

3) To monitor the schemes benefitting Oil Palm Growers;

4) To develop the feeder roads to facilitate movement of Oil Palm FFBs;

5) Any other purpose in the interests of Oil Palm Growers in particular or in the interests of general public residing in Oil Palm Growing zones.

Oil Palm Development in Mizoram has been taken up in the Public – Private Partnership mode between the Government, the Companies and the Farmers.

3.10.2. Objectives and Expected Outcome of the Oil Palm Development Programme

i) To create income generation opportunities for small and marginal farmers.

ii) To reverse the degradation process and achieve eco-balance to sustain land and water use.

iii) To motivate farmers to switch over from jhum cultivation to permanent settlement.

The expected outcomes of the oil palm development in Mizoram are

1) The existing practice of Jhum Cultivation is not productive and proposed to be replaced by the Oil Palm Cultivation for higher production and productivity.

2) Income of the farmers will be generated in considerable extent with the introduction of Oil Palm.

3) A part of citrus decline area which is unutilized at present could be conveniently converted into Oil Palm.

4) In jhum cultivation, no soil conservation measures in possible. However, with the introduction of Oil Palm necessary soil and water conservation measures could be taken up in the plantation area.

5) A good number of educated unemployment youth will find employment in Rural Sector.

6) Oil Palm Cultivation will convert jhum area into permanent settlement with greater employment opportunity with higher income to farmers.

3.10.3 Growth of Area of Cultivation of Oil Palm in Mizoram

Mizoram has shown significant growth in oil palm cultivation since 2004. As presented in the following Table 3.12 below, the area under cultivation in Mizoram has increased from 110 hectares in 2005-06 to 17588 hectares in 2013-14. The increase in area is more profound since 2008-09. The highest increase is found in the year 2013-14.

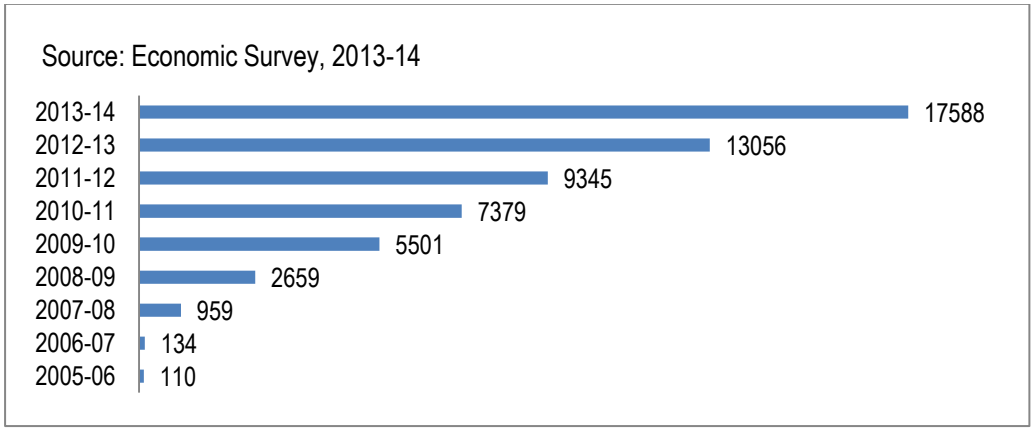
Table 3.12 Area Covered Under Oil Palm in Mizoram (2005-06 to 2013-14)

Year	Name of District						Area (in Ha)
	Kolasib	Lunglei	Mamit	Serchhip	Lawngtlai	Aizawl	
2005-06	82	28	-	-	-	-	110
2006-07	24	-	-	-	-	-	24
2007-08	543	15	267	-	-	-	825
2008-09	964	218	476	42	-	-	1700
2009-10	997	806	697	342	-	-	2842
2010-11	489	500	474	310	105	-	1878
2011-12	478	562	350	250	300	26	1966
2012-13	1039	750	928	327	617	50	3711
2013-14	711	852	1300	381	957	331	4532
Total	**5327**	**3731**	**4492**	**1652**	**1979**	**407**	**17588**

Source: Economic Survey Mizoram 2013-14

The increased cultivated area is a result of the increase in the holdings of the households as well as the increase in the number of farmers involved in Oil Palm cultivation. A total number of 10,800 families are involved in Oil Palm cultivation as on 12th February, 2014. Numbers of village covered under Oil Palm during the same period is 225. (Economic Survey Mizoram 2013-14). The growth of Oil Palm cultivation area can be clearly represented in the figure 3.5.

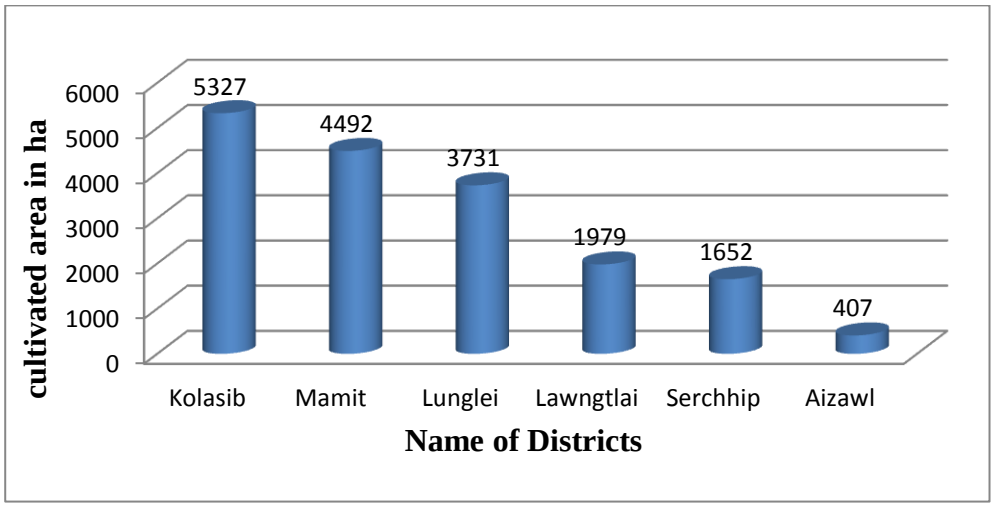
Figure 3.5: Area Expansion of Oil Palm Cultivation in Mizoram
(2005-2006 to 2013-14) (Area in hectare)



The two highest cultivated districts, viz. Kolasib and Mamit, are allotted to the Godrej Agrovet Limited. The two Districts put together accounts for 55.83 percent of the total area of cultivation in the State. The Company have established Oil Palm Mill at Bukvannei and started extraction of Oil since 2014. Lunglei District and Lawngtlai District are in the middle level in terms of area of cultivation. The two districts added together accounts for 32.47 percent of the total cultivated area. The two Districts are allotted to Ruchi Soya Industries Ltd. Aizawl, Serchhip and Saiha districts are allotted to 3F Oil Palm Agrotech Pvt. Ltd. However, cultivation of Oil Palm had not been taken place in Saiha District. Therefore, only Aizawl and Serchhip Districts are under 3F Oil Palm Agrotech Pvt. Ltd. The total area of cultivation in the two Districts put together accounts for 11.70 percent of the total cultivated area in the State. Even though with an identified potential area of 9000 hectares, Saiha District have not yet taken up cultivation of Oil Palm. No potential are was identified in Champhai District and therefore, no cultivation of Oil Palm was taken place in the District.

Kolasib District is having the largest area of cultivation accounting for 30.29 percent of the total cultivated area in the State. Mamit District is in the second position with 25.54 percent of the total cultivated area Lunglei District has 21.21 percent of the total cultivated area; Lawngtlai District is having a total cultivated area of 11.25 percent of the total cultivated area. Serchhip District is having 9.39 percent of the total cultivated area whereas Aizawl District is in the bottom with 2.31 percent of the total cultivated area.

Figure 3.6: District Wise total Area of Oil Palm Cultivation in Mizoram under OPDP (2005-2006 to 2013-14) (Area in hectare)



Source: Economic Survey, 2014-15

In relation to the potential area available in the districts, the performance is still very low. The area cultivated are - Kolasib District (30.70 percent), Lunglei (24.87 percent), Mamit (24.28 percent), Serchhip (13.77 percent), Lawngtlai (11.64 percent) and Aizawl (3.35 percent). Kolasib District is having a potential area of 17350 hectares while the total cultivated area in the whole of State of Mizoram is 17588 hectares. The total area cultivated in the State is only 238 hectares more than the potential area in Kolasib District alone.

In addition, the proposed area for Oil Palm Cultivation for the year 2014-15 to 2016-17 under the **National Mission on Oil Seeds and Oil Palm** are 5700 ha for 2014-15, 5400 ha for 2015-16 and 4600 ha for 2016 -17. At the end of the 12th Five Year Plan additional area of 25,000 ha is expected to be under Oil Palm cultivation. Estimated production of Fresh Fruit Bunch (FFB) of Oil Palm at the end of 12th Plan is 1,35,000 MT with a value of about Rs.100 crore (Mizoram Economic Survey, 2014-15).

3.10.4 Impact of NLUP in Oil Palm Development.

The Government of Mizoram with the approval of Planning Commission has launched a comprehensive Project for inclusive development called "New land Use Policy (NLUP)" termed as Flagship Programme/Project. It focussed mainly amongst others on major overhaul of the economy through structural changes by weaning away farmers from destructive Jhum practices to sustainable livelihood opportunities based on local resources, genius of the people and keeping in view regeneration of resources. The government of Mizoram is giving assistance to the farmers from the financial allocation for state's flagship programme, ***New Land Use Policy (NLUP)***.

Oil Palm Cultivation is one of the four different types of trades/activities under the Development Components of NLUP that the beneficiaries can select. During the year 2007-08, the total area covered under Oil Palm Cultivation is 959 hectares and was increased to17,588 hectares during the year 2013-14. The introduction of Oil Palm Cultivation trade under NLUP in Agriculture Sector is one of the reasons for the fast growth of Oil Palm cultivation in the State.

The total number of beneficiaries covered under the New Land Use Policy for cultivation of Oil Palm is 2290 and the area under cultivation is 2759 ha, which accounts for 15.60 per cent of the total area under Oil Palm cultivation till 2013-2014. Oil Palm was not selected in Saiha and Champhai Districts under NLUP. Lunglei District is having the largest number of NLUP beneficiaries during the 1st and 2nd phase with a total number for the period is 524 farmers up to February, 2013. Serchhip is having 454 beneficiaries during the period and is in the second position. Kolasib is having 185 beneficiaries during the 1st and 2nd phase. Aizawl District is having only 40 beneficiaries during the two phases.

