Developmental Action Plan for Promoting Oil Palm in the North Eastern Region of India

FINAL REPORT

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North Eastern Development Finance Corporation Ltd. (NEDFi)

Developmental Action Plan for Promoting Oil Palm in the North Eastern Region of India

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Acronyms & Abbreviations

ASEAN	Association of South East Asian Nations
CACP	Commission for Agricultural Costs & Prices
CPO	Crude Palm Oil
DAC&FW	Department of Agriculture Cooperation & Farmers' Welfare
FFB	Fresh Fruit Bunch
FTA	Free Trade Agreement
FY	Financial Year
Ha	Hectare
ISOPOM	Integrated Scheme of Oilseeds, Pulses, Oil Palm & Maize
Kg	Kilogram
KVK	Krishi Vigyan Kendra
MDoNER	Ministry of Development of North Eastern Region
MOU	Memorandum of Understanding
MSP	Minimum Support Price
MT	Metric Tonne
NE	North East (Region of India)
NEC	North Eastern Council
NEDFi	North Eastern Development Finance Corporation Ltd.
NFSM	National Food Security Mission
NFSM (OS&OP)	National Food Security Mission (Oilseeds & Oil Palm)
NMOOP	National Mission for Oilseeds and Oil Palm
OPAE	Oil Palm Area Expansion
PDPS	Price Deficiency Payment System
PKO	Palm Kernel Oil
RBD	Refined Bleached & Deodorized
Rs.	Rupees
ST	Scheduled Tribe
SWOT	Strengths Weaknesses Opportunities & Threats
TMOP	Technology Mission on Oilseeds and Pulses
WTO	World Trade Organization

Executive Summary

Introduction

India is heavily dependent upon imports to meet over two-thirds of its requirements of edible oils. Now, the country imports about 15 million tonnes of edible oils, of which around 60% consists of crude palm oil (CPO) and RBD palmolein. In line with the spirit of Atmanirbhar Bharat, it has become necessary to consider expanding the area under oil palm in India. In July 2020, the Hon'ble Prime Minister of India had appealed to farmers in the North Eastern (NE) Region to grow oil palm, in order to make India self-sufficient in edible oils. While considerable progress has been made, especially in Mizoram, the existing efforts need to be broadened elsewhere in the region. Such endeavours will boost the region's economy, especially by providing a sustainable livelihood for small growers in the interior areas. Accordingly; the Government of India, which is promoting the above crop in the NE states, has identified oil palm as a thrust area of economic activity for the region.

In October 2020, North Eastern Development Finance Corporation Ltd. (NEDFi) was entrusted by the North Eastern Council Secretariat, Ministry of Development of North Eastern Region (MDoNER), Government of India with the task of preparing a Developmental Action Plan for Oil Palm in the North Eastern Region. The Terms of Reference of the assignment are given below:

- To assess the current status of oil-palm sector in the NE Region through stakeholders' consultation on 'challenges, prospects and recommendations for development and promotion of the oil-palm sector in NER';
- To assess the gaps and prospects in the existing policies and schemes, and to identify priority areas for intervention with implementation strategy and agency; and
- To prepare a five-year developmental action plan including state specific sub-plans, resource requirement and role of stakeholders**.**

The Scope of Work has been detailed at Chapter-1 of the Report and may be referred to therein. This document, which has been prepared in December 2020, furnishes the Action Plan in accordance with the requirements of the present assignment. The chapters and sections of the plan have been organized to cover the Scope of Work. The assignment has been carried out by studying information from secondary sources, understanding the data gaps, carrying out discussions with stakeholders, and undertaking field visits to meet growers and others in order to meet the information requirements. The inputs received from all these interactions have been duly incorporated herein, while finalizing the present plan for developing oil palm in the North Eastern Region.

Current Status of Oil Palm at the Global & National Levels

Palm oil is considered as a 'miracle oil' due to its diversity of uses for both food and non-food products. While the global output of edible oil had grown from nearly 81 million MT in 1990 to 185 million MT in 2016-17, the share of palm oil in the global mix of edible oils had surged from 13.6% to 33% in the same period. The production of palm oil had reached 73.02 million MT in 2019-20. Indonesia and Malaysia dominate the global output of palm oil, accounting for 84%-85% of the world production in recent years. The top consuming nations include Indonesia, India, European Union, China, Malaysia, Pakistan and Thailand. They account for over three-fifths of palm oil consumption across the globe. Additional information about the global status of palm oil is available at Chapter-2.

India is the second largest consumer of palm oil. It consumes about 12% of the global output of palm oil. In 2018-19, India had imported nearly 15 million MT of edible oils to meet its consumption of about 23 million MT. In other words, the nation depends upon imports to supply over 65% of its requirements of edible oils. Palm oil forms the most important component of nation's edible oil consumption, as it forms 40% of such intake. As the country produces little (below 0.30 million MT) in comparison to its needs, it has to import almost 97% of its requirements of palm oil. In India, the major part of available palm oil and its fractions are used for food-uses (in cooking, frying, bakery and confectionary units etc.), while a smaller part of palm oil (about 15%) is used for non-food uses, especially for the production of toilet soaps, fatty alcohols and fatty acids. The latter have a wide range of uses for making items like cosmetics, rubber and polymer processing, pharmaceuticals etc.

The major items that account for around 95% of India's imports of palm oil by volumes are crude palm oil and refined palm oil. The current basic customs duty on these items has been 54% and 44% respectively since 1st March 2018. The total duties are higher after the addition of surcharges and taxes. There is a usual differential of 10% in the basic customs duty between crude palm oil and refined oil, with a higher tariff for the latter. This has been practised in order to promote the domestic processing sector. Till 2018, the customs duty on refined palm oil was lower than the preferential tariff under Indo-ASEAN FTA or India Malaysia CECA. After 1st January 2019, the preferential tariffs were lower, especially for refined palm oil from Indonesia. However, imports of refined palm oil (such as RBD palm oil and RBD palmolein) into India have been placed on the 'restricted list' with effect from 8th January 2020. On 27th November 2020, the duty on crude palm oil was reduced significantly to 27.5%.

Sizeable areas in India are suitable for growing oil palm. As per the assessment carried out in 2012, an area of 19.33 lakh hectares had been identified as 'potential areas' for oil palm plantation. Nearly half of the above area is located in the five states of South India. In view of the importance of growing oil palm, the Government of India has been supporting the area expansion and output increase under different initiatives. These are briefly described at Chapter-2. The outcomes of such initiatives of the Government have been also briefly discussed therein. It has been reported that 3.50 lakh hectares were under oil palm in India, as on 31st March 2019. This is about 18% of the 'potential area' identified in 2012 as being suitable for growing oil palm in the country. About four-fifths of the planted area in the country is located in the South Indian states, especially Andhra Pradesh which accounts for almost half the area under oil palm in India. While the strides appear to be impressive, much ground remains to be covered since India continues to rely almost fully upon imports for its needs of palm oil.

Current Status of Oil Palm in the NE Region

The NE Region offers large scope for the cultivation of oil palm, as the plantation of the crop will facilitate soil conservation as well as the repair of degraded land and provide ecological balance. The hill areas of the region have been affected by shifting cultivation, also known as jhum cultivation, which has resulted in deforestation and land degradation owing to the shortened jhum cycle. Besides, the crop can provide a steady source of income for the small landholders.

All states of the NE Region, excluding Sikkim, have been identified as having potential area for growing oil palm. It has been widely felt that the region offers large scope for the cultivation of oil palm, as the plantation of the crop will facilitate soil conservation as well as the repair of degraded land and provide ecological balance. The hill areas of the region have been affected by shifting cultivation, also known as jhum cultivation, which has resulted in deforestation and land degradation

owing to the shortened jhum cycle. Besides, the crop can provide a steady source of income for the small landholders.

As per an assessment made in 2012; 218,000 hectares had been identified in the NE Region as being 'potential area' for oil palm cultivation. About 17.60% of the Potential Area (as per the 2012 assessment) has been covered under oil palm as per the latest reports. Further, the area covered by oil palms in the NE states is less than 4% of the area reassessed in 2020.

Till 2018-19, only Mizoram has reported the production of Fresh Fruit Bunches (FFBs) and Crude Palm Oil (CPO). The plantations of some of the other states (Arunachal Pradesh, Assam and Nagaland) have started yielding FFBs since the past year. However, there has been no lifting of the crop by any of the processors. Hence, there are no official estimates of the crop in these states. A sizeable number of stakeholders were contacted for their views on the subject of oil palm development in the North Eastern states. Their major viewpoints have been summarized at Chapter-3 of the Report. In addition, this chapter gives a brief SWOT Analysis of Oil Palm in region. Several measures have been suggested in order to address such weaknesses and threats (The SWOT analysis of individual states has been furnished in Chapter-7 as a part of the State Specific Planning.).

Analysing the Government Policies

The prevailing model for the development of oil palm plantation in India relies upon smallholders who cultivate the crop on small parcels of land, usually below 5 hectares. They are supported by processors in matters like supply of seedlings and technical inputs. The growers are being subsidised by the Government for the initial planting and maintenance, as well as for the cultivation of intercrops. Processors are companies that enter into an MOU with the State Government for the processing of oil palm crop in certain districts of the state on an exclusive basis, with such districts forming its 'factory zone'. Hence, the policies and statutes of the Government at the Central and State levels have a vital role in the action plan for the oil palm expansion in the NE Region. These are briefly discussed in Chapter-4.

While oil palm has been considered as a secondary source for the indigenous supply of vegetable oils, a substantial portion of the national requirement of edible oil is now being met through import of palm oil from Indonesia and Malaysia. Hence, the Government's strategy is to support growers to undertake the plantation of oil palm on a larger scale, by providing them with subsidies for planting materials, inter-cropping cost and maintenance cost during its gestation period. From 2018-19 onwards, the pre-existing National Mission for Oilseeds and Oil Palm (NMOOP) has been subsumed within the National Food Security Mission (NFSM) as NFSM-Oilseeds & Oil Palm. This is being done with the primary objective of augmenting the availability of vegetable oils and to reduce the import of edible oils by increasing the production and productivity of vegetable oils sourced from oilseeds, oil palm and tree borne oils.

The development of oil palm in the North Eastern Region will also depend upon the existing policies and statutes of its constituent states pertaining to subjects like agriculture, industry, and land laws which are under the purview of the State Governments as per the Constitution of India. These have been briefly discussed in Chapter-4.

The main gaps in the existing Government initiatives for expanding oil palm cultivation in the North Eastern states are listed below:

- Partial coverage of the investments needed for establishing oil palm;
- Non-inclusion of some items in extending subsidies for establishment of oil palm;

- Low amount of support for the maintenance of the planted area during the initial period;
- Lack of checks in use of non-certified seedlings;
- Delays in the receipt of funds by some of the Implementing Agencies;
- Delays in the disbursement of subsidies to the growers;
- Apprehension of growers about the non-remunerative prices offered to them; and
- Delay in the establishment of processing unit by the processors.

The above aspects have been briefly discussed in Chapter-4, including their possible impacts on the development of oil palm in the N E Region. Such impacts may be summarized as follows.

(a) Due to the above gaps in the on-going initiatives of the Government, many intending persons (almost all being from ST communities) are not able to grow oil palm on their lands due to their poor economic conditions.

(b) Almost all the existing oil palm plantations suffer from lack of irrigation facilities. In addition, the recommended package of practices is not usually observed, including the application of fertilizers. On account of these deficiencies, yields from the existing areas will become much lower. Further, the use of non-certified seedlings can reduce yields over the lifetime of the palm.

(c) Often, the existing growers have to face problems in receiving their subsidies in time. This may be a reason for the above low utilization of fertilizer and irrigation for oil palm in the region.

(d) The delay in establishing processing units in the states can discourage many of the existing growers, whose fruits are getting wasted on account on the non-lifting of the output. In case, the prices of FFBs are not increased, the expansion plans for oil palm in the NE Region may remain unimplemented.

(e) The high cost of transportation of CPO from the FFB Processing Units in NE Region to the nearest CPO Refinery can depress the FFB prices fixed for growers in the NE states.

Accordingly, the priorities for policy support and interventions from the Government have been worked out. These have been given in Chapter-4, and may be seen therein. These include:

- Ensuring that the Processors set up an adequate number of processing units in the oil palm growing belts by extending Support for the Establishment of FFB Processing Factory in NE Region;
- Introducing a Scheme for Price Support of Oil Palm Growers in North Eastern states akin to the Price Deficiency Payment System (PDPS), so that growers receive the difference between the normative cost of cultivation (including adequate return) and the FFB prices paid by the processors;
- Introducing a 100% Govt. of India funded scheme for Supporting the Establishment of Oil Palm in the NE Region and the Initial Maintenance of newly planted areas
- Subsidy for the transportation of Crude Palm Oil from FFB Processing Unit in NE Region to the nearest CPO Refinery;
- Devising a system for reducing the delays of receipt of funds by the Implementing Agencies, including regular reporting and compliance to scheme guidelines;
- Ensuring that subsidies reach the growers in time for the maintenance of plantations during the initial gestation period and for intercropping;
- Revising the quantum of subsidies payable to the growers for the establishment and initial maintenance of oil palm;
- Encouraging intending growers to plant oil palm in their lands, including jhum wastelands and idle fallows after considering the suitability of such lands for such plantation; and
- Establishing a number of nurseries in the region for the adequate supply of quality seedlings.

Vision, Goals & Strategies of the Action Plan

Vision Statement: 'To encourage growers in the North Eastern states of India to take up the oil palm crop, in order to achieve a significant reduction in the imports of palm oil into the country'

The Action Plan seeks to realise the vision of the Hon'ble Prime Minister of India who has appealed to growers in the North Eastern Region to take up oil palm cultivation, in order to make India self-sufficient in edible oils. The above vision statement can guide the actions of the State Governments, growers, processors and other stakeholders in North Eastern states during the next five years.

Regional Goals: The Regional Goals of this Action Plan, which are to be covered within five years of its adoption, are given as follows:

(a) **Growing of Oil Palm**: To expand the area covered under oil palm by at least 75,000 hectares within five years by growing this crop on culturable waste lands and fallow lands available in the North Eastern states of India.

(b) **Processing of Oil Palm**: To establish adequate oil palm processing capacity, preferably within 12-18 hours of travel time from the growing areas, with each such units being able to handle the output of fresh fruit bunches (FFBs) from matured oil palms standing on about 2,000-3,000 hectares of the crop.

(c) **Planting Materials**: To establish adequate numbers of nurseries in the North Eastern states in order to grow germinated seeds for supply of seedlings to facilitate the achievement of the above area coverage target, with the requirement being nearly 147 lakh healthy seedlings over eight years. This includes seedlings needed for vacancy in-filling for three years after planting.

(d) **Other Goals**: To support the growers adequately in matters of subsidies, training and technical assistance along with the establishment of a scheme to support oil palm growers in order to achieve the plantation goals; to support processers with subsidies and loans to establish processing units in the growing belts, and to support other stakeholders (Government Departments and Agricultural Institutions) to enable them to play a suitably facilitating role.

Strategies for the Regional Goals: On a regional basis, the following strategies may be taken up in order to reach the above-mentioned goals of this plan for promoting the growing and processing of oil palm in the North Eastern Region. The Ministry of Development of North Eastern Region, Government of India and the North Eastern Council can have a coordinating role in the regional strategies. These have been detailed at Chapter-5 and may be referred to therein.

These proposed regional strategies include the same for growing and processing oil palm, for making available planting materials, and for ensuring price support and credit to the growers, etc. The state-specific strategies for oil palm (discussed at Chapter-7) have been derived based on the regional strategies presented in this chapter.

Regional Summary of State-specific Plans

This chapter summarizes on a regional basis, all the State-specific Plans for the Development of Oil Palm in the various states of the North Eastern Region of India. It has been prepared by taking into account (a) the Vision, Goals and Regional Strategies as described previously, and (b) the interest of the states, as well as their suitability for growing the crop.

Planned Area: This plan proposes to establish 75,000 hectares under oil palm in a period of five years in five states of the NE Region of India. The state-wise break-up is given below.

Table-ES.1: Planned Area for Oil Palm in NE Region

State	Area of Coverage (in Hectares)	Remarks
Arunachal Pradesh	25,000	State implementing oil palm programme
Assam	20,000	-Do-
Manipur	5,000	State taking up the crop for first time
Mizoram	10,000	First NE state to implement commercial plantation of oil palm
Nagaland	15,000	State implementing oil palm programme
Total	**75,000**	

Note: While Sikkim is not suited for the growing of oil palm on account of its mountainous nature, Meghalaya and Tripura have not expressed interest to grow oil palm in their states.

Chapter-6 gives the annual planting targets that have been proposed for the different states of the NE Region that have shown their interest for the crop. This has been given below.

Table-ES.2: Planned Annual Planting Targets for Oil Palm in NE Region

State	Annual Planting Target (in Hectares)					Total (in Ha)
	Year-1	Year-2	Year-3	Year-4	Year-5	
Arunachal Pradesh	3,000	5,000	6,000	6,000	5,000	25,000
Assam	3,000	4,000	5,000	4,000	4,000	20,000
Manipur	200	800	1,600	1,400	1,000	5,000
Mizoram	2,000	2,000	2,000	2,000	2,000	10,000
Nagaland	2,000	3,000	4,000	3,000	3,000	15,000
Total	**10,200**	**14,800**	**18,600**	**16,400**	**15,000**	**75,000**

Taking all the above states together, the maximum planting is planned to be done in the 3rd Year, while the 4th Year has the next highest target. The first year and the fifth year have almost equal planting targets on a regional basis.

Planned Investment: On a regional basis, the plan to grow oil palm on 75,000 hectares in the interested states will require an amount of Rs. 2287.50 crore. The item-wise break-up is given as follows.

Table-ES.3: Investment needed to cover the Planned Area under Oil Palm in NE Region

Head of Expenditure	Rs in Crore	Remarks
Establishment of Plantation	337.50	---
Micro-Irrigation (including Pump-set & Intake)	990.00	From surface sources
Maintenance of Planted Area in the Gestation Period (3 years)	960.00	Three Years after Planting
Total	2287.50	---

Note: Additional costs may be needed based on ground conditions for items like:

- Terracing of lands with steep terrain (above 20 degree slope);
- Drainage for clayey soils; and
- Investment on extra or alternate items like fencing, rodent protection etc.; transport of seedlings to interior areas (beyond 50 km); and cost of submersible pump and tube-well for ground water sources in case of lack of adequate surface water, and cost of water-harvesting structures (if constructed).

The state-wise and year-wise break-ups of the above investments have been furnished at Chapter-6.

Sources as Proposed: The sources of investment for incurring the above expenditure are planned as follows**.**

Table-ES.4: Proposed Sources of Investment to cover Planned Area under Oil Palm in NE Region

Source of Investment	Rs in Crore	Remark
Under NSFM (OS&OP)		Existing scheme of the Govt. of India, which funds Rs. 12,000 for planting materials; Rs 30,486 for micro-irrigation (NE states) and 50% of cost of pump-sets. In NE Region, the Government of India contributes 90% of the approved annual plan.
(a) Government of India	475.87	
(b) State Government	52.88	
Sub-total: NFSM – OS&OP	528.75	
Proposed Scheme for Govt. of India funding	1436.62	Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas (Details at Chapter-8)
Growers' Contributions	322.13	Balance amount
Total	2287.50	---

The state-wise break-up for the proposed sources of investment is available in Chapter-6.

Additional Items of Expenditure: Apart from the direct investment for supporting the growers for establishing oil palm plantation, setting up micro-irrigation systems and maintenance of the new areas during the gestation period, Government has to incur expenses on the following aspects:

- Training of Extension Officers and Workers;
- Training of the Growers;
- Programme Expenses of Implementation Agency (workshops and conferences, inspection visits, stationery and repair of computers etc.); and
- Monitoring & Evaluation (3rd Party).

Chapter-6 may be seen for the details of the above proposed expenses.

Summing up the Proposed Government Support: The Government support has been proposed as follows for the Development Action Plan for Promotion of Oil Palm in the NE region.

Table-ES.5: Summary of the Proposed Government Support for Oil Palm in NE Region

Item of Expenditure	Rs in Crore	Remarks
Under NSFM (OS&OP)		**Existing scheme of the Govt. of India**, which funds Rs. 12,000 for planting materials; Rs 30,486 for micro-irrigation (NE states) and 50% of cost of pump-sets. In NE Region, the Government of India contributes 90% of the approved annual plan.
(a) Government of India	475.87	90% contribution
(b) State Government	52.88	10% contribution
Sub-total: NFSM – OS&OP	528.75	
Proposed Scheme for Govt. of India funding	1436.62	Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas (Details at Chapter-8)
Additional Items		
Training of Extension Officers and Workers (including Input Dealers)	0.09	1 batch per annum per participating state
Training of Growers	0.30	5 batches per annum per state

Item of Expenditure	Rs in Crore	Remarks
Establishment Expenses	3.75	For workshops & conferences, inspection visits, stationery and repair of computers etc.
Monitoring & Evaluation Expenses	9.83	Third Party Monitoring @ ½ % of NFSM (OP) & Special Scheme (Proposed)
Support for FFB Processing Units	30.00	Under PM KSY @ Rs. 5.00 crore x 6 units
Total	**2009.34**	

Note: The above table excludes amounts that may be payable per annum on account of the following:

- Proposed **Subsidy for Transport of CPO from FFB Processing Unit to Nearest CPO Refinery,** which has been estimated at **Rs 74.59 crore per annum** for CPO obtained from FFBs on the entire 75,000 hectares on maturity, assuming a yield of 3 MT of CPO per hectare and 50% transport subsidy on average freight of Rs 6.50 per kg from FFB Processing Unit to nearest CPO Refinery; and
- Proposed **Price Support for Oil Palm FFB** (at difference between Normative Cost and FFB Prices), which can be about Rs. 112.50 crore per annum for price support of Rs. 1/- for each rupee of price support per kg of FFB. The exact price support will require Government decision.

The year-wise break-up of the above support has been given at Chapter-6, which may be seen for the details.

Major Outcomes of the Proposal from the Government Point of View

The major outcomes of the present proposal from the Government view-point have been summarized below.

Table-ES.6: Major Outcomes from Proposal (Government View-point)

Major Outcome	Monetary Value (Rs. in Crore)	Remarks
Returns from GST on Crude Palm Oil	301.69 - 753.97	Present Value of GST streams over 28 years (lifetime of palm) based on different yields (12 MT, 15 MT and 18 MT) per hectare and different discounting rates (11%, 12% and 13%), hence the variation of the estimated monetary value Based on assumptions furnished under Table-9.4 of Chapter-9
Potential Reduction of Outflow from MG-NREGA due to Increased Rural Employment	205.11	Labour for establishment and initial maintenance of the oil palm
	739.37	Present value of labour for intercultural operations and harvesting over lifetime of palm (wages for annual labour requirement is estimated to be Rs.82.68 crore)
Reduction of Foreign Exchange Outflow for Imports of CPO	1165.70 per year	Assuming average yield of 18 MT, OER of 16.5% and CIF Prices of Imports as $ 712 per MT

Source: Consultant's Calculations

The details in the above regard have been briefly furnished at Chapter-9 and may be referred to therein for the details.

State Specific Plans

The State-specific Plans have been presented at Chapter-7 for each of the states of the NE Region which have expressed interest for oil palm. Such state-wise plans include the suggested strategies for each of the states to meet the planting targets, apart from the responsibilities, resource requirements and other pertinent details. The state-specific plans of these states have been covered in separate sections of Chapter-7: Arunachal Pradesh, Assam, Manipur, Mizoram and Nagaland. The other states have either not shown their interest despite the past efforts of the Government of India (like Meghalaya & Tripura) or are unsuitable for oil palm cultivation (Sikkim). Chapter-7 may be referred to for the details of the state-specific plans of the above mentioned states.

Recommended Action Points to Support the Action Plan

The implementation of the Developmental Action Plan for growing oil palm in the states of the NE Region will need the following support:

- Introduction of a Government of India funded Scheme for Establishment of Oil Palm in NE Region and the Maintenance of Newly Planted Areas;
- Support for Establishment of FFB Processing Unit in NE Region (under existing PMKSY);
- Support for the Transportation of CPO from FFB Processing Unit in NE Region to nearest CPO Refinery (New Scheme as Proposed);
- Price Support Scheme for Oil Palm Growers in NE Region (New Scheme as Proposed);
- Direct Payment of Government of India Funds to Implementing Agency; and
- Price Revision for Oil Palm Seedlings;
- Augmenting the Availability of Oil palm Seedlings; and
- Evolving an Appropriate Model for Implementation.

The above action points have been briefly described at Chapter-8, including the rationale of the proposed action point and the quantum of support required for the different action points.

In addition, suggestions have been received from NITI Aayog. These have been included in the above chapter under a separate heading titled 'Strategies mentioned by NITI Aayog'. The details may be referred to therein.

Outcomes of the Action Plan

Economic Value of the Oil Palm Crop: The present value of FFB sales from one hectare of oil palm over its lifetime of 28 years is estimated to widely range from Rs. 4.93 lakh (@ 12 MT yield, 13% discount rate and Rs 5.50 per kg as initial rate of FFB) to Rs. 15.60 lakh (@ 18 MT yield, 11% discount rate and Rs 9.50 per kg as initial rate of FFB). This illustrates the impact of major factors on the economic returns, such as the yields achieved and the price of FFB received by the grower.

In this report, the initial investment has been taken as Rs. 3.05 lakh per hectare. Hence, the crop will yield substantial economic returns. The quantum of such returns will vary, based on the above major factors, i.e. the FFB prices obtained by the growers and their achieved yields. These factors are inter-linked since the observance of the recommended package of practices by the growers will depend upon the level of their returns from the crop. The economic impact of growing oil palm on 75,000 hectares in the NE Region can range from **Rs. 3,700 crore to Rs 11,700 crore**, based on the premises of the above table. This excludes the spin-off benefits which are discussed below.

The extended value chain of oil palm (including derivatives of oil palm) will include the entire spectrum of activities from nurseries, field plantation (establishment, gestation and yielding phases followed by re-plantation of old plantations), harvesting and processing of FFBs, CPO aggregation and refining, secondary processes on refined items like RBD Palm Oil and Palm Stearin. As the proposed plan calls for the expansion of area under oil palm plantation in the NE Region by 75,000 hectares, it can yield from 2,00,000 MT to 2,90,000 MT of CPO per annum. This may sustain a CPO refinery in the NE Region to produce value added items like Palm Fatty Acid Distillates, Palm Stearin etc. that can be used as oleo-chemical feedstock, apart from RBD Palm olein and other items for the domestic sector and food units.

Employment Generation: Apart from the economic output as discussed previously, another important outcome of oil palm plantation is the generation of farm based employment in rural areas. Based on the average man-days of labour required on one hectare of oil palm plantation for different stages, this proposal **will create about 96.75 lakh man-days of direct employment in the first eight years**. In addition, the **maintenance (inter-cultural operations) and harvesting of the expanded areas** will create additional employment during the lifetime of the palms. This requirement is estimated at about **39.00 lakh man-days per annum.** There are additional employment opportunities in related areas like nurseries, transportation, FFB processing factories etc. This is excluding the opportunities in sales and various services needed by the oil palm based economy

Other Outcomes: Apart from the output and employment generation aspects, the promotion of oil palm in the NE Region will have the other significant impacts. These include:

- **Import substitution**, leading to saving of valuable foreign exchange;
- **Rural development** of the growing areas due to the inflow of cash from the plantations;
- Positive **social impacts** due to rural incomes like health, education, law and order etc.; and
- Reduction of **shifting cultivation,** which will reduce pollution due to the widespread burning of hill-sides before the rainy season.

Further, as the oil palm plantations are being proposed to be raised on wastelands and fallow lands, there will be no destruction of any forests as apprehended. Rather, open and degraded wastelands areas will be brought under oil palms.

1. Introduction

1.1. Background

India is heavily dependent upon imports to meet over two-thirds of its requirements of edible oils. Now, the country imports about 15 million tonnes of edible oils, of which around 60% consists of crude palm oil (CPO) and RBD palmolein. The nation has emerged as the largest importer of palm oil in the world; as such imports had grown tremendously in the past few decades.

In line with the spirit of Atmanirbhar Bharat, it has become necessary to consider expanding the area under oil palm in India. The Government of India has been promoting oil palm under different schemes. There has been some progress in its cultivation, especially in the south Indian states like Andhra Pradesh, Karnataka, Tamil Nadu and Telangana. In the North Eastern region, which has been identified as a focus area for the crop, Mizoram has pioneered the growing of oil palm.

In July 2020, the Hon'ble Prime Minister of India had appealed to farmers in the North Eastern Region to grow oil palm, in order to make India self-sufficient in edible oils. While considerable progress has been made, especially in Mizoram, the existing efforts need to be broadened. Such endeavours will boost the region's economy, especially by providing a sustainable livelihood for small growers in the interior areas. Accordingly; the Government of India, which is promoting the crop in the NE states, has identified oil palm as a thrust area of economic activity for the region.

In October 2020, North Eastern Development Finance Corporation Ltd. (NEDFi) was entrusted by the North Eastern Council Secretariat, Ministry of Development of North Eastern Region (MDoNER), Government of India with the task of preparing a Developmental Action Plan for Oil Palm in the North Eastern Region. The above plan was also required to cover aspects like state specific sub-plans, implementation mechanisms, fund requirements, convergence with existing policies and schemes of the Government of India, role of stakeholders etc. This plan has been accordingly prepared based on information collected from different sources like official discussions, stakeholders' consultations and field visits, supplemented by secondary data. It seeks to develop a practicable road map for realizing the overall vision of supporting rural livelihoods in the North Eastern Region of India by expanding oil palm in the states of the region.

1.2. Terms of Reference & Scope of Work

The Terms of Reference and Scope of Work for the present assignment are given below.

Terms of Reference

The Terms of Reference of the assignment are:

1. To assess the current status of the oil-palm sector in the NE Region through stakeholders' consultation on 'challenges, prospects and recommendations for development and promotion of the oil-palm sector in the NE Region';
2. To assess the gaps and prospects in the existing policies and schemes, and to identify priority areas for intervention with implementation strategy and agency; and
3. To prepare a five-year developmental action plan including state specific sub-plans, resource requirement and role of stakeholders.

Scope of Work

The Scope of Work has been tabulated below, based on the above-mentioned Terms of Reference.

Table-1.1: Scope of Work for the Assignment

Term of Reference	Scope of Work
To assess the current status of the oil-palm sector in the NE Region through stakeholders' consultation	• To understand the growing conditions of oil palm, and the harvesting and processing of Fresh Fruit Bunches (FFB) of oil palm; • To study the various products derived from Crude Palm Oil (CPO) and their end uses (for food and non-food segments); • To track the global output of FFB and Palm Oil products for the recent past years, their sale prices in India, market share of major producers in the Indian imports of these products; • To assess the national scenario in India regarding the growing of oil palm (area and FFB output), and its processing into CPO and other items • To understand the national production of oilseeds and demand trends of various edible oils; • To assess the current position of oil-palm in the NE Region: Availability of land suitable for growing oil palm; the outcome of existing initiatives in terms of area and production; investments, logistics position etc.; • To carry out stakeholders' consultations for a coverage of the above mentioned points; and • To undertake a SWOT Analysis for the oil-palm sector in NE Region of India.
To assess the gaps and prospects in the existing policies and schemes, and to identify priority areas for intervention with implementation strategy and agency	• To understand Government of India policies related to the growing and processing of oil-palm; and the support measures being taken for boosting its area and output • To analyze the Government of India policies related to trade in edible oil, including palm oil derivatives; along with the impact of various trade agreements entered into by India • To assess the State Government policies and statutes related to the growing and processing of oil palm in the NE Region including land laws, agricultural and industrial policies etc • Based on the above exercise, to assess the gaps in the existing policies and schemes related to the development of the oil-palm sector in the NE Region
	Continued ...

Term of Reference	Scope of Work
To assess the gaps and prospects in the existing policies and schemes, and to identify priority areas for intervention with implementation strategy and agency (Continued)	• To identify priority areas for policy support & other interventions for the development of oil-palm sector in the NE Region; including Minimum Support Price interventions needed for initial viability • To suggest the developmental strategy for oil palm in the NE Region and identify the implementing agencies
To prepare a five-year developmental action plan including state specific sub-plans, resources required and role of stakeholders	• To propose a five year developmental action plan for the oil-palm sector in the NE Region with the following components: ✓ State-specific sub-plans (five year); ✓ Year-wise phasing; ✓ Fund requirements & sourcing (existing sources /new scheme); ✓ Convergence with existing schemes and sources; ✓ Implementation Mechanism; and ✓ Role of the Stakeholders.

1.3. About this Report

This document, which has been prepared in December 2020, furnishes the Action Plan in accordance with the requirements of the present assignment. The chapters and sections of the plan have been organized to cover the Scope of Work, as defined in the above table.

Annex-1 gives the Approach and Methodology adopted for the conduct of the work. The assignment has been carried out by studying information from secondary sources, understanding the data gaps, carrying out discussions with stakeholders, and undertaking field visits to meet growers and others in order to meet the information requirements.

It may be noted that the assignment was carried out in consultation with different stakeholders at the national, regional and state levels. In addition, field level interactions were undertaken with growers and others across the region in the last quarter of 2020. Annex-14 gives the list the stakeholders contacted for the conduct of the present study. The inputs received from all these interactions have been duly incorporated herein, while finalizing the present plan for developing oil palm in the North Eastern Region.

2. Current Status of Oil Palm at the Global & National Levels

2.1. About Oil Palm

Oil palm is a plantation crop, which originated in the western and central parts of Africa. In the 20th Century, it became commercially established in other parts of the world, especially in Malaysia and Indonesia. The specialty of oil palm is that it gives the highest yield of edible oil per hectare of crop as compared to the present yields from all other oil crops. Apart from this, derivatives from oil palm find a wide range of uses; cooking and other food uses, apart from many non-food applications.

Oil Palm (*Elaeis guineensis*) is a species of palm that best grows in the humid tropical areas of the world. The plant is single stemmed and it can grow to up to 20 metres in height. The tree has pinnate-leaves. It yields fruits that are reddish in colour and about the size of a large plum. Each fruit consists of an outer layer (pericarp), which encloses a fleshy and oily layer and a single nut that encloses the kernel. The fruits are obtained in bunches, called the Fresh Fruit Bunches (FFBs) in industry parlance. Each bunch can weigh from 5 kg to 30 kg, depending upon the age of the palm.

Originally, oil palm was found as scattered groves in the wilds of western and central Africa. Subsequently, it has been adapted for growing as a plantation crop. In Indonesia and Malaysia, large swathes of land have been cleared and planted with the crop. Like tea, there are two models for growing oil palm: (a) Estate Model, wherein the crop is grown in large sized estates by companies; and (b) Smallholder Model: where the crop is grown on small-sized holdings and sold to companies for processing. As in the case of tea leaves plucked in the gardens, the output of fruits from oil palms has to be taken to a processing plant within 24 hours of these being harvested. Hence, such a plant has to be located near the oil palm growing areas.

Annex-2 gives additional details regarding the growing of oil palm, including the agro-climatic and soil conditions and package of practices needed for an optimal yield.

2.2. Oil Palm & Its Derivative Products

Oil can be obtained from the fleshy middle layer (mesocarp) of the oil palm fruit, with the extracted oil being called as Crude Palm Oil (CPO). The kernel also yields oil, which is referred to as Palm Kernel Oil (PKO). The oils obtained from these two sources (i.e. the mesocarp and the kernel) have widely differing physical and chemical properties, as well as end-uses. Crude Palm Oil and Palm Kernel are two important products produced in the FFB Processing Unit (also called as a Palm Oil Mill). Annex-3 gives the details regarding the processes carried out in a Palm Oil Mill to get the above items.

Crude palm oil can be refined, with two important fractions being thus obtained. The lighter fraction is called palmolein, while palm stearin is the heavier portion. These fractions can be processed further to yield other products. Annex-4 gives further information about the refining of CPO.

Thus, various products are obtained from the processing of oil palm FFBs and as fractions from the refining of crude palm oil. These items have a range of end usages, based on their properties and prices. The market of palm oil and its fractions depends upon such uses for domestic and industrial purposes. This has been discussed at Annex-5 of this report.

Uses of Palm Oil & Its Derivatives

Palm oil is considered as a 'miracle oil' due to its diversity of uses for both food and non-food products. As edible oil, palm oil can be used directly, or as ingredients for other items like cakes, ice-cream, chocolate etc. The various uses of palm oil, food and non-food, have been described below.

Table-2.1: Food & Non-food Uses of Palm Oil

Food Products	Non Food Products
Cooking Oil, Dough Fat, Vanaspati Vegetable Ghee Margarine Salad Oil Chocolate, Ice-cream, Frying fats, Specialty fats for coatings Cocoa Butter substitutes	Bio Fuel And Bio Lubricants Cosmetic Products/Aromatherapy Pharmaceutical Products Toiletries, Detergents including Soaps & Soap Blends Esters Oleo-chemicals, including Fatty acids & Fatty Alcohols

Source: Analysis of Secondary Information

It may be noted that in India, the food uses of palm oil (mainly RBD palmolein) account for 85% of the volumes of palm oil imported into the country. These consist of household cooking, industrial and institutional frying, use in biscuit, bakery and confectionary units etc. Non-food usage comprises the balance of the usage, with soap and detergent manufacturers and other oleo-chemicals being bulk consumers. Annex-5 furnishes the details about the various derivatives of palm oil.

2.3. The International Position of Palm Oil Production, Consumption & Trade

In India, palm oil is mainly used as edible oil. While the global output of edible oil had grown from nearly 81 million MT in 1990 to 185 million MT in 2016-17, the share of palm oil in the global mix of edible oils had surged from 13.6% to 33% in the same period. The recent production of vegetable oils has been given in Annex-6, which discusses the global position of palm oil production, consumption, and trade.

Production of Palm Oil

The production of palm oil had reached 73.02 million MT in 2019-20. Table-2.2 (in the next page) gives the output in the past four years. It is seen that Indonesia and Malaysia dominate the global output of palm oil. They have accounted for 84%-85% of the world production in the recent years.

The above dominance of these two South East Asian nations has mainly been on account of the two factors: (a) availability of large tracts of land due to conversion of forests and wastelands; and (b) high yields due to favourable agro-climatic conditions. The cost of production has been low, enabling these nations to compete effectively in the global market for edible oils. Annex-6 may be referred to for additional details.

Global Production of Palm Oil

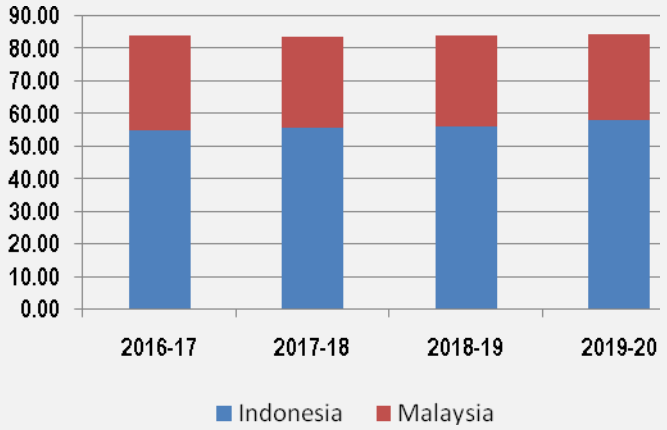
Table-2.2: Global Production of Palm Oil (million MT)

	2016-17	2017-18	2018-19	2019-20
Indonesia	36.00	39.50	41.50	42.50
Malaysia	18.86	19.68	20.80	19.25
Thailand	2.50	2.78	3.00	2.80
Colombia	1.15	1.63	1.63	1.53
Nigeria	0.99	1.03	1.02	1.02
Others	5.85	5.96	6.08	5.93
Production	**65.34**	**70.58**	**74.02**	**73.02**

Source: Foreign Agricultural Service (FAS), US Department of Agriculture

Other countries include: Guatemala, Honduras, Ecuador, Papua New Guinea, China etc.

Indonesia and Malaysia produce over 84% of the world's output of palm oil now.



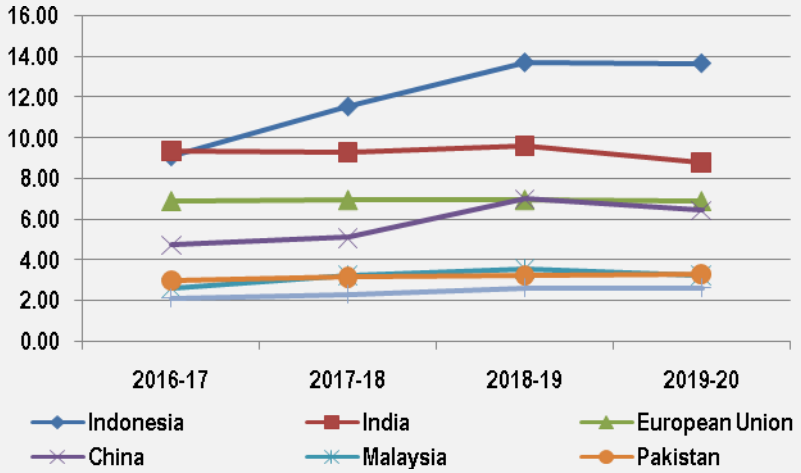
Global Consumption of Palm Oil

Table-2.3: Global Consumption of Palm Oil (million MT).

	16-17	17-18	18-19	19-20
Indonesia	9.13	11.57	13.72	13.68
India	9.35	9.27	9.61	8.81
European Union	6.90	6.95	6.96	6.90
China	4.75	5.10	7.01	6.46
Malaysia	2.62	3.24	3.57	3.28
Pakistan	3.00	3.15	3.25	3.29
Thailand	2.14	2.34	2.64	2.64
Others	23.72	25.36	26.10	26.56
Consumption	**61.60**	**66.97**	**72.85**	**71.62**

Source: Foreign Agricultural Service (FAS), US Department of Agriculture

The above consuming nations account for over 60% of the global consumption in these years.



Consumption of Palm Oil

The consumption of palm oil across the world has been summarized in Annex-6. The top consuming nations include Indonesia, India, European Union, China, Malaysia, Pakistan and Thailand. Table-2.3, available in the previous page, furnishes the details. The above countries account for over three-fifths of palm oil consumption across the globe. India is the second largest consumer of palm oil. It consumes about 12% of the global output of palm oil.

2.4. The National Scenario of Oil Palm & Its Derivatives

In 2018-19, India had imported nearly 15 million MT of edible oils to meet its consumption of about 23 million MT. In other words, the nation depends upon imports to supply over 65% of its requirements of edible oils.

Palm oil forms the most important component of nation's edible oil consumption, as it forms 40% of such intake. As the country produces little (below 0.30 million MT) in comparison to its needs, **it has to import almost 97% of its requirements of palm oil**. Now, India is the largest importer of palm oil in the world, apart from being its second largest consumer. While the per capita consumption of edible oils remains comparatively less in India (19 kg per year), its high and increasing population and low domestic production will force India to continue with imports of sizeable volumes, at least in the short and medium term. Most of these imports will consist of palm oil.

In India, the major part of available palm oil and its fractions are used for food-uses, such as: (a) cooking medium for households, hotels, restaurants and street vendors; (b) in bakery and confectionary units; (c) industrial frying for chips, crisps, French fries etc.; and (d) blended with other edible oils like soybean, groundnut, rapeseed-mustard, sesame, sunflower etc. Besides, a smaller part of palm oil (about 15%) is used for non-food uses – especially for the production of toilet soaps, fatty alcohols and fatty acids. The latter have a wide range of uses for making items like cosmetics, rubber and polymer processing, pharmaceuticals etc. The following table gives the estimated consumption profile of palm oil in India in 2018.

Table-2.4: Consumption Pattern of Palm Oil in India

Use	Consumption (million MT)	As a %	Remarks
Packed Oils	3.88	36	For household and institutional use as the low cloud point (10˚C) of palmolein makes it suitable for India
Frying Use	2.40	22	Palmolein is used as a frying medium on account of its neutral flavour and odour for the preparation of snacks and deep fried foods on industrial scale
Bakery & Vanaspati	1.66	15	Vanaspati is hydrogenated vegetable oil, originally introduced as a substitute for ghee and butter
Biscuits	1.20	11	Palmolein is used as an inexpensive substitute for butter due to its neutral flavour, while palm stearin is added for imparting crunchiness and flakiness
Non-Edible Use	1.63	15	Soaps – toilet soap and laundry soap; apart from fatty acids and fatty alcohols having industrial uses
Total	10.77	100	---

Source: Presentation by Wilmar Group in the Palm Oil Trade Fair & Seminar (POTS), India 2019

The domestic market for palm oil is mainly driven by the food and cooking sector, which accounts for 85% of the total consumption. The non-food uses (such as cosmetics, surfactants, lubricants and other industrial uses) account for about 15% of the national market. The Indian refined palm oil market is marked by high-volumes and low-margins, which has assisted consolidation and domination by a small number of companies operating in the edible oils business.

Annex-7 provides additional information regarding the national scenario of palm oil use.

2.5. Palm Oil Imports & Tariffs in India

Imports of Palm Oil into India

In 2018-19, 60% of the import of edible oil by volumes (and 55% by value) consisted of palm oil. India imported almost 9 million MT of palm oil in 2019-20, which mainly included both Crude Palm Oil (CPO) and RDB Palmolein. Imports supply almost all the consumption of this item in the country, as domestic production remains low.

The import and consumption of palm oil has been facilitated by its lower cost, which is the most important consideration of the price sensitive consumers of India. The following table gives the imports of palm oil into India in the recent years.

Table-2.5: Imports of Palm Oil into India

Financial Year →	13-14	14-15	15-16	16-17	17-18	18-19	19-20
Palm Oil Imports (million MT)							
(A) Crude Palm Oil	5.13	6.97	7.11	5.36	6.75	6.42	6.32
(B) Refined	2.54	1.19	2.57	2.94	2.77	2.52	2.51
Total = (A) + (B)	7.67	8.16	9.68	8.30	9.52	8.94	8.83
Value (Rs. in crore)	39,355	38,894	37,800	41,089	43,655	36,633	37,050
As Percentage of the Edible Oil Imports (*)							
By Volume	72	63	58	59	61	55	NA
By Value	76	67	64	62	64	60	NA

Financial Year (India) covers the period from April of a particular year to March in the following year.

(*) Including palm oil, soybean oil and sunflower oil

Source: 'Commodity Profile of Edible Oil for September 2019' citing Department of Commerce, Government of India

The composition of the imports has been furnished at Annex-8. It is seen that Crude Palm Oil and RBD Palmolein constitute over 92% of India's imports of palm oil. CPO imports comprise between two-thirds and four fifths of all palm oil imports in the recent years.

Tariff Structure

The import of palm oil into India is based on the prevailing Foreign Trade Policy of the Government of India, which is administered through the Department of Commerce, Ministry of Commerce and Industry. As part of India's commitment to WTO, import quotas on edible oils were removed and allowed to be imported freely with a bound tariff rate of 300%. (Bound rates under the WTO represent commitments not to increase tariffs above the listed rates. These serve as ceilings for trade between WTO member nations.)

Tariffs on CPO & RBD Palmolein: The major items that account for around 95% of India's imports of palm oil by volumes are crude palm oil and refined palm oil. The current basic customs duty on these items has been 54% and 44% respectively since 1st March 2018. The total duties are higher after the addition of surcharges and taxes. There is a usual differential of 10% in the basic customs duty between crude palm oil and refined oil, with a higher tariff for the latter. This has been practised in order to promote the domestic processing sector. On 27th November 2020, the duty on crude palm oil was reduced significantly to 27.5%.

Till 2018, the customs duty on refined palm oil was lower than the preferential tariff under Indo-ASEAN FTA or India Malaysia CECA. After 1st January 2019, the preferential tariffs were lower, especially for refined palm oil from Indonesia. However, imports of refined palm oil (such as RBD palm oil and RBD palmolein) into India have been placed on the 'restricted list' with effect from 8th January 2020. Under this category, importer would need to have a licence to import the item, and imports are to be used by the importer only. The rules regarding imports of refined palm oil were made more stringent after 13th April 2020.

Tariffs on Other Palm Oil Based Items: Other palm oil fractions that are being imported into India mainly include Crude Palm Stearin (CPS), Palm Fatty Acid Distillate (PFAD) and Crude Palm Kernel Oil (CPKO). The following table gives the prevailing basic customs duty levied on this class of imports.

Table- 2.6: Basic Customs Duty on Other Palm Oil based Products

Product	BCD Rate (as % of Assessed Value)	Remarks
Crude Palm Stearin	7.5	Having FFA of 20% or more
RBD Palm Stearin	7.5	-Do-
RBD Palm Stearin	15	Under HS Code 1511 90 – All goods
Crude Palm Kernel Oil	12.5	Under HS Code 1513 – All goods, crude & edible
Refined Palm Kernel Oil	20	Under HS Code 1513 – All goods, refined & edible
Palm Fatty Acid Distillate	7.5	Under HS Code 3823 1900 (attracting 18% IGST)

Source: Customs Notifications of the Central Board of Indirect Taxes & Customs

Tariff Values for Palm Oil: The CBEC (now replaced by the Central Board for Indirect Taxes and Customs) has the power to fix tariff values for any class of imported goods or exported goods. Fixing the tariff value for any class of imported goods or exported goods means that the duty shall be chargeable with reference to such tariff value. This measure has been taken up to prevent under-reporting of CIF values to evade customs duties and other levies. Tariff values are being periodically fixed with respect to the imports of Crude Palm Oil, RBD Palm Oil, Other Palm Oils, Crude Palmolein, RBD Palmolein etc. The present tariff values (as in October 2020) have been furnished at Annex-8.

2.6. Government Initiatives for Promotion of Oil Palm in India

As per periodic assessments made by various committees constituted by the Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW), Government of India; sizeable areas are suitable for growing oil palm in India. As per the assessment carried out in 2012, an area of 19.33 lakh hectares had been identified as being 'potential areas' for oil palm plantation. Nearly half of the above area is located in the five states of South India.

In view of the importance of growing oil palm, the Government of India has been supporting the area expansion and output increase under different initiatives. These are briefly described below.

(a) Technology Mission on Oilseeds & Pulses: In 1991-92, the Technology Mission on Oilseeds and Pulses (TMOP) had been launched. During the 8th and 9th Five Year Plans, the Oil Palm Development Programme (OPDP) had been funded under the above mission as a Centrally Supported Scheme (CSS). It covered six states of the nation.

(b) Integrated Scheme of Oilseeds, Pulses, Oil Palm & Maize: From 2004-05, the Integrated Scheme of Oilseeds, Pulses, Oil Palm & Maize (ISOPOM) was taken up. The OPDP was funded under the above scheme from 2004-05 onward, with 12 states of India being covered under its ambit, including Assam and Mizoram in the NE Region.

(c) Special Programme on Oil Palm Area Expansion: Another thrust was made for growing oil palm under the Special Programme on Oil Palm Area Expansion (OPAE) under the RKVY scheme from 2011-12 to 2013-14.

(d) National Mission on Oilseeds and Oil Palm: From 2014-15, the National Mission on Oilseeds and Oil Palm (NMOOP) promoted the expansion of area under oil palm under Mini Mission II (MM-II). MM-II of NMOOP was implemented in 13 states; including 4 states in the NE Region (Arunachal Pradesh, Assam, Mizoram and Nagaland). This mission was carried out till the end of the FY 2017-18.

The outcomes of the above initiatives of the Government have been briefly discussed at the next page. While the strides appear to be impressive, much ground remains to be covered since India continues to rely almost fully upon imports for its needs of palm oil.

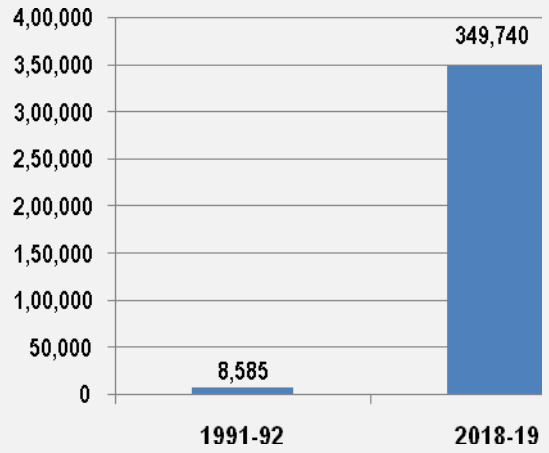
National Food Security Mission (NFSM) Oilseeds & Oil Palm

From 2018-19 onward, the promotion of oil palm cultivation was being done under the revamped guidelines of the National Food Security Mission (NFSM) Oilseeds & Oil Palm. The NMOOP has been merged with the above mission from 1st April 2019.

It has been reported that 3.50 lakh hectares were under oil palm in India, as on 31st March 2019. This is about 18% of the 'potential area' identified in 2012 as being suitable for growing oil palm in the country. About four-fifths of the planted area in the country is located in the South Indian states, especially Andhra Pradesh which accounts for almost half the area under oil palm in India. Additional details in the above regard have been given at Annex-9.

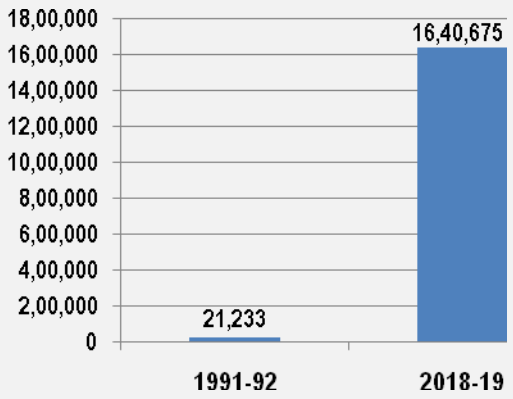
Impact of Government Initiatives for Oil Palm

Area Expansion (in Hectares)



Area expanded by over 40 times in the above period.

Production of Fresh Fruit Bunches (in MT)



Output of fruit bunches went up by more than 77 times. Productivity has risen.

While the area expanded by over 40 times, the output of FFBs went up by more than 77 times.

	91-92	18-19
Area (in Ha)	8,585	3,49,740
FFB (in MT)	21,233	16,40,675
Productivity (MT per Ha)	2.47	4.69

Source: Department of Agriculture Cooperation & Farmers Welfare

While productivity went up, the yield seems to remain low. This is due to the fact that much of the area has been planted recently, and these do not yield full fruits till their maturity.

Production of Crude Palm Oil

While strides have been made in the area and output of Fresh Fruit Bunches (FFBs), the output of Crude Palm Oil (CPO) remains below 3 lakh MT. Hence, large volumes of CPO and other Palm Oil items have to be imported to meet the domestic demand. India is the largest importer of such products in the world. This has made it necessary to expand the area under oil palm in India, including in the NE Region.

3. Current Status of Oil Palm in NE Region

3.1. Potential Area for Oil Palm Cultivation in NE Region

The North Eastern Region of India includes eight states, i.e. Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. It has been widely felt that the region offers large scope for the cultivation of oil palm, as the plantation of the crop will facilitate soil conservation as well as the repair of degraded land and provide ecological balance. The hill areas of the region have been affected by shifting cultivation, also known as jhum cultivation, which has resulted in deforestation and land degradation owing to the shortened jhum cycle. Besides, the crop can provide a steady source of income for the small landholders.

All states of the NE Region, excluding Sikkim, have been identified as having potential area for growing oil palm. As per an assessment made in 2012; 218,000 hectares had been identified in the region as being 'potential area' for oil palm cultivation. The following table shows the details in this regard. Annex-10 has a detailed discussion on the land availability for oil palm in the region.

Table-3.1: Potential Area for Growing Oil Palm in the NE Region of India (in Hectares)

State →	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura	Total
Potential Area (Ha)	25,000	25,000	---	50,000	61,000	50,000	7,000	218,000

Source: 'Status Paper on Oil Palm', National Mission on Oilseeds & Oil Palm, 2018 (Table-13.7 at Page No. 66)

In 2020, the potential area for oil palm in the NE Region has been re-assessed as being 9.63 lakh hectares, spread over seven states of the region. The break-up of this area is given in the next page.

3.2. Outcome of the Earlier Initiatives

Area under Plantation

The following area has been recorded as being under oil palm cultivation in the North Eastern region of India.

Table-3.2: Area under Oil Palm Plantation in the NE Region of India (in Hectares)

State →	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura	Total
Cultivated Area (in Ha) till 2018-19	2,752	2,389	0	0	28,914	3,773	530	38,358

Source: Data from DAC&FW, Ministry of Agriculture & Farmers' Welfare, Govt. of India & State Governments

It is seen that about 17.60% of the Potential Area (as per the 2012 assessment) has been covered under oil palm as per the latest reports. Further, the area covered by oil palms in the NE states is less than 4% of the area reassessed in 2020.

Oil Palm Plantation in the NE Region of India

Potential Area (2020)

Table-3.3: Potential Area for Oil Palm Cultivation (2020)

State	Potential Area (Hectares)
Arunachal Pradesh	1,33,811
Assam	3,75,428
Manipur	66,652
Meghalaya	122,637
Mizoram	66,792
Nagaland	51,297
Tripura	1,46,364
Total	**9,62,981**

Source: Reassessment Committee 2020 of the Ministry of Agriculture & Farmers Welfare, Government of India cited in the document 'Focus Sectors for North Eastern Region'

Cultivated Area in NE States

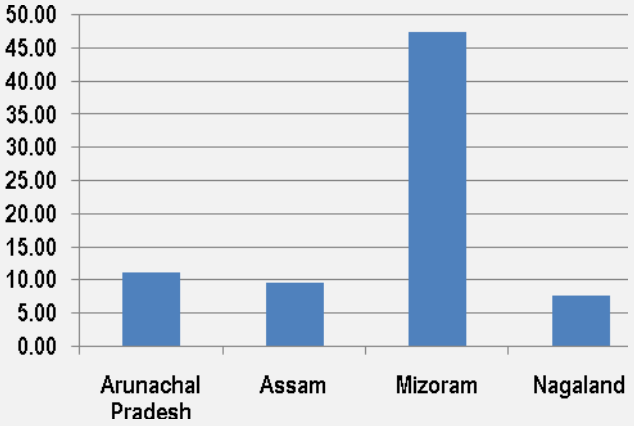
Table-3.4: Utilization of Potential Area (Assessed in 2012)

State	Arunachal Pradesh	Assam	Mizoram	Nagaland
Utilization (%)	11.01	9.56	47.40	7.55

Source: Computed from Tables-.3.1 & 3.2

It is seen that Mizoram has cultivated nearly half of the potential area identified in 2012. The other states have utilized much less of their potential areas.

Graph – Utilization of Potential Area for Oil Palm (*)



(*) As a Percentage of the Assessment of 2012

Output of FFB & CPO in NE Region

Till 2018-19, only Mizoram has reported the production of Fresh Fruit Bunches (FFBs) and Crude Palm Oil (CPO). The following table shows the output of FFB and CPO in this state.

Table-3.5: Output of Fresh Fruit Bunches (FFB) and Crude Palm oil (CPO) in Mizoram

	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
FFB (in MT)	2	32	88	480	1339	1544	2096	3753	4796	5238	N.A.
CPO (in MT)	--	---	--	---	--	---	365	496	603	648	625

Sources: (a) Agricultural Statistics at a Glance 2018 (b) NMOOP (c) NFSM (Oilseeds & Oil Palm)

The plantations of some of the other states (Arunachal Pradesh, Assam and Nagaland) have started yielding FFBs since the past year. However, there has been no lifting of the crop by any of the processors. Hence, there are no official estimates of the crop in these states.

3.3. Summary of the Stakeholders' Viewpoints

A sizeable number of stakeholders were contacted for their views on the subject of oil palm development in the North Eastern states. Their major viewpoints have been summarized below.

(a) Viability of the Crop: Oil palm can be grown in all the states of the NE Region, except for Sikkim which is a mountainous state. Further, growers in these states are having a positive view of the economic potential of the oil palm as a commercial crop.

(b) Growing Model: However, the crop is not saleable in the open market as it cannot be used without processing. Only a company operating a processing factory can purchase and use the FFBs produced by the growers. Therefore, State Governments require that a Company enter into an MOU whereby they are allotted a 'Factory Zone'. Growers in a zone have to sell their crop to the Company which has been given the zone. The Company has to purchase all FFBs offered to it by growers in its zone, at a price fixed by the Government Committee.

(c) Factory Establishment: So far, only one factory to process FFBs has been established in Mizoram. There is no factory anywhere else in the NE Region. This has started causing apprehensions amongst growers in Arunachal Pradesh, Assam and Nagaland, as some of the plantations in these states have started yielding fruits.

(d) Prices of FFBs: The prices finalized in Mizoram are not remunerative for the growers, as these have not been revised for a long time. Prices for FFBs have to be fixed in the other states. Growers are expecting a substantial rise over the prices fixed in Mizoram, but Companies point out that the output of CPO has to be transported over a large distance to the nearest refinery in West Bengal. If the prices of CPO produced in the NE Region have to remain competitive with respect to imports from South East Asia, then the FFBs produced in the states of the region will have to be determined after considering the transport costs to the nearest refinery.

(e) Delays in Payment of Subsidy & Impacts: Most growers do not practise the recommended package of practices, especially regarding the application of fertilizers and irrigation during the dry months. This can affect the productivity of the areas brought under oil palm in the region.

One reason may be the delays in transferring subsidies to the growers due to the late receipt of funds by the Implementing Agencies.

(f) Level of Support: Most of the growers were looking forward to a higher quantum of support from the Government for establishing the plantation area and maintaining it during the gestation period. They have stated that the existing quantum of subsidy for maintenance and inter-cropping support is low as compared to the actual costs.

(g) Future Prospects: If factory is set up, large tracts can be brought under oil palm, especially in Arunachal Pradesh and Assam. In these states, many intending growers are waiting for the Companies to establish their FFB processing units.