Figure 3.13 District Wise NLUP Beneficiaries for Oil Palm Cultivation

Sl. No	Name of District	No. of Beneficiaries	
		1st Phase	2nd Phase (Feb. 2013)
1	Aizawl	34	16
2	Lunglei	41	483
3	Saiha	-	-
4	Champhai	-	-
5	Kolasib	83	102
6	Serchhip	75	379
7	Lawngtlai	168	136
8	Mamit	168	184
	Total	**404**	**1300**

Source: Mizoram Economic Survey 2012-13

A total number of 2290 beneficiaries have been assisted till 2013-14 under NLUP. During the first phase (2010-11), 403 beneficiaries were assisted, during the second phase (2011-12), 1260 beneficiaries were assisted, during the third phase (2012-13), 45 beneficiaries were assisted and 176 beneficiaries were assisted during the fourth phase making a total number of 2290 beneficiaries being assisted under NLUP till 2013-14. A total amount of Rs. 22.90 crore had been given to the beneficiaries under NLUP. Financial assistance under NLUP was given in four instalments as shown in Table 3.14.

Table 3.14: Number of NLUP Beneficiaries and Assistance given for Cultivation of Oil Palm in Mizoram (2010-11 to 2013-14).

Physical Achievement			(no. of Beneficiaries)		
Trade	2010-11	2011-12	2012-13	2013-14	Total
Oil Palm	403	1260	451	176	2290
Financial Achievement				Amount in Rs.	
	1st	2nd	3rd	4th	Total
Rate Rs.	20000	40000	28000	12000	100000

Source: NLUP Implementing Board (NIB), Government of Mizoram Dt.29.5.2014

The implementation of NLUP in Mizoram is a good encouragement for the poor farmers to take up Oil Palm cultivation. The number of families engaged in Oil palm cultivation, area of cultivation and production increases to considerable extent. At the same time, many family are leaving the wasteful practice of jhum cultivation for a more secure and settled cultivation of Oil Palm.

3.11. Marketing of Oil Palm in Mizoram

In Mizoram, under the Oil Palm Act, the factory should buy all the Oil Palm FFB produced by all the Oil palm growers or their Cooperative Societies in that factory zone as are offered for sale by them at a price which shall not be less than the price fixed by the authority empowered to fix the price under the Act. Therefore, all the FFBs produced by the growers are sold to the factories. During the period up to May, 2014, the total FFBs purchased by the factories/companies amounts to 140.0995 metric tonnes worth Rs.322548.75 only. Godrej Agrovet Pvt. Ltd. Purchased Oil Palm FFBs weighing 65.592 metric tonnes worth Rs. 311562.00 from Kolasib District and Oil Palm FFBs weighing 67.905 metric tonnes worth Rs. 322548.75 from Mamit District. Ruchi Soya Industries Ltd. purchased Oil Palm FFBs weighing 6.6025 metric tonnes worth Rs. 31363.00 till May 2014. However, 3F Oil Palm Agrotech Pvt. Ltd have not made any purchase of Oil Palm FFBs till May, 2014 as shown in Table 3.15.

Table 3.15: Fresh Fruit Bunches Harvested in Mizoram (up to May, 2014)

Sl No.	Name of District	Companies	Qnty Purchased (MT)	Amount in Rupees
1	Kolasib	Godrej Agrovet Pvt. Ltd	65.592	311562.00
2	Mamit	Godrej Agrovet Pvt. Ltd	67.905	322548.75
3	Lunglei	Ruchi Soya Industries Ltd	6.6025	31363.00
4	Serchhip	3F Oil Palm Agrotech Pvt. Ltd	-	-
Total			**140.0995**	**665473.75**

Source: Department of Agriculture, Government of Mizoram.

Among the three companies dealing with Oil Palm in Mizoram, only Godrej Agrovet Pvt. Ltd. at its Oil Palm Mill at had started extraction of Palm Oil. Another two companies have not started extraction of Palm Oil from their factory. Godrej Agrovet Pvt Ltd had been allotted the two northern Districts of Mizoram, viz. Kolasib and Mamit Districts. The two Districts are the major Oil Palm growing Districts in Mizoram and they had contributed a large amount of the FFBs produced in the State. The Company had started the extraction of Palm Oil since 2014.

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Table 3.16: District wise FFB Purchased from Kolasib and Mamit District (2012-13 to 2015-16)

SL. No.	Month	2012-13			2013-14			2014-15			2015-16		
		Kolasib	Mamit	Total	Kolasib	Mamit	Total	Kolasib	Mamit	Total	Kolasib	Mamit	Total
1	Apr	25.74	30.21	55.951	40.39	39.89	80.28	20.85	33.64	54.488	68.07	97.87	165.935
2	May	59.85	48.94	108.790	93.54	95.89	189.43	123.10	125.99	249.097	196.99	244.83	441.825
3	Jun	101.76	86.25	188.009	85.02	83.05	168.06	125.72	135.64	261.355	202.77	214.89	417.653
4	Jul	123.33	109.78	233.111	107.72	75.80	183.52	102.64	85.45	188.085	149.19	139.13	288.316
5	Aug	111.31	57.96	169.263	63.45	40.46	103.91	33.13	20.88	54.009	45.81	31.85	77.652
6	Sep	63.72	25.52	89.237	38.51	66.38	104.89	68.97	36.37	105.340	147.21	91.86	239.074
7	Oct	176.48	88.91	265.398	153.48	192.04	345.52	247.73	268.63	516.355	399.05	372.39	771.442
8	Nov	77.51	36.20	113.714	168.70	213.94	382.64	204.24	280.71	484.943	377.26	559.18	936.437
9	Dec	26.98	8.78	35.758	58.87	99.21	158.08	36.32	53.65	89.967	83.15	138.35	221.494
10	Jan	5.15	0.49	5.635	6.55	9.26	15.81	8.593	21.775	30.368	3.479	26.365	29.844
11	Feb	1.17	0.45	1.623	1.55	0.00	1.55	3.944	10.642	14.586		15.224	15.224
12	Mar	6.92	4.43	11.349	8.44	5.27	13.71	3.08	14.80	17.882	11.449	35.91	47.354
Total		***779.92***	***497.91***	***1277.838***	***826.20***	***921.20***	***1747.40***	***978.31***	***1088.17***	***2066.475***	***1684.42***	***1967.83***	***3652.250***
District wise %		**61.03%**	**38.97%**	100.00%	**47.28%**	**52.72%**	**100.00%**	**47.34%**	**52.66%**	**100.00%**	**46.12%**	**53.88%**	100.00%

Source : Godrej Agrovet Ltd. Mizoram

In Mizoram, Oil Palm cultivation is of recent activity. Many of the plants have not started yielding. Oil Palm starts yielding from the fourth year of cultivation. However, a good number of plants are being harvested. The FFBs produced by the growers are processed by Godrej Agrovet Pvt Ltd only which is allotted two districts viz. Kolasib and Mamit District. The FFBs produced in other Districts viz. Aizawl, Serchhip, Lunglei and Lawngtlai are not yet processed. The production level in those districts is also very small compared to the production in Kolasib and Mamit Districts.

Kolasib and Mamit districts are having a total potential area of 35850 hectares, which is 35.50 percent of the total potential area in Mizoram. Oil Palm Companies have recorded the purchase of 140.0995 metric tonnes up to May, 2014. The purchase made by Godrej Agrovet Pvt. Ltd. was 95.29 percent of the total purchase whereas Ruchi Soya Industries Ltd. procured 4.71 percent from Lunglei District. Godrej Agrovet Pvt. Ltd. started extraction of Palm Oil since 2014 and they sell the products in Guwahati or Kolkatta.

Godrej Agrovet Pvt Ltd collected FFBs from the Growers of Kolasib and Mamit District. The total collection in 2012-13 is 1277.84 metric tonnes, 1747.402 metric tonnes in 2013-14, 2066.475 metric tonnes in 2014-15 and 3652.250 metric tonnes in 2015-16. The total purchase made by the Company was 8743.967 metric tonnes.

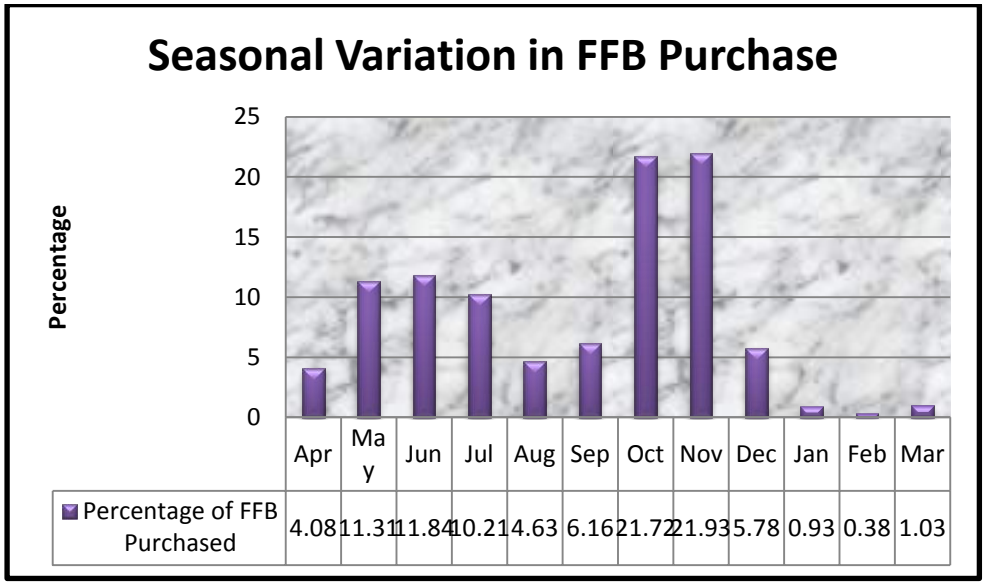
Kolasib District is having the largest cultivated area of Oil Palm. Oil Palm Mill was established by Godrej Agrovet Pvt Ltd at Bukvannei in Kolasib District. All the FFBs are sold to the Company and the present rate of FFB is Rs. 5.50 as per fixed by the Price Fixation Committee. The harvest is 779.92 metric tonnes in 2012-

13, 826.20 metric tonnes in 2013-14, 978.31 metric tonnes in 2014-15 and 1684.42 metric tonnes in 2015-16. The total production during the four year is 4268.85 metric tonnes, with an annual average production of 1067.2125 metric tonnes. The FFBs sold to the Mill in 2015-16 costs Rs. 92,64,310.00 at present rate of Rs. 5.50 per Kg. During the same period, FFBs collected from Mamit District is 4475.11 metric tonnes costing Rs.2,46,13,105.00 at Rs. 5.50 per Kg. Out of the total FFB purchased by the Oil Palm Mill, only 48.82 percent is shared by Kolasib District. During the initial year of production in 2012-13, Kolasib produced 61.03 percent which declined to 47.28 percent in 2013-14 and rise slightly to 47.34 percent in 2014-15. It further fell to 46.12 percent in 2015-16.

In 2013-14, the total area under Oil palm cultivation in Kolasib was 5327 hectares with the FFB production of 826.20 metric tonnes while Mamit was having 4492 hectares of cultivation with the FFB production of 921.20 metric tonnes. Productivity in Kolasib in the same year was 0.16 metric tonnes of FFBs per hectare while Mamit is producing 0.21 metric tonnes of FFBs per hectare.

Consideration of seasonality of production is very important in agriculture and allied activities. This also applies in the case of Oil Palm cultivation and harvesting of the FFBs. A record of the four year period from 2012-13 to 2015-16 have been taken to see the seasonal variation of FFB collection by the Mill. Oil Palm FFB collection is during October and November and lowest in January and February. It slowly rises again and reached a medium level during the three months period from May to July. However, during the heavy rainy season of August and September, the collection of FFB is dwindling again. The seasonal variation in the quantity of FFB collection is shown in figure 3.7.

Figure 3.7: Percentage of Monthly Oil Palm FFB Collection by Godrej Agrovet Pvt Ltd Oil Palm Mill, Bukvannei, Kolasib, Mizoram



Source: *Godrej Agrovet Ltd. Mizoram*

3.12. Concluding Remarks

India remains one of the major importing countries of palm oil for consumption as major food items. It was estimated that more than 10250 thousand metric tonnes had been imported in 2016. To reduce the excessive expenditure on import, it has implemented several schemes to increase domestic oil palm production. There are seven major cultivating states in terms of area cover. They are Andhra Pradesh (56.11 per cent), Karnataka (14.29 per cent), Tamil Nadu (10.51 per cent), Mizoram (7.43 per cent), Gujarat (1.64 per cent), Kerala (2.14 per cent) and Odisha (6.04 per cent).

Mizoram has also entered into the bandwagon of Oil Palm cultivation since 2004 when The Mizoram Oil Palm (Regulation of Production and Processing) Act, 2004 was enacted. The promotional work was undertaken through CSS like ISOPOM and state flagship NLUP. Under the Oil Palm Act 2004, contract farming

system had been instituted with three companies namely; Godrej Agrovet Pvt. Ltd., Ruchi Soya Industries Ltd., 3F Oil Palm Agrotech Pvt. Ltd. to supply the seedlings and purchase the produce. Presently, Godrej Agrovet Ltd. as established processing mills and already started functioning and purchased substantial quantities of FFBs from the growers.

As per the records of The Godrej Agrovet Pvt. Ltd; the company, so far, have collected 4268.85 metric tonnes of FFBs which turned out to be Rs.234.79 lakh during the first four years. They have collected from two districts - Kolasib and Mamit, with the contribution of the latter is higher. The analysis of the quantity purchased by this company showed regular collection of the FFBs throughout the year where, October and November appear to be the peak period of harvest. Given the possibility of regular harvesting of the FFBs, the Oil Palm Plantation can be a regular livelihood source for family sustenance if undertaken successfully.

Chapter-4

PERFORMANCE OF OIL PALM GROWERS IN MIZORAM: AN ANALYSIS

4.1 Introduction

As discussed in the previous chapter, Oil Palm Cultivation (Plantation) has been undertaken by large number of families in Mizoram since 2004. Growers in the two districts of Kolasib and Mamit have started harvesting and Oil Palm Mill was set up by the company. In our endeavor to examine the performance of oil palm growers in Mizoram, we decided to select Kolasib district as the study area which is considered reasonably representing the entire state. The District is having a total land area of 138251 hectares with a potential area of 17350 hectares. The area covered under Oil Palm Cultivation in the District up to 2013-2014 is 5327 hectares which is about 30.70 percent of its potential area. A total number of 1514 families were involved in Oil Palm Cultivation in Kolasib District till 2013-2014, as per the Oil Palm Population Census 2014 of the District.

Field Survey was conducted during the months of September and October, 2016. Four villages were selected from Bilkhawthlir Block and three villages from Thingdawl RD Block covering a total number of seven villages. Random sampling was adopted to obtain representative sample for the study through the use of well structured interview schedules. Finally, forty two respondents from Bilkhawthlir Block and forty eight respondents from Thingdawl Block were selected for final analysis after dropping those respondents who have not yet produce FFBs making a total number of respondents as 90. The villages were selected based on the predominant production of

Oil Palm FFBs in the District. The chapter is divided into 7 Sections. Section 4.1 deals with Introduction; section 4.2 deals with Socio-Economic Conditions of the Oil Palm Growers; Section 4.3 deals with Land Ownership Status; Section 4.4 deals with Cultivation Practice; Section 4.5 deals with Marketing; Section 4.6 deals with deals with General Perceptions & Problems of the Oil Palm Growers and Section 4.7 deals with the Concluding Observations.

4.2. Socio-Economic Conditions of the Oil Palm Growers:

4.2.1. Demography

Table 4.1 shows the educational level of the respondents who were basically the owners of the oil palm plantation. Among the growers interviewed, 73 (81.11 percent) were male whereas only 17 (18.89 percent) were female. As much as 6.85 percent of male and 5.88 percent of female respondents were illiterate, making an overall illiteracy rate of 6.67 percent. 30.14 percent of male and 47.06 percent of female were of primary level education. This means that almost half of the female respondents were at the primary level education. A total of 58.91 percent of male respondents were at the Middle level Education and below; the figure for the same level for female is 82.35 percent. Among the male respondents 31.51 percent attained high school level of education whereas only 17.65 percent of female attained high school level of education. About 4.10 percent of male respondents were Graduate and above, while no female respondents were found to attain higher secondary.

Table 4.1: Educational Level of Respondents

	Sex					
Education	**Male**	**%**	**Female**	**%**	**Total**	**%**
Illiterate	5	6.85	1	5.88	6	6.67
Primary	22	30.14	8	47.06	30	33.33
Middle	16	21.92	5	29.41	21	23.33
High School	23	31.51	3	17.65	26	28.89
Higher Secondary	4	5.48	0	0	4	4.45
Graduate and Above	3	4.1	0	0	3	3.33
Total	**73**		**17**		**90**	
Source: Field Survey, September & October, 2016						

The study found the mean age of 60.41 years among the growers, which is much higher than (37 years). This means that majority of the Oil Palm Growers in Kolasib District are relatively old and above the active age group. Among the respondents, there were none below the age of 30 and only 18.89 percent were aged 50 year and below. Most of the Oil Palm growers (58.89 percent) were at the age range between 51 – 70 years, which implies that young workers do not have enough interests in Oil Palm Plantation. Out of the total population of the respondents' families, 50.20 percent were female while 49.80 were male. The total number of workers was 247 (48.62 percent) and 261 (51.38 percent) were dependents. Among the dependents, 38.47 percent were children below the age of 14 and students above 14 year of age comprised 46.36 percent; 13.79 percent were aged and 1.15 percent was disabled. These are shown in Table 4.2.

Table 4.2: Demographic characteristics of the Growers (N=90)

Variables		
Age of the Respondents	**Frequency**	**Percent**
< 30	0	0
31-40	3	3.33
41-50	14	15.56
51-60	30	33.33
61-70	23	25.56
71 and above	20	22.22
		Mean Age = 60.41
Total Population	508	
Female	255	50.20
Male	253	49.80
Worker	247	48.62
Dependents	261	51.38
No. of Dependents	261	
Below 14 years	101	38.70
Students above 14 yrs	121	46.36
Aged	36	13.79
Disabled	3	1.15
Source: Field Survey, September & October, 2016		

4.2.2 Income of the Oil Palm Growers

Table 4.3 shows the annual income range of the Oil palm growers of the study area. Annual income of the Oil Palm Growers in the study area from all sources is very much diverse ranging from Rs.15000 to Rs. 9,60,000 and it was classified into 5 categories, from less than 2,00,000 to more than 8,00,000. Most of the growers (71.11 percent) were at the income range of less than Rs. 2,00,000 and 22.22 percent of the growers were at an income range between Rs. 2,00,000 to Rs. 4,00,000 while only 6.66 percent were at the income level of more than Rs. 4,00,000.

Table 4.3 Annual Income of the Oil Palm Growers from all sources

Categories	Frequency	Percent
less than 200000	64	71.11
200000<400000	20	22.22
400000<600000	1	1.11
600000<800000	4	4.44
800000<1000000	1	1.11
Total	90	100

Source: Field Survey, September & October, 2016

Table 4.4 shows the main sources of income of the Oil palm Growers. The study result shows that only 27.78 percent of the growers adopted Oil Palm as their main source of income, 21.11 percent put 'Others', 18.89 percent put Daily Wage, 16.67 percent put Other Horticultural Crops, 10 percent put Permanent Jobs as their main sources of income. Household/Cottage industries were 3.33 percent and those livestock farmers accounted for only 2.22 of the respondents. The results reveal that the area is still very backward and do diverse activities as they do not afford to go on large scale activity. This may be an exposition of backward rural economy.

Main source of income specifically mentioned under the head 'Others' include Pensions, Petty trades, WRC, Fish ponds, etc. It is found that some pensioners growing Oil Palm also are running petty trades at the same time. The total Annual Income of the growers is Rs. 1,44,25,160.00 with an average income of Rs. 1,60,280.00 only per farmer. However, the income level of the growers is very much diverse and the high level of income of some growers makes the average income high.

Table 4.4: Main Source of Income as indicated by the respondents

Main Source of Income	Frequency	Percent
Oil Palm Plantation	25	27.78
Others	19	21.11
Daily Wage	17	18.89
Other Crops	15	16.67
Permanent Jobs	9	10.00
Household/Cottage Industries	3	3.33
Livestock	2	2.22

Source: Field Survey, September & October, 2016

4.3. Land Ownership Status

Table 4.5 shows the land ownership status and land suitability as perceived by the growers. From the total landholdings of the respondents, 47.78 percent were having Periodic Patta, 42.22 percent were having VC Pass and 10 percent were having LSC.

The Lushai Hills District (Village Council) Act 1953 authorised the Village Council to allot a particular region within the boundaries of each village for jhums each particular year. However, the Village Council used to issue VC Pass for allotment of site for plantations, which has no legal back up, but very commonly practiced. The Mizoram (Land Revenue) Act, 2013 (Act 5 of 2013), however, does not render the power to allot land for jhum to the VC. Periodic Patta could be issued by the Revenue Officer for agriculture and allied purposes, valid only for initial 5 years, which shall automatically lapse unless reclaimed, prepared or developed. Land Settlement Certificate, which is permanent, heritable and transferable, could be issued exactly to the area covered in the Periodic Patta, if the land is reclaimed or developed for the intended purpose.

Table 4.5 Land Ownership Status

Status of Landholdings	Frequency	Percent
VC Pass	38	42.22
Periodic Patta	43	47.78
LSC	9	10.00
Total	**90**	**100**

Source: Field Survey, September & October, 2016

Table 4.6 shows the total landholdings and the area under Oil Palm cultivation. Most of the Oil Palm growers were having lands for cultivation of Oil Palm or for another purpose. The total landholding of the respondents was 518.20 hectares with average landholdings of 5.76 hectares. However, 56.67 percent of the respondents were having less than 5 hectares while 30 percent were having land area of 5 to 9.9 hectares. Those who were having land area of more than 10 hectares were only 13.33 percent whereas their total landholdings of 199.80 hectares was more than the total landholdings of those 56.67 percent smallholders whose total landholdings was 137.30 hectares and the total landholdings of the medium landholders consisting of 30 percent of the respondents with 181.10 hectares. It was observed that large area of land was concentrated at the hands of few farmers.