3.4. SWOT Analysis of Oil Palm in NE Region

The SWOT Analysis of Oil Palm in NE Region is given below. The SWOT analysis of individual states has been furnished in Chapter-7 for the states which are interested to expand their oil palm areas. The following gives the overall picture from a regional point of view.

Strengths

- Availability of lands for growing oil palm
- Suitability of climate and soil conditions for the crop
- Experience in growing oil palm for the past few years in most states, while Mizoram has over 15 years of experience with the crop

Weaknesses

- No factory in any state, apart from Mizoram (where output remains low)
- Growers do not follow the recommended package of practices, especially for application of fertilizers and irrigation during the dry season – which can affect yields
- Low populations in the hill areas and restrictions in engaging outsiders may lead to labour shortage for growing and harvesting the crop

Opportunities

- Large market for Crude Palm Oil (CPO) and derivatives in India across a spectrum of applications like cooking, industrial level frying, food applications, oleo-chemical usage etc.
- Government support for reducing imports and growing oil palm in India

Threats

- Availability of imports like sunflower, canola, olive oil etc. which have a better image amongst the upper income consumers
- International movement against oil palm, which has also manifested itself as a protest against expansion of oil palm in NE India

About SWOT Analysis

SWOT analysis is a technique used to help an organization in planning by identifying its strengths and weaknesses, as well as the opportunities and threats related to its line of work. In the above analysis, the state is considered as the entity where the technique is being applied. In the SWOT analysis, it is assumed that strengths and weaknesses are frequently internal, while opportunities and threats are more commonly external.

Addressing the Weaknesses and Threats

The following weaknesses have been noted on a regional basis:

- No factory in any state, apart from Mizoram (where output remains low);
- Growers do not follow the recommended package of practices, especially for application of fertilizers and irrigation during the dry season – which can affect yields; and
- Low populations in the hill areas and restrictions in engaging outsiders may lead to labour shortage for growing and harvesting the crop.

In order to address the above weaknesses, the following measures can be taken up:

- Support to companies to establish FFB processing factories (under existing / new schemes) apart from ensuring measures so that the productivity of the planted areas does not become lower than the potential yields;
- Taking measures like awareness creation amongst growers, regular monitoring by implementing agency and enhanced support for the maintenance of juvenile plantations, so that the recommended package of practices are followed for optimal yields, especially for the adequate application of fertilizers and irrigation during the dry season;
- In states like Arunachal Pradesh and Nagaland where oil palm is being taken up along the Assam plains, labourers may be engaged from amongst communities traditionally engaged for tea plantations in Assam, as many members of such communities are looking for work on account of reduced opportunities in Assam. In Manipur, the population of hill areas is adequate for the oil palm plantation.

Further, the following threats have been highlighted on a regional basis regarding the cultivation of oil palm in the NE Region:

- Availability of imports like sunflower, canola, olive oil etc. which have a better image amongst the upper income consumers
- International movement against oil palm, which has also manifested itself as a protest against expansion of oil palm in NE India.

The above threats may be addressed as follows:

- While other edible oils have a better image amongst the upper class, the volume of edible oils required in India is too large to significantly impact the imports on account of the rising population and growing consumption of edible oils. Further, palm oil is cheaper than other oils. In India, only 18% of edible oils are used for domestic cooking, and the remainder is used in institutional cooking (hotels, restaurants, street vendors etc.), industrial frying, manufacture of biscuits, confectionaries and vanaspati etc. apart from serving as feedstock for industrial uses. Most of the above segments will purchase based on the price of the oil, which gives a clear advantage to palm oil. Further, only 3.5% of the present imports will be substituted by CPO from NE Region. Hence, the availability of imports like sunflower, canola, olive oil etc. does not seem to a major factor.
- It must be pointed out that the cultivation of oil palm is being considered on culturable waste lands and fallow lands, without affecting forests, crop lands and pastures. The voices being generated against oil palm on account of 'oil palm leads to massive deforestation' may be met by pointing out the facts on the ground. On the contrary, the planting of oil palm on jhum lands will reduce the burning of hillsides for such shifting cultivation on annual basis.

4. Analysing the Government Policies

4.1. Background

The prevailing model for the development of oil palm plantation in India relies upon smallholders who cultivate the crop on small parcels of land, usually below 5 hectares. They are supported by processors in matters like supply of seedlings and technical inputs. Processors are companies that enter into an MOU with the State Government for the processing of oil palm crop in certain districts of the state on an exclusive basis, with such districts forming its 'factory zone'. They are mandated with the task of lifting the fresh fruit bunches (FFBs) from the growers, at rates fixed by the State Government. Hence, the processor has to set up a FFB processing factory near the growing belts.

The growers are being subsidised by the Government for the initial planting and maintenance, as well as for the cultivation of intercrops. This support is being extended by the Government of India through the State Government as per the National Food Security Mission (Oilseeds & Oil Palm). This is a scheme of the Department of Agriculture Cooperation & Farmers' Welfare, Government of India. There is also a component under the above scheme for subsidising 50% of the cost of processing units in newly planted areas, subject to a ceiling of Rs. 250 lakh. The Nodal Department at the state level for oil palm development is the Agriculture Department, which also reports the progress of the oil palm development to the Government of India.

Hence, the policies and statutes of the Government at the Central and State levels have a vital role in the action plan for the oil palm expansion in the NE Region. These are briefly discussed below.

4.2. Existing Government of India Policies for Oil Palm

Context: Over the past few decades, the domestic consumption of edible oils has increased substantially in India. The Government view is that such consumption is likely to increase further with enhancements in the per-capita income and population of the country. The production of domestic edible oils has not been able to keep pace with the growth in consumption. The gap between production and consumption is being met through large scale imports. While oil palm has been considered as a secondary source for the indigenous supply of vegetable oils, a substantial portion of the national requirement of edible oil is now being met through import of palm oil from Indonesia and Malaysia. The Government has recognized that any disruption in the supply of palm oil from these countries may place India in a very odd condition.

Government Strategy: In view of the above, the Government's strategy is to support growers to undertake the plantation of oil palm on a larger scale, by providing them with subsidies for planting materials, inter-cropping cost and maintenance cost during its gestation period. An area of 19.33 lakh hectares had been identified in the country as being suitable for oil palm cultivation. Oil palm cultivation, which had been started during 1975-76 in India, has shown good impact in terms of area coverage and yield of FFBs of oil palm.

Present Scheme for Oil Palm: From 2018-19 onwards, the pre-existing National Mission for Oilseeds and Oil Palm (NMOOPM) has been subsumed within the National Food Security Mission (NFSM) as NFSM-Oilseeds & Oil Palm. This is being done with the primary objective of augmenting the availability of vegetable oils and to reduce the import of edible oils by increasing the production and productivity of vegetable oils sourced from oilseeds, oil palm and tree borne oils.

Recent Amendment of the Essential Commodities Act: The Essential Commodities (Amendment) Act, 2020 has removed edible oils and other items from the list of essential commodities. The supply of such foodstuffs, including edible oilseeds and oils will be regulated only under extraordinary circumstances which can include war, famine, extraordinary price rise and natural calamity of grave nature. 'Stock limit' imposed under the above act shall not apply to a processor or value chain participant of any agricultural produce, if the stock limit of such person does not exceed the overall ceiling of installed capacity of processing.

Other Recent Legislations: The impact of other recent legislations like the Farming Produce Trade and Commerce (Promotion and Facilitation) Act, 2020 and the Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020 is likely to be limited for oil palm growers. This is due to the fact that their output of fresh fruit bunches is highly perishable and needs to be processed within 24 hours of harvest. These bunches do not have any use without such processing, which effectively ties the growers to the nearest processor.

4.3. Trade Policies of India for Oil Palm based Items

The details in the above regard have been discussed previously at Chapter-2. The salient points are given below. The tariffs on the major imports of oil palm based items, i.e. crude palm oil and refined palm oil, have risen sharply within a short period from 2016 to 2018, before being reduced recently on 27th November 2020. It may be noted that the above items are being mainly imported from Indonesia and Malaysia. The tariff rates for imports from these nations have been determined by the following factors: (a) current tariffs prevailing in general; and (b) preferential tariffs under agreements entered into between India and ASEAN (in which both nations are members) and between India and Malaysia.

Existing Tariffs on Major Items: Regarding crude palm oil, after declining to 7.5% in September 2016, the basic customs duty on this item has been increased to 44% by March 2018. This has been reduced to 27.5% recently. Similarly, the basic customs duty on refined palm oil has risen from 15% to 54% during the same period. It may be noted that tariffs are usually higher on refined palm oil by a margin of 10% as compared to crude palm oil. This differentiation in the tariffs is generally followed in order to promote domestic units involved in the refining of crude palm oil. A detailed discussion on tariffs of CPO and RBD palm oil is available at Annex-8.

Special Provisions for ASEAN Nations: As per the Indo-ASEAN Free Trade Agreement, the basic customs duties on crude palm oil and refined palm have been progressively reduced to 37.5% and 45% respectively as on 1st January 2020. However, till 2018, the customs duties on both crude palm oil and refined palm oil were lower than the preferential tariffs under Indo-ASEAN FTA or India Malaysia CECA. After 1st January 2019, the preferential tariffs were lower, especially for refined palm oil from Indonesia. Imports of refined palm oil from Malaysia were subjected to provisional safeguards' duty of 5% for 180 days (till 2nd March 2020) on grounds of dumping. Thereafter, imports of refined palm oil (such as RBD palm oil and RBD palmolein) into India have been placed on the 'restricted list' with effect from January 2020. Now, an importer would need to have a licence to import this item. In April 2020, the rules regarding such imports were made more stringent.

Tariffs on Other Oil Palm based Items: While customs duties on crude and refined palm oil are considerably high, imports of other items like crude palm stearin, palm fatty acid distillate and RBD palm stearin attract considerably lower basic customs duties of 7.5%. These are mainly needed by the soap manufacturers and other oleo-chemical units. Products derived from palm kernel are subject to higher tariffs, such as 12.5% for crude palm kernel oil and 20% for refined palm kernel oil.

4.4. Pertinent Policies & Statutes of NE States

The development of oil palm in the North Eastern Region will also depend upon the existing policies and statutes of its constituent states pertaining to subjects like agriculture, industry, and land laws which are under the purview of the State Governments as per the Constitution of India. These have been briefly discussed as follows.

Oil Palm in the Agricultural Initiatives of the NE States: The agricultural policies and plans of the states of the NE Region aim at ensuring the growth of their farm sectors. Some states have specifically mentioned oil palm in their agricultural plans or policies, while others have taken important measures for establishing this crop. The pertinent details have been tabulated below.

Table-4.1 Oil Palm in the Agricultural Initiatives of NE States

State	Status of Oil Palm in the State's Initiatives (including Policies & Plans)
Arunachal Pradesh	The state has been extending assistance under 'Support for Oil Palm Development' for the provision of fencing of oil palm plantations. This has been extended as the above component is not covered under any CSS scheme of the Government of India. The provision for fencing in oil palm gardens was included in order to protect the plantations from domestic and wild animals. This measure is expected to encourage more farmers in taking up the growing of oil palm.
Assam	The latest Agricultural Policy of Assam states that ' Expansion of area under oil palm plantation which is emerging as a major sector will be explored in uncultivable waste lands, rain shadow belts and barren areas'. The State Government has been steadily increasing the area under oil palm.
Manipur	On 12th November 2020, the State Government formally launched an Oil Palm Mission in the state to replace poppy cultivation and shifting (jhum) farming, so as to benefit the farmers and preserve the environment. The Mission had been constituted earlier under the Agriculture Department. In addition, a Sub-Committee on Oil palm has been formed with members from other departments and institutions.
Mizoram	Mizoram had pioneered the growing of oil palm in the North Eastern Region. The Agriculture Department had selected Oil Palm as one of the crops to be cultivated under the New Land Use Policy (NLUP) of Mizoram. This was done with the expectation that the cultivation of Oil Palm would enhance the income of farm families and ultimately result in economic uplift of the rural poor. Consequently, the State Government took up a programme for Oil Palm Development with its objectives being 'to generate employment and mitigate environmental degradation'. Further, the State Government has enacted the **Mizoram Oil Palm (Regulation of Production & Processing) Act, 2004** for facilitating oil palm growing and processing in the state.
Nagaland	The State Government sees scope in oil palm, which is now being grown on 3,773 hectares, covering six districts of the state.

Source: Websites of the Agriculture Departments of above States, and other Secondary Information

Land Acts: The land laws of many states of the region (like Arunachal Pradesh, Meghalaya, Mizoram, and Nagaland) do not permit any non-indigenous person or entity to purchase or lease land in the state. In other states like Assam, Manipur and Tripura, non-tribal persons face restrictions in land ownership or lease in the demarcated tribal areas.

However, since the model for growing oil palm in India relies mainly upon the existing smallholders, the above land acts of the NE states will not have any impact upon the expansion of plantation area. This is borne out by the recent experiences in introducing the crop into this region. Further, most of the states have taken concrete steps to permit the mortgaging of land titles to banks as security for obtaining loans. This can enable the growers to access bank credit available on concessional terms for agricultural purposes if required.

Industrial Policies: The Industrial and Investment Policies of some of the NE states (for example, Arunachal Pradesh) envisage that investors from outside the state will enter into agreements with indigenous private land owners and communities in their state for leasing out land on a long-term basis for setting up industrial units. Usually, Government permission is needed for such lease agreements, so that the rights of local tribes are safeguarded. Some of the State Governments (like Mizoram) require that such investors enter into joint ventures with local companies or entrepreneurs. Other states (such as Nagaland) envision the development of industrial estates, so that investors can establish industrial units therein.

Since the oil palm processors have to locate their units near the growing belts, the availability of land at appropriate location will have to be facilitated by the concerned State Governments.

4.5. Gaps in the Existing Initiatives for Oil Palm Development in NE Region

The main gaps in the existing Government initiatives for expanding oil palm cultivation in the North Eastern states are listed below:

- Partial coverage of the investments needed for establishing oil palm;
- Non-inclusion of some items in extending subsidies for establishment of oil palm;
- Low amount of support for the maintenance of the planted area during the initial period;
- Lack of checks in use of non-certified seedlings;
- Delays in the receipt of funds by some of the Implementing Agencies;
- Delays in the disbursement of subsidies to the growers;
- Apprehension of growers about the non-remunerative prices offered to them; and
- Delay in the establishment of processing unit by the processors.

The above aspects have been briefly discussed in the following page, including their possible impacts on the development of oil palm in the N E Region. Such impacts may be summarized as follows.

1. Due to the above gaps in the on-going initiatives of the Government, many intending persons (almost all being from ST communities) are not able to grow oil palm on their lands due to their poor economic conditions.
2. Almost all the existing oil palm plantations suffer from lack of irrigation facilities. In addition, the recommended package of practices is not usually observed, including the application of fertilizers. On account of these deficiencies, yields from the existing areas will become much lower. Further, the use of non-certified seedlings can reduce yields over the lifetime of the palm.
3. Often, the existing growers have to face problems in receiving their subsidies in time. This may be a reason for the above low utilization of fertilizer and irrigation for oil palm in the region.
4. The delay in establishing processing units in the states can discourage many of the existing growers, whose fruits are getting wasted on account on the non-lifting of the output. In case, the prices of FFBs are not increased, the expansion plans for oil palm in the NE Region may remain unimplemented.

Gaps in the Existing Initiatives for Oil Palm Development in North Eastern India

Stage: Establishment of Oil Palm Plantation

Gaps in the Initiatives	Possible Impacts
Planting Materials: Only the cost of seedlings is provided up to 85% of the costs, subject to a ceiling of Rs 12,000 per hectare.	In practice, the processor supplies seedlings to growers, who do not incur expenses on seedlings. However, the quality of the seedlings will depend upon the processor. The Government rate (@ Rs.83.90 per seedling) is lower than the market rate. The use of poor quality non-certified seedlings can affect the **yield from the palms for their entire life-time**.
Cost of Other Items for Setting up Oil Palm Plantation: The cost of other items is not included such as land development (including clearance, drainage, terracing etc), digging of pits and planting of seedlings, provision of fencing for the protection of plantations etc.	About 55-60 man-days of labour are needed for establishing plantations, apart from the use of materials (like phorate and fertilizer for pits), which need smaller investments. Either the grower **forgoes income from his own and from family labour** or he has to engage labourers, who have to be **paid off from his limited resources**.
Drip Irrigation: Cost of drip-irrigation is over Rs 1.00 lakh per hectare. The Government subsidises only 30% of the cost. Further, only half the cost of related items such as pump-set, bore-well, and water harvesting structure is provided – subject to ceilings for each item.	As most growers are from poor economic backgrounds, they cannot afford to establish irrigation systems. This prevents irrigation of the palms during the 3-5 dry months prevailing across the region. Lack of irrigation will **reduce yields**.

Stage: Maintenance of Juvenile Plantations

Gaps in the Initiatives	Possible Impacts
Over a three year period, the cost of maintenance of juvenile plantation will cost the grower about Rs. 1.28 lakh per hectare, over 60% of which is needed for materials like fertilizers, pesticides, weevils, mulching, seedlings for vacancy infilling etc. The rest is needed for meeting the labour costs. The Government provides only 50% of the maintenance costs, subject to a maximum of Rs 5,000 per annum for 4 years. This is about 16% of the maintenance cost for the first three years. (The palms start yielding fruits from the 4th year onward.)	Since the Government support for maintenance of juvenile palms is very low, almost all growers fail to provide fertilizers and pesticides. In addition; the observance of recommended practices is slack, mainly due to the financial condition of the oil palm growers. The above can reduce the expected yields from the plantation by almost 60%. Yields from poorly maintained areas are at most 10 MT per hectare, while properly maintained areas can give up to 25 MT per hectare. **Poor yields can defeat the basic purpose of area expansion**, i.e. of increasing the output of FFB and Crude Palm Oil.

... Continued

Gaps in Existing Initiatives regarding Oil Palm Development in North Eastern India (Continued)

Stage: Crop from Matured Plantation

Gaps in the Initiatives	Possible Impacts
The prices offered to the growers for their crop of Fresh Fruit Bunches (FFBs) is reported to be non-remunerative. Such prices are fixed by Government Committees or through a Government led mechanism. The prices need to be revised annually, based mainly on the normative costs of cultivation of oil palm in the NE Region.	If prices of FFB continue to remain low (and hence un-remunerative), **existing growers** can either adopt an approach of benign neglect to harvest diminishing yields or take active measures to uproot oil palms and plant alternative cash crops like areca-nut, banana etc. **Intending growers** may be discouraged from trying out oil palm cultivation.
The **processor organizations** have signed MOUs with the State Governments. The usual practice has been to offer them a particular area (one or more districts), where the processor has to lift the FFBs from the growers, usually from the farm gate or from a collection point. However, except for Godrej Agrovet (which serves two districts in Northern Mizoram), no other processor has established any unit for handling the output of FFBs collected from the growers. Two instances of processors withdrawing from their areas have been reported. Government needs to (1) facilitate the establishment of the FFB processing units, and (2) enforce the MOUs. Preferably, Agreements need to be signed in lieu of MOUs, to protect the interest of all the main stakeholders – the growers, the processors and the Government.	Processing units need to be established as soon as the harvest of FFBs starts. This will enable the smooth conduct of trial production, as well as to assure the growers. Presently, it has been reported that in many of the growing belts of the NE Region, crops of harvestable FFBs are being left unattended as there have been significant delays in establishing processing units in these areas. The processors have either lifted the fruit bunches in low volumes or not lifted any quantity at all. The above has led to widespread disappointments amongst the growers in different parts of the NE Region. **The lack of processing facilities for FFBs is the biggest hurdle** in achieving the area extension of oil palms in the NE Region.

Other Gaps:

Fund Flows & Disbursements to Growers

1. It is understood that there are occasional **delays in release of funds** to the implementing agency. The funds released by the Ministry do not always reach the implementing agency in time. This hinders the smooth utilization of the budgeted funds. In such cases, the agency cannot submit their utilization certificates in time to the Government of India. (There may be other reasons for the slackness on the part of the agency in submitting its reports, which can delay the flow of funds.) Consequently, some of the allotted funds may **remain unutilized** during the Financial Year and **become lapsed**. The lack of full and proper utilization of funds can curtail the budgets of an Implementing Agency during the subsequent years.
2. The delayed receipt of funds at the agency level results in further delays in paying the **subsidies to the growers**. As the latter have to invest monies based on the seasonal calendar of activities (for planting, fertilizer application, maintenance etc.), delays in their receipt of subsidies may force them to either invest more of their own funds or to omit carrying out many of the recommended practices. This can **affect the yields** as well as the **economic viability** of the plantations. The Government has to ensure the timely payment of subsidy to the grower, which will reduce his burden of higher investments on the oil palm crop, and encourage more persons to start oil palm cultivation in the NE Region.

Road Connectivity between Growing Areas & Collection Centres

1. The processing of FFBs has been undertaken only in Mizoram. As per the experience in this state, the poor road connectivity between the growing areas and the Collection Centres (which are located on the highway). This has hindered the flow of harvested crops from the growing areas to the FFB Processing Factory.
2. In other states of the NE Region (Arunachal Pradesh, Assam, Nagaland), many of the growers have pointed out to the need for improved roads from the growing areas to the nearest highway. Such improvements will be needed for transporting the crops to the FFB Processing Unit (when these are established).

High Transportation Costs of CPO to nearest CPO Refinery

1. The experience of Mizoram is that the transportation of CPO from the existing CPO refinery requires substantial costs (Rs 60,000 per truck from GAVL factory in Kolasib district to Haldia in West Bengal). FFB prices are largely determined by CPO prices (apart from Palm Kernel prices), with CPO prices being influenced by cost of imported CPO and tariffs.
2. The Companies may be reluctant to pay higher prices to the growers they have to compete with imported CPO by quoting similar rates on cif Refinery basis (inclusive of freight rates). This can put a ceiling on FFB prices in NE Region and thereby discourage intending growers.

Logistics Issues

The expansion of oil palm cultivation on 75,000 hectares will require the transportation of about 11.25 lakh MT of Fresh Fruit Bunches (FFBs) to the nearest FFB Processing Unit on an annual basis, when the plantations become mature. Further, about 2.25 lakh MT of Crude Palm Oil (CPO) has to be transported each year to the nearest CPO refinery after the plantations attain maturity. The logistics issues that have emerged in the above connection are briefly mentioned below.

1. The plantations are located away from the existing rural roads. In Mizoram, where the processing of FFBs has started sometime back in one area, it was seen that the absence of roads in the growing areas had hindered the harvest of the crop and its transport to the nearest Collection Centre. Hence, the State Government took up the construction of connectivity roads to connect the growing areas to the collection centres, which were located on highways. However, the maintenance of these roads has posed challenges.
2. While states like Arunachal Pradesh and Nagaland have avoided the cultivation of oil palm on interior and hilly areas considering the experience of Mizoram, even there the transportation of FFBs to the Processing Plant may be difficult in the absence of roads and bridges to the existing rural roads. In Assam too, the access to some of the growing areas located in interior places is not easy and results in higher transportation costs.
3. Once the FFB Processing Units are established, the Crude Palm Oil (CPO) being produced there will have to be transported by road to the nearest CPO Refinery. The cost of such transport is high, and will depress the FFB prices as domestically produced CPO has to compete with imported CPO from Indonesia and Malaysia.

While the logistics issues of moving FFBs from farm to FFB Processing Plant (roads and missing bridges) have to be handled by the State Governments, the cost of road transportation of CPO to the nearest refinery may be subsidized. Hence, logistics issues need the following proposed measures, which have been discussed later on.

(a) Support for the Transportation of CPO from FFB Processing Plant in NE Region to the nearest CPO Refinery; and

(b) Improvement of Roads and Bridges in the Oil Palm growing areas.

4.6. Priorities for Policy Support & Interventions

The priorities for policy support and interventions from the Government include the following measures:

1. Ensuring that the **processors** set up an adequate number of **processing units** in the oil palm growing belts by extending **Support for the Establishment of FFB Processing Factory in NE Region**, so that the growers can regularly harvest their crops and thereby receive regular returns from their oil palm plantations;
2. Introducing a **Scheme for Price Support of Oil Palm Growers in North Eastern states** akin to the Price Deficiency Payment System (PDPS), so that growers receive the difference between the normative cost of cultivation (including adequate return) and the FFB prices paid by the processors. Under this scheme, it will be necessary to devise the following:
   (a) A system for the annual determination of the normative cost of cultivation of oil palm (including adequate return) akin to the computation of the Minimum Support Prices (MSP) existing for 28 agricultural commodities in India; and
   (b) A mechanism for the periodic review of the prices of Fresh Fruit Bunches (FFBs) payable to the growers by the processors.

   [Additional details are available at the next page regarding: (a) the Price Deficiency Payment System (PDPS); and (b) the Determination of the Minimum Support Prices.]
3. Introducing a 100% Govt. of India funded scheme for Supporting the Establishment of Oil Palm in the NE Region and the Initial Maintenance of newly planted areas;
4. Subsidy for the transportation of Crude Palm Oil from FFB Processing Unit in NE Region to the nearest CPO Refinery;
5. Devising a system for reducing the delays of receipt of funds by the Implementing Agencies, including regular reporting and compliance to scheme guidelines;
6. Ensuring that subsidies reach the growers in time for the maintenance of plantations during the initial gestation period and for intercropping;
7. Revising the quantum of subsidies payable to the growers for the establishment and initial maintenance of oil palm;
8. Encouraging intending growers to plant oil palm in their lands, including jhum wastelands and idle fallows after considering the suitability of such lands for such plantation; and
9. Establishing a number of nurseries in the region for the adequate supply of quality seedlings.

4.7. Overall Developmental Strategy

The following chapter gives the Vision, Goals and Strategies for the development of oil palm in the states of the NE Region. The Regional Vision is '*to encourage growers in the North Eastern states of India to take up the oil palm crop, in order to achieve a significant reduction in the imports of palm oil into the country'*. This will serve to guide the actions of the State Governments, growers, processors and other stakeholders in North Eastern states during the next five years.

Accordingly, goals have been laid down in order to plant 75,000 hectares under oil palm over this period, along with the establishment of adequate processing capacity and a sufficient supply of quality planting materials (nearly 147 lakh seedlings). The regional strategies seek to serve as the guidance for action at the regional level, which can be supplemented by state level strategies. Based

on the above, state specific plans have been drawn up in order to achieve the goals for expanding oil palm cultivation in the NE Region.

Price Deficiency Payment Scheme (PDPS)

On 12th September 2018, the Government of India had announced an umbrella scheme titled the '*Pradhan Mantri Annadata Aay SanraksHan Abhiyan*' (PM-AASHA) in order to ensure remunerative prices to the farmers for their produce. This scheme has three components:

- Price Support Scheme (PSS), which involves physical procurement of selected food and fibre crops for providing Minimum Support Prices (MSP) to farmers growing such crops;
- Price Deficiency Payment Scheme (PDPS), a new scheme described below; and
- Pilot of Private Procurement & Stockist Scheme (PPPS) which has been rolled out on a pilot basis in selected districts involving the participation of private stockists.

Under Price Deficiency Payment Scheme (PDPS), cultivators are being supported for crops, where the Minimum Support Price (MSP) is being notified by the Government annually based on the recommendations of the Commission for Agricultural Costs & Prices (CACP). The difference between the MSP and the selling price (modal prices prevailing in the markets) will be made to '*pre-registered farmers selling his produce in the notified market yard through a transparent auction process. All payment will be done directly into registered bank account of the farmer. This scheme does not involve any physical procurement of crops as farmers are paid the difference between the MSP price and sale / modal price on disposal in notified market*'. (PIB Notification dated 12th September 2018)

The above scheme is reported to be 'the most efficient method as it eliminates all logistic costs related to procurement, storage and offloading. It is advisable to implement PDPS for crops with scattered and thinly distributed production, like oilseeds'.

Determination of Minimum Support Prices (MSP)

The Government of India took a policy decision to guarantee Minimum Support Price (MSP) to cover at least 1.5 times the production cost, if prices fall below it. Towards this end, the Centre announces MSP for major agricultural commodities each year. Now, 28 such commodities are being covered.

While recommending price policy of various commodities under its mandate, the Commission for Agricultural Costs & Prices (CACP) keeps in mind the various Terms of Reference (TOR) given to CACP in 2009. '*Accordingly, it analyzes the following:*

1) *Demand and supply;*
2) *Cost of production;*
3) *Price trends in the market, both domestic and international;*
4) *Inter-crop price parity;*
5) *Terms of trade between agriculture and non-agriculture;*
6) *A minimum of 50 percent as the margin over cost of production; and*
7) *Likely implications of MSP on consumers of that product.*

It may be noted that cost of production is an important factor that goes as an input in determination of MSP, but it is certainly not the only factor that determines MSP'. (Website of the Commission for Agricultural Costs & Prices)

Oil palm is not being covered under the above system for the determination of Minimum Support Prices (MSP). A mechanism may be needed for carrying out a similar exercise for this crop, as the growers in the NE Region may need to be supported for taking up oil palm, which is a relatively new crop for the growers in the region.

5. Vision, Goals and Strategies of the Action Plan

This chapter lays the basis for the Action Plan to promote the growing and processing of oil palm in the North Eastern region of India. At the outset, it discusses the vision and goals of the plan, followed by the strategies needed to reach the goals.

5.1. Vision Statement

'**To encourage growers in the North Eastern states of India to take up the oil palm crop, in order to achieve a significant reduction in the imports of palm oil into the country**'

The Action Plan seeks to realise the vision of the Hon'ble Prime Minister of India who has appealed to growers in the North Eastern Region to take up oil palm cultivation, in order to make India self-sufficient in edible oils.

The above vision statement can guide the actions of the State Governments, growers, processors and other stakeholders in North Eastern states during the next five years.

5.2. Regional Goals

The Regional Goals of this Action Plan, which are to be covered within five years of its adoption, are given as follows:

(a) **Growing of Oil Palm**: To expand the area covered under oil palm by at least 75,000 hectares within five years by growing this crop on culturable waste lands and fallow lands available in the North Eastern states of India.

(b) **Processing of Oil Palm**: To establish adequate oil palm processing capacity, preferably within 12-18 hours of travel time from the growing areas, with each such units being able to handle the output of fresh fruit bunches (FFBs) from matured oil palms standing on about 2,000-3,000 hectares of the crop.

(c) **Planting Materials**: To establish adequate numbers of nurseries in the North Eastern states in order to grow germinated seeds for supply of seedlings to facilitate the achievement of the above area coverage target, with the requirement being nearly 147 lakh healthy seedlings over eight years. This includes seedlings needed for vacancy in-filling for three years after planting.

(d) **Other Goals**: To support the growers adequately in matters of subsidies, training and technical assistance along with the establishment of a scheme to support oil palm growers in order to achieve the plantation goals; to support processers with subsidies and loans to establish processing units in the growing belts, and to support other stakeholders (Government Departments and Agricultural Institutions) to enable them to play a suitably facilitating role.

Explanatory Notes:

1. As per the previous chapter; a potential area of 218,000 hectares has been identified as being suitable for oil palm. Out of this less than 17% has been planted so far. As analysed in Annex-10, the potential area for oil palm constitutes only 18% of the total extent of culturable waste land and fallow land (lying unused for over 5 years) in the North Eastern states. Hence, the above

goal will be to cover less than 10% of the above types of lands in the region. No forest lands; cropped areas and current fallows; areas under bamboo, cane and other miscellaneous trees; and pastures and grazing lands will be required to meet the above target. Further, the culturable waste lands are suited for cultivation and these lands have not been used for more than five years.

The identification of areas for suitable growing oil palm will depend upon their evaluation as per the parameters given in Annex-2, apart from the interest of potential growers and communities who have rights over such lands.

2. If the above goal for expanding the cultivation of oil palm is met, the additional coverage can produce about 0.90 million MT of fresh fruit bunches (FFBs) during the maturity period from the 9th Year of planting onwards. This is assuming an average yield of 12 MT per hectare, and vacancy in-filling to substitute mortality of young plants. The above FFB crop has to be processed within 7 months of the growing season (about 5,100 hours). Hence, the total processing capacity has to be about 177 MT per hour, which can be met by establishing around 15 Palm Oil Mills in different areas of the region, with the units having capacities of 10-15 MT per hour in terms of FFB processing capacity. This has to be done within 12-13 years of the start of implementation of this plan. Annex-3 gives details of the processing of the FFBs harvested from the oil palms.

3. In order to compute the requirements of planting materials, field planting is assumed to be done with a spacing of 9 m x 9 m on an equilateral basis. Such spacing can accommodate around 143 palms per hectare of planted land. It is assumed that 35% of the palms will require replacement due to juvenile mortality during the first three years or so after field plantation.

4. For the development of seedlings, germinated seeds are planted in large poly bags (40 cm x 50 cm) which are placed in the open in the nursery for 12-14 months before transplantation in the field. (Some shade is needed till 13 leaves emerge.) Alternatively, the seeds are raised for 4-5 months in smaller poly bags in the pre-nursery before being shifted to larger poly bags and raised for 10-12 months in the (main) nursery. There are advantages of both systems. However, the single stage nursery system is being usually practised in India.

5.3. Regional Strategies

On a regional basis, the following strategies may be taken up in order to reach the above-mentioned goals of this plan for promoting the growing and processing of oil palm in the North Eastern Region. The Ministry of Development of North Eastern Region, Government of India and the North Eastern Council can have a coordinating role in the regional strategies.

Regional Strategies for Growing Oil Palm

In order to meet the above goal for the expansion of oil palm on 75,000 hectares of land in the North Easter Region, the following strategies are to be adopted on a regional basis:

1. Assure intending growers about the off-take of their fresh fruit bunches (FFBs) by facilitating companies and other entities to establish units near the growing areas to process the FFBs;
2. Subsidise the growers in establishing oil palm plantations and in maintaining the same properly for the initial three years when there is no income from the crop;
3. Provide capacity building to the existing and intending growers through training and exposure visits, so that they assimilate and practise the recommended package of practices for oil palm;

4. Ensure that the growers receive suitable returns for their output of fresh fruit bunches by evolving a system of minimum support price (MSP) for the crop; and
5. Create awareness amongst the growers of the support being extended by the Government, so that more areas are brought under oil palm in the NE Region.

In addition, State Governments of the region and other stakeholders may work to evolve state-specific strategies for bringing additional land in under oil palm, considering the local position.

Regional Strategies for the Processing of Oil Palm

Since fresh fruit bunches of oil palm has to be processed within 24 hours of their harvest, a suitable number of processing units have to be established in due course in the NE Region near the growing areas. The regional strategy for encouraging the establishment of adequate oil palm processing capacity, preferably within 12-18 hours of travel time from the growing areas, has to focus on:

1. Prioritizing the establishment of three units to cater to the existing oil palm growing areas in Arunachal Pradesh, Assam and Nagaland which have no such facilities nearby;
2. Facilitating the provision of adequate land at suitable locations by the State Governments along with power connection and other supporting infrastructure, so that interested companies and other entities can establish oil palm (FFB) processing units;
3. Including oil palm (FFB) processing units in the list of eligible sectors for support under PM KISAN SAMPADA Yojana (PMKSY), prioritizing such units under the scheme; permitting multiple applications by same company and relaxing the requirement to establish units in Mega Food Park / Agricultural Processing Clusters;
4. Advising the State Governments to ensure the free movement of oil palm FFBs across state borders, so that crops can be expeditiously dispatched to nearby processing units located across inter-state borders.

Apart from the above regional strategies, the State Governments of the region may devise additional measures to supplement the regional initiatives for establishing sufficient processing capacity for oil palm fruit bunches.

Regional Strategies for Planting Materials

The states of the NE Region will need about 147 lakh seedlings over five years, if 75,000 hectares are to be brought under oil palm, including for replacing dead plants. The regional strategy for ensuring the supply of adequate number of healthy seedlings will require the following broad measures:

1. Encourage the establishment of a sufficient number of nurseries in the growing belts to supply growers with sufficient number of healthy seedlings on demand;
2. Advise State Governments to earmark adequate acreage of suitable land, with supply of water and other infrastructure to facilitate the establishment of oil palm nurseries;
3. Prioritize the proliferation of improved varieties of seedlings (lower height and higher yield), which will improve yields and facilitate quicker harvesting; and
4. Establish a system for certifying seedlings and stopping the usage of non-certified planting materials.

Annex-11 gives additional details about the planting materials arrangements required for the oil palm development in NE states as per the present Action Plan.

Regional Strategies for Price Support to Oil Palm Growers

As mentioned previously under the 'Priorities for Policy Support & Interventions', it is necessary to evolve a special scheme for supporting the oil palm growers in North Eastern states on the lines of the Price Deficiency Payment System (PDPS). The PDPS compensates growers for the difference between the market price and the Minimum Support Price (MSP). In the case of oil palm, the MSP mechanism is not covering the crop. Further: as the Fresh Fruit Bunches (FFBs) have to be processed within 24 hours of their harvesting; it is not feasible to develop markets for the saleable crop from oil palm plantations.

In lieu of the MSP, it is proposed that a system for the annual determination of the normative cost of cultivation of oil palm (including adequate return) may be devised, while keeping the interest of both the growers and the processors in mind along with the overall national goals.

The prices fixed for the sale of the FFBs to the processors can be used instead of the market prices, as these take time to get revised. The difference between the cost based amount fixed annually and the FFB price can be used to determine the support to the growers of oil palm in the region.

Credit for Smallholders growing Oil Palm

There is a need for introducing collateral-free long-term loan product for smallholders growing oil palm in the NE Region. This can be extended to growers in districts covered by MOU or Agreement with the processor company. Interest subvention can be extended for the first three (or four) years, when the palms yield no income. Repayment can commence from the fifth year onward. The repayment period can be suitably framed as per the expected margins from the harvest.

It may be noted that collateral free loan products are being extended in some sectors as briefly described below.

Collateral Free Loan Products

It may be noted that collateral free loans are available under Government schemes for certain categories of borrowers, with interest subventions being also offered on a periodic basis. The above sector-specific loans include the following:

1. **CGTMSE Loans to Micro and Small Enterprises**: Collateral free loans are available to MSE units for amounts up to Rs 200 lakh under the Scheme for 'Credit Guarantee Fund for Micro and Small Enterprises'. Loans made to MSEs by banks and financial institutions are guaranteed by the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) under the above scheme. Interest subvention (at the rate of 2% per annum) is available for MSE loans up to Rs 100 lakh from banks (including cooperative banks) till 31st March 2021.
2. **MUDRA loans to Non-Corporate Small Businesses**: These include loans made to non-corporate, non-farm small and micro enterprises under the Pradhan Mantri Mudra Yojana (PMMY). Such loans are being made through banks, NBFCs and MFIs and these are refinanced by the Micro Units Development & Refinance Agency Ltd (MUDRA). Banks have been mandated by RBI not to insist for collateral security for MUDRA loans up to Rs. 10 lakh. Interest subvention had been given to MUDRA Sishu loans (up to Rs 50,000) for a period of 12 months as a part of the Atmanirbhar Bharat stimulus package.
3. **KCC Loans for Field Crops**: Land-holders can be registered under the Kishan Credit Card (KCC) scheme for obtaining KCC loans. These loans are (a) collateral free till Rs 1.60 lakh; and (b) covered by interest subvention (@2% per annum) for loans up to Rs 3.00 lakh. KCC loans are intended for cultivation of field crops and post-harvest expenses (short term loan in the nature of revolving cash credit facility); and expenses for the purchase of assets like pump-sets and sprayers, dairy animals etc. (long-term loans). In addition, expenses allowed include personal consumption, crop insurance, asset maintenance etc. which are subject to limits.

5.4. State Specific Strategies

As mentioned earlier, the State Governments of the NE Region may develop additional strategies to supplement the above regional strategies, so that the primary goal of growing oil palm on 75,000 hectares in the NE Region on a sustainable basis can be achieved along with the supporting goals of ensuring adequate processing capacity and sufficient supply of seedlings.

The Regional Summary of State-specific Action Plans for the Development of Oil Palm in the NE Region has been given at the next chapter. These State-specific Plans have been presented after this chapter for each of the states of the NE Region which have expressed interest for the cultivation of oil palm. Such state-wise plans include the suggested strategies for each of the states to meet the planting targets, apart from the responsibilities, resource requirements and other pertinent details.

6. Regional Summary of State-specific Plans

This chapter summarizes on a regional basis, all the State-specific Plans for the Development of Oil Palm in the various states of the North Eastern Region of India. It has been prepared by taking into account (a) the Vision, Goals and Regional Strategies as described in the previous chapter, and (b) the interest of the states, as well as their suitability for growing the crop. The state-wise plans have been furnished in the next chapter.

6.1. Planned Area and State-wise Break-up

This plan proposes to establish 75,000 hectares under oil palm in a period of five years in five states of the NE Region of India. The state-wise break-up of the above total area is given below.

Table-6.1: Planned Area for Oil Palm in NE Region

State	Area of Coverage (in Hectares)	Remarks
Arunachal Pradesh	25,000	State implementing oil palm programme
Assam	20,000	-Do-
Manipur	5,000	State taking up the crop for first time
Mizoram	10,000	First NE state to implement commercial plantation of oil palm
Nagaland	15,000	State implementing oil palm programme
Total	**75,000**	

Note: While Sikkim is not suited for the growing of oil palm on account of its mountainous nature, Meghalaya and Tripura have not expressed interest to grow oil palm in their states.

6.2. Annual Planting Targets

The annual planting targets have been proposed as follows for the different participating states of the NE Region.

Table-6.2: Planned Annual Planting Targets for Oil Palm in NE Region

	Annual Planting Target (in Hectares)					Total (in Ha)
State	Year-1	Year-2	Year-3	Year-4	Year-5	
Arunachal Pradesh	3,000	5,000	6,000	6,000	5,000	25,000
Assam	3,000	4,000	5,000	4,000	4,000	20,000
Manipur	200	800	1,600	1,400	1,000	5,000
Mizoram	2,000	2,000	2,000	2,000	2,000	10,000
Nagaland	2,000	3,000	4,000	3,000	3,000	15,000
Total	**10,200**	**14,800**	**18,600**	**16,400**	**15,000**	**75,000**

Taking all the above states together, the maximum planting is planned to be done in the 3rd Year, while the 4th Year has the next highest target. The first year and the fifth year have almost equal planting targets on a regional basis.

6.3. Investment Requirements

On a regional basis, the plan to grow oil palm on 75,000 hectares in the interested states will require an amount of Rs. 2287.50 crore. The item-wise break-up is given as follows.

Table-6.3: Investment needed to cover the Planned Area under Oil Palm in NE Region

Head of Expenditure	Rs in Crore	Remarks
Establishment of Plantation	337.50	---
Micro-Irrigation (including Pump-set & Intake)	990.00	From surface sources
Maintenance of Planted Area in the Gestation Period (3 years)	960.00	Three Years after Planting
Total	2287.50	---

Note: Additional costs may be needed based on ground conditions for items like:

(a) Terracing of lands with steep terrain (above 20 degree slope);
(b) Drainage for clayey soils; and
(c) Investment on extra or alternate items like fencing, rodent protection etc.; transport of seedlings to interior areas (beyond 50 km); and cost of submersible pump and tube-well for ground water sources in case of lack of adequate surface water, and cost of water-harvesting structures (if constructed).

The state-wise and year-wise break-ups of the above investments have been furnished at overleaf.

6.4. Sources of Investment

The sources of investment for incurring the above expenditure are planned as follows**.**

Table-6.4: Proposed Sources of Investment to cover the Planned Area under Oil Palm in NE Region

Source of Investment	Rs in Crore	Remark
Under NSFM (OS&OP)		Existing scheme of the Govt. of India, which funds Rs. 12,000 for planting materials; Rs 30,486 for micro-irrigation (NE states) and 50% of cost of pump-sets. In NE Region, the Government of India contributes 90% of the approved annual plan.
(a) Government of India	475.87	
(b) State Government	52.88	
Sub-total: NFSM – OS&OP	528.75	
Proposed Scheme for Govt. of India funding	1436.62	Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas (Details at Chapter-8)
Growers' Contributions	322.13	Balance amount
Total	2287.50	---

The state-wise break-up for the proposed sources of investment is available in the next page.

Table-6.5: State-wise break-up of the Investment needed to cover the Planned Area

Head of Expenditure	State-wise Break-up of Investment Required (Rs. in Crore)					Total Investment (Rs. crore)	Remarks
	Arunachal Pradesh	Assam	Manipur	Mizoram	Nagaland		
Establishment of Plantation	112.50	90.00	22.50	45.00	67.50	337.50	---
Micro-Irrigation (including Pump-set & Intake)	330.00	264.00	66.00	132.00	198.00	990.00	From surface sources
Maintenance of Planted Area during the Gestation Period (3 Years)	320.00	256.00	64.00	128.00	192.00	960.00	Three Years after Planting
Total	762.50	610.00	152.50	305.00	457.50	2287.50	

Note: Additional costs may be needed based on ground conditions for items like:

(a) Terracing of lands with steep terrain (above 20 degree slope);
(b) Drainage for clayey soils; and
(c) Investment on extra or alternate items like fencing, rodent protection etc.; transport of seedlings to interior areas (beyond 50 km); and cost of submersible pump and tube-well for ground water sources in case of lack of adequate surface water, and cost of water-harvesting structures (if constructed).

Table-6.6: Year-wise break-up of the Investment needed to cover the Planned Area in the States of the Region

State	Year-wise Break-up of Investment Required (Rs. in Crore)								Total (Rs Crore)
	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	
Arunachal Pradesh	53.10	98.46	135.61	163.10	160.09	73.48	52.61	26.05	762.50
Assam	53.10	80.76	114.59	120.11	126.27	56.41	37.92	20.84	610.00
Manipur	3.54	14.82	31.83	34.55	33.35	17.63	11.56	5.21	152.50
Mizoram	35.40	42.04	50.58	61.00	61.00	25.60	18.96	10.42	305.00
Nagaland	35.40	59.74	89.30	89.61	95.77	43.61	28.44	15.63	457.50
Total	**180.54**	**295.82**	**421.91**	**468.37**	**476.48**	**216.73**	**149.49**	**78.15**	**2287.50**

Table-6.7: State-wise break-up of the Proposed Sources for the Investment needed to cover the Planned Area

Head of Expenditure	State-wise Break-up of Investment Required (Rs. in Crore)					Total Investment (Rs. crore)	Remarks
	Arunachal Pradesh	Assam	Manipur	Mizoram	Nagaland		
Under NSFM (OS&OP)							Existing scheme for subsidy on planting materials, micro-irrigation and pump-sets
(a) Government of India	158.62	126.90	31.73	63.45	95.17	475.87	90% contribution for the NE States
(b) State Government	17.63	14.10	3.53	7.05	10.58	52.88	10% contribution for NE States
Sub-total: NFSM – OS&OP	176.25	141.00	35.25	70.50	105.75	528.75	---
Proposed Scheme for Govt. of India funding	478.87	383.10	95.77	191.55	287.32	1436.62	Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas (Details at Chapter-8)
Growers' Contributions	107.38	85.90	21.48	42.95	64.43	322.13	Balance of Payments to cover labour component of the maintenance during gestation period
Total	**762.50**	**610.00**	**152.50**	**305.00**	**457.5**	2287.50	

Note: Sources of investment have been worked out as follows:

For the **Establishment Costs** (including Micro-Irrigation, Pump-set and Surface Intake)

- **NFSM (OS&OP)** support is taken at existing levels, i.e. Rs 12,000 per hectare for planting; Rs 30,486 per hectare for micro-irrigation and 50% of cost of pump-set (Rs. 13,000) totalling about Rs. 55,500 per hectare
- **Govt. of India support under Proposed Scheme i**s taken as Rs. 89,850 per hectare, while **Grower Contribution** is to cover the balance (Rs. 31,650). Details are at Chapter-8.

For Maintenance of the Juvenile Plantations for 3 Years:

The annual break-up is given as follows for the year of planting and three years hence.

	Year-1	Year-2	Year-3	Total	Remarks
NFSM (Oil Palm)	5,000	5,000	5,000	15,000	NFSM gives Rs 5,000 per year for four years, However the above is computed for 3 years only
New Scheme (Proposed)	25,380	33,930	42,390	101,700	90% of the Balance after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Growers Contribution	2,820	3,770	4,710	11,300	Balance 10% after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Total	33,200	42,700	52,100	1,28,000	---

6.5. Additional Items of Expenditure

Apart from the direct investment for supporting the growers for establishing oil palm plantation, setting up micro-irrigation systems and maintenance of the new areas during the gestation period, Government has to incur expenses on the following aspects:

- Training of Extension Officers and Workers;
- Training of the Growers;
- Programme Expenses of Implementation Agency (workshops and conferences, inspection visits, stationery and repair of computers etc.)
- Monitoring & Evaluation (3rd Party)

Basis for Allocation

The above may be incurred either on the basis of NFSM (Oil Palm) norms (i.e. for training) or on the basis of standards (i.e. monitoring and evaluation). The allocation for the same is discussed below.

Table-6.8: Allocation of Additional Items of Expenditure

Item of Expenditure	Proposed Allocation	Remarks
Training of Extension Officers and Workers (including Input Dealers)	Orientation Training or Refresher Training of two days for a batch of 20 participants (extension officers and workers, and input dealers)	1 batch per annum per participating state Total = 5 batches x 5 years = 25 batches
Training of Growers	For a batch of 30 growers for 2 days @ Rs. 24,000 per training	5 batches per annum per state Total = 5 batches x 5 state x 5 years = 125 batches
Programme Expenses of Implementing Agency	Rs. 15.00 lakh per state per annum	For workshops & conferences, inspection visits, stationery and repair of computers etc.
Monitoring & Evaluation Expenses	@ Rs 45.00 lakh per state per annum	Third Party Monitoring @ 1% of NFSM (OS&OP) & Special Scheme (Proposed)

Proposed Allocation

The proposed allocation for the additional items is tabulated below.

Table-6.9: Additional Items of Expenses

Item of Expenditure	Rate (Rs)	Quantity	Amount (Rs. lakh)	Remarks
Training of Extension Officers and Workers (including Input Dealers)	36,000 per batch of 20	25 batches	9.00	1 batch per annum per participating state
Training of Growers	24,000 per batch of 30	125 batches	30.00	5 batches per annum per state
Establishment Expenses	Rs. 15.00 lakh per state per annum	5 states x 5 years	375.00	For workshops & conferences, inspection visits, stationery and repair of computers etc.
Monitoring & Evaluation Expenses	Rs. 30.00 lakh per state per annum	5 states x 5 years	750.00	Third Party Monitoring @ 1% of NFSM (OS&OP) & Special Scheme (Proposed)
Total	**---**	**---**	**1164.00**	**---**

Annual Break-up of the Additional Expenses

The year-wise break-up of the additional expenses has been given in the following table.

Table-6.10: Year-wise Break-up of the Additional Expenses

Item of Expenditure	Year-wise (Rs. in lakh)					Total (Rs. in lakh)
	Year-1	Year-2	Year-3	Year-4	Year-5	
Training of Extension Officers and Workers (including Input Dealers)	1.80	1.80	1.80	1.80	1.80	9.00
Training of Growers	6.00	6.00	6.00	6.00	6.00	30.00
Establishment Expenses	75.00	75.00	75.00	75.00	75.00	375.00
Monitoring & Evaluation Expenses	150.00	150.00	150.00	150.00	150.00	750.00
Total	**232.80**	**232.80**	**232.80**	**232.80**	**232.80**	**1164.00**

6.6. Summing up the Proposed Government Support

The Government support has been proposed as follows for the Development Action Plan for Promotion of Oil Palm in the NE region.

Table-6.11: Summary of the Proposed Government Support for Oil Palm in NE Region

Item of Expenditure	Rs in Crore	Remarks
Under NSFM (OS&OP)		Existing scheme of the Govt. of India, which funds Rs. 12,000 for planting materials; Rs 30,486 for micro-irrigation (NE states) and 50% of cost of pump-sets. In NE Region, the Government of India contributes 90% of the approved annual plan.
(a) Government of India	475.87	90% contribution
(b) State Government	52.88	10% contribution
Sub-total: NFSM – OS&OP	528.75	
Proposed Scheme for Govt. of India funding	1436.62	Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas (Details at Chapter-8)
Additional Items		
Training of Extension Officers and Workers (including Input Dealers)	0.09	1 batch per annum per participating state
Training of Growers	0.30	5 batches per annum per state
Establishment Expenses	3.75	For workshops & conferences, inspection visits, stationery and repair of computers etc.
Monitoring & Evaluation Expenses	9.83	Third Party Monitoring @ ½ % of NFSM (OP) & Special Scheme (Proposed)
Support for FFB Processing Units	30.00	Under PM KSY @ Rs. 5.00 crore x 6 units
Total	**2009.34**	

Note: The above table excludes amounts that may be payable per annum on account of the following:

- Proposed **Subsidy for Transport of CPO from FFB Processing Unit to Nearest CPO Refinery,** which has been estimated at **Rs 74.59 crore per annum** for CPO obtained from FFBs on the entire 75,000 hectares on maturity, assuming a yield of 3 MT of CPO per hectare and 50% transport subsidy on average freight of Rs 6.50 per kg from FFB Processing Unit to nearest CPO Refinery; and
- Proposed **Price Support for Oil Palm FFB** (at difference between Normative Cost and FFB Prices), which can be about Rs. 112.50 crore per annum for price support of Rs. 1/- for each rupee of price support per kg of FFB. The exact price support will require Government decision.

The year-wise break-up of the above support has been given at overleaf.

Table-6.12: Year-wise Break-up of the Proposed Government Support for Oil Palm in NE Region

	Year-wise Break-up of Investment Required (Rs. in Crore)								Total (Rs Crore)
	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	
Under NSFM (OS&OP)									
(a) Government of India	50.949	78.516	104.157	101.538	97.335	22.500	14.130	6.750	475.875
(b) State Government	5.661	8.724	11.573	11.282	10.815	2.500	1.570	0.750	52.875
Sub-total: NFSM – OS&OP	56.610	87.240	115.730	112.820	108.150	25.000	15.700	7.500	528.750
Proposed Scheme for Govt. of India funding	91.647	158.866	239.292	288.015	302.245	172.561	120.415	63.585	1436.626
Additional Items									
Training of Extension Officers and Workers (including Input Dealers)	0.018	0.018	0.018	0.018	0.018	0.000	0.000	0.000	0.090
Training of Growers	0.060	0.060	0.060	0.060	0.060	0.000	0.000	0.000	0.300
Establishment Expenses	0.750	0.750	0.750	0.750	0.750	0.000	0.000	0.000	3.750
Monitoring & Evaluation Expenses	0.741	1.231	1.775	2.004	2.052	0.988	0.681	0.355	9.827
Total (*)	149.826	248.165	357.625	403.667	413.275	198.549	136.796	71.440	1979.343
(*) Excludes Rs. 30 crore as proposed Support for FFB Processing Units under PM-KSY @ Rs. 5.00 crore x 6 units									

7. State Specific Plans

This chapter details state-specific plans for the promotion of oil palm in the NE Region. Such state-specific plans briefly cover the following aspects for each of the states showing interest in the crop.

Background	Narrative of the background for the introduction of oil palm in the state, along with the initial steps taken for establishing plantations.
Status of Development	This gives the total area in the state covered by oil palm, along with the annual area planted and the number of growers.
Processing Company	The names of the companies which have entered into an MOU with the State Government for oil palm development in the state.
Learning Points	This highlights some of the salient lessons from the introduction of oil palm in the state and the expansion of area under the crop
Best Practices	Brief narration of the best practices of oil palm cultivation in the state
Potential Area	As determined by the Reassessment Committee (2012) and the Reassessment Committee (2020) with pertinent details as available
Break-up of Area	District-wise break-up (if available)
SWOT Analysis	Strengths and Weaknesses as internal factors depending upon the status of oil palm cultivation in the state; and Opportunities and Threats as factors which are external to the state and originate from the general business environment affecting oil palm
Goals	In terms of the Area Target & Its Annual Break-up (as follows) • **Area Target**: In hectares for a five year period from commencement • **Annual Break-up:** The break-up of area planned to be covered in each of the above five year period from commencement of implementation
Main Strategies & Action Points	The principal action points to cover the targeted area under oil palm, including the development of processing capacity and nursery. Also, including the time-lines and responsibilities for the action points
Implementing Agency	Name & Address of the Agency, including details of its Main Officials
Investment Required	Total investment; including subsidy and loans. Processors' contributions not tabulated.
Sources of Investment	Gives the sources of investment such as: (a) NSFM (OS&OP) scheme funded by the Government of India (90%) and the State Govt. (10%); proposed 100% Govt. of India funded 'Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas; and Growers' Contributions for the balance of the requirements. Processors' Contribution for Unit and Nursery etc. is not detailed and included in the Investments
Convergence	Funding sources from other schemes

Note: The state-specific plans of these states have been covered in the following sections: Arunachal Pradesh, Assam, Manipur, Mizoram and Nagaland. The other states have either not shown their interest (like Meghalaya & Tripura) or are unsuitable for oil palm cultivation (Sikkim).

7.1. Arunachal Pradesh: State Specific Plan for Oil Palm Development

Background

In 2013-14, the State Government initiated steps for an oil palm programme by preparing a techno-economic feasibility report. The work was carried out by the Agriculture Department of the State Government, in association with the College of Horticulture & Forestry, Pasighat (of the Central Agricultural University). The report identified 131,500 hectares of land in Arunachal Pradesh as being suited for oil palm cultivation. These lands were located on foothills along the Assam border of the state. The above assessment was based on inputs received from the district level offices of the Department. Accordingly, the State Government commenced the works for plantation of the crop along with the growers and processors, with support from the Government of India under the Oil Palm Area Expansion (OPAE) sub-scheme.

Earlier, the Reassessment Committee (of 2012) had found 25,000 hectares to be the potential area for oil palm in Arunachal Pradesh. Subsequently, this has been revised to 133,000 hectares as per the latest Reassessment Committee Report of 2020. The areas of the state were divided into 4 zones, which were assigned to four companies through MOUs. It may be mentioned that a 1.5 hectare of land was covered by oil palm plantations near Deomali (in Tirap district) by the Arunachal Pradesh Forest Corporation more than 20 years ago. The palms are bearing fruit despite their neglected conditions. This indicates that the foothill areas of the state are suited for the crop.

Status of Development

As per the records with the Government of India, the total area in Arunachal Pradesh covered by oil palm is 2,752 hectares. The area planted annually has been tabulated below.

Table-7.1: Progress of New Planting of Oil Palm in Arunachal Pradesh

Year -->	15-16	16-17	17-18	18-19	19-20	Total
Area (Ha)	330	573	843	557	429	2752

Source: Department of Agriculture Cooperation & Farmers' Welfare, Government of India

Note: The district-wise figures are given at overleaf as per the State Government information. These have some variance with the above year-wise data.

Details of the Processor Companies

The names of the companies which have entered into an MOU with the State Government for oil palm development in Arunachal Pradesh are given as follows.

Table-7.2: Companies involved for the Oil Palm Development in Arunachal Pradesh

Zone	Districts	Processor Company
1	Changlang, Tirap, Lohit & Namsai	Shivasais Oil Palm Ltd.
2	Lower Dibang Valley (Roing)	3F Oil Palm Agrotech Pvt. Ltd.
3	East Siang	Ruchi Soya Industries Ltd.
4	West Siang, Lower Subansiri, Papum Pare & East Kameng	-Do-

Source: Department of Agriculture, Arunachal Pradesh

Note: Zone-4 was initially allotted to Godrej Agrovet Ltd. but it did not proceed further. Hence, this zone was later re-allotted to Ruchi Soya Industries Ltd. In Zone-1, the processor has stalled its work in the past two years.

Potential Areas for Oil Palm in Arunachal Pradesh

The techno-economic feasibility report prepared by the Agriculture Department of Arunachal Pradesh, along with the College of Horticulture & Forestry had identified the following potential areas in the state.

Table-7.3: Potential Areas for Oil Palm in Arunachal Pradesh

	District	Approx. Potential Area (Ha)
1	Lohit (undivided)	25,000
2	Changlang	10,000
3	Tirap	3,500
4	Lower Dibang Valley	30,000
5	East Siang (undivided)	24,000
6	West Siang (undivided)	12,000
7	Lower Subansiri	8,000
8	Papum Pare & East Kameng	19,000
	TOTAL	1,31,500

Source: Techno-Economic Feasibility Report (2013-14)

Areas under the Factory Zones for Oil Palm Development

Table-7.4: Factory Zones for Oil Palm Development (Arunachal Pradesh)

Zone	Districts	Approx. Area (Ha)
1	Lohit (undivided), Tirap & Changlang	32,000
2	Lower Dibang Valley	10,000
3	East Siang	3,500
4	Lower Subansiri, Papum Pare & East Siang	32,000

Source: Agriculture Department, Govt. of Arunachal Pradesh

District-wise Coverage of Areas under Oil Palm

The expansion of oil palm plantation in the different districts of the state has been done as follows.

Table-7.5: Area Expansion for Oil Palm in Arunachal Pradesh (*)

District	15-16	16-17	17-18	18-19	19-20	Total
Tirap	5	30	55	0	0	90
Changlang	15	70	50	0	0	135
Namsai	60	100	43	0	0	203
Lower Dibang Valley	50	180	331	440	56	1057
East Siang	200	250	307	45	13	815
Papum Pare	0	0	5	92	89	186
Kamle	0	0	18	0	4	22
Lower Siang	0	0	0	0	53	53
Total for Year	330	630	809	577	215	2561

(*) Till October 2019

Source: Agriculture Department, Govt. of Arunachal Pradesh

Potential Area

The potential area for the development of oil palm in Arunachal Pradesh has been determined by the Reassessment Committee (2012) and the Reassessment Committee (2020) as follows:

- By the Reassessment Committee (2012): 25,000 Hectares
- By the Reassessment Committee (2020): 133,811 Hectares

Table-6.3 (at the previous page) furnishes the district wise break-up of potential area as assessed by the State Government in 2013-14.