The total area of Oil Palm cultivation of the 90 respondents was 203.9 hectares and 3.33 percent of them were cultivating less than 1 hectare, 31.11 percent were cultivating 1 hectare to less than 2 hectares. Majority of the growers consisting of 36.67 percent were cultivating 2 hectares to less than 3 hectares and 17.78 percent were cultivating 3 hectares to less than 4 hectares. Only 11.11 percent were cultivating 4 hectares and above. The average cultivated area of Oil Palm per grower was 2.7 hectares which was very much lower than the average area of 18 hectares in Osa and

Golfito region of Costa Rica as found by Beggs, et al (2013) and even smaller than the average plantation size of 5.33 hectares in Abia State of Nigeria (Agwu, 2006). Therefore, the Oil Palm growers of the area were small and marginal farmers. That was is in line with that observed by Rao (2013) in his study of Oil Palm Cultivation in Andhra Pradesh State. Oil Palm cultivated area to the total landholdings of the respondents was 39.35 percent only. The rest 60.65 percent of their lands were used for cultivating another crops or kept as forests.

Table 4.6 Total Landholdings and Area of Oil Palm Cultivation

Total Landholdings in hectares:			
	Frequency	**Percent**	**Total area (ha)**
< 5	51	56.67	137.3
5 - 9.9	27	30.00	181.1
> 10	12	13.33	199.8
Total Landholdings in hectares			518.2
Average Landholdings			5.76
Area under Oil Palm Cultivation:			
less than 1	3	3.33	2.00
1- <2	28	31.11	37.3
2 - <3	33	36.67	68.4
3 - < 4	16	17.78	50.5
4 and above	10	11.11	45.7
Total Area under Oil Palm			203.9
Average landholdings			2.27
Source: Field Survey, September & October, 2016			

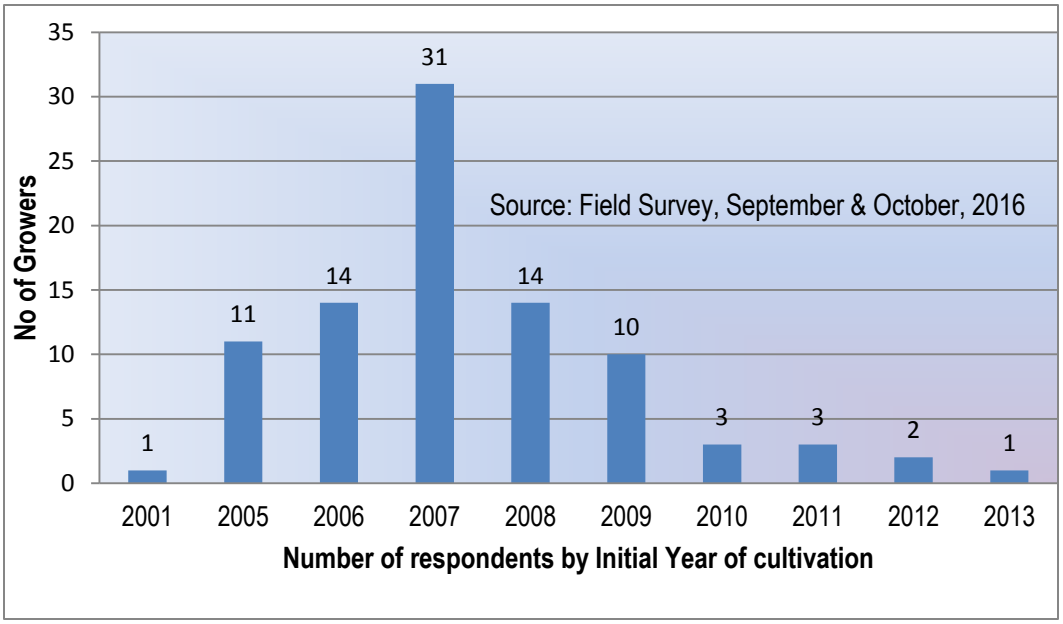
4.4. Cultivation Details

4.4.1. Years of Starting & Numbers Planted

The earliest cultivation of Oil Palm took place in the year 2001. However, there were no new Growers among the respondents during the next three year – 2002, 2003

and 2004. Cultivation of Oil Palm was again resumed since 2005. The number of growers was increasing reaching a peak level in 2007 and again falling continuously. Among the 90 Growers interviewed, only 1 started cultivation in 2001, 11 started growing Oil Palm in 2005, 14 in 2006, 31 in 2007, 14 in 2008, 10 in 2009 and continuously fell and only 1 in 2013. Maximum number of growers was found in 2007 with 34.44 percent of all the growers interviewed. Less new growers were found in recent years as shown in Figure 4.1. However, it must be kept in mind that only those growers with production of FFBs were interviewed and those growers who have not started producing were not interviewed.

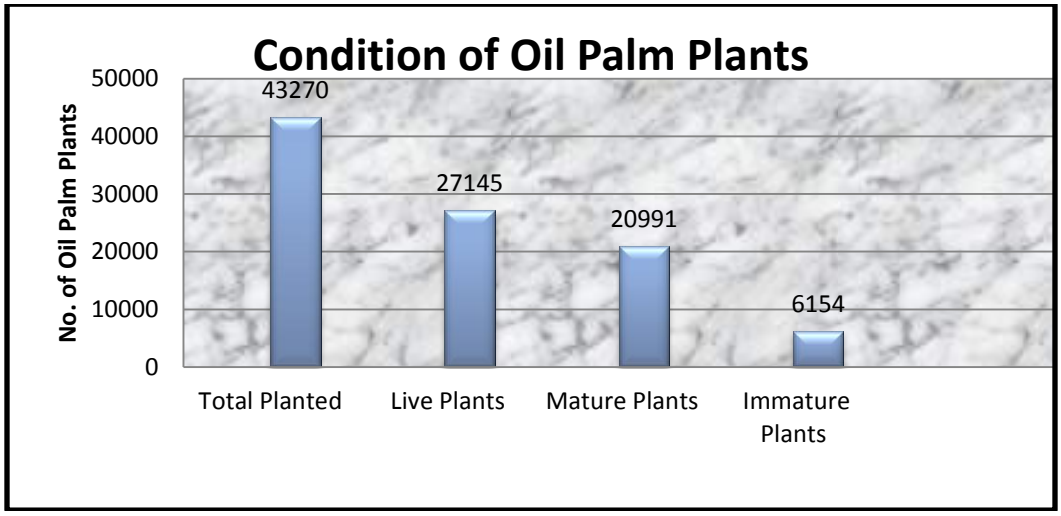
Fig. 4.1 Number of Respondents by initial year of Oil Palm Cultivation.



The field situation may be clearly seen from Figure 4.2 showing total planted, live plants, mature plants and immature plants. Among the 90 respondents, the total number of Oil Palm Seedling planted was 43270 seedlings out of which live plants

account for 27145, which was 62.73 percent of the total planted. As per the information received from the respondents, most of the loss of plants was caused by animals' attack. Further number of mature plant was 20991, which was 77.33 percent of the live plants. Out of the 27145 live plants, 6154 were immature or not yet bearing fruits which accounted for 22.67 percent of live plants.

Fig 4.2 Condition of Oil Palm Plants of the Respondents



Source: Field Survey, September & October, 2016

4.4.2. Cost of Cultivation

Table 4.7 shows the initial costs of establishment and annual costs of maintenance of the Oil Palm Plantation. Initial costs include land preparation costs and planting costs. Oil Palm seedlings were received by the growers free of cost as those were supplied by the government under the Oil Palm Development Programme. The Government had borne the costs of seedlings at the rate of Rs. 85 per exotic seedlings and indigenous seedling at the rate of Rs.65 per seedling. The cost of seedling was not directly borne by the growers and therefore not counted in the cost of establishment.

Among the respondents, 85.56 percent were spending less than Rs. 30000.00 for land preparation and the figure is the same for planting. The total expenditure on Land preparation is Rs. 1578800.00 while the total expenditure on Planting was Rs. 1445000.00 which was almost 92 percent of the cost of land preparation.. The large share of expenditure on planting was due to the transportation problems of the potted seedlings. Normally, seedlings were very big due to late transplanting, which made it difficult to transport to the place of plantation. Besides, many of the plantations were located far from the motor-able road and seedlings had to be transported using manual labour enhancing the cost of planting.

Annual costs include weeding, harvesting, pruning, hiring of vehicle or manual labour for transportation of the FFBs and miscellaneous expenditure like cost of fertilizer, herbicides, pesticides, irrigation, etc. Expenditure on harvesting is highest as many of the growers included pruning cost and transportation cost of FFB. The total annual costs including weeding, harvesting, miscellaneous and vehicle hiring is Rs. 3748706.00 only for the 90 growers out of which harvesting accounts for Rs. 1783650.00 only, ie. 47.58 percent of the total annual costs. Weeding accounts for 32.55 percent, vehicle hiring or manual labour (some respondent included this in the cost of harvesting) accounts for 13.31 percent and miscellaneous expenditure accounts for 6.56 percent. From the results, expenditure on agricultural inputs inputs like fertiliser, herbicide, insecticide, etc. are very small implying that there is a very great scope for improvement of the harvest by improving the expenditure on such items. Besides, increase in the application of more herbicides, etc will increase the yield as well as reducing the expenditure on weeding.

Table 4.7: Initial Costs of Establishment and Annual Costs of Maintenance

Initial Costs:				
	Land Preparation		**Planting**	
Expenditure (Rs.)	**Frequency**	**Amount (Rs.)**	**Frequency**	**Amount (Rs.)**
< 30000	77 (85.56)	886300	77 (85.56)	801000
30000 - 59999	10 (11.11)	410000	10 (11.11)	392000
> 60000	3 (3.33)	282500	3 (3.33)	252000
Total	**90 (100)**	**1578800**	**90 (100)**	**1445000**
Av. Expdr.(Rs.)		**17542**		**16056**

Annual Costs –I:				
	Weeding		**Harvesting**	
Expenditure (Rs.)	**Frequency**	**Amount (Rs.)**	**Frequency**	**Amount (Rs.)**
< 30000	84 (93.33)	938200	74 (82.2)	968900
30000 – 59999	5 (5.56)	209900	12 (13.3)	480200
> 60000	1 (1.11)	72000	94(4.4)	334550
Total	**90 (100)**	**1220100**	**90 (100)**	**1783650**
Av. Expdr. (Rs.)		**13557**		**19818**

Annual Costs -2:	**Miscellaneous**		**Vehicle**	
Expenditure (Rs.)	**Frequency**	**Amount (Rs.)**	**Frequency**	**Amount (Rs.)**
No Expenditure	24 (26.67)	0	33 (36.7)	0
< 30000	65 (72.22)	215976	56 (62.2)	468980
30000 - 59999	1 (1.11)	30000	1 (1.1)	30000
> 60000	0	0	0	0
Total	**90 (100)**	**245976**	**90 (100)**	**498980**
Av. Expdr. (Rs.)		**2733**		**5544**

Source: Field Survey, September & October, 2016
Figures in the parentheses indicates percentage

4.4.3. Sources of Labour

In annual maintenance of the Oil Palm Plantation, more of hired labours were used than that of family labour. The total expenditure on labours including family labours and hired labours were about Rs. 3040500, out of which Rs. 1417610 (46.62

percent) were met from family labour whereas Rs. 1622890 (53.38 percent) were met from hired labour. In all levels of expenditures, hired labours outnumbered family labour. Among the respondents, 3.33 percent depended fully on hired labour whereas, 13.3 percent did not hire any labour and fully depended on family labour.

Table 4.8: Source of Labour

Labour Cost	Family labour		Hired Labour	
Expenditure (Rs.)	Frequency	Amount (Rs.)	Frequency	Amount (Rs.)
No Expenditure	3 (3.33)	0	12 (13.3)	0
< 30000	72 (80)	740460	59 (65.6)	668540
30000 - 59999	12 (13.34)	456350	13 (14.4)	516200
> 60000	3 (3.33)	220800	6 (6.7)	438150
Total	90 (100)	1417610	90 (100)	1622890
Av. Expdr. (Rs.)		15751		18032

Source: Field Survey, September & October, 2016 ,
Figures in the parentheses indicates percentage

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4.4.4. Application of Agricultural Inputs

The field survey results confirmed that management of Oil Palm Plantation is lacking in agricultural inputs. Among the growers, 70 percent claimed that they used to apply fertilizers, which were supplied at subsidized rate. However, it was observed during the survey that the quantity of fertilizers applied is less than prescribed quantity as the supply is less. Many of the respondents said that they have stopped application of fertilizers as the supply had been stopped. Many farmers stated that the reduced harvest was due to lack of fertilizers.

Irrigation was practiced by only 17.78 percent of the growers and 82.22 percent did not irrigate their plants. They were of the opinion that with abundant rainfall in the

area, rain water was enough for the plants and claimed that irrigation was not needed. However, during the survey, it was observed that Oil Palm growers harvested FFBs for about 6 to 8 months in a year, implying that there were about 4 to 6 unproductive months in a year. Kolasib District receives average rainfall of less than 100 mm per month for a period of five months in a year starting from November to March, i.e. 5 months in a year. This implies the requirement for irrigation to ensure year round production of FFBs.

Herbicide was applied by 73.33 percent while another 26.67 percent had not applied herbicide. Most of the farmers applying herbicide also mentioned very less quantity, which means the required quantity was not applied. Instead, manual labour was used to clear the weeds. Besides, many of the plantations were not treated properly, thereby reducing the harvests. Pesticide was applied by only 20 percent and 80 percent of the Oil Palm Growers had not used pesticide. Intercropping was practiced by 52.22 percent and 47.78 percent grown only Oil palm. It was found that most of the Oil Palm growers were lacking the technical knowledge about the cultivation and management techniques of the Oil Palm cultivation.

Table 4.9: Application of Agricultural inputs

Response	Fertiliser		Irrigation		Herbicide		Pesticide		Intercropping	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No	27	30.00	74	82.22	24	26.67	72	80	43	47.78
Yes	63	70.00	16	17.78	66	73.33	18	20	47	52.22

Source: Field Survey, September & October, 2016

4.4.5 Spacing between plants

The study found that 57.78 percent of the growers planted the seedling at a spacing of 9mx9mx9m as recommended. However, 41.11 percent of them planted at less than the recommended spacing and 1.11 percent planted at more than the recommended spacing. The smaller spacing made it difficult to take care of the plants and at the same time, some farmers said that the production of FFB was less with that.

Among the Oil Palm growers, 90 percent have attended training but another 10 percent have not attended training on Oil Palm Cultivation. Some of the growers said that they had attended trainings only after establishment of their plantation and had already committed mistakes in the plantation management. Experts or Officials have visited the plantation of 62.22 percent of the growers while 37.78 percent said that their plantation had never been visited by Experts or any Official. 53.33 percent of the growers were visited 1 to 5 times by Experts or Officials in a year and another 8.89 percent were visited 6 to 12 times in a year. It clearly indicated that some of the farmers could feel neglected while some were well taken care of.

4.5. Marketing

As per the Memorandum signed between the Government of Mizoram and the Company under the Mizoram Oil Palm (Regulation of Production & Processing) Act, 2014 the FFBs harvested were sold to the Godrej Agrovet Ltd. Oil Palm Mill at Bukvannei. The rate of FFB was fixed at Rs.5.50 per Kg. The costs of FFBs are paid to the farmers through their bank account. There were some growers who complained that the full amount of the costs of their FFBs had not been transferred to their accounts

while there were some who claimed that they had to wait for their money too long to get transferred to their account.

As per provision made under Section-13 of Mizoram Oil Palm (Regulation of Production and Processing) Act, 2004 and as decided in the 4th Meeting of Price Fixation Committee held on 27th May, 2014 at Agriculture Committee Room, Aizawl, the rate of Oil Palm FFB is fixed at Rs.5.50/- (Rupees five and fifty paise) per Kg at Collection Centres. This new rate was effective from 1st June, 2014, till the period of survey in September and October, 2016. During the interaction, 39 percent of the growers mentioned that the price of FFB was too low and said that they could hardly manage the plantation.

4.5.1 Annual Production and Sale of FFBs

The total annual production of the respondents was 10475.69 quintals. The average production of FFBs per grower is 116.40 quintals or 11.64 metric tonnes. The total area of Oil Palm cultivation of the respondents is 197 hectares. Therefore, the average productivity is 53.18 quintals per hectare or 5.32 metric tonnes per hectare, which is very low in comparison to other producing countries of the world. The number of growers producing less than 100 quintals consists of 53.34 percent of the respondents. They produced only 22.77 percent of the total FFBs production. There were 31.11 percent of growers who produced 100 to 199 quintals per year and the total production of the section is 3808 quintals or 36.35 percent of the total production of the respondents. However, the quantity sold is less than quantity harvested due to problems in transportation, due to low rate of FFBs and due to failure of collection of FFBs by

the company as claimed by some growers. 98.85 percent of the total harvest collected had been sold to the company and 1.15 percent had not been sold to the Company.

Table 4.10: FFB Harvests and FFBs Sold

FFB quantity in quintals	FFB Harvest per Year			FFB Sold Per Year		
	Frequency	Percent	Qnty (Qtls.)	Frequency	Percent	Qnty (Qtls.)
<100	48	53.34	2384.99	49	54.45	2404.99
100 - 199	28	31.11	3808	27	30	3668
200 - 299	9	10	2207.7	9	10	2207.7
300 - 399	2	2.22	615	2	2.22	615
400 - 499	2	2.22	960	2	2.22	960
500 and above	1	1.11	500	1	1.11	500
	90	100	10475.69	90	100	10355.69

Source: Field Survey, September & October, 2016

4.5.2 Net Income from Oil Palm Cultivation

From the study, it was found that 81.11 percent of the respondents were having net income of less than Rs. 50000 per annum from Oil Palm cultivation. 12.22 percent were making net income between Rs. 50000 and Rs. 99999. Another 3.33 percent had an income range between Rs.100000 to Rs. 149999 and 1.11 percent had an income of Rs. 150000 to Rs. 199999. There were only 2.22 percent of respondents who were at the income range above Rs.200000. The per capita Net Income from Oil Palm was Rs. 37188.00 only. However, the per capita Gross Income from Oil Palm was Rs.65821.00 only; a large portion of the difference between the Gross Income and the Net Income was spent on cost of labour.

The total income of respondents from all sources is Rs. 14425160.00, and the per capita annual income from all sources is Rs. 160280.00 only. The per capita Net

Income of Rs.37188.00 from Oil Palm is very much lower than the average per capita annual income of the respondents.

Table 4.11: Annual Net Income from Oil Palm Cultivation

Net income	Frequency	Percent	Amount (Rs.)
less than 50000	73	81.11	1586405
50000 - 99999	11	12.22	759455
100000 - 149999	3	3.33	399810
150000 - 199999	1	1.11	178500
200000 and above	2	2.22	422710
Total	**90**	**100**	**3346880**
Average Net Income per grower			**37188.00**
Source: Field Survey, September & October, 2016			

4.5.3. Benefit-Cost Analysis of Oil Palm Cultivation

One of the significant indicators of the economy of any economic activity is its sustainability in terms of benefit-cost ratio (or cost-benefit ratio). Due to unavailability of adequate data it is not possible to conduct comprehensive cost-benefit analysis. However, attempt is made to undertake the analysis using the data obtained from the field survey so as to generate the situation of benefit and cost, at least roughly. The indicator of benefit being adopted is net annual income per hectares, while annual maintenance cost (recurring) is taken as cost. It may be noted that the system of contract farming prevailed in the study area where seeds and equipments are supposed to be supplied by the contracting company. To avoid duplication in the estimation, it is decided to exclude the initial expenditure in the calculation of benefit-cost (B-C) ratio. It may also be noted that all the estimates are averages. The analysis is based on the information presented in Table 4.7 & 4.11 and Figure 4.2. The result of the analysis is presented in Table 4.12.

Table 4.12: Analysis of Benefit-Cost Ratio of Oil Palm Cultivation in Kolasib District

Averages

SN	Particulars	Value
1	Average Area under Cultivation (Ha)	2.27
2	No. of Seeds Planted Initially	43270
3	No. of Seeds Survived till date	27145
4	No. of Mature Plants	20991
5	Total Initial Cost per Ha (Rs)	14801
6	Annual Maintenance Cost per Ha (Rs)	14072
7	Net Annual Income per Ha (Rs)	16382
8	Estimated cost of planting per Ha	19062
9	Plant Survival Rate (%)	62.73
10	Estimated Initial Cost per Ha (Rs)	14801
11	Projected Net Income on Maturity of all Plants per Ha (Rs)	21166
12	Current Benefit-Cost Ratio	1.16
13	Projected Benefit Ratio	1.50

Note: Calculation is based on the information obtained from 90 respondents

Surprisingly, the overall plant survival rate is very low at 62.73 percent, which may be increased further. But this analysis assumes that the plant survived till date will reach harvesting stage. Though the annual maintenance cost may decrease further, but it is assumed, here, to be constant only for this analysis. The total initial cost for land preparation, leveling, jungle clearance, seeds supply etc is estimated to be Rs.14801 per hectare, while the annual recurring cost for farm maintenance is estimated to be Rs.14072 per hectare. At the same time, the estimated net annual income per hectare is Rs.19062. Once all the existing live plants reach the maturity stage, the net annual income could increase to Rs.21166 per hectare.

At current rate of income per hectare and annual maintenance cost, the B-C ratio turned out to be 1.16, i.e. the net income is 16 percent higher than the cost. If all the existing plants reach the harvesting stage, the B-C ratio can be increased to 1.50.