Learning Points

These have been furnished after the next page, and they highlight some of the salient learning points derived from the introduction of oil palm in Arunachal Pradesh, as well as from the state's experience regarding the expansion of area under oil palm.

Best Practices

The narration given after the following page briefly highlights the best practices of oil palm cultivation in Arunachal Pradesh. It relates to the application of irrigation from surface water sources for sandy and gravelled soils in the state.

SWOT Analysis

The SWOT Analysis for Oil Palm in Arunachal Pradesh has been carried out in the next page, based on the experience of the crop in the state.

Goals

As follows (in terms of Area Target & Its Annual Break-up)

(a) Area Target

For a five year period from commencement: 25,000 hectares

(b) Annual Break-up

The break-up of area planned to be covered in Arunachal Pradesh for oil palm development during a five year period from the commencement of implementation has been tabulated as follows.

Table-7.6: Goal for Arunachal Pradesh - Area Expansion

Year →	1	2	3	4	5	Total
Target Area (in Ha)	3,000	5,000	6,000	6,000	5,000	25,000

Note: Area coverage may be re-adjusted within years if needed. This will affect the year-wise investment levels given in the subsequent pages.

SWOT Analysis – Arunachal Pradesh

Strengths

1. Extensive waste and fallow lands are available in the foothill areas that are suitable for oil palm cultivation (as soils are fertile and many soils have good moisture content).
2. As land ceiling laws are not applicable in the state, large scale plantation is possible in the state. Average size of oil palm is higher (about 4 hectare).
3. Good growth of oil palm in terms of girth and canopy.
4. Availability of interested growers; provided that FFB processing units are set up.
5. Good performance by two processors in terms of area expansion.

Weaknesses

1. Processing factory not set up by any of the processor companies, hence fruits are being wasted in the planting area covered 4 years ago (or earlier). This has slowed the existing momentum of expansion in the state.
2. Un-remunerative prices fixed for FFBs (Rs. 8 per kg of FFB against Rs 10 as the reported cost of cultivation).
3. Delays in the receipt of funds by the Implementing Agency.
4. Weak performance of processor in Zone-1.
5. Non-observation of recommended practices (for fertilizers, irrigation, maintenance etc.) by most growers on account of their financial position, fertilizer availability and dependence upon company for advice on growing and maintenance of crop.
6. Lack of labour in many parts of the state.

Opportunities

1. Growing requirements for edible oils, including for palm oil in India, much of which has to be imported.
2. Support of the Government for expansion of oil palm in the entire North Eastern Region.
3. Utilization of palm oil derived products as oleo-chemical feedstock.

Threats

1. International campaign against oil palm on grounds of destruction of forests elsewhere, which includes occasional publicity against oil palm expansion in NE Region.
2. Lower consumption of palm oil by the upper income segments on accounts of fears about its suitability as an edible oil.
3. Cash crops like tea, rubber, ginger etc. are being grown in the potential areas, which are better known to local growers of Arunachal Pradesh.

SWOT analysis helps an organization in planning by identifying its strengths and weaknesses, as well as the opportunities and threats related to its field. In the above analysis, the state is considered as the entity where the analysis is being applied. In the SWOT analysis, it is assumed that strengths and weaknesses are frequently internal, while opportunities and threats are more commonly external.

Learning from Oil Palm Cultivation – Arunachal Pradesh

- The feasibility of oil palm has been established by establishing an experimental plot in the College for Horticulture & Forestry, Pasighat, which could yield up to 25.8 MT of FFBs per hectare per annum (in the 11th year).
- The growers are depending upon the Companies for advice, as the crop is new to the Department. The growers are not in touch with the above college.
- The existing processors have not established any FFB processing unit in the state. This has discouraged the existing growers of Arunachal Pradesh. While the Companies are purchasing some quantities of FFBs, the same are being dumped in pits. The momentum for further development has become stalled.
- The timely payment of subsidy is important, otherwise only affluent large growers can afford to follow the recommended practices, including application of fertilizers and use irrigation during dry days.
- The release of funds received by the State Government takes time, which can delay payments to the growers. This leads the growers to compromise on the recommended practices like use of fertilizers and irrigation.
- South East Asian nations have developed better varieties which give higher yields. Malaysia has offered some of these varieties, but existing Government quarantine rules may make their induction a time-consuming process.

BEST PRACTICE – ARUNACHAL PRADESH

Successfully Growing Oil Palm on Sandy Gravelly Soil

Significant parts of Arunachal Pradesh are characterized by porous sandy gravelly soil with low clay content (below 20%). This leads to water stress for horticultural crops during the dry season, as the water holding capacity of such soils is lower. Hence, irrigation during the dry months will be needed.

The College for Horticulture & Forestry, Pasighat undertook a work to demonstrate the growing of oil palm in sandy and gravelly soil under conditions of irrigation and application of fertigation.

The construction of polythene-lined water harvesting structures was undertaken to provide a source of surface water. Polythene of 250 gsm was used for lining the bottom and side surfaces of the structure, in order to prevent the out-filtration of the stored water.

The above structure was used for providing micro-irrigation with fertigation to oil palm grown nearby. The yield was computed to be 25.8 MT per hectare during the 11th year of the irrigated crop. As reported by the researchers from the College, the average life of the polythene lined pond is about five years and the cost per litre of storage of the water is less than Rs 0.50/-.

[**Source**: 'CAU Farm Magazine', Volume 9, No. 3 (July – Sept 2019)]

Left: Oil Palm grown on sandy and gravelly soil by the College of Horticulture & Forestry, Pasighat in Arunachal Pradesh with irrigation from surface source (polythene lined water harvesting structure). Fertigation was applied along with observance of the recommended practices to get a yield of 25.8 MT per hectare in the 11th year. **The College was visited by the Consultants during the study.** The College is preparing a Package of Practices specific to the NE Region, based on its experience with the crop.

Main Strategies & Action Points

In order to cover the targeted area in Arunachal Pradesh under oil palm, the major action points are listed below. These include the setting up of processing factories and nurseries in the state.

Planting Expansion

1. Planting will be done in the identified factory zones in the first phase, where sufficient land has been made available for this purpose. Arunachal Pradesh has 4 such zones, where 77,000 hectares are available.

   Responsibilities: Implementing Agency & Processor (Company)

   Implementing Agency has to undertake awareness creation, along with College of Horticulture & Forestry and other stakeholders. Intending growers may be taken to existing plantation areas in the state. Select growers may be taken to other states like Andhra Pradesh, Mizoram etc. where they can be shown the well-maintained plantations and the processing units in those states. Growers may consult more often with the College for adoption of suitable practices.

   Processor has to be associated with the above steps.

   Time Line: From Year-1 to Year-5 as stated at above

2. Steps have to be taken up to either activate the inactive Processor of Zone-1 or to replace it with another company.

   Responsibilities: Implementing Agency & Processor (Zone-1)

   Time Line: Year-1 (or by Year-2 at the most)

3. Cost of establishing oil palm plantation is almost Rs. 177,000 per hectare (incl. micro-irrigation, pump and intake) and Rs. 128,000 for the first three years' maintenance (excluding irrigation facilities) as per estimates, which could be higher for a hilly state. A substantial part of it needs to be subsidized as the growers are facing difficulty in investing due to the large size of area and uncertainty of crop returns.

   Responsibilities: Government of India – for introducing a special scheme for NE Region for establishing oil palm and maintaining newly planted areas with 100% contribution by the Centre.

   Time Line: As per Govt. of India decision

4. The Implementing Agency needs to ensure that irrigation is done during the dry season and that adequate amount of fertilizers is applied, along with observation of the recommended practices. This is especially important given the soil conditions in parts of the state, which have lower clay content and water retaining capacity. Availability of fertilizers at reasonable prices is needed.

   Responsibilities: Implementing Agency (through its Field Staff); the existing Growers and their Associations. In addition, the Processor is to supplement the above activity in its zone, especially ensuring the adequate availability of fertilizers at reasonable prices.

   Time Line: From Year-1 onwards till adequate observation of the practices is ensured.

Processing Unit

1. A processing unit has to be established soon in Arunachal Pradesh, if planting targets are to be achieved. Later on, the capacity of the unit may be augmented or another such unit may be established, depending upon the growth of FFB output in the state. (Total ... 2 units)

   Responsibilities: Processors & Implementing Agency

   Time Line: One factory has to be established soon in Arunachal Pradesh. Another unit may be set up later on, based on the achieved expansion of oil palm areas and the yield of FFBs in the bearing areas of the state. [Land has been identified near Roing in Zone-2 for the factory. In Zone-3 (Pasighat), while about 50 acres is needed, growers have suggested setting up the factory in the IDC Niglok, which may not be optimal as the IDC has a range of industries.]

2. The price for the FFBs has to be economically remunerative for the present growers to show interest, as well as for more numbers to start its plantation.

   [As suggested earlier, this can be addressed to on a regional basis. A system akin to the Price Deficiency Payment System of PM-AASHA can be introduced, based on an annual computation of normative cost of cultivation and regular review of the FFB prices.]

   Responsibilities: Government Committee for FFB prices; and Government of India for the initiation of PDPS-like system

   Time Line: To be done of periodic basis (FFB prices)

Planting Materials

1. In Arunachal Pradesh, the area expansion will require about 49.00 lakh seedlings – for which a suitable number of nurseries (secondary nurseries) can be set up in the state. The annual requirements have been tabulated below. 3F Oil Palm has established a large nursery in its zone.

Table-7.7: Goal for Arunachal Pradesh – Planting Materials for Area Expansion

Year →	1	2	3	4	5	6	7	8	Total
Seedlings ('000s)	435	812	1060	1140	1024	277	117	35	4900

   Note: The above figures for the requirement of seedlings include the numbers needed for the replacement of dead palms in the planted areas for three subsequent years after planting.

   Responsibilities: Processors & Interested Nursery Entrepreneurs

   Time Line: Requirement of Seedlings will be for 8 years (including for the replacement of mortalities in three subsequent years @ 29, 15 and 7 per Ha)

2. The Implementing Agency and Processors will try to ensure a supply of quality seedlings needed for expanding the area under oil palm in the state.

   Responsibilities: Implementing Agency & Processors

   Time Line: Over the above period (including for vacancy infilling as stated at above)

Details of the Implementing Agency

Name & Address of the Agency:

Directorate of Agriculture, Arunachal Pradesh
Krishi Bhawan, D Sector, Naharlagun 791 110

Main Officers: As follows

Director of Agriculture	Mr. Anong Lego
Joint Director	---
Nodal Officer (Oil Palm)	Mr. Idar Nyori, Agri. Development Officer

Investment Requirements & Funding Sources

Investment Required

The total cost for planting 25,000 hectares under oil palm in Arunachal Pradesh is estimated at Rs. 762.50 crore over a period of eight years (five years for the plantation and three years for maintenance). The details have been furnished at the next page. The item-wise break-up is given as follows:

Table-7.8: Investment Requirements for Arunachal Pradesh

Item of Expenditure	Rs in crore	Remarks
Establishment of Plantation	112.50	---
Micro-Irrigation (including Pump-set & Intake)	330.00	Surface sources
Maintenance of Planted Area (Gestation Period)	320.00	Three Years after Planting
Total	762.50	

Note: Additional costs may be needed based on ground conditions for items like (a) terracing of lands with steep terrain; (b) drainage for clayey soils; and (c) investment on extra items like fencing, rodent protection etc.; transport of seedlings to interior areas (beyond 50 km); and cost of submersible pump and tube-well for ground water sources in case of lack of adequate surface water or cost of water-harvesting structures (necessary in parts of the state)

The year-wise requirement of investment is as follows (all in Rs. crore):

Table-7.9: Investment Requirements for Arunachal Pradesh – Year-wise Break-up

Year →	1	2	3	4	5	6	7	8	Total
Investment (Rs. crore)	53.10	98.46	135.61	163.10	160.09	73.48	52.61	26.05	762.50

NB: The above is for 5 years of planting and maintenance of crop for three years after their planting (as calculated at overleaf)

Table-7.10: Fund Requirement for Establishment of Oil Palm and Maintenance for 3 Years in Arunachal Pradesh (25,000 hectares)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	3,000	5,000	6,000	6,000	5,000	---	---	---	25,000
Cost of:										
Establishment	Rs. in Lakh	1350	2250	2700	2700	2250	---	---	---	11250
Micro-Irrigation	-Do-	3960	6600	7920	7920	6600	---	---	---	33000
Maintenance of Planting done in										
Year-1	Rs. in Lakh	---	996	1281	1563	---	---	---	---	3840
Year-2	-Do-	---	---	1,660	2135	2605	---	---	---	6400
Year-3	-Do-	---	---	---	1992	2562	3126	---	---	7680
Year-4	-Do-	---	---	---	---	1992	2562	3126	---	7680
Year-5	-Do-	---	---	---	---	---	1660	2135	2605	6400
Total (**)	-Do-	5310	9846	13561	16310	16009	7348	5261	2605	76250

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares)

(**) Year-wise Total of Costs (all Rs. in Lakh) for (a) Cost of Establishment of Plantation on Area under Planting Target for the Year; (b) Cost of Micro-Irrigation of the target Area including cost of pump-set and surface intake; and (c) Total of the Maintenance Costs for area planted in previous years falling due in the year.

Notes:

1. Costs are taken as follows: (Details are given at Annex-12)
   - Establishment of New Plantations @ Rs. 45,000 per Ha
   - Micro-Irrigation (incl. pump-set and surface intake) @ Rs 132,000 per Ha
2. Maintenance of Plantation (Gestation Period) in Rs. per Ha as follows: 1st Year after planting: 33,200 / 2nd Year: 42,700 / 3rd Year: Rs 52,100, with Total being Rs.128000 per hectare. The above figures exclude any investment and returns from inter-cropping. Details are given at Annex-12.
3. Additional costs will be needed for the following cases: (These have to be computed on the basis of the ground conditions prevailing in the potential areas of the state)
   - Terracing of steep slopes;
   - Drains for clayey soils;
   - Investment on optional items like fencing, rodent protection etc.;
   - Transport of seedlings to interior areas (beyond 50 km); and
   - Cost of submersible pump and tube-well for ground water sources, in case surface water is not available; and Cost of water harvesting structures

Sources of Investment

The sources of investment for Arunachal Pradesh have been summarized below. The details have been furnished at overleaf.

Table-7.11: Sources of Investment for Oil Palm Development in Arunachal Pradesh

	Source of Investment	Rs in crore	Remarks
1	Under NSFM (OS&OP)		
	(a) Government of India	158.63	@ 90% of the fund requirement of Rs. 176.25 crore
	(b) State Government	17.63	@ 10% of the fund requirement
	Sub-total: NFSM – OS&OP	176.25	
2	Govt. of India Special Scheme (Proposed New Scheme)	478.88	Proposed for 100% funding by the Government of India
3	Growers' Contributions	107.38	Balance
	Total	762.50	= (1) + (2) + (3)

Note: Processors' Contribution for: (a) FFB Processing Unit and; (b) setting up and operating costs of Nursery are not included at above, including subsidy proposed for establishment of FFB unit. In addition; capacity building (including training and awareness creation costs) and departmental costs (travel and establishment costs) are extra.

Convergence – Sourcing of funds from Other Government Schemes

The following gives the funding sources from other schemes. This is an indicative list.

(a) **PMGSY**: For the costs of approach roads to nearby villages

(b) **MG-NREGS**: For the costs of water harvesting structure, making of terraces on hill slopes, internal paths etc.

(c) **PM-Krishi Sinchay Yojana (PMKSY)** – Costs of Drip Irrigation

The amounts that can be received from the above sources have not been included, as the same will depend upon the inclusion of the oil palm related investments in the approved plans for the above schemes depending upon Govt. of India fund position, State Govt. priorities and inclusion of items in the Annual Action Plan of MG-NREGS etc. This is beyond the scope of the present assignment.

Table-7.12: Proposed Sources of Fund for Establishment of Oil Palm & Maintenance for 3 Years in Arunachal Pradesh (25,000 Ha)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	3,000	5,000	6,000	6,000	5,000	0	0	0	25,000
ESTABLISHMENT COSTS										
Establishment	Rs. in Lakh	1350.00	2250.00	2700.00	2700.00	2250.00	0.00	0.00	0.00	11250.00
Micro-Irrigation (**)	-Do-	3960.00	6600.00	7920.00	7920.00	6600.00	0.00	0.00	0.00	33000.00
Sub-Total	-Do-	5310.00	8850.00	10620.00	10620.00	8850.00	0.00	0.00	0.00	44250.00
Sources:										
NFSM (OS&OP)	Rs. in Lakh	1665.00	2775.00	3330.00	3330.00	2775.00	0.00	0.00	0.00	13875.00
Govt. of India (***)	-Do-	2695.50	4492.50	5391.00	5391.00	4492.50	0.00	0.00	0.00	22462.50
Grower	-Do-	949.50	1582.50	1899.00	1899.00	1582.50	0.00	0.00	0.00	7912.50
MAINTENANCE COSTS										
Cost	Rs. in Lakh	0.00	996.00	2941.00	5690.00	7159.00	7348.00	5261.00	2605.00	32000.00
Sources										
NFSM (OS&OP)	Rs. in Lakh	0.00	150.00	400.00	700.00	850.00	850.00	550.00	250.00	3750.00
Govt. of India (***)	-Do-	0.00	761.40	2286.90	4491.00	5678.10	5848.20	4239.90	2119.50	25425.00
Grower	-Do-	0.00	84.60	254.10	499.00	630.90	649.80	471.10	235.50	2825.00

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares) (**) Including Pump-sets and Surface intake

(***) under proposed 'Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas' as described at Chapter 8

For the **Establishment Costs** (including Micro-Irrigation, Pump-set and Surface Intake)

- **NFSM (OS&OP)** support is taken at existing levels, i.e. Rs 12,000 per hectare for planting; Rs 30,486 per hectare for micro-irrigation and 50% of cost of pump-set (Rs. 13,000) totalling about Rs. 55,500 per hectare
- **Govt. of India support under Proposed Scheme i**s taken as Rs. 89,850 per hectare, while **Grower Contribution** is to cover the balance (Rs. 31,650). Details are at Chapter-8.

For **Maintenance of the Juvenile Plantations** for 3 Years:

The annual break-up is given as follows for the year of planting and three years hence.

	Year-1	Year-2	Year-3	Total	Remarks
NFSM (Oil Palm)	5,000	5,000	5,000	15,000	NFSM gives Rs 5,000 per year for four years, However the above is computed for 3 years only
New Scheme (Proposed)	25,380	33,930	42,390	101,700	90% of the Balance after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Growers Contribution	2,820	3,770	4,710	11,300	Balance 10% after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Total	33,200	42,700	52,100	1,28,000	---

7.2. Assam: State Specific Plan for Oil Palm Development

Background

The commercial planting of oil palm in Assam commenced in 2015-16. The first steps were taken around Dudhnoi, a town in the Goalpara district of the state. Oil Palm was introduced into the area by a scientist of Krishi Vigyan Kendra (KVK) Goalpara. The local farmers became interested to grow the crop, after hearing about its potential. Besides, they identified potential areas and organized themselves as needed.

The plantation of oil palms started in the area from 2015-16 with the support of the State Government and the Rabha Hasong Autonomous Council. The processor also contributed as per terms of its MOU. This was the first area in Assam to cultivate the crop on commercial basis.

[It may be noted that there is a record of 10 hectares being cultivated in the state earlier on an experimental basis. This had been done under the Technology Mission, which had been operated during the period from 1992-93 to 2003-04.]

Status of Development

As per the records with the Government of India, the total area in Assam covered by oil palm is 2,389 hectares. The following table gives the area planted annually in the state.

Table-7.13: Progress of New Planting of Oil Palm in Assam

Year -->	15-16	16-17	17-18	18-19	19-20	Total
Area (Ha)	560	465	814	300	250	2,389

Source: Agriculture Department, Government of Assam

Note: The district-wise figures are given at below on cumulative basis as per the State Government information. These have some variance with the above year-wise data.

Table-7.14: District-wise Coverage of Areas under Oil Palm (Assam)

	District	Area in Hectares	Remarks
1	Goalpara	1525	These figures cover a period till 2018-19
2	Kamrup	621	
	Total	2146	-Do-

Source: Agriculture Department, Government of Assam

Details of the Processor Companies

The names of the companies which have entered into an MOU with the Government of Assam for oil palm development in the state are given as follows.

Table-7.15: Companies involved for the Oil Palm Development in Assam

	Processor Company	Districts in Factory Zone
1	Shivasais Oil Palm Ltd. Eluru, West Godavari, Andhra Pradesh Chief Executive Officer: Mr. Y S Ranganaikulu	Kamrup, Goalpara & Bongaigaon

Source: Agriculture Department, Government of Assam

Potential Area

The potential area for the development of oil palm in Assam has been determined by the Reassessment Committee (2012) and the Reassessment Committee (2020) as follows:

- By the Reassessment Committee (2012): 25,000 Hectares
- By the Reassessment Committee (2020): 3,75,428 Hectares

The district wise break-up of potential area as assessed by the Committee in 2012 is given below.

Table-6.16: Potential Areas for Oil Palm in Assam (as per Reassessment Committee, 2012)

District →	Goalpara	Kamrup	Bongaigaon	Total
Area (in Ha) →	10,000	5,000	10,000	25,000

Source: Agriculture Department, Government of Assam

Learning Points

The following page highlights some of the major lessons from the introduction of oil palm in Assam and the expansion of area under the crop in the state.

Best Practices

The 'Best Practice' in the state has been described at overleaf. This measure has been to promote the cultivation of two palms as 'Welcome Palm' in front yard of each household.

SWOT Analysis

The SWOT Analysis for Oil Palm in Assam has been carried out in the next page, based on the experience of growing oil palm crop in the state.

Goals: Area Coverage & Annual Break-up

The goal is given as follows in terms of Area Target and Its Annual Break-up.

(a) Area Target

The target for area coverage under oil palm in Assam during a five year period from commencement is 20,000 hectares.

(b) Annual Break-up

The break-up of area planned to be covered under oil palm plantation in the state during a five year period from the commencement of implementation is given as follows.

Table-7.17: Goal for Assam - Area Expansion

Year →	1	2	3	4	5	Total
Area (Ha)	3,000	4,000	5,000	4,000	4,000	20,000

Note: Area coverage may be re-adjusted within years if needed. This will affect the year-wise investment levels for different years as furnished for the state subsequently.

ASSAM – LEARNING & BEST PRACTICE

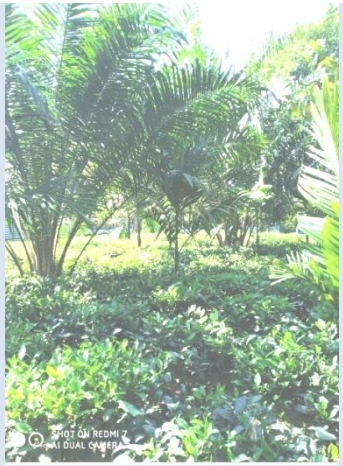
Learning from Oil Palm Cultivation

- Oil palm is a new crop in Assam. As per the growers, it can give good yields in the growing belts and hence the crop can be financially lucrative.
- However, it needs proper irrigation, fertilizers and maintenance for ensuring good yields. The crop has a long gestation period of 4 years.
- A processing unit needs to be established as the crop cannot be used in unprocessed form or sold elsewhere.
- Since the processing unit could not come up (due to COVID pandemic), there has been wastage of fruits, which started yielding fruit from the past year (mid-2019 onwards).
- In addition, the growers have reported delays in the receipt of subsidy, which forces them to invest more amounts.

BEST PRACTICE – WELCOME PALMS

The Growers' Association has convinced many local households to grow two oil palms in their front garden as 'Welcome Palm'. The yield from these palms will help these households to understand the potential of the crop. Hopefully, they will be encouraged to take up oil palm in a bigger way in the future.

Photograph on right shows 'Welcome Palms' grown by a household in the Goalpara district of Assam



ASSAM -SWOT ANALYSIS

Strengths

1. Growing area is climatically suitable, despite low minimum temperatures and scanty rainfall in the cool dry months.
2. Availability of area which is comparatively accessible and consists mostly of flat land
3. Interest of most of the growers

Weaknesses

1. Lack of contiguous land for large scale plantation
2. Cost of cultivation is high, transport cost to some interior foothill sites is also high
3. Most of the growers are financially weak.
4. The use of irrigation in dry season and application of fertilizers is almost absent, which will affect yield
5. The processing unit has not be established

Opportunities

- Assured market of palm oil in India
- Relatively well connected to the rest of India

Threats

1. Availability of substitutes to palm oil for cooking and other uses
2. International campaign against oil palm expansion
3. Other cash crops can be grown locally like areca nut, banana etc. which need no processing and which have ready local and regional markets.

SWOT analysis is a technique used to help an organization in planning by identifying its strengths and weaknesses, as well as the opportunities and threats related to its line of work. In the above analysis, the state is considered as the entity where the technique is being applied. In the SWOT analysis, it is assumed that strengths and weaknesses are frequently internal, while opportunities and threats are more commonly external.

Main Strategies & Action Points

The principal action points for oil palm development in Assam, including the development of processing capacity and nursery are as follows.

Planting Expansion

1. Planting will be done in the identified three districts in the first phase, before other districts are targeted. Adequate area is available here for achieving the proposed area expansion.

   Responsibilities: Implementing Agency & Processor

   Implementing Agency has to undertake awareness creation, along with KVKs and other stakeholders (Farmers Associations etc.). In addition, intending growers may be taken to existing plantation areas in the state. Select growers may be taken to other states like AP, Mizoram etc. where they can be shown the well-maintained plantations and the processing units.

   Processor has to be associated with the above steps.

   Time Line: From Year-1 to Year-5 as stated at above

2. Cost of cultivation is Rs 1.20 lakh per hectare (as per Government) and may be even higher as assessed in this Report (almost Rs. 45,000 for establishing one hectare and over Rs. 128,000 for the first three years' maintenance). In addition, about Rs. 32,000 is needed for pump-set and surface intake, besides Rs 103,000 for micro-irrigation on one hectare. A substantial part of it needs to be subsidized as almost all the growers in Assam are economically weak.

   Responsibilities: Government of India – for introducing a special scheme for NE Region for establishing oil palm and maintaining newly planted areas with 100% contribution by the Centre

   Time Line: As per Govt. of India decision

3. The Implementing Agency needs to ensure that irrigation is done during the dry season and that adequate amount of fertilizers is applied, along with observation of the recommended practices.

   Responsibilities: Implementing Agency (through its Field Staff); the existing Growers and their Associations

   Time Line: From Year-1 onward till adequate observance is achieved

Processing Unit

1. As planned, the processing unit has to be established soon in the growing area of Assam, if the above planting targets are to be achieved.

   Responsibilities: Processors & Implementing Agency

   Time Line: One unit has to be set up soon, while other units may be established later on, based on the expansion and yield of FFBs in the growing areas of the state.

2. The price for the FFBs has to be economically remunerative for the present growers to show interest, as well as for more numbers to start its plantation.

   [As suggested earlier, this can be addressed to on a regional basis. A system akin to the Price Deficiency Payment System of PM-AASHA can be introduced, based on an annual computation of normative cost of cultivation and regular review of the FFB prices.]

   Responsibilities: Government Committee for FFB prices; and Government of India for the initiation of PDPS-like system

   Time Line: To be done of periodic basis (for the FFB prices)

Planting Materials

1. The area expansion will require about 39.20 lakh seedlings – for which a suitable number of nurseries (secondary nurseries) can be set up in the state. The year-wise break is furnished below, including for seedlings to ensure that dead palms are replaced.

Table-7.18: Goal for Assam – Planting Materials for Area Expansion

Year →	1	2	3	4	5	6	7	8	Total
Seedlings ('000s)	435	667	886	806	799	211	88	28	3920

   Note: The above figures for the requirement of seedlings include the numbers needed for the replacement of dead palms in the planted areas for three subsequent years after planting.

   Responsibilities: Processors & Interested Nursery Entrepreneurs

   Time Line: Requirement of Seedlings will be for 8 years, including for the replacement of mortalities in three subsequent years @ 29, 15 and 7 per Ha

2. The Implementing Agency and Processors will try to ensure a supply of quality seedlings needed for expanding the area under oil palm in the state.

   Responsibilities: Implementing Agency & Processors

   Time Line: Over the above period (including for vacancy infilling as stated at above)

Details of the Implementing Agency

Name & Address of the Agency:

Directorate of Agriculture, Govt. of Assam,
Krishi Bhawan, Khanapara, Guwahati-22

Main Officers: As follows:

Director of Agriculture	Mr. Akash Deep, IAS
Joint Director (Pulses)	Mr. Prafulla Mahanta
Nodal Officer (OS&OP)	Mr. Rabindra Sarmah
Assisting Officer (OS&OP)	Mr. M A Akanda

Investment Requirements & Funding Sources

Investment Required

The total cost for the establishment of 20,000 hectares of oil palm plantation in Assam has been estimated as Rs. 610.00 crore. This amount will be needed over a period of eight years, including five years for the plantation and three years for the maintenance of each planted area. The item-wise break-up is given as follows.

Table-7.19: Investment Requirements for Assam

Item of Expenditure	Rs in crore	Remarks
Establishment of Plantation	90.00	---
Micro-Irrigation (including Pump-set & Intake)	264.00	Surface sources
Maintenance of Planted Area (Gestation Period)	256.00	Three Years after Planting
Total	610.00	

Note: Additional costs may be needed based on ground conditions for items like:

- terracing of lands with steeper terrain;
- drainage for clayey soils; and
- investment on extra items like fencing, rodent protection etc.; transport of seedlings to interior areas (beyond 50 km); and cost of submersible pump and tube-well for ground water sources in case of lack of adequate surface water or cost of water-harvesting structures.

The details regarding the above investments have been furnished at overleaf, including the annual break-up of investment needs.

Year-wise Requirement of Funds

The year-wise requirement of investment is as follows (all in Rs. crore):

Table-7.20: Investment Requirements Assam – Year-wise Break-up

Year →	1	2	3	4	5	6	7	8	Total
Investment (Rs. crore)	53.10	80.76	114.59	120.11	126.27	56.41	37.92	20.84	610.00

NB: The above is for 5 years of planting and maintenance of crop for three years after their planting as calculated at overleaf.

Table-7.21: Fund Requirement for Establishment of Oil Palm and Maintenance for 3 Years in Assam (20,000 hectares)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	3,000	4,000	5,000	4,000	4,000	---	---	---	20,000
Cost of:										
Establishment	Rs. in Lakh	1350	1800	2250	1800	1800	---	---	---	9000
Micro-Irrigation	-Do-	3960	5280	6600	5280	5280	---	---	---	26400
Maintenance of Planting done in										
Year-1	Rs. in Lakh	---	996	1281	1563	---	---	---	---	3840
Year-2	-Do-	---	---	1,328	1708	2084	---	---	---	5120
Year-3	-Do-	---	---	---	1660	2135	2605	---	---	6400
Year-4	-Do-	---	---	---	---	1328	1708	2084	---	5120
Year-5	-Do-	---	---	---	---	---	1328	1708	2084	5120
Total (**)	-Do-	5310	8076	11459	12011	12627	5641	3792	2084	61000

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares)

(**) Year-wise Total of Costs (all Rs. in Lakh) for (a) Cost of Establishment of Plantation on Area under Planting Target for the Year; (b) Cost of Micro-Irrigation of the target Area including cost of pump-set and surface intake; and (c) Total of the Maintenance Costs for area planted in previous years falling due in the year.

Notes:

1. Costs are taken as follows: (Details are given at Annex-12)
   - Establishment of New Plantations @ Rs. 45,000 per Ha
   - Micro-Irrigation (incl. pump-set and surface intake) @ Rs 132,000 per Ha
2. Maintenance of Plantation (Gestation Period) in Rs. per Ha as follows: 1st Year after planting: 33,200 / 2nd Year: 42,700 / 3rd Year: Rs 52,100, with Total being Rs.128000 per hectare. The above figures exclude any investment and returns from inter-cropping. Details are given at Annex-12.
3. Additional costs will be needed for the following cases: (These have to be computed on the basis of the ground conditions prevailing in the potential areas of the state)
   - Terracing of steep slopes;
   - Drains for clayey soils;
   - Investment on optional items like fencing, rodent protection etc.;
   - Transport of seedlings to interior areas (beyond 50 km); and
   - Cost of submersible pump and tube-well for ground water sources, in case surface water is not available; and Cost of water harvesting structures

Sources of Investment

The sources of investment for establishing oil palm in Assam have been summarized below. The details have been furnished at overleaf.

Table-7.22: Sources of Investment for Oil Palm Development in Assam

	Source of Investment	Rs in crore	Remarks
1	Under NSFM (OS&OP)		
	(a) Government of India	126.90	@ 90% of the fund requirement of Rs. 141.00 crore
	(b) State Government	14.10	@ 10% of the fund requirement
	Sub-total: NFSM – OS&OP	141.00	
2	Govt. of India Special Scheme (Proposed New Scheme)	383.10	Proposed for 100% funding by the Government of India
3	Growers' Contributions	85.90	Balance
	Total	610.00	= (1) + (2) + (3)

Note: Processors' Contribution for: (a) FFB Processing Unit and; (b) setting up and operating costs of Nursery are not included at above, including subsidy proposed for establishment of FFB unit. In addition; capacity building (including training and awareness creation costs) and departmental costs (travel and establishment costs) are extra.

Convergence – Sourcing of funds from Other Government Schemes

The following gives the funding sources from other schemes. This is an indicative list.

(a) **PMGSY**: For the costs of approach roads to nearby villages

(b) **MG-NREGS**: For the costs of water harvesting structure, making of terraces on hill slopes, internal paths etc.

(c) **PM-Krishi Sinchay Yojana (PMKSY)** – Costs of Drip Irrigation

The amounts that can be received from the above sources have not been included, as the same will depend upon the inclusion of the oil palm related investments in the approved plans for the above schemes depending upon Govt. of India fund position, State Govt. priorities and inclusion of items in the Annual Action Plan of MG-NREGS etc. This is beyond the scope of the present assignment.

Table-7.23: Proposed Sources of Fund for Establishment of Oil Palm and Maintenance for 3 Years in Assam (20,000 hectares)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	3,000	4,000	5,000	4,000	4,000	0	0	0	20,000
ESTABLISHMENT COSTS										
Establishment	Rs. in Lakh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Micro-Irrigation (**)	-Do-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	-Do-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sources:										
NFSM (OS&OP)	Rs. in Lakh	1665.00	2220.00	2775.00	2220.00	2220.00	0.00	0.00	0.00	11100.00
Govt. of India (***)	-Do-	2695.50	3594.00	4492.50	3594.00	3594.00	0.00	0.00	0.00	17970.00
Grower	-Do-	949.50	1266.00	1582.50	1266.00	1266.00	0.00	0.00	0.00	6330.00
MAINTENANCE COSTS										
Cost	Rs. in Lakh	0.00	996.00	2609.00	4931.00	5547.00	5641.00	3792.00	2084.00	25600.00
Sources										
NFSM (OS&OP)	Rs. in Lakh	0.00	150.00	350.00	600.00	650.00	650.00	400.00	200.00	3000.00
Govt. of India (***)	-Do-	0.00	761.40	2033.10	3897.90	4407.30	4491.90	3052.80	1695.60	20340.00
Grower	-Do-	0.00	84.60	225.90	433.10	489.70	499.10	339.20	188.40	2260.00

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares) (**) Including Pump-sets and Surface intake

(***) under proposed 'Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas' as described at Chapter 8

For the **Establishment Costs** (including Micro-Irrigation, Pump-set and Surface Intake)

- **NFSM (OS&OP)** support is taken at existing levels, i.e. Rs 12,000 per hectare for planting; Rs 30,486 per hectare for micro-irrigation and 50% of cost of pump-set (Rs. 13,000) totalling about Rs. 55,500 per hectare
- **Govt. of India support under Proposed Scheme i**s taken as Rs. 89,850 per hectare, while **Grower Contribution** is to cover the balance (Rs. 31,650). Details are at Chapter-8.

For **Maintenance of the Juvenile Plantations** for 3 Years:

The annual break-up is given as follows for the year of planting and three years hence.

	Year-1	Year-2	Year-3	Total	Remarks
NFSM (Oil Palm)	5,000	5,000	5,000	15,000	NFSM gives Rs 5,000 per year for four years, However the above is computed for 3 years only
New Scheme (Proposed)	25,380	33,930	42,390	101,700	90% of the Balance after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Growers Contribution	2,820	3,770	4,710	11,300	Balance 10% after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Total	33,200	42,700	52,100	1,28,000	---

7.3. Manipur: State Specific Plan for Oil Palm Development

Background

The Reassessment Committee (2020) has identified 66,652 hectares of land as being the potential area for oil palm cultivation in Manipur. In order to implement the project for oil palm expansion in the state, the State Government has constituted an Oil Palm Mission Manipur headed by a Joint Director of Agriculture as Mission Director. In addition, a Sub-Committee on Oil Palm Manipur has been formed under the Chair of the Principal Secretary and consisting of members from Central Agricultural University, ICAR-NEH Region (Manipur), Manipur Remote Sensing Application Centre apart from officers of the Line Departments.

The Agriculture Department has already submitted a DPR for the growing of oil palm on 5,000 hectares of land in the state. On the 12th November 2020, the Oil Palm Mission Manipur was formally launched by the Hon'ble Chief Minister of Manipur. In addition, the Sub-Committee on Oil Palm Manipur has drafted a bill for the Regulation of Production, Processing & Marketing of FFBs in the state. This will be placed before the State Cabinet soon.

Status of Development

The planting of oil palm is yet to be started on a commercial basis in the state of Manipur. (Status in November 2020)

Processing Company

The State Government has not yet entered into MOU with any company for the development of oil palm in the state.

Potential Area

The potential area for the development of oil palm in Mizoram has been determined as follows. This has been done by the Government of India Committees established for this purpose:

- By the Reassessment Committee (2012): Not assessed
- By the Reassessment Committee (2020): 66,652 Hectares

Details of the Implementing Agency

Name & Address of the Agency Directorate of Agriculture, Manipur
Sanjengthong, Imphal East 795 001

Main Officers

Director	Ms. LALTANPUII VANCHHONG IAS
Joint Director	Mr. TODINANG PANMEI

SWOT Analysis

The SWOT Analysis for the development of oil palm in Manipur has been furnished at the next page, based on the state's suitability and plans for growing the crop.

SWOT ANALYSIS FOR OIL PALM IN MANIPUR

Strengths

1. The state has over 66,000 hectares of potential area for oil palm as per the assessment made in 2020.
2. The climate and soil of the state have been deemed as suitable for growing oil palm.

Weaknesses

1. The state has not undertaken any plantation of oil palm on a commercial scale. Hence, the Government and intending Growers have to get experience about the crop.
2. The state is located far away from the nearest FFB processing unit and palm oil refinery, which can depress the FFB off-take and prices.
3. Growers of the state have to become aware of the crop practices, while the cultural operations for oil palm have to be adapted for the state's conditions.

Opportunities

1. The Government of India is supporting the expansion of oil palm in the entire North Eastern Region, while the State Government has started focussing on oil palm.
2. There are fast growing requirements for edible oils, including for palm oil in India, almost all of which has to be imported. Hence, there are attempts to increase indigenous output.
3. There is a wide range of applications of the items derived from palm oil in cooking, food units and oleo-chemical industries

Threats

1. There are alternative cash crops that can be grown in Manipur with minimal processing requirements and local consumption. These include horticultural crops, ginger, bamboo etc. which can yield good incomes to the growers. Besides, these are known to the local growers.
2. The roads from the state to other parts of India are prone to landslides during the rainy season. Besides, there are frequent disruptions due to agitations on the route.
3. Globally, activists have been quite vocal against oil palm expansion, including in the North Eastern part of India.

About SWOT Analysis

SWOT analysis helps an organization in planning by identifying its strengths and weaknesses, as well as the opportunities and threats related to its field. In the above analysis, the state is considered as the entity where the analysis is being applied. In the SWOT analysis, it is assumed that strengths and weaknesses are frequently internal, while opportunities and threats are more commonly external.

Goals – Area Expansion & Its Annual Break-up

As follows (in terms of Area Target & Its Annual Break-up)

(a) Area Target

The target for area expansion of oil palm in Manipur during the five year period is 5,000 hectares.

(b) Annual Break-up

The break-up of the area that is planned to be covered in Manipur under the oil palm during a five year period has been tabulated below.

Table-7.24: Goal for Manipur - Area Expansion

Year →	1	2	3	4	5	Total
Target Area (in Ha)	200	800	1,600	1,400	1,000	5,000

Note: Area coverage may be re-adjusted within the above years if needed. This will affect the year-wise investment levels given in the subsequent pages.

Main Strategies & Action Points

In order to cover the above-mentioned area in Manipur under oil palm, the major action points are listed below. These include the setting up of nurseries in the state, as well as planning for a FFB processing unit.

Establishing Plantations

Oil palm plantations have to be established in the state, with growers being new to the crop. Hence the following action points are suggested:

1. Awareness creation amongst intending growers of the state about the crop and its growing requirements and prospects;
2. Training those who register themselves for growing and harvesting the crop;
3. Exposure visits of officials and growers to states in the region and to Andhra Pradesh;
4. Hand-holding the initial land preparation and planting activities; and
5. Ensuring the proper conduct of cultural operations like application of fertilizers, irrigation during the dry periods, weeding, mulching, pest control and other activities.

Responsibilities: Implementing Agency, Growers and their Associations, and Processor.

Time-lines: Covering all five years of this Action Plan

Planning for FFB Processing Unit

While initial areas may not be large enough for the establishment of a FFB processing unit, the planning for the same has to be started soon. This includes the identification of suitable land for the factory in area having adequate road connection, power supply and source of water. Once the output of FFB from (about) 1500-2000 hectares of maturing plantations (4th Year onward) reaches about 10,000 MT per annum, it may be possible to operate a factory of capacity 5 MT per hour.

Responsibilities: Implementing Agency, Revenue Department and other concerned agencies of the State Government, and Processor Company.

Time-lines: Land Identification and finalization in Year-1 and Year-2, other activities can commence thereafter.

Arranging Planting Materials

1. The planting of oil palm over a considerable area of 5,000 hectares will require a large number of seedlings (9.80 lakh) in 5 years, both for the initial planting as well as for the replacement of dead palms (vacancy in-filling).

   The requirements have been tabulated below, considering both initial needs as well as vacancy in-filling needs @ 25, 15 and 7 seedlings in the 1st, 2nd and 3rd years after the planting has been done in a particular place.

Table-7.25: Goal for Manipur – Planting Materials for Area Expansion

Year →	1	2	3	4	5	6	7	8	Total
Seedlings ('000s)	29	121.8	258.2	262.8	215.2	61.2	24.8	7	980

   Note: The above figures for the requirement of seedlings include the numbers needed for the replacement of dead palms in the planted areas for three subsequent years after planting.

2. The stakeholders have to ensure that the seedlings supplied for oil palm area expansion have been checked for their quality.

Responsibilities: Implementing Agency and Processor, Growers' Associations.

Time-lines: Covering all five years of this Action Plan, and beyond for three years.

Establishing a Price Fixation Committee

The State Government has to establish a Price Fixation Committee which can fix the FFB prices on a periodic basis. The above committee can have membership from the Government, Processor Companies and the Growers.

Responsibilities: State Government.

Time-lines: After the passage of a Bill for the regulation of oil palm development in the state. (A bill has been prepared, as reported).

Investment Requirements & Funding Sources

Investment Required

The total cost for planting 5,000 hectares under oil palm in Manipur is estimated at Rs. 152.50 crore over a period of eight years (five years for the plantation and three years for maintenance). The details have been furnished after the next page.

The item-wise break-up is given as follows:

Table-7.26: Investment Requirements for Manipur

Item of Expenditure	Rs in crore	Remarks
Establishment of Plantation	22.50	---
Micro-Irrigation (including Pump-set & Intake)	66.00	Surface sources
Maintenance of Planted Area (Gestation Period)	64.00	Three Years after Planting
Total	152.50	

Note: Additional costs may be needed based on ground conditions for items like (a) terracing of lands with steep terrain; (b) drainage for clayey soils; and (c) investment on extra items like fencing, rodent protection etc.; transport of seedlings to interior areas (beyond 50 km); and cost of submersible pump and tube-well for ground water sources in case of lack of adequate surface water or cost of water-harvesting structures (necessary in parts of the state)

Year-wise Break-up of the Investment Requirements

The year-wise requirement of investment is as follows (all in Rs. crore):

Table-7.27: Investment Requirements for Manipur – Year-wise Break-up

Year →	1	2	3	4	5	6	7	8	Total
Investment (Rs. crore)	3.54	14.82	31.83	34.55	33.35	17.63	11.56	5.21	152.50

NB: The above is for 5 years of planting and maintenance of crop for three years after their planting (as calculated at overleaf)

Sources of Investment

The sources of investment for Manipur have been summarized below. The details have been furnished after the next page.

Table-7.28: Sources of Investment for Oil Palm Development in Manipur

	Source of Investment	Rs in crore	Remarks
1	Under NSFM (OS&OP)		
	(a) Government of India	31.73	@ 90% of the fund requirement of Rs. 35.25 crore
	(b) State Government	3.53	@ 10% of the fund requirement
	Sub-total: NFSM – OS&OP	35.25	
2	Govt. of India Special Scheme (Proposed New Scheme)	95.78	Proposed for 100% funding by the Government of India
3	Growers' Contributions	21.48	Balance
	Total	152.50	= (1) + (2) + (3)

Note: Processors' Contribution for: (a) FFB Processing Unit and; (b) setting up and operating costs of Nursery are not included at above, including subsidy proposed for establishment of FFB unit. In addition; capacity building (including training and awareness creation costs) and departmental costs (travel and establishment costs) are extra.

Table-7.29: Fund Requirement for Establishment of Oil Palm and Maintenance for 3 Years in Manipur (5,000 hectares)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	200	800	1,600	1,400	1,000	---	---	---	5,000
Cost of:										
Establishment	Rs. in Lakh	90	360	720	630	450	---	---	---	2250
Micro-Irrigation	-Do-	264	1056	2112	1848	1320	---	---	---	6600
Maintenance of Planting done in										
Year-1	Rs. in Lakh	---	66.4	85.4	104.2	---	---	---	---	256
Year-2	-Do-	---	---	266	341.6	416.8	---	---	---	1024
Year-3	-Do-	---	---	---	531.2	683.2	833.6	---	---	2048
Year-4	-Do-	---	---	---	---	464.8	597.8	729.4	---	1792
Year-5	-Do-	---	---	---	---	---	332	427	521	1280
Total (**)	-Do-	354	1482.4	3183	3455	3334.8	1763.4	1156.4	521	15250

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares)

(**) Year-wise Total of Costs (all Rs. in Lakh) for (a) Cost of Establishment of Plantation on Area under Planting Target for the Year; (b) Cost of Micro-Irrigation of the target Area including cost of pump-set and surface intake; and (c) Total of the Maintenance Costs for area planted in previous years falling due in the year.

Notes:

1. Costs are taken as follows: (Details are given at Annex-12)
   - Establishment of New Plantations @ Rs. 45,000 per Ha
   - Micro-Irrigation (incl. pump-set and surface intake) @ Rs 132,000 per Ha
2. Maintenance of Plantation (Gestation Period) in Rs. per Ha as follows: 1st Year after planting: 33,200 / 2nd Year: 42,700 / 3rd Year: Rs 52,100, with Total being Rs.128000 per hectare. The above figures exclude any investment and returns from inter-cropping. Details are given at Annex-12.
3. Additional costs will be needed for the following cases: (These have to be computed on the basis of the ground conditions prevailing in the potential areas of the state)
   - Terracing of steep slopes;
   - Drains for clayey soils;
   - Investment on optional items like fencing, rodent protection etc.;
   - Transport of seedlings to interior areas (beyond 50 km); and
   - Cost of submersible pump and tube-well for ground water sources, in case surface water is not available; and Cost of water harvesting structures

Table-7.30: Proposed Sources of Fund for Establishment of Oil Palm & Maintenance for 3 Years in Manipur (5,000 Ha)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	200	800	1,600	1,400	1,000	0	0	0	5,000
ESTABLISHMENT COSTS										
Establishment	Rs. in Lakh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Micro-Irrigation (**)	-Do-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	-Do-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sources:										
NFSM (OS&OP)	Rs. in Lakh	111.00	444.00	888.00	777.00	555.00	0.00	0.00	0.00	2775.00
Govt. of India (***)	-Do-	179.70	718.80	1437.60	1257.90	898.50	0.00	0.00	0.00	4492.50
Grower	-Do-	63.30	253.20	506.40	443.10	316.50	0.00	0.00	0.00	1582.50
MAINTENANCE COSTS										
Cost	Rs. in Lakh	0.00	66.40	351.00	977.00	1564.80	1763.40	1156.40	521.00	6400.00
Sources										
NFSM (OS&OP)	Rs. in Lakh	0.00	10.00	50.00	130.00	190.00	200.00	120.00	50.00	750.00
Govt. of India (***)	-Do-	0.00	50.76	270.90	762.30	1237.32	1407.06	932.76	423.90	5085.00
Grower	-Do-	0.00	5.64	30.10	84.70	137.48	156.34	103.64	47.10	565.00

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares) (**) Including Pump-sets and Surface intake

(***) under proposed 'Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas' as described at Chapter 8

For the **Establishment Costs** (including Micro-Irrigation, Pump-set and Surface Intake)

- **NFSM (OS&OP)** support is taken at existing levels, i.e. Rs 12,000 per hectare for planting; Rs 30,486 per hectare for micro-irrigation and 50% of cost of pump-set (Rs. 13,000) totalling about Rs. 55,500 per hectare
- **Govt. of India support under Proposed Scheme i**s taken as Rs. 89,850 per hectare, while **Grower Contribution** is to cover the balance (Rs. 31,650). Details are at Chapter-8.

For **Maintenance of the Juvenile Plantations** for 3 Years:

The annual break-up is given as follows for the year of planting and three years hence.

	Year-1	Year-2	Year-3	Total	Remarks
NFSM (Oil Palm)	5,000	5,000	5,000	15,000	NFSM gives Rs 5,000 per year for four years, However the above is computed for 3 years only
New Scheme (Proposed)	25,380	33,930	42,390	101,700	90% of the Balance after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Growers Contribution	2,820	3,770	4,710	11,300	Balance 10% after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Total	33,200	42,700	52,100	1,28,000	---

Convergence – Sourcing of funds from Other Government Schemes

The following gives the funding sources from other schemes. This is an indicative list.

(a) **PMGSY**: For the costs of approach roads to nearby villages

(b) **MG-NREGS**: For the costs of water harvesting structure, making of terraces on hill slopes, internal paths etc.

(c) **PM-Krishi Sinchay Yojana (PMKSY)** – Costs of Drip Irrigation

The amounts that can be received from the above sources have not been included, as the same will depend upon the inclusion of the oil palm related investments in the approved plans for the above schemes depending upon Govt. of India fund position, State Govt. priorities and inclusion of items in the Annual Action Plan of MG-NREGS etc. This is beyond the scope of the present assignment.

7.4. Mizoram: State Specific Plan for Oil Palm Development

Background

Mizoram was the pioneering state in NE Region to take up oil palm cultivation on large-scale with the involvement of companies. Initial planting was done in 1999-2000 in pockets of Lunglei and Kolasib districts. Based on the promising results, the planting of this crop was started in 2004-05. This was taken up under the New Land Use Policy (NLUP), which sought to support stable and permanent livelihoods in the state in order to replace jhum (shifting cultivation). Oil palm was identified as a suitable crop for this purpose.

In December 2004, the state passed The Mizoram Oil Palm (Regulation of Cultivation & Processing) Act to facilitate the development of the crop on a PPP mode, with growers and companies coming together under the aegis of the State Government. In 2005 and 2006, the MOUs were signed with three companies for growing oil palm in seven districts of the state.

Status of Development

As per the records with the Government of India, the total area in Mizoram covered by oil palm is 28,914 hectares (up to FY 2018-19). The annual area planted has been tabulated below.

Table-7.31: Progress of New Planting of Oil Palm in Mizoram

Year -->	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13
Area (Ha)	12	24	185	1614	2547	3499	1877	1970	3711
Year -->	13-14	14-15	15-16	16-17	17-18	18-19	19-20	Total	
Area (Ha)	4532	2789	2981	1669	885	NA	NA	28914	

Source: Department of Agriculture Cooperation & Farmers' Welfare, Government of India

Note: The figures for area expansion as reported by the State Government are found to be lower for the period up to FY 09-10 (inclusive). The district-wise figures are given at overleaf as per the State Government data.

Processing Company

The State Government had entered into MOUs with three companies, viz. Godrej Agrovet (in September 2005); 3F Oil Palm Agrotech Ltd. (in March 2006) and Ruchi Soya Industries Ltd. (in October 2006). The above companies were each allotted districts as their 'factory zone', the details being tabulated below.

Table-7.32: Companies involved for the Oil Palm Development in Mizoram

	Districts	Processor Company	Remarks
1	Kolasib & Mamit	Godrej Agrovet Ltd.	Established the first FFB processing unit in NE India
2	Aizawl, Serchhip & Saiha	3F Oil Palm Agrotech Ltd.	Applied for withdrawal
3	Lunglei & Lawngtlai	Ruchi Soya Industries Ltd.	---

Source: Department of Agriculture, Mizoram

The FFB processing factory established by Godrej Agrovet Ltd. in Kolasib district of the state is the first such unit in the NE Region.

District-wise Progress of Area Expansion

The following table gives the progress of area under oil palm in Mizoram up to 2014-15. The table has been filled up as per data made available in the public domain by the State Government.

Table-7.33: Oil Palm Development in Mizoram: District-wise Data

Year	Area Planted in Districts (in Ha)							TOTAL (in Ha)
	KOLASIB	MAMIT	AIZAWL	SERCHHIP	LUNGLEI	LAWNGTLAI	SAIHA	
2005-06	82	0	0	0	28	0	0	110
2006-07	24	0	0	0	0	0	0	24
2007-08	543	267	0	0	15	0	0	825
2008-09	964	476	0	42	218	0	0	1700
2009-10	997	697	0	342	806	0	0	2842
2010-11	489	474	0	310	500	105	0	1878
2011-12	478	350	26	250	562	300	0	1966
2012-13	1039	928	50	327	750	617	0	3711
2013-14	711	1300	331	381	852	957	0	4532
2014-15	694	238	102	216	927	570	42	2789
2015-16	437	402	286	201	631	980	44	2981
2016-17	330	379	64	61	601	234	0	1669
2017-18	65	101	0	0	332	398	0	896
2018-19	55	80	0	0	170	303	0	608
2019-20	53	54	0	0	4	0	0	111
TOTAL	**6961**	**5746**	**859**	**2130**	**6396**	**4464**	**86**	**26642**

Source: Directorate of Agriculture, Government of Mizoram

Potential Area

The potential area for the development of oil palm in Mizoram has been determined as follows, by the Government committees established for this purpose: (a) By the Reassessment Committee (2012): 61,000 Hectares; and (b) By the Reassessment Committee (2020): 66,792 Hectares.

SWOT Analysis

The SWOT Analysis for the development of oil palm in Mizoram has been furnished at the next page, based on the state's long experience of growing the crop.

Learning Points

These have been furnished after the next page, and they highlight some of the salient learning points derived from the introduction of oil palm in Mizoram, as well as from the state's experience regarding the expansion of area under oil palm.

Best Practices

Mizoram is one of the states that have passed an act to regulate the cultivation and processing of oil palm. This had been enacted in 2004 in order to (inter alia) protect interests of the grower and the viability of the company, so that the development of oil palm occurs in an orderly manner.

The **growers** located within a particular zone will supply all FFBs to a designated company and to no other person or organization. The **company** needs to buy all the FFBs produced by the growers within its factory zone at a price not less than fixed by the government. If the company fails to buy the FFBs without any valid reason, it is liable to pay compensation to growers.

SWOT ANALYSIS – MIZORAM

Strengths

1. Mizoram was the first state in NE Region to start oil palm plantation on commercial scale. The Government and growers have adequate experience with the crop.
2. It has both a seed garden (to supply quality sprouts to nurseries) and a FFB processing factory (to handle the milling of harvested FFBs). No other state in the NE Region has either of the two facilities, viz. seed garden or FFB processing unit.
3. The state has 61,000 hectares of potential area for oil palm as per the assessment made in 2012, out of which less than half have been planted.
4. It is the only state which has enacted legislation to regulate the production and processing of oil palm, which offers legal protection to the stakeholders.

Weaknesses

1. The road system to the collection centres is under-developed, which hinders the aggregation of the harvested crop.
2. Growers are receiving non-remunerative prices for the FFBs for a long time (last seven years), which affects their incomes.
3. Most of the growers are not practising the recommended practices like application of fertilizers, irrigation during the dry months, regular maintenance of the plantations etc. This can affect their yields. The recorded output of FFBs is low compared to the area reported to have been planted.
4. The state is far off from the nearest refinery in West Bengal, as the trucks have to take a circuitous route through the territory of India, which pushes up the hire charges substantially.
5. The production of CPO remains low as per the reports.

Opportunities

1. The Government of India supports the expansion of oil palm in the entire North Eastern Region, while the State Government is also focussing on oil palm.
2. There are fast growing requirements for edible oils, including for palm oil in India, much of which has to be imported. Hence, there are attempts to increase indigenous output.
3. There is a wide range of applications of products derived from palm oil in food and oleo-chemical industries.

Threats

1. There are alternative cash crops that can be grown in Mizoram with lower processing requirements (if at all) and local markets. These include vegetables, areca nut, bamboo etc. which can yield good incomes to the growers.
2. The road and rail communication to other parts of India are prone to disruptions during the rainy season. Besides, there are occasional disruptions due to agitations on the route.
3. Globally, activists have been agitating against oil palm expansion, including in the North Eastern part of India.

SWOT analysis helps an organization in planning by identifying its strengths and weaknesses, as well as the opportunities and threats related to its field. In the above analysis, the state is considered as the entity where the analysis is being applied. In the SWOT analysis, it is assumed that strengths and weaknesses are frequently internal, while opportunities and threats are more commonly external.

Lessons Learnt – Mizoram

1. The growers of oil palm have appreciated the fact that FFBs are being lifted from collection centres near the growing areas. However, the absence of roads to the collection centres is hindering the movement of FFBs from these centres. There is a need to develop rural roads in the state to facilitate the transport of the crop from oil palm plantations.
2. Most of the growers in the state do not apply fertilizers at all. Oil palm is being mainly grown as a rain-fed crop as there is a lack of irrigation facilities. There is a need to popularize drip irrigation along with fertigation facilities.
3. Many growers are not following the proper cultivation practices for spacing, weeding, and use of mulching and proper harvesting despite advice from the Agriculture Department.
4. The price being offered to the growers is very low – Rs 5.50 per kg of FFB. It has not been revised since a long time. State Govt. provided support @ Rs 1 per kg for two years. The low prices of FFBs have slowed down the expansion of areas under oil palm in the state.
5. Despite the above, oil palm has enabled the growers to earn substantial incomes in the rural areas. However, output is low in matured areas.
6. The soil and climate of the state are suitable for oil palm. Besides, the growers are interested on account of the income flows. Hence, oil palm is a promising crop for the state.
7. Officials and growers from other states like Arunachal Pradesh, Assam and Nagaland have visited Mizoram while introducing the crop in their states. Planting materials have been sourced from Mizoram for some states in the region.

Mizoram Oil Palm (Regulation of Production & Processing) Act, 2004

The fresh fruit bunches (FFBs) of oil palms have to be processed within 24 hours of their harvest. In India, this is done by a company ('Processor') which establishes a factory in the growing belt. Initially, the company enters into an MOU with the State Government for the development of oil palm in its 'factory zone', which consists of some districts of the state. The company supplies seedlings to interested growers within its zone. After the FFBs are harvested, the company has to lift these from collection centres and pay the grower as per the rate fixed for FFB by the State Government. Growers have to sell their output to the company and none other entity.

In order to ensure the above, some states of India have passed legislation for the above aspects. In Mizoram, the Mizoram Oil Palm (Regulation of Production & Processing) Act, 2004 was enacted in order to ensure the orderly growth of oil palm in the state.

As per the above act, the growers located within a particular zone will supply all FFBs to a designated company and to no other person or organization. This factory needs to buy all the FFBs produced by the growers within its factory zone at a price not less than fixed by the government. If the company fails to buy the FFBs without any valid reason, it is liable to pay compensation to growers. In this manner, the interests of the grower and the viability of the company are being protected.

Details of the Implementing Agency

Name & Address of the Agency Directorate of Agriculture, Mizoram
Tuikual 'A', Aizawl 796 001

Main Officers

Director	Mr. ROHMINGTHANGA COLNEY, MAS
Deputy Director	Mr. C. LALTHLAMUANA, MAS
SDO (Agriculture)	Mr. P. RAMHNUNSANGA

Goals – Target for Area Expansion & Its Break-up

As follows (in terms of Area Target & Its Annual Break-up)

(a) Area Target

The new area for oil palm planting in Mizoram as proposed over a five year period from commencement of work: 10,000 hectares

(b) Annual Break-up

The break-up of area planned to be covered in Mizoram for oil palm development during a five year period from the commencement of implementation has been tabulated as follows.

Table-7.34: Goal for Mizoram - Area Expansion

Year →	1	2	3	4	5	Total
Target Area (in Ha)	2,000	2,000	2,000	2,000	2,000	10,000

Note: Area coverage may be re-adjusted within years if needed. This will affect the year-wise investment levels given in the subsequent pages.

Main Strategies & Action Points

In order to cover the targeted area in Mizoram under oil palm, the major action points have been listed as follows.

Planting Expansion

1. The expansion of planting can be concentrated in areas which are relatively better served by roads in the zones where the processor is active.