That is, the net income earned from sale of FFB would be more than 50 percent of the cost of cultivation. Thus, it can be concluded that cultivation of oil palm could fetch significant and sustainable income for the growers.

4.5.4. Impact of NLUP on the performance of Oil Palm Cultivation

Among the total respondents of 90 Oil Palm Growers interviewed, 72 respondents (80 percent) were Non-NLUP growers, whereas 18 respondents (20 percent) were assisted under NLUP. The contribution of NLUP in Oil Palm cultivation could be seen from Table 4.13. Out of the total growers interviewed, 20 percent were under NLUP and accounted for 25.46 percent of the Oil Palm cultivated area. The per capita Oil Palm cultivated area of NLUP beneficiaries, 2.87 hectares, was more than 2.1 hectares per capita cultivated by the non-NLUP growers. 21.52 percent of live plants were owned by the NLUP beneficiaries and accounted for 19.13 percent of mature plants. However, they accounted for 29.77 percent of the immature plants, which indicated more production in future. Out of the total harvest of Oil Palm FFBs, growers under NLUP accounted for 20.87 percent and accounted for 21.01 percent of the total sale of the FFBs. However, in terms of Net Income from the Oil Palm cultivation, they accounted for only 18.29 percent; this may be due to the high percentage of the immature plants which are not yet producing FFBs. Given the various indicators presented in Table 4.13, the State Flagship NLUP has significant impact on the growth of Oil Palm Plantation in the study areas.

Table 4.13: Contribution of NLUP in Oil Palm Cultivation

	Non-NLUP	NLUP	Total	Contribution percentage of NLUP
No. of Growers	72	18	90	20.00
Oil Palm cultivated Area	151.1	51.6	202.7	25.46
Per capita Oil Palm Area	2.1	2.87	2.25	
No of Seedlings planted	31320	11950	43270	27.62
Live Plants	21263	5832	27095	21.52
Mature Plants	16976	4015	20991	19.13
Immature Plants	4287	1817	6104	29.77
Total Harvest	8288.9	2186.75	10475.65	20.87
Total Sold	8203.94	2181.75	10385.69	21.01
Net Income (Rs.)	2734517	612363	3346880	18.29
Source: Field Survey, September & October, 2016				

4.5.5. Purchase of FFBs at the Collection Centre

The Company designated some places at the road-side as Collection Centre for the FFBs. There were only few Collection Centres with buildings. However, Oil Palm growers keep their harvests on the road-side to be collected by the Company. 58.89 percent of the growers said that there was no Collection Centre nearby while 41.11 percent said that Collection Centre was available nearby. Regarding the purchase of FFBs in the Collection Centre, 58.89 percent said that the FFBs was collected weekly by the Company, 23.33 percent said that it was collected twice a month; 3.33 percent said that it was collected monthly. 14.44 percent said that it depends on the availability of FFB and on the convenience of the Company. It was shown in Table 4.14.

Table 4.14: Frequency of FFB Purchase in the Collection Centre

Purchase of FFBs in the Collection Centre	Frequency	Percent
Weekly	53	58.89
Twice monthly	21	23.33
Monthly	3	3.33
Others	13	14.44

Source: Field Survey, September & October, 2016

4.5.6. Distance from Oil Palm Mill

Regarding the distance of the plantation from the Oil Palm Mill, the maximum distance is at 78 km while the minimum distance is at 0.80 km; the mean distance is 26.69 km. Plantations within the range of 30 km are 54.44 percent; between 30 km to 49 km are 31.11 percent whereas there are 14.44 percent located beyond 50 km. In comparison to the distance of plantation from the Mill in Andhra Pradesh and Tamil Nadu where 67.70 percent of the plantations are within the radius of 30 km as observed by Owolarafe et al (2007), only 54.44 percent in Mizoram are within the same distance. In addition to this, as many as 89.89 percent of the plantations in Mizoram were located away from the main road. Some plantations were connected with fair weather road while the peak season for harvest is during rainy season. Still adding to the problem, there were many plantations without any kind of road connectivity from where the FFBs had to be transported by manual labour increasing the cost of maintenance.

Table 4.15: Distances between Oil Palm Plantations and the Processing Mill

Distance from Oil Palm Mill (km)	Frequency	Percent
< 30	49	54.44
30-49	28	31.11
50 and above	13	14.44
Distance from the main road (Km)		
0	10	11.11
<1 km	56	62.22
1 km - 5km	11	12.22
6km -10km	8	8.89
>10 km	5	5.56

Source: Field Survey, September & October, 2016

4.6 General Perceptions & Problems of the Oil Palm Growers

Oil Palm is the most productive edible oil producing plant. The Government of India also encouraged Oil Palm cultivation to meet the domestic edible oil requirement. Under the Oil Palm Area Expansion Programme, the Government of Mizoram is also taking steps towards cultivation of Oil Palm. The programme started in the state since 2001 and farmers were also encouraged to take up Oil Palm Cultivation for their livelihood. With the passage of time, the Oil Palm cultivation progressed and Oil Extraction was started in the year 2014 at Godrej Agrovet Ltd Oil Palm Mill at Bukvannei, Kolasib District of Mizoram. In the year 2015-2016, Godrej Agrovet Ltd procured 1684.42 metric tonnes of Oil Palm Fresh Fruit Bunches from the growers of Kolasib District. The total FFB sold by the 90 respondents during the same year is about 10295.69 quintals or 1029.6 metric tonnes.

Respondents were asked their perception about the dependability of Oil Palm cultivation for meeting the requirement for livelihood using 4 point Likert Scale.

Among the respondents, 22.22 percent perceived it as ‘not dependable’; 47.78 percent perceived is as ‘hardly dependable’; 27.78 percent perceived it as ‘dependable’ while 2.22 percent perceived it as ‘fully dependable’.

Table 4.16: Perceptions of the respondents on the dependability for livelihood

Perception of the Respondents	Frequency	Percent
Not Dependable	20	22.22
Dependable to some extent	43	47.78
Dependable	25	27.78
Fully Dependable	2	2.22
Source: Field Survey, September & October, 2016		

Table 4.17 presents the general perceptions of the growers regarding the suitability of their lands for Oil Palm cultivation. There were 2.22 percent who said that their land were not suitable for Oil Palm cultivation due to the rough topography and the distance from the main road. Another 17.78 percent said that their lands were only suitable to some extent. However, there were 66.67 percent who said that their lands were suitable for Oil Palm cultivation. In addition, there were 13.33 percent who said that their lands were very suitable. This indicates that a significant percentage of the lands were suitable for cultivation of Oil Palm and land suitability is not a major problem faced by the growers.

Table 4.17: Land Suitability as perceived by the Respondents

Land Suitability	Frequency	Percent
Not suitable	2	2.22
Hardly Suitable	16	17.78
Suitable	60	66.67
Very Suitable	12	13.33
Total	**90**	**100**

Source: Field Survey, September & October, 2016

Table 4.18 shows the General problems as perceived by the respondents. Transportation problem was the main problem as appeared in the table. 85.56 percent indicated as their problem. Many of the plantations were located far away from the paved road where transportation is very difficult. Some of the growers said that they declined to receive fertilizer from the Company as the Company insisted them to pluck the fruits and to sell it to them. They said that due to high transportation cost in the absence of road connectivity, they could not recoup the cost for hiring labour from the sale of the FFBs and declined to receive the fertilizer. Technical Support problem was indicated by 62 percent of the respondents. Financial problem was indicated by 37 percent. Animals like wild hogs, porcupines, rodents, etc. attacked the plants and resulted in loss of plant population and this menace caused much problem to the Oil palm Growers and 34 percent of the growers indicated it among the problems. Marketing problem was indicated by 13 percent of the respondents. Other problems mentioned by the respondents were lack of fertilizers, unavailability of subsidized chemicals like herbicide, pesticide, sprayer, etc. Low rate of FFBs was mentioned by 35 percent of the respondents and 15 percent also mentioned the requirement for harvesting equipments like hand glove, pruning machine, ladder, etc. They cited their problems in collection of FFB in the steep slope. The increase in the height of the Oil

Palm tree with years make it difficult to collect the fruit bunches. They also stated problems in handling the thorny fruit bunches. They said that the labour requirement was very high in Oil palm Plantation, which discouraged some growers. High cost of labour was also mentioned by some respondents among their problems.

Among the respondents, 27 percent of the growers have uprooted some of the plants due to various reasons. The total number of plants uprooted was 424. However, no farmer had uprooted the whole plantation. The highest number uprooted by one grower was 100. The reason for uprooting as mentioned by 23 growers was less spacing while 2 growers claimed the reason for their uprooting as financial problems and another 2 growers claimed that they were not satisfied with the scheme.

Table 4.18 presents the problems faced by the growers in the cultivation and marketing of the oil palm in the study area. It is observed that transportation remains the main problem of the growers as more than 85 percent of the growers were found facing transportation problem. At the same time, majority of the growers (68.89 percent) also faced problems in technical inputs. As majority of the growers have transportation and technical problems, it may be an academic interest to test their statistical significance before making any further conclusion. If more than half (50 percent) of the growers are facing such problem, we may say that it is the main problem. Consequently, Z-statistic have been calculated under the hypothesis that more than half of them face such problems (i.e. $H_o : P = 0.50$ & $H_1 : P > 0.50$). It is observed that Z-statistic is significant in case of transportation and technical inputs. Thus, we may conclude that transportation and technical inputs are the main problems to the growers.

Table 4.18: General Problems faced by the Respondents

Sl. No.	Problems	Frequency	Percent
1	Transportation Problems		
	Yes	77	85.56**
	No	13	14.44
2	Financial Problems		
	Yes	37	41.11
	No	53	58.89
3	Pests and Animals Problems		
	Yes	34	37.78
	No	56	62.22
4	Technical Support Problems		
	Yes	62	68.89**
	No	28	31.11
5	Marketing Problems		
	Yes	13	14.44
	No	77	85.56
6	Low Rate of FFBs		
	Yes	35	38.89
	Not Mentioned	55	61.11
7	Equipments for cutting of FBBs		
	Yes	15	16.67
	No	75	83.33

Source: Field Survey, September & October, 2016

**Z-statistic is significant.

4.7. Concluding Observations

The chapter presents the various aspects of Oil Palm cultivation in the study areas. It analysed the socio-economic background of the growers, landholding status, cultivation practices, labour, marketing, problems and general perceptions of the respondents. Based on the analysis undertaken, the following points may be noted:

Firstly, in spite of the effort shown by the Government and the contracting Company to promote its production, Oil Palm plantation remains to be subsidiary

economic activity in nature for majority of the cases. It was observed that only 27.78 percent of the respondents were found adopting it as main source of livelihood. This is also implicated by the percentage contribution of income from sale of the Oil Palm FFBs to the total annual family income. Further, the size of the landholdings is low in most of the cases (below 2 hectares) which may be insufficient for production at commercial scale.

Secondly, analysis of the socio-economic condition shows low educational levels of the growers. The educational attainment of more than half of them is below middle standard. This may pose problems in technology transfer in farm management and marketing of the produce. In addition, the landholding status is also informal in substantial number of cases. As much as 42.22 percent of the lands were held in the form of VC Pass, which does not have legal backing for permanent cultivation as per the existing land law.

Thirdly, an interesting practices being observed is the unexpectedly higher contribution of hired workers in plantation activities. Significant number of growers contacted said that they had engaged hired labour. This may be taken as generation of additional employment through Oil Palm Plantation work, while it also implicated the situation where the plantation is given secondary importance of the family economic activities.

Fourthly, uneven usages of agricultural inputs like fertilizer, irrigation, herbicide, etc among the growers may implicate high productivity variations in the study areas.

Fifthly, the significant push through public policy intervention to promote Oil Palm production in the area is NLUP. This project is found to have positively significant impact on area expansion, number of seedlings planted, number of growers, etc. Upon reaching full harvest of these new entrants, it is expected that more production is likely in the near future.

Sixthly, of the 43270 seedling reportedly planted by the respondents, 27145 survives, that is, the survival rate is 63.73 percent only. Low plant survival rate may be due to a number of factors including inadequate uses of inputs and neglect by the growers as majority of them adopted it as only secondary livelihood activities which suggests from maintenance of plants and farms in a number of cases. Of these survived plants, 77.33 percent have reached maturity and harvesting stage.

Seventhly, it may be too early to make conclusion about the net income earned from sale of FFBs given the fact that substantial number of plants have not reach production stage. Despite this fact, attempt is made to assess the net income earned from sale of FFBs. It is observed that average annual income turned out to be Rs. 37188 per grower which is more than Rs. 3000 per month. At the same time, 58.89 percent sold FFBs on weekly basis, 23.33 percent are on fortnightly and 3.33 percent on monthly basis. In anticipation of all the plants reaching production stage and the existing net income and frequency of sale, it is reasonable to conclude that Oil Palm plantation could fetch substantial income regularly for the growers. Further, the Benefit-Cost analysis suggested the possibility of sustained and substantial income earned from sale of FFB in the future. All these are in support of our hypothesis No. 1 which says “Oil Palm provides substantial and sustainable income for the growers”.

Lastly, the analysis of the perceptions of the respondents showed that 30 percent of the growers said the plantation is dependable to be family income source, while 47.78 percent said it is dependable to some extent. Thus there is positive perception among the majority of the growers towards Oil Palm plantation. At the same time, the respondent growers faced serious problems in transportation. A significant number of 85.56 percent of these growers faced problems in transportation of their FFBs to the collection point of the contracting company. Thus, transportation remains to be the main problem of Oil Palm Grower. This is in support of our hypothesis no 2 which is, "Transportation problem remains the main setback for development of Oil Palm cultivation in Mizoram". It may be concluded that development of better transport facility would boost the economy of Oil palm plantation in the study area; which would further improve farm access and efficiency of marketing chain.

Chapter – 5

Major Findings and Conclusions

5.1. Introduction

Studies confirmed that Oil Palm farmers made profit and improved their income (Owolarafe, et al. 2007; Damoah, 2012; Beggs, et al. 2013; Ibitoye, et al. 2014). India is heavily dependent on import of palm oil from other countries. In view of meeting the domestic demand and to reduce import requirement, the Government of India had initiated expansion of Oil Palm cultivation. The initiative is mainly funded through centrally sponsored schemes of Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) and National Mission on Oilseeds and Oil Palm (NMOOP). The State of Mizoram was identified to have vast potential area for its cultivation.

The seven major Oil Palm cultivating States in India with the cultivated area till 2013-14 are Andhra Pradesh (150784 ha); Karnataka (38391 ha); Tamil Nadu (28238 ha); Mizoram (19971 ha); Odisha (16225 ha); Kerala (5740 ha) and Gujarat (4415 ha). Mizoram is among the major Oil palm cultivating States and an area under Oil Palm cultivation till 2014-15 is 20377 hectares (MES 2015-16).

Cultivation of Oil Palm was started in Mizoram since 2004-2005 during the X^{th} Plan Period under ISOPOM. To facilitate its development 'The Mizoram Oil Palm (Regulation of Production and Processing) Act, 2004' was passed in the Assembly and received the assent of the Governor of Mizoram on the 2^{nd} December, 2004. Under the provisions of the Act, Memorandum of Understanding was signed between the Government of Mizoram and three

Companies viz. Godrej Agrovet Ltd. (on 14th September, 2005), Ruchi Soya Industries Ltd. (on 3rd October, 2006) and 3 F Oil Palm Agrotech Pvt. Ltd (on 7th March, 2007). Godrej Agrovet Ltd. has established Processing Mill at Bukvannei, Kolasib District and started processing the FFBs since 2014. Substantial quantities of FFBs were purchased by Godrej Agrovet Ltd. from the farmers, while the latter have received regular income from the produces.

5.2. Major Findings

The main findings and observations of the study are summarised as follows:

1. The area covered under Oil palm cultivation in 2005-06 was 110 hectares only which grew to 17588 hectares in 2013-14 (MES 2013-14). Kolasib has the maximum area under Oil Palm which is 5327 hectares, i.e. 30.29 percent of the total cultivated area while Aizawl District is having the minimum area under Oil Palm with 407 hectares, i.e. 2.31 percent only.
2. Oil Palm cultivation is under contract farming in Mizoram. The Government signed MoU with the Companies where the produce from the allotted Districts are to be sold to the concerned Company. The total purchase up to March, 2014 is only 140.0995 metric tonnes of FFBs, out of which the share of Godrej Agrovet Ltd. is 133.50 metric tonnes (95.29 percent) while 6.6025 metric tonnes (4.71 percent) was procured by Ruchi Soya Industries Ltd from Lunglei District.
3. Godrej Agrovet Ltd. had completed the establishment of Oil Palm Processing Mill and processing of FFB for extraction of Palm Oil was started from 2014. As per the latest report, the Company procured

8743.97 metric tonnes of Fresh Fruit Bunches during 2012-13 to 2015-16 from the farmers of Kolasib and Mamit Districts. The total FFB production during the year 2015-16 for the State is 3686.77 metric tonnes (MES 2015-16) while the amount procured by Godrej Agrovet Ltd. from Kolasib and Mamit Districts was 3652.25 metric tonnes, which is 99.06 percent.

4. FFB purchased from Kolasib District increased by 115.97 percent during four-year period from 2012-13 to 2015-16 while the figure was 295.22 percent for Mamit District during the same period.

5. The percentage share of Kolasib District in comparison to the share of Mamit District in terms of FFB purchase by the Godrej Agrovet Ltd was declining. The share of Kolasib District was 61.03 percent in 2012-13, 47.28 percent in 2013-14, 47.3 percent in 2014-15 and further declined to 46.12 percent in 2015-16. Out of the total purchase of 3652.250 metric tonnes in 2015-16, the share of Kolasib District was 1684.42 metric tonnes or 46.12 percent, whereas Mamit District contributed 1967.83 metric tonnes or 53.88 percent.

6. Oil Palm produces FFBs throughout the year. However, the production during the dry seasons from January to March is very less and Maximum harvest is found in the months of October and November. From the purchase data of the Godrej Agrovet Ltd, we can clearly observed that purchase during the months of January and February were both less than 1 percent while the purchase during the months of October and November were both more than 21 percents of the annual purchase.

7. In the study area, Oil Palm cultivation appears to be subsidiary occupation in nature as only 27.78 percent of the Oil Palm growers used Oil palm cultivation as their main source of income. Other main sources of income of the rest of the growers with percentages are: 'Daily wage' – 18.89 percent, 'Other horticultural crops' – 16.67 percent, 'Permanent jobs' – 10 percent, 'Household/Cottage Industries' – 3.33 percent, 'Livestock' – 2.22 percent and 'Others' - 21.11 percent. Those sections of growers who selected 'Others' as their main source of income consists mainly of pensions, petty trade/business, WRC, Fish Pond, etc.

8. The average annual income turned out to be Rs. 37188 per grower which is more than Rs. 3000 per month. At the same time, 58.89 percent sold FFBs on weekly basis, 23.33 percent are on fortnightly and 3.33 percent on monthly basis.

9. Scrutinising the Net Income from Oil Palm, it is observed that all the AAY families were in the Net Income level below Rs. 50000.00, whereas 88.89 percent of the BPL families were in the same level and 78.26 percent of the APL families were in that level. From the APL families, 14.49 percents were in the Net Income level between Rs. 50000.00 – Rs. 99999.00 and the rest 7.25 percent were in the level above Rs. 100000.00; which indicates that the performance of Oil Palm farmers depends on the household status to some extent.

10. It is found that 81.11 percent of the respondents were male whereas only 18.89 percent were female. The mean age of the respondents was 60.41. Young farmers do not give interest in Oil palm cultivation.

11. The educational attainment of more than half of them is below middle standard. This may pose problems in technology transfer in farm management and marketing of the produce.

12. Average Oil Palm cultivated area of 2.27 hectares is very small and need to be enhanced in order to make Oil palm cultivation dependable for livelihood. In addition, the landholding status is also informal in substantial number of cases. As much as 42.22 percent of the lands were held in the form of VC Pass, which does not have legal backing for permanent cultivation as per the existing land law.

13. Among the respondents, 3.33 percent were AAY families, 20 percent were BPL families and 76.67 percent were APL families. Out of the total respondents, 4.44 percents were having kutcha house, 66.67 percent were having semi-pucca house and another 28.89 percent were having pucca house.

14. The extent of the Farm maintenance among the respondents differs greatly. Maintenance of the Oil Palm plantation depends on the size of plantation, distance and other factors. The average expenditure on Land preparation is Rs. 13442.00 while the average expenditure on planting is Rs. 16056.00 only. After establishment of the Oil Palm Plantation, annual maintenance cost has to be incurred for maintenance of the plantation. Annual maintenance costs may include expenditures on weeding, harvesting, pruning and other miscellaneous expenditures. The Average expenditure on weeding is Rs. 17235.00, average expenditure on harvesting is Rs. 24911.00 and average miscellaneous expenditure including cost of fertilisers, herbicides, etc. is Rs. 2930.00 only. This

shows that the Oil Palm plantations in the study area were applying very less agricultural inputs.

15. However, among the respondent, 70 percent applied fertilisers in their plantation. Only 17.78 percent used irrigation, 73.33 percent applied herbicides; pesticide was used by only 20 percent; while 52.22 practiced intercropping.

16. Among the respondents, 27 percent of the growers have uprooted some of the plants due to various reasons. The total number of plants uprooted was 424. Main reason of uprooting was less spacing between the plants.

17. In few cases, growers complained that they were facing with marketing problems like failure to collect the FFBs on the assigned date by the Company, and incomplete receipt of cost of FFBs.

18. It is noteworthy that the Oil Palm farmers in the study area are using more hired labour than family labour. Family labour constituted only 39.59 percent of the total labour requirement and the rest 60.41 percent were met from hired labour. This implies that Oil palm plantations in the area are creating employments to others.