   Responsibilities: Implementing Agency & Processor

   As the state has a long history of oil palm cultivation, the stress needs to be upon addressing the issues of the existing growers, since intending persons will be influenced by their experience. In planning expansion; the areas having better quality of internal roads need to be targeted for serving these areas in a better manner. In addition, the processor has to be interested in the area expansion activities as its role is important in matters like supply of seedlings and other

support in the initial phase. The processor has a crucial role in the implementation of the above step for area expansion.

Time Line: From Year-1 to Year-5 as stated at above

2. The price being paid to growers for FFB has to be increased from Rs 5.50 per kg in order to make the planting of new areas viable for growers.

   Responsibilities: Price Fixation Committee constituted by the State Government

   Time Line: Price revision has to be more frequent.

3. Stakeholder need to ensure that the growers apply fertilizers and use irrigation as per the recommended package of practices; and that the growers also conduct weeding, mulching and other cultural practices regularly.

   Responsibilities: Implementing Agency, Growers and Processors

   The Implementing Agency and Processor have to undertake awareness creation along with the Growers' Associations for ensuring application of fertilizer and use of irrigation in dry months, along with the regular maintenance of the basin of the palm and the rest of the plantation area.

   [The above is needed as the reported FFB output is quite low in comparison to the reported area that should have matured by now.]

   Time Line: From Year-1 to Year-5 till the observance of the above is satisfactory

4. Cost of establishing oil palm plantation is almost Rs. 177,000 per hectare (incl. micro-irrigation, pump and intake) and Rs. 128,000 for the first three years' maintenance (excluding irrigation facilities) as per estimates, which could be higher for a hilly state. A substantial part of it needs to be subsidized as the growers are economically weak in the state.

   Responsibilities: Government of India – for introducing a special scheme for NE Region for establishing oil palm and maintaining newly planted areas with 100% contribution by the Centre

   Time Line: As per Govt. of India decision

Processing Unit

The existing processing unit of Godrej Agrovet Ltd. has been showing low output in the recent years for which data is available. In order to have better utilization of its capacity, the stakeholders have to take suitable action to improve yields in the service area of the company (i.e. its 'factory zone').

Other zones in the state are located further away from this factory, and there are no factories here to process the FFB output. In one of the zones, the Company has withdrawn its operations. If the other zones are combined, one factory may be established for processing the FFB output.

Planting Materials

1. In Mizoram, the area expansion will require about 19.60 lakh seedlings – for which a suitable number of nurseries (secondary nurseries) can be set up in the state. The annual requirements have been tabulated below.

Table-7.35: Goal for Mizoram – Planting Materials for Area Expansion

Year →	1	2	3	4	5	6	7	8	Total
Seedlings ('000s)	290	348	378	392	392	102	44	14	1960

Note: The above figures for the requirement of seedlings include the numbers needed for the replacement of dead palms in the planted areas for three subsequent years after planting.

Responsibilities: Processors & Interested Nursery Entrepreneurs

Time Line: Requirement of Seedlings will be for 8 years (including for the replacement of mortalities in three subsequent years @ 29, 15 and 7 per Ha)

2. The Implementing Agency and Processors will try to ensure a supply of quality seedlings needed for expanding the area under oil palm in the state.

   Responsibilities: Implementing Agency & Processors

   Time Line: Over the above period (including for vacancy infilling as stated at above)

Investment Requirements & Funding Sources

Investment Required & Annual Break-up

The total cost for planting 10,000 hectares under oil palm in Mizoram is estimated at Rs. 305.00 crore over a period of eight years (five years for the plantation and three years for maintenance). The details have been furnished at the next page. The item-wise break-up is given as follows:

Table-7.36: Investment Requirements for Mizoram

Item of Expenditure	Rs in crore	Remarks
Establishment of Plantation	45.00	---
Micro-Irrigation (including Pump-set & Intake)	132.00	Surface sources
Maintenance of Planted Area (Gestation Period)	128.00	Three Years after Planting
Total	305.00	

Note: Additional costs may be needed based on ground conditions for items like (a) terracing of lands with steep terrain; (b) drainage for clayey soils; and (c) investment on extra items like fencing, rodent protection etc.; transport of seedlings to interior areas (beyond 50 km); and cost of submersible pump and tube-well for ground water sources in case of lack of adequate surface water or cost of water-harvesting structures (necessary in parts of the state)

The year-wise requirement of investment is as follows (all in Rs. crore):

Table-7.37: Investment Requirements for Mizoram – Year-wise Break-up

Year →	1	2	3	4	5	6	7	8	Total
Investment (Rs. crore)	35.40	42.04	50.58	61.00	61.00	25.60	18.96	10.42	305.00

NB: The above is for 5 years of planting and maintenance of crop for three years after their planting (as calculated at overleaf).

Table-7.38: Fund Requirement for Establishment of Oil Palm and Maintenance for 3 Years in Mizoram (10,000 hectares)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	2,000	2,000	2,000	2,000	2,000	---	---	---	10,000
Cost of:										
Establishment	Rs. in Lakh	900	900	900	900	900	---	---	---	4500
Micro-Irrigation	-Do-	2640	2640	2640	2640	2640	---	---	---	13200
Maintenance of Planting done in										
Year-1	Rs. in Lakh	---	664	854	1042	---	---	---	---	2560
Year-2	-Do-	---	---	664	854	1042	---	---	---	2560
Year-3	-Do-	---	---	---	664	854	1042	---	---	2560
Year-4	-Do-	---	---	---	---	664	854	1042	---	2560
Year-5	-Do-	---	---	---	---	---	664	854	1042	2560
Total (**)	-Do-	3540	4204	5058	6100	6100	2560	1896	1042	30500

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares)

(**) Year-wise Total of Costs (all Rs. in Lakh) for (a) Cost of Establishment of Plantation on Area under Planting Target for the Year; (b) Cost of Micro-Irrigation of the target Area including cost of pump-set and surface intake; and (c) Total of the Maintenance Costs for area planted in previous years falling due in the year.

Notes:

1. Costs are taken as follows: (Details are given at Annex-12)
   - Establishment of New Plantations @ Rs. 45,000 per Ha
   - Micro-Irrigation (incl. pump-set and surface intake) @ Rs 132,000 per Ha
2. Maintenance of Plantation (Gestation Period) in Rs. per Ha as follows: 1st Year after planting: 33,200 / 2nd Year: 42,700 / 3rd Year: Rs 52,100, with Total being Rs.128000 per hectare. The above figures exclude any investment and returns from inter-cropping. Details are given at Annex-12.
3. Additional costs will be needed for the following cases: (These have to be computed on the basis of the ground conditions prevailing in the potential areas of the state)
   - Terracing of steep slopes;
   - Drains for clayey soils;
   - Investment on optional items like fencing, rodent protection etc.;
   - Transport of seedlings to interior areas (beyond 50 km); and
   - Cost of submersible pump and tube-well for ground water sources, in case surface water is not available; and Cost of water harvesting structures

Sources of Investment

The sources of investment for Mizoram have been summarized below. The details have been furnished at overleaf.

Table-7.39: Sources of Investment for Oil Palm Development in Mizoram

	Source of Investment	Rs in crore	Remarks
1	Under NSFM (OS&OP)		
	(a) Government of India	63.45	@ 90% of the fund requirement of Rs. 70.50 crore
	(b) State Government	7.05	@ 10% of the fund requirement
	Sub-total: NFSM – OS&OP	70.50	
2	Govt. of India Special Scheme (Proposed New Scheme)	191.55	Proposed for 100% funding by the Government of India
3	Growers' Contributions	42.95	Balance
	Total	305.00	= (1) + (2) + (3)

Note: Processors' Contribution for: (a) FFB Processing Unit and; (b) setting up and operating costs of Nursery are not included at above, including subsidy proposed for establishment of FFB unit. In addition; capacity building (including training and awareness creation costs) and departmental costs (travel and establishment costs) are extra.

Convergence – Sourcing of funds from Other Government Schemes

The following gives the funding sources from other schemes. This is an indicative list.

(a) **PMGSY**: For the costs of approach roads to nearby villages

(b) **MG-NREGS**: For the costs of water harvesting structure, making of terraces on hill slopes, internal paths etc.

(c) **PM-Krishi Sinchay Yojana (PMKSY)** – Costs of Drip Irrigation

The amounts that can be received from the above sources have not been included, as the same will depend upon the inclusion of the oil palm related investments in the approved plans for the above schemes depending upon Govt. of India fund position, State Govt. priorities and inclusion of items in the Annual Action Plan of MG-NREGS etc. This is beyond the scope of the present assignment.

Table-7.40: Proposed Sources of Fund for Establishment of Oil Palm & Maintenance for 3 Years in Mizoram (10,000 Ha)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	2,000	2,000	2,000	2,000	2,000	0	0	0	10,000
ESTABLISHMENT COSTS										
Establishment	Rs. in Lakh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Micro-Irrigation (**)	-Do-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	-Do-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sources:										
NFSM (OS&OP)	Rs. in Lakh	1110.00	1110.00	1110.00	1110.00	1110.00	0.00	0.00	0.00	5550.00
Govt. of India (***)	-Do-	1797.00	1797.00	1797.00	1797.00	1797.00	0.00	0.00	0.00	8985.00
Grower	-Do-	633.00	633.00	633.00	633.00	633.00	0.00	0.00	0.00	3165.00
MAINTENANCE COSTS										
Cost	Rs. in Lakh	0.00	664.00	1518.00	2560.00	2560.00	2560.00	1896.00	1042.00	12800.00
Sources										
NFSM (OS&OP)	Rs. in Lakh	0.00	100.00	200.00	300.00	300.00	300.00	200.00	100.00	1500.00
Govt. of India (***)	-Do-	0.00	507.60	1186.20	2034.00	2034.00	2034.00	1526.40	847.80	10170.00
Grower	-Do-	0.00	56.40	131.80	226.00	226.00	226.00	169.60	94.20	1130.00

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares) (**) Including Pump-sets and Surface intake

(***) under proposed 'Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas' as described at Chapter 8

For the **Establishment Costs** (including Micro-Irrigation, Pump-set and Surface Intake)

- **NFSM (OS&OP)** support is taken at existing levels, i.e. Rs 12,000 per hectare for planting; Rs 30,486 per hectare for micro-irrigation and 50% of cost of pump-set (Rs. 13,000) totalling about Rs. 55,500 per hectare
- **Govt. of India support under Proposed Scheme i**s taken as Rs. 89,850 per hectare, while **Grower Contribution** is to cover the balance (Rs. 31,650). Details are at Chapter-8.

For **Maintenance of the Juvenile Plantations** for 3 Years:

The annual break-up is given as follows for the year of planting and three years hence.

	Year-1	Year-2	Year-3	Total	Remarks
NFSM (Oil Palm)	5,000	5,000	5,000	15,000	NFSM gives Rs 5,000 per year for four years, However the above is computed for 3 years only
New Scheme (Proposed)	25,380	33,930	42,390	101,700	90% of the Balance after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Growers Contribution	2,820	3,770	4,710	11,300	Balance 10% after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Total	33,200	42,700	52,100	1,28,000	---

7.5. Nagaland: State Specific Plan for Oil Palm Development

Background

Oil palm was taken up in Nagaland from 2014-15 onward. Prior to this, the State Department of Agriculture had carried out a Techno-Economic Feasibility study, which determined that the agro-ecological situation of the foothill areas of the state was suitable for the crop. The study suggested that ground water be utilized for oil palm as the growing areas receive low rainfall during the cool period from November to February (4 months).

In Nagaland, there are large areas of unutilized wastelands that can be used for growing oil palm. In addition, this crop could provide a sustainable alternative to the local farmers practicing jhum (shifting) cultivation now.

Status of Development

As per the records made available by the State Government, the total area in Nagaland covered by oil palm is 3,773 hectares. The annual area planted has been tabulated below.

Table-7.41: Progress of New Planting of Oil Palm in Nagaland

Year -->	15-16	16-17	17-18	18-19	19-20	Total
Area (Ha)	140	1,033	700	800	1,100	3,773

Source: Department of Agriculture, Government of Nagaland

Note: The district-wise figures are given at overleaf as per the State Government information.

District-wise Progress of Area Coverage

The district-wise progress is given below.

Table-**7.42: District-wise Progress of New Planting of Oil Palm in Nagaland**

District	Year-wise Progress of New Planting (in Ha)					Total Area (in Ha)
	15-16	16-17	17-18	18-19	19-20	
Dimapur	59	395	270	310	405	1,439
Peren	23	209	100	130	165	627
Kohima	0	0	0	0	40	40
Mokokchung	15	138	130	150	200	633
Wokha	20	211	110	120	165	626
Mon	15	80	90	90	95	370
Longleng	8	0	0	0	30	38
Total	**140**	**1,033**	**700**	**800**	**1,100**	**3,773**

Source: State Government document

Details of the Processor Companies

The names of the companies which have entered into an MOU with the State Government for oil palm development in Nagaland are given as follows.

Table-7.43: Companies involved for the Oil Palm Development in Nagaland

	Processor Company	Districts covered
1	Shivasais Oil Palm Ltd. Eluru, West Godavari, Andhra Pradesh Chief Executive Officer: Mr. Y S Ranganaikulu	Dimapur, Peren, Mon, Longleng, Mokokchung & Wokha

Source: Department of Agriculture, Nagaland

Notes:

(a) Initially, the State Government was in discussions with three companies for entering into MOU with them for developing oil palm in eight districts of the state.

(b) Subsequently, only Shivasais Oil Palm Ltd. signed an MOU with the Nagaland Government. It is now covering six districts: Dimapur, Peren, Mon, Longleng, Mokokchung and Wokha. While the latter two districts had been assigned to another company, it did not commence its activities in the state. Now, Shivasais Oil Palm Ltd. is covering these districts.

Potential Area

The potential area for the development of oil palm in Nagaland has been determined by the Reassessment Committee (2012) and the Reassessment Committee (2020) as follows:

- By the Reassessment Committee (2012): 50,000 Hectares
- By the Reassessment Committee (2020): 51,297 Hectares

SWOT Analysis

The SWOT Analysis for Oil Palm in Nagaland has been carried out in the next page, based on the experience of the crop in the state.

Learning Points

These have been furnished after the next page, and they highlight some of the salient learning points derived from the introduction of oil palm in Nagaland, as well as from the state's experience regarding the expansion of area under oil palm.

Goals – Area Target & Annual Break-up

As follows (in terms of Area Target & Its Annual Break-up)

Area Target – for five year period	15,000 hectares
Annual Break-up	As tabulated below

Table-7.44: Goal for Nagaland – Annual Area Expansion

Year →	1	2	3	4	5	Total
Target Area (in Ha)	2,000	3,000	4,000	3,000	3,000	15,000

Note: Area coverage may be re-adjusted within years if needed. This will affect the year-wise investment levels given in the subsequent pages.

SWOT ANALYSIS

Strengths

- Availability of unutilized wasteland in the foothill areas of the state that are suited for oil palm cultivation
- Interest of the growers, which has to be sustained by creating market through establishment of processing factory
- Areas are relatively well connected, including to the plains of Assam

Opportunities

- India imports large volumes of Crude Palm Oil, and indigenous production has become necessary to conserve foreign exchange
- Policymakers have focussed upon NE Region for expanding oil palm cultivation in India

Weaknesses

- Processing unit has not been established, which can lead to wastage of FFBs in the fruiting plantations
- Difficulty in convincing farmers as oil palm is a new crop with long gestation period.
- Problems in sourcing quality planting materials
- Lack of observation of recommended practices, including irrigation in dry months and application of fertilizers (which can reduce yields significantly)
- Poor condition of roads leading to the growing areas

Threats

- The foothill areas of the state are near the prime tea growing belt of Assam. Growers can take up this crop or other cash crops (including plantation of teak) as these are known to them
- International campaign against oil palm has found echo in India, where groups are periodically raising their voices, especially against oil palm in North East India

NAGALAND

Above: Weevils being released in oil palm plantation located in Dimapur district of Nagaland

SWOT analysis is a technique used to help an organization in planning by identifying its strengths and weaknesses, as well as the opportunities and threats related to its line of work. In the above analysis, the state is considered as the entity where the technique is being applied. In the SWOT analysis, it is assumed that strengths and weaknesses are frequently internal, while opportunities and threats are more commonly external.

Learning Points from Nagaland

- The grower is the most important pillar for the area expansion of oil palm in the state. Hence, it is necessary that he needs to be aware about the recommended practices for the crop, including the necessity of application of appropriate doses of fertilizers and irrigation during the dry season. In addition the maintenance of the plantation areas has to be taken up.
- Water harvesting structures are a necessity in areas where ground water can be difficult to access and surface water sources are available.
- As planting materials have been identified as a bottleneck, the processor company needs to make available adequate number of seedlings by setting up nursery in each major growing area. This will reduce the transportation costs for carrying seedlings to the Sub-Divisional Offices from where growers generally collect their allocated seedlings.
- Once 3,000 hectares are planted within a cluster, a processing factory can operate viably. There is a need to establish one such unit in the state soon, so that the farmers' output is picked up regularly. This will encourage the intending growers in Nagaland.
- Training and awareness creation activities need to be emphasized in Nagaland, to educate the growers – both existing and intending growers.

Nurseries in Nagaland

M/S Shivasais Oil Palm Ltd. has been active in Nagaland. It has covered six districts in the state as the Processor Company in accordance with its MOU with State Government.

The above company established the following nurseries in the state.

Location of Nursery	District
Dimapur – 4th Mile	Dimapur
Jalukie	Peren
Tuli	Mokokchung

Seedlings were raised in these secondary nurseries after being sourced from different institutions in South India.

The proper supply of healthy seedlings from these nurseries can support the area expansion in the state.

Oil Palm for Jhum Wastelands in Nagaland and elsewhere in NE India

As in the other hilly regions of North Eastern India, farmers in Nagaland grow crops in patches cleared on the hillside. This is done by setting a part of a hillside on fire before the onset of rains. The cleared patch is cultivated for one or two years, before the farmer shifts out. After a few years, the farmer returns to this spot, after having moved around.

Such cycles were originally long enough for the parcels to recover. However, the growth of population has meant that shorter cycles are being practised. As a result, jhum affected lands are not recovering adequately. The growing of oil palm on such wastelands can introduce a sustainable alternative, provided that the areas are connected by serviceable roads or paths for carriage of the FFBs to the nearest Collection Centre.

Main Strategies & Action Points

The major action points are listed below for covering the targeted area in Nagaland under oil palm. These include the setting up of processing factory and additional nurseries in the state.

Planting Expansion

1. Planting can be done in identified areas that are relatively better served by roads and other public infrastructure. In Nagaland, areas adjacent to Assam have been chosen for the crop.

   Responsibilities: Implementing Agency & Processor

   Implementing Agency has to undertake awareness creation, along with SARD Medzhiphema and other stakeholders. In addition, intending growers may be taken to existing plantation areas in the state. Select growers may be taken to other states like Andhra Pradesh, Mizoram etc. where they can be shown the well-maintained plantations and the processing units in those states.

   Processor has to be associated with the above steps, as it has a crucial role like supply of seedlings and support to new growers.

   Time Line: From Year-1 to Year-5 as stated at above

2. The cost of establishing oil palm plantation is almost Rs. 177,000 per hectare (incl. micro-irrigation, pump and intake) and Rs. 128,000 for the first three years' maintenance (excluding irrigation facilities) as per estimates, which could be higher for a hilly state. A substantial part of it needs to be subsidized considering the ground conditions in the state.

   Responsibilities: Government of India – for introducing a special scheme for NE Region for establishing oil palm and maintaining newly planted areas with 100% contribution by the Centre

   Time Line: As per Govt. of India decision

3. The Implementing Agency needs to ensure that irrigation is done during the dry season and that adequate amount of fertilizers is applied, along with observation of the recommended practices. This is especially important as the yields can be much lower if the above are not carried out.

   Responsibilities: Implementing Agency (through its Field Staff); the existing Growers and their Associations. In addition, the processor is to supplement the above activity in its districts.

   Time Line: From Year-1 onwards till adequate observation of the practices is ensured.

Processing Unit

1. A processing unit has to be established soon in Nagaland, if planting targets have to be achieved. Later on, the unit may be augmented as per the growth of yields.

   Responsibilities: Processors & Implementing Agency

   Time Line: One factory has to be established soon in Nagaland. (Other units may be set up later on, based on the achieved expansion of oil palm areas and the yield of FFBs in the bearing areas of the state.)

2. The price for the FFBs has to be economically remunerative for the present growers to show interest, as well as for more numbers to start its plantation.

   [As suggested earlier, this can be addressed to on a regional basis. A system akin to the Price Deficiency Payment System of PM-AASHA can be introduced, based on an annual computation of normative cost of cultivation and regular review of the FFB prices.]

   Responsibilities: Government Committee for FFB prices; and Government of India for the initiation of PDPS-like system

   Time Line: To be done of periodic basis (FFB prices)

Planting Materials

1. In Nagaland, the planned area expansion will require about 29.40 lakh seedlings. For ensuring this supply, a suitable number of nurseries (secondary nurseries) can be set up in the state to augment the existing ones as needed. It may be noted that the Processor had established three nurseries in the state.

   The annual requirements have been tabulated below.

Table-7.45: Goal for Nagaland – Planting Materials for Area Expansion

Year →	1	2	3	4	5	6	7	8	Total
Seedlings ('000s)	290	493	697	610	603	160	66	21	2940

   Note: The above figures for the requirement of seedlings include the numbers needed for the replacement of dead palms in the planted areas for three subsequent years after planting.

   Responsibilities: Processors & Interested Nursery Entrepreneurs (to supplement Processor)

   Time Line: Requirement of Seedlings will be for 8 years, including for the replacement of mortalities in three subsequent years @ 29, 15 and 7 per Ha

2. The Implementing Agency and Processors will try to ensure a supply of quality seedlings needed for expanding the area under oil palm in the state.

   Responsibilities: Implementing Agency & Processors

   Time Line: Over the above period (including for vacancy infilling as stated at above)

Details of the Implementing Agency

Name & Address of the Agency Directorate of Agriculture, Nagaland
AG Colony, Kohima 797 001

Main Officers

Director	Mr. M B YANTHAN
Joint Director	Mr. RENPHAMO KIKON, Nodal Officer (Oil Palm)

Investment Requirements & Funding Sources

Investment Required

The total cost for planting 15,000 hectares under oil palm in Nagaland is estimated at Rs. 457.50 crore over a period of eight years (five years for the plantation and three years for maintenance). The details have been furnished at the next page.

The item-wise summary of the investment is given as follows:

Table-7.46: Investment Requirements for Nagaland

Item of Expenditure	Rs in crore	Remarks
Establishment of Plantation	67.50	---
Micro-Irrigation (including Pump-set & Intake)	198.00	Surface sources
Maintenance of Planted Area (Gestation Period)	192.00	Three Years after Planting
Total	457.50	

Note: Additional costs may be needed based on ground conditions for items like:

- terracing of lands with steep terrain;
- drainage for clayey soils; and
- investment on extra items like fencing, rodent protection etc.; transport of seedlings to interior areas (beyond 50 km); and cost of submersible pump and tube-well for ground water sources in case of lack of adequate surface water or cost of water-harvesting structures (necessary in parts of the state)

Year-wise Break-up of the Investment Requirements

The year-wise requirement of investment is as follows (all in Rs. crore).

Table-7.47: Investment Requirements for Nagaland – Year-wise Break-up

Year →	1	2	3	4	5	6	7	8	Total
Investment (Rs. crore)	35.40	59.74	89.30	89.61	95.77	43.61	28.44	15.63	457.50

NB: The above is for 5 years of planting and maintenance of crop for three years after their planting (as calculated at overleaf)

Table-7.48: Fund Requirement for Establishment of Oil Palm and Maintenance for 3 Years in Nagaland (15,000 hectares)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	2,000	3,000	4,000	3,000	3,000	---	---	---	15,000
Cost of:										
Establishment	Rs. in Lakh	900	1350	1800	1350	1350	---	---	---	6750
Micro-Irrigation	-Do-	2640	3960	5280	3960	3960	---	---	---	19800
Maintenance of Planting done in										
Year-1	Rs. in Lakh	---	664	854	1042	---	---	---	---	2560
Year-2	-Do-	---	---	996	1281	1563	---	---	---	3840
Year-3	-Do-	---	---	---	1328	1708	2084	---	---	5120
Year-4	-Do-	---	---	---	---	996	1281	1563	---	3840
Year-5	-Do-	---	---	---	---	---	996	1281	1563	3840
Total (**)	-Do-	3540	5974	8930	8961	9577	4361	2844	1563	45750

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares)

(**) Year-wise Total of Costs (all Rs. in Lakh) for (a) Cost of Establishment of Plantation on Area under Planting Target for the Year; (b) Cost of Micro-Irrigation of the target Area including cost of pump-set and surface intake; and (c) Total of the Maintenance Costs for area planted in previous years falling due in the year.

Notes:

1. Costs are taken as follows: (Details are given at Annex-12)
   - Establishment of New Plantations @ Rs. 45,000 per Ha
   - Micro-Irrigation (incl. pump-set and surface intake) @ Rs 132,000 per Ha
2. Maintenance of Plantation (Gestation Period) in Rs. per Ha as follows: 1st Year after planting: 33,200 / 2nd Year: 42,700 / 3rd Year: Rs 52,100, with Total being Rs.128000 per hectare. The above figures exclude any investment and returns from inter-cropping. Details are given at Annex-12.
3. Additional costs will be needed for the following cases: (These have to be computed on the basis of the ground conditions prevailing in the potential areas of the state)
   - Terracing of steep slopes;
   - Drains for clayey soils;
   - Investment on optional items like fencing, rodent protection etc.;
   - Transport of seedlings to interior areas (beyond 50 km); and
   - Cost of submersible pump and tube-well for ground water sources, in case surface water is not available; and Cost of water harvesting structures

Sources of Investment

The sources of investment for Nagaland have been summarized below. The details have been furnished at overleaf.

Table-7.49: Sources of Investment for Oil Palm Development in Nagaland

	Source of Investment	Rs in crore	Remarks
1	Under NSFM (OS&OP)		
	(a) Government of India	95.18	@ 90% of the fund requirement of Rs. 105.75 crore
	(b) State Government	10.58	@ 10% of the fund requirement
	Sub-total: NFSM – OS&OP	105.75	
2	Govt. of India Special Scheme (Proposed New Scheme)	287.33	Proposed for 100% funding by the Government of India
3	Growers' Contributions	64.43	Balance
	Total	457.50	= (1) + (2) + (3)

Note: Processors' Contribution for: (a) FFB Processing Unit and; (b) setting up and operating costs of Nursery are not included at above, including subsidy proposed for establishment of FFB unit. In addition; capacity building (including training and awareness creation costs) and departmental costs (travel and establishment costs) are extra.

Convergence – Sourcing of funds from Other Government Schemes

The following gives the funding sources from other schemes. This is an indicative list.

(a) **PMGSY**: For the costs of approach roads to nearby villages

(b) **MG-NREGS**: For the costs of water harvesting structure, making of terraces on hill slopes, internal paths etc.

(c) **PM-Krishi Sinchay Yojana (PMKSY)** – Costs of Drip Irrigation

The amounts that can be received from the above sources have not been included, as the same will depend upon the inclusion of the oil palm related investments in the approved plans for the above schemes depending upon Govt. of India fund position, State Govt. priorities and inclusion of items in the Annual Action Plan of MG-NREGS etc. This is beyond the scope of the present assignment.

Table-7.50: Proposed Sources of Fund for Establishment of Oil Palm & Maintenance for 3 Years in Nagaland (15,000 Ha)

Year →	Unit	1	2	3	4	5	6	7	8	Total (*)
Planting Target	Hectare	2,000	3,000	4,000	3,000	3,000	0	0	0	15,000
ESTABLISHMENT COSTS										
Establishment	Rs. in Lakh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Micro-Irrigation (**)	-Do-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	-Do-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sources:										
NFSM (OS&OP)	Rs. in Lakh	1110.00	1665.00	2220.00	1665.00	1665.00	0.00	0.00	0.00	8325.00
Govt. of India (***)	-Do-	1797.00	2695.50	3594.00	2695.50	2695.50	0.00	0.00	0.00	13477.50
Grower	-Do-	633.00	949.50	1266.00	949.50	949.50	0.00	0.00	0.00	4747.50
MAINTENANCE COSTS										
Cost	Rs. in Lakh	0.00	664.00	1850.00	3651.00	4267.00	4361.00	2844.00	1563.00	19200.00
Sources										
NFSM (OS&OP)	Rs. in Lakh	0.00	100.00	250.00	450.00	500.00	500.00	300.00	150.00	2250.00
Govt. of India (***)	-Do-	0.00	507.60	1440.00	2880.90	3390.30	3474.90	2289.60	1271.70	15255.00
Grower	-Do-	0.00	56.40	160.00	320.10	376.70	386.10	254.40	141.30	1695.00

(*) Item-wise totals (all Rs. in lakh, except for 'Planting Target' which is in Hectares) (**) Including Pump-sets and Surface intake

(***) under proposed scheme for 'Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas' as described at Chapter 8

For the **Establishment Costs** (including Micro-Irrigation, Pump-set and Surface Intake)

- **NFSM (OS&OP)** support is taken at existing levels, i.e. Rs 12,000 per hectare for planting; Rs 30,486 per hectare for micro-irrigation and 50% of cost of pump-set (Rs. 13,000) totalling about Rs. 55,500 per hectare
- **Govt. of India support under Proposed Scheme i**s taken as Rs. 89,850 per hectare, while **Grower Contribution** is to cover the balance (Rs. 31,650). Details are at Chapter-8.

For Maintenance of the Juvenile Plantations for 3 Years:

The annual break-up is given as follows for the year of planting and three years hence.

	Year-1	Year-2	Year-3	Total	Remarks
NFSM (Oil Palm)	5,000	5,000	5,000	15,000	NFSM gives Rs 5,000 per year for four years, However the above is computed for 3 years only
New Scheme (Proposed)	25,380	33,930	42,390	101,700	90% of the Balance after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Growers Contribution	2,820	3,770	4,710	11,300	Balance 10% after Deducting NFSM (Oil Palm) from Total Costs of Maintenance
Total	33,200	42,700	52,100	1,28,000	---

7.6. Oil Palm in Other States of the North Eastern Region

In the preceding pages, state specific plans have been furnished for oil palm development in the following five states of North Eastern Region: Arunachal Pradesh, Assam, Manipur, Mizoram and Nagaland. Regarding the other three states of the NE Region, two states (Meghalaya and Tripura) have not shown their interest, while Sikkim is not suitable for its cultivation. The following paragraphs may be referred to for additional details.

Meghalaya

The State Government has not shown its interest in the cultivation of oil palm in Meghalaya. This was conveyed during the Stakeholders' Meeting organized by North Eastern Council (on 16th October 2020). Subsequently, the Consultant had written to the State Government on the subject of oil palm development in the state. However, response from the concerned department is still awaited.

Tripura

The Government of Tripura has not shown its interest in the taking up oil palm in the state. This is despite an area of 530 hectares having been reportedly covered under the earlier oil palm development programmes: 431 hectares under the Technology Mission on Oilseeds and Pulses (TMOP) which had been operated from 1992-93 to 2003-04, and 99 hectares under the Integrated Scheme on of Oilseeds, Pulses, Oil Palm & Maize (ISOPOM), which had been functional in the years 2003-04 to 2013-14)

During the Stakeholders' Meeting organized by North Eastern Council (on 16th October 2020) on the subject, it was reported that the State Government was not interested to expand area under oil palm. Subsequently, the Consultant had written to the Government of Tripura on this subject (viz. regarding oil palm development in the state). However, response from the concerned department has not yet been received.

Sikkim

Sikkim is wholly mountainous in nature. Its climate and terrain are not suited for the cultivation of oil palm. Hence, this state has not been covered under the present Action Plan.

8. Recommended Action Points to Support the Action Plan

The implementation of the Developmental Action Plan for growing oil palm in the states of the NE Region will need the following support:

- Introduction of a Government of India funded Scheme for Establishment of Oil Palm in NE Region and the Maintenance of Newly Planted Areas;
- Support for Establishment of FFB Processing Unit in NE Region (under existing PMKSY);
- Support for the Transportation of CPO from FFB Processing Unit in NE Region to nearest CPO Refinery (New Scheme as Proposed);
- Price Support Scheme for Oil Palm Growers in NE Region (New Scheme as Proposed);
- Direct Payment of Government of India Funds to Implementing Agency; and
- Price Revision for Oil Palm Seedlings;
- Augmenting the Availability of Oil palm Seedlings; and
- Evolving an Appropriate Model for Implementation of the proposal.

The above action points have been briefly described below.

8.1. Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas (New Scheme as Proposed)

Description

Establishment of Oil Palm: The establishment of oil palm is relatively capital intensive, as the same requires about Rs. 177,000 per hectare, including Rs 132,000 as the cost of micro-irrigation system (with surface intake and pump) and Rs 45,000 as the other costs of establishment of oil palm (seedlings, pit-digging, land development, planting of seedlings etc.). The following table summarizes the costs.

Table-8.1: Establishment of Oil Palm Plantation

Item of Cost	Total (Rs / Ha)	Govt. of India / State Govt. under NFSM (Rs. / Ha)	Balance (Rs / Ha)	Remarks
Cost of Establishment	45,000	12,000	33,000	Excluding items at below
Micro-Irrigation System	103,000	30,500	72,500	Govt. support is rounded off
Pump-set	26,000	13,000	13,000	50% support
Surface Intake	3,000	---	3,000	---
TOTAL	**177,000**	**55,500**	**121,500**	

Source: Annex-12 for the details

While the Government is presently providing Rs 12,000 per hectare as subsidy for meeting the costs of planting materials under NFSM, the grower has to bear the cost of other items of cost like land development (including clearance of shrubs and weeds), pit digging and refilling, cost of fertilizers and insecticide (phorate equivalent) for applying in pit, unloading of seedlings etc. In addition, Rs. 30,486 is being provided for micro-irrigation apart from 50% of the cost of pump-set. The total of such subsidies is about Rs. 55,500 per hectare (about 31% of the costs).

About 13% of the costs are labour costs, and the balance (about 87%) is materials costs (micro-irrigation system, pump and intake, seedlings etc.). The grower has to meet about 69% of the costs now (46% on account of materials costs plus 13% on account of labour costs. The Government of India may extend support as proposed below.

Table-8.2: Sources of Investment for Establishment of Oil Palm Plantation

Item of Cost	Total (Rs per Ha)	Govt. of India / State Govt. under NFSM (Rs per Ha)	Balance (Rs per hectare)		
			Total less NFSM Support	Proposed Govt. of India Scheme	Grower
Cost of Establishment	45,000	12,000	33,000	10,200	22,800
Micro-Irrigation System	103,000	30,500	72,500	65,250	7,250
Pump-set	26,000	13,000	13,000	11,700	1,300
Surface Intake	3,000	---	3,000	2,700	300
TOTAL	**177,000**	**55,500**	**121,500**	**89,850**	**31,650**

Rationale of the above proposal:

1. Under cost of establishment (on per hectare basis), Rs 22,800 is on account of labour component (57 man-days), which may be borne by the grower, while the balance Rs. 10,200 may be borne by the Government.
2. For micro-irrigation, pump-set and surface intake, the Government of India may bear 90% of the balance of costs, and the grower the balance 10%.

Maintenance of newly planted Oil Palm Areas: The maintenance of oil palm areas needs a substantial amount of funds for purchase of fertilizers, pesticides, diesel (for operating pump-sets for supplying water) etc. apart from making payment for labour (or compensating the grower for own and family labour).

The following table gives the summary of annual costs. It is proposed that the costs be shared by Government of India and Grower on '90:10' basis after deducting NFSM provisions.

Table-8.3: Maintenance of newly established Oil Palm Plantation (Rs. per Hectare)

Item of Cost	Rupees per Hectare (Years are after Planting)				Remarks
	Year-1	Year-2	Year-3	Total	
Cost of Maintenance	33,200	42,700	52,100	128,000	From Table- A(12).3 in Annex-12
NFSM (OS&OP)	5,000	5,000	5,000	15,000	At existing levels (3 years)
Balance	28,200	37,700	47,100	113,000	
Sources					Proposed as follows:
Government of India	25,380	33,930	42,390	101,700	@ 90% of Balance
Grower	2,820	3,770	4,710	11,300	@ 10% of Balance

The sources of investment for the establishment of oil palm plantations and the maintenance of newly planted areas include: (a) Government support under existing NFSM scheme (90% by Govt. of India and 10% by State Govt.); (b) Proposed Scheme described herein for 100% support by Govt. of India; and (c) Growers' Contributions. The following table summarizes the above.

Table-8.4: Sources of Investment for the Establishment of Oil Palm Plantation & Maintenance of newly Planted Areas

Item of Cost	Total (Rs / Ha)	Sources of Investment (Rs per Hectare)		
		Govt. of India/ State Govt. under NFSM (Oilseeds & Oil Palm)	Govt. of India Support under Proposed Scheme (*)	Grower
Cost of Establishment	45,000	12,000	10,200	22,800
Micro-Irrigation System	103,000	30,500	65,250	7,250
Pump-set	26,000	13,000	11,700	1,300
Surface Intake	3,000	---	2,700	300
Cost of Maintenance	128,000	15,000	101,700	11,300
TOTAL	**305,000**	**70,500**	**191,550**	**42,950**

(*) Proposed 'Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas'

Source: From Tables 8.2 & 8.3 at above

The Contributions will be as follows:

1. **Government of India / State Govt. ... 86%**
   - Under existing NFSM (Oilseeds & Oil Palm Scheme) ... 23%
   - Govt. of India under Proposed Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas ... 63%
2. **Grower ... 14%**

Rationale

The above scheme will enable the growers with land but limited capital to invest in the establishment of oil palms and in their maintenance during the gestation period. This is needed as a vast majority of the growers have limited means and need support.

Further; as such growers are financially weak, they will be unable to purchase the above items to ensure compliance with the recommended package of practices, especially for application of fertilizers and irrigation. The above scheme will help to ensure that the growers comply with the recommended package of practices, including for application of fertilizers and irrigation. This is necessary so that the yields from the expanded areas do not become low in the future, which will defeat the logic of investing for area expansion.

100% support from the Government of India is suggested as the State Governments are not financially strong enough to provide for their contributions from their own sources.

Appropriate mechanism for payment to growers is proposed to avoid delays in release of funds to the growers and also so that their funds do not get blocked.

Further, if felt necessary, input suppliers (fertilizers etc.) and the companies establishing micro-irrigation systems and supplying pump-sets and intakes may be paid directly after the satisfactory supply and installation of the items.

Quantum of Government of India Support under Proposed Scheme

The proposed quantum of support under the proposed scheme is Rs 191,550 per hectare, with the year-wise distribution of the support being given as follows.

Table-8.5: Support under proposed 'Scheme for the Establishment of Oil Palm Plantation & Maintenance of newly Planted Areas'

Item	For Planting, Micro-Irrigation, Pump-set & Intake (Rs./Ha)	Year after Planting (Rs/Ha)			Total Support (Rs./Ha)
		1st Year	2nd Year	3rd Year	
Proposed Support under Scheme (Rs. / Ha)	89,850	25,380	33,930	42,390	191,550

The **total support needed for covering 75,000 hectares of new oil palm areas in NE Region under this scheme is Rs. 1436.63 crore**, with the year-wise requirement being tabulated below.

Table-8.6: Total Support under proposed 'Scheme for the Establishment of Oil Palm Plantation & Maintenance of newly Planted Areas' (Annual Break-up)

Year	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Total
Rs. in Crore	91.65	158.87	239.29	288.02	302.25	172.56	120.41	63.59	1436.63

8.2. Support for the Establishment of FFB Processing Factory in NE Region (under the existing PM KISAN SAMPADA Yojana)

Description

As a policy measure for supporting the expansion of area under oil palm, Government may consider extending benefits under the existing PM KISAN SAMPADA Yojana (PMKSY) scheme as described briefly below. This will facilitate the establishment of FFB Processing Factories in the NE Region by Companies that have entered into MOUs with State Governments for oil palm.

[While there is a scheme to boost industrialization of the North Eastern states, viz. the North East Industrial Development Scheme (NEIDS) 2017, **plantation industries are not eligible for benefits under the above scheme as per the Negative List at Annexure-1.**]

Support under PM KISAN SAMPADA Yojana (PMKSY) of Ministry of Food Processing Industries: The Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters (SAMPADA) is a Central Sector Scheme being implemented by the Ministry of Food Processing Industries, Government of India. It is a comprehensive package which will result in creation of modern infrastructure with efficient supply chain management from farm gate to retail outlet. Details of the scheme are available at Annex-

The following points may be considered for relaxation in relation to the existing 'Creation/ Expansion of Food Processing/ Preservation Capacities (CEEFPC)' under the PMKSY scheme in order to facilitate the area expansion of oil palm in the states of NE Region:

- Processing of Oil Palm FFBs may be specifically included in the list of eligible sectors (Point No. 2 of Guidelines dated 11.07.2017/ Modified Guidelines dated 2.3.2020)
- Oil Palm FFB units may be given due priority as per 'Preference to the Proposals' (Point No. 5 of Guidelines dated 11.07.2017 /)
- In case a Company has MOU with different State Governments of the NE Region, there may be relaxation in case of multiple applications by same company.

  While the original guidelines restricted grants in case applicant (or its subsidiary company / related company / group company) had availed of grants under any other scheme of the Ministry (they should have achieved completion and commenced commercial operation / production and *successfully completed at least one year* before the date of advertisement of EOI of this scheme'); the modified guidelines (dated 2.3.2020) require an undertaking by the applicant (Appendix-F) that 'the applicant to' that the organization's subsidiary company (s)/ related company / group company as well as the applicant company itself availed / not availed financial assistance for a food processing project in the past from the Ministry of Food Processing Industries (MoFPI) or from State Government (Name of the State), if availed, the details thereof shall be furnished'.

  The above is suggested as there are few Companies which are interested in oil palm area expansion programmes through MOUs with State Governments.
- Condition that 'New Units will be allotted in Mega Food Park only' (Circular Dated 22.09.2017) needs to be relaxed. Further, as per Modified Guidelines (dated 2..2020), Point No. 5, 'The proposals for creation/ expansion/ modernization of food processing & preservation units will be considered in Mega Food Parks (MFPs), Agro-processing Clusters assisted by the Ministry. However, in State/UTs having no Mega Food Park, Agro Processing cluster, units may be considered anywhere'.

[As per the Modified Guidelines dated 2.3.2020 (under 9 (v)), this is already being allowed as a special provision for SC / ST entrepreneurs having 100% stake in the applicant firm in which case 'Proposals having eligible project cost of Rs. 1 (one) crore or more will be considered anywhere / irrespective of location subject to meeting other terms & conditions of the scheme guidelines'.].

Rationale

The Fresh Fruit Bunches (FFBs) harvested from oil palms have to be processed within 24 hours. Hence, they have to be taken to a Processing Factory located near the growing area and they cannot be transported over large distances. The biggest hurdle for expansion of area under oil palm is the lack of processing facility for oil palm FFBs in any NE state, except Mizoram. The existing growers in states like Arunachal Pradesh, Assam and Nagaland have expressed their apprehensions on this account. Further, intending growers in these states are awaiting the construction and commissioning of such factories.

Quantum of Support

The quantum of support for establishment of a unit under CEFPPC of PM KISAN SAMPADA Yojana is limited to 50% of the eligible project cost in the NE Region, subject to a maximum of Rs. 5.00 crore.

Under this Action Plan and State Specific Plans, the number of FFB Processing Units needed for the oil palm expansion is tabulated below.

Table-8.7: Establishment of FFB Processing Units

State →	Arunachal Pradesh	Assam	Manipur	Mizoram	Nagaland	Total
No. of FFB Processing Units	2	1	1	1	1	6

Hence, **the quantum of support for the establishment of FFB Processing Units under PM KISAN SAMPADA Yojana is Rs 30.00 crore** (= Rs. 5.00 crore per unit x 6 units). The actual utilization will depend upon the steps taken by the Companies to establish the FFB units as per their MOU with the State Governments.

8.3. Support for the Transportation of Crude Palm Oil from FFP Processing Plant in NE Region to nearest CPO Refinery (New Scheme as Proposed)

Description

The support for transportation of Crude Palm Oil (CPO) from FFB Processing Unit located in any state of the NE Region to the nearest CPO Refinery in Haldia (West Bengal) may be extended under a special Transport Subsidy Scheme for Crude Palm Oil produced in NE Region. It may be noted that under the North East Industrial Development Scheme (NEIDS) 2017, which is being implemented by the Department for Promotion of Industry & Internal Trade of the Government of India, Transport Incentive is being extended to eligible industrial units on transportation of only finished goods through Railways or the Railway Public Sector Undertakings, Inland Waterways or scheduled airline for a period of five years from the date of commencement of commercial production. **However, plantation industries are not eligible for benefits under NEIDS 2017 as per the Negative List at Annexure-1.**

Hence, it is proposed that a separate Transport Incentive Scheme may be framed for extending support for the outward transportation of Crude Palm Oil produced in any FFB Processing Unit located in any of the NE states. It is proposed as follows:

(1) The support for transport of CPO may be extended to its **transport by road**, since the growing areas in states like Arunachal Pradesh, Mizoram and Nagaland are located away from railway network.

(2) The **quantum** of support may be fixed at a reasonable level, as the Transport Incentive under NEIDS for rail and waterway transport is fixed at 20% of the cost of transportation, which may not be adequate for meeting the objectives of the support.

Rationale

The FFP Processing Plant yields Crude Palm Oil (CPO) apart from Palm Kernel. CPO has to be refined to give marketable products like RBD Palmolein, RBD Palm Stearin, and Palm Fatty Acid Distillates (PFAD). These items can be processed further to yield other items to meet market needs. Hence, till output of CPO becomes high enough to establish a Refinery within the NE Region, CPO produced in any FFB Processing Unit located in any of the NE states has to be taken to refineries located outside the region. As such transportation costs are significant, it may be necessary to subsidize the transportation of CPO from the FFB Processing Unit to the Refinery. Otherwise, the Companies are reluctant to pay a better price to the growers for FFB, as they point out to the costs of outward

transport to nearest refinery. In addition, the domestic CPO supplied by these Companies will have to compete against imports of cheap CPO from Indonesia and Malaysia.

Hence, the requirement exists for extending subsidy for the outward transportation of CPO from the FFB Processing Plant to the nearest refinery. In case, CPO is transported to other refineries (and not the nearest refinery), the concerned Company will have to bear the costs without reducing FFB prices payable to growers.

Quantum of Support

The quantum of support under the above proposed scheme for 'Support for the Transportation of Crude Palm Oil from FFP Processing Plant in NE Region to nearest CPO Refinery' is calculated as given below.

It is assumed 75,000 hectares of fruit bearing areas, with crude yield at 3.06 MT per hectare (18 MT of FFB per hectare with 17% oil content), the volume of CPO will be 229,500 MT, which may be rounded up to 230,000 MT. The freight per kg may be about Rs. 6.50/- (Mizoram to Haldia, West Bengal). If 50% of the transport costs are subsidized, then **the quantum of support will be Rs 74.59 crore per annum**.

The above is a maximal amount, as the actual amount can be initially lower, due to factors such as:

- Actual yields from newly planted areas, which may take time to reach the 18 MT per hectare level;
- Oil Extraction Rates (OER) of FFBs produced in the areas (may be lower than 17%)
- Establishment of FFB Processing Units by the Companies in the growing areas as per their MOU with State Governments;
- Actual freight costs from FFB Processing Plant locations in NE states to nearest Refinery; and
- Rate of Transport Subsidy finalized by the Government of India, which can vary from the 50% rate as proposed at above.

8.4. Price Support Scheme for Oil Palm Growers in North Eastern Region (New Scheme as Proposed)

Description

The Government of India has introduced a system of price support called as the Price Deficiency Payment System (PDPS). Under this system, cultivators are being supported for crops, where the Minimum Support Price (MSP) is being notified by the Government annually based on the recommendations of the Commission for Agricultural Costs & Prices (CACP). The difference between the MSP and the selling price (modal prices prevailing in the markets) will be made to 'pre-registered farmers selling his produce in the notified market yard through a transparent auction process'.

In the case of oil palm, the crop is not covered under the MSP system. Further, sale is made by growers to the Processor which covers the area of the grower as its 'Factory Zone'. It is not possible to sell the output of the oil palm growers in different markets, as the fruits have to be processed within 24 hours of their harvest. Hence, the price support to oil palm growers may be carried out as proposed below.

A system has to be introduced for the annual determination of the normative cost of cultivation of oil palm (including adequate return) akin to the computation of the Minimum Support Prices (MSP)

existing for 28 agricultural commodities in India. The prices payable by the processor to the growers for their output of Fresh Fruit Bunches (FFBs) must be periodically reviewed. As the cost of cultivation (with adequate return) may be higher than the FFB prices, the difference may be paid by the Government to the growers by a DBT mechanism.

Rationale

The oil palm growers are raising a crop which needs to be cultivated more widely in India to reduce the burgeoning imports of Crude Palm Oil. However, the prices of FFB may be reviewed only periodically in the NE states (going by the example of Mizoram). Hence, growers may not get a remunerative price, which can discourage them and also dampen the interest of intending persons with usable land. The above system will ensure a continued return to the growers, which will enable them to maintain the areas properly and use adequate amounts of fertilizers and irrigation, thereby keeping the yields at acceptable levels.

Quantum of Support

The quantum of price support will depend upon: (a) the volume of FFB sales to the processor companies; and (b) the difference between (i) the FFB prices fixed by the Government Pricing Committee, and (ii) the cost of cultivation prevailing in growing areas and the return on the cost of cultivation fixed for the crop. Further, the cost of cultivation will depend upon the cost of fertilizers, insecticides, diesel, electricity, labour rates, weather conditions etc.

8.5. Direct Payment of Government of India Funds to Implementing Agency

Description

In most of the NE states, there are delays in the receipt of funds at the level of the Implementing Agency. This delays the transfer of subsidies payable to the grower, which makes the latter spend less on fertilizers and irrigation, wherever the recommended package is being followed. This affects the yield of the crop from the areas planted with oil palms.

Further, the implementing agency may not be able spend the Government of India funds in time, which can lead to unspent balances at the end of the year from the budget allocated by the Ministry. In such cases, the Ministry can reduce allocations for oil palm development to the state in the future budgeting exercises. In addition, the State Governments may be encouraged to contribute their share (10%) under NFSM (Oil Palm) in a timely manner.

Rationale

Direct payment to the implementing agency can lead to timely expenditures at the ground level, which will enable the agency to furnish progress reports to the Ministry in time. The subsequent instalments can be received in time. This will lead to better utilization of the allotted budgetary amounts. More importantly, the growers will receive their subsidies in time, which can help them to spend on inputs as needed. This will help to maintain the yield levels in the plantation areas.

Quantum of Support

The entire amount of budgetary allocation for oil palm development under NFSM (Oil Palm) and other future schemes may be paid directly to the Implementing Agency, as per decision of the Ministry with the concurrence of the State Government.

Under the present plan, the following amounts are proposed from the Government of India to the NE states.

Table-8.8: Proposed Government Support for Oil Palm in NE States (For Direct Payment to Implementing Agency)

Government Scheme	Proposed Support to the States (Rs in Crore)					Total Investment (Rs. crore)
	Arunachal Pradesh	Assam	Manipur	Mizoram	Nagaland	
Under NSFM (OS&OP)						
(a) Government of India	158.62	126.90	31.73	63.45	95.17	475.87
(b) State Government	17.63	14.10	3.53	7.05	10.58	52.89
Proposed Govt. of India 'Scheme for Establishment of Oil Palm in NE Region & the Maintenance of Newly Planted Oil Palm Areas'	512.63	410.10	102.53	205.05	307.58	1537.88

8.6. Price Revision of Oil Palm Seedlings

Description

The Government of India is paying about Rs 83.90 per seedling. As per the processors, who undertake to supply the seedlings to the growers, the above rate is not viable. Also, a few State Governments have opined that the rate needs to be revised upwards.

Rationale

As per data furnished by one of the processor, they incur about Rs 155 as the cost of producing one indigenous seedling (all inclusive and assuming 20% culling). One of the State Governments has also stated that the rate of indigenous seedling needs to be raised to Rs 160 per seedling. The cost of imported seedling suggested by it is Rs. 180-200 per seedling.

Quantum of Support

The quantum of support will depend upon the rate of revision of seedling prices. The seedling requirements under this plan have been projected as follows.

Table-8.6: Seedling Requirements under Action Plan

Year →	1	2	3	4	5	6	7	8	Total
Nos. in Lakh	14.79	24.42	32.79	32.11	30.33	8.11	3.40	1.05	147.00

The present plan has been prepared with about Rs 130 as the cost of one seedling including transport and loading costs. The seedling rate has been taken as Rs 84 (as per the prevailing Government rate).

If the price of seedlings is raised, the investment requirements will rise substantially. Even if the rates are increased by a nominal amount of Rs 20/- per seedling, the fund requirement will increase

by Rs 29.40 crore. This is clear from the above table which gives the seedling requirements for the entire period of the plan.

8.7. Augmenting the Availability of Oil Palm Seedlings

As per the above table, the requirement of seedlings under the Action Plan is 147.00 lakh over the period of eight years (including for vacancy in-filling for three years). The peak requirement is estimated at 2.79 lakh in the 3rd year. However, the availability of quality seedlings in India is reported to range from 13-16 lakh per year only.

Imports of seedlings are subject to phyto-sanitary certification requirements from the originating nation. In addition, permission of the Ministry is needed. Further, all seeds, sprouts and plant material have to be grown under quarantine for 10-12 months as per the prevailing Government regulations. It appears that the import of seedlings may not offer an easy way out of the conundrum.

In fact, an interval of over two years may be needed for arranging an adequate supply of seedlings before the commencement of planting under this scheme. This is considering the following time periods: (a) One year as the interval between the placement of orders for sprouts (germinating seeds) and their receipt for commencing nursery operations; and (b) 12-14 months needed for raising seedlings under the single stage nursery system (or under quarantine for imports);. Hence, priority must be accorded for suitably augmenting the availability of seedlings in the country as well as within the region, if the planting targets are to be achieved under this Action Plan.

Construction & Strengthening of Roads & Bridges in Oil Palm Growing Areas

The State Governments of the NE states, where oil palm is being grown (or proposed under this Plan), may be extended financial support by the Government of India to construct new roads and bridges or to strengthen existing roads and bridges to serve the oil palm growing areas. The support for proposals made by State Governments may be based on factors like extent of plantation area served, investment required, type of existing roads and bridges etc. Support may be extended for the maintenance of roads constructed or strengthened to serve the growing areas.

8.8. An Appropriate Model for Implementation

The National Food Security Mission (NFSM) has devised an implementation model based on bodies at the national, state and district levels. On similar lines, the proposal for expansion of oil palm in the NE Region may be taken up in a mission mode.

The implementation mechanism may be evolved by forming appropriate bodies at the regional, state and district levels. There can be a Regional Council with the participation of Ministries of DONER and Agriculture & Farmers' Welfare, State Governments (of participating states) and others for laying down the policies and guidelines, as well as for the reallocation of resources across the states and districts and for the grant of major approvals.

At the State level, there can be a State Committee for overseeing the implementation of the programme. At the district level (for the districts where oil palm will be developed under the proposal), there can be a District Society for project implementation. Representatives of the Processor Company and the Growers can be invited to the meetings of the District Society, apart from the Officers of the Third part Monitors (if engaged).

In view of delays in fund flows to the implementing agency and growers at present, a suitable mechanism may be devised for direct fund transfer to the District Society. This will enable faster disbursement to the growers, as well as improved utilization of funds in timely manner. The implementation of the project at the ground level can be supervised by the District Mission. In addition, a system of Third Party Monitoring may be considered for better utilization of funds and improved project outcomes.

8.9. Strategies mentioned by NITI Aayog

The following strategies have been mentioned by NITI Aayog (vide Office Memorandum No. F. No. M-l 3052/l0/2019-S-NE dated 17.03.2021) for achieving the projected area expansion targets in the oil palm in the North Eastern States of India:

1. Measures have to be taken so that oil-palm cultivation in NE states is more **economically viable** compared to **other crops** such as rubber, areca-nut, banana and coconut etc., which are also prominent crops in the NE Region.

2. **Minimum price of FFB** may be fixed which would give confidence to farmers for taking up oil palm cultivation. FFB price is to be revised upwards in the coming years, in line with the recommendations of CACP, Government of India.

3. **Price Stabilization Fund** may be established for Oil Palm, which could be used in case of the FFB prices fall below a threshold level as per CACP Formula, or through a system for the annual determination of the normative cost of cultivation of oil palm (including adequate return)

4. **Harvesters groups** could be formed in different zones and provided with improved tools and machineries through custom Hiring Centres for harvesting oil palm bunches.

5. **Capacity building** programs on oil palm cultivation are to be organized for various oil palm stakeholders.

6. There is a need for financial support to the existing **oil palm seed gardens** to strengthen their production capabilities. At the same time, efforts should be made to develop new seed gardens with advanced planting-materials for high oil yield.

7. The private sector especially the oil palm processors involved in oil palm development program should also be encouraged to establish **seed gardens** to cater to their needs for planting materials on Public-Private Partnership mode. ICAR-IIOPR shall facilitate technical guidance to all the seed gardens in the country.

8. Efforts should be made for timely establishment of new/ additional **processing units** in different states and districts.

9. As **planting material** production from indigenous sources is limited at present, the import of planting material could be facilitated for the time being (after exhausting the seed materials produced from indigenous seed gardens) to meet the suggested area expansion targets.

10. **Irrigation:** For providing community water storage tanks / watershed areas / development of catchment areas for providing supplementary irrigation in feasible areas during non-rainy days; effort could be converged with MGNREGA. The installation of solar pumps could be facilitated for irrigation to realize higher productivity**.**

11. Possibilities may be explored for **growing oil palm** in **wasteland categories** like grassland, land with shrub/scrub and area under shifting cultivation in NER states.

12. **Fertilizers** are to be made available at all the oil palm growing farmers, as oil palm requires high nutrients. All the farmers should be encouraged to apply fertilizers to oil palm crop as per the recommended schedule.

13. Promotion of **FPOs** is suggested to assist in purchasing tractor/ truck for transportation of seedlings, fertilizers, oil palm bunches, fertilizers and other related inputs

14. Development of a **CPO refinery** may help in reducing the transportation cost of Crude Palm Oil (CPO) to distant areas, save time and reduce the expenditure for further distribution of refined products in NE states.

15. **Freight subsidy** may be provided to oil palm processors in NER for transportation of CPO to nearest port (i.e. Kolkata).

9. Outcomes of the Action Plan

9.1. Economic Value of Oil Palm Crop

After an initial gestation period, the oil palms start yielding fresh fruit bunches (FFBs) over their lifetime, which is usually 28 years. Such FFBs are sold to processor companies at rates fixed by the Government Pricing Committees. The economic value of the crop can be inferred from the present value of future sales by discounting these flows appropriately. Hence, the major factors determining the economic value of the oil palm area are: (a) annual yields of the palms, (b) price obtained by growers for the FFBs; and (c) the rate of discount used. In turn, the annual yields will depend upon: (a) the expected yield profile of the palm over its lifetime, and (b) factors that can affect the expected yields like fertilizers, irrigation, intercultural operations, weather, pests etc.

As far as the grower is concerned, the proceeds from the sale of FFBs represent his gross income, out of which the cost of cultivation has to be met. While growers will be more interested in the net returns, i.e. the sales less costs of cultivation; the overall economic impact has to consider the gross income from FFB sales. This is due to the fact that the impact has to consider other participants in the value chain (from seed to crop) like hired labourers, input suppliers, nurseries, transporters and others. Hence, the gross value of the output is taken in analysing the economic outcomes.

The table at overleaf furnishes a summary of the discounted cash flows from the sale of FFBs grown on one hectare, i.e. the present value on gross terms. The assumptions in this connection have been furnished along with the table. The cash flows have been discussed under the following scenarios:

(a) Different average lifetime **yields** (in terms of MT per hectare per annum), viz. 12 MT, 15 MT and 18 MT.

(b) Various initial **prices of FFBs** (in Rs. per kg), which have been taken as Rs. 5.50 (present rate in Mizoram), Rs. 7.50 (average of rates in South India) and Rs. 9.50 (estimated to be the economically viable price). The prices are assumed to remain unchanged for 4 years and then increased by 10% in the subsequent year, with this cycle of price revisions repeating after every four years across the lifetime of the plantation. Annex-13 furnishes additional details about FFB and CPO pricing in India.

(c) The **rate of discount** has been taken as 11%, 12% and 13%, which is based on the External Benchmark Rate (EBR) of SBI (7%) plus spreads of 4% to 6% in order to account for the crop risks.

(d) It is assumed that the yields are not disturbed by any unusual weather conditions, pest attacks etc. and that normal yields will be obtained during the growing period.

The present value of FFB sales from one hectare of oil palm are estimated to widely range from Rs. 4.93 lakh (@ 12 MT yield, 13% discount rate and Rs 5.50 per kg as initial rate of FFB) to Rs. 15.60 lakh (@ 18 MT yield, 11% discount rate and Rs 9.50 per kg as initial rate of FFB). This illustrates the impact of major factors on the economic returns, such as the yields achieved and the price of FFB received by the grower.

In this report, the initial investment has been taken as Rs. 3.05 lakh per hectare. Hence, the crop will yield substantial economic returns. The quantum of such returns will vary, based on the above major factors, i.e. the FFB prices obtained by the growers and their achieved yields. These factors are inter-linked since the observance of the recommended package of practices by the growers will depend upon the level of their returns from the crop.

Table-9.1 Economic Output from the Sale of FFB growing on One Hectare of Oil Palm (4th to 28th Years)

Initial Price of FFBs in Year-1 (in Rs. per MT)	Sum of Discounted Cash Flows (Rs. in lakh) from 4th to 28th Years of Oil Palm								
	Average Lifetime Yield 12 MT/Ha/Year			Average Lifetime Yield 15 MT/Ha/Year			Average Lifetime Yield 18 MT/Ha/Year		
	11%	12%	13%	11%	12%	13%	11%	12%	13%
5,500	6.02	5.44	4.93	7.52	6.80	6.17	9.03	8.16	7.40
7,500	8.21	7.42	6.73	10.26	9.27	8.41	12.31	11.13	10.09
9,500	10.40	9.39	8.52	13.00	11.74	10.65	15.60	14.09	12.78

Source: Consultants' Computations

Note:

The above are the sum of discounted cash flows, with the discounting rates being from 11% to 13%, based on the External Benchmark Rate (EBR) of State Bank of India (7%) with adequate spreads of 4%-6% to reflect risks.

The above table has been computed after assuming that:

- The yields of the plantation are not affected by pests, weather and other adverse factors in a major manner; and
- The FFB prices remain flat for a period of 4 years and are increased by 10% thereafter in the subsequent year, with the cycle of price revision being repeated every fifth year across the lifetime of the plantation.

The above results assume a well maintained plantation, where the owner follows the recommended package of practices to various degrees as evidenced by the differing average yields. In addition, all vacancies in the planted areas due to mortalities of palms are assumed to be filled up promptly.

Factors Affecting the Economic Returns from Oil Palm

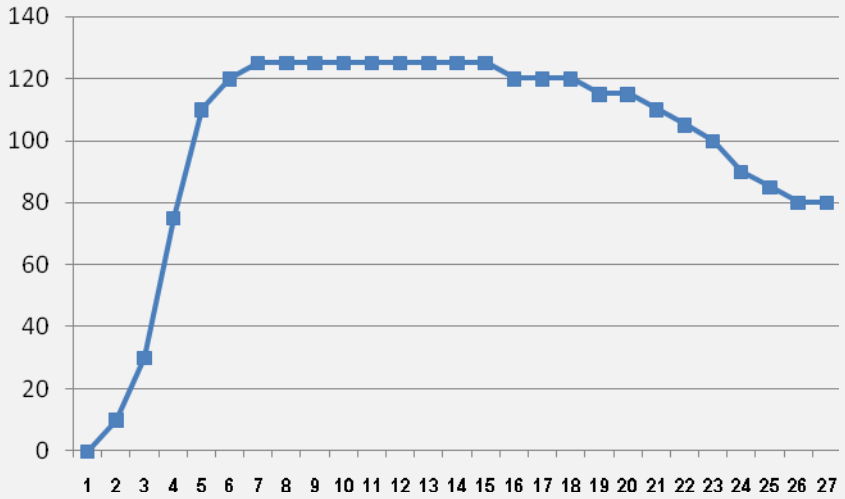
Yield Profile of Planted Area

The planted areas are expected to start yielding fruits from the 4th year onward. Over the lifetime, the yield of a palm as a percentage of the average yield usually behaves as follows.

Years	Yield Pattern as % of Lifetime Average
4-8	Increases rapidly from 30% in 4th year to 125% in 8th year
9-18	Around 120% - 125% of average
19-23	Slow decline from 120% in 19th Year to 105% in 23rd year
24-28	Faster decline from 100% in 24th year to 80% in 28th year

[**Source**: 'Malaysian Oil Palm Industry: Prospect and Problem', ASA Ferdous Alam et al, Journal of Food Agriculture and Environment · May 2015]

The adjoining graph shows the yield profile of an average plantation area.



Average Yield of the Planted Area

The average yield of the planted area will depend upon several factors like prevalent climate and soil conditions, type of planting material used, density of planting, application of fertilizers and irrigation as needed, observation of the other packages of practice, occurrence of unusual weather conditions and pest attacks etc.

If the recommended package is used, and the quality of the planting material is satisfactory, the peak yields may range from 17 MT to 20 MT, which corresponds to a lifetime average yield of 13.5-16 MT per hectare per annum. In the present discussion, three scenarios are discussed – lower yield (12 MT/ha/year); moderate yield (15 MT/ha/year) and high yield (18 MT/ha/year).

Price of Fresh Fruit Bunches (FFBs)

As per the recommendation of Commission for Agricultural Costs & Prices (CACP) in 2012, the price of FFBs has been 'fixed at 13.54% of net Crude Palm Oil (CPO) weighted average price plus 75.25% on 9% recovery of palm kernel nuts weighted average price'. This has been done based on estimated cost of cultivators being 75.25% in the total cost of production of CPO from farm level to factory level.

The Government of India has stated (in August 2013) that any variation in the OER would result in change in the pricing formula in respect of the part pertaining to 'net Crude Palm Oil (CPO) weighted average price'. The OER would be determined as per the actual oil content extracted by the processing units, as established by the State Governments

As the price of CPO fluctuates widely, the State Governments of South India announce the price of FFB on a monthly basis. Annex-13 discusses the pricing of FFBs in greater detail.

The economic impact of growing oil palm on 75,000 hectares in the NE Region can range from **Rs. 3,700 crore to Rs 11,700 crore**, based on the premises of the above table. This excludes the spin-off benefits which are discussed subsequently.

Value Chain of Oil Palm

The extended value chain of oil palm (including derivatives of oil palm) will include the entire spectrum of activities from nurseries, field plantation (establishment, gestation and yielding phases followed by re-plantation of old plantations), harvesting and processing of FFBs, CPO aggregation and refining, secondary processes on refined items like RBD Palm Oil and Palm Stearin. The oleo-chemical feedstock obtained from palm oil refining can be further used for making an array of items. Globally, the value chain of oil palm and derivatives has been estimated to be as follows.

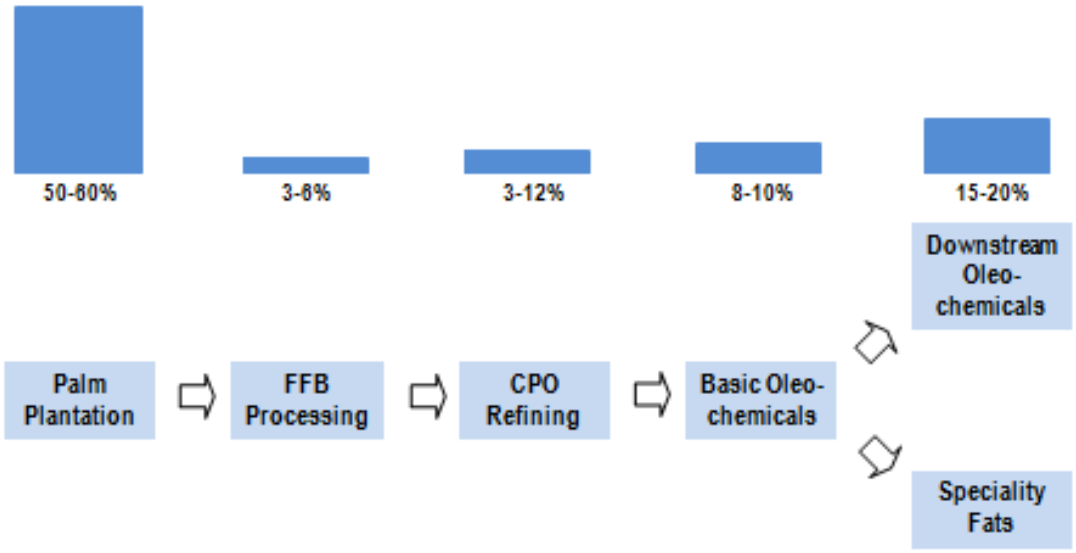


Figure: Value Chain of Oil Palm derived Products
Source: Frost & Sullivan
[Cited in https://www.toptal.com/finance/market-research-analysts/palm-oil-investing]

As the proposed plan calls for the expansion of area under oil palm plantation by 75,000 hectares, it can yield from 2,00,000 MT to 2,90,000 MT of CPO per annum. This may sustain a CPO refinery in the NE Region to produce value added items like Palm Fatty Acid Distillates, Palm Stearin etc. that can be used as oleo-chemical feedstock, apart from RBD Palm olein and other items for the domestic sector and food units.

In India, about 15% of the volumes of palm oil are used for oleo-chemicals. There is ample scope for this sector in the country, since many applications are not yet established in India. As the economy grows and changes qualitatively, due to increases in the per-capita income, there will be new markets for many categories of items made from the basic oleo-chemicals.

9.2. Employment Generation

Apart from the economic output as discussed previously, another important outcome of oil palm plantation is the generation of farm based employment in rural areas. The average man-days of labour required on one hectare of oil palm plantation for different stages are given as follows:

Establishment of Plantation	...	55-60 man-days
Maintenance during Gestation (1st-3rd Years)	...	about 24 man-days per annum
During the Yielding Period (4th Year onward)	...	Maintenance ... as above PLUS about 2 man-Days per round of harvesting

It is evident that the crop has huge potential of direct employment of the rural households. One hectare of oil palm needs about 57 man-days for its establishment and 72 man-days during the gestation period. Thus, before fruits start yielding; one hectare needs about 130 man-days of direct labour. The following table gives the employment potential due to establishment and initial maintenance of oil palm in the NE region as per this plan.

It is seen that the planned **establishment and initial maintenance of oil palm** in the NE region under this proposal **will create about 96.75 lakh man-days of direct employment in the first eight years**. Further, the **maintenance (inter-cultural operations) and harvesting of the expanded areas** will create additional employment during the lifetime of the palms. This requirement is estimated at about **39.00 lakh man-days per annum**.

It may be noted that there are additional employment opportunities in related areas like nurseries, transportation, FFB processing factories etc. This is excluding the opportunities in sales and various services needed by the oil palm based economy.

9.3. Other Outcomes of the Action Plan

Apart from the output and employment generation aspects, the promotion of oil palm in the NE Region will have the other significant impacts. These include:

- **Import substitution**, leading to saving of valuable foreign exchange;
- **Rural development** of the growing areas due to the inflow of cash from the plantations;
- Positive **social impacts** due to rural incomes like health, education, law and order etc.; and
- Reduction of **shifting cultivation,** which will reduce pollution due to the widespread burning of hill-sides before the rainy season.

Further, as the oil palm plantations are being proposed to be raised on wastelands and fallow lands, there will be no destruction of any forests as apprehended. Rather, open and degraded wastelands areas will be brought under oil palms.

Table-9.2: Employment Generation from the Expansion of Oil Palm in NE Region (Establishment & Maintenance of Young Areas from 1st to 8th Years)

Source of Employment	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Total
Establishment of New Area	5,81,400	8,43,600	10,60,200	9,34,800	8,55,000	0	0	0	42,75,000
Maintenance of Young Areas (under Gestation	0	2,44,800	6,00,000	10,46,400	11,95,200	12,00,000	7,53,600	3,60,000	54,00,000
Total	**5,81,400**	**10,88,400**	**16,60,200**	**19,81,200**	**20,50,200**	**12,00,000**	**7,53,600**	**3,60,000**	**96,75,000**

Source: Consultants' Computations

Note:

The above table has been computed on the basis of man-days needed for the establishment of new areas and their maintenance during the gestation period only. **It excludes employment for the maintenance of the areas (intercultural operations) and harvest of output during the yielding period.**

9.4. Major Outcomes from the Proposed Investment from the Government Point of View

The major outcomes of the above recommendations from the Government view-point have been summarized below.

Table-9.3: Major Outcomes from Proposal (Government View-point)

Major Outcome (Government Point of View)	Monetary Value (Rs. in Crore)	Remarks
Returns from GST on Crude Palm Oil	301.69 - 753.97	Present Value of GST streams over 28 years (lifetime of palm) based on different yields (12 MT, 15 MT and 18 MT) per hectare and different discounting rates (11%, 12% and 13%) Based on assumptions furnished under following table (Table-9.4)
Potential Reduction of Outflow from MG-NREGA due to Increased Rural Employment	205.11	Labour for establishment and initial maintenance of the oil palm
	739.37	Present value of labour for intercultural operations and harvesting over lifetime of palm (wages for annual labour requirement is estimated to be Rs.82.68 crore)
Reduction of Foreign Exchange Outflow for Imports of CPO	1165.70 per year	Assuming average yield of 18 MT, OER of 16.5% and CIF Prices of Imports as $ 712 per MT

Source: Consultant's Calculations

The details in the above regard have been briefly furnished as follows.

Returns from GST on Crude Palm Oil

The prevailing rate of GST on Crude Palm Oil (CPO) is 5%. The total value of GST payable from CPO derived from one hectare of oil palm plantation during the life-time of the palm (28 years) is given below. This has been computed by considering the following variations:

- Average Yield over Lifetime (in terms of FFB): Varied as 12 MT, 15 MT and 18 MT per hectare; and
- Rate of Discount: Varied as 11%, 12% and 13% (respectively being 4%, 5%, and 6% over the present EBR of 7%)

The yield profile of the oil palm is assumed to follow the pattern given earlier in this chapter (under 'Factors Affecting the Economic Returns from Oil Palm'). The conversion of FFB to CPO is assumed to be 16.5%. Price of CPO is assumed as Rs 52,000 per MT in Year-1 and assumed to increase by 2.5% per annum.

Table-8.8: Present Value of GST on Crude Palm Oil (CPO) from FFB Harvested from 1 Hectare of Oil Palm Plantation

Average Yield per Hectare over Lifetime of Palm	Present Value of GST on CPO (in Rs.) from FFB Harvested from 1 Hectare of Oil Palm under different Discounting Rates over lifetime of Palm (28 years)		
	11%	12%	13%
12 MT	67,019	44,369	40,225

Average Yield per Hectare over Lifetime of Palm	Present Value of GST on CPO (in Rs.) from FFB Harvested from 1 Hectare of Oil Palm under different Discounting Rates over lifetime of Palm (28 years)		
	11%	12%	13%
15 MT	83,774	55,461	50,281
18 MT	100,529	66,553	60,337

Source: Consultant's Calculations

NOTE: The above table has been computed after assuming that:

- The GST rates on CPO remain at the present levels of 5% throughout the lifetime of the palm (28 years);
- Yields of FFB from the plantation follow the following pattern:

Years	Yield Pattern as % of Lifetime Average
4-8	Increases rapidly from 30% in 4th year to 125% in 8th year
9-18	Around 120% - 125% of average
19-23	Slow decline from 120% in 19th Year to 105% in 23rd year
24-28	Faster decline from 100% in 24th year to 80% in 28th year

- Yields are not affected by other factors like pests, weather and other adverse factors in a major manner;
- CPO yield from FFB (Oil Extraction Ratio) is taken as 16.5%
- Price of CPO is taken as Rs. 52,000 per MT in Year-1 and assumed to increase by 2.5% per annum.
- GST realized on other products obtained like Palm Kernel Oil (PKO) is not taken into account.

Thus, the present value of GST realized from CPO extracted from FFBs growing on 1 Hectare of plantation can range from Rs. just over Rs 40,000 to just over Rs 100,000, based on the yields and rate of discount used. As the proposed Plan involves area expansion by 75,000 hectares; **the net present value of GST realized by the Government from CPO on the expanded area in the NE region can range from Rs. 301.69 crore to Rs 753.97 crore**.

Potential Reduction of Outflow on MG-NREGS due to increased Rural Employment

The other important outcome of oil palm plantation is the generation of farm based employment in rural areas. This has been estimated to be **about 96.75 lakh man-days of direct employment in the first eight years** on account of planned **establishment and initial maintenance of oil palm.** Further, the **maintenance (inter-cultural operations) and harvesting of the expanded areas** will create additional employment during the lifetime of the palms. This requirement is estimated at about **39.00 lakh man-days per annum.**

The above employment creation has the potential to reduce the demand of work under MG-NREGS in the growing areas. The weighted average of wages for manual unskilled labour is taken as Rs.212 per day, based on MG-NREGS rates for 2020-21 and the planned area under oil palm in different NE states. At this rate, the potential reduction of outflow on MG-NREGS is estimated to be as follows:

- Rs. 205.11 crore for the labour needed to establish the oil palm plantations and initial maintenance in the gestation period; and
- Rs. 82.68 crore per annum for the labour needed for maintenance (inter-cultural operations) and harvesting of the expanded areas. The present value of this component over the lifetime of palm (28 years) at a discount rate of 12% is estimated to be Rs. 739.37 crore.

The above excludes employment on account of areas like nurseries, transportation, FFB processing factories etc. This is excluding the opportunities in sales and various services needed by the oil palm based economy.

Savings of Foreign Exchange

The production of Crude Palm Oil under the proposal can lead to reduction of future imports by a similar volume. Assuming a yield of 18 MT and Oil Extraction Ratio (OER) of 16.5%, an area of 75,000 hectares can yield about 222,750 MT of CPO per annum, when the palms reach maturity (9th year onward). The market rates of CPO vary widely; the average over the period from November 2019 to October 2020 is about $ 712 per MT (on CIF Rotterdam basis).

At this rate, the foreign exchange savings from the expanded area in NE Region is about $158.60 million per annum, which translates to about Rs 1165.70 crore per annum at the present rate of about Rs. 73.50 to $1.

. **Developmental Action Plan for Promoting Oil Palm in the North Eastern Region of India**

List of Annexes

Annex-1: Approach & Methodology

Approach

The basic approach for the conduct of the present assignment has been to devise an Action Plan that relies upon the feedback and information furnished by stakeholders at the state, regional and national levels.

The states like Mizoram, Nagaland, Arunachal Pradesh, and Assam etc. with existing oil palm areas have been focused upon; since there appears to have been considerable planting and other activities in these states. Manipur had been identified during the stakeholders' meeting as having sizeable potential area, and hence it was also covered. This state has shown interest in oil palm development.

Apart from the above State Governments, the processors and growers were planned to be covered as feasible in the time period available.

Methodology

The adopted methodology consisted of the following steps:

1. Finalization of Terms of Reference & Scope of Work
2. Study of Secondary Information
3. Determination of the Information Gaps & Preparation of Data Collection Instruments (Discussion Points, Field Study)
4. Primary Study – covering the focus states at state level, and select growers and processors, along with discussions with national level bodies as necessary
5. Collation of Data & Analysis
6. Draft Action Plan & Its Finalization

Deliverables

The deliverables included the following: (a) Draft Report and (b) Finalization of the Report. Presentations will be given in this connection.

Time Frame

The preparation of the Action Plan was to be completed within twelve weeks (three months) from the date of its assignment.

The time for the completion of each of the above methodological steps has been indicated in the next page and the details may be referred to therein.

Time Frame for the Completion of the Assignment

Methodological Step	Weeks from Zero Date											
	1	2	3	4	5	6	7	8	9	10	11	12
Finalization of Terms of Reference & Scope of Work	☆											
Study of Secondary Information												
Determination of the Information Gaps & Preparation of Data Collection Instruments (Discussion Points, Field Study)												
Primary Study – covering states, select growers and processors, along with discussions with national level bodies												
Collation of Data & Analysis												
Draft Action Plan & Its Finalization												

NOTES:

1. Zero Date is the date of finalization of the Terms of Reference and Scope of Work.
2. The above time frame is subject to standard force majeure clause.

Annex-2: Growing of Oil Palm

The oil palm tree yields palm oil and palm kernel oil which have a wide range of uses in modern society. It has become the most cultivated source of vegetable oil in the world, as it yields the most oil per unit of land amongst all oil crops. The oil yield from oil palm can go up to 5 tons per hectare by adopting suitable cultivation practices. The oil palm starts yielding from third year of planting and harvesting of fruits can be done every weekly interval for 25 to 30 years.

Cultivar

Tenera is the variety of oil palm that is now commercially preferred. It is a hybrid of two other varieties: (a) Dura, which has a thick shell, and (b) Pisifera, a variety without a shell. Tenera is characterized by a thin shell, medium to high mesocarp (65%-90%) and high oil content (16%-20%).

Agro-climatic Conditions for Oil Palm

The optimal agro-climatic conditions for the oil palm are given below.

Climatic Conditions

Table-A (2).1: Climatic Conditions for Growing Oil Palm

Parameter	Ideal Conditions	Remarks
Maximum Temperature (˚C)	29-33	Mean maximum temperature
Minimum Temperature (˚C)	22-24	Mean minimum temperature
Annual Rainfall (mm)	2,000 or more 100 mm / month	In case of non-availability of such rainfall, irrigation has to be used. The oil palm needs about 300 litres of water per day per palm. Preferably, rain should occur regularly (@ 100 mm per month)
Solar Radiation (MJ / m^2 per day)	15	Incident radiation upon a surface is termed as 'irradiation'
Hours of Sunshine (per day)	5-7	In all months (ideally)
Relative Humidity (%)	80	Ideally 85% or more With vapour pressure deficit of below 2 K Pa (20 milli-bars)

Source: 'The Oil Palm', Corley 2003

NOTE:

As stated in the above source: 'It is **particularly difficult to state the requirements of the oil palm in seasonal climates, where monthly water deficits vary widely and a large annual rainfall may not compensate for poor distribution**, if rainy months have little sunshine. The general conclusions are as follows.

The ideal requirements are (Hartley, 1988):

- **Annual rainfall** of 2000 mm or greater, evenly distributed, without a marked **dry season**, and preferably at least 100 mm in **each month**,
- A mean **maximum temperature** of about 29–33°C,
- A mean **minimum temperature** of about 22–24°C,
- **Sunshine** of 5–7 h/day in all months, and
- **Solar radiation** of 15MJ/m^2 per day.

Goh (2000) made a similar general list:

- **Annual rainfall** of 2000–2500mm
- **Relative humidity** above 85%
- Low **vapour pressure deficit**
- No extreme **temperatures** or **wind-speed**
- Adequate **sunshine** hours, and
- **Solar radiation** of 16–17MJ/m^2 per day.

This was allied to a requirement for high fertility, and no limitation to root development.'

In fact, the following classification of climatic properties has been suggested in relation to suitability for oil palm cultivation.

Table-A (2).2: Climatic Suitability for Growing Oil Palm

Climatic Element	Highly Suitable	Suitable	Moderately Suitable	Currently Unsuitable	Permanently Unsuitable
Annual Rainfall (mm / year)	2,000-2,500	2,500-3,000	3,000-4,000	4,000-5,000	>5,000
		1,700-2,000	1,400-1,700	1,100-1,400	<1,100
Duration of Dry Season (month)	0	1	2-4	5-6	>6
Mean Annual Temperature (˚C)	26-29	29-32	32-34	34-36	>36
		23-26	20-23	21-23	<20
Daily Solar Radiation (MJ/m^2)	16-17	17-19	19-21	21-23	>23
		14-16	11-14	8-11	<8
Wind (m/s)	<10	10-15	15-25	25-40	>40

Source: Goh cited in 'The Oil Palm', Corley 2003

Soil Conditions

Oil palm can grow in a range of soils. The soil should be deep, moist and well-drained. The oil palm root system needs to be well developed, and a problem with some soil types is their inadequate rooting volume. The minimum soil depth required is 1 m, as almost all the fine root is in the top 1 m; with most of it being in the top 30 cm. Oil palm cannot grow in water-logged areas. Other unsuitable soils include highly alkaline and highly saline soils, apart from relatively higher slopes. As per IIOPR National Seminar in February 2015, oil palm can grow in acidic soils with pH values of 5.0 or more.

Basically, a good soil is one with little gravel; a texture that allows reasonable drainage, but has still retained plenty of exchangeable cations (which is a measure of soil fertility) and contains a good level of soil organic matter. Hartley had classified soils in terms of suitability for oil palm cultivation as follows.

Table-A (2).3: Grading of Soil as per Suitability for Growing Oil Palm

Soil Class (*)	Characteristics				
	Texture	Gravel & Stones	Drainage	Chemical Status	
				Organic Matter	Exchangeable Cations (**)
I	Sands to clays	None	Good	Good	Good
II a	Sands to clayey sands	None or very little	Good to 900 mm	Medium	Medium
II b	Sands to clays	Some gravel	Good to 600 mm	Medium	Medium
III	Sands to clays	Gravelly	Poor	Medium	Poor
IV	Leached sand or very heavy clays	Very gravelly	Very bad or deep peat	Poor	---

(*) I: Good IV: Poor

(**) Indicator of soil fertility

Source: Hartley cited in 'The Oil Palm', Corley 2003

Role of Other Climatic Factors: Vapour Pressure Difference & Solar Radiation

Vapour Pressure Difference

Vapour Pressure Difference (VPD) is the difference between the amount of moisture in air for a given temperature and the amount when it is saturated. It is an indicator of the dryness of air.

At high light levels, photosynthesis becomes 'light saturated' and the rate of carbon dioxide uptake through the stomata becomes the main limitation. Increased VPD may trigger closure of stomata to avoid excessive evaporation loss. This can lead to carbohydrate depletion in the plant. Enhanced VPD levels can affect growth even before soil moisture limits are reached.

VPD is measured in terms of Kilo Pascal (K Pa) or milli-bars. The relation between the above measures is given as follows: 1 K Pa = 10 milli-bars

Ideal Range

The ideal range for VPD for Oil Palm is 0.8 K Pa or less (8 milli-bars or less)

Maximum VPD for Oil Palm

2 K Pa or 20 milli-bars

VPD above this limit can affect the photosynthesis rates of leaf and canopy, leading to fall in yields. 'Sites with VPD less than 2 K Pa should be preferred as far as possible'. ['Water Relations and Photosynthesis Of The Oil Palm In Peninsular India', Jose Kallarakkal] 'Canopy photosynthesis was found to be half at VPD of 2 K Pa as compared to VPD of 0.8 K Pa' (Henson cited in 'The Oil Palm').

Range (Assam) in the non-monsoon season

Location	Oct	Nov	Dec	Jan	Feb	Mar	Apr
DIKOM	16	14	14	11	17	12	11
TOCKLAI	12	14	14	12	18	13	16
SILCOORIE	14	14	17	14	22	22	21

Source: 'Growth & Development of Tea Industry in Assam', Dr. P Barua

Note: The above locations are all in the tea belt, with Dikom being situated in between Dibrugarh and Tinsukia, Tocklai near Jorhat and Silcoorie near Silchar

Solar Radiation

Solar radiation is important for plant growth as well as the production of FFB. For adult palms, sunlight increases the production of female inflorescence.

Solar radiation is composed of a range of wavelengths, and roughly half the total solar radiation energy is effective in photosynthesis. The rate at which carbon dioxide is fixed by a green leaf increases with the radiation incident upon it. However, beyond a limit (light saturation limit), the increase of irradiation has low effect upon photosynthesis.

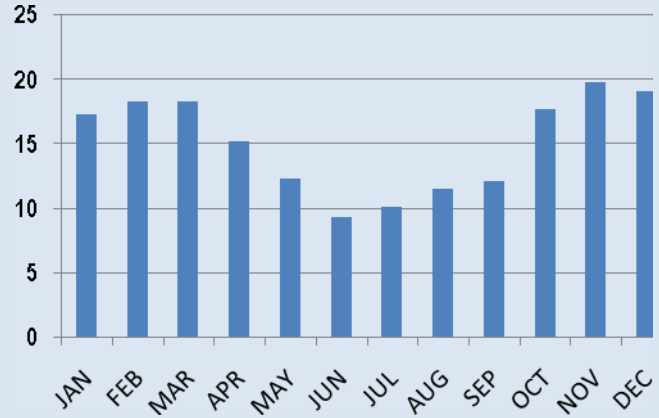
The rate of incidence of solar radiation is measured in terms of MJ/m^2/ day or KW / m^2. The relation between the above is as follows: 1 KWhr = 3.6 MJ

Ideal Range

15 -17 MJ / m^2 / day (Solar radiation)

Range (Guwahati, Assam at 26.167 N, 91.747 E) Direct Normal Irradiation (DNI) in MJ/m^2 per day

MONTH	DNI
JAN	17.29
FEB	18.26
MAR	18.28
APR	15.21
MAY	12.30
JUN	9.28
JUL	10.10
AUG	11.54
SEP	12.14
OCT	17.67
NOV	19.80
DEC	19.07



Source: Photovoltaic Geographical Information System (PVGIS) of ec.europa.eu

Note: Above values are the averages of 12 year figures (2005-2016)

Relation between Sunshine Hours & Solar Radiation

Sunshine Hours: Sometimes sunshine hours are used as rough measure of solar radiation, because they are easier to measure than radiation, and they are normally well correlated. The total sunshine hours per year have been correlated with annual yield, with a displacement of 28 months

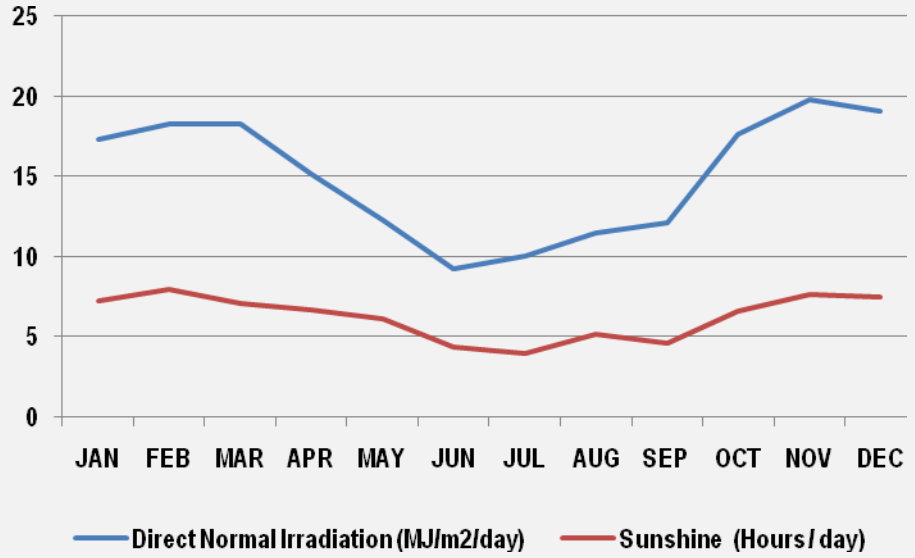
However, this is not always so, such as when haze or dust affects the incident radiation.

Table-A (2).4: Sunshine Hours & Solar Radiation (Guwahati)

Month	Direct Normal Irradiation (MJ/m²/day)	Sunshine (Hours / day)
JAN	17.29	7.29
FEB	18.26	8.00
MAR	18.28	7.10
APR	15.21	6.70
MAY	12.30	6.16
JUN	9.28	4.43
JUL	10.10	4.00
AUG	11.54	5.23
SEP	12.14	4.63
OCT	17.67	6.65
NOV	19.80	7.70
DEC	19.07	7.48

Sources: (a) Photovoltaic Geographical Information System (PVGIS) of ec.europa.eu; (b) Secondary Sources for Sunshine hours

Graph: Solar Radiation (DNI) & Sunshine Hours (Guwahati)



Mathematically, the coefficient of correlation is 0.938 between the above arrays of data, which indicates that irradiation and sunshine hours are strongly correlated.

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Land Characteristics

The following land characteristics for oil palm plantation have been evolved in South-east Asia, but they are applicable in all similar climates. However, a pragmatic approach has to be taken to using these guidelines.

Table-A (2).5: Suitable Land Characteristics for Growing Oil Palm

Soil Characteristic ↓	Suitability →	Highly Suitable		Moderately Suitable	Marginally Suitable	Unsuitable
	Degree of Limitation →	No Limitation	Minor Limitation	Moderate Limitation	Serious Limitation	Severe Limitation
Topography						
Slope (%)		0-4	4-12	12-23	23-38	>38
Slope (°)		0-2	2-16	6-12	12-20	>20
Wetness						
Drainage Class		Moderately well drained	Well drained to somewhat excessively drained	Excessively drained or Somewhat poorly drained	Poorly drained	Very poorly drained
Flooding		Not Flooded	Not Flooded	Minor Flooding	Moderate Flooding	Severe Flooding
Physical Conditions						
Texture		Clayey Loam Sandy Clay	Loam Silty Clayey Loam	Sandy Clayey Loam Silty Clay	Sandy Loam Loamy Fine Sand	Loamy Coarse Sand
Depth to Root restricting Layer (cm)		100	---	75-100	50-75	<50
Depth to Acid Sulphate Layer (cm)		>100	---	75-100	50-75	<50
Thickness of Organic Soil		---	0-50	50-200	200-500	>500
Soil Fertility Conditions						
Weathering Stage [Effective CEC (cmol + / 100 gram of clay)]		>24	16-24	<16	---	---
Base Saturation (%) A Horizon		>50	35-50	<35	---	---
Organic Carbon (%) A Horizon		1.5-2.0	>2.0 or <1.5	---	---	---
Micro-nutrients		---	Deficiency	Toxicity	---	---

Source: Paramanathan cited in 'The Oil Palm', Corley 2003

Notes:
1. Slope in % (x) can be converted to Slope in degree (y) by the following equation: $y = \tan^{-1}(x) * 180/\pi$, where π can be taken as 3.1416
   Conversely, $x = \tan(y) * \pi/180$
2. A Horizon is the top layer of the mineral soil layers, often called as 'top soil'
3. CEC stands for Cation Exchange Capacity, which is a measure of soil fertility

The important factors are:

(a) **Topography**: Land is unsuitable for oil palms if it has a slope greater than 20° (38%)

(b) **Wetness**: The 'wetness' criterion effectively selects land that is neither excessively or insufficiently drained, nor prone to flooding.

(c) **Drainage**: Land may be unsuitable if it suffers from flooding or a high water table. Further, the hydraulic conductivity of the soil must allow the rainfall to infiltrate or to move down the profile.

(d) **Physical Conditions**: The 'physical' criteria are soil conditions arising from the texture of the soil material, and the presence or absence of barriers to root penetration, such as solid rock, compacted gravel or soil, or toxic chemical conditions such an acid sulphate horizon.

Package of Practices

Oil palm is a perennial crop that has an economic life span of 30 years, comprising three distinct phases, viz. juvenile period (1-3 years), stabilizing period (4-8 years) and stabilized period (9-30 years). With good planting material, irrigation and proper management, oil palm has the potential to produce 20-25 MT fresh fruit bunches (FFB) per hectare after attaining the age of 5 years. This in turn is capable of yielding 4-5 MT of palm oil and 0.4-0.5 MT palm kernel oil (PKO). In comparative terms, yield of palm oil is 5 times the yield of edible oil obtainable from traditional oilseeds

As a plantation crop, oil palm is raised from seedlings grown in a nursery. The preferred cultivar is called Tenera, which is a cross between the thick shelled Dura variety originally found in Africa, and the Pisifera variety which has no shell. The Tenera cultivar yields fruits with a medium to high mesocarp (middle fleshy layer) having high oil content.

Field Planting of Seedlings

The seedlings are planted in the field when they are 12-14 months old, 1 m high, and having about 13 leaves and 20-25 cm girth at the collar region. The seedlings should get watered soon after they are planted in the field.

Field planting is to be done during the rainy months. The seedlings are planted in the form of an equilateral triangle with a spacing of 9 m between the individual palms (9m x 9m x 9m). The pits are 60cm x 60 cm x 60 cm in size. The number of plants that can be planted per hectare of land is about 148. The pit has to be filled with 400 grams of SSP and 50 grams of insecticide (phorate substitute).

Water Requirements

Water requirements are important, as water deficit leads to yield loss. The loss of yield can be taken as 10% for every 100 mm increase of water deficit. The major factors affecting water deficit (and hence the water requirements) are (a) evapo-transpiration, (b) precipitation, (c) surface and sub-surface run-off, and (d) soil texture.

For mature oil palm, the rate of evapo-transpiration is about 4-5 mm a day, which translates to a water requirement of 280-350 litres per palm per day (MKV Carr 'Water Relations & Irrigation Requirements of Oil Palm'). The Indian Institute of Oil Palm Research (IIOPR) gives the daily water requirement as 150-200 litres per day per palm for juvenile trees. In older plantations, it may go up to 300 litres per palm per day, with actual requirements depending upon site conditions like rainfall, infiltration and run-off characteristics, soil texture and water capacity, evapo-transpiration etc.

Basin method of irrigation may be taken up when irrigation water is not a constraint. The required quantity of water is to be given at 4-5 days interval. [Basin of palm is the area of active root; it is about 1 m in 1st year, 2 m in 2nd year and 3 m in third year] Else, investment may be needed on micro-irrigation or drip irrigation systems to conserve the water requirements.

Nutrient Requirement

The fertilizer requirements will depend upon factors like (a) soil fertility and nutrient uptake, (b) losses due to run-off, volatility and leaching, (c) addition of nutrients due to recycled Empty Fruit Bunches (EFBs), Palm Oil Mill Effluent (POME), pruned branches, litter etc. as well as rainfall deposit. As nutrient uptake by the palm is a major factor, the same has been tabulated at overleaf.

Table-A (2).6: Nutrient Uptake of Oil Palms

Year	Nutrient Uptake (Kg per Ha per year) (*)				
	Nitrogen	Phosphorus	Potassium	Magnesium	Calcium
First	20	5	20	5	---
Second	80	10	130	25	---
Third	145	20	250	50	43

Sources: 'Fertilizer Management in Oil Palm', Goh et al./ 'The Oil Palm' Corley

(*) to be multiplied by approx. 6.76 (=1000/148) to get the nutrient uptake in grams per palm per year

Nutrient Losses

Nutrient losses occur on account of the following factors:

1. Run-off and leaching (with run-off being high for soluble nutrients like nitrogen, potassium and magnesium, especially in the first year when root system is less developed.

   Losses on the above counts may be about 15% for N, 3% for P, 12½% for K, 18% for Mg, 5% for Ca and 20% for B.
2. In addition, if urea is applied to the surface, about one-third may be lost as volatile losses.
3. Further, about 200-1000 p.p.m. of applied phosphorus is fixed to soil

Demand of Nutrients by Oil Palm

Total demand of nutrients of a plant as composed of two separate processes: growth demand and deficiency demand

(a) Growth demand arises from the enlargement of the plant organs and the production of any plant parts that are removed, such as fruit bunches. In the oil palm, the continued growth of the trunk throughout the palm's life, and the continued production and removal of fresh fruit bunches (FFB) means that all nutrients contained in these new parts are additions, and hence part of the plant growth demand.

(b) If the nutrient availability is deficient, then the plant requires an extra supply of nutrients to raise the concentration throughout the palm to that which is essential for the maximum growth rate and rate of production of FFB at its site yield potential (SYP).

If the deficiency demand is met it implies that as the deficiency is corrected, the palm canopy and the number of inflorescences and the FFB are likely to become larger and heavier, so that the growth demand will also increase. This must be taken into account in the growth demand calculation.

Role of Nutrients

Nutrient	Role
Nitrogen	Constituent of proteins and nucleic acids, integral part of chlorophyll, helps in vigorous vegetative growth with dark green colour, it increases fruit bunches and their yields
Phosphorus	Role in energy storage and transfer; constituent of nucleic acids and phospholipids, stimulates root growth, promotes seed and root formation, it increases the FFB weight
Potassium	Involved in activation of Enzymes related to starch synthesis; osmotic and ionic regulation, translocation of sugar from leaves to other parts, imparts disease and pest resistance, regulation of stomatal openings
Magnesium	Constituent of chlorophyll; cofactor for enzymatic reactions, involved in phosphate transfer from ATP, structural component of ribosome
Sulphur	Constituent of amino acids, biotin, Vit. B_1, and coenzyme A, aids in fats and oils formation, involved in chlorophyll synthesis
Calcium	Constituent of cell wall; role in cell division and permeability of cell membrane

Fertilizer Application

The fast growth of oil palm requires a lot of nutrients, much of which has to be supplied through the application fertilizers. The requirement of nutrients depends upon the age of the plant. The Indian Institute of Oil Palm Research (IIOPR) has recommended the following application of fertilizer for the proper growth of oil palm and ensuring sufficient yield of FFBs under rain-fed conditions.

Table-A (2).7: Application of Fertilizers for Oil Palm

Year	Nutrient Requirement in terms of Fertilizers (grams per palm per year)							
	Nitrogen (N) from either		Phosphate (P_2O_5) from any one of:			Potash (K_2O)	$MgSO_4$	Borax
	Urea	Ammonium Sulphate	DAP	SSP	RP	MOP		
1st Year (SSP/RP)	870	2000	---	1250	1000	667	125	25
1st Year (DAP)	700	1610	435	---	---			
2nd Year (SSP/RP)	1740	4000	---	2500	2000	1333	250	50
2nd year (DAP)	1400	3215	870	---	---			
3rd Year onward (SSP/RP)	2610	6000	---	3750	3000	2000	500	100
3rd Year onward (DAP)	2100	4825	1305	---	---			

Source: Indian Institute of Oil Palm Research (IIOPR)

Notes:

1. Since Diammonium Phosphate (DAP) has 11% nitrogen, use of DAP will require modification of use of urea and ammonium sulphate as shown in the second, fourth and sixth rows of the above table.
2. Rock Phosphate (RP) is assumed to have 20% P_2O_5 content, while Single Super Phosphate is marketed in India with 16% P_2O_5 content (which gives about 7% phosphorus), apart from 11% sulphur and 18% calcium content.
3. Muriate of Potash (MOP) is a chloride of potassium (KCl_4), which contains 60% K_2O
4. Borax is Sodium Tetraborate, it has 11% boron. [Boric acid has 17.5% and Solubor has 20%, the latter is a mixture of disodium octaborate, boric acid and sodium pentaborate.
5. The nutrient composition (in %) of commonly used fertilizers is given below.

Name of Fertilizer		N	P	K	Mg	Ca	S
Urea		46	---	---	---	---	---
Ammonium Sulphate		21.1	---	---	---	---	2.5
SSP		---	7	---	---	18	11
Di-ammonium Phosphate		18	20	---	---	---	---
Muriate of Potash		---	---	50	---	---	---
Kiesler Rock		---	---	---	9.5	---	12.5

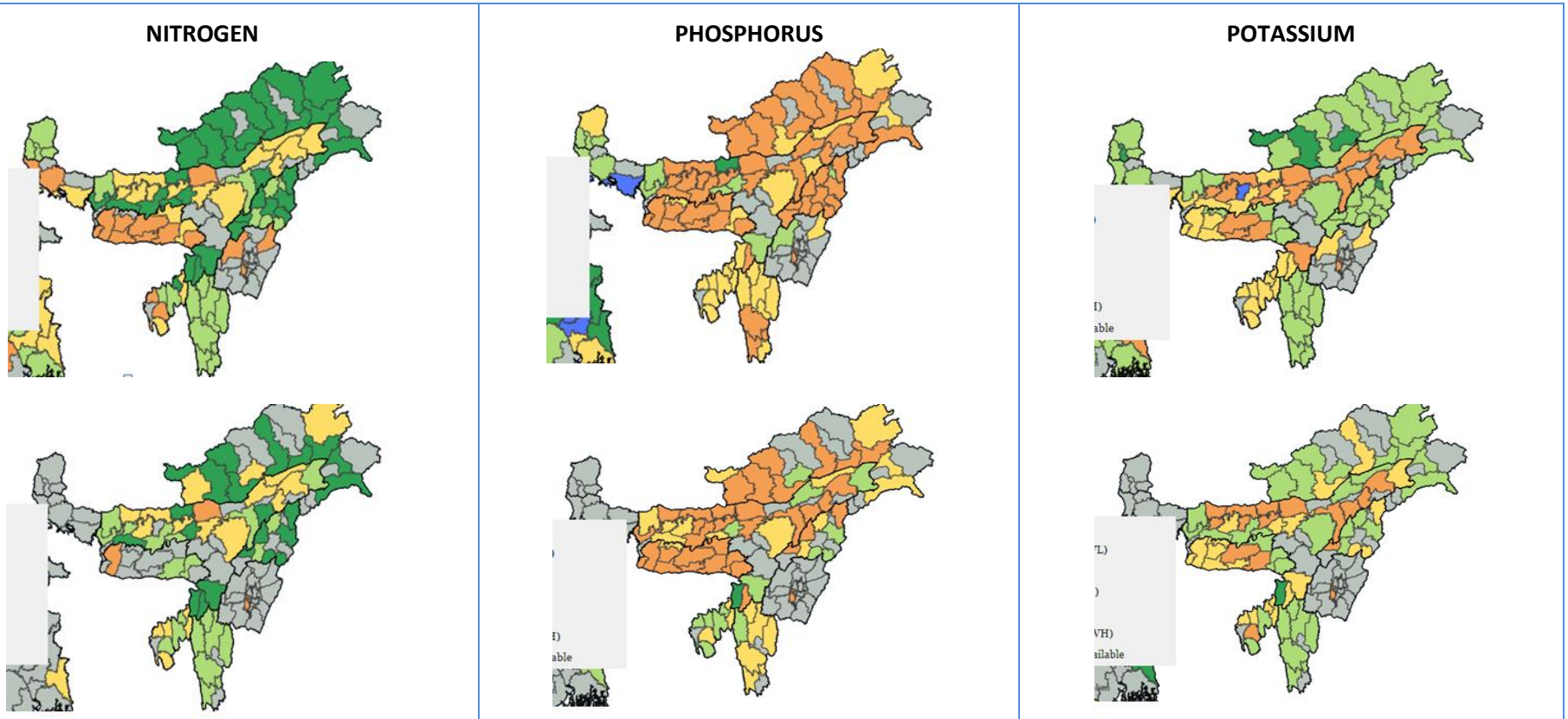
Kiesler Rock is $MgSO_4.H_2O$ (Magnesium Sulphate)

6. The above table has been constructed on the basis of the following requirement of nutrients by oil palm under rain-fed conditions.

Year	Nutrient Requirements (grams per palm per year)			
	Nitrogen	P_2O_5	Potash (K_2O)	Magnesium Sulphate
1	400	200	400	125
2	800	400	800	250
3 onward	1200	600	1200	500

7. Actual application has to be preceded by soil testing to determine the **levels of nutrients** at the site of plantations.

Soil Fertility in the states of NE Region (Macro-Nutrients) 2015-16 (upper row) & 2016-17 (lower row)



Low	Medium	High	Low	Medium	High	Low	Medium	High
<280	280-560	>560	<28	28-56	>56	<140	140-280	>280

Very Low (VL) | Low (L) | Medium (M) | High (H) | Very High (VH) | Data not available

Source: Soil Health Card website (https://www.soilhealth.dac.gov.in/)

Note: All figures at above are Kg per Ha

Fertilizer doses have to be applied four times a year. The first dose is to be given in June or July (at the beginning of rains), the second dose in September or October, the third dose in January or February (cool season) and the fourth dose in April or May. The doses are separated by three months. The second dose of fertilizer application in the first year must be made along with 50-100 kg of FYM and 100 kg of green manure per plant.

Manual weeding or application of recommended herbicide is needed to keep the basin area free of weeds. Otherwise, the young palm has to compete with weeds during its first few years for obtaining nutrients from the soil.

Intercrops

Juvenile period (first three years): Inter crop selected should be compatible with the main crop and should not compete with oil palm for light, water and nutrients. Any remunerative crop can be grown, but the most suitable crops are vegetables, banana, flowers, tobacco, chillies, turmeric, ginger, pineapple etc. In addition, cereals (except paddy), pulses, oilseeds, vegetables, flowers, cotton, sugarcane and banana can be grown as inter crops in the juvenile oil palm plantations (IIOPR National Seminar held in February 2015)

Mature period (palm height is at least 3 m): The intercrops should be able to grow under partially shaded conditions and should not compete with oil palm for water, sunlight and nutrients (e.g. cocoa, pepper, heliconia and ginger lily). As per IIOPR: also shade loving crops like cocoa, red ginger, anthurium, long pepper and asparagus can be grown subsequently as inter crops in adult oil palm plantations (IIOPR National Seminar held in February 2015)

Mulching

Mulching of oil palm basins is essential to conserve moisture as well as to control weeds. Mulching can be done with dried leaves, male flowers, coconut husk, empty bunches etc.

Harvesting

When the fruit colour changes from purple to orange colour, and the single fruit could easily fall off from the bunch, harvesting of the Fresh Fruit Bunches (FFBs) must be carried out. While harvesting a stalk length of 5 cm alone should be left. Harvesting should be done at 10-12 days interval. During rainy season, harvesting may be done at closer intervals. In young plantations, we get more bunches with less bunch weight. In adult plantations the bunch weight is more but bunch number is lower.

The oil palm plants start bearing from 4th year onwards and the production progressively increases up to 10 years. The pattern of bearing as per international standard is given below.

Table-A (2).8: Bearing Potential of Oil Palms

Age (Years)	Bearing Potential (MT/Ha)
4	5.0
5	8.0
6	11.0
7	15.0
8	18.0
9	18.0
10	18.0

Source: Status Paper on Oil Palm: Oilseeds Division, DAC&FW

Soil Water Relations

Soil moisture content is the amount of water present in the soil. After precipitation (rainfall or snow fall), the incident water is available to the soil. A part is lost in surface run-off, and some are evaporated back. Most of the incident water infiltrates into the soil till its saturation capacity. However, at this condition, all soil pores are filed up and plants suffer. They need both air and moisture in the soil. However, after the soil is saturated by the infiltrating water, it is gradually drained away – either by gravity (percolation) or as sub-surface run-off.

The water remaining in the soil profile after 48 hours of free drainage is called the **Field Capacity** of the soil. A part of it is not available for plant growth, as it is tightly held by the soil and the roots of the plant cannot extract it. Such water held by the soil defines the **Permanent Wilting Point**. The plant can use the available water till this point.

The water between the Field Capacity and the Permanent Wilting Point is called the **Available Water Capacity** (AWC). This capacity determines the moisture in the soil available for the plant. It depends upon the soil texture, organic matter in the soil, temperature, and presence of impeding layers. AWC is usually measured in inches per feet or as a percentage

The following table gives the Available Water Capacity of various soils in terms of inches per feet of soil profile, and as a percentage

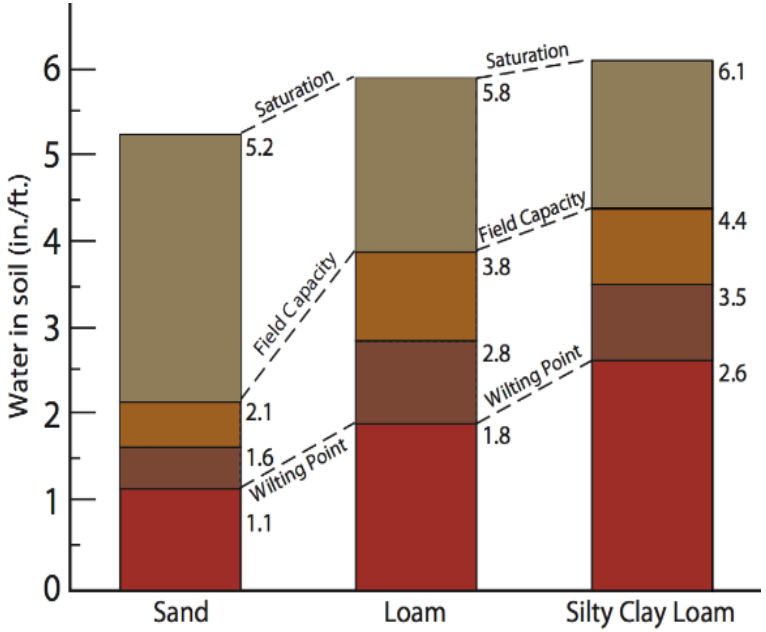


Table-A (2).9: Available Water Content of Different Soil Textures

Soil Texture	Coarse Sand	Fine Sand	Loamy Sand	Sandy Loam	Fine Sandy Loam	Silty Loam	Silty Clayey Loam	Silty Clay	Clay
AWC (inches per feet of soil)	0.25 - 0.75	0.75 – 1.00	1.10 – 1.20	1.25 – 1.40	1.50 – 2.00	2.00 – 2.50	1.80 – 2.00	1.50 – 1.70	1.20 – 1.50
AWC as %	2-6	6-8	9-10	10-12	13-17	17-21	15-17	13-14	10-13

Source: Plant & Soil Sciences e-Library, University of Nebraska-Lincoln (www.unl.edu)

Medium textured soils (fine sandy loam, silt loam and silty clay loam) have the highest water holding capacity, while coarse soils (sand, loamy sand and sandy loam) have the lowest water holding capacity. Medium textured soils with a blend of silt, clay and sand particles, and good aggregation provides a large number of pores that hold water against gravity. Coarse soils are dominated by sand and have very little silt and clay. Because of this, there is little aggregation and few small pores that will hold water against gravity. Fine textured clayey soils have a lot of small pores that hold much water against gravity. Water is held very tightly in the small pores making it difficult for plants to absorb it.

Water Deficits & Irrigation Requirements

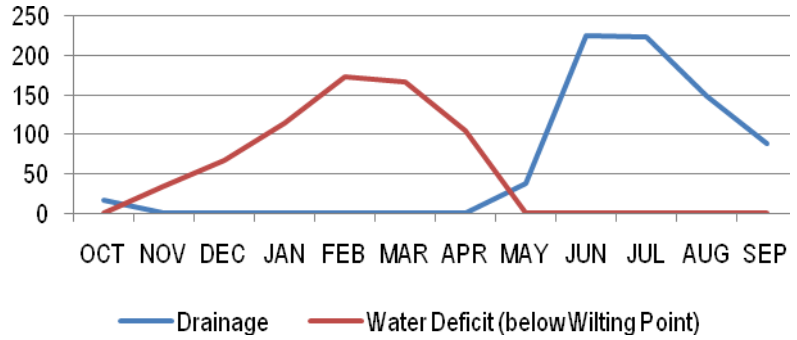
Water Deficits

The Available Water Capacity (AWC) of a soil profile between two points of time (1) and (2), is given by the following equation: **$AW_2 = AW_1 + P + I - Ea - S - D$**, where

AW_1 and AW_2 are the available water held in the profile down to the depth limit at the beginning and end of the measurement period, P is the precipitation, I is the irrigation, Ea is the actual evapo-transpiration, S is the net surface runoff and D is the deep or lateral drainage from the profile to beyond the rooting zone.

The above parameters are stated in terms of mm depth of water.

Based on the above it is possible to estimate the **Water Deficit** of a soil profile as follows. (Surface runoff is neglected) The table has been prepared from October onward (i.e. end of monsoons, when the AWC_1 can be set as equal to the Field Capacity)



(all figures are in mm)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
AWC (beginning)	127	127	92	60	12	0	0	22	127	127	127	127
Add: Rainfall	107	15	8	12	21	59	152	293	366	345	249	188
Less: PET	90	50	40	60	80	100	130	150	140	120	100	100
Equals	144	92	60	12	-47	-41	22	165	353	352	276	215
Field Capacity	127	127	127	127	127	127	127	127	127	127	127	127
Drainage	17	0	0	0	0	0	0	38	226	225	149	88
AWC (end)	127	92	60	12	0	0	22	127	127	127	127	127
Water Deficit (below Wilting Point)	0	35	67	115	174	168	105	0	0	0	0	0
Cumulative Water Deficit	0	35	102	217	391	559	664	664	664	664	664	664

Notes:

1. AWC (end) = AWC (beginning) + Rainfall – PET, where PET stands for Potential Evapo-transpiration (for a hypothetical crop surface liberally supplied with water).
2. AWC end is set to zero in case the equation yields a negative value, else it is equal to the Field Capacity
3. In case of negative value, the difference between the equation value and the Field Capacity gives the Water Deficit.
4. **The cumulative value of water deficit gives an idea of the irrigation requirement for the dry season. Actual irrigation requirement will be more each month, since the AWC cannot be allowed to reduce to the Permanent Wilting Point and Surface Run-off of Rainfall will be present in real case**. [Assuming plant shows stress at 50% reduction of the AWC, irrigation will have to be 64 mm more each month plus the amount needed to compensate for surface run-off]
5. In case of positive value of the equation, the excess over Field Value gives the figure for drainage due to gravity and sub-surface run-off.
6. Above table refers to crop area near Guwahati, with a sandy loam texture (with Field Capacity=127 mm). Values for PET are approximate. It is assumed that rooting is up to 1 metre.

Annex-3: Processing of Fresh Fruit Bunches

The processing of oil palm crop is done near the growing areas, since the harvested fruit has to be processed within 24 hours and long transit to the Palm Oil Mill may damage the fresh fruit bunches (FFBs). In case of delays of harvesting and bruising to the fruits en-route, Free Fatty Acids (FFA) in the fruits rises substantially from 1% to 5%-6%. The current standards for Crude Palm Oil (CPO) permit up to 5% FFA. Palm Kernel is another significant product emerging from the Palm Oil Mill.

The processing of FFBs involves the following steps after the fruit bunches reach the Palm Oil Mill, with these steps being depicted at the next page in a schematic manner:

(a) **Sterilization** of the FFBs;
(b) **Threshing** to separate the sterilized bunch into individual fruitlets;
(c) **Digestion** of the sterilized fruitlets;
(d) **Pressing** of the sterilized fruitlets which gives crude oil (liquid part) and cake (solid part);
(e) **Clarification** & **Purification** of the crude oil from press to obtain crude palm oil;
(f) **Nut Separation** (Kernel Recovery) from the pressed solid mass;
(g) **Cracking** of the separated nuts
(h) **Kernel Separation** from Palm Kernel Shell
(i) **Drying** of the Wet Kernel to obtain dried Palm Kernel

The following table gives the purpose of the above steps.

Table-A (3).1: Rationale for the Steps in the Palm Oil Mill

Process	Rationale
Sterilization	To deactivate lipases in fruits, and prevents build-up of FFAs, which impact the quality of Crude Palm Oil. Also, weakens the attachment of fruitlets to the bunch and softens the mesocarp
Threshing	To separate the sterilized fruitlets from the stalks of the bunch
Digestion	To break-down of the oil-bearing cells of the fruits as a preliminary step for the pressing process, so that oil can be separated
Pressing	To squeeze out the (crude) oil from the oily mash that comes out from the digestion process, leaving the balance as the Press Cake.
CRUDE OIL	Liquid portion emerging from the Press undergoes further processes:
Clarification	To enable the post-extraction separation of water and other contaminants from crude oil
Purification	To ensure the purification of the clarified oil through the removal of remaining impurities
Drying	To reduces the moisture content further to between 0.15% and 0.2%, in order to stabilize the FFA content of the Crude Palm Oil
Sludge Centrifugation	To recover oil available in the sludge from the clarification process
PRESS CAKE	Solid part coming out from the Press undergoes further processes as follows:
Nut Separation	To remove the nut in the Press Cake from the fibres
Cracking & Winnowing	To crack the nut into the kernel and the shell, and removal of some of the lighter matters
Kernel Separation	To separate the kernel and the nut in the cracked mix
Kernel Drying	To enable the drying of the wet palm nut that comes from the separation process

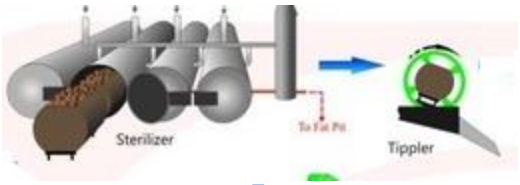
Source: Analysis of the Palm Oil Mill Process

VIEW OF THE MAIN PROCESSES IN THE PALM OIL MILL

FRESH FRUIT BUNCHES

STERILIZATION

STEAM



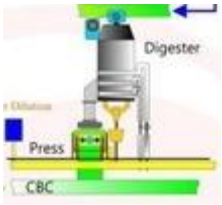
CONDENSATE

THRESHING

EMPTY FRUIT BUNCHES

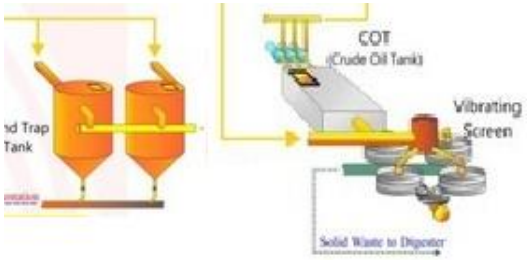
DIGESTION

STEAM



CRUDE OIL ← PRESS → PRESS CAKE

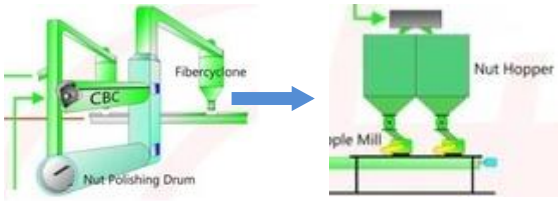
PRE-PROCESSING



PALM KERNEL RECOVERY

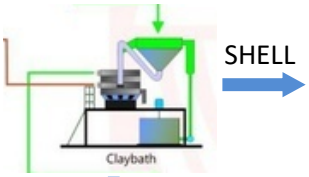
NUT SEPARATION

NUT CRACKING



FIBRE

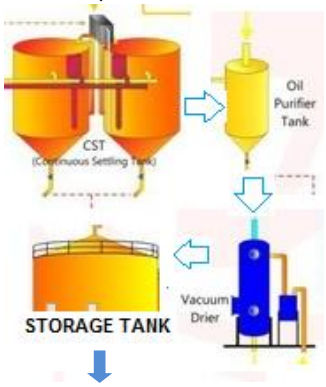
SHELL REMOVAL



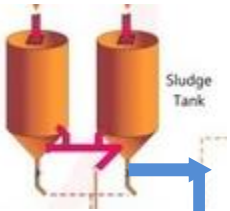
SHELL

CLARIFICATION, PURIFICATION & DRYING

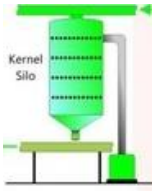
WATER



SLUDGE



KERNEL DRYING



RECOVERED OIL TO CLARIFIER

PROCESSING

CPO DISPATCH

CAKE

EFFLUENT

KERNEL DISPATCH

In the case of wet sterilization (using steam or boiling), sterilization is done before the threshing, while for dry sterilization (using roasting or smoking), threshing of the FFB is done beforehand.

The size of the processing plant will be determined by the following factors: (a) number of days of operation, depending upon the arrival of fruits, (b) and size of the catchment area of the plant. The minimum sized plant processes 5 MT of FFB per hour. If such a plant operates for 4,200 hours per year (seven months @ 25 days), and the annual yield of FFB is about 18 MT per hectare, it will need about 1,200 hectare of oil palms for its operation.

The following pages give additional details regarding the various processing steps undertaken in the Palm Oil Mill, including the pictures of some of the major equipment being used.

Material Balance for Palm Oil Mill

The following table gives an overview of the material balance in the different steps involved in the Palm Oil Mill.

Table-A (3).2: Materials Balance in Palm Oil Mill (per MT of FFB)

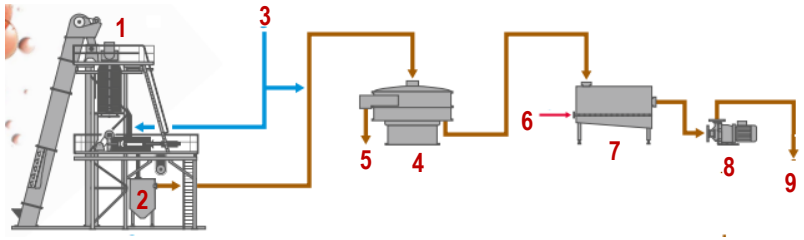
Process	Figures are in Kg		
	Inflow	Outflow (Main)	By-products
Sterilization	Fresh Fruit Bunch: 1000 Steam: @ 25% of FFB	Sterilized FFB: 880	Sterilizer Condensate: 200 Evaporation Loss: 170
Threshing	Sterilized FFB: 880	Sterilized Fruitlets:660	Empty Fruit Bunches: 220
Digestion	Sterilized Fruitlets: 660	Digested Mash: 660	---
Pressing	Digested Mash: 660	Crude Oil (Liquid): 396 Press Cake:264	---
LIQUID PORTION			
Clarification	Crude Oil (Liquid): 396 Dilution Water: 159 (@40% of Crude Oil) Recovered Oil (from Sludge of Clarifier): 30	Clarified Oil: 218	Sludge: 337 Water: Balance
Purification	Clarified Oil: 218	Purified Oil: 206	Impurities: 12
Drying	Purified Oil: 206	Crude Palm Oil: 200	Evaporation Loss: 6
Sludge Centrifugation	Sludge: 337	Recovered Oil: 30	Wastewater: Balance
PALM KERNEL			
Nut Separation	Press Cake: 264	Nut: 129	Fibre:135
Cracking & Winnowing	Nut :129	Cracked Materials: 79.3	Winnowed Material: 49.7
Kernel Separation	Cracked Materials: 79.3	Wet Kernel: 61.9	Wet Shell: 17.4
Kernel Drying	Wet Kernel: 61.9	Dry Kernel: 60	Evaporation: 1.9

Source: 'Waste Minimization for Palm Mills', Palm oil Engineering Bulletin 122, Malaysia Palm Oil Board

The main outputs are Crude Palm Oil @ 20% and Palm Kernel @ 6% of the FFB. The EFBs are used as phosphatic fertilizers, while the palm kernel shell, fibres and light particles are incinerated to produce steam. The Palm Oil Mill Effluents (POME) are treated and used for irrigation.

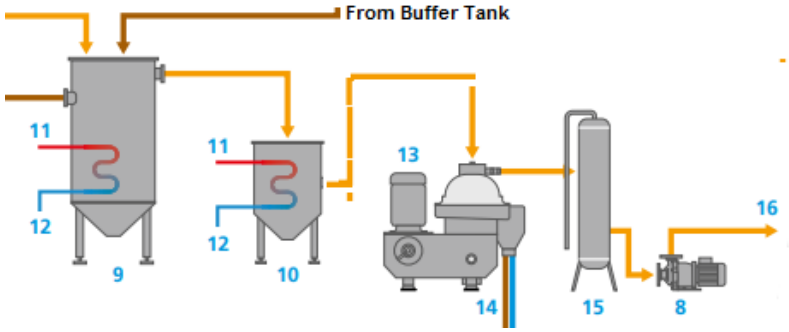
Processing of Fresh Fruit Bunches in the Palm Oil Mill

Steps	Purpose	
Sterilization	Sterilization deactivates the lipases in the fruits, and prevents build-up of free fatty acids (FFA), which impact the quality of the crude palm oil. In addition, sterilization weakens the stem attaching the fruitlets (*) to the bunch and softens the mesocarp. These respectively help in the threshing and digestion operations. Usually a horizontal pressurized autoclave is used. It is shown in the picture on the right side. In large mills, the fruit bunches are filled in perforated steel cages with open tops. These are later pushed to the sterilizers on rails as can be seen in the picture. These FFBs in cages will be sterilized using low pressure steam. Alternatives include: (a) vertical sterilizers, which are much cleaner and easier to operate than conventional sterilizers, and (b) tilting sterilizer, which eliminates much of the machinery associated with conventional sterilizers. This is the latest design that offers improved milling efficiency, and reduced labour and maintenance cost. (*) '*Fruitlets' comprise a nut in the centre, surrounded by a thick layer of fibrous material, jacketed by a thin, tough skin. The fibrous matter contains the palm oil*.	
Threshing	Threshing involves separating the sterilized fruitlets from the stalks of the bunch. (It is also called stripping). This is usually achieved by means of a rotating drum or a fixed drum. Fixed drums use beater-arm strippers and these are more suitable for small mills with capacities of up to 5 MT per hour. In a rotating drum, the fruit bunches are subject to tumbling along with vibration to separate the fruitlets. Such rotary drum strippers can handle up to 20 MT of bunches per hour and generally run more efficiently and smoothly than beater-arm types The stalks are often disposed by incineration, giving ash as potash fertilizer, and fuel for boilers. Others are transported to the plantations for use as fertilisers in mulching near the palms. Stalks which have fruits still attached on them are called hard bunches, and have to be recycled back to sterilizers for further cooking. Hard bunches are detected by visible inspection.	

Steps	Purpose	
Digestion	Digestion of the fruit is a preliminary pressing before extraction of oil in the press. It is the process of releasing the palm oil in the fruit through the rupture or breaking down of the oil-bearing cells. The sterilized fruitlets from loosened from the thresher are moved to the steam injection digester, which is a steam-heated cylindrical vessel fitted with a central rotating shaft carrying a number of beater (stirring) arms. Through a slow moving action of the rotating beater arms the fruit is pounded. This destroys the fruits' outer covering (exocarp), and completes the disruption of the oil cells already begun in the sterilization phase. The digester produces a 'mash' (slurry) of mesocarp and nuts. The ideal temperature for this process is 95˚C. The digester is kept full and as the digested fruit is drawn out, freshly stripped fruits are brought in to take their place.	 **Above: Combined Picture of Digester and Screw Press**
Pressing	The oily slurry (digested fruitlets) emerging from the digester is next sent to the press for extracting crude oil (in extracted liquid). Usually, a screw press is used, which is a cylindrical perforated cage through which runs a closely fitting screw. Digested fruit is continuously conveyed through the cage towards an outlet restricted by a cone, which creates the pressure to expel the oil through cage perforations (drilled holes). Screw presses, due to the turbulence and kneading action exerted on the fruit mass in the press cage, can effectively break open the unopened oil cells to release the inherent oil. The solid cake is thus separated from the crude oil (liquid part), with the latter consisting of oil, water and other impurities. Improvements in press designs have allowed fruits to undergo single or multiple pressing. Second stage pressing on press cake fibres enables more oil to be extracted.	**Below: Processing between the Press & Vertical Clarifier**  **1 Thresher & Screw Press 2 Sand Trap 3 Water 4 Vibrating Screen** **5 Fibres 6 Steam 7 Buffer Tank 8 Pump 9 To Vertical Clarifier**
	PROCESSING OF PRESSED LIQUIDS (CRUDE OIL) The conventional processes for recovering crude palm oil relies upon the use of vertical clarifiers in which the oil is crude separated from the sludge.	
From the Press to the Vertical Clarifier	Before the clarifier, the press liquid (crude oil) is passed through (1) sand trap, (2) vibrating screen and (3) buffer tank, all of which significantly remove the fibres and other solid impurities.	

<table>
<tr><th>Steps</th><th>Purpose</th><th></th></tr>
<tr><td>Clarification</td><td>Clarification is the post-extraction separation of water and other contaminants from crude oil. In the clarifier, impurities in the liquid product of the press (like water and non-oily fibrous materials) are removed through the action of gravity assisted by addition of hot water.

In the conventional process, separation of the oil from the rest of the liquor is achieved by settling tanks based on gravity. The mixture containing the crude oil is diluted with hot water to reduce its viscosity. A settling time of 1-3 hour is usual.</td><td rowspan="2"> 
Above: Vertical Clarifier of Palm Oil Mill</td></tr>
<tr><td>Purification & Drying</td><td>After clarification, the oil still contains about 0.5% water and significant quantities of sludge and other impurities which cause oxidation and quality deterioration. Further purification of the clarified oil into CPO through (a) use of centrifugal purifier to remove the remaining impurities, and (b) drying by using vacuum dryer.

The former (purification) reduces the water content to about 0.25% and the dirt content to about 0.005% to 0.013%, while the latter (vacuum drier) reduces the moisture content further to between 0.15% and 0.2%, in order to stabilize the FFA content of the oil. After cooling, CPO is sent to the storage tanks.</td></tr>
<tr><td>Oil Recovery from Clarifier Sludge</td><td>The sludge from the clarifier is sent to the three phase decanter, where a fraction is the recovery oil that is sent to the centrifugal purifier for obtaining oil.</td><td rowspan="2"> 

Above: <u>Purification & Drying Steps</u>
9 Vertical Clarifier 10 Tank 11 Steam
12 Condensate 13 Purifier 14 Sludge
15 Vacuum Drier 16 Crude Palm Oil 8 Pump</td></tr>
<tr><td>Storage of Crude Palm Oil</td><td>The storage and distribution palm oil requires careful handling; if the deterioration of oil quality is to be avoided. It is especially important to keep oxidation as low as possible, since the peroxides formed during oxidation decompose and cause rancidity. Iron or copper traces also affect quality. Therefore oil is normally kept in stainless steel or lined tanks.

It is generally accepted that combined mill and bulk storage capacity should not be less than 30% of annual production so that oil can be kept during slack trading periods.</td></tr>
</table>

Steps	Purpose	
	PROCESSING OF PALM KERNEL Apart from palm oil, the main product from oil palm fruit is the kernel. Oil is extracted from the kernel by crushing and the remaining cake is used for animal feed. Large-scale mills use the recovered fibre and nutshells to fire the steam boilers. The super-heated steam is then used to drive turbines to generate electricity for the mill. For this reason it makes economic sense to recover the fibre and to shell palm nuts.	 **Above: Depericarper Section**
Separation of Nut & Fibre	The mash from the mill contains nuts and fibre, which is conveyed by the cake breaker conveyer (CBC). Although hydraulic or mechanical separation (like rotary drum separator) had been used in the past to separate the nuts and fibre, modern mills use pneumatic (air based) systems. The pneumatic (air flow) based depericarper system separates most of the fibres by blowing them off, while the nuts fall into a rotary drum. After this, the polishing drum removes the other impurities along with the remaining part of fibres from the nut. The fibre is sent to boiler for generating steam, while the palm nuts are processed further as follows.	
Nut Cracker	The nut is cracked in nut cracker or ripple mill (with the latter achieving 98% cracking). The palm kernel and palm shells form the output, with lighter impurities.	 **Above: Ripple Mill for Nut Cracking**
Winnowing	Air-cyclone (blowing) is used to separate lighter particles (any fibres and lighter shell fragments) from the cracked nut mix before it is sent for separation of kernel and shell.	
Separation of Kernel & Shell	The cracked nut mixture is sent for the separation of kernel and shell. This is done in either: (a) clay bath having a density of 1.2 where the lighter kernel floats and the denser shell drops to the bottom; or (b) hydro-cyclone which uses water pumped in at high pressures for the separation. Shell content of kernel is below 6%.	
Drying of Kernel	The wet kernels are next sent to the silo drier, where they are dried to about 7% moisture content before packing.	

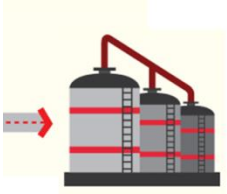
Annex-4: Crude Palm Oil Refining and Palm Kernel Processing

Refining of Crude Palm Oil

Crude Palm Oil is extracted from oil palm by series of operations, which will result in the formation of free fatty acids (FFA), phospholipids, peroxides, moisture, dirt, pigments, metal traces etc. Such components may affect the quality of finished product as well as the productivity and yield of processing. To eliminate such unwanted components and make finished product suitable for human consumption, crude palm oil must be refined.

There are two methods of refining of palm oil which are physical and chemical refining. Physical refining is a process which makes use of the lower boiling point of the FFA compared to the boiling point of the triglyceride oil. In chemical or alkaline refining, an alkali is used to neutralise the FFA. Physical refining involves three main steps degumming, bleaching and deodorization while chemical refining involves one additional step i.e. neutralization; and hence it has four major steps degumming, neutralization, bleaching and deodorization. The main processes involved in the physical refining of Crude Palm Oil have been given below.

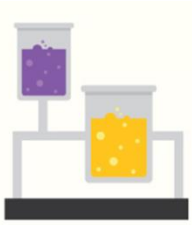
Arrival of the Crude Palm Oil



CPO is categorized based on:

- Free Fatty Acid
- Moisture & Impurities
- Deterioration of Bleachability Index (DOBI)

Degumming



CPO is heated under vacuum and phosphoric acid is added to separate the gums.

Degumming process is used for the removal of phospholipids (called as 'gums'). It is necessary in the physical refining of oils if phospholipids content is greater than 30 ppm. Acid degumming is used for treating palm oil, where small quantity (0.1-0.3%) of 85% solution of phosphoric acid is used to remove impurities like phospholipids etc. Water degumming is not used for palm oil.

The acid degumming process transforms phospholipids into components that are removed by adsorption on bleaching earth in the so-called Dry Degumming Process.

Bleaching

Bleaching earth (activated clay) is added to absorb all colour pigments in the oil

Originally described as a process of mixing oil and clay adsorbent to remove colour, the bleaching operation effectively removes some of the colour, reduces the contents of chlorophyll, residual soap and gums, trace metals, oxidation products, and indirectly impacts on deodorized oil colour.

The bleaching process involves the mixing of adsorbent and oil, followed by filtration. Bleaching clay both adsorbs and absorbs contaminants.

Filtration

Removes the bleaching earth

Filtration is a mechanism of trapping or physically removing suspended contaminants: the physical act of filtering out the suspended clay that simultaneously removes the minor contaminants adsorbed to the clay particles

Deodorization

Oil is heated and the distillate (vapour) is removed – it is called as the Palm Fatty Acid Distillate (PFAD)

Deodorization is a stripping process in which a given amount of a stripping agent (usually steam) is passed for a given period of time through hot oil at a low pressure (2-4 millibar). It is mainly a physical process in which various volatile components are removed. It is usually carried out at high temperature (about 260°C) for palm oil for stripping the FFA and effective heat bleaching of the oil to degrade the carotene quickly.

During deodorization, free fatty acids are discharged as refining waste from upper section of deodorizer (about 5% of the CPO is obtained as PFAD which is 85%-90% FFAs). The deodorized oil is then cooled and the filtered to obtain sparkling oil – RBD Palm Oil (@ 95% of the CPO.

RBD Palm Oil

Industrial customers use Refined Bleached & Deodorised (RBD) Palm Oil for frying purposes

[It is defined as 'Palm oil obtained from crude palm by bleaching with bleaching earth or activated carbon or both, deodorized and then de-acidified by physical means']

One MT of CPO produces 0.95 MT of RBD Palm Oil

Fractionation

RBD Palm Oil is gradually cooled (crystallization) and passed through a membrane filter.

The portion which crystallizes on cooling yields **Palm Stearin** (used as margarine, shortening and oleo-chemical feedstock), while the liquid portion is **Palmolein**, which is used for cooking or frying.

[Detailed description at overleaf]

Packaging

Margarine, shortening and cooking oil are packed in boxes, pouches, jerry cans or in bulk.

Cooking oils are classified based on their 'cloud point', with olein having low cloud point being used for consumer, while oil with higher cloud point is used for commercial purposes

NOTE: The Food Safety and Standards (Food Products Standards & Food Additives) Regulations, 2011 of India has defined refining as 'the process by which an expressed vegetable oil is de-acidified with alkali, or by physical refining, or both'. It may involve (inter-alia) degumming followed by bleaching with absorbent earth and/or activated carbon and deodorized with steam without using any other chemical agents. Refining 'may include the process of degumming using phosphoric/citric acid'.

Detailed Description of Fractionation of RBD Palm Oil

After Crude Palm Oil is obtained from the Palm Oil Mill, it is next refined to get Refined (RBD) Palm Oil. This is subjected to the following processes during fractionation.

Crystallization Section

RBD Palm oil is first pre-heated through a plate heat exchanger before being fed into the crystallizer. The feeding of oil into the crystallizers is more or less continuous. Once the oil reaches high level, the crystallizer is ready for the cooling programme.

The cooling cycle for each crystallizer is being controlled by an individual microprocessor-based programmable controller. Cooling tower water is used for initial pre-cooling, thereby saving energy. Due to the large cooling surface in crystallizer in relation to the volume of oil, the refiner is able to obtain crystallized slurry, which is proven to be most suitable for the membrane filtration system.

The cooling cycle for each crystallizer is completed within a few hours. The crystallized slurry is then ready to be filtered at the membrane filtration system.

Filtration Section

The partially crystallized RBD palm oil is fed to membrane filter press by filter feed pump. The filter is of mixed packed type and 3-piece detachable type of rubber membrane with individual squeezing air / hose connection, closed delivery, hydraulic press closing type.

The filtrate, i.e. olein passes through a filter cloth of suitable porosity, and flows along the corrugated channels of a rubber membrane, which wraps behind the filter cloth, and guide the olein out of the filter frame into a channel for closed discharge into a olein receiver tank.

When the chambers are filled with cake, i.e. stearin, the feed is topped and high pressure fluid (usually compressed air) is admitted behind the membrane which being elastic, presses or squeezes the stearin mass in the chamber free of liquid olein entrained within the inter-spaces of the crystals out into the discharge channel following the path of the filtrate. When the squeezing operation is done, the frames are hydraulically opened and solid stearin drops into a stearin melting tank. The filter press is then closed for the next cycle of operation.

Further Processing of RBD Palm Oil & Its Fractions

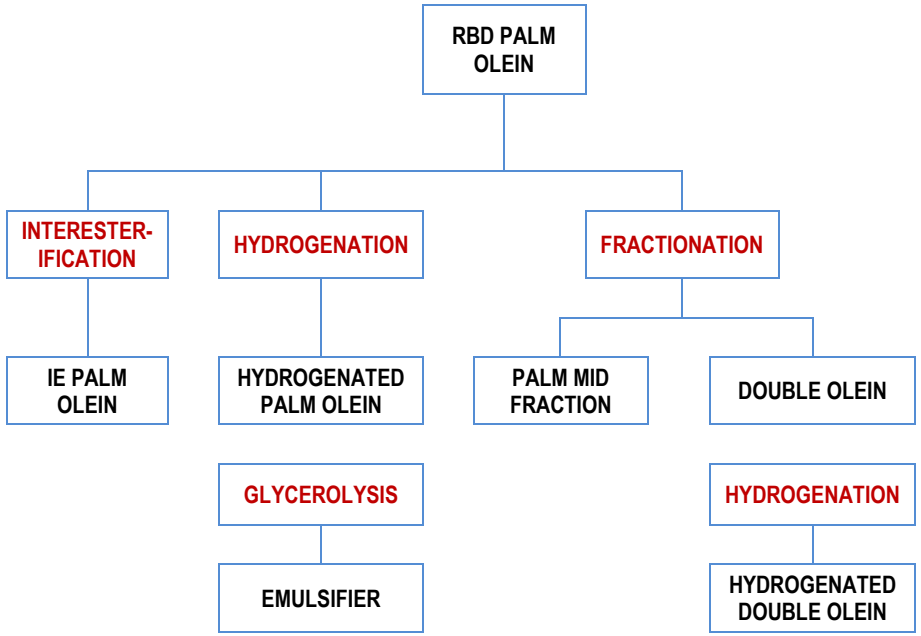
The refining of Crude Palm Oil derived from the Palm Oil Mill, gives the following products: RBD Palm Oil (95% of the CPO) and Palm Fatty Acid Distillate (5%). The fractioning of RBD Palm Oil yields 80% as RBD Palm Olein (76% of CPO); and 20% as RBD Palm Stearin (19% of the CPO).

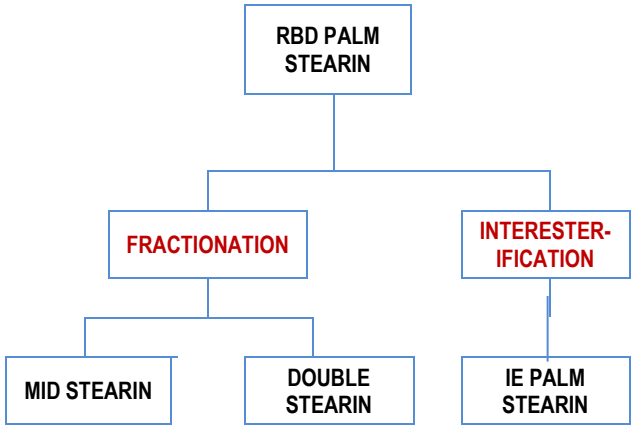
Processing of RBD Palm Oil: The processing of RBD Palm Oil gives: (a) Hydrogenated Palm Oil by hydrogenation, (b) Emulsifier (by Glycerolysis), and (c) IE Palm by Interesterification.

Processing of RBD Palm Oil Fractions

In turn, the further processing of RBD Palm Olein and RBD Palm Stearin gives a range of products. This has been depicted at overleaf. Additional details about these products are available in the following annex (Annex-5), which may be referred to as necessary.

SECONDARY PROCESSING OF FRACTIONS OF RBD PALM OIL





NOTE:

Processes are marked in RED, while the products are given in BLACK

NOTES ON PROCESSES:

1	Fractionation	It is a separation process in which a certain quantity of a mixture is divided into smaller quantities (fractions), which are collected based on differences in the specific property of the components (like difference in boiling point). This enables the separation of two or more components in a single run.
2	Glycerolysis	A chemical reaction in which **glycerol** is combined with one or more fatty acids to form a glyceride. This reaction is the basis for making mono-glyceride emulsifiers for food use. Emulsifiers facilitate the mixing of oil and water.
3	Hydrogenation	The process of adding hydrogen atoms to the double bonds between carbon atoms in a fatty acid. The result is the conversion of a double bond (unsaturated) to a single bond (saturated). It converts liquid oils to semi-solid plastic fats (with higher melting points) suitable for manufacturing shortening and margarine.
4	Hydrolysis	This is an ester splitting reaction, where addition of **water** yields a **free fatty acid** and a free hydroxyl group. This reaction, called ***saponification***, is usually catalyzed with a base such as **sodium hydroxide**, and the fatty acid is neutralized to sodium **soap**.
5	Interesterification	This involves changing the positions of the fatty acids on triglycerides. A free fatty acid can displace another fatty acid from an ester, leaving a glyceride with somewhat changed properties because its fatty acid structure has changed. This reaction is used to change fat properties for commercial purposes.

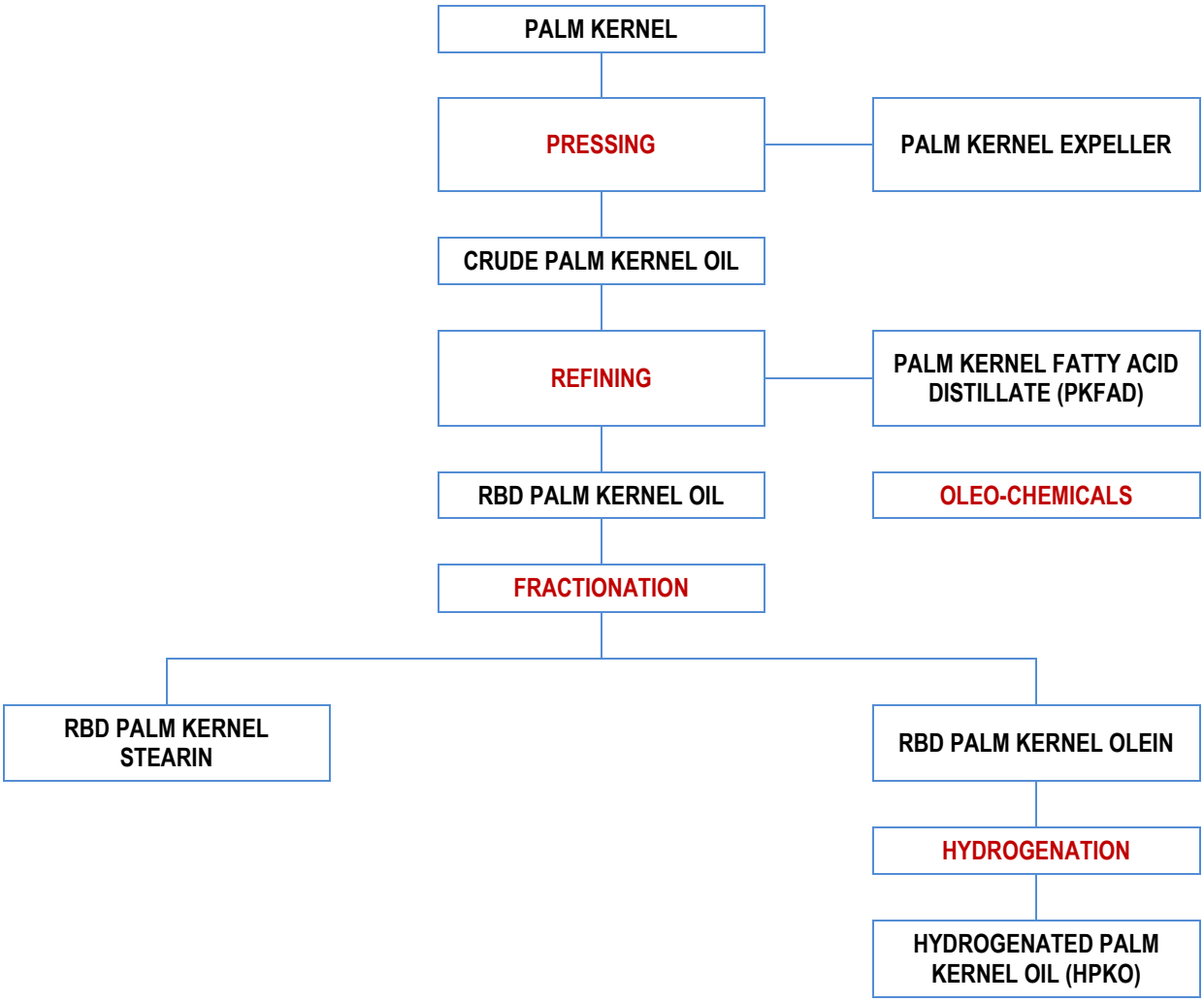
Further Processing of Palm Kernels

Palm Kernel is crushed and pressed to obtain Crude Palm Kernel Oil (CPKO), which can be refined and then fractionated to get RBD Palm Kernel Olein (60% of the refined output) and RBD Palm Kernel Stearin (40%). RBD Palm Kernel Olein can be hydrogenated to get Hydrogenated Palm Kernel Oil.

RBD Palm Kernel Oil, obtained from refining Crude Palm Kernel Oil, can be hydrogenated to obtain Hydrogenated RBD Palm Kernel Oil. The distillate from the refining process is called Palm Kernel Fatty Acid Distillate. This can be used for making oleo-chemicals.

The different steps involved in the further processing of Palm Kernels are given below.

FURTHER PROCESSING OF PALM KERNEL



NOTE:

Processes are marked in RED, while the products are given in BLACK

Annex-5: Palm Oil & Its Derivatives

As described in the preceding annexes, oil palms yield Fresh Fruit Bunches (FFBs) which have to undergo primary processing to yield Crude Palm Oil (CPO). The latter undergoes further processing (viz., refining and fractionation) yield RBD Palmolein and RBD Palm Stearin. These have been described at the next page. Further, these fractions can be processed to yield downstream items.

Uses of Palm Oil & Its Derivatives

The uses of palm oil and its derivatives for food and non-food purposes have been tabulated below.

Table-A (5).1 Food & Non-food Uses of Palm Oil

<table>
<tr><th>Food Usage</th><th>Remarks</th><th>Non Food Use</th><th></th></tr>
<tr><td>Cooking Oil</td><td>Used as edible oil in India, also blended with other edible oils due to its lack of colour and odour</td><td rowspan="4">Base for Oleo-chemicals</td><td rowspan="4">There are five basic oleo-chemicals: fatty acids, fatty alcohols, fatty methyl ester, fatty nitrogen compounds and glycerine. These palm-based oleo-chemicals appear in products such as cleaning product (soaps, detergents, shampoos etc.), skin care products including shampoos, lotions and body oils; cosmetics etc.
Other uses include in making candles, rubber, pharmaceuticals etc.</td></tr>
<tr><td>Frying Fat</td><td>Preference for the use of palm olein, the low-melting fraction of palm oil</td></tr>
<tr><td>Salad Oil</td><td>Double olein is used as it does not become cloudy till 7-10˚C</td></tr>
<tr><td>Margarine</td><td>Contains about of 16% water and a 80% fat content (40% being a blend of oils including palm oil & derivatives)</td></tr>
<tr><td>Vanaspati</td><td>Hydrogenated palm oil</td><td rowspan="3">Animal Feed</td><td rowspan="3">Palm Kernel Meal is used along with other palm oil containing items; apart from cereal grains, oilseed products and pulses – all of which are blended together</td></tr>
<tr><td>Instant Noodles</td><td>Up to 20% of the items by weight</td></tr>
<tr><td>Other Snacks like crisps, nuts, etc.</td><td>Fried with economic alternatives, especially palm oil</td></tr>
<tr><td>Biscuits</td><td>Uses margarine, spreads and shortening that can contain palm oil to impart creamy taste & texture. Other ingredients like creams, fillings & coatings; and colouring, flavouring & emulsifier ingredients have palm oil</td><td>Bio-fuel</td><td>Bio-fuel component of diesel, called a Fatty Acid Methyl Ester (FAME), is made using a process called trans-esterification, by catalyzed reaction between refined vegetable oils, refined animal fat, used cooking oil, methanol etc. Glycerine is a by-product</td></tr>
<tr><td>Bakery Items (Bread, cakes and pastries)</td><td>Use palm-containing ingredients for ease-of-baking and economy such as baking fats (margarine, spreads & shortening), other ingredients (creams, fillings, coatings) and food additives</td><td colspan="2" rowspan="6">As described earlier, the food uses of palm oil stem from its properties – with RBD palm oil being colourless and odour free, which enables wide uses including blending with other oils for edible use.
Palm oil fractions (olein and stearin) can be subjected to additional processing including further fractionation, hydrolysis, glycerolysis, inter-esterification which yields a variety of items having differing boiling points and other physical properties, which lend these for different possible uses.
In addition, palm stearin and PFAD (palm fatty acid distillate) form important ingredients for soap making and other oleo-chemical purposes.</td></tr>
<tr><td>Chocolate</td><td>To keep it from melting, as well as to impart smooth and shiny appearance</td></tr>
<tr><td>Confectionaries</td><td>Used as a cocoa butter equivalent</td></tr>
<tr><td>Ice Cream</td><td>To make it both smooth and creamy</td></tr>
<tr><td>Pizza Dough</td><td>To prevent it from sticking together , as well as for enhancing texture</td></tr>
<tr><td>Food Additives</td><td>Uses several vegetable oils (normally coconut and palm kernel oil)</td></tr>
</table>

Source: Analysis of Secondary Information

Table-A (5).2 Derivatives of Oil Palm Fruits in Palm Oil Mill & Refining of CPO (including Fractionation of RBD Palm Oil)

Derivative	Abbreviation	Description
Palm Oil	---	Palm oil is an edible vegetable oil derived from the mesocarp (reddish pulp) of the fruit of the oil palms, primarily the African oil palm *Elaeis guineensis*, and to a lesser extent from the American oil palm *Elaeis oleifera* 'Palm oil means the oil obtained from fleshy mesocarp of the oil palm (Elaeis Guineensis) tree by the method of expression or solvent extraction. It shall be clear, free from rancidity, suspended or other foreign matter, separated water, added colouring and flavouring substances or mineral oil.' [Appendix-B to 'Prevention of Food Adulteration Rules']
Crude Palm Oil (also known as Red Palm Oil)	CPO	Crude palm oil is obtained by a process of cold-pressing from the fruit of the oil palm. It is also known as red palm oil, since it is naturally reddish in colour on account of the high beta-carotene content of the processed oil. It also contains vitamin- E and antioxidants, and can be used for cooking and others uses. Customs Notification (No. 120/2003) defines 'Crude Palm Oil' as: "*Crude palm oil" means fixed vegetable oils, fluid or solid, obtained by pressure, if they have undergone no processing other than decantation, centrifugation or filtration, provided that, in order to separate the oils from solid particles only mechanical force, such as gravity, pressure or centrifugal force, has been employed, excluding any absorption filtering process, fractionalization or any other physical or chemical process. If obtained by extraction an oil shall continue to be considered as "crude", provided it has undergone no change in colour, odour or taste when compared with corresponding oil obtained by pressure'*
Refined Bleached & Deodorised Palm Oil	RBD Palm Oil	Crude red palm oil that has been refined bleached and deodorized results in a common commodity called RBD (refined, bleached, and deodorized) Palm Oil. It does not contain carotenoids. During refining palm oil losses its deep red colour, so refined oil is also known as White Palm Oil. It is 'palm oil obtained from crude palm by bleaching with bleaching earth or activated carbon or both, deodorized and then de-acidified by physical means' **Properties**: balanced fatty acid composition; **Uses**: bakery fats, biscuit fat, food service frying oils
Palmolein	---	Palmolein means the liquid fraction obtained by fractionation of palm oil obtained from the fleshy mesocarp of fruits of oil palm (Elaeis Guineesis) tree by the method of expression or solvent extraction. It shall be clear, free from rancidity, suspended or other foreign matter, separated water, added colouring and flavouring substances or mineral oils. [Appendix-B to 'Prevention of Food Adulteration Rules'] Palmolein is widely used for frying foods, it blends well with other vegetable oils and is valued for its resistance to oxidation and the long shelf life it lends to foods fried in it
Crude Palmolein	---	This is 'the liquid fraction obtained by a one stage fractionation of crude palm oil'
RBD Palmolein	---	This is the liquid fraction obtained from fractionation of RBD Palm Oil **Properties**: liquid at room temperature; **Uses**: snack food manufacture, cooking oils

Derivative	Abbreviation	Description
Palm Stearin	PS	Palm stearin is the high melting fraction obtained by fractionation of palm oil which is derived from the fleshy mesocarp of fruits of oil palm (*Elaeis guinensis*) tree by the method of expression or solvent extraction. The solid consistency of palm stearin makes it useful in the production of margarine and shortening, and in baked goods requiring the use of hard fats
Crude Palm Stearin	---	It is 'the high melting fraction obtained by a one stage fractionation of crude palm oil'
RBD Palm Stearin	---	This the solid fraction obtained from fractionation of RBD Palm Oil **Properties**: solid at room temperature; **Uses**: pastry fats, margarines, soap manufacture
Palm Kernel Oil	PKO	It is the oil which comes from crushing the kernel/seed, or the stone in the middle of the fruit. It is 'the oil obtained from sound palm kernel or the fruits of oil palm (Elaeis Ginenesis) tree by the method of expression or solvent extraction. It shall be clear, free from rancidity, suspended or other foreign matter, separated water, added colouring and flavouring substances or mineral oil.' [Appendix-B to 'Prevention of Food Adulteration Rules'] It is closer in composition to coconut oil than to palm oil. It contains 81% of saturated fatty acid as compared to 49% in palm oil, while coconut contains 86% of saturated fatty acids. Palm kernel oil can be utilized for food uses (ice-cream, butter, chocolate, milk lotion etc.) as well as for non-food uses like cosmetics, personal care products (soap, cream, body care products etc.), bio-diesel, lubricants etc.
Fractionated PKO	Fractionated PKO	It is made by further processing palm kernel oil to remove the liquid portion, leaving behind even more saturated solids. This oil is often used in energy bars, for example, where it makes the coatings less likely to melt.
Palm Fatty Acid Distillate	PFAD	Palm Fatty Acid Distillate (PFAD) is obtained as a by-product during the refining of the CPO (while the deodorization step is executed). It mainly consists of the Free Fatty Acids (FFA), formed in the fruit during delays in delays in transport, bruising etc. CPO has 5% FFA, while RBD Palm Oil has less than 1% FFA. About 5% PFAD is obtained from the refining of CPO. PFAD has to be removed to improve the oil's taste, odour and colour and to increase its shelf life. It has uses like bio-fuels, candles, soap, other oleo-chemical products

Source: Various Official Documents and other secondary sources

Products obtained from Secondary Processing of RBD Palm Oil & Its Fractions

The following table gives the details and uses of the various products obtained from secondary processing of RBD Palm Oil fractions, viz. RBD Palm Olein and RBD Palm Stearin.

Table-A (5).3 Products obtained from RBD Palm Oil & Its Fractions

Product	Melting Point (˚C)	Properties	Uses
Hydrogenated Palm Oil	42-65	High melting point	Distilled emulsifier manufacture, flaked and powdered fats
IE Palm	42	Improved crystallization	Dry mixes
Emulsifier	---	Facilitates the mixture of oil and water, significantly improving the texture of many foods. Also helps to maintain quality and freshness, preventing the growth of mould which would happen if the oil and fat separate.	Margarine (a butter substitute), low fat spread, biscuits, cakes, ice cream, bread, etc.
IE Palm Stearin	50	Flaked fats	Pizza dough
Hydrogenated Palm Olein	42	Good melting properties	Dairy fat alternatives
Palm Mid Fraction	25-30	Solid at low temperatures and melts quickly	Confectionary fillings (in lieu of cocoa butter), biscuit fillings, frying oil
Double Olein (Super Olein)	10	Remains liquid with clarity at lower temperatures, mixes well with seed oils	As a frying oil
Hydrogenated Double Olein	36	Good melting properties	Confectionery fillings
Mid Stearin	30	Mid range melting point	Hard Stock for margarine
Double Stearin	60-62	Very hard, easy to flake or powder	Soup dry mixes, cake dry mixes
IE Palm Olein	38	Improved crystallisation	Confectionery, biscuit filling fats

Source: www.greenpalm.org

Products obtained from Further Processing of Palm Kernel

The following table gives the details and uses of the various products obtained from the further processing of Palm Kernel.

Table-A (5).4 Products obtained from Further Processing of Palm Kernel

Product	Melting Point (˚C)	Properties	Uses
Palm Kernel Fatty Acid Distillate (PKFAD)	---	---	Animal Fat & Detergents
RBD Palm Kernel Olein	22-25	Low melting point, generally hydrogenated	Coffee whiteners

Product	Melting Point (˚C)	Properties	Uses
RBD Palm Kernel Stearin	32-33	Low melting point, good oxidative stability	Confectionery, biscuit cream, ice cream, chocolate coatings
Hydrogenated Palm Kernel Oil (HPKO)	36	High in saturates, rapid melt down for good flavour release	Ice cream, confectionery, chocolate coatings, soap, cosmetics, bio-fuel
Palm Kernel Expeller (PKE) also called Palm Kernel Meal	---	Good source of fibre and minerals including phosphorous, copper, zinc and manganese	Animal Feed

Source: www.greenpalm.org

Standards as per the Food Safety and Standards (Food Products Standards & Food Additives) Regulations, 2011 of India

The table at next page gives the standards for some of the palm oil items (for edible uses) as per the above regulations. Some of the terms used in the following table have been explained below.

Refractive Index — A physical property of a substance that relates to how light is refracted from the material. Usually used to indirectly measure some other property such as concentration.

Butyro-refractometer reading — The varying composition of different oils and fats allows for them to be characterized by refractive index measurement. These measurements can thus also provide insight as to their quality, as any change in their optimal composition will affect the refractive index and butyro value. International regulations demand the measurement of oils and fats either with an Abbe refractometer or with a butyro refractometer.

Saponification Value — Saponification value or saponification number (SV or SN) represents the number of milligrams of potassium hydroxide (KOH) required to saponify one gram of fat under the conditions specified

Iodine Value — Measures double bonds to indicate degree of fat unsaturation. A higher value means more double bonds.

Elemental iodine (I_2) can add to double bonds in unsaturated fatty acids. This reaction (with variations that speed up the test) is used to measure fat unsaturation. The results are expressed as grams of iodine absorbed by 100 g of fat.

Unsaponifiable Matter — Waxes, sterols, and hydrocarbons in fats and oils are generally determined as being unsaponifiable material.

A weighed sample is saponified (refluxed with aqueous sodium hydroxide). The solvent is removed from the combined dried extracts, which are then weighed and reported as unsaponifiable material. The content of unsaponifiable material in a properly refined fat or oil is generally less than 0.5% and is not a problem with respect to quality.

Melting Point — Capillary Method: Temperature at which fat in sealed tube melts

Slip Method: Temperature at which fat rises in a capillary tube

Cloud Point — Cloud point is the temperature below which a transparent solution undergoes either a liquid-liquid phase separation to form an emulsion or a liquid-solid phase transition to form either a stable sol or a suspension that settles a precipitate. (Oil forms a cloudy appearance below this temperature, as it starts to solidify.)

Free Fatty Acid — The free fatty acids in a fat are removed during refining and deodorizing. An FFA level of more than 0.05% indicates that these steps were not properly done, *or* that there is a high level of citric acid in the oil

Acid Value — The acid value is defined as the number of milligrams of Potassium hydroxide required to neutralize the free fatty acids present in one gram of fat. .

Table-A (5).5: Standards as per Food Safety & Standards Regulations, 2011 of India (for Edible Uses)

		Palm Oil	Palm Olein	Palm Super Olein	Palm Kernel Oil	Palm Stearin	Palm Kernel Olein	Palm Kernel Stearin
1	Refractive Index	1.4491-1.4552 (at 50˚C)	1.455-1.461 (at 40˚C)	1.463-1.465 (at 40˚C)	1.449-1.452 (at 40˚C)	1.447-1.452 (at 60˚C)	1.451-1.453 (at 40˚C)	1.449-1.451 (at 60˚C)
2	OR Butyro-refractometer reading	35.5 - 44 (at 50° C)	43.7-52.5 (at 40˚C)	---	35.3 - 39.5 (at 40° C)	---	---	---
3	Saponification Value	195-205	195-205	180-205	237-255	193-205	231-244	244-255
4	Iodine Value	45-56 (Wij's Method)	54-62 (Wij's Method)	Not less than 60	10-23 (Wij's Method)	Not more than 48	20-28	4-8.5
5	Unsaponifiable Matter	Not more than 1.2% by weight	Not more than 1.2%	Not more than 1.3%	Not more than 1.2% by weight	Not more than 0.9% by weight	Not more than 1.5% by weight	Not more than 1.5% by weight
6	Melting Point	Not more than 39˚C (by capillary slip method)	---	---	---	Not less than 44˚C (slip method / Slip melting point)	21-26˚C (slip method / slip melting point)	31-34 (slip method / Slip melting point)
7	Cloud Point	---	Not more than 18˚C	---	---	---		---
8	Free Fatty Acid	Not more than 10% by weight (expressed as Palmitic Acid)	---	Not more than 3% by weight (expressed as Palmitic Acid	Not more than 10% by weight (expressed as Lauric Acid)	Not more than 5% by weight (expressed as Palmitic Acid)	Not more than 5% by weight (expressed as Lauric Acid)	Not more than 5% by weight (expressed as Lauric Acid)
9	Acid Value	---	Not more than 6	---	---	---	---	---

Source: Food Safety and Standards (Food Products Standards & Food Additives) Regulations, 2011

NOTE:

Indigenously produced raw Palm Oil obtained by method of expression may be supplied for human consumption as such provided Free Fatty Acid value (%) (expressed as Palmitic Acid) is not more than 3.0. But palm oil imported into the country or domestically produced having Free Fatty Acid value more than 3.0 and up to 10.0 or obtained by solvent extraction shall be refined before it is supplied for human consumption and it shall conform to the standards laid down under regulation 2.2.1 (16), which reads as follows:

'*The name of the vegetable oil from which the refined oil has been manufactured shall be clearly specified on the label of the container. In addition to the under-mentioned standards to which refined vegetable oils shall conform to the standards prescribed in these regulations for the specified edible oils shall also apply except for acid value which shall be not more than 0.5. Moisture shall not exceed 0.10 per cent by weight. Test for argemone oil shall be negative.*

The oils shall be clear and free from rancidity, adulterants, sediments, suspended and other foreign matter, separated water, added colouring and flavouring substances and mineral oil. However, it may contain food additives permitted in these Regulations and Appendices'.

All other above items need to conform to the above standards as per the prevailing regulations in India. Additionally, the above shall have Flash Point (Pensky Marten closed method) - not less than 250˚C. Oil so refined shall not contain hexane more than 5.00 ppm.

The fatty acid composition of vegetable oils as determined by gas liquid chromatography (expressed as percentage of total fatty acids) is as follows:

Table-A (5).6: Fatty Acid Composition as per Food Safety & Standards Regulations, 2011 of India (for Edible Uses)

Fatty Acid	Common Name	Palm Oil	Palm Olein	Palm Super Olein	Palm Kernel Oil	Palm Stearin	Palm Kernel Olein	Palm Kernel Stearin
C 6:0	Caproic Acid	ND	ND	ND	ND-2.5	ND	0.7 max	0.2 max
C 8:0	Caprylic Acid	ND	ND	ND	2.0-6.3	ND	2.9-6.3	1.3-3.0
C 10:0	Capric Acid	ND	ND	ND	2.7-7.0	ND	2.7-4.5	2.4-3.3
C 12:0	Lauric Acid	ND-1.5	0.1-0.5	0.1-0.5	39.7-55.0	0.1-1.5	39.7-47.0	52.0-59.7
C 14:0	Myristic Acid	0.5-2.0	0.5-1.5	0.5-1.5	11.5-19.0	1.0-2.0	11.5-15.5	20.0-25.0
C 16:0	Palmitic Acid	32.0-47.5	38.0-43.5	30.0-39.0	6.0-14.0	48.0-74.0	6.2-10.6	6.7-10.0
C 16:1		ND-0.6	ND-0.6	0.5 max	ND-0.1	0.2 max	0.1 max	ND
C 17:0		ND-0.2	ND-0.2	0.1 max	---	0.2 max	ND	ND
C 17:1		ND	ND-0.1	ND	---	0.1 max	ND	ND
C 18:0	Stearic Acid	3.5-6.0	3.5-5.4	2.8-4.5	1.0-4.0	3.9-6.0	1.7-3.0	1.0-3.0
C 18:1	Oleic Acid	36.0-44.0	39.8-47.0	43.0-43.9	10.5-24.6	15.5-36.0	14.4-24.6	4.1-8.0
C 18:2	Linoleic Acid	8.5-12	10.0-13.5	10.5-15.0	0.5-4.3	3.0-10.0	2.4-4.3	0.5-1.5
C 18:3		ND-0.5	ND-0.6	0.2-1.0	ND-0.3	0.5 max	0.3 max	0.1 max
C 20:0	Arachidic Acid	ND-1.0	ND-0.5	0.4 max	ND-0.9	1.0 max	0.5 max	0.5 max
C 20:1		ND-0.4	ND-0.2	0.2 max	ND-0.4	0.4 max	0.2 max	0.1 max
C 20:2		ND	ND	ND	ND	ND	ND	ND
C 22:0		ND-0.2	---	0.2 max	ND-0.2	0.2 max	ND	ND
C 22:1	Erucic Acid	ND	ND	ND	ND	ND	ND	ND
C 22:2		ND	ND	ND	ND	ND	ND	ND
C 24:0		ND	---	ND	ND	ND	ND	ND
C 24:1		ND	ND	ND	ND	ND	ND	ND

Source: Food Safety and Standards (Food Products Standards & Food Additives) Regulations, 2011

NOTE: ND means 'Not Detectable', which is below or equal to 0.05%

Annex-6: Global Position of Palm Oil

Palm Oil and Other Vegetable Oils

In India, palm oil is mainly used for cooking as edible oil. While the global output of edible oil had grown from nearly 80 million MT in 1990 to 185 million MT in 2016-17, the share of palm oil in the global mix of edible oils had surged from 13% to 33% in the same period. This illustrates the growing preference for this cheap and versatile product across the world.

Table-A (6).1: Edible Oil Production in the World

	1990	2000	2010	2014	2016
Palm Oil	11.08	21.75	45.57	59.05	65.98
Soybean	16.13	25.17	23.62	45.44	51.88
Rapeseed	8.2	23.62	23.5	26.93	27.71
Sunflower	7.89	9.47	12.8	19.89	15.53
Others	37.61	43.09	50.59	18.34	17.45
Total	80.91	123.1	156.08	169.65	178.55

Source: US Department of Agriculture

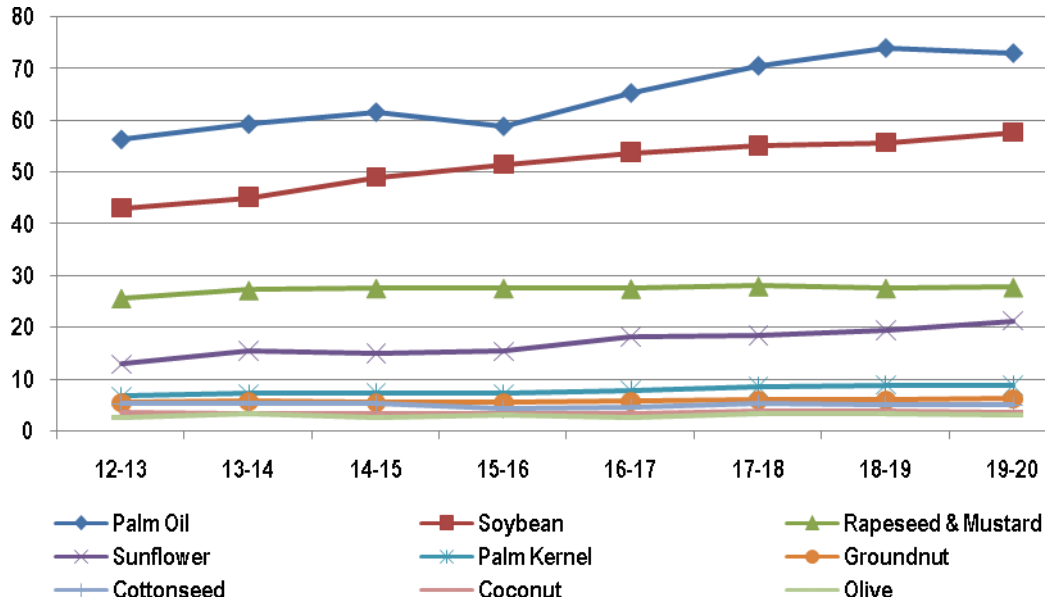
The recent production of vegetable oils has been captured in the following table. (It may be noted that the following oils are usable for edible purposes. However, not all vegetable oils are edible – jojoba oil for example. The edible use of oils like palm kernel oil may be limited, especially in developed nations, on account of health concerns.)

Table-A (6).2: Vegetable Oil Production in the World (Major Crops)

	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20
Palm Oil	56.38	59.34	61.64	58.92	65.34	70.58	74.02	73.02
Soybean	43.10	45.13	49.06	51.56	53.84	55.17	55.80	57.70
Rapeseed & Mustard	25.69	27.26	27.63	27.64	27.55	28.05	27.67	27.84
Sunflower	12.90	15.52	14.91	15.40	18.21	18.50	19.44	21.28
Palm Kernel	6.72	7.13	7.39	7.18	7.83	8.53	8.87	8.80
Groundnut	5.47	5.67	5.54	5.43	5.72	5.92	5.86	6.20
Cottonseed	5.22	5.17	5.13	4.25	4.38	5.10	4.97	5.09
Coconut	3.62	3.38	3.37	3.34	3.41	3.67	3.76	3.60
Olive	2.50	3.19	2.54	3.13	2.61	3.27	3.25	3.08
Total	**161.60**	**171.79**	**177.21**	**176.85**	188.89	198.79	203.64	206.61

Source: Foreign Agricultural Service (FAS), US Department of Agriculture

The following graph shows that the output of palm oil and soybean has climbed in the recent years, while that of rapeseed and mustard, and sunflower seed has remained comparatively static.



[Others include Palm Kernel Oil, Groundnut, Cottonseed, Coconut and Olive oil]

Graph – Global Output of Nine Major Vegetable Oils

Production of Palm Oil

The production of palm oil had reached 73.02 million MT in 2019-20. The following table gives the output in the past four years. It is seen that Indonesia and Malaysia dominate the global output of palm oil. They have accounted for 84%-85% of the world production in the recent years.

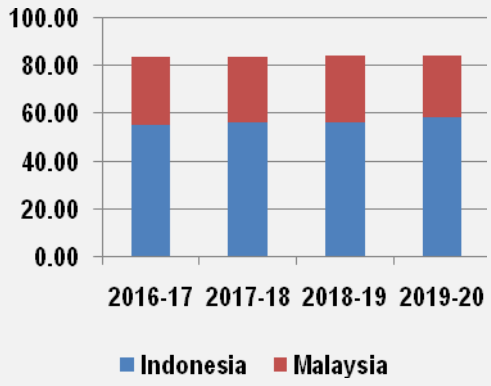
Table-A (6).3: Global Production of Palm Oil (in million MT)

	2016-17	2017-18	2018-19	2019-20
Indonesia	36.00	39.50	41.50	42.50
Malaysia	18.86	19.68	20.80	19.25
Thailand	2.50	2.78	3.00	2.80
Colombia	1.15	1.63	1.63	1.53
Nigeria	0.99	1.03	1.02	1.02
Others	5.85	5.96	6.08	5.93
Total	65.34	70.58	74.02	73.02

Source: Foreign Agricultural Service (FAS), US Department of Agriculture

Other countries include: Guatemala, Honduras, Ecuador, Papua New Guinea, China etc.

Indonesia and Malaysia in Global Output of Palm Oil



The above two South East Asian nations produce over 84% of the world's output of palm oil now

The above dominance of these two South East Asian nations has mainly been on account of the two factors: (a) availability of large tracts of land due to conversion of forests and wastelands; and (b) high yields due to favourable agro-climatic conditions. The cost of production has been low, enabling these nations to compete effectively in the global market for edible oils.

Consumption of Palm Oil

The consumption of palm oil has been summarized in the following table. The top consuming nations account for over three-fifths of the domestic consumption across the globe.

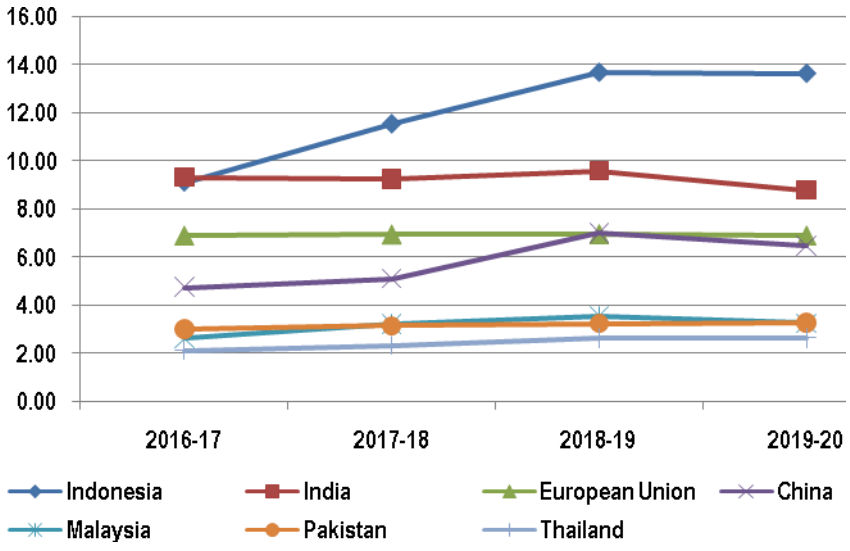
Table-A (6).4: Global Consumption of Palm Oil (million MT)

	16-17	17-18	18-19	19-20
Production	65.339	70.575	74.024	73.021
ADD				
Opening Stock	8.744	9.573	11.030	11.036
Imports	45.977	46.506	50.334	47.815
LESS				
Exports	48.888	48.653	51.500	49.262
Closing Stock	9.573	11.030	11.036	10.991
EQUALS				
Domestic Consumption	**61.599**	**66.971**	**72.852**	**71.619**
Indonesia	9.125	11.565	13.721	13.680
India	9.350	9.270	9.605	8.810
European Union	6.900	6.950	6.960	6.900
China	4.750	5.100	7.012	6.462
Malaysia	2.622	3.238	3.573	3.275
Pakistan	2.995	3.145	3.245	3.290
Thailand	2.135	2.343	2.640	2.640

Source: Foreign Agricultural Service (FAS), US Department of Agriculture

Note: Exports and Imports differ in the above table; as the marketing years, based on which the report has been compiled, vary for different nations

EU and China use only 46% and 58% of their respective palm oil consumption for food purposes, while the rest is used for non-food uses like cosmetics, oleo-chemical, and pharmaceutical products. South East Asian nations use less than 50% of their domestic consumption for food purposes, as Indonesia and Malaysia are encouraging blending of palm oil in bio-diesels to reduce dependence on fluctuating exports. In India, almost 85% of the consumption of palm oil is used for food uses.



Graph – Consumption of Palm Oil by Leading User Nations

Annex-7: National Scenario of Palm Oil

In 2018-19, India had imported nearly 15 million MT of edible oils to meet its consumption of about 22 million MT. In other words, the nation depends upon imports to supply 68% of its requirements of edible oils. Palm oil forms the most important component of nation's edible oil consumption, as it forms 45% of such intake. The details have been furnished at the next page.

As the country produces little (below 0.30 million MT) in comparison to its needs, it has to import almost 97% of its requirements of palm oil. Now, India is the largest importer of palm oil in the world, apart from being its second largest consumer. While the per capita consumption of edible oils remains low in India (22 kg per year), its high and increasing population and low domestic production will force India to continue with imports of sizeable volumes of edible oil. This will ensure that India will continue with imports of palm oil in the short and medium term. While the per capita consumption of edible oils remains low in India (22 kg per year), its high and increasing population and low domestic production will force India to continue with imports of sizeable volumes of edible oil (mainly palm oil, soybean oil and sunflower oil). This will ensure that palm oil will have to be imported into India, at least in the short and medium term.

Palm Oil Consumption Pattern

In India, the major part of available palm oil and its fractions are used for food-uses, such as: (a) cooking medium for households, hotels, restaurants and street vendors; (b) in bakery and confectionary units; (c) industrial frying for chips, crisps, French fries etc.; and (d) blended with other edible oils like soybean, groundnut, rapeseed-mustard, sesame, sunflower etc. Besides, a smaller part of palm oil (about 15%) is used for non-food uses – especially for the production of toilet soaps, fatty alcohols and fatty acids. The latter have a wide range of uses for making items like cosmetics, rubber and polymer processing, pharmaceuticals etc. The following table gives the estimated consumption profile of palm oil in India in 2018.

Table-A (7).1: Consumption Pattern of Palm Oil in India

Use	Consumption (million MT)	As a %	Remarks
Packed Oils	3.88	36	For household and institutional use as the low cloud point (10˚C) of palmolein makes it suitable for India
Frying Use	2.40	22	Palmolein is used as a frying medium on account of its neutral flavour and odour for the preparation of snacks and deep fried foods on industrial scale
Bakery & Vanaspati	1.66	15	Vanaspati is hydrogenated vegetable oil, originally introduced as a substitute for ghee and butter
Biscuits	1.20	11	Palmolein is used as an inexpensive substitute for butter due to its neutral flavour, while palm stearin is added for imparting crunchiness and flakiness
Non-Edible Use	1.63	15	Soaps – toilet soap and laundry soap; apart from fatty acids and fatty alcohols having many industrial uses
Total	10.77	100	---

Source: Presentation by Wilmar Group in the Palm Oil Trade Fair & Seminar (POTS), India 2019

India – Geographical Differences in Usage of Edible Oil

Table-A (7).2: Pattern of Edible Oil Use in the Regions of India

	West India	East India	North India	South India	All India
Population as % of National Total	26.1	26.2	24.8	20.9	---
Edible Oil Use as % of National Total	29.4	26.1	24.5	20.0	---
Pattern of Consumption					
Palm Oil	37	48	36	63	45
Soybean	32	12	25	7	20
Sunflower	7	2	6	23	9
Rapeseed & Mustard	5	18	16	1	10
Others	19	20	17	6	16

Source: 'Indian Edible Oils Demand & Supply Outlook 2016-17', GGN Research

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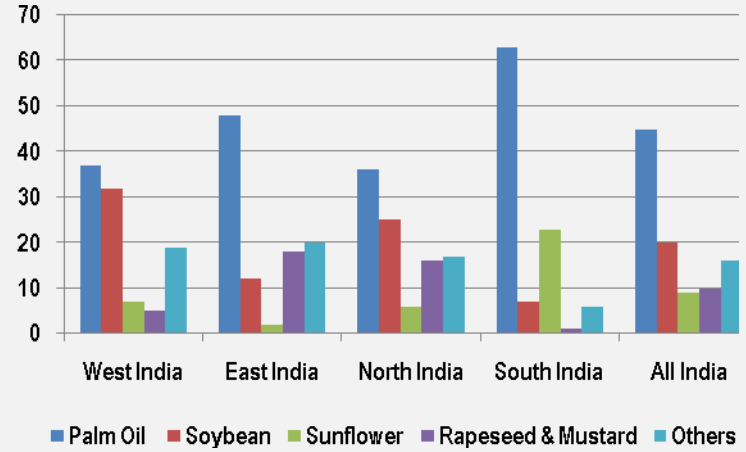
Note:

1. West India includes Goa, Gujarat, Madhya Pradesh, Maharashtra, and Rajasthan
2. East India includes Assam, Bihar, Chhattisgarh, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim and Tripura
3. North India includes Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Ladakh, Punjab, Uttarakhand, and Uttar Pradesh
4. South India includes Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and Telangana.

Pattern of Consumption of Edible Oils (as % of Total Intake in the Region)

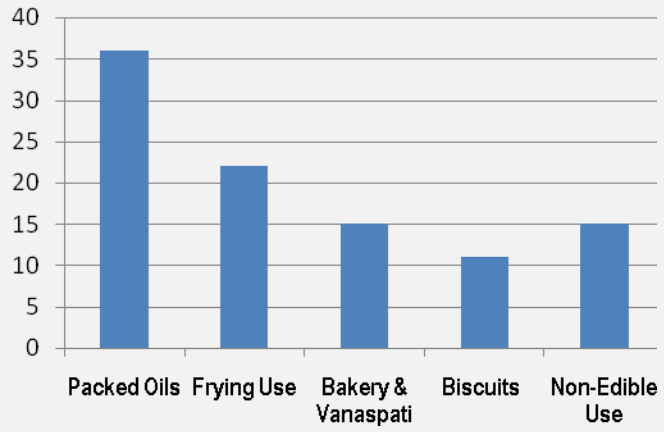


Across India, palm oil is the most widely used oil, followed by soybean, rapeseed and mustard, and sunflower oil. The zone-wise position is given below.

- **Palm oil** has the highest proportionate use in South India, followed by East India. It has lower usage in the other zones; despite being the most widely used edible oil in both these zones.
- In West India and North India, **palm oil** has lower usage. In both these zones, **soybean** oil has significant usage.
- **Rapeseed & mustard oil** continues to be widely used in East India, but its earlier widespread use in North India has been supplanted by palm oil and soybean oil.
- **Sunflower** oil has found wide usage in South India, where it is the second most used edible oil.

The domestic market for palm oil is mainly driven by the food and cooking sector, which accounts for 85% of the total consumption. The non-food uses (such as cosmetics, surfactants, lubricants and other industrial uses) account for about 15% of the national market. The Indian refined palm oil market is marked by high-volumes and low-margins, which has assisted consolidation and domination by a small number of companies operating in the edible oils business.

The following graph gives the sources of consumption of palm oil in India, as per Table-A (7).1 which is available at the page preceding the previous page.



Palm oil consumption in India is mostly for packets, industrial frying and non-frying use (biscuits, bakery and vanaspati).

Non-food use includes soap, apart from fatty acids and fatty alcohols which are used to make an array of items. While 5% of imports consists of inputs for non-food use (like CPS and PFAD), these items are produced as by-products from local refining of imported crude palm oil.

Profile of Oil Palm Consumption in India

Details of Usage Areas

Food Usage

The food-use demand mainly arises from the following segments: (a) usage by lower and middle income households; (b) commercial establishments (hotels, restaurants and cafes); and (c) bakery and confectionary usages. Government procurement no longer plays a large role, as edible oils are not usually distributed through Fair Price Shops (FPSs) across the country, except in some states at the initiative of the State Government.

(a) Household Usage (Branded & Loose Consumption)

The higher purchasing power of Indian consumers and their lack of awareness about the health effects of different oils have driven up consumption levels of edible oils in the country, including of palm oil. However, household consumption utilizes only 18% of the palm oil consumed in India, with 70% of such household usage being accounted for by rural areas. Further, 84% of the household use of palm oil is concentrated in six southern and eastern states of the country. (IMRB study cited in Wilmar Group Presentation in the Palm Oil Trade Fair & Seminar (POTS), India 2019] Imported sunflower and soybean oil, as well as locally produced rapeseed and mustard oil, and groundnut oil, seem to be preferred by most of the home consumers.

Indian consumers reportedly tend to associate palm oil with low prices and hence, the product has a down-market image. Hence, palm oil brands have lack prominence in the big retail chains. The item has a lower appeal to the up-market consumers, who are health conscious and usually

prefer other edible oils like olive oil, canola, rice bran oil etc. Such health conscious consumers feel that palm oil is thick and not easy to digest. Hence, they perceive that it may not be very healthy for consumption.

The market is marked by the presence of prominent companies as the top five brands account for 62% of the volumes sold in the organized market, and 124 small brands are jostling for a share of the remaining market. (Presentation by Wilmar Group in the Palm Oil Trade Fair & Seminar (POTS), India 2019] Some of the prominent Indian companies like Godrej Agro-vet, 3F Industries and Ruchi Soya have been active in the NE Region in order to promote the expansion of areas under oil palm cultivation in these states.

In the low income classes, palm oil is usually purchased in loose form. As 72% of the consumers are located in rural areas and 81% nationally are in the lower three income categories (IMRB data), this segment is quite large. Loose sale of edible oil occurs since the low income classes cannot afford to purchase even small packets of branded oils. However, loose oil purchases carry risks of adulteration and sale of lesser volumes than what the consumer pays for. The loose sale of edible oil prevents any inquiry into adulteration and short sales. The Indian Vegetable Oil Producers Association has been advocating for micro-sized pouches (50 ml and 100 ml) for preventing the sale of edible oil in loose forms.

(b) Usage by the Commercial Establishments (Hotels, Restaurants, Catering and Street Vendors)

The above segment is playing a big role in the oil palm consumption in India. However, the segment is very price sensitive as it needs to contain the cost of all inputs, including the cost of cooking oil used. It has been reported that palm kernel oil also finds application in commercial cooking since it is relatively more cost-effective than other conventional counterparts and also remains stable at high cooking temperature. Street Vendors are reported to constitute a large part of this segment.

GGN Research estimates that 42% of edible oil used in India for Out of House Consumption (OHC) is accounted by this segment, including hotels, restaurants and canteens, snack shops and hawkers, caterers and banquet halls. About 20% of palm oil use in India may be accounted for by this segment.

(c) Usage by Bakery & Confectionary Units

The refined derivatives of palm oil are widely utilized in the bakery and confectionary industry in India owing to their cost competitiveness. As per Wilmar Group, about 26% of the palm oil consumption in India is due to bakery, biscuit and vanaspati units. GGN Research estimates that 22% of the OHC use of edible oils is for non-frying use by bakery units (13% for making biscuits), confectionary and other food uses (ice creams, pickles, margarine etc.).

(d) Industrial Frying

Palm oil is widely used globally for industrial frying, especially since RBD palmolein has very low FFA content and other properties that render it fit for continuous use without reaching discard points as needed for industrial frying. In India, the preparation of snacks (chips and crisps), instant noodles and pre-cooked deep fried preparations on industrial scale have driven up demand for palm oil. This segment uses about 22% of the edible oil consumed in the country (as per WILMAR Group).

(e) Blending with Other Edible Oils

In its refined form, palm oil is marked by lack of any colour or odour. Hence, in India, it is often blended with other edible oils. This helps to improve the volumes of palm oil sold, as well as increase the profitability of other edible oils. However, such market driven practices do not help build up awareness amongst Indian consumers about palm oil and its benefits. There is no reliable estimate of such end use.

Non Food Usage

The biggest non-food usage of palm oil is the use of Crude Palm Stearin (CPS) and Palm Fatty Acid Distillate (PFAD) for manufacture of soaps, fatty acids and fatty alcohols. About 15% of the consumption of palm oil fractions is for such non-food purposes. About one third of the requirement (500,000 MT) is met by imports of CPS and PFAD, while the balance comes from by-products of the local refining of imported crude palm oil. (Refining of crude palm oil yields 75% olein, 19% stearin and 5% PFAD). The following table gives the estimated demand for CPS and PFAD for non-food uses.

Table- A (7).3: Estimated Profile for Non-Food Use of Palm Oil in India

Non-Food Use	Volume (MT)	Remarks
Toilet Soap	970,000	Includes laundry soap
Fatty Alcohols	135,000	Includes glycerol used for resins, pharmaceuticals etc.
Fatty Acids	325,000	Includes (a) stearic acid used for cosmetics and for rubber and PVC processing; (b) oleic acid used for soaps, miscellaneous industrial uses
Total	1,430,000	

Source: 'India's Oleo-chemicals Market – Potential for Palm Oil', a Presentation by Mr. S Lovekar for an On-line Seminar in February 2019 organized by 'Pointers', Malaysian Oil Palm Council

Demand for Biodiesel & Specialty Chemicals from Palm Oil

In India, production of biodiesel from palm oil is reported to be uneconomical on account of import duties, as well the absence of any mandate regarding biodiesel. The intent of Government policy is to use domestic feedstock for production of bio-fuels, and to achieve 5% blending in diesel by 2030. Methyl or ethyl esters of fatty acids derived from non-edible vegetable oils, used cooking oil, acid oil etc. will be used to produce biodiesels.

Indian laundry soap market is still mostly based on manual washing, which limits the present market for surfactants like Methyl Ester Sulfonates (MES) and Alkyl Polyglucosides (APG). Demand for value added chemicals from palm oil like Vitamin E; carotene etc. is still reported to be low.

Annex-8: Palm Oil Imports & Tariffs in India

Import of Palm Oil & Its Derivatives into India

Since 1994, palm oil is being imported in massive volumes into India. Now, the country has emerged as its largest importer in the world. About 90% of these imports are being used as edible oil. [It may be noted that India had imported nearly 15 million MT of edible oils to meet its consumption of about 22 million MT. In other words, the nation depends upon imports to supply 68% of its requirements of edible oils.]

In 2018-19, over three-fifths (63%) of the import of edible oil consisted of palm oil. India imported almost 9 million MT of palm oil in 2019-20, which included both Crude Palm Oil (CPO) and refined derivatives, mainly RDB Palmolein. Imports supply almost all the consumption of this item in the country, as domestic production remains low. The import and consumption of palm oil has been facilitated by its lower cost, which is the most important consideration of the price sensitive consumers of India. The following table gives the imports of palm oil into India in the recent years.

Table-A (8).1: Imports of Palm Oil into India

Financial Year →	13-14	14-15	15-16	16-17	17-18	18-19	19-20
Palm Oil Imports (million MT)							
(A) Crude Palm Oil	5.13	6.97	7.11	5.36	6.75	6.42	6.32
(B) Refined	2.54	1.19	2.57	2.94	2.77	2.52	2.51
Total = (A) + (B)	7.67	8.16	9.68	8.30	9.52	8.94	8.83
Value (Rs. in crore)	39,355	38,894	37,800	41,089	43,655	36,633	37,050
As a % of Edible Oil Import (*)	72	63	58	59	61	55	N.A.

Financial Year (India) covers the period from April of a particular year to March in the following year.

(*) Including palm oil, soya oil and sunflower oil

Source: 'Commodity Profile of Edible Oil for September 2019' citing Department of Commerce, Government of India

The following table gives the break-up of imports of palm oil into India.

Table-A (8).2: Imports of Palm Oil into India – Detailed Break-up (Million MT)

Marketing Year →	14-15	15-16	16-17	17-18	18-19
(A) Edible Oils					
Crude Palm Oil (CPO)	7.72	5.75	6.34	6.46	6.53
RBD Palmolein	1.66	2.62	2.87	2.14	2.73
Crude Palm Kernel Oil (CPKO)	0.15	0.07	0.09	0.11	0.14
Sub-Total (A)	**9.54**	**8.44**	**9.30**	**8.70**	**9.41**
(B) Non –Edible Oils					
Palm Fatty Acid Distillate (PFAD)	0.08	0.10	0.16	0.25	0.31
Crude Palm Stearin (CPS)	0.01	0.01	0.05	0.16	0.20

Marketing Year →	14-15	15-16	16-17	17-18	18-19
RDB Palm Stearin	0.04	0.05	0.11	0.09	0.10
Palm Kernel Fatty Acid Distillate (PKFAD)	0.02	0.01	0.02	0.01	0.03
Crude Palm Kernel Oil (CPKO) & Others	0.04	0.00	0.02	0.00	0.01
Sub-Total (B)	**0.19**	**0.17**	**0.36**	**0.51**	**0.64**

Source: Solvent Extractors' Association of India

NOTES

1. **Marketing Year** (India) covers the period from November of a particular year to October in the following year.
2. **Crude Palm Stearin** is allowed for imports when admixed with at least 10% Free Fatty Acids. Non-edible industrial grade Crude Palm Stearin admixed with at least 3.5% Free Fatty Acids will also be allowed to be imported without an import licence by only those importers who are registered with the Directorate of Vanaspati, Vegetable Oils & Fats.
3. **Palm Kernel Oil (PKO)** can be utilized for food uses (ice-cream, butter, chocolate, milk lotion etc.) as well as for non-food uses like cosmetics, personal care products (soap, cream, body care products etc.), bio-diesel, lubricants etc.
4. All figures have been rounded off; sub-totals and totals may not appear to tally.

Tariff Structure

The import of palm oil into India is based on the prevailing Foreign Trade Policy of the Government of India, which is administered through the Department of Commerce, Ministry of Commerce and Industry. As part of India's commitment to WTO, import quotas on edible oils were removed and allowed to be imported freely with a bound tariff rate of 300%. (Bound rates under the WTO represent commitments not to increase tariffs above the listed rates. These serve as ceilings for trade between WTO member nations.) Subsequently, India started large scale imports of palm oil from the mid-1990s. This occurred after a period of decline in imports in the preceding period from 1988 to 1994, which stressed the domestic production of oilseeds.

In the case of palm oil and its fractions (whether refined or not) and covered under HS Code 1511, the standard rate of duty had been fixed at 100%, and the duty for preferential areas had been fixed at 90%. ('Preferential area' is any country or territory declared as such by the Central Government in the Official Gazette.) However, the applied rates are lower than the above mentioned levels.

Regarding the major items that account for around 95% of India's imports of palm oil and fractions by volumes, i.e. crude palm oil and refined palm oil, the current basic customs duty have been 54% and 44% respectively since 1st March 2018. The total duties are a bit higher after the addition of surcharges and taxes. The above differential tariffs have been fixed for crude and refined palm oil, with a higher tariff for the latter, with a view to promote the domestic processing sector.

Tariff for Crude Palm Oil

India imports crude palm oil from Indonesia and Malaysia mainly. The tariff rates for imports from these nations have been determined by the following: (a) current applied tariffs prevailing; and (b) preferential tariffs under agreements entered into between India and ASEAN (in which both nations are members) and between India and Malaysia. These have been discussed below.

(a) **Customs Duty on Crude Palm Oil** (Last Five Years)

The following table gives the customs duty on crude palm oil for the past five years.

Table-A (8).3: Total Customs Duty on Crude Palm Oil (HS Code 1511 1000)

Effective Date →	17 Sep 15	23 Sep 16	11 Aug 17	17 Nov 17	2 Feb 18	1 Mar 18
Assessable Value	101	101	101	101	101	101
Basic Customs Duty	12.5	7.5	15	30	30	44
Social Welfare Surcharge	---	---	---	---	10	10
Customs Education Cess	3	3	3	3	---	---
IGST	---	---	5	5	5	5
Total Customs Duty	13.003750	7.802250	21.434725	37.819450	40.046500	56.378200

Source: Customs Notifications of the Central Board of Indirect Taxes & Customs

NOTES:

1. Assessable Value is determined by adding CIF Value with a Landing Charge @ 1% of the CIF Value (thus, Assessable Value = 1.01 x CIF Value)
2. Social Welfare Surcharge is levied from 2nd February 2018 @10% on the aggregate of duties, taxes and cesses levied and collected under Section 12 of the Customs' Act. It replaces the Education Cess and Higher Education Cess.
3. GST was introduced in India from 1st July 2017. IGST is applicable for import of palm oil items @ 5%.
4. Levy of Social Welfare Surcharge on IGST is fully exempt as per Customs Notification (13/2018) dated 2.2.18.

(b) Customs duty under Indo-ASEAN Free Trade Agreement (FTA)

Under the above agreement, which went into effect with major palm oil exporters like Malaysia and Indonesia in 2010, India offered access to its markets at special terms. Crude palm oil was permitted to be imported with concessional customs duty. The tariff reduction schedule for crude palm oil under the above agreement is tabulated below.

Table-A (8).4: Preferential Tariffs on Crude Palm Oil under Indo-ASEAN FTA

Tariff Line	Base Rate	Preferential Tariffs under AIFTA (%)										
		Not Later Than 1st January										31.12.19
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Crude Palm Oil	80	76	72	68	64	60	56	52	48	44	40	37.5

Source: Schedules of Tariff Commitments to the above Agreement as furnished at Annex-1.

(c) Customs Duty under India Malaysia Comprehensive Economic Cooperation Agreement (CECA)

As per the CECA, India and Malaysia have offered additional commitments over and above their obligations under the ASEAN-India Trade in Goods Agreement. The applied MFN tariff rates for the Special Products would be reduced. The tariff reduction schedule for crude palm oil is tabulated as follows.

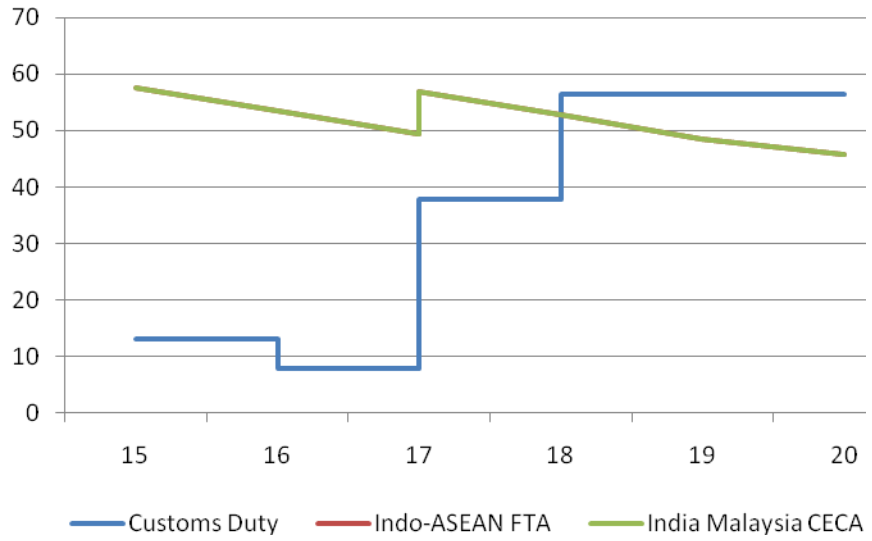
Table-A (8).5: Preferential Tariffs on Crude Palm Oil under India Malaysia CECA

Tariff Line	Base Rate	Preferential Tariffs under CECA (%)									
		On EIF	Not Later Than								
			1.1.12	1.1.13	1.1.14	1.1.15	1.1.16	1.1.17	1.1.18	31.12.18	31.12.19
Crude Palm Oil (CPO)	80	72	68	64	60	56	52	48	44	40	37.5

EIF: Entry into Force of the Agreement

Source: Schedules to the Indo- Malaysia Comprehensive Economic Cooperation Agreement

The following graph shows the comparison of the Total Customs Duty under the above different conditions for Crude Palm Oil.



NOTE: As the tariffs as per both Indo-ASEAN FTA (shown by the red line) and India Malaysia CECA (green line) are the same for crude palm oil, both the green and red lines overlap. Only the green line is shown in the above graph.

Graph- Customs Duty on Crude Palm Oil

From the above graph, it is seen that till 2018, the customs duty on crude palm oil was lower than the preferential tariff under Indo-ASEAN FTA or India Malaysia CECA. After 1st January 2019, the preferential tariffs were lower.

Tariff for Refined Palm Oil

Refined palm oil called RBD (Refined Bleached Deodorised) palm oil is obtained from crude palm oil by a process of refining. The fraction which remains at liquid state at room temperature (20˚C) is called RBD palmolein. India had been importing considerable volumes of RBD palmolein in the recent years from Malaysia and Indonesia. As discussed earlier, the tariff rates for imports from these nations are determined by the following factors: (a) current applied tariffs prevailing; and (b) preferential tariffs under agreements entered into between India and ASEAN (in which both nations are members) and between India and Malaysia. These have been discussed below.

(a) **Customs Duty on Refined Palm Oil** (Last Five Years)

The customs duty on refined palm oil (including refined palmolein) for the past five years has been tabulated below.

Table-A (8).6: Total Customs Duty on Refined Palm Oil & Refined Palmolein (HS Codes 1511 9010/20)

Effective Date →	17 Sep 15	23 Sep 16	11 Aug 17	17 Nov 17	2 Feb 18	1 Mar 18
Assessable Value	101	101	101	101	101	101
Basic Customs Duty	20	15	25	40	40	54
Social Welfare Surcharge	---	---	---	---	10	10

Effective Date →	17 Sep 15	23 Sep 16	11 Aug 17	17 Nov 17	2 Feb 18	1 Mar 18
Customs Education Cess	3	3	3	3	---	---
IGST	---	---	5	5	5	5
Total Customs Duty	20.806000	15.604500	32.357875	48.742600	51.712000	68.043700

Source: Customs Notifications of the Central Board of Indirect Taxes & Customs

NOTES:

1. Assessable Value is determined by adding CIF Value with a Landing Charge @ 1% of the CIF Value (thus, Assessable Value = 1.01 x CIF Value)
2. Social Welfare Surcharge is levied from 2nd February 2018 @10% on the aggregate of duties, taxes and cesses levied and collected under Section 12 of the Customs' Act. It replaces the Education Cess and Higher Education Cess.
3. GST was introduced in India from 1st July 2017. IGST is applicable for import of palm oil items @ 5%.
4. Levy of Social Welfare Surcharge on IGST is fully exempt as per Customs Notification (13/2018) dated 2.2.18.

(b) Customs duty under Indo-ASEAN Free Trade Agreement

As discussed earlier, India offered access to its markets at special terms as per the above agreement. Among other items, refined palm oil was permitted to be imported from ASEAN members like Malaysia and Indonesia under concessional customs duty. The tariff reduction schedule for refined palm oil under the above agreement is tabulated below.

Table- A (8).7: Preferential Tariffs on Refined Palm Oil under Indo-ASEAN FTA

Tariff Line	Base Rate	Preferential Tariffs under AIFTA (%)										
		Not Later Than 1st January										31.12.19
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
RBD Palm Oil	90	86	82	78	74	70	66	62	58	54	50	45

Source: Schedules of Tariff Commitments to the above Agreement as furnished at Annex-1.

(c) Customs Duty under India Malaysia Comprehensive Economic Cooperation Agreement

Under the above CECA, India and Malaysia have offered additional commitments over and above their obligations under the ASEAN-India Trade in Goods Agreement. The applied MFN tariff rates for the Special Products would be reduced. The tariff reduction schedule for refined palm oil is tabulated below.

Table- A (8).8: Preferential Tariffs on Refined Palm Oil under India Malaysia CECA

Tariff Line	Base Rate	Preferential Tariffs under CECA (%)									
		On EIF	Not Later Than								
			1.1.12	1.1.13	1.1.14	1.1.15	1.1.16	1.1.17	1.1.18	31.12.18	31.12.19
RBD Palm Oil	90	82	78	74	70	66	62	58	54	45	45

EIF: Entry into Force of the Agreement

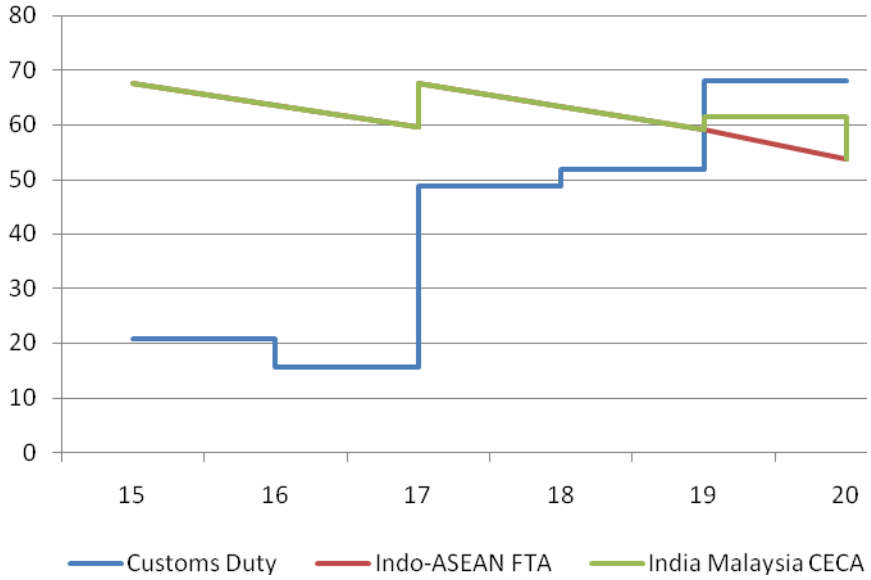
Source: Schedules to the Indo- Malaysia Comprehensive Economic Cooperation Agreement

In 2019, the Solvent Processors' Association (a trade body representing the oil processors of India) filed an application under the India Malaysia Comprehensive Economic Cooperation Agreement (Bilateral Safeguard Measures) Rules, 2017 for review of the above rates. The application was made on the grounds that the difference between the tariffs of crude and refined palm oil had always been 10% to permit the effective utilization of capacity of domestic

industry, which had now been reduced to 5% from 1st January 2019. The association represented that there had been a surge of refined palm oil from Malaysia, leading to large scale losses to the domestic units on account of lower prices and capacity utilization as the differential duty protection had reduced.

The Directorate General of Trade Remedies had recommended provisional duty ('bilateral safeguard duty) to be imposed upon imports of refined palm oil sourced from Malaysia for a period of 180 days, based on which the Government of India had imposed a provisional duty of 5% from 4th September 2019 till 2nd March 2020.

The following graph shows the comparison of the Total Customs Duty under the above different conditions for Refined Palm Oil.



NOTE: The tariffs as per both Indo-ASEAN FTA (shown by the red line) and India Malaysia CECA (green line) are the same till the imposition of safeguard duty on refined palm oil imported from Malaysia from 4th September 2019 for 180 days. Hence, both the green and red lines overlap. Only the green line is shown in the above graph, till the tariffs become divergent consequent to the imposition of the above safeguards duty.

Also, the tariffs for Indo-ASEAN nations and IM-CECA have been adjusted to include the effect of IGST and other levies as applicable.

Graph- Customs Duty on Refined Palm Oil

It is inferred from the above graph, that till 2018, the customs duty on refined palm oil was lower than the preferential tariff under Indo-ASEAN FTA or India Malaysia CECA. After 1st January 2019, the preferential tariffs were lower, especially for refined palm oil from Indonesia.

However, imports of refined palm oil (such as RBD palm oil and RBD palmolein) into India have been placed on the 'restricted list' with effect from 8th January 2020. Under this category, importer would need to have a licence to import the item, and imports are to be used by the importer only. The rules regarding imports of refined palm oil were made more stringent after 13th April 2020.

Tariff for Other Palm Oil Products

Other palm oil fractions that are being imported into India include Crude Palm Stearin (CPS), Palm Fatty Acid Distillate (PFAD) and Crude Palm Kernel Oil (CPKO). The following table gives the basic customs duty levied on the above products in the recent past.

Table- A (8).8: Tariff of Other Palm Oil Products

Date	Item	Basic Customs Duty Rate (%)	Remarks
	Crude Palm Stearin (CPS)		HS Code 38231111 (Note below may be seen)
6.7.2019	Crude Palm Stearin (Non-Edible)	7½	Having Free Fatty Acid (FFA) 20% or more and imported for manufacture of soaps, fatty acids and fatty alcohols by a manufacturer having plant
11.7.2014	-Do-	Nil	-Do-
30.06.2017	Crude Palm Stearin	7½	Palm stearin, whether crude, RBD or other, having free fatty acid (FFA) 20% or more [Not imported by end user for the manufacture of soaps, fatty acids and fatty alcohols]
	RBD Palm Stearin		HS Code 1511 9030 / 3823 1112
30.06.2017	RBD Palm Stearin	Nil	Palm stearin, whether crude, RBD or other, having free fatty acid (FFA) 20% or more for the manufacture of oleo-chemicals. [**This was dropped with effect from 6th July 2019**]
30.06.2017	RBD Palm Stearin	7½	Palm stearin, whether crude, RBD or other, having free fatty acid (FFA) 20% or more [Not imported by end user for the manufacture of soaps, fatty acids and fatty alcohols]
30.06.2017	RBD Palm Stearin	15	Under 1511 90 – All Goods
	Crude Palm Kernel Oil		HS Code 1513 2110
30.6.2017	CPKO	12½	All goods under 1513 – crude and edible [Refined PKO attracts 20% BCD under this Notification]
	Palm Fatty Acid Distillate		HS Code 3823 1900
30.06.2017	PFAD	7½	All Goods
30.06.2017	PFAD	Nil	All Goods for manufacture of soaps and oleo-chemicals [**This was dropped with effect from 6th July 2019]**

Source: Customs Notifications of the Central Board of Indirect Taxes & Customs

Notes:

1. Basic Customs Duty is on the Assessed Value, which is taken as 101% of the CIF Value, inclusive of Landing Charge
2. 'PFAD' stands for Palm Fatty Acid Deposit, while 'CPKO' indicates Crude Palm Kernel Oil
3. HS Code Nos. 3823 1111 for Crude Palm Stearin & 3823 1112 for RBD Palm Stearin have been both dropped from 1st April 2019.
4. Regarding RBD Palm Stearin: HS Code 38231112 has been dropped from 1st April 2019.
5. **Difference between RBD Palm Stearin under HS Codes 15119030 and 38231112:** RBD Palm Stearin under HS Code 15119030 is derived from palm oil as a fraction and it is basically a triglyceride of fatty acids (esters). RBD Palm Stearin under 38231112 is basically free fatty acid. The latter category was dropped / reallocated from 1st April 2019.
6. All Palm Oils and fractions thereof, whether or not refined but not chemically modified, are included under HS Code 1511.
7. Palm kernel and fractions thereof, whether or not refined but not chemically modified, are included under HS Code 1513. [Coconut oil, babassu oil and fractions thereof are also included within this code, unless these are chemically modified.]

The prevailing rates for the above items (as in October 2020) have been summarized below.

Table- A (8).9: Prevailing Rates of Other Palm Oil based Products

Product	BCD Rate (as % of Assessed Value)	Remarks
Crude Palm Stearin	7.5	Having FFA of 20% or more
RBD Palm Stearin	7.5	-Do-
RBD Palm Stearin	15	Under HS Code 1511 90 – All goods
Crude Palm Kernel Oil	12.5	Under HS Code 1513 – All goods, crude & edible
Refined Palm Kernel Oil	20	Under HS Code 1513 – All goods, refined & edible
Palm Fatty Acid Distillate	7.5	Under HS Code 3823 1900 (attracting 18% IGST)

Tariff Values for Palm Oil & Fractions

The CBEC (now replaced by the Central Board for Indirect Taxes and Customs) has the power to fix tariff values for any class of imported goods or exported goods. Fixing the tariff value for any class of imported goods or exported goods means that the duty shall be chargeable with reference to such tariff value. This measure has been taken up to prevent under-reporting of CIF values to evade customs duties and other levies.

Tariff values are being periodically fixed with respect to the imports of Crude Palm Oil, RBD Palm Oil, Other Palm Oils, Crude Palmolein, RBD Palmolein etc. These tariff values are fixed on a fortnightly basis. The current values (for October 2020) have been tabulated below.

Table-A (8).10: Tariff Values for Import of Palm Oil & Fractions into India (October 2020)

Sl. No.	Chapter Heading / Sub-heading	Description of Goods	Tariff Value (US$ per MT)	
			1.10.2020	15.10.2020
1	1511 10 00	Crude Palm Oil	762	755
2	1511 90 10	RBD Palm Oil	795	787
3	1511 90 90	Others – Palm Oil	779	771
4	1511 10 00	Crude Palmolein	802	793
5	1511 90 20	RBD Palmolein	805	796
6	1511 90 90	Others Palmolein	804	795

Source: Solvent Extractors' Association of India

Annex-9: Government Initiatives for Oil Palm

As per periodic assessments made by various committees constituted by the Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW), Government of India; sizeable areas have been deemed as being suitable for growing oil palm in India. As per the latest assessment, an area of 19.33 lakh hectares had been identified as being 'potential areas' for oil palm cultivation. Nearly half of the above area is located in the five states of South India.

Earlier Initiatives: In view of the importance of oil palm cultivation due to high levels of import, the Government of India has been supporting the area expansion and output increase under different initiatives. In 1991-92, the Technology Mission on Oilseeds and Pulses (TMOP) had been launched. During the 8th and 9th Five Year Plans, the Oil Palm Development Programme (OPDP) had been funded under the above mission as a Centrally Supported Scheme (CSS). It covered six states of the nation.

Later on, from 2004-05, the Integrated Scheme of Oilseeds, Pulses, Oil Palm & Maize (ISOPOM) was taken up. The OPDP was funded under the above scheme from 2004-05 onward, with 12 states of India being covered under its ambit, including Assam and Mizoram in the NE Region. Another thrust was made under the Special Programme on Oil Palm Area Expansion (OPAE) under the RKVY scheme from 2011-12 to 2013-14.

National Mission on Oilseeds and Oil Palm: From 2014-15 onward, the National Mission on Oilseeds and Oil Palm (NMOOP) promoted the expansion of area under oil palm under Mini Mission II (MM-II). MM-II of NMOOP was implemented in 13 states; including 4 NE states (Arunachal Pradesh, Assam, Mizoram and Nagaland). This mission was carried out till 2017-18.

Present Initiative under NFSM: From 2018-19 the promotion of oil palm was being done under the revamped guidelines of the National Food Security Mission (NFSM) Oilseeds & Oil Palm. The guidelines of this scheme have been described subsequently under this annex. It may be noted that the NMOOP has been merged with the above mission from 1st April 2019.

Outcome of the Government Interventions at National Level

The progress of oil palm cultivation till the end of the NMOOP period (March 2018) is as follows: (a) Total coverage in hectares under oil palm - 316,600 hectares; and (b) as a percentage of total potential area – 16%. The state-wise break-up is available at the next page. Nearly four-fifths of the cultivated area is located in the South Indian states. Notably, Andhra Pradesh accounts for nearly half of the cultivated area under oil palm in India.

In March 2019, it was reported that 3.50 lakh hectares were under oil palm in India, which is about 18% of the 'potential area' identified in the country. The states having significant areas under this crop include Andhra Pradesh, Karnataka, Tamil Nadu, Mizoram, Odisha and Telangana

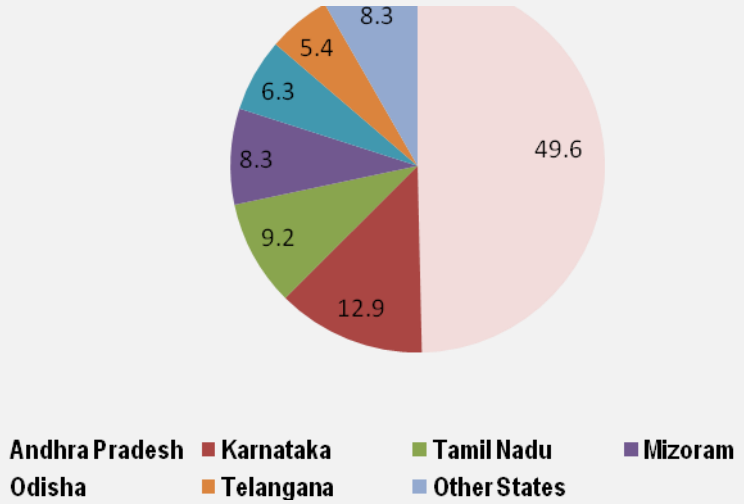
All the above developmental initiatives of the Government have resulted in area expansion under oil palm from 8,585 Ha in 1991-92 to 349,740 Ha by the end of 2018-19. Similarly, the output of Fresh Fruit Bunches (FFBs) has risen from 21,233 MT in 1992-9 to 1,640,675 MT in 2018-19, while the production of Crude Palm Oil (CPO) has increased from 1,134 MT (1992-93) to 278.922 MT by the end of 2018-19.

Oil Palm Cultivation in India

Table-A (9).1: Cultivated Area under Oil Palm in India (2018-19)

State	Potential Area	Cultivated Area
Andhra Pradesh	4,19,500	1,73,349
Telangana	50,000	18,933
Karnataka	2,60,000	44,992
Tamil Nadu	2,05,000	31,958
Kerala	6,500	5,786
Gujarat	2,60,250	6,365
Goa	2,000	953
Odisha	56,000	22,075
Chhattisgarh	48,000	5,086
Mizoram	61,000	28,914
Assam	25,000	1,849
Nagaland	50,000	3,322
Arunachal Pradesh	25,000	2,561
Other States	4,65,000	3,067
Total	**19,33,250**	**3,49,210**

Source: Department of Agriculture, Cooperation & Farmers Welfare, Government of India



Andhra Pradesh has almost half the nation's area under oil palm cultivation. Other states having significant areas under this crop include Karnataka, Tamil Nadu, Mizoram, Odisha and Telangana. It may be noted that South Indian states account for nearly four-fifths (79%) of the cultivated area under oil palm in the country.

Outcome of the Government Interventions in the NE Region

The progress of oil palm cultivation in NE Region has been tabulated below.

Table-A (9).2: Progress of Areas under Oil Palm in NE Region (up to 2017-18)

State	Previous Schemes	Under NMOOP				Total	As per Record	Difference (%)
	Up to 31.3.2014	2014-15	2015-16	2016-17	2017-18			
Arunachal Pradesh	0	0	330	573	843	1,746	1,746	0.00
Assam	10	0	560	465	814	1,849	1,849	0.00
Mizoram	19,971	2,789	2,981	1,669	885	28,295	28,259	0.13
Nagaland	0	0	140	1,033	800	1,973	1,973	0.00

Source: National Mission on Oilseeds & Oil Palm till 2015-16 & National Food Security Mission (OS&OP) for balance

NOTE: Mizoram cultivation of oil palm in previous years (in Ha) as per data from National Mission on Oilseeds & Oil Palm

2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total
12	24	185	1,614	2,547	3,499	1,877	1,970	3,711	4,532	19,971

National Food Security Mission – Oilseeds & Oil Palm

From 2018-19 onward, the promotion of oil palm cultivation was being done under the revamped guidelines of the National Food Security Mission (NFSM) Oilseeds & Oil Palm. The NMOOP has been merged with the above mission from 1st April 2019. The NFSM has been revamped with its component under Part-III dealing with Oilseeds and Oil Palm, and consisting of the sub components NFSM Oilseeds, NFSM-Oil Palm and NFSM-TBOs. The details of the guidelines of NFSM Oilseeds & Oil Palm are described below.

Oilseeds Division of Department of Agriculture Cooperation & Farmers' Welfare (DAC&FW) is implementing the scheme and fund is being released to the states under the ongoing head of account specified for NMOOP.

Background

National Mission on Oilseeds & Oil Palm (NMOOP) was launched in 2014-15 and continued up to 2017-18 to augment the availability of vegetable oils and to reduce the import of edible oils by increasing the production and productivity of oilseeds and area expansion of oil palm.

The EFC meeting for continuation of Umbrella Scheme 'Krishonnati Yojana' was held on 29.11.2017 under the Chairmanship of Secretary, Department of Expenditure, Ministry of Finance. It has been decided for merger/ conversions or linkage of Schemes/ sub-Schemes/ programmes, etc. having similar components such as incentive for seed, demonstration, and farm implements including efficient water application tools covered under NFSM and NMOOP. Therefore, NMOOP scheme has been merged with revamped NFSM.

Accordingly from 2018-19 onwards the existing NMOOP is being implemented under NFSM as NFSM-Oilseeds & Oil palm comprising the sub components NFSM Oilseeds, NFSM-Oil Palm and

NFSM-TBOs. (This was implemented from 1st April 2019; vide circular F No. 20-1/2018-NFSM (CA-V) dated 4th September 2018.)

Objectives (Pertaining to Oil Palm)

- To augment the availability of vegetable oils and to reduce the import of edible oils by increasing the production and productivity of vegetable oils sourced from Oilseeds, Oil palm and TBOs
- To achieve additional area of 1.05 lakh hectare under oil palm cultivation during 2017-18 to 2019-20 area over on and above current area of 3.15 lakh ha (2016-17). With this additional area total area of about 4.20 lakh ha, will be under oil palm cultivation by 2020

Strategy (Pertaining to Oil Palm)

Although the country is surplus in food grain production excluding oilseeds but facing a threat for crisis of water and soil health management due to cultivation of cereals after cereals (paddy-wheat). Land being a limiting factor area expansion under any agricultural crop will depend on economic viability of the crop.

Oil Palm & TBOs

- Plantation of oil palm, olive and other TBOs species on larger scale
- Inter cropping and maintenance cost during gestation period of oil palm and TBOs.
- Enhancing collection, plantation and processing of TBOs

Capacity building

- Training of farmers / dealers
- Training of Extension officials
- Exposure visit of farmers / Officers
- Kisan Mela / Seminar / Exhibition / DD Kisan /Brain storming session

New initiatives

- Creation of seed hubs of oilseeds
- Supporting oil extraction unit at village level through FPOs
- Structure

Structure

Table-A (9).3: Policy & Implementation Structure for NFSM (Oilseeds & Oil Palm)

Level	Body	Remarks
National Level	NFSM-General Council	The NFSMGC has been constituted under the chairmanship of Union Minister for Agriculture and Farmers Welfare is empowered to lay down and amend the operational guidelines, decide need based reallocation of resources across the states and districts and approve projects as per requirement for all the components of NFSM including NFSM-OS&OP.

Level	Body	Remarks
	NFSM-Executive Committee	NFSMEC headed by Secretary (AC & FW) to oversee the operations by approving the individual State Action Plans of all component of NFSM including NFSM-Oilseeds & Oil Palm , periodic review of their progress and achieving coordination across related Departments and Ministries
State Level	SFSM Executive Committee	It is constituted under the Chairmanship of the Chief Secretary of State having Secretaries of Agriculture, Irrigation, Power, Panchayati Raj, Tribal Affair, Social Welfare Department, Vice Chancellor of SAUs, Director, ICAR Institutes, Representative of NABARD and Lead Banks, etc. as members for overseeing the implementation of the programme. State Mission Director works as member secretary of SFSMEC.
	SAMETI	Under NFSM, State Governments have created a suitable autonomous agency registered under the Societies Registration Act for implementing Mission at the State level called State Agricultural Management and Extension Training Institute (SAMETI) at the State Level
District Level	DFSM – Executive Committee	The District Food Security Mission Executive Committee (DFSMEC) exists under the District Collector for guiding the District Level Agency in project formulation, implementation and monitoring of the Scheme components. DFSMEC has representatives from concerned line Departments, SAUs, KVKs, ATMA, nominated progressive farmers, Self Help Groups of the Farmers and active Non-Governmental Organizations (NGOs) as its members. The District Agriculture Officer is the Member Secretary of DFSMEC.
District Level	ATMA	Under NFSM, State Governments have created a suitable autonomous agency registered under the Societies Registration Act for implementing Mission at the districts level called Agriculture Technology Management Agency.

Source: Operational Guidelines, NFSM – Oilseeds & Oil Palm

The scheme is to be implemented by the Department of Agriculture, Cooperation and Farmers Welfare, Government of India through Departments of Agriculture/Horticulture of the State Governments, Central Agencies and other Institutions. National Mission Director NFSM (Joint Secretary, Crops/Oilseeds) is to be responsible for overall implementation of the scheme.

At the district level, the scheme is to be implemented through the Agricultural Technology Management Agency (ATMA). State Level Agency provides the required funds to District Level Agency for execution of the programme at district/ block level.

Project Management Teams

National Level Project Management Team (PMT): Up to 1% of the funds allocated under NFSM – Oilseeds and Oil palm is to be earmarked at national level to meet the contingency expenditure including engagement of contractual manpower for monitoring of implementation of the Mission. Under NFSM- Oilseeds & Oil palm there is a provision for Technical Support Group (TSG), consisting (inter alia) of 3 National Consultants and 5 Technical Assistants.

State Level Project Management Team (PMT): At the state level, up to 3% of total allocation under NFSM-Oilseeds and Oil Palm is to be provided for engaging state/district level consultant/Technical assistant and DEO. The PMT is to have the responsibility to ensure collaboration among various Line Departments in the circle/state/district to achieve the target of oilseeds production the appointment of technical manpower is to be made on contract basis with the term of reference laid down for the purpose of NFSMEC. The PMT is to provide the technical service/ advice.

Funding Pattern

The sharing Pattern under NFSM-Oilseeds & Oil Palm between Central and State Governments is to be in the ratio of 60:40 for general category of States and 90:10 for North Eastern and Himalayan States.

Few interventions like purchase of breeder seeds by both State and Central seed producing agencies, supply of seed mini-kits to the farmers through central seed producing agencies and production of foundation and certified seeds, development of seed infrastructure at SAUs/KVKs farms, Front Line / cluster demonstrations through ICAR/KVKs, R&D activities, *Kisan Mela* etc. are 100% funding by Government of India.

The funds are to be released to the implementing State Departments of Agriculture / Horticulture. As far as possible, electronic banking under Public Fund Management System (PFMS) is planned to be used for transfer of funds to the State /Agencies.

The private sectors and NGOs could be involved through the State Departments of Agriculture and Horticulture only. The Government of India is to release the funds to the implementing agencies for the directly funded components / activities at Central level. The State Govt. is to be responsible for release of 40% or 10% State share of the allocation annually in the beginning of the financial year.

Beneficiary Oriented Components: Majority of interventions like supply of seed/ planting material, other inputs like soil ameliorants, micro-nutrients, bio-fertilizers, PP chemicals, demonstration of improved technologies, PP equipments, farm implements including sprinkler/drip irrigation are beneficiary oriented. The resources for Scheduled Caste (16.6%) and Scheduled Tribe (8.6%) are to be earmarked for utilization under all the components of NFSM-OS & OP. However, States are to be allowed to make allocation to SC/ST farmers proportionate to their population in the States/Districts.

In addition, adoption of cluster approach is advocated for ensuring the participation of all farmers belonging to small/marginal, SC/ST/minority/women categories in a cluster. There is a provision for additional 10% assistance to Women farmers group under supply of plant protection equipments and improved farm implements

Direct Benefit Transfer (DBT): The scope of DBT has since widened to cover all Centrally Sponsored Schemes, where benefits (in cash or kind) are transferred to individual beneficiaries. DBT Mission

established under the Cabinet Secretariat has laid down 31st March, 2017 as the time line for transition of all agriculture schemes to DBT mode. It is therefore compulsory to execute the schemes and programmes as per the expanded scope of DBT and plan transition of the scheme to DBT mode.

States Included

According to survey of DAC&FW, states have potential to grow oil palm in 19.33 lakh ha and so far 3.15 lakh ha covered (2013-18). Oil Palm development was implemented in 13 states during 2017-18 viz., Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Karnataka, Kerala, Mizoram, Nagaland, Odisha, Tamil Nadu and Telangana under NMOOP. All these states are to continue during next three years under sub component NFSM-OP of NFSM-OS&OP. Any other state will also be included subject to potential and prospects of oil palm in the concerned State with the approval of the NFSMGC (General Council).

Interventions for Oil Palm under NFSM (Oilseeds & Oil Palm)

The allocation of funds to the States would be made on the basis of their Annual Action Plan (AAP) for which the percentage of funds under various activities would be as under:

Table-A (9).4: Components for Annual Action Plan of States under NFSM (Oilseeds & Oil Palm)

	Component	Percentage of Funds
1	Supply of planting material, maintenance/cultivation cost and inter cropping during gestation period	50-70
2	Other Components (Irrigation, Seed Garden, Machinery & Tools, Vermi-compost, Training, R&D etc.)	20-30
3	Flexi Funds	0-10
4	Project Management Expenses (PME)	0-3
	Total	100

Source: Operational Guidelines, NFSM – Oilseeds & Oil Palm

The support under National Food Security Mission (Oilseeds & Oil Palm) for development of oil palm has been tabulated at overleaf. In addition, support under Flexi-fund can be extended as follows.

Flexi Fund (capped @10% of AAP)

State Government may include the following activities under Flexi Fund, for support that is not covered as an intervention under the programme NFSM-OP within 10% of total allocation:

(i) The State Governments can take up essential activities require for improving oil palm area and production of FFBs as per their need viz.; transport cost of seedling of oil palm, assistance for harvesting of FFBs from tall palm tree, Ring well, Water carrying pipes, plant protection equipments, half moon terrace, equipment for harvesting, community hiring centres, water saving devices, FFBs transportation charges from field to processing mills etc.;

(ii) Support for publicity programme by the implementing states on Oil Palm under NFSM-Oil Palm;

(iii) Support for organizing exposure visits (inter and intra state) of farmers and/or officers and for organizing Seminar/Conference/Workshop etc by the implementing states on oil palm crop & its technologies and support to states for use of ICT;

(iv) Concurrent/Mid Term/ End term independent evaluation of NFSM-Oil Palm Components; and

(v) Any other interventions as state specific local initiative, which may be crucial for effective implementation and adoption of best practices in increasing production and productivity of palm oil and to encourage farmers to grow oil palm.

Table-A (9).5: Support under National Food Security Mission (Oilseeds & Oil Palm)

Intervention	Details about Assistance	Remarks
Supply of Planting Material	@ 85% of the cost of planting material limited to Rs. 12,000/- per ha for entire land holding/planting area of the farmer	Quality of planting materials used greatly determines the productivity and production and therefore, the success of cultivation of a crop. It is only with use of good planting materials that potential yield levels can be achieved under proper management practices
Maintenance/cultivation cost during Gestation Period	@ 50% of the cost during gestation period for 4 years with a ceiling of Rs. 20,000/- per ha @ Rs. 5,000/- per ha per year from 1st year to 4th year for entire land holding/ planting area	Oil Palm starts producing Fresh Fruit Bunches (FFBs) after 4 to 5 years of its planting, so it becomes essential to maintain the plantation
Inputs for Inter-cropping with Palm Oil	@ 50% of the cost of inputs for inter-crops during gestation period for 4 years with a ceiling of Rs. 20,000 per ha @ Rs. 5,000/- per ha per year from 1st year to 4th year for entire land holding / plantation area	For purchase of seeds/ fertilizers/ INM/ IPM/ fertigation/ tree guards and PP chemicals etc. Out of this, 75% funds will be for procurement of fertilizers/seeds and remaining 25% for crop protection inputs for inter cropping
Drip Irrigation	States with good infrastructure is available: @ Rs. 24035 / Ha; for states with low penetration @ Rs. 27640 per Ha and for North Eastern and Himalayan States @ Rs. 30,486 per Ha	Drip irrigation support will be given as per Drop More Crop micro irrigation component of PMKSY. Guidelines at: pmksy.gov.in/ microirrigation/Archive/ GuidelinesMIRevised250817.pdf [Paragraphs 8-10 may be seen]
Supply of Diesel/Electric Pump sets	@ 50% of the cost limited to Rs. 27000/ per pump set for SC,ST, Small & marginal Farmers, women and NE states beneficiaries and Rs. 22500/- per pump set for other beneficiaries as per the norms of Sub-Mission on Agriculture Mechanization (SMAM)	For growers with 2 ha or more area under Oil Palm plantation; pump set (diesel/electric/petrol) of capacity up to 15HP – this is in **addition** to the drip irrigation [SMAM Annexure II (c)]
Bore Well at oil palm farm	@50% limited to Rs. 50,000/- per unit	Subject to condition that these are not installed in critical, semi-critical and over exploited ground water zones
Water Harvesting Structure/ Ponds at oil palm farm for Individuals	@ 50% of construction cost limited to Rs. 1.50 lakh per unit in plain areas and Rs. 1.80 lakh per unit in hilly areas including lining	@ Rs. 125 per cubic meter for plain / Rs. 150 per cubic meter for hilly areas (size 20mX20mX3m) – Mission for Integrated Development of Horticulture (MIDH) Operational Guidelines at Annexure V (Point No. B.4)
Establishment of Seed Gardens	**One time Assistance** for a maximum amount Rs.10.00 lakh as subsidy for setting up a new seed garden in 15 ha area; OR As a **Revolving Fund Scheme** with the assistance of Rs 30.00 lakh for an area of 15 ha: with a breakup of Rs. 10 lakh in the first year and Rs. 2 lakh each for 2nd to 6th years (both inclusive). In 7th year, a block grant of Rs.10 lakh will be provided. From 8th year onwards the scheme is likely to become self supportive	By oil palm farmers' association/ co-operative etc. through State Government (for Andhra Pradesh, Gujarat, Karnataka, Mizoram, Orissa & Tamil Nadu or other suitable state)

Intervention	Details about Assistance	Remarks
Construction of vermi-compost units at oil palm fields	@50% of the cost limited to Rs. 15000/vermi compost unit with a size of 15m length, 0.9m width and 0.24 m depth	At oil palm field / garden of the farmers
Machinery & Tools	Support will be provided for equipments/tools up to the amount or up to 50% of the cost as per SMAM Guidelines • Manually handled/high reach oil palm cutter - Rs. 1500/- per unit, • Oil Palm protective wire mesh - 15000/- per unit, • Motorized Chisel - Rs. 10000/- per unit • Aluminium Portable ladder - Rs. 3000/- per unit • Chaff cutter for chaffing of oil palm leaves (oil palm farmers only) - Rs. 20000/- per unit for SC, ST small & Marginal Farmer, women and NE states beneficiaries and for other beneficiaries Rs. 16000/- unit as per SMAM norms. • Tractor up to 20HP with trolley: up to 40% of the cost of procurement subject to a ceiling of Rs. 1.80 lakh for other beneficiary. [Additional 10% assistance to SC / ST / Small / Marginal Farmer / Women and NE states beneficiary to a ceiling of Rs. 2.25 lakh per unit.]	Other machinery recommended by ICAR/SAUs, which is useful to the oil palm growers could be included under local initiatives covered under flexi fund
Special component for NE/Hilly States/LW Areas/regions	As follows	These supports will depend on the resources available under the Mission and the policy adopted time to time.
(a) Roads	50% of the actual cost estimated by PWD/CPWD for roads from oil palm field to nearest FFB collection/processing centre limited to 20% of total outlay of the State under Annual Action Plan	This activity can be taken up on project basis by the implementing states and will require separate approval from DAC&FW.
(b) FFB Processing Unit	50% of the cost limited to Rs 250.00 lakh for a FFB processing unit of 5.00 MT/Hr for newly planted oil palm areas	The assistance will be given to the States Government agencies/ Cooperative sector/Government Recognized Farmers' Associations for setting up of a mill where sufficient area to run a mill of 5 MT/hr capacity is under production of FFBs. The Farmers' Associations/Cooperatives will be eligible for subsidy if their proposal is approved by the State Governments and will be available as back-ended subsidy through banks for plant and equipments.
	For creation of additional capacity for crushing of FFBs, at least by 1MT/Hr @25% of the cost limited to Rs.25.00 lakh to the existing units	To units of State Government agencies/Cooperatives etc. based on the discretion as elaborated in paragraph above
Training of Farmers	@ Rs. 24,000 per training	For a batch of 30 farmers for 2 days as per norms

Intervention	Details about Assistance	Remarks
Training of Extension Officials/Workers/Input dealers	@ Rs. 900/- per participant per day	For a batch of 20 participants of extension officials and input dealers for organizing orientation/refresher training of 2 days: total may come to Rs. 36,000
Research & Development	Need based 100% support will be given for new R&D schemes of ICAR/SAUs.	Financial support will also be provided to the ICAR-Indian Institute of Oil Palm Research (IIOPR) and SAUs for ongoing schemes, import of germ-plasms and maintenance of existing seed gardens of oil palm, demonstration fields, inter-cropping etc.

Source: Operational Guidelines, NFSM – Oilseeds & Oil Palm

NOTE: In addition, support is available as per approved Flexi-fund components of the State's approved Annual Action Plan (capped @ 10%). These may include:

- **Essential activities** required for improving oil palm area and production of FFBs as per their need viz.; transport cost of seedling of oil palm, assistance for harvesting of FFBs from tall palm tree, Ring well, Water carrying pipes, plant protection equipments, half moon terrace, equipment for harvesting, community hiring centres, water saving devices, FFBs transportation charges from field to processing mills etc.;
- **Publicity programme** by the implementing states on Oil Palm under NFSM-Oil Palm;
- Organizing **exposure visits** (inter and intra state) of farmers and/or officers and for organizing **Seminar/Conference/Workshop** etc by the implementing states on oil palm crop & its technologies;
- Use of **ICT**.
- **Independent Evaluations** as Concurrent, Mid Term or End term evaluations; and
- Any other state specific local initiatives for increasing production and productivity of palm oil but not covered as an intervention of the NFSM-Oil Palm as tabulated at above.

Project Management Expenses (PME) – capped at 3% of AAP

The states will be allowed to utilize 3% of the total allocation as Project Management Expenses (PME) for effective implementation of the programme NFSM-OP, on sharing of expenses between Central and State Government in the ratio of 60:40 (General States)/ 90:10 (NE & Himalayan tates).

The following activities will be covered under this intervention:

- States will be allowed to engage state level consultants/ supporting staff as Technical Support Group (TSG) purely on contractual basis.
- Hiring of vehicles (but not its purchase), Monitoring of scheme, attending workshop and meetings by state functionaries etc for implementation of the programme.
- States will be allowed to incur any other expenditure that may be essential for smooth implementation of the programme such as office stationary, office equipments, expenses towards monitoring etc. at the discretions of the State Government within the allocation of PME.

Comparison of Support under Government Schemes

The following pages briefly give the support extended by the Government under different schemes in the past ten years. These include support under:

- National Food Security Mission (NFSM) – Oilseeds and Oil Palm (from 1st April 2018 onward);
- National Mission on Oilseeds and Oil Palm (NMOOP) for the period from FY 2014-15 to FY 2017-18; and
- Oil Palm Area Expansion Programme (OPAE) under RKVY for FY 2011-12 to FY 2013-14.

Table-A (9).6: Government Support for Oil Palm (Schemes of Last 10 Years)

Intervention	National Food Security Mission (NFSM) Oilseeds & Oil Palm	National Mission on Oilseeds & Oil Palm (NMOOP)	Oil Palm Area Expansion (OPAE) under RKVY
Period	From 1st April 2018	2014-15 to 2017-18	2011-12 to 2013-14
Supply of Planting Material	@ 85% of the cost of planting material limited to Rs. 12,000/- per ha for entire land holding/planting area of the farmer	@ 85% of the cost of planting material limited to Rs. 10,000/- per ha for entire land holding/planting area of the farmer	@ 85% of the cost of planting material limited to Rs. 10000/- per ha for entire land holding of the farmer
Maintenance/cultivation cost during Gestation Period	@ 50% of the cost during gestation period for 4 years with a ceiling of Rs. 20,000/- per ha @ Rs. 5,000/- per ha per year from 1st year to 4th year for entire land holding/ planting area	@ 50% of the cost during gestation period for 3 years with a ceiling of Rs.14,000 per ha up to 25 ha	50% of the cost of cultivation to the farmers @ Rs.6,000/ha for first year PLUS 50% of the cost for INM, IPM, Fertigation, PP Chemicals, tree guard etc limited to Rs.5000/ha
Inputs for Inter-cropping with Palm Oil	@ 50% of the cost of inputs for inter-crops during gestation period for 4 years with a ceiling of Rs. 20,000 per ha @ Rs. 5,000/- per ha per year from 1st year to 4th year for entire land holding / plantation area	@ 50% of the cost limited to Rs. 3000/ha (1st year to 4th year) for purchase of seeds, fertilizers, INM, IPM, fertigation, tree guards and PP chemicals etc.	50% of the cost limited to @ Rs.10000/hectare for purchase of planting material of horticultural intercrops/ seed material of fields crops
Drip Irrigation	States with good infrastructure is available: @ Rs. 24035 / Ha; for states with low penetration @ Rs. 27640 per Ha and for North Eastern and Himalayan States @ Rs. 30,486 per Ha [as per Drop More Crop micro irrigation under PMKSY]	As per NMSA guidelines:	50% of the cost of drip irrigation system for spacing of oil palm plantation at 9X9M. The assistance will be provided as per the subsidy admissible under National Mission on Micro-Irrigation (NMMI) up to 5 ha per farmer.
Supply of Diesel/Electric Pump sets	@ 50% of the cost limited to Rs. 27,000/ per pump set for SC,ST, Small & marginal Farmers, women and NE states beneficiaries and Rs. 22,500/- per pump set for other beneficiaries as per the norms of Sub-Mission on Agriculture Mechanization (SMAM) – up to 15 HP capacity	Of capacity up to 10HP @ 50% of the cost limited to Rs.15,000/pump set as per the norms of SMAM	Pump set (diesel/electric) of capacity up to 10 HP @ 50% of the cost limited to Rs10000/pump set.
Bore Well at oil palm farm	@50% limited to Rs. 50,000/- per unit	@50% limited to Rs. 25000/- per unit	50% of the cost limited to Rs.50000/bore well
Water Harvesting Structure/ Ponds at oil palm farm for Individuals	@ 50% of construction cost limited to Rs. 1.50 lakh per unit in plain areas and Rs. 1.80 lakh per unit in hilly areas including lining as per MIDH	50% of cost limited to Rs. 75,000 for plain areas and Rs. 90,000 for hilly areas including lining	50% of cost of water harvesting structure as alternative to bore-well)

Intervention	National Food Security Mission (NFSM) Oilseeds & Oil Palm	National Mission on Oilseeds & Oil Palm (NMOOP)	Oil Palm Area Expansion (OPAE) under RKVY
Establishment of Seed Gardens	One time assistance for a maximum amount Rs.10.00 lakh as subsidy for setting up a new seed garden in 15 ha area; OR As a Revolving Fund Scheme with the assistance of Rs 30.00 lakh for an area of 15 ha: with a breakup of Rs. 10 lakh in the first year and Rs. 2 lakh each for 2nd to 6th years (both inclusive). In 7th year, a block grant of Rs.10 lakh	One time assistance – up to Rs. 10 lakh for 15 ha garden Revolving Fund Scheme: Rs 30.00 lakh with a breakup of Rs. 10 lakh in the first year and Rs. 2 lakh each for 2nd, 3rd,4th, 5th and 6th year. In 7th year, block grant of Rs.10 lakh to be provided.	---
Construction of vermi-compost units at oil palm fields	@50% of the cost limited to Rs. 15000/vermi compost unit	@50% of the cost limited to Rs.15000/vermi compost unit	50% of the cost limited to Rs.15000/unit
Machinery & Tools	Support will be provided for equipments/tools up to the amount or up to 50% of the cost as per SMAM Guidelines • Manually handled/high reach oil palm cutter - Rs. 1500/- per unit, • Oil Palm protective wire mesh - 15000/- per unit, • Motorized Chisel - Rs. 10000/- per unit • Aluminium Portable ladder - Rs. 3000/- per unit • Chaff cutter for chaffing of oil palm leaves (oil palm farmers only) - Rs. 20000/- per unit for SC, ST small & Marginal Farmer, women and NE states beneficiaries and for other beneficiaries Rs. 16000/- unit as per SMAM norms. • Tractor up to 20HP with trolley: up to 40% of the cost of procurement subject to a ceiling of Rs. 1.80 lakh for other beneficiary. [Additional 10% assistance to SC / ST / Small / Marginal Farmer / Women and NE states beneficiary to a ceiling of Rs. 2.25 lakh per unit.]	Up to the amount, or Up to 50% of the cost or for equipments/tools as follows: • Manually handled/high reach oil palm cutter - Rs. 1500/- per unit, • Oil Palm protective wire mesh - 15000/- per unit, • Motorized Chisel - Rs. 10000/- per unit • Aluminium Portable ladder - Rs. 3000/- per unit • Chaff cutter for chaffing of oil palm leaves (oil palm farmers only) - Rs. 7000/- per unit. • Small tractor with trolley: 25% of the cost of procurement subject to a ceiling of Rs. 0.75 lakh. Additional 10% assistance to SC / ST / Small / Marginal Farmer / Women, Groups >5 members FPOs and NE States to a ceiling of Rs. 1.00 lakh per unit.]	---

Intervention	National Food Security Mission (NFSM) Oilseeds & Oil Palm	National Mission on Oilseeds & Oil Palm (NMOOP)	Oil Palm Area Expansion (OPAE) under RKVY
Special component for NE/Hilly States/LW Areas/regions	As follows		
(c) Roads	50% of the actual cost estimated by PWD/CPWD for roads from oil palm field to nearest FFB collection/processing centre limited to 20% of total outlay of the State under Annual Action Plan	50% of the actual cost estimated by PWD/CPWD for roads from oil palm field to nearest FFB collection/ processing centre	---
(d) FFB Processing Unit	50% of the cost limited to Rs 250.00 lakh for a FFB processing unit of 5.00 MT/Hr for newly planted oil palm areas	50 % of the cost limited to Rs 250.00 lakh for a FFB processing unit of 5.00 MT/Hr for newly planted oil palm areas	---
	For creation of additional capacity for crushing of FFBs, at least by 1MT/Hr @25% of the cost limited to Rs.25.00 lakh to the existing units	for creation of additional capacity for crushing of FFBs, at least by 1MT/Hr @25% of the cost limited to Rs.25.00 lakh	---
FFB Processing Unit in Potential State	---	---	50% of the cost limited to 250.00 lakh per unit for the mill of 5 MT/hr FFBs processing capacity
Training of Farmers	@ Rs. 24000/training	@ Rs. 24,000/training for a batch of 30 farmers for 2 days	---
Training of Extension Officials/Workers/Input dealers	@ Rs. 900/- per participant per day	Support will be provided @ Rs. 900/- per participant per day for a batch of 20 participants of extension officials and input dealers for 2 days	---

Annex-10: Land Availability in the NE Region

The prime requirement for the plantation of oil palm is the availability of suitable land, apart from suitable climatic and soil conditions. The North East Region of India is reported to have adequate land for growing oil palm. This has been analysed as follows.

The following categories of land are not included in the land availability analysis.

(a) Forests
(b) Land not available for cultivation
(c) Current Fallows
(d) Miscellaneous areas under trees
(e) Permanent pastures & grazing lands
(f) Net Sown Area

The reasons for excluding the above areas have been briefly discussed below.

- In India, forest land has stringent protection against diversion, even when it has little tree cover or located outside the protected area (like reserve forests, protected forests, protected area network etc.). The diversion of forest land is not possible, as the same is a long-drawn out matter needing the Central Government permission. It is usually permitted for unavoidable infrastructure and security related uses like roads, power lines etc. The user agency has to deposit funds to the Government for undertaking compensatory afforestation.
- Land not available for cultivation includes barren and un-culturable land, which cannot be normally cultivated as the conversion entails huge investments even if the land can be made cultivable. It also includes lands used for settlements, industry, and transport links etc.; water bodies like rivers, canals, ponds, swamps etc.
- Current fallows are cultivated lands, which have left uncultivated for a period of 1-5 years. Net sown area represents the cultivated area, including orchards. Both categories represent crop lands which provide food to the local inhabitants or yield marketable surplus.
- Miscellaneous areas under trees include area under cane and bamboo, thatch, fuel trees etc. which have other economic uses. Similarly, conversion of grazing lands may be difficult as these are needed for the animal husbandry activities.

Basically, much of the available culturable waste lands and fallow lands (apart from current fallows) can be considered for oil palm plantation, Culturable waste lands include lands available for cultivation, whether uncultivated at all, or left uncultivated for the past five years or more. Such lands may be either fallow or covered with shrubs and jungle. Similarly, fallow lands are lands that have not been cropped for the past five years. However, the suitability of such lands has to be analyzed against relevant factors like climatic suitability, soil conditions, availability of water for irrigation, terrain, infrastructure, distance from the FFB processing plant etc. A significant proportion of the culturable wastelands and fallow lands may not be usable for oil palm plantations.

The table at the following page gives the land use details of the North Eastern states. In addition, the notes to the table give the manner in which land has been classified. It may be noted that while most of the geographical area of the states has been classified, some areas have not been covered – especially in tracts where such classification is not easy.

Table-A (10).1: Land Use Classification of the North Eastern States

State	All figures are Area in '000 hectares									
	Total Geographical Area	Reporting Area for Land Use Statistics	Forest	Area not available for Agricultural Use	Permanent Pastures & Other Grazing Lands	Land under Miscellaneous Tree Crops, etc	Culturable Waste land	Fallow Land (other than Current Fallows)	Current Fallows	Net Sown Area
Arunachal Pradesh	8374	7228	6725	62	18	35	62	65	36	225
Assam	7884	7844	1853	2460	167	220	142	87	87	2827
Manipur	2233	2117	1699	27	1	6	1	0	0	383
Meghalaya	2243	2242	946	240	---	165	390	155	60	286
Mizoram	2108	2039	1585	75	11	41	7	127	47	145
Nagaland	1658	1652	863	95	---	92	68	99	50	384
Sikkim	710	442	336	10	---	4	4	5	7	77
Tripura	1049	1049	629	146	1	11	3	2	1	255

Source: Directorate of Economics & Statistics, DAC&FW, Government of India

NOTES: Areas below 500 hectares have been ignored.

The above categories are defined as follows:

Reporting Area stands for the area for which data on land use classification of area are available. In areas where land utilization figures are based on land records, reporting area is the area according to village papers, i.e. the papers prepared by the village accountants. In some cases, the village papers may not be maintained in respect of the entire area of the State. For example, village papers are not prepared for the forest areas but the magnitude of such area is known. Also there are tracts in many States for which no village paper exists. In such cases, ad-hoc estimates of classification of area are derived to complete the coverage.

Forests: This includes all lands classed as forest under any legal enactment dealing with forests or administered as forests, whether state-owned or private, and whether wooded or maintained as potential forest land. The area of crops raised in the forest and grazing lands or areas open for grazing within the forests should remain included under the forest area.

Land Not Available for Agriculture: Includes the following:

- **Area under Non-agricultural Uses**: This includes all lands occupied by buildings, roads and railways or under water, e.g. rivers and canals and other lands put to uses other than agriculture.
- **Barren and Un-culturable Land**: includes all barren and un-culturable land like mountains, deserts, etc. Land which cannot be brought under cultivation except at an exorbitant cost should be classed as un-culturable whether such land is in isolated blocks or within cultivated holdings.

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Other Uncultivated Land (excluding Fallow Land): consists of:

- **Permanent Pastures and other Grazing Lands**: includes all grazing lands whether they are permanent pastures and meadows or not. Village common grazing land is included under this head.
- **Land under Miscellaneous Tree Crops, etc.**: This includes all cultivable land which is not included in 'Net area sown' but is put to some agricultural uses. Lands under Casurina trees, thatching grasses, bamboo bushes and other groves for fuel, etc. which are not included under 'Orchards' should be classed under this category.
- **Culturable Waste Land**: This includes lands available for cultivation, whether not taken up for cultivation or taken up for cultivation once but not cultivated during the current year and the last five years or more in succession for one reason or other. Such lands may be either fallow or covered with shrubs and jungles, which are not put to any use. They may be assessed or un-assessed and may lie in isolated blocks or within cultivated holdings. Land once cultivated but not cultivated for five years in succession should also be included in this category at the end of the five years.

Fallow Lands: Include the following

- **Fallow Lands other than Current Fallows**: This includes all lands, which were taken up for cultivation but are temporarily out of cultivation for a period of not less than one year and not more than five years.
- **Current Fallows**: This represents cropped area, which are kept fallow during the current year. For example, if any seeding area is not cropped against the same year it may be treated as current fallow.

Net area Sown: This represents the total area sown with crops and orchards. Area, which is sown more than once in the same year, is counted only once.

The following table compares the potential area assessed in 2012 by the Government of India with the availability of culturable waste land in the NE states.

Table-A (10).2: Comparing the Potential Area identified for Oil Palm with Culturable Waste Lands & Fallow Lands in the North Eastern States of India

State	Potential Area for Oil Palm (A)	Culturable Waste Land	Fallow Land (apart from Current Fallows)	Culturable Waste Land PLUS Fallow Land (B)	(A) as a percentage of (B) (In %)
Arunachal Pradesh	25,000	62,000	65,000	1,27,000	20
Assam	25,000	1,42,000	87,000	2,29,000	11
Manipur	Not Assessed	1,000	0	1,000	0
Meghalaya	50,000	3,90,000	1,55,000	5,45,000	9
Mizoram	61,000	7,000	1,27,000	1,34,000	46
Nagaland	50,000	68,000	99,000	1,67,000	30
Sikkim	Not Assessed	4,000	5,000	9,000	0
Tripura	7,000	3,000	2,000	5,000	140
NE Region	**2,18,000**	**6,77,000**	**5,40,000**	**12,17,000**	**18**

Source: Computed from Table-3.1 and Table-A (10).1

It is thus analyzed that the potential area for oil palm plantation constitutes only 18% of the culturable waste lands and available fallow lands in the NE states. Hence, the cultivation of the crop does not have to affect the forest lands of these states or lands used (or usable) for other purposes like crops (including current fallows), cane and bamboo, pastures etc.

However, **the utilization of the culturable waste lands and fallow lands will depend upon their suitability for oil palm plantation** based on the prevailing agro-climatic conditions, availability of water, terrain of the lands, infrastructure, distance from nearest palm oil mill for FFB processing etc.

[Oil palm ideally requires a relatively stable high temperature and continuous moisture throughout the year, apart from deep and well drained soils. Deviation from these conditions, particularly with respect to light and moisture supply, leads to a decrease in the yields. Dry periods of more than 2-3 months do not specifically damage vegetative growth, but affect seriously the production and quality of the fruit bunches.]

Position as per Reassessment Committee Report of 2020

The Reassessment Committee (2020) has identified 962,981 hectares of land for oil palm cultivation in the NE states. In the present Action Plan, the states of Meghalaya and Tripura have been omitted since the State Governments of these states have not shown interest to grow oil palm. Further, the reassessed areas for Mizoram and Nagaland are 50% and 31% respectively of the combined area in these states under the categories of 'culturable wasteland' and 'fallow land' as per the Land-use Classification. Regarding the other states, the position of the reassessed areas vis-à-vis the availability of culturable wastelands and idle fallow land is given below.

Assam: In the case of Assam, the reassessed area is 375,428 hectares while the area under 'culturable wasteland' and 'fallow land' (as per Land-use Classification records) is 229,000 hectares. The discrepancy of about 145,000 hectares can be adjusted as follows.

Table-A (10).3: Reconciling the Land-Use Classification & Wasteland Atlas of India (Assam)

Description	Area in Hectares	Remarks
As per Land-use Classification		
• Barren and un-culturable land	11,91,251	Statistical Handbook Assam 2018
• Water-logged Land	66,193	-Do-
Total	12,57,444	
As per 'Wasteland Atlas of India'	9,00,308	Latest Atlas of 2019, based on satellite imagery cross-checked by land based assessment on sample basis Includes water-logged and marshy lands (74,953 hectares)
Difference	**3,57,136**	**---**

Sources: (a) Statistical Handbook Assam 2018 (b) Wasteland Atlas of India 2019

Over 350,000 hectares seem to have been over-assessed as either 'barren and un-culturable land' or as 'water-logged land' in Assam as per the above table. Much of it can be culturable wastelands. Hence, the reassessed land as per the recent Committee Report (2020) appears to be within the limits of actual culturable wastelands and fallow lands in Assam.

Arunachal Pradesh: The State Government had assessed about 131,500 hectares as potential area for oil palm after detailed review of the lands by district level offices in 2013-14. The Ministry has assessed a similar extent of land now as being suitable for the crop. The above assessments seem to be a bit higher than the total of the culturable wastelands and fallow lands in the state. However, it may be noted that Land-use Classification covers only 86% of the area of Arunachal Pradesh. The actual extent of the culturable wastelands and fallow lands in the state may be higher.

In addition, as per the Land-use Classification data at Table-10 (A).1, 'forests' cover 67.25 lakh hectares (around 67,250 sq. Km) in the state. However, as per the Forest Department, the total extent of the Recorded Forest Area and Protected Area Network is about 61,189 sq. Km as per the following details.

Table-A (10).4: Reconciling the 'Forest' area as per Land-Use Classification & the Forest Department Records (Arunachal Pradesh)

Description	Area in Hectares	Remarks
As per Land-use Classification		
Forest	67,25,000	Table-A (10).1
Forest Department Records		
• Recorded Forest Area	51,40,700	Reserved Forest (RF): 10,589 km^2 Protected Forest (PF): 9,779 km^2 Un-classed Forest (UF): 31,039 km^2
• Protected Area Network	9,78,200	National Park – 2 Nos. Wild Life Sanctuaries – 11 Nos.
Total	61,18,900	Recorded Forest Area + Protected Area Network
Difference	6,06,100	Area as per Land-use Classification is higher

Sources: (a) India State of Forest Report, 2019 (Volume 2) (b) Table-A (10).1

NOTE: 'Un-classed Forests' include forest land or waste land or any other land recorded in land records as 'Forest' but not notified in Government Gazette as 'Reserved Forest' or 'Protected Forest' under Indian Forest Act.

There seems to have been an over-estimation of forests as per the Land-use Classification in the state (which covers 86% of the state's area). It appears that the coverage of the potential area under oil palm will not entail the large-scale destruction of forest cover in this state.

Manipur: The state is reported to have 66,652 hectares as 'potential area' for oil-palm cultivation. However, the culturable wastelands and fallow lands in the state extend over 1,000 hectares only, which appears to cover the areas in Imphal Valley only. About 16.99 lakh hectares have been classified as 'forests' as per the Land-use Classification data furnished in Table-A (10).1.

It may be noted that Land-use Classification covers 95% of the area of Manipur. The reconciliation of forest area in the state has been done below.

Table-A (10).5: Reconciling the 'Forest' area as per Land-Use Classification & the Forest Department Records (Manipur)

Description	Area in Hectares	Remarks
As per Land-use Classification		
Forest	16,99,000	Table-A (10).1
Forest Department Records		
• Recorded Forest Area	17,41,800	Reserved Forest (RF): 1,467 km^2 Protected Forest (PF): 4,171 km^2 Un-classed Forest (UF): 11,780 km^2
• Protected Area Network	22,600	National Park – 1 No. Wild Life Sanctuaries – 2 Nos. Community Reserves – 4 Nos.
Total	17,64,400	Recorded Forest Area + Protected Area Network
Difference	65,400	Area as per Land-use Classification is lower

Sources: (a) India State of Forest Report, 2019 (Volume 2) (b) Table-A (10).1

NOTE: 'Un-classed Forests' include forest land or waste land or any other land recorded in land records as 'Forest' but not notified in Government Gazette as 'Reserved Forest' or 'Protected Forest' under Indian Forest Act.

It has been reported that in Manipur 'tribal communities and tribal chiefs are already holding ownership of forest land in non-reserved forest area' (i.e. in the un-classed forests). The State Government has no de-facto control over such forests.

Over two-thirds of the recorded forest area is under the category of 'un-classed forest'. About 2,400 sq. km (or 14%) of the recorded forest area in Manipur may have no forest coverage. It appears that the un-classed forests may have suffered most loss of forest coverage as these enjoy the least degree of protection. The potential area as assessed in 2020 is just 66,000 hectares – which may be about one-quarter of the denuded un-classed forests. Hence, planting of oil palm can improve the green cover of the state.

Annex-11: Arrangement of Planting Materials

One of the crucial factors for the success of the Action Plan is the availability of sufficient amounts of planting materials in order to carry out the area expansion in the NE states. Such planting materials will be required to cover the planted area (with spacing 9 m x 9 m), and also to meet the requirements for vacancy in-filling due to mortality of the planted seedlings in the first three years of their field planting.

Requirements of Oil Palm Seedlings

The requirements of the seedlings in the different states have been summarized at overleaf. It is seen that the regional requirement will be about 147 lakh seedlings over a period of eight years.

The arrangement of such a large number of seedlings will require a major effort. It is reported that the present supply of quality seedlings of oil palm is between 13-15 lakh per annum in the entire country. The present plan requires this number (14.79 lakh) in the first year itself. By Year-3, the regional requirement is projected to be more than 32.79 lakh for the various participating states. This is considerably larger than the output of seedlings of acceptable quality in the country.

Existing Role of Processor Company

As per the Memorandum of Understanding (MOU) that a Processor Company enters into with a State Government, it is required to arrange for nursery development and distribution of planting materials for the benefit of the intending growers within its zone.

Accordingly; the different companies, which had entered into MOUs with the State Governments of states like Arunachal Pradesh, Assam, Mizoram and Nagaland, had established nurseries for their respective areas. They had been distributing seedlings to the growers and arranging for the carriage of the same to the growing sites. The Processors are being compensated for the seedlings supplied to the growers at a fixed rate of Rs 83.90 per seedling.

Constraints of Nursery in North Eastern States

The following are the major constraints being faced by the Processor Companies in NE states in undertaking their nursery programmes:

- The rate fixed for the seedlings is low. The Company will require about Rs. 140-150 per seedling for recovering its cost. (It is reported that nursery cost can be up to 7% of the total cost of raising oil palm plantation.)
- A factor in the region is the occurrence of hailstorms that cause damages to the seedlings being raised in the secondary nursery under open conditions.
- Imported seedlings may need Rs 180-200 per seedling for their supply. These are subject to quarantine to prevent the spread of diseases and pests.
- Payments to the Processor Company for seedlings supplied to growers are occasionally delayed by some of the State Governments of the region.

The above constraints need to be addressed for ensuring the smooth flow of adequate numbers of seedlings of acceptable quality under this proposed Action Plan.

Table-A (11).1: Requirement of Seedlings for the Action Plan in the States of NE Region

State	Annual Requirement of Seedlings (Nos.)								Total Requirement
	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	
Arunachal Pradesh	4,35,000	8,12,000	10,60,000	11,40,000	10,24,000	2,77,000	1,17,000	35,000	49,00,000
Assam	4,35,000	6,67,000	8,86,000	8,06,000	7,99,000	2,11,000	88,000	28,000	39,20,000
Manipur	29,000	1,21,800	2,58,200	2,62,800	2,15,200	61,200	24,800	7,000	9,80,000
Mizoram	2,90,000	3,48,000	3,78,000	3,92,000	3,92,000	1,02,000	44,000	14,000	19,60,000
Nagaland	2,90,000	4,93,000	6,97,000	6,10,000	6,03,000	1,60,000	66,000	21,000	29,40,000
Total – Year-wise	**14,79,000**	**24,41,800**	**32,79,200**	**32,10,800**	**30,33,200**	**8,11,200**	**3,39,800**	**1,05,000**	**1,47,00,000**

Source: Requirements furnished at Chapter-6 against the State Specific Plans

Notes: Meghalaya and Tripura have not indicated their interest in growing oil-palm in their states, despite the availability of potential areas as assessed by the Government of India Committees. Sikkim is a mountainous state, which is not suited for growing the crop.

The above figures for the requirement of seedlings include the numbers needed for replacement of dead palms in the planted areas for three subsequent years.

Models for Oil Palm Nursery

There are two models for oil palm nurseries: the single stage nursery and the double stage nursery. These are briefly described below.

Single Stage Nursery: This system utilises only large poly-bags and the germinated seeds are planted directly into the large poly-bags of 40cm x 50cm (16"x20") size and made of material having thickness of 500 gauge (125 microns) with holding capacity of about 16 kg of soil. Initially, shade has to be provided till the emergence of two leaves. Some of the advantages of this system include: (a) root system is not disturbed and hence establishment and growth is faster; and (b) less requirement of land, equipment and labour as compared to a double stage system of pre-nursery and main nursery.

Double Stage Nursery: Under this system, the germinated seeds are first planted into smaller sized poly-bags of size 15cm x 23cm (6"x9"). These are grown in the pre-nursery, where they are packed closely together in a very small area under shaded conditions for the first 3-4 months. Next, the seedlings are shifted to the main nursery, where they are planted in the larger poly-bags and raised under the open sky. The seedlings remain here till they attain the size needed for field planting.

This system has a number of advantages over the single stage nursery, such as: (a) only a small section of the nursery is needed to be cared for initially as the smaller poly-bags can be packed together; (b) less requirement of irrigation and supervision in this initial period; and (c) culling can be easily carried out initially. However, as the seedlings have to be replanted after the initial period, labour requirements are larger in this case. Further, growth time for seedling is longer in this system by 2-3 months. The following table exemplifies.

Table-A (11).2: Time Needed for Seedlings in Nursery

Stage	Time Needed in Months		Remarks
	Two Stage Nursery	Single Stage Nursery	
Pre-nursery	4-5	---	
Main Nursery	10-12	12-14	Till 4-5 leaves emerge
Total (*)	14-17	12-14	Till there are 13 leaves

(*) Excludes about 3-4 months needed in seed germination under dry heat treatment

Source: 'The Oil Palm', Corley 2003

At the present, the **single stage nursery system is being followed in India**.

Land for Nursery

The spacing in nursery is about 90 cm x 90 cm between the poly-bags (on an equilateral triangle basis), which permits the raising of about 11,000 seedlings on one hectare of land. This can be used to plant nearly 77 hectares of land.

Thus, considerable area will be needed as nursery land in the different states. The peak nursery area for different states can range from about 24 hectares (Manipur) to 104 hectares (Arunachal Pradesh), if the above spacing is to be maintained. Since the nursery has to be created about 16-18 months ahead of peak planting (Year-3 in most states), the maximum space for nursery has to be organized for the Processor by the end of Year-1.

Import of Planting Materials of Oil Palm

Imports of planting materials of oil palm are permissible on the basis of phyto-sanitary certificate (PSC) issued by the exporting country, the inspection conducted by plant protection adviser or officers authorized by him and fumigation, if required, including all other general conditions. This is subject to the following:

1. Import of oil palm and related species is prohibited from Philippines and Guam due to the incidence of destructive Cadang cadang or Tinangaja (viroid).

2. Imports from other countries are permitted, subject to (a) prior approval of Department of Agriculture, Cooperation and Farmers' Welfare in the Ministry of Agriculture & Farmers' Welfare, Government of India; and (b) special condition that the consignment will be grown under post-entry quarantine for a period of 10-12 months.

3. Additional declarations required to be incorporated into the PSC issued by an appropriate authority of the country of origin that the plant material is free from (a) Vascular wilt (b) Freckle (c) Red ring and its vector Rhyncophorus palmarum (d) Lethal bud rot or sudden wilt (e) Fatal wilt or hart rot (f) Leaf mottle virus (g) Cadang cadang and related viroids (h) Palm kernel borer.

Annex-12: Indicative Costs of Establishment & Initial Maintenance

Cost of Establishment of Oil Palm

The indicative cost for the establishment of oil palm over 1 hectare of land has been tabulated below. The above has been computed for relatively more accessible areas of the NE Region of India and for gentler terrain. Such expenses will be higher In the case of interior areas and for the development of oil palm on steeper terrain (having slopes of over 12 degree or 20%).

Table-A (12).1: Cost of Establishment of Oil Palm over 1 Hectare

	Item of Expenditure	Amount (Rs.)	Remarks
1	Cost of Labour	22,800	Estimated the requirement of 57 man-days for: • Removal of shrubs, weeds and other growth • Marking & Staking the Pit Sites • Digging of Pits • Re-Filling of Pits with Top Soil for Receiving Seedlings after mixing with insecticide and fertilizers • Unloading & Planting of Seedlings at Site
2	Cost of Seedlings	18,850	145 seedlings, including transportation @ Rs. 130 per seedling
3	Cost of Insecticide & Fertilizer	1,600	250 grams of rock phosphate and 100 grams of anhydrous magnesium sulphate plus 50 grams of phorate substitute (per palm)
4	Sub-Total	43,250	= (1) + (2) + (3)
5	Add: Contingency	1,298	@ 3% on (4)
6	**Total – Establishment Cost**	**44,548**	**Per Hectare**

Source: Computations of Consultant, based on discussions and secondary data

The cost of establishment of oil palm will be taken as Rs 45,000 per hectare for accessible areas with relatively gentle terrain. The following costs will be extra, in order to provide for development costs for other types of lands (steeper lands, clayey soils etc.) or to provide for the costs of optional items.

(a) **Development of Land with Steeper Terrain**: For slopes over 12 degrees, the rate will be higher for excavating earth for making terraces and providing side drains to prevent erosion of the hill-sides. The additional cost will depend upon the terrain.

(b) **Drainage for Clayey Soils**: If plantation is carried out on non-permeable clayey soils, about 7% extra may be needed on the above cost for digging drains. Such drains have to be provided in order to prevent water-logging in the fields.

(c) **Providing Optional Items**: Further, additional costs may be incurred on items like fencing and rodent protection, if these are necessary.

(d) **Seedling Transportation to Interior Areas:** This may need extra costs.

(e) **Cost of Micro-Irrigation**: The cost of drip irrigation for oil palm (including filtration, mains, sub-mains, laterals and emitters with accessories) will be about Rs. 1.03 lakh per hectare as worked out below. This excludes the cost of pump and intake

Table-A (12).2: Cost of Drip Irrigation with Fertigation for 1 Hectare of Oil Palm

	Item of Expenditure	Amount (Rs.)	Remarks
1	Water Filtration System	39,000	Including Hydro-cyclone Filter, Sand Filter & Screen Filter for flow of 10 m^3 per hour
2	Fertigation Items	7,000	Fertigation Tank or Venturi Injector with By-pass
3	Main, Sub-mains & Laterals	37,000	63 mm PVC Mains and 50 mm PVC Sub-mains – both Class II (4 kg per cm^2) 16 mm HDPE laterals – 2.5 kg per cm^2
4	Emitters	3,000	8 litres per hour x 580 Nos.
5	Valves	9,500	Non Return (Check Valve) – 2 Nos. By-pass Valve – 1 No. Control Valve – 11 Nos. Air Release Valve – 1 No. Flush Valve – 3 Nos.
6	Sub-Total of (1) to (5)	95,500	
7	Accessories	2,865	@ 3% of (6)
8	Fitting	1,910	@ 2% of (6)
9	Sub-Total of (1) to (8)	1,00,275	
10	Contingency	3,008	@ 3% on (8)
11	TOTAL	1,03,283	For 1 hectare (exclusive of pump and surface intake)
	PUMP & INTAKE		
12	Diesel Pump-set (3 HP)	27,000	Including accessories (starter, switch ,wiring etc.) and installation 3 HP centrifugal pump is sufficient for a operating head of about 15 m at the emitter after 28 m head losses in the system (including for pumping) and a flow of 2.5 litres per second
13	Intake	2,000	Surface Source
14	TOTAL	1,32,283	Irrigation System including pump and surface intake

Source: Computations of Consultant, based on discussions and secondary data

The cost of establishing drip irrigation (filtration, pipes, emitters and accessories) is taken as Rs. 1.03 lakh per hectare. The cost of pump-set and intake (or tube-well) is Rs. 29,000 extra.

(f) **Use of Ground Water Source**: In case of the use of ground water through tube-well, then a submersible pump of 7.5 HP capacity will have to be used, for which a tube-well of 150 mm diameter is necessary. The cost of the above items (submersible pump and tube-well) is about Rs. 1.15 lakh (excluding boring costs), which is about Rs 86,000 higher than the items (i.e. centrifugal pump and intake pipe) needed to draw up water from surface sources.

Cost of Initial Maintenance

The following table indicates the maintenance cost of oil palm during the initial period when it is not yielding any fruit. This has been worked out for the first three years for one hectare of land when the oil palms are in their juvenile stage.

Table-A (12).3: Cost of Maintenance of 1 Hectare of Oil Palm

	Item of Expenditure	Amount (Rs.)			Remarks
		Year-1	Year-2	Year-3	
	COST OF MATERIALS				The unit material costs are assumed to rise by 10% per annum
1	Fertilizers	4,900	10,800	18,400	Fertilizer use as per IIOPR recommendations - excluding the cost of application
2	Pesticides	1,300	1,500	1,600	Use of rodent killers (1.2 kg) and insecticides (1.2 litres) - excluding cost of application
3	Vacancy In-filling of Dead Palms	4,100	2,400	1,200	Mortality assumed as follows, totalling 35% in the three years Mortality (in %): Year-1 20%, Year-2 10%, Year-3 5% Mortality in Nos.: Year-1 29, Year-2 15, Year-3 7 Rates of seedlings (including transport) are as per table for establishment of plantation, with 10% increase per annum
4	Cost of Diesel used for Irrigation	9,700	10,700	11,700	Used for 200 hours over 4 dry months and intermittent dry periods with diesel use being assumed at 0.63 litre per hour Add:
5	Sub-total of Material Costs	20,000	25,400	32,900	= (1) + (2) + (3) + (4)
	OTHER COSTS				
6	Repairs & Maintenance of Micro-Irrigation System	2,600	2,900	3,200	2% as the repair costs for the micro-irrigation system (@ Rs 1.32 lakh), assumed to rise by 10% per annum
7	Labour Costs	9,600	13,200	14,500	Application of insecticides, other intercultural operations (weeding of basin area, pruning, light weeding of plantation area, collection and application of mulching etc.) – estimated at 24 man-days per year Ablation costs in 2nd & 3rd Years also included Maintenance of platforms and silt traps (hilly terrain) ... 5 days - not included
8	Sub-Total of Above	32,200	41,500	50,600	= (5) + (6) + (7)
9	Contingency	1,000	1,200	1,500	@ 3% of (8)
	Total	**33,200**	**42,700**	**52,100**	= (8) + (9)

Source: Computations of Consultant, based on discussions and secondary data

Thus, it is computed that the maintenance costs of the oil palm plantations will be about Rs 1.28 lakh per hectare over the initial three years, when the palms do not yield fruits ready for processing.

Total Costs for One Hectare of Oil Palm (Establishment of Plantation & Initial Maintenance)

It is computed that the total cost for the establishment of oil palm over one hectare is Rs 45,000 (establishment of plantation) and Rs 128,000 for the maintenance (first three years), totalling about Rs 1.73 lakh. In addition, an amount of Rs 1.03 lakh will be needed for the micro-irrigation system and Rs 29,000 for pump and surface intake.

The total of the above is Rs. 3.05 lakh per hectare of oil palm for its establishment and three year maintenance. This excludes any investment and returns from inter-cropping.

Additional costs will be needed for the following cases:

- Terracing of steep slopes (details furnished at below);
- Drains for clayey soils;
- Investment on optional items like fencing, rodent protection etc.;
- Transport of seedlings to interior areas (beyond 50 km); and
- Cost of submersible pump and tube-well for ground water sources.

The above have to be computed on the basis of the ground conditions prevailing in the potential areas of the different states.

Land Development Costs in Hilly Terrain

The land development costs in hilly and mountainous areas have been given below for the NE states that have shown interest in oil palm crop.

Table-A (12).4: Additional Cost for Land Development in Hill States (Indicative)

State	Work	Rate (per Ha)	Specification
Arunachal Pradesh	Land Levelling & Shaping		As follows:
	2-4% slope	92,000	Average slope 3%, width of plot (m) 25, earth work (cu. M.)937.5, length of shoulder bund (m):600, earthwork for shoulder bund (cu .m.):189
	4-6% slope	1,02,000	Average slope 5%, width of plot (m) 20, earth work (cu. m.)1250, length of shoulder bund (m):750, earthwork for shoulder bund (cu. m.):236.25
	Bench Terracing		As follows:
	6 – 10% slope	1,05,000	Terrace width: 8m, vertical interval: 1.41m, length of terrace 766.87m, earth work for terrace for 1200cu. m., earthwork for shoulder bund for 53.68cu. m
	10 – 20% slope	1,32,000	Terrace width: 12m, vertical interval: 1.04m, length of terrace 1062.7m, earth work for terrace for 1500cu. m., earthwork for shoulder bund for 74.39cu. m.
	20 – 30% slope	1,47,000	Terrace width: 5m, vertical interval: 1.8m, length of terrace 1470.6m, earth work for terrace for 1656cu. m., earthwork for shoulder bund for 102.94cu. m

State	Work	Rate (per Ha)	Specification
Arunachal Pradesh (Continued)	Contour cum Field Bunding		As follows:
	3-5% slope	35,000	Ave. slope: 4.0%, horizontal interval: 20.5m, vertical interval: 0.87m, length of bund: 610m, earth work for bund: 384.3cu. m., soil & boulder structure:`1500
	6-8% slope	68,000	Ave. slope: 7.5%, horizontal interval: 11m, vertical interval: 0.82m, length of bund: 1140m, earth work for bund: 718.2cu. m., soil & boulder structure:`2000
Mizoram	Contour Bunding	42,500	Slope 2-3%
	On farm Development works	1,03,750	Slope 2-3%
	Soil Reclamation	21,500	For saline / alkaline areas
Nagaland	Bench Terracing		
	Slope 8%	75,700	Average slope
	Slope 15%	93,000	-Do-
	Slope 26.58%	1,02,600	-Do-

Source: State-wise Master Unit Cost, National Bank for Agriculture & Rural Development (NABARD) (https://www.nabard.org/info-centre-statewise-masterunitcost.aspx?cid=501&id=24)

Annex-13: Pricing of FFBs and CPO

This annex discusses the mechanism for pricing of FFBs (fresh fruit bunches) of oil palm, and of Crude Palm Oil (CPO). It may be noted that the prices of FFBs are derived from that of the CPO.

As per the recommendation of the Commission for Agricultural Costs & Prices (CACP) in 2012, the price of FFBs has been 'fixed at 13.54% of net Crude Palm Oil (CPO) weighted average price plus 75.25% on 9% recovery of palm kernel nuts weighted average price'. This has been done based on estimated cost of cultivators being 75.25% in the total cost of production of CPO from farm level to factory level. Implicit in the above recommendation is an Oil Recovery Ratio (OER) of 18%. The factors that will determine the prices of FFBs are:

- Oil Extraction Ratio (OER);
- Price of Crude Palm Oil (CPO) based on Global Prices & Indian Tariffs; and
- Price of Palm Kernel Nut.

The above factors have been discussed below in brief.

Oil Extraction Ratio (OER)

The Government of India has stated (in August 2013) that any variation in the OER would result in change in the pricing formula in respect of the part pertaining to 'net Crude Palm Oil (CPO) weighted average price'. The OER would be determined as per the actual oil content extracted by the processing units, as established by the State Governments.

Hence, if the OER is found to be either higher or lower than 18%; then the price of FFBs will change accordingly, due to changes in the computation of related to the component 'net Crude Palm Oil (CPO) weighted average price'. The following table illustrates the above.

Table-A (13).1: Effect of Oil Extraction Ratio (OER) on FFB Prices

OER (%) →	14	15	16	17	18	19	20	21	22	23	24
Percent of 'net CPO weighted average price'	10.54	11.29	12.04	12.79	13.55	14.30	15.05	15.80	16.56	17.31	18.06

Source: Circular F. No. 12-22/22/2010-(TMOP) dated 13th August 2013 from Department of Agriculture & Cooperation, Ministry of Agriculture

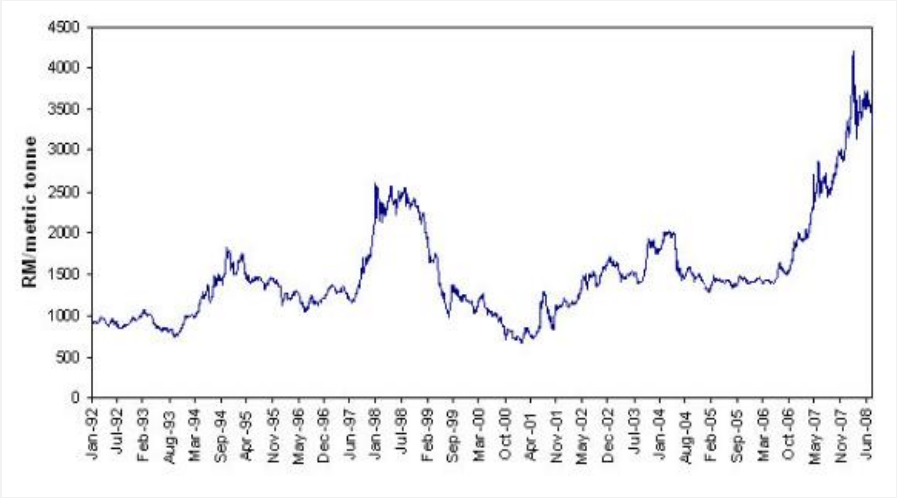
Global Price of Crude Palm Oil (CPO)

The price of CPO varies widely on the international market, based on the demand and supply factors. Over the past decades (1992-2008), the demand of CPO has risen rapidly by over three times on account of its lower prices and widening applications. While supply has increased, the same has lagged the growth of demand leading to the rising trend. In the past 10 years, prices have fallen marginally.

However, on a year-to-year basis, the CPO prices have been fluctuating in both directions. The following charts illustrate the same. The first chart shows the rise of CPO prices from 1992 to 2007, while the second chart shows such prices from 2007 to 2017.

Fluctuations in the Crude Palm Oil (CPO) Prices

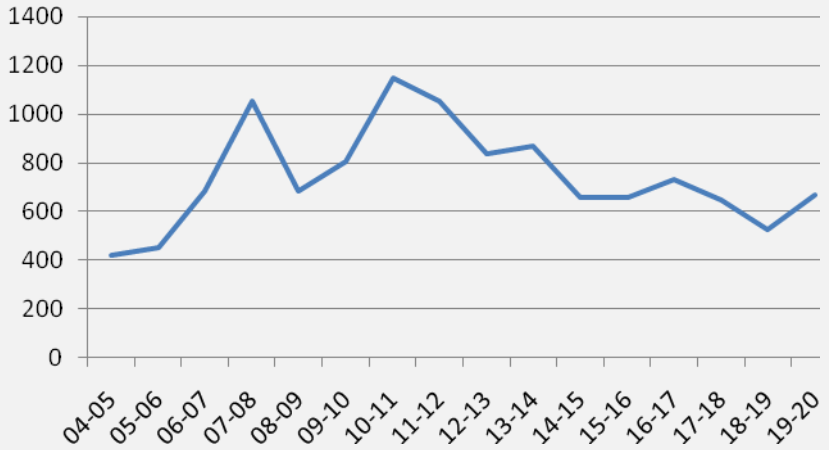
1992-2008: Period of Rise



Source: http://www.howtotradestocks.org/palm-oil-futures.html

Prices of CPO have increased from about RM 1000 per MTin 1992 to around RM 3500 ($ 1030) per MT in 2008.

2004-05 to 2019-20: Fluctuations of Average CPO Prices ($ per MT)



Source: 'Oilseeds, Oils & Meals Monthly Price and Policy Update', Food & Agricultural Organization of the United Nations (November 2020)

Average yearly prices have fluctuated from $ 419 MTin 2004-05 to $ 668 per MT in 2019-20, with peaks in between during 2007-08 and from 2010-11 to 2011-12. (Prices are averages for the marketimng year from October to September). The following table may be seen.

Table-A (13).2: Average Annual International Prices of Crude Palm Oil (2004-05 to 2019-20)

Year	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20
$ / MT	419	451	684	1050	682	806	1147	1051	835	867	658	655	729	648	523	668

CIF Rotterdam Prices

Source: 'Oilseeds, Oils & Meals Monthly Price and Policy Update', Food & Agricultural Organization of the United Nations (November 2020)

Monthly Global Crude Palm Oil (CPO) Prices 2014-2020

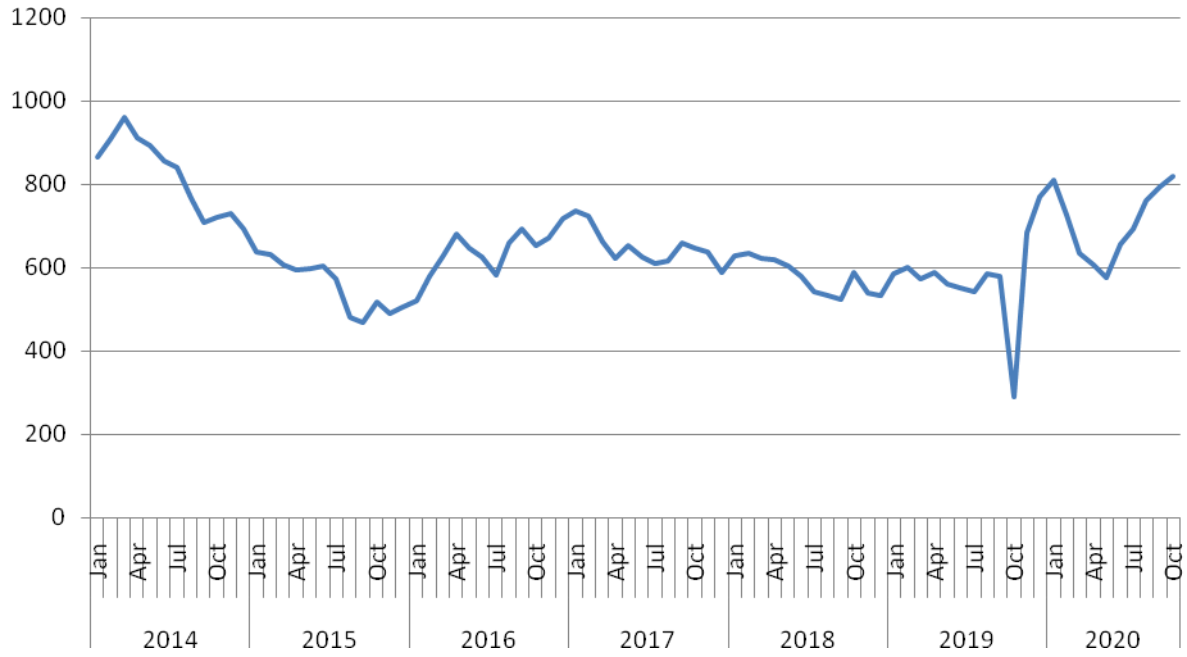
The following chart gives the variation of global prices of CPO in US$ per MT.

Table-A (13).3: Global Prices of Crude Palm Oil in $ per MT

	2014	2015	2016	2017	2018	2019	2020
Jan	865	639	523	735	628	585	810
Feb	908	632	581	723	635	603	729
Mar	961	607	627	665	624	573	636
Apr	911	594	680	623	620	588	609
May	893	600	647	653	603	563	577
Jun	857	606	625	625	580	552	656
Jul	841	573	584	612	545	544	694
Aug	766	481	661	618	534	586	760
Sep	709	469	695	659	524	580	796
Oct	722	518	655	649	590	291	819
Nov	731	490	671	637	539	683	---
Dec	693	505	720	589	535	770	---

Source: STATISTA (https://www.statista.com/statistics/673385/monthly-prices-for-palm-oil-worldwide/)

The following graph shows the above fluctuations in the monthly prices of CPO in the global prices.



It is seen from the above graph that the global prices of CPO have exhibited wide variations on a month-to-month basis and between the different years covered by the graph. The price for 1 MT of CPO is seen to vary between $400-800 for most months of the above graph.

Prices of Fresh Fruit Bunches (FFBs)

Andhra Pradesh produces most of the FFBs harvested in India, with its output forming over 84% of the national production in 2018-19. The following table gives the FFB prices fixed in the state in the recent years as made available by the web-site of Andhra Pradesh Cooperative Oilseeds Grower's Federation Ltd. (AP OILFED)

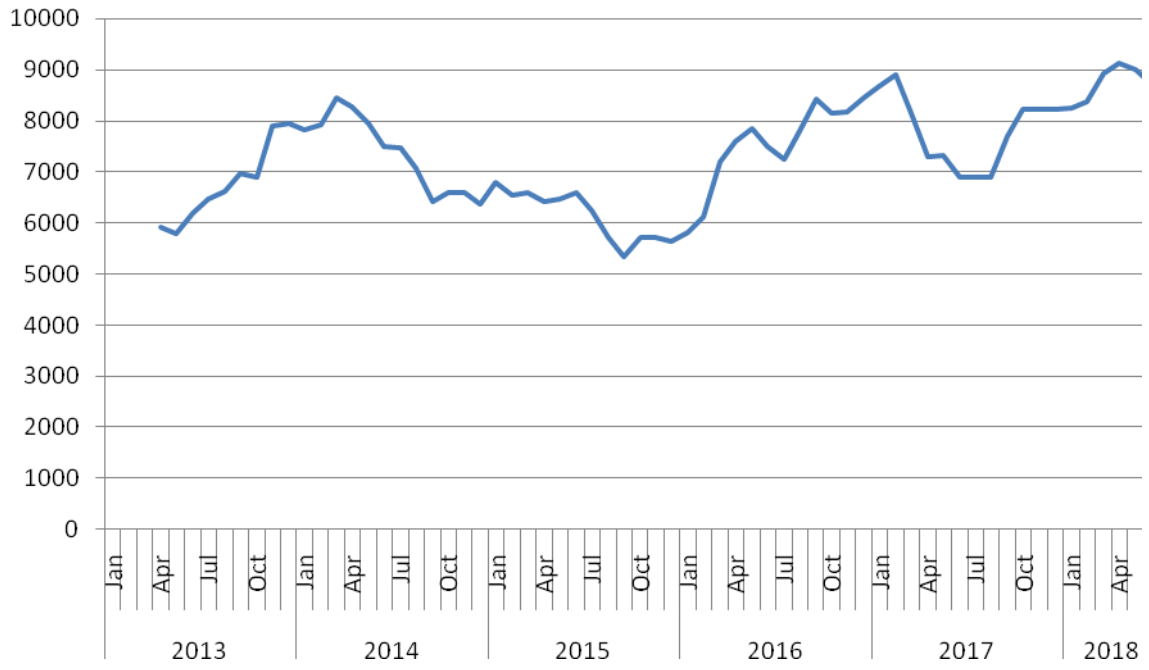
Table-A (13).3: Prices of FFBs of Oil Palm fixed in Andhra Pradesh in Rs. per MT

	2013	2014	2015	2016	2017	2018
January	5687	7824	6803	5837	8679	8251
February	5808	7926	6557	6129	8891	8369
March	5814	8441	6595	7207	8155	8909
April	5932	8267	6421	7586	7307	9121
May	5808	7938	6473	7839	7321	9002
June	6210	7510	6601	7494	6897	8720
July	6464	7472	6240	7250	6897	---
August	6624	7071	5722	7792	6897	---
September	6971	6424	5352	8434	7702	---
October	6907	6589	5731	8142	8222	---
November	7900	6598	5733	8177	8222	---
December	7951	6370	5647	8455	8222	---

Source: AP OILFED (http://www.apoilfed.com/index.php/welcome/oilpalm_division)

NOTE: The above is based on the following formula: '12.85% of net Crude Palm Oil (CPO) weighted average price (based on actual average OER of 17.06% recovered for the Oil Year 2016-17 by AP OILFED) plus 75.25% on 9.614% recovery of palm kernel nuts weighted average price realized by AP OILFED'. The underlying prices of CPO and Palm Kernel have been given at overleaf.

The following graph depicts the above data. The price shows an upward trend over the years, which can be attributed to the increased tariff protection in the recent years.

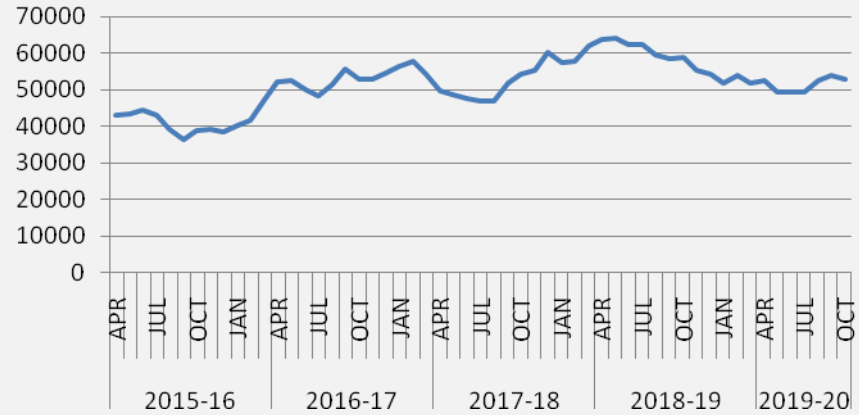


Domestic Prices of Crude Palm Oil (CPO)

Table-A (13).4: Prices of CPO of Oil Palm in Andhra Pradesh in Rs. per MT

	2015-16	2016-17	2017-18	2018-19	2019-20
APRIL	42950	51882	49465	63591	52502
MAY	43341	52421	48462	64009	49094
JUNE	44263	49931	47532	62379	49037
JULY	42757	48066	46751	62143	49206
AUGST	38974	51260	46898	59343	52544
SEPTEMBER	36161	55510	51706	58444	53853
OCTOBER	38495	52603	54035	58723	52774
NOVEMBER	39048	52735	55289	55046	---
DECEMBER	38407	54489	60133	54199	---
JANURARY	39865	56233	57186	51800	---
FEBRUARY	41510	57635	57497	53823	---
MARCH	47199	54038	61872	51732	---

Source: AP OILFED http://www.apoilfed.com/index.php/welcome/bulk_marketing

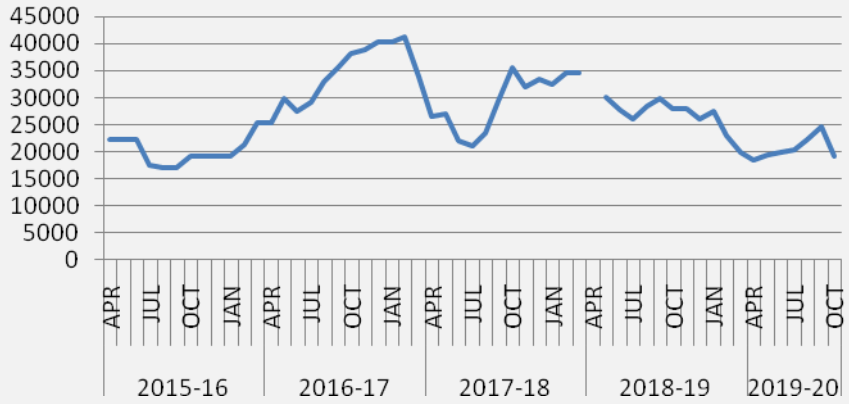


Domestic Prices of Palm Kernel

Table-A (13).5: Prices of Palm Kernel in Andhra Pradesh in Rs. per MT

	2015-16	2016-17	2017-18	2018-19	2019-20
APRIL	22200	25300	26500	0	18454
MAY	22200	30000	27000	30043	19500
JUNE	22396	27550	22017	27831	19858
JULY	17606	29282	21060	26120	20373
AUGST	17050	33000	23429	28491	22258
SEPTEMBER	17100	35642	29471	29783	24557
OCTOBER	19171	38200	35560	28012	19100
NOVEMBER	19165	38936	32010	28000	---
DECEMBER	19100	40400	33514	25988	---
JANURARY	19100	40400	32500	27500	---
FEBRUARY	21381	41303	34670	23000	---
MARCH	25300	34000	34670	19797	---

Source: AP OILFED http://www.apoilfed.com/index.php/welcome/bulk_marketing



Annex-14: List of Stakeholders

The following gives the list of stakeholders involved in furnishing inputs for this Developmental Action Plan for Promoting Oil Palm in the NE Region of India.

Air Vice Marshall (Retd.) Anjan Gogoi	Member, North Eastern Council
Mr. Iboyaima Meitei	Adviser (Horticulture), North Eastern Council
Mr. Anong Lego	Director of Agriculture, Arunachal Pradesh
Mr. Idar Nyori	Agri. Development Officer & Nodal Officer (Oil Palm), Arunachal Pradesh
Mr. Akash Deep, IAS	Director of Agriculture, Assam
Mr. Rabindra Sarmah	Deputy Director & Nodal Officer (OS&OP) Assam
Mr. M A Akanda	Assisting Officer (OS&OP) Assam
Ms. Laltanpuii Vanchhong IAS	Director of Agriculture, Manipur
Mr. Todinang Panmei	Joint Director of Agriculture & Nodal Officer (Oil Palm), Manipur
Mr. Rohmingthanga Colney	Director of Agriculture, Mizoram
Mr. C. Lalthlamuana	Deputy Director of Agriculture, Mizoram
Mr. P. Ramhnunsanga	SDO (Agriculture), Kolasib
Mr. M B Yanthan	Director of Agriculture, Nagaland
Mr. Renphamo Kikon	Joint Director & Nodal Officer (Oil Palm), Nagaland
Mr. Rokovotso	Agriculture Officer (Oil Palm) Dimapur, Nagaland
Mr. Y S Ranganaikulu	Chief Executive Officer, Shivasais Oil Palm Ltd.
Mr. Umesh Naravane	Senior Executive, Jain Irrigation Systems Ltd.
Mr. Monoranjan Das	Sub Divisional Agricultural Officer, Dudhnoi Assam
Ms. Bandana Patgiri	Senior Agricultural Developmental Officer, Dudhnoi, Assam
Mr. N Hazowary	Agricultural Developmental Officer, Dudhnoi, Assam
Mr. Dhaneswar Rabha	President, Oil Palm Growers Coordination Committee Dudhnoi
Mr. Nirmal Sutradhar	Secretary, Oil Palm Growers Coordination Committee Dudhnoi
Mr. Harakanta Basumatary	Treasurer, Oil Palm Growers Coordination Committee Dudhnoi
Mr. Aditya Rabha	Oil Palm Grower, Bongaon, Goalpara District, Assam
Mr. Chettry	Oil Palm Nursery (Shivasais), Mouman Village, Boko, Assam
Mr. Shekheto	Oil Palm Grower, Hiveshe Village, Dimapur, Nagaland
Mr. Kariman Mahato	Farm Hand, Hiveshe Village, Dimapur, Nagaland

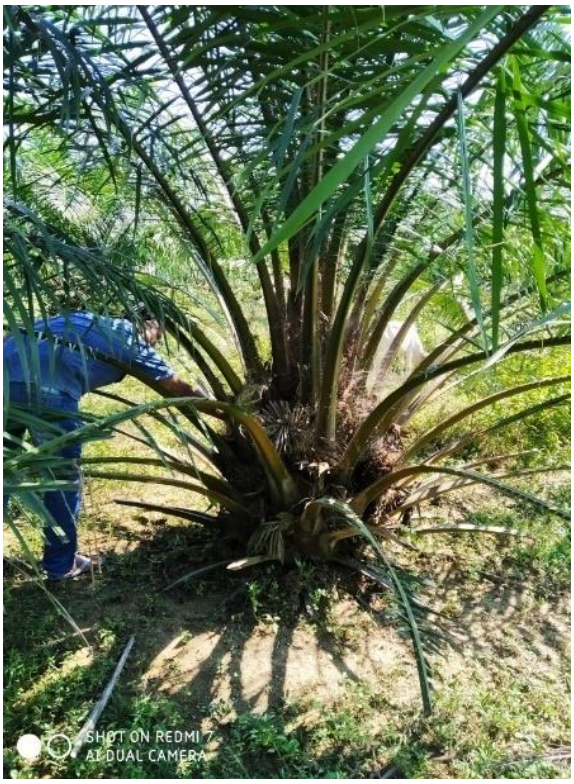
Dr. Barun Singh	Assistant Professor, College of Horticulture and Forestry, Pasighat
Mr. Kingman Komut	Secretary, East Siang Oil Palm Farmers' Association, Pasighat, Arunachal Pradesh
Mr. Orin Lego	Member, East Siang Oil Palm Farmers' Association, Pasighat, Arunachal Pradesh
Mr. Aran Kamin Rukbo	-Do-
Mrs. Yalen Burang	-Do-
Mrs. Miti Penme	-Do-
Mr. J Ete	District Agricultural Officer, Lower Dibang Valley, Arunachal Pradesh
Mr. Ogam Gamno	President, Lower Dibang Valley Oil Palm Growers' Association, Roing, Arunachal Pradesh [He attended meeting held on 8th December 2020 at Roing in Arunachal Pradesh along with ten Oil Palm Growers}
Mr. Mahendra Singh Yadav	Manager, 3F Oil Palm Agrotech Pvt. Ltd., Roing, Arunachal Pradesh
Mr. Ambika Bhardwaj	3F Oil Palm Agrotech Pvt. Ltd., Roing, Arunachal Pradesh
Mr. Kaushal Kumar Shama	Nursery In-charge, 3F Oil Palm Agrotech Pvt. Ltd., Roing, Arunachal Pradesh

In addition to many of the above officers, the following officers attended the Stakeholders' Meeting organized by North Eastern Council Secretariat on 16th October 2020 discussing (inter-alia) the development of oil palm in NE Region.

Prof. Biman Kumar Dutta	Member, North Eastern Council
Mr. C.H Kharshiing	Planning Adviser, North Eastern Council
Ms. Sherry Lalthangzo	Economic Adviser, North Eastern Council
Mr. Iboyaima Meitei	Adviser (Horticulture), North Eastern Council
Ms. R. Lalrodingi	Adviser (BIT), North Eastern Council
Mr. Deepak Narang	Deputy Secretary, Ministry of MSME, Government of India
Mr. Kuntal Sensarma	Economic Adviser, Ministry of Food Processing Industries, Government of India
Dr. B. N. Srinivasa Murthy	Horticulture Commissioner, Ministry of Agriculture & Farmer's Welfare, Government of India
Mr. B.P Muktieh	Chairman & Managing Director, NEDFi
Mr. S K Baruah	Executive Director, North Eastern Development Finance Corporation Ltd.
Ms. Neekita Bansal, IRS	Director, Ministry of Commerce & Industry, Government of India
Dr. M Angamuthu , IAS	Chairman, APEDA
Dr. Tarun Bajaj	Director, APEDA
Mr. U K Vatsal	General Manager, APEDA

Annex-15: Photographs of the Field Visits & Meetings

The following gives the photographs from the field visits and meetings undertaken as a part of the assignment for the preparation of the Developmental Action Plan for Promoting Oil Palm in the North Eastern Region of India.

	
Above: First Oil Palm planted in Assam on 29th June 2016 (Deulguri near Dudhnoi, Goalpara)	**Above**: Oil Palm in 4th Year of growth showing promise of the future
	
Above: 'Welcome Palms' grown by households. They serve as demonstration trees to convince the locals about the income earning capacity of the crop.	**Above**: Fresh Fruit Bunches in 4-year old palm

Above: Discussions with Officers & Growers prior to the Field Visit (at Dudhnoi, Goalpara)

Above: Meeting held with Mr. Y S Ranganaikulu, Chief Executive Officer, Shivasais Oil Palm Ltd.

Above: Meeting held with East Siang Oil Palm Farmers' Association in Pasighat

Above: Visit to Growers' Plantations in East Siang

Above: Demonstration Plot started in 2006 for testing viability of Oil Palm in NE Region (at College of Horticulture & Forestry, Pasighat)

Above: Another Demonstration Plot at the College planted in 2019 for ascertaining the nutrient management for oil palm in NE Region

	
Above: Inside small-scale CPO making unit at the College	**Above: Another** View of the CPO unit at the College
	
Above: Meeting with Oil Palm Growers in Roing, Lower Dibang Valley, Arunachal Pradesh	**Above:** Oil Palms near Roing, Lower Dibang Valley, Arunachal Pradesh
	
Above: Mr. J Ete, District Agriculture Officer, Lower Dibang Valley in the Oil Palm plantation	**Above:** Oil Palm Nursery of 3F Oil Palm Agrotech Pvt. Ltd. near Roing, Lower Dibang Valley