19. Transportation remains to be the main problem of Oil Palm Grower as 85.56 percent of the growers were facing transportation problem.

20. The number of NLUP Beneficiaries for Oil Palm cultivation since 2011 rose to 2290 in 2013-14. A total amount of Rs. 22,90,00,000.00 had been incurred for assisting the Oil Palm growers under NLUP up to 2013-14 since inception of the NLUP in 2011. The New Land Use Policy of the State Government has a considerable impact on Oil Palm Development in the study area. This project is found to have positively significant

impact on area expansion, number of seedlings planted, number of growers, etc. Out of the total growers interviewed, 20 percent were under NLUP and accounted for 25.46 percent of the Oil Palm cultivated area. The per capita Oil Palm cultivated area of NLUP beneficiaries, 2.87 hectares, was more than 2.1 hectares per capita cultivated by the non-NLUP growers. 21.52 percent of live plants were owned by the NLUP beneficiaries and accounted for 19.13 percent of mature plants. However, they accounted for 29.77 percent of the immature plants, which indicated more production in future. Out of the total harvest of Oil Palm FFBs, growers under NLUP accounted for 20.87 percent and accounted for 21.01 percent of the total sale of the FFBs. Upon reaching full harvest of these new entrants, it is expected that more production is likely in the near future.

21. At current rate of income per hectare and annual maintenance cost, the estimated Benefit-Cost ratio of Oil Palm cultivation turned out to be 1.16, i.e. the net income is 16 percent higher than the cost. If all the existing plants reach the harvesting stage, the B-C ratio can be increased to 1.50. That is, the net income earned from sale of FFB would be more than 50 percent of the cost of cultivation. Thus, it can be concluded that cultivation of oil palm could fetches significant and sustainable income for the growers.

5.3. Conclusion

The study reveals that Oil Palm cultivation is showing development and in anticipation of all the plants reaching production stage and the existing net income and frequency of sale, it is reasonable to say that Oil Palm plantation

could fetch substantial and sustainable income regularly for the growers. At the same time, the attitudes of the growers for expansion and intensification of its cultivation is found not encouraging as majority of these growers adopted it as only subsidiary livelihood activities. This is mainly due to apparent problems of transportation of the FFB to reach the collection points. In spite of this, the study found impressive scope of oil palm development in Mizoram considering the availability of large potential areas. However, its expansion should be done side by side with the development of the facilitative infrastructures, especially for transportation of the produces.

5.4. Recommendations

Having the performance of the oil palm growers in Mizoram been studied, it is considered necessary to propose policy recommendations to further its success. The study has proposed the following recommendations:

i) The starting point for the successful cultivation of oil palm in Mizoram is the improvement of farm connectivity for easy transportation of the products. This is necessary keeping in view the hilly terrain of the areas where most of the potential areas could not be reached by motorable roads. Connectivity development initiatives may be undertaken in two ways: (1) Construction of link roads to all cultivated areas as well as potential areas. (2) In fact, connecting the plantation areas at certain point is not sufficient as it may be difficult for the farmers to bring the FFB in the access point (reached by motorable road) by head-load even within the vicinity of their farm. So, it is necessary to develop in-farm road networks (a network of roads within the farm) in each of the

plantation areas to ensure at least the movement of trolleys in the collection of FFB.

ii) It is necessary to evolve sustainable land use planning exercise, like *compact area approach*, *one-crop-one-village*, *crop zoning*, etc before proceeding further to expand areas under cultivation. This is necessary keeping in view the problems of transportation, crop maintenance, and marketing which are likely to occur in the subsequent stages of the cultivation.

iii) Expansion of plantation areas to each growers and intensification of the cultivation practices is necessary. To leverage the potential economies of scale in cultivation, harvesting and marketing, the growers may be encouraged to expand their cultivated areas. To increase the productivity of their existing lands, the growers may also be encouraged to practice intercropping. This will intensify their current land use and increase their income to a great extent.

iv) Use of better technology (fertiliser, mechanised equipments, etc) in the cultivation, harvesting, and marketing is necessary. This will improve plant survival while also enabling better farm maintenance practices, post-harvest and marketing.

v) Current procurement price of FFB, which was in effect since the 1st June, 2014, failed to catch up with the price trends of other agricultural products as well as the overall inflation rate of the country. Thus, it is recommended that continuous price review mechanism be instituted under the provision of Mizoram Oil Palm Act, 2004. This will have dual effects: (i) it will ensure earning of remunerative prices by the growers,

and (ii) it will boost the morale of the growers for further development in its cultivation.

5.5 Suggestions for further research

In addition to the above recommendations, the study also identifies certain areas where further research may be undertaken. They are as follows:

i) As noted earlier, majority of the growers covered in the study areas adopted oil palm cultivation as subsidiary livelihood activities, while substantial number of the household depend on daily labour to earn income to meet their daily family consumption needs. It is necessary to study the factors that have inhibited the farmers from undertaking oil palm cultivation as main activity. This is necessary to identify alternative ways for effective policy interventions.

ii) It is necessary to conduct, before development of oil palm cultivation, a proper assessment of the attitudes of the society in all the potential areas vis-a-vis analysis of the attachment they have in their age-old practices of shifting cultivation, and other means of livelihood. The exercise will identify the extent of the adaptability of the people to shift into the cultivation of modern commercial crops. This will enable policy makers in chalking out effective strategies for capacity development for cultivation.

iii) It is necessary to conduct research continuously to provide scientific inputs to the growers for farm management, crop protection, post-harvest practices and marketing.

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APPENDIX

INTERVIEW SCHEDULE FOR OIL PALM FARMERS

Schedule No: _____ Date: _____

Name of Investigator: _____

The interview schedule examines the significance of socio-economic condition on the performance of Oil Palm Farmers. Your response will greatly contribute towards meeting this objective and shall be used only for the purpose of this study. The confidentiality of your responses is assured.

Name of the Village: _____, Block: _____

Section I: Socio-economic Indicators:

1. Name of the Head of family:
2. Sex (please tick): 1. Male 2. Female
3. Age (in years) : _____
4. Educational Qualification (please tick):
   1. Illiterate 2. Primary 3. Middle 4. High School
   5. Higher Secondary 6. Graduate & above.
5. Family Size (please write in figure) : _____
6. No. of Female : _____
7. No. of Male : _____
8. No. of Workers : _____
9. No. of Dependents (write in figure) : _____
10. No. of children (below 14yrs) : _____
11. No. of students (above 14 years) : _____
12. No. of Aged, who cannot work : _____
13. No. of disabled : _____
14. Household Status (please tick):
    1. AAY 2. BPL 3. APL
15. Housing Status (please tick): 1. Kutcha 2. Semi-pucca 3. Pucca
16. Main Source of Income (please give only one answer) :
    1. Oil Palm Plantation 2. Other Horticulture Crops
    3. Household/Cottage industries 4. Livestock 5. Daily Wage
    6. Permanent Job 7. Others (specify) _____

17. Total Annual Income from all sources (approximate): Rs. _____

Section II: Land Holdings (Area in hectare)

18. Total Landholdings: _____
19. Area under Oil Palm Cultivation: _____
20. Year of Initial cultivation of Oil Palm: _____
21. Status of Landholding (please tick):

    1) LSC; 2) Periodic Patta; 3) VC Pass; 4) Lease from others
22. Perception of the grower on the land suitability for Oil palm cultivation in terms of topography and fertility of the soil:

    1) Not suitable 2) somewhat suitable 3) suitable 4) very much suitable

Section II - Total number of Oil Palm Plants and maintenance activities:

23. No. of Seedlings Planted : _____
24. No. of Live Plants : _____
25. No. of Mature Plants : _____
26. No. of Immature plants : _____
27. Plant spacing (in meter) :
    1. Less than 9m x 9m x 9m
    2. At 9m x 9m x 9m
    3. More than 9m x 9m x 9m
28. Do you apply Fertiliser: Yes / No
29. Do you irrigate your plants: Yes/No
30. Do you apply herbicides: Yes / No
31. Do you apply pesticides: Yes / No
32. Do you practice inter-cropping: Yes/No
33. Did you uproot the plant (due to dissatisfaction) : Yes/No
34. If yes, how many plants? : _____
35. Please state the reason for uprooting:

    1- Dissatisfaction with the scheme: 2- Financial Problems

    3- Better option; 4- Others (specify) _____
36. Quality of Seedlings distributed:

    1) Bad; 2) somewhat good; 3) Good; 4) Very Good
37. Time of Distribution of Seedlings:

1) Off-season; 2) Somewhat late season; 3) at season 4) exactly at the right season

38. Distance of Oil Palm Plantation from the Processing Mill (km): _____
39. Distance of Plantation from the Main Road (km): _____

Section III: Government Intervention:

40. Have you attend training on Oil Palm cultivation: Yes/No
41. Have any expert visited your plantation: Yes/No
42. Frequency of the visit?: _____
43. Is there FFB Collection Centre nearby?: Yes /No
44. What is the distance from your plantation?: _____
45. What is the frequency of FFB collection at the Collection Centre?:
    1) Weekly: 2) Twice a month; 3) Once a month;
    4) Others (specify) _____

Section IV: Value Chain in Oil Palm Cultivation:

(Cultivation, Maintenance and Marketing)

46. Land Preparation (cutting, clearing, etc): Rs. _____
47. Expenditure on Planting:_____
48. Expenditure on Weeding: _____
49. Expenditure on Harvesting: _____
50. Annual Labour used:
    a) Family Labour: _____ b) Hired Labour: _____
    (Daily wage rate of labour: Rs. _____)
51. Miscellaneous Expenditure (Herbicides, Pesticides, Fertilisers, etc.. per year): Rs. _____
52. Transportation Cost (including hiring vehicle and wages for labour): Rs._____

FFB Harvest:

i) FFB harvest per year (qtl): _____
ii) FFB sold per year (qtl):_____
iii) Rate of FFB per Kg: Rs. _____

Net Income (Gross Income – Total Expenditure): Rs. _____

Section V: Problems Faced by Oil Palm Growers:

Please tick the problems being faced by you:

i) Financial Problems

ii) Problems of securing seedlings

iii) Transportation problems.

iv) Marketing problems

v) Inadequate technical assistance

vi) Pest infestation

vii) Others (specify): _____

53. What is the main problem being faced by you from the above list?

_____

54. What is your perception about the dependability of income accrued from Oil palm Cultivation for meeting the livelihood requirement of the family?

1- Not Dependable, 2- Somewhat Dependable,

3- Dependable, 4-Very Much Dependable.

Section V: Perception of the Investigator on the performance of the Farmer
(This should be filled up after interviewing the farmer)
I. What is your perception about the enthusiasm and performance of the farmer? 1- Not good, 2- Somewhat good, 3- Good, 4- Very Good
II. Comment on the performance of the farmer on the following points:
1) Maintenance of his plantation:
2) Transport and marketing:
3) Improvement in economic condition:
4) Enthusiasm in his work:
5) Any other comments: