



# Smallholder Diagnostic Study of Oil Palm Landscape in India across Assam and Andhra Pradesh

Final Research Report

April | 2024

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# Executive Summary

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# Executive Summary | This report provides a baseline report on the profile and characteristics of smallholder oil palm farmers in Andhra Pradesh and Assam, maps their readiness to move towards sustainable practices, and accordingly proposes strategies and interventions

## Farmer Constraints and Readiness

**Land Legality**



All farmers in Andhra Pradesh have land titles, as compared to Assam where significant % lacks titles

**Women Participation**



While participation of women is slightly higher in Assam as compared to Andhra Pradesh, overall participation is low

**Nature of Land**



All farmers in Andhra Pradesh use agricultural land, as compared to Assam where farmers are also using forest and common land

**Risk of Child Labour**



Child labour is not prevalent in either of the states

**Organization into Groups**



Majority of the farmers are not associated with any farmer groups in both the states

**Fertilizers**



There is a higher use of fertilizers in Andhra Pradesh as compared to Assam

**Willingness**



Farmers in Assam showed a greater willingness for RSPO certification as compared to Andhra Pradesh

**Irrigation**



Majority of farmers use rainwater and groundwater in Assam and Andhra Pradesh respectively

## Proposed Interventions



**Ecosystem Engagement**  
Improve coordination within the ecosystem actors and promote sustainable oil palm



**Smallholder Training**  
Training farmers on technical and management components related to oil palm cultivation



**Certification Process**  
Ensuring palm oil cultivation is sustainable, responsible and profitable for all the entities involved

# Oil Palm Landscape in India and Introduction to the Study

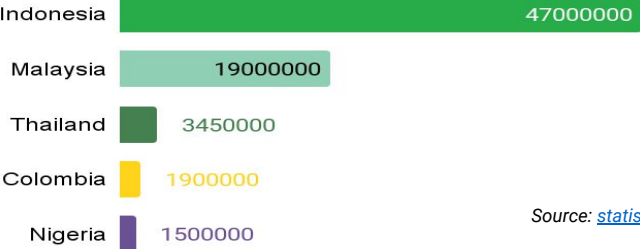
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India accounts for **8.4 million metric tons of palm oil consumption per year** and in the absence of sufficient domestic production of the crop the country has also become the **largest global importer** of palm oil

### Global Landscape of Palm Oil Production

- Palm oil market valued at **USD 62.94 billion** in 2021, projected to reach **USD 99.41 billion** by 2030 with a **CAGR of 5.21%**
- **Asia-Pacific leads with over 71% of market share in 2021**, driven by growing populations and diverse food applications in countries like India and China
- The **major oil palm producing countries are Indonesia, Malaysia, and Thailand**, with **India producing nearly no palm oil itself**, relying heavily on imports to meet its demand

Global production of oil palm (in metric tons)



Source: [statista.com](https://www.statista.com)

### Palm Oil Production in India



India is the **world's largest palm oil importer** and imported **8.4 million metric tonnes (MMT) of palm oil in 2020-21**, constituting around **18%** of global imports



The **actual fruiting area** for oil palm in India is only **1.87 lakh hectares**, but a reassessment committee has assessed a total area of around **28 lakh hectares**.

**16.89 lakh MT**

Oil palm FFBs produced in India

**2.72 lakh MT**

Crude Palm Oil produced in India



**84%** of domestic production is from Andhra Pradesh with **2.5 Lakh MT Crude Palm oil production** in 2023-24

To reduce dependence on edible oil imports, India aims to increase production of oil palm to **1.12 million tonnes across 1 million hectares by 2025-26**, and to **2.8 million tonnes across 6.6 million hectares by 2030**

Source: 1. Aggarwal, M. (2021, August 5). Mongabay-India. 2. India: palm oil consumption 2022 | Statista. (2024, February 12). Statista 3. NMEO-OP Operational Guidelines

# To boost domestic production of palm oil, policies and schemes promoting expansion of acreage and yield from oil palm across selected priority states are being implemented at Central and State levels

The **National Mission on Edible Oils - Oil Palm (NMEO-OP)** has the aim to enhance the edible oilseeds production and oils availability in the country by harnessing Oil Palm area expansion, increasing CPO production and to reduce import burden on edible oils. It is currently being implemented alongside other State level policies across **priority 22 states and UTs**, with a focus on the North East region and Andaman & Nicobar Islands.

## National Level Policy/Scheme

*The National Food Security Mission-Oil Palm (NFSM-OP) and the National Mission on Edible Oils (NMOOP), 2021 are the key national schemes*

### NFSM-Oil Palm

- **Focus:** Providing financial assistance for specific activities like planting, irrigation, and fertilization.
- **Area limit:** 15 hectares per beneficiary
- **Target group:** Primarily small and marginal farmers

### NMEO-OP

- **Focus:** Broadly promoting oil palm cultivation through various initiatives like, financial assistance, research, infrastructure development, and market linkages.
- **Area limit:** No specific land holding limit
- **Target group:** All stakeholders involved in the oil palm value chain, including farmers, processors, traders

The key stakeholders supporting the implementation of these policies along with their roles within the institutional environment has been detailed out [here](#)

## State Level Policies

### Andhra Pradesh

Plantations were encouraged through the **DBT (Direct Beneficiary Transfers) scheme** in 3 districts (East Godavari, West Godavari & Krishna) in 1992 with **support from Dept of Horticulture**

The **Andhra Pradesh Oil Palm (Regulation of Production and Processing) Act, 1993** and concurrently **Andhra Pradesh Oil Palm (Regulation of Production and Processing) Rules, 2008** determines the current production and processing regulations-

- Regulation of cultivation
- Designation of factory zones linked to processing facilities
- Processing and marketing

**Assam doesn't have a state level policy regulating the production of oil palm yet.**

# NMEO-OP is a Centrally Sponsored Scheme being implemented in 20 states covering 284 districts in India over a period of five years with the aim to **enhance the edible oilseeds production and oils availability** in the country

The **reassessment committee of ICAR- Indian Institute of Oil Palm Research (IIOPR) 2020** has **assessed in the year 2020**, a total area of around **28 lakh hectares fit for oil palm cultivation** in India. Out of the total 27.99 lakh ha potential area, an area of **18.37 lakh is in the general states**, and **9.62 lakh in the North-Eastern States**.

## Key strategies under the NMEO-OP

- Increasing production of seedlings by establishment of seed garden nurseries of oil palm to assure domestic availability of seedlings
- Improving productivity of FFBs
- Increasing drip irrigation coverage under oil palm
- Diversification of area from low yielding cereals crops to oil palm
- Inter-cropping during gestation period of 4 years, would provide economic return to the farmers when there is no production



Farmers



Processors

## Key features of NMEO-OP

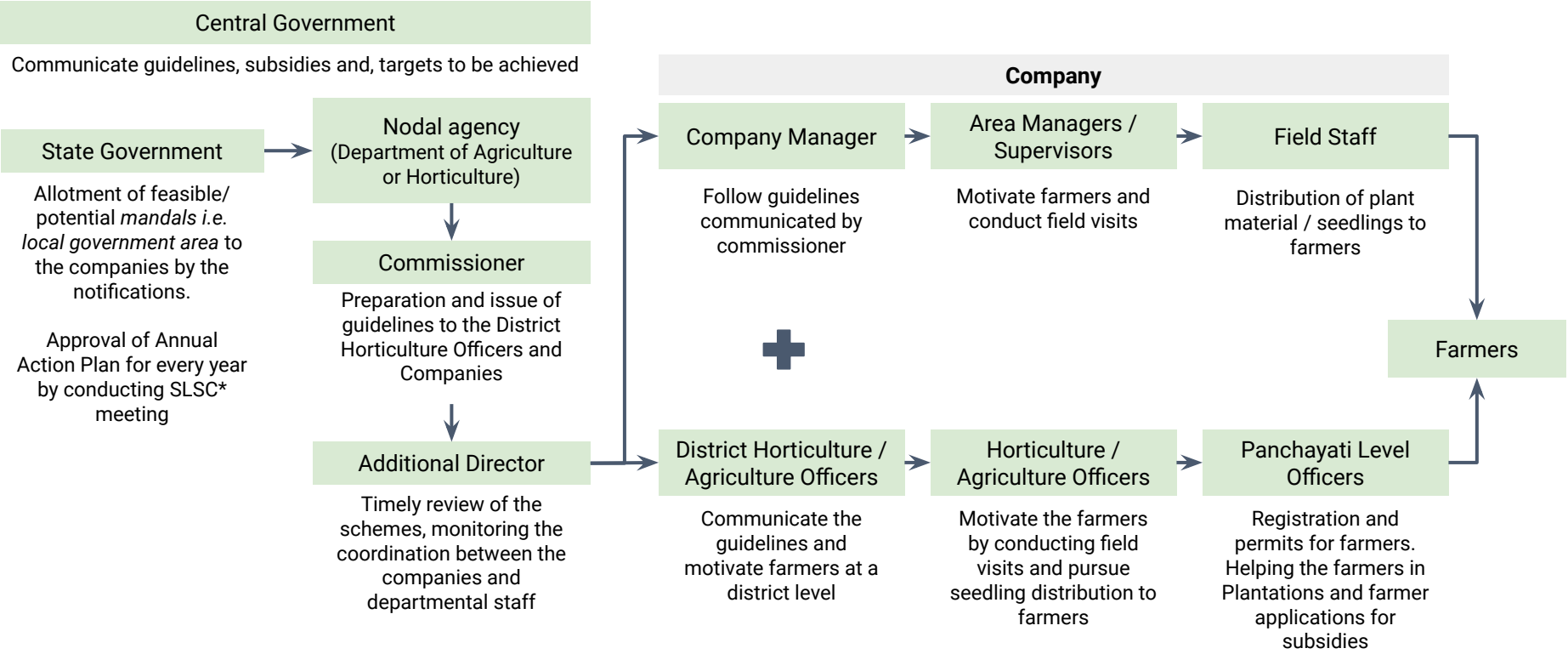
In addition to supporting farmers with subsidies and supply of planting material, intercropping during gestation period, drip irrigation etc., the scheme has introduced a **Viability Price (VP)\*** to insulate them from fluctuations in the international price. If the payment to farmers by the industry is below the VP, the Government will provide a **Viability Gap Payment (VGP)**.

In order to provide a complete package for oil palm development, new mills will be setup in **NE states @ 50% of the cost limited to Rs. 500.00 lakhs for a FFB processing unit of 5 MT/hr for newly planted oil palm area**. The land for mills will be provided by the State Govt to the processor on lease / rent / purchase basis.

\*VP of FFB per ton shall be 14.3% of the annual average price of CPO of the last 5 years adjusted with wholesale price index (WPI) of all India.



While there are **some inter-state variations**, the State Department of Agriculture / Horticulture, Central University, ICAR Institutions, Oil palm processors / Associations, and DD Kisan among others are the **key implementing stakeholders** of the NMEO-Oil palm



\*State Level Sanctioning Committee

# Sustainability of Oil Palm in India | As India tries to gain self sufficiency in oil palm production, it is important to ensure negative environmental and social consequences are mitigated

Countries such as Malaysia and Indonesia have witnessed large scale deforestation, loss of biodiversity and wildlife, and instances of human rights and labour rights violations

However in India, the palm oil cultivation and market is highly regulated:

- The policy enables **direct linkages between the company and the farmer**, reducing middlemen within the value chain
- **Farmers are entitled to a government determined price** – the policy protects them from volatility in international prices
- **Ownership of land and agency remains with the farmer** – one company is allocated per region for procurement

Environmental and social considerations are accounted for while selecting the land for expansion as well as designing / implementing the scheme.

For example, **only farmers who have land titles, access to sufficient water, and suitable land are allowed to enroll and grow oil palm.**

**Implementation of the policy is unable to address granular and region-specific risks** such as biodiversity loss, water shortages, human-wildlife conflicts, impact on local and indigenous communities etc, lack of market linkages etc.

Initiatives and stakeholders promoting sustainable palm oil production and conservation of biodiversity, while supporting smallholder farmer livelihoods include:

## IDH, the Sustainable Trade Initiative <sup>1</sup>

- Running the Sustainable Production of Palm Oil (SPPO) program
- Focused on promoting best practices in palm oil cultivation, including sustainable land use, biodiversity conservation, and community engagement

## Indian Palm Oil Sustainability Framework (IPOS)<sup>2</sup>

- Developed by Solidaridad in collaboration with the palm oil industry and stakeholders
- Aims to promote sustainable palm oil production in India through guidance and support to producers, processors, and traders

## Centre for Sustainable Agriculture (CSA)

- Works with smallholder farmers to promote sustainable agriculture practices, including palm oil cultivation
- Focuses on promoting agroecology, biodiversity conservation, and community empowerment in the palm oil sector

As RSPO aims to expand its footprint in India and promote the production and distribution of certified sustainable oil palm products in India, this study aims to **increase understanding of the existing oil palm production systems across India**, with the aim to identify opportunities and interventions for promoting sustainable oil palm cultivation.

<sup>1</sup> IDH Palm-market-India, <sup>2</sup> IPOS framework by Solidaridad





# Research Methodology


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# Sattva has used quantitative and qualitative research methods to explore the landscape of smallholder cultivation of oil palm across two states in India- Assam and Andhra Pradesh (AP)

## Key Objectives for the survey

 Compile a baseline of smallholder data and demographics to understand the landscape of oil palm farmers in Assam and Andhra Pradesh

 Identify the potential sustainability (environmental, social, and profitability in the long term) risks of the current cultivation and the proposed expansion

 Mapping level of readiness for smallholders to move towards sustainable practices and propose actionable strategies/interventions

## Areas of enquiry

Smallholder characteristics mapping	Overview of the landscape		
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*Who are the farmers growing oil palm?*

*What are the yield and production trends?*

*What are the key support from and gaps in institutional environment?*

*What are the social, economic and environmental impacts?*

- Demographic and socio economic characteristics of farmers
- Farm Profile
  - Landholding pattern and size of holding
  - Crop mix
  - Resource Use
  - Age of plantation and ownership
  - Intra and inter state differences
- Reasons for uptake of oil-palm farming
- Key success factors and key challenges

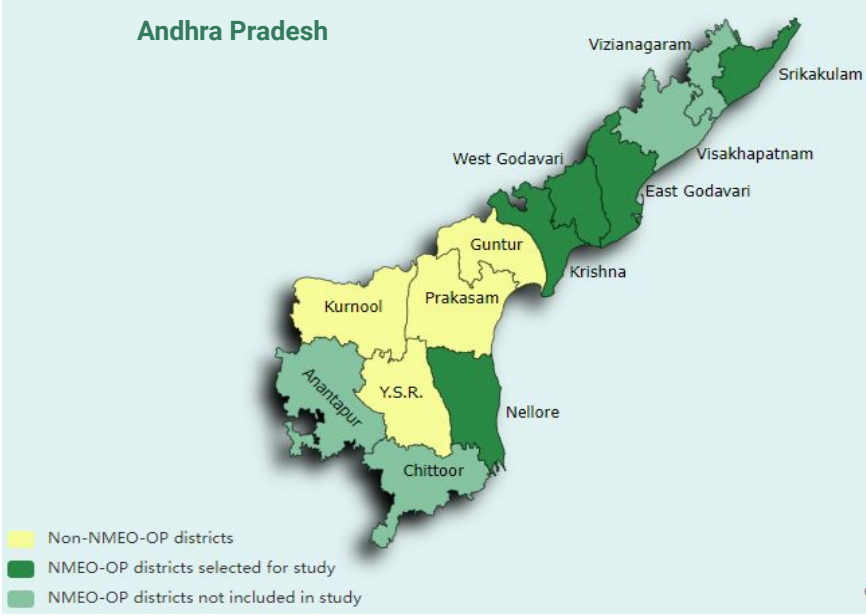
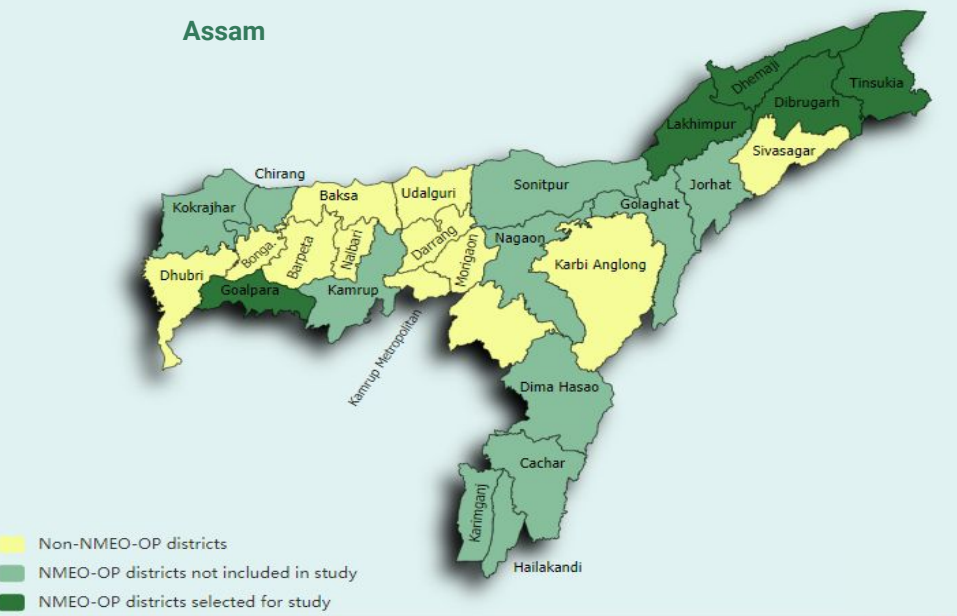
- Yield and Productivity**
- Cost and income
  - Farm inputs - natural resources and agrochemicals
  - Technical inputs and machinery use
  - Farm maintenance
  - Harvesting and yield

- Institutional Environment**
- Level of organization of farmers and key stakeholders
  - Private sector and Govt support and schemes
  - Nature of contracts or customary agreements
  - Access to market, resources

- Social and Environmental Impact**
- Social impact at household level and community level changes in income, landholding, working conditions
  - Environmental impact and sustainability practices

Total Nos of **Smallholder farmer Surveys**: 188  
Total Nos of Smallholder farmers covered through **FGDs**: 43

**Primary research** using mixed methods was **conducted across 10 districts of the two states** and covered a total of ~230 smallholder farmers, besides other stakeholders



Total Number of Farmers Part of the Study	Number of Farmers covered in Surveys	Number of Farmers covered in FGDs
112	79	33

Total Number of Farmers Part of the Study	Number of Farmers covered in Surveys	Number of Farmers covered in FGDs
125	111	9

Interviews with **other key ecosystem stakeholders** allowed for triangulation and optimization of data gathered through the farmer surveys, while providing insights on market linkages, institutional support and challenges for palm plantations



### Government

### Private Corporations

### Research Organizations

### Farmer Cooperatives

Assam

- District Agriculture Officer, Tinsukia
- District Agriculture Officer, Lakhimpur
- District Agriculture Officer, Goalpara

Andhra Pradesh

- Additional Director of Horticulture (Planning, Establishment, RKVY & NMOOP)
- Assistant Director of Horticulture, Nellore
- Horticulture Assistant, West Godavari

Key Areas of Enquiries

- Policy Implementation of NMEO-OP
- Market linkages and incentives to farmers
- Sustainability and expansion of oil palm cultivation



3F OIL PALM  
sowing for a better future

- Market linkages and role of corporates in NMEO-OP
- Initiatives and best practices across the value chain
- Challenges and constraints across the value chain



**Solidaridad**



- Characteristics of current production areas
- Scope for sustainable growth and expansion
- Sustainability risks and opportunities

- Oil Palm Growers Coordination Committee, Goalpara
- Kunkrajani Oil Palm Group
- Mili Juli Women Farmers Group

- Chinthalapudi Fed Producer Company Ltd.

*(not oil palm specific, but farmers in the FPO have some oil palm plantations)*

- On ground insights and challenges faced by farmers
- Market linkages and prevailing prices
- Practices followed by farmers and sources for the same

## Limitations of the Study | The study had certain limitations and risks associated with primary data collection and interpretation, the Sattva team has highlighted the specific limitations and mitigation strategies followed to counter them

Challenges	Mitigation Measures
<p><b>Limited Availability of farmers, data collection schedule coinciding with harvest festivals:</b> Due to the pre-decided timelines of the engagement, some data collection schedules coincided with local harvest festivals across AP and Assam, leading to limited availability of farmers for interviews.</p>	<ul style="list-style-type: none"> <li>• Working with local farmer SPoCs to ensure availability and turnaround of farmers</li> <li>• Conducting telephone interviews in case all farmers are not available for in-person visits and surveys</li> </ul>
<p><b>Limited Availability of Value Chain stakeholders:</b> The engagement scope demanded interactions with a number of key government, NGO as well as corporate stakeholders across the palm oil value chains, however availability and willingness of all stakeholders to participate was limited.</p>	<ul style="list-style-type: none"> <li>• Utilizing existing RSPO networks to schedule interviews/discussions</li> <li>• Utilizing existing Sattva network to target stakeholders</li> <li>• Building field level connects with stakeholder organizations through Agri-Horti shows and engagement to increase stakeholder willingness and participation in the study</li> </ul>
<p><b>Limited recall and accuracy of financial and productivity data by farmers:</b> Smallholder farmers do not maintain proper written records of income, sales and harvests which led to recall bias during interviews</p>	<ul style="list-style-type: none"> <li>• Collecting data on multiple variables related to income (e.g. average yield, total yield, sale price, number of harvest etc) to triangulate and validate farmer responses</li> <li>• Optimizing data based on benchmarks and inputs from local and topical experts</li> </ul>
<p><b>Subjectivity of responses:</b> Individual perspectives and biases may influence responses to certain questions (e.g. availability of government support)</p>	<ul style="list-style-type: none"> <li>• Such questions were probed further in FGDs to understand the rationale and validated through conversations with other relevant stakeholders</li> </ul>



# Farmer Profile and Productivity

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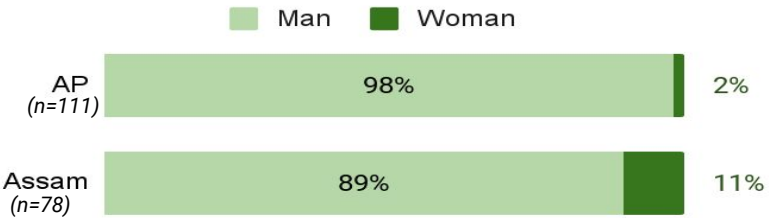


# Farmer Profile: Gender and Category | Assam has greater participation from women as well as scheduled tribes as primary farmers in decision making roles compared to Andhra Pradesh



Of the farmers we spoke to **95% were male** and **5% were female** farmers

Graph with state wise distribution of gender distribution.

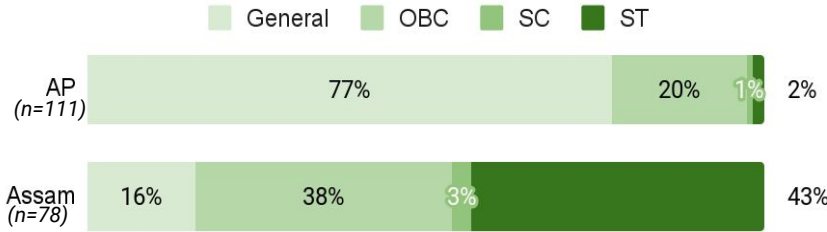


Assam's higher representation of women can be linked to the matrilineal system among specific tribes such as Garo and Khasi which allows women to have land rights **5 out of 8** of women who were interviewed as part of the survey in Assam were from the **ST category**



Farmers spoken to were **spread across the social categories** (general, OBC, SC, and ST)

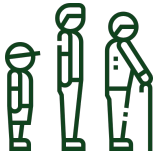
Graph with state wise distribution oil palm farmers in various social categories.



Among the ST population in Assam the Rabha and Garo tribes in Goalpara and Mising tribe in Dhemaji are some of the notable ones. While lack of ST and SC farmer participation in AP demands further exploration, boosting their participation in oil palm landscape can be a key intervention area for RSPO.

**Caste forms an interesting dimension within oil palm farmers in Assam and AP, with most farmers in AP belonging to the General category while in Assam farmers belong to the ST and OBC category largely (81%). RSPO's interventions in AP can focus on dissemination of technical knowledge and information on govt incentives and subsidies' to all social groups to promote farmers from socially marginalised backgrounds to take up oil palm**

# Farmer Profile: Age and Education | Oil Palm cultivation in Assam and Andhra Pradesh reflect an aging group of farmers with a significant number of illiterate farmers in Andhra Pradesh (31%)

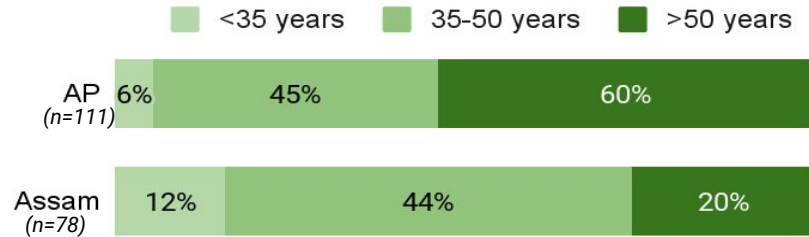


Oil Palm Farmers ranged from **20-85 years of age** and had **varied education statuses**



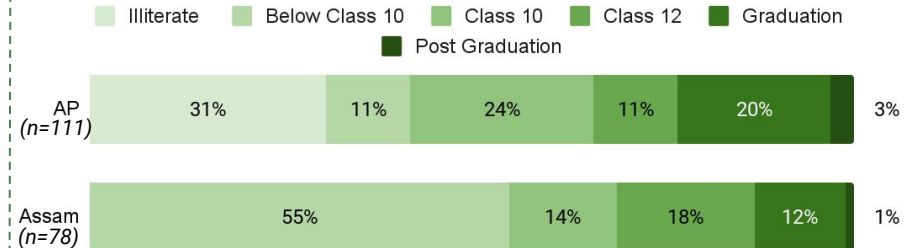
Of the farmers we spoke to **55% farmers** have **studied till below 10th standard** in Assam and **31% farmers** are **illiterate** in AP.

Graph with state wise distribution of the age range of farmers.



Assam has younger farmers (58% between 35-50 yrs) taking up oil palm, however in AP a large section of farmers that are over 50 years of age, indicating an ageing population of farmers associated with the crop

Graph with state wise distribution of the educational qualification of farmers.



Assam has farmers who have studied below 10th standard (55%) taking up oil palm, however in AP a large section of farmers that are illiterate (31%), indicating a population with lower educational qualification of farmers associated with the crop.

*RSPO's interventions in AP can focus on dissemination of technical knowledge and information on govt incentives and subsidies' to younger generations for promoting them to take up oil palm and participate in agriculture. However, this has to be done in a manner where farmers with low educational qualification can also participate.*

# Reason for Growing Oil Palm

Farmers have started growing oil palm largely due to the high monetary returns associated with the crop, and ease of cultivation- it requires minimal effort as compared to other cash crops like rubber and areca nut

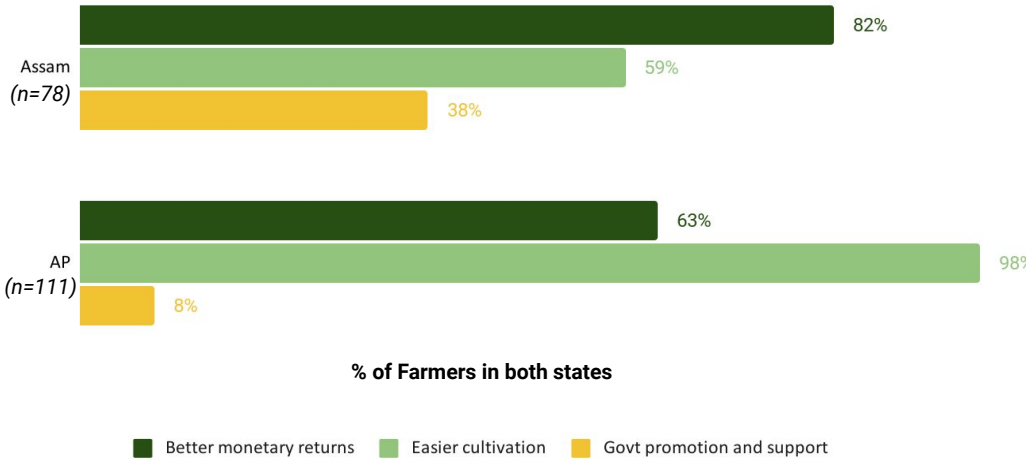


**71%**  
farmers have taken up oil palm due to **better monetary returns**

**82%**  
of farmers have started growing oil palm due to **easier cultivation**

**21%**  
farmers have taken up oil palm due to **promotion and support by Govt**

## Reasons for growing oil palm: Assam and AP



“  
We started oil palm to obtain good profit, we have been growing since 6 years and it has given us good profits till now.. We hope to expand the plantation...  
- **Farmer (F, 65), Goalpara, Assam (member- Mili Juli Group)**”

“  
We are cultivating oil palm since the time we migrated from Godavari in search of livelihood. It has been 15 years and our main source of income is through farming.  
- **Farmer (M, 62), Srikakulam, Andhra Pradesh**”

Source: Primary Interviews across AP and Assam, Sattva Analysis

# Nature of Plantation and Farming Practices | Primary research conducted by Sattva among the smallholder farmers have provided insights across various farming practices



## Land use for Plantations

- Nature of land used
- Ownership of land, availability of land titles
- Volume/Share of land allocated to oil palm



## Seedling Variety

- Seedling variety and source of seedlings
- Planting season
- Cost incurred on seedlings



## Irrigation

- Source of water
- Mode of irrigation
- Cost incurred on irrigation



## Fertilizer

- Type of fertilizer used
- Cost incurred on fertilizer



## Energy

- Source and use of energy
- Cost incurred on energy



## Labour

- Source of labour
- Activities undertaken by labour
- Cost incurred on labour

Detailed insights across these **six areas** have been covered in [Annexure 2](#)

# Harvesting and Yield | Andhra Pradesh reported more than double the harvest times and ~8 times per acre yield as compared to Assam

## Assam (Goalpara)



**9  
Times**

Average number of harvests per year, with the reported range being **2-16 harvests per year**



**2,976  
kgs**

Average yield in a year per hectare\* ranging from **903 kgs to 6502 kgs**



**94%**

Farmers reported increase in yield since previous year (N=32)

The farmers are not able to harvest the FFBS all year round due to reliance on only rainwater for irrigation. Poor farm management and lack of irrigation results in lower overall productivity of plantations in the state.

## Andhra Pradesh



**22  
Times**

Average number of harvests per year, with the reported range being **6-24 harvests per year**



**19,536  
kgs**

Average yield in a year per hectare\*\* ranging from **568 kgs to 37,065 kgs**



**9%**

Farmers reported increase in yield since previous year (N=78)

The average per hectare yield in a year is highest in West Godavari (**19,296 kgs**) and the lowest in Srikakulam (**12,117 kgs**), which may be attributed to the presence of more mature farmers in West Godavari (> 7 years).

*Andhra Pradesh leads in terms of productivity owing to good plantation management practices. Interestingly, while the farmers in Assam are reporting a YoY increase in yield from plantations, plantations in AP have reached maturity leading to a stagnation in YoY growth in yield.*

\*Calculated from the optimized data of 17 out of 32 farmers in Goalpara, Assam who are harvesting. The yield was optimized based on the reported revenue, price per kg, average yield and land size

\*\*Calculated from the optimized data of 54 out of 78 farmers in Andhra Pradesh, who have been growing oil palm for more than > 4 years

# Income from Oil Palm | Oil Palm is a major source of income for smallholders in Andhra Pradesh but hasn't acquired the status of the key cash crop in Assam yet

## Assam (Goalpara)



100%

Farmers reported increase in income since previous year (N=32)



Rs 45,181

Average revenue in a year per hectare\* ranging from Rs 7,225 to Rs 138,723



Rs 34,087

Average cost in a year per hectare\* ranging from Rs. 1,376 to Rs. 45,113  
(2 people reported Rs 0)



Rs 11,094

Estimated average income in a year per hectare

Revenue from oil palm is not a primary source of income from agriculture in Assam as 65% farmers reported that the revenue from oil palm contributes to **less than 60% of their total agricultural revenue**

## Andhra Pradesh



9%

Farmers reported increase in income since previous year (N=78)



Rs 236,276

Average revenue in a year per hectare\*\* ranging from Rs 6,252 to Rs 426,248



Rs 90,982

Average cost in a year per hectare\*\* ranging from Rs 988 to Rs 225,602  
(2 people reported Rs 0)



Rs 145,294

Estimated average income in a year per hectare

The average reported income from oil palm is **Rs 101,624 per hectare** (N=47), ranging from **Rs 2,471 to Rs 14.82 lakh per hectare**. Hence, there is some **underreporting/misreporting of income** by respondents. While the overall data on income is not reliable in Andhra Pradesh, it is clear that oil palm is one of the major sources of overall income among coconut, cotton etc but no one is relying entirely on it.

*There is a significant difference between the investment and return on oil palm each season in both the states. Due to this, there is also a 10X difference in average profit / income. However, since the crop is in growth phase in Assam, farmers are seeing a YoY increase in income, whereas the income growth in Andhra Pradesh seems to have stagnated.*

\*Based on the optimized data of 17 out of 32 farmers in Goalpara, Assam who are harvesting. The yield was optimized based on the reported revenue, price per kg, average yield and land size

\*\*Calculated by multiplying the optimized yield data and reported prices of 53 out of 78 farmers in Andhra Pradesh, who have been growing oil palm for more than > 4 years

# Institutional Support and Market Linkages

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# Oil Palm Landscape on the Ground | Other than farmers, the nature and roles of key players vary in Assam (nascent market) and Andhra Pradesh (mature market)



## Government

State Agriculture Department



Organization formed by farmers which provides for sharing of costs and profits/benefits among the members\*

## Farmer Producer Organizations

1. **Farmer Associations** - Oil Palm Growers Coordination Committee, RHAC have been pivotal in introduction of oil palm in the state, and are responsible for facilitating transport and sales to the local collection centre.

2. **Farmer groups** - Manabashi, Mili Juli, facilitate collective transportation till the collection centre and cost sharing; awareness on schemes and subsidies; peer to peer learning.

Limited FPOs in Andhra Pradesh with some found in West Godavari



## Market Players

1. **Trading Companies** - Shivasais is the only trading company purchasing oil palm FFBs from farmers in Goalpara. It had also facilitated setting up of a nursery for seedlings.

2. **Large corporates (NMEO-OP)**- Starting oil palm cultivation in other sectors by selecting farmers, getting approval from nodal agencies, and providing farmers with seedlings and training.

1. **Local Private / Government Mills** - Purchase FFBs from farmers and then trade them further in the open market.

2. **Large Corporates (NMEO-OP)** - Run collection centres and processing units where farmers can sell their FFBs. They are also trying to provide training and inputs to farmers through the NMEO-OP subsidies and guidelines.

Assam

- Implement NMEO-OP and other farmer welfare schemes in coordination with allocated corporates
- Identifying farmers interested in growing oil palm and assessing suitability of the land
- Provide subsidies for intercropping, fertilizers, maintenance of farm and fertilizers, seeds etc
- Participate in training of farmers and providing them information along with the other market players

Andhra Pradesh

State Horticulture Department

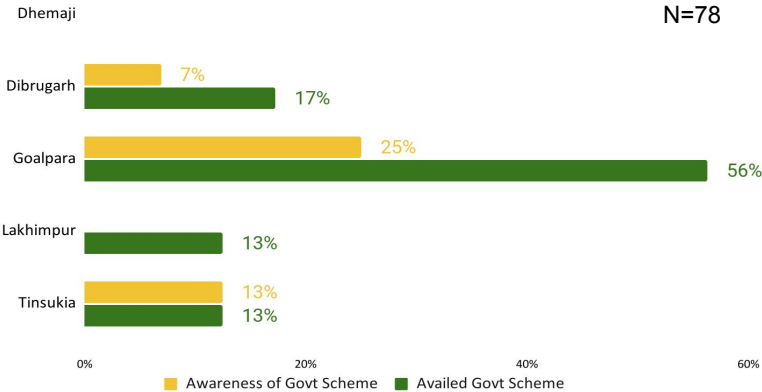
\*[Farmers Producer Organisation \(FPO\)](#)



# Government Support | There is low awareness of and assistance from government schemes across farmers in both the states, leading to lack of support and interest respectively

## Assam

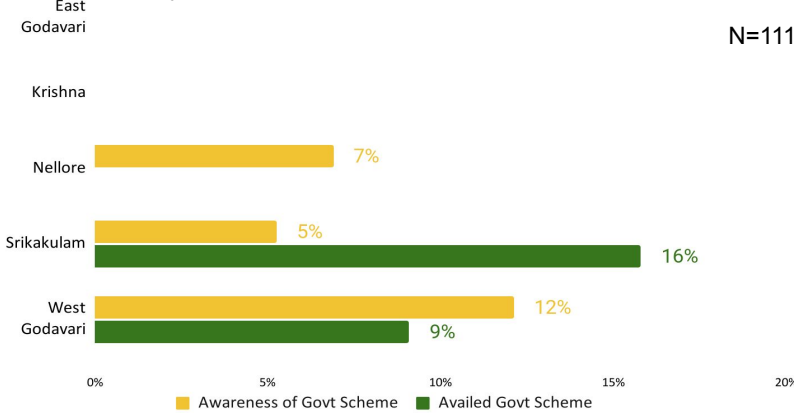
14% farmers receive **regular information**, mainly from the agri dept, and **32% receive assistance** from the government schemes, largely in Goalpara. **Information dissemination** regarding technical knowhow and practices is sporadic post cultivation in Goalpara. Cultivation is very nascent in other districts to comment.



- **Govt:** District / state agriculture office, Panchayat secretary, Krishi Vikas Kendras (KVK)
- **FPO:** Oil Palm Grower Coordination Committee

## Andhra Pradesh

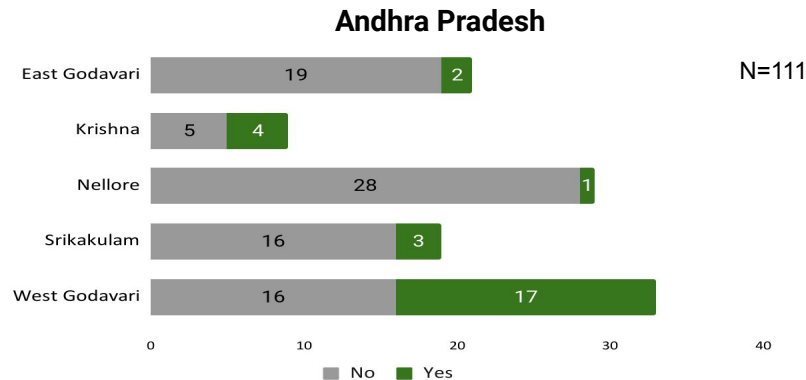
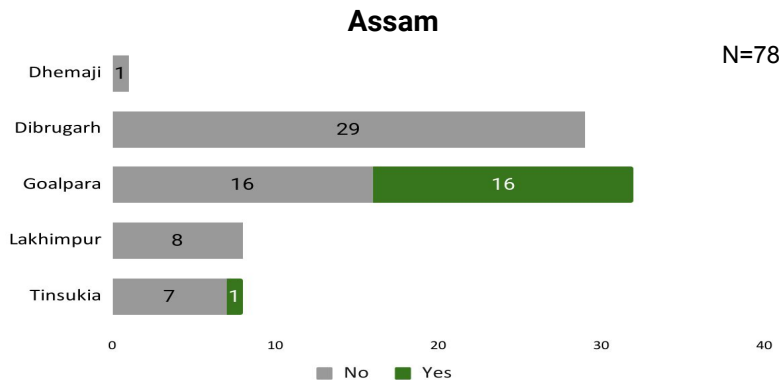
6% farmers receive **regular information** and 5% receive assistance from the government schemes, largely due to dependence on corporates. Despite multiple schemes for farmers, follow up assistance, information dissemination and training is very low.



- **Govt:** District horticulture department (sits in the village secretariat i.e. *sachivalayam*)
- **Rythu Bharosa Kendram:** One stop shop for govt certified agri inputs with attached workshops and knowledge centres
- **Corporations:** Field staff

Farmers perceive low awareness and access to schemes and technical knowhow across both the states due to challenges such as **limited direct delivery of interventions, low reach and benefit of on-ground programs**, as well as **administrative issues that lead to delays in release of financial assistance** or incentives to farmers.

# Participation in farmer groups | There are few FPOs in both Andhra Pradesh and Assam which leads to limited awareness and dependence on corporates among farmers



FPOs are largely present in Goalpara, where the farmers are mature and involved in sale of FFBs. Farmers are usually associated with one or both of these:

- **Registered FPOs** having 25-100+ members (*Manabashi, Mili Juli, Banabashi etc*)
- **Cooperatives** facilitating collection and sales of the produce and providing farmers with technical assistance (RHAC, Oil Palm Grower Coordination Committee)

Despite Andhra Pradesh being a mature market, **Sattva did not come across any oil palm FPOs**. In fact, farmers in East Godavari reported a lower need for FPOs due to corporate involvement across the value chain.

- While larger, more influential farmers cited they do not need FPOs, smaller farmers who may lack regular government and corporate support in accessing information and training on farming practices, cited a need for FPOs and organization.
- In Eluru (earlier West Godavari), government supported the farmers in forming FPOs\*

*In both the states, the prevalent trend of lower association among farmers might be a challenge in implementing the RSPO standards and providing certifications to groups. However, it was seen that farmers who organized themselves benefit due to better awareness and collaboration*

# Market Linkages – Assam | Most farmers are unsure of who they are selling to and are not receiving the MSP of Rs 9.80 per kg\* in Goalpara

In Assam, only Goalpara has mature plantations (>4 yrs) where oil palm FFBs are being harvested, ~100% of farmers sell their produce through two routes, N=31

Source  Primary Research  Secondary Research

## Route 1 (69% farmers)

₹ Farmers receive Rs 8 per kg

50% farmers are associated with an FPO

95% farmers reported self transportation till the collection centre

Sell directly to the trading company obtaining a uniform price for all farmers each season

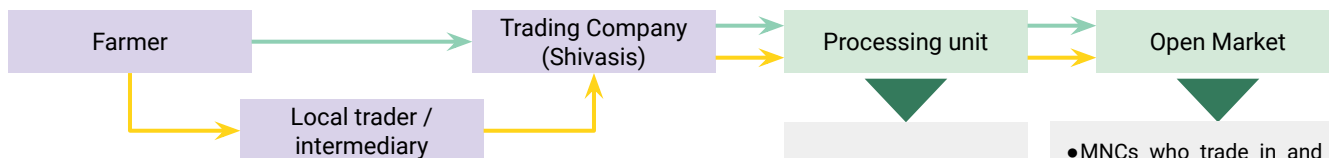
## Route 2 (31% farmers)

₹ Farmers receive a price between Rs 7 - Rs 7.80 per kg or don't know

45% farmers are associated with an FPO

Sell to company through local traders and intermediaries, often at lower than fixed prices

64% farmers reported self transportation, remaining said buyer or FPO takes care of it



### Notes:

- The farmers do not register themselves with Shivasis at any stage. Since it is the only large trading company procuring from Goalpara, the farmers sell to Shivasis\*\*.
- Mode of payment: Shivasis pays the farmers through bank accounts, within 7-10 days, however local intermediaries and traders practice immediate cash payouts, prompting some farmers to choose selling to them.

Shivasais transports the the produce to Mizoram for processing at Godrej owned mill

- MNCs who trade in and use palm oil (eg. Cargill, Cofcan, etc)
- Smaller domestic users of oil palm like local restaurants and food producers (e.g. Haldiram, Bikanervala)

Farmers have to pay for their own transportation costs, FPOs enhance access to transportation and arrangement of transport as well as cost sharing for transportation but does not bear the cost for each member farmer

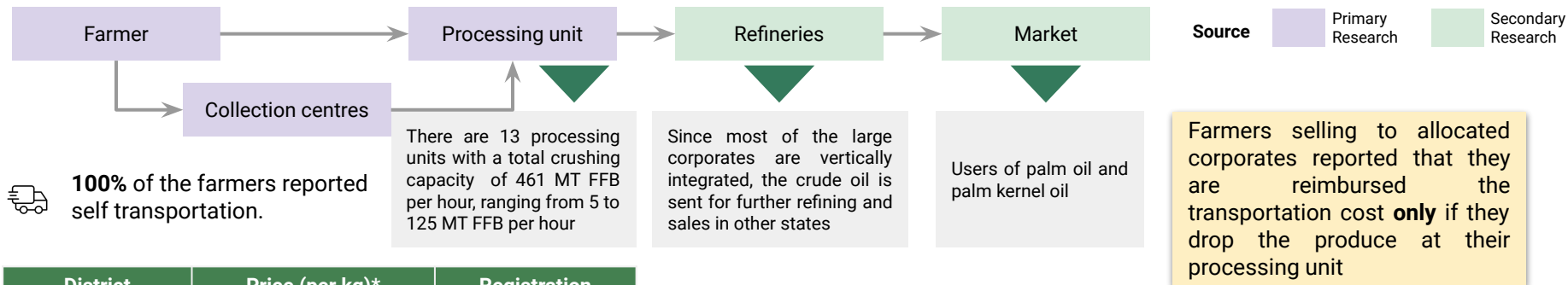
The absence of a formal procurer assigned by the govt, and legal issues in Goalpara has led to one trading company buying most of the produce, with a number of intermediaries or middlemen existing as well. During FGDs, farmers reported receiving as less as Rs 5 per kg, leading to lack of motivation to continue with oil palm.

\*The MSP fixed by the government is Rs 9,830.29 / MT as per the notification dated September, 2023;

\*\*Shivasis started procuring from Goalpara due to the initiative taken by Rabha Hasong Autonomous Council (RHAC) that was instrumental in starting Palm Cultivation in the region

# Market Linkages – Andhra Pradesh | While the market is more mature, it is highly regulated based on NMEO-OP and Oil Palm Act, 1993

In Andhra Pradesh, 91% of farmers across five districts sell their produce. Since it is a mature market the routes are well structured with the growers selling to nearby private or government mills, N=111



District	Price (per kg)*	Registration
<b>East Godavari</b> N=21	Rs 11 - Rs 16, Average price Rs 12.11	29%
<b>Krishna</b> N=9	Rs 12 - Rs 12.40, Average price Rs 12.10	78%
<b>Nellore</b> N=29	Rs 12 - Rs 12.40 Average Price Rs 12.34	52%
<b>Srikakulam</b> N=19	Rs 11 - Rs 12.40 Average Price Rs 11.65	74%
<b>West Godavari</b> N=33	Rs 11 - Rs 12.50 Average Price Rs 12.11	82%

There are no large variations in the per kg price reported across districts, with the overall average being **Rs 12.12**. The market is well structured with both large and small mills having allocated regions for procurement. The variation in price is assumed to be because of the fluctuating rates of oil palm across the months.

Majority of farmers reported registering\*\* with buyers (either formally or informally), especially in **Krishna, Srikakulam and Nellore**. This registration also facilitates direct account transfer of the price to the farmers when they sell their harvest to the company. However, the farmers are not obligated to sell to these buyers.

\*The MSP fixed by the government is Rs 12,493 / MT as per the notification dated June, 2023

\*\*The farmers register with corporates by providing their bank details and the corporate provides them with inputs in return.

# Emerging Archetypes, Key Constraints and Recommendations

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# Specific **recommendations** have been customised by identification of the most pressing constraints impacting the different stakeholder archetypes and sub-archetypes



## Archetypes and Sub-archetypes

**Segmentation of farmers** based on different **characteristic determinants** can allow in-depth constraint identification. Segmentation and sub-segmentation has been conducted based on:

- **Inter-state differences:** Farmers in Assam and AP have different needs, and constraints owing to different policy atmosphere and implementation modes, differential market maturity wrt oil palm processing
- **Inter-stage differences:** Farmers in gestation period differ from farmers that have started harvesting FFBs, and even within the later group there are differences within farmers who have harvested the crop for less than 5 years versus others



## Constraint Mapping and Prioritization

Constraints specific to the palm oil value chain have been identified and mapped based on severity for each sub-archetype and archetype of farmers.

Each constraint has been assigned **high/med/low severity for each archetype** based on their level of impact on the farmers, followed by assigning of a composite high/low/med scoring for each constraint at a state level. Further each constraint has been evaluated on the basis of:

- **Impact on sustainability:** What is the sustainability implications of the particular constraint, and how can interventions solve for challenges?
- **Impact of Policy landscape:** Is the current policy landscape addressing or aggravating the constraint in any manner?



## Recommendations and Interventions

Specific **recommendations and actionable intervention strategies** have been proposed and evaluated across the following parameters:

- **Impact on yield:** Will the intervention lead to yield improvement for farmers in the short/med/long term?
- **Impact on income:** Will the intervention lead to income improvement for smallholders?
- **Ease of Implementation:** Is RSPO well-placed to implement the intervention given their current presence in the ecosystem?

**Farmer readiness** has been mapped based on specific parameters which are important from an RSPO perspective for the implementation of interventions.

Each intervention strategy has been detailed out within the Short-Med-Long term timeframe highlighting **activities, enablers and considerations**.

# Farmer Archetypes I

The archetypes have been created based on geography and maturity of farmers as these are key differentiating factors while mapping constraints

## Assam

The government is promoting oil palm cultivation in Assam with large-scale plantation project initiated by the state government, this underscores the need to understand the implications of such initiatives on the environment and local communities. Studying oil palm cultivation in Assam is crucial to balance economic development with environmental sustainability and to make informed decisions regarding agricultural practices in the region.



## Andhra-Pradesh

Since AP is a mature market with oil palm cultivation starting from early 2000s, the concerns related to environmental protection, and socio-economic welfare manifest differently here as compared to Assam. Identifying obstacles such as low productivity, price fluctuations, insufficient processing facilities, and lack of suitable technologies will help develop strategies to overcome them



*The sub-archotyping of farmers is done based on the maturity level of plantations, which is a key determinant of constraints and opportunities due to the variation in inputs access and utilization along with on-farm activities across various stages of production and maturity.*

# Archetype Characteristics | These characteristics allowed in developing a deeper understanding of **challenges and support required** to overcome them for each archetype

	Assam			Andhra-Pradesh		
	Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years	Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years
Age	<b>64%</b> Farmers are in the age group of 35-50 yrs	<b>39%</b> Farmers are in the age group of 35-50 yrs	<b>75%</b> Farmers are in the age group of 35-50	<b>48%</b> Farmers are in the age group of 35-50 & >50 yrs	<b>54%</b> Farmers are in the age group of >50 yrs	<b>60%</b> Farmers are in the age group of >50 yrs
Education	<b>51%</b> Farmers have studied below class 10th	<b>57%</b> Farmers have studied below class 10th	<b>75%</b> Farmers have studied below class 10th	<b>30%</b> Farmers are illiterate and <b>30%</b> are graduate	<b>52%</b> Farmers are illiterate	<b>40%</b> Farmers are illiterate
Land used for oil palm	<b>1.3 Ha</b> average landholding	<b>1 Ha</b> average landholding	<b>1.4 Ha</b> average landholding	<b>2.7 Ha</b> average landholding	<b>3.5 Ha</b> average landholding	<b>4 Ha</b> average landholding
Average % the total land	<b>48%</b> Of the total land is being used for oil palm	<b>68%</b> Of the total land is being used for oil palm	<b>96%</b> Of the total land is being used for oil palm	<b>96%</b> Of the total land is being used for oil palm	<b>100%</b> Of the total land is being used for oil palm	<b>91%</b> Of the total land is being used for oil palm
Category	<b>66%</b> Farmers belong to OBC category	<b>91%</b> Farmers belong to general category	<b>88%</b> Farmers belong to ST community	<b>70%</b> Farmers belong to general category	<b>81%</b> Farmers belong to general category	<b>78%</b> Farmers belong to general category



# Constraints I Primary research among smallholder farmers has shed light on constraints faced by farmers across the value chain

## Division of value chain based on inputs utilisation at different stages of production

### Pre-farm

This stage refers to the initial phase of planning and preparation of the land for planting the oil palm trees by adding the critical inputs like setting irrigation facilities, testing soil quality, etc. The lack of availability and accessibility of these inputs directly impacts farmer income and plantation yield, highlighting the need for interventions to address this constraint.

### On-farm

This stage includes activities such as planting, maintaining, and harvesting the oil palm trees. It also involves the management of pests, diseases, and weeds, as well as the application of inputs to ensure optimal growth and productivity of the oil palm trees.

### Post-farm

The post-farm stage in the cultivation of oil palm refers to activities that take place after the oil palm fruits have been harvested from the plantation. Other activities in the post-farm stage may include waste management, maintenance of equipment, and farm infrastructure.

## Specific constraints

1. Lack of proper use and application of fertilizer
2. Lack of access to free seeds and saplings in AP
3. Inaccessibility of soil testing facility in both the states
4. Limited irrigation facilities
5. Unavailability of land titles to farmers in Assam

1. Incurring high cost of labour
2. Inability to have the formation of cooperatives / FPOs
3. Negative impact of disease infestation, human-animal conflict
4. Unawareness regarding the benefits of intercropping & govt subsidies

1. Inability to get govt determined prices for oil palm
2. Lack of transportation facilities
3. Lack of processing units

Based on these constraints, RSPO can play a key role in enabling farmers' access to higher incomes and better markets, the next slides seek to answer the following questions:

- **What are the various interventions that RSPO can implement or facilitate to enable high-value linkages?**
- **Which interventions are likely to provide the highest returns or impact with respect to improving farmer earnings/yield?**
- **How feasible and sustainable are these interventions in the long run, given the socio-economic context of the farmers and other value chain actors?**
- **What skills, knowledge and resources does RSPO have and/or need to implement these interventions?**
- **What external challenges and barriers does RSPO need to address to ensure the success of the interventions?**

# Constraints: Pre-farm I

Farmers face constraints related to accessing proper inputs and in determining appropriate application rate and techniques for the specific inputs

Constraint	Severity in AP	Severity in Assam
Fertilizer	Low	High
Soil Quality	High	High
Land Rights	Low	Medium
Irrigation	Low	High

■ High    ■ Medium    ■ Low

More farmers in Assam are impacted by pre-farm challenges as compared to AP. However some challenges like access to soil testing is a constraint impacting farmers across both states.

## High and Medium Severity Constraints

### Access to inputs

#### Fertilizers:

- All the farmers in gestation period in Assam use less than 5 fertilizers essential for palm oil production.
- Farmers lack information on oil palm fertilizer requirements, while those without land titles are unable to access government subsidies for fertilizers.
- Fertilizers are used excessively in AP with 80% farmers using more than 8 fertilizers

#### Irrigation:

- In Assam the farmers are entirely dependent on rainfall for irrigation as the state receives abundant rainfall. 83% farmers in gestation period don't have access to irrigation systems
- Farmers in AP depend entirely on groundwater leading to over utilisation.

### Soil Quality

- There is an inability / unawareness to avail the oil testing facility by farmers in both the states which hinders farmers from making informed decisions about their farming practices.
- 9 out of 10 farmers in Assam and 5 out of 10 farmers in AP in the gestation period don't have avail the soil testing facility which can significantly boost productivity by guiding informed decisions on fertilizer use, crop selection, and soil management.
- Since the fertilizer usage is not done optimally in AP there is a sustainability implication which in turn degrades the soil quality

### Access to Land

- 26% farmers in Assam harvesting for less than 5 years don't have ownership to land they grow oil palm.
- Farmers in Assam without land titles are unable to access government subsidies and support for agricultural inputs, including fertilizers and equipment, which are essential for oil palm cultivation.
- According to the recently passed amendments to the Forest (Conservation) Act, deemed forests that weren't under protection according to the Indian Forest Act, 1927, can be used for non-forest activities potentially driving vast oil palm plantations.<sup>1</sup>

*The farmers in Assam face a higher number of severe constraints as compared to farmers in AP. In Assam as well as AP farmers have limited information availability and trainings on farm management and sustainability which directly impacts their income and yield and has implication on farm sustainability. Thus, information dissemination on best practices and sustainable oil palm cultivation is a necessity for the farmers.*

1. [Oil palm plantations proved to be a disaster in Mizoram – is Assam next?](#)

# Constraints: On-farm | Farmers face constraints related to accessing proper inputs and in determining appropriate application rate and techniques for the specific inputs

Constraint	Severity in AP	Severity in Assam
Disease Infestation	High	Medium
Extension services	High	Medium
Human animal conflict	Low	Medium

■ High   
 ■ Medium   
 ■ Low

More farmers in AP are impacted by on-farm challenges as compared to AP. Specifically some challenges like disease infestation and lack of extension services are interrelated and reflect gaps in policy implementation and stakeholder collaboration.

### High and Medium Severity Constraints

#### Disease Infestation

- Over 60% of farmers in AP have suffered from disease infestation in their plantations, farmers also complained of rodent infestation, and lack technical knowledge to manage the same effectively. Common diseases include *rot in leaves*, *rot in FFBS*, *coconut palm beetles*.
- Farmers in Assam are not majorly impacted by pest attacks, however few farmers reported *termites*, *rodents* *small birds (bulbul) attacking trees*. Farmers in Assam also lack knowledge on appropriate pesticides.
- Sustainability issues arise from unregulated pesticide, poor knowledge dissemination causing soil and water pollution, harm to non-target species and pest resistance.

#### Extension services

- Farmers in AP have low awareness of govt schemes and face challenges in accessing extension services due to sole reliance on Corporates/processors for all information.
- Farmers in Goalpara, Assam receive information from Farmer leaders/influential farmers, and KVKs, corporates actively in other districts.
- The NMEO-OP scheme directs the processor assigned to an area to take up training and knowledge sharing activities for all oil palm farmers of the area, however implementation of the same is poor.

#### Human Animal conflict

- Farmers in Assam face challenges arising from Human Animal conflict, specially farmers in the gestation period increasingly reported this (51%) due to a number of plantations lying close to elephant corridors and pathways.
- Elephant attacks are uncommon in AP, however some districts like Krishna and Srikakulam face irregular disruption from elephants occasionally.
- Land conversions for plantations, including palm besides others like areca nut, rubber etc have led to destruction of forests and habitats, leading to more frequent human animal interactions and conflicts.

*The farmers in AP face a higher number of severe constraints as compared to farmers in Assam. In Assam as well as AP farmers have limited information availability and trainings on farm management and sustainability which directly impacts their income and yield and has implication on farm sustainability.*

# Constraints: On-farm | Farmers face constraints related to accessing proper inputs and in determining appropriate application rate and techniques for the specific inputs

Constraint	Severity in AP	Severity in Assam
Intercropping	High	Medium
Cooperatives & FPOs	High	High
Climate events	High	Low

■ High    ■ Medium    ■ Low

More farmers in AP are impacted by on-farm challenges as compared to AP. However some challenges like absence of cooperatives and farmer associations is a constraint impacting farmers across both states.

## High and Medium Severity Constraints

### Intercropping

- Farmers in AP are reluctant to pursue intercropping with ~100% of farmers in harvesting stage not intercropping and only 17% in the gestation period intercropping.
- Farmers cited oil palm tree's resource dependence and shade as hindrances to successful intercropping.
- Monoculture leads to high vulnerability from crop failure and depletion of soil nutrients, biodiversity loss.
- Farmers also fail to realize full potential of subsidies for not availing intercropping subsidy.

### Cooperatives & FPOs

- Assam, specially Goalpara has presence of some oil palm specific farmer groups but FPOs interactions were minimal in other locations.
- Over 80% of farmers in gestation stage and harvesting <5 yrs are not associated with FPOs. In AP, absence of FPOs is due to large size of individual plantations and farmers trying to secure individual profits by directly working with the processing companies.
- Absence of FPOs leads to increased dependence on corporates for information, lack of cost sharing, bargaining.
- Farmers cited need for FPOs for greater awareness and learning and lower dependencies on corporates.

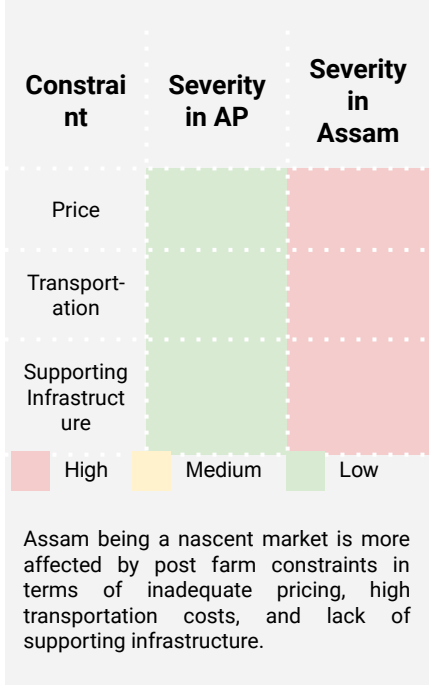
### Climate events

- Over 1 in 2 farmers in AP is impacted by changing climate conditions and weather patterns.
- Drought and erratic rainfall patterns are the most common manifestation of climate change in AP, leading to farmers facing challenges in obtaining water for irrigation, and extreme reliance on groundwater, which further pushes down water tables and aggravates drought conditions.

*The farmers in AP face a higher number of severe constraints as compared to farmers in Assam. In Assam as well as AP farmers have limited information availability and trainings on farm management and sustainability which directly impacts their income and yield and has implication on farm sustainability.*

# Constraints: Post farm I

Post farm constraints are largely centered around accessing proper markets and supporting infrastructure, which is emerges significantly as a challenge in Assam



## High and Medium Severity Constraints

### Price

- Almost 9 out of 10 farmers harvesting FFBs in Assam do not receive the NMEO-OP assured price for their produce
- Absence of a government assigned buyer and legal complexities in Goalpara has led to one trader dominating the market, operating alongside several middlemen.
- Contrastingly, only 1 out of 10 farmers in Andhra Pradesh reported not receiving the NMEO-OP price, which may be attributed to the fluctuations in monthly rates of oil palm based on the international crude oil prices.

### Transportation

- Almost 9 out of 10 farmers harvesting FFBs in Assam are not reimbursed for transportation (as specified in the policy). However, some farmers are assisted by FPOs and associations in transportation which reduces their individual costs.
- While there is an MOU between Assam govt and Shivasais in Goalpara, there are challenges in implementation leading to lack of visibility on the transportation reimbursement policies, prices paid etc

### Supporting Infrastructure

- Assam does not have any mills yet leading to long transportation distances affecting the quality of the perishable FFBs. The nearest mill is in Mizoram
- There are 13 processing units in AP with a total crushing capacity of 461 MT FFB per hour, ranging from 5 to 125 MT FFB per hour

*The Goalpara district in Assam must resolve the legal issues to ensure farmers are receiving a fair price for their produce and are incentivised to continue oil palm cultivation. A larger risk is that the dissatisfaction among these farmers can lead to lack of interest in other farmers as well making adoption difficult.*

# Farmer Readiness | Based on the eligibility and milestone parameters of the RSPO ISH Certification, farmers in both states display a **low readiness** for obtaining the certification

## Current Level of Readiness for RSPO SH Certification



Land Legality

Nature of Land

Organization into Groups

Willingness

Women Participation

Risk of Child Labour

Fertilizers

Irrigation

Assam

**68%**

Farmers don't have patta / contracts for the land they are currently using for plantations

**81%**

Land used for oil palm is arable agri land, remaining being forest and common land

**78%**

Farmers are not part of FPOs/ Cooperatives or other farmer groups

**85%**

Farmers were willing to know and adopt RSPO certification

**11%**

Women landowning farmers

**Not prevalent**

**96%**

Farmers use less than 5 types of fertilizers

**80%**

Farmers use rainwater for irrigation

AP

**100%**

Landowners have papers for their land

**100%**

Land used for oil palm is arable agri land

**76%**

Farmers are not part of FPOs/ Cooperatives or other farmer groups

**17%**

Farmers were willing to know and adopt RSPO certification

**2%**

Women landowning farmers

**49%**

Farmers use more than 8 types of fertilizers

**100%**

Farmers use groundwater for irrigation

Based on these parameters of farmer readiness, **farmers in Andhra Pradesh are more prepared but less willing for ISH certification as compared than farmers in Assam.** A **three pronged strategy** has been proposed for RSPO to solve for these challenges as well as increase readiness of farmers for certification.

# Needs and Interventions | Sattva proposes the following actionable intervention strategies to meet needs of farmers and ecosystem stakeholders

	A. Ecosystem Engagement	B. Smallholder Training	C. Certification Process
	<b>Improve coordination within the ecosystem actors and promote sustainable oil palm</b>	<b>Training farmers on technical and management components related to oil palm cultivation</b>	<b>Ensuring palm oil cultivation is sustainable, responsible and profitable for all the entities involved</b>
<b>Pre Farm</b>	<ul style="list-style-type: none"> <li>Lack of access to free seeds and saplings in AP</li> <li>Unavailability of land titles to farmers in Assam</li> <li>Limited irrigation facilities</li> </ul>	<ul style="list-style-type: none"> <li>Inaccessibility / unawareness of soil testing facility</li> <li>Lack of proper use and application of fertilizers</li> </ul>	<ul style="list-style-type: none"> <li>Use of biodiversity rich land and high conservation areas for cultivation (e.g. forest and common lands in Assam)</li> </ul>
<b>On Farm</b>	<ul style="list-style-type: none"> <li>Lack of awareness and access to government schemes (e.g. intercropping, planting, seeds )</li> <li>Vulnerability to manifestation of climate change</li> </ul>	<ul style="list-style-type: none"> <li>Unawareness around benefits of intercropping and proper farm management</li> <li>Prevalence of disease infestation</li> <li>High cost incurred on labour</li> </ul>	<ul style="list-style-type: none"> <li>Managing human-wildlife interactions within plantations</li> <li>Inability to have the formation of cooperatives / FPOs</li> </ul>
<b>Post Farm</b>	<ul style="list-style-type: none"> <li>Access to govt assured prices and viability price</li> <li>Access to transportation / reimbursement</li> <li>Lack of processing units / refineries</li> </ul>	<ul style="list-style-type: none"> <li>Med-high cost incurred on labour (need to bring in light mechanization for particular stages- harvesting)</li> <li>Lack of awareness of existing and assigned buyers</li> </ul>	<ul style="list-style-type: none"> <li>Lack of access to market (can be facilitated for CSPO through RSPO credits)</li> <li>Lack of record keeping at farmer level</li> <li>Declining prices in AP over the years (premium)</li> </ul>

Farmer Constraints

**Relevance for Other Stakeholders**

Ecosystem engagement will create **greater synergies** between all the players to **solve current ecosystem challenges**, such as excess saplings within corporate nurseries, ineligibility of land for oil palm cultivation (due to lack of land titles), viability of setting up new processing units etc.

Training farmers will result in **better quality of yield (FFBs) from plantations**. Further, multi-stakeholder collaboration shall ensure the **training modules encourage productivity and sustainability, while being relevant for the different contexts** in which farmers operate.

The process for achieving the certification will lead to **responsible cultivation, benefiting all the stakeholders**. It can prevent plantations in unfavourable areas- among dense vegetation, which may be difficult to manage, produce low quality FFBs and face greater issues related to connectivity.

# *Annexure*

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# I. Plantation Characteristics

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# Land Profile I Farmers are largely using their own land for oil palm plantations, however across both states there are some who used leased land or common land



**86%** of farmers are using their own land for growing oil palm while the rest are using leased or common land.

However, availability of legal records, land titles is low in Assam



**60%** of total farmers in the survey have land titles, however only **31%** of farmers in Assam have land titles or documents signifying ownership

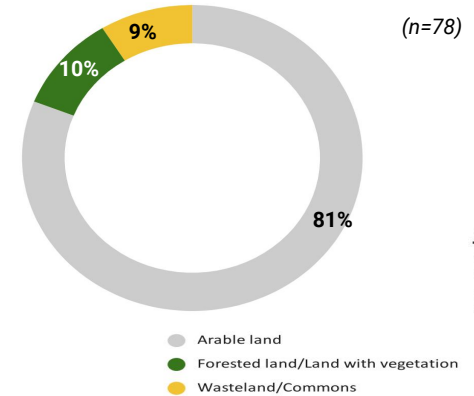
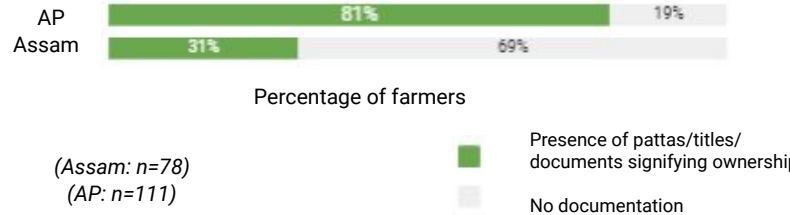
While all land conversions occurring in AP are from agricultural land, in **Assam** some **deemed forest lands, densely vegetated** and **common lands** are also undergoing **conversion to plantations**.

In AP, oil palm plantation expansion follows recommendation of **Dr Chadha & Dr Reithnam committees** (2006 and 2012) which furnished the feasible areas for cultivation in the state.

Mandals are allotted to different companies and **evaluations are conducted by IIOPR** along with state department representatives based on field visits and inspections to select feasible areas.

## Distribution of nature of land conversion in Assam

## Distribution of percentage of farmers with land titles/ pattas



Farmers in AP have larger land parcels and have larger share of their own land allocated to oil palm. On the other hand, farmers in Assam have just started cultivation, and therefore have smaller land parcels allocated to the crop. This reflects higher importance given to the crop in AP, also corresponding to a higher share of household income derived from the crop (see [slide 22](#))

# Focus on Land Conversions in Assam | Assam is undergoing land conversions for palm plantations as the area under palm is rapidly expanding

Andhra Pradesh (AP) has mature plantations, and the growth rate of palm plantations is lower in the state, as compared to Assam where the growth rate is higher. In AP, all of the land being converted into palm plantations are agriculture land- arable or land under permanent crops, Assam also has land with vegetation (forest lands), along with Commons such as pastures undergoing conversion into plantations.

## Unpacking Land types in Assam

- **Land with dense vegetation-** These lands are forest land or land with dense vegetation, in terms of ownership they are owned by the State Revenue dept or by Forest dept in some instances, however they do not form part of 'protected areas'. In terms of use, these parcels have been used by tribal communities since decades, and although they do not have land titles, they have been controlling and managing the land since long.
- **Wastelands-** India still follows the colonial terminology of classifying non-forested and non-agricultural lands as 'wastelands'. Quite contrary to the term, these lands have been used since decades by communities as common property resources and serve important ecological, environmental and economic functions for communities.

In Assam, both of these land types have also been used for practicing shifting cultivation or 'jhum' by local communities.



Oil Palm plantation in a densely vegetated area in Dhemaji, Assam

# Land Use | Size of plantations vary inter- and intra-state, Andhra Pradesh has larger average land parcels used for plantations as compared to Assam



**88%** of landowning farmers in **AP** and only **32%** of landowning farmers in **Assam** are using **more than 80% of their land** to grow oil palm.

## Profile of Plantations

Most farmers across AP have allocated almost all of their landholding to oil palm, however across Assam, mature farmers have more share of land allocated to palm compared to those in gestation period, indicating lower maturity of the crop within the state, and lower importance given by new farmers

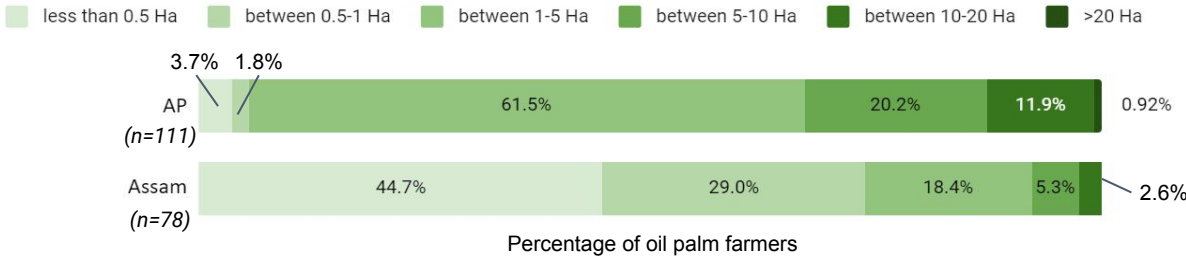
Assam

AP

### % of total land ownership owned being used for palm plantations

Gestation Phase	Harvesting <5 yrs	Harvesting >5 yrs
Assam	48%	68%
AP	96%	100%

### Distribution of landholding used for oil palm cultivation across Assam and AP



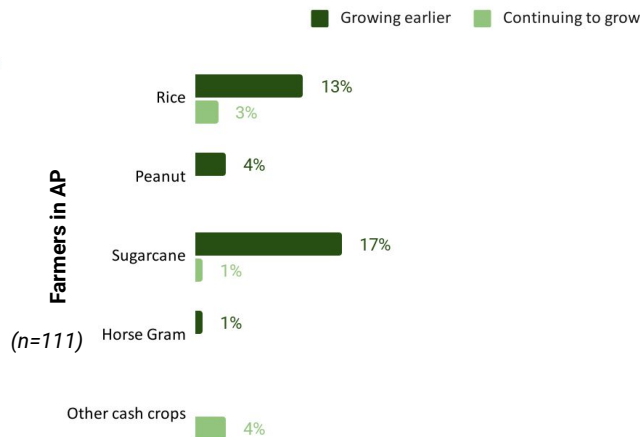
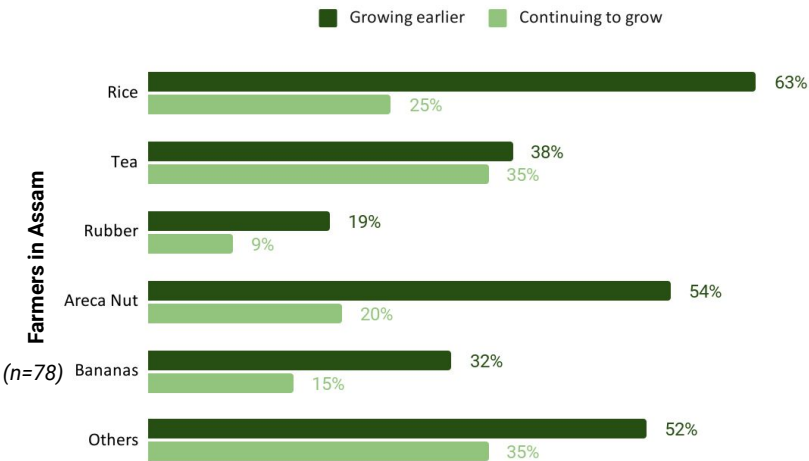
Plantation landholdings are larger in AP compared to Assam, with a significant number of farmers (~33%) using land more than 1 Ha for the plantations in AP. Compared to this, majority of plantations in Assam (~75%) are less than 1 Ha in size.

*Farmers in AP have larger land parcels and have larger share of their own land allocated to oil palm, farmers in Assam have just started cultivation, and therefore have smaller land parcels allocated to the crop. This reflects higher importance given to the crop in AP, also corresponding to a higher share of household income derived from the crop (see [slide 22](#))*

# Crop Profile | 54% of the farmers planted other crops prior to growing oil palm, majority of these farmers are from Assam and the notable cash crops are Areca Nut, Rubber, and Tea



**25%** farmers in AP  
**96%** farmers in Assam  
 were **growing other crops before taking up oil palm.**



“ I was not using this patch of land earlier, and growing rubber and areca nut in other patches of land I own.. Also I grow rice in a small patch for household consumption. I started growing oil palm around 5-6 years ago, when other farmers in Goalpara started...  
 - Farmer (M, 45)  
 Goalpara, Assam

*Oil palm is lucrative for farmers, as with increase in the number of years of growing the crop, farmers allocate more land to palm plantations and reduce cultivation of other crops to shift entirely to oil palm plantations*

# Crop Profile | Farmers in Assam are intercropping palm with other crops, and also availing Govt subsidies for the same, while farmers in AP find the plantations unsuitable for the growth of any other crops

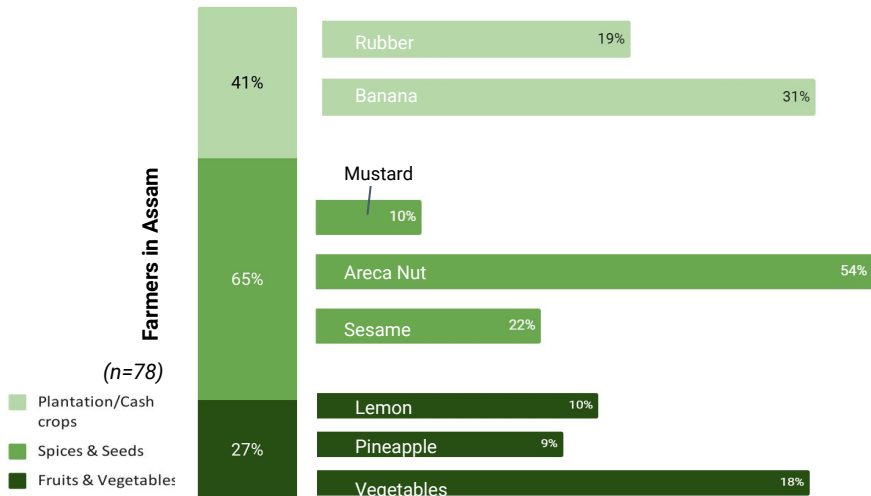
## Intercropping Practices



~70% of farmers in **Assam** are practicing intercropping within oil palm plantations. Farmers are most commonly taking up growing **fruits & vegetables** and **nuts and spices** in-between the palm plantations. The mature palm plantations seen in AP are unsuitable for intercropping, as stated by farmers.

[Back](#)

**Distribution of various intercropping patterns in Assam**



- In AP, farmers growing oil palm for more than 7 years rarely do intercropping, however **in Assam plantations >7 years old also have intercropping**
- Farmers in Assam have cited a challenge of the **oil palm trees taking up more resources**, however specific crops like *pineapple, mustard, sesame* that are drought resistant thrive well

*Intercropping can be practiced until the 2 years of planting the seed. Once the tree starts growing, we remove the crops grown around it to ensure the oil palms gets the necessary nutrients.*

- Farmer (M, 58)  
Krishna, AP

*Oil palm is lucrative for farmers, as with increase in the number of years of growing the crop, farmers stop cultivating other crops, and have a tendency to shift entirely to oil palm plantations*

## II. Farming Practices

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# Nature of Plantation and Farming Practices | Primary research conducted by Sattva among the smallholder farmers have provided insights across various farming practices



## Fertilizer

- Type of fertilizer used
- Cost incurred on fertilizer



## Irrigation

- Source of water
- Mode of irrigation
- Cost incurred on irrigation



## Energy

- Source and use of energy
- Cost incurred on energy



## Labour

- Source of labour
- Activities undertaken by labour
- Cost incurred on labour



# Irrigation | While majority of farmers in Assam (82%) practice rainfed cultivation of oil palm, all plantations in AP rely on irrigation systems

## Source of Water for Irrigation

The three prominent **sources of water for irrigation are ground, canal/river and rainwater.**



Majority of farmers in Assam rely on rainfed agriculture. **~80% farmers use rainwater** as a major source for irrigation.

In AP, **100% of the farmers rely on groundwater** for irrigation.

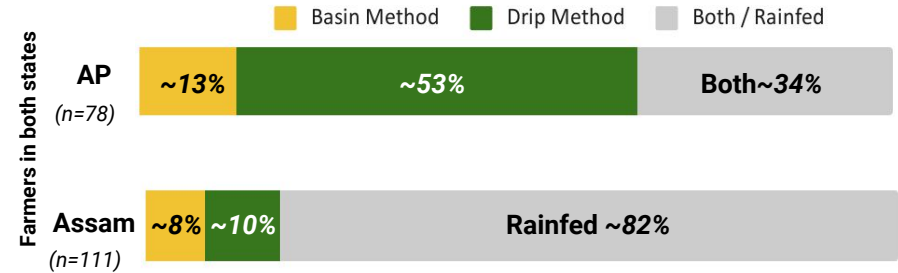
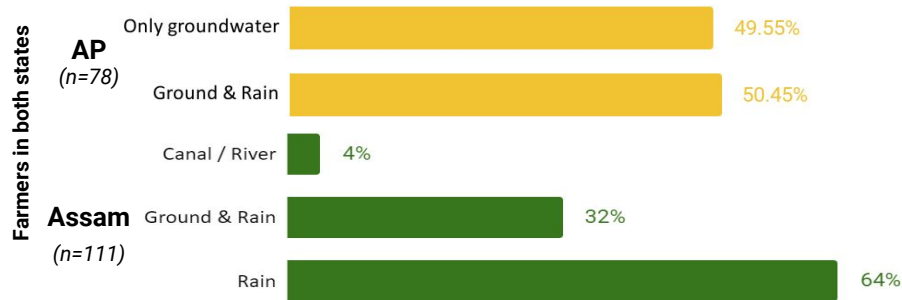
## Method of Irrigation

Dominant methods of irrigation in both Assam and AP are **Basin Method and Drip or Microjet Method of irrigation.**



**34%** of farmers in AP have both Basin and Drip irrigation method. **53%** use drip irrigation exclusively and rest **13%** use only basin irrigation method.

**18%** of farmers in Assam have either Basin or Drip irrigation



The success of oil palm cultivation in Assam is significantly supported by its abundant rainfall. However, approximately 40% cited the absence of irrigation facilities as a challenge. This issue arises from the erratic nature of rainfall, leading to prolonged periods of drought lasting 3-4 months, during which farmers experience complete yield loss.

**Fertilizers** | Farmers in AP use variety of fertilizers to boost productivity of plantations (49% of farmers use more than 8 fertilizers) as compared to Assam where fertilizer usage is nominal (96% of farmers use less than 5 fertilizers)

### Reason of Low Fertilizer Usage in Assam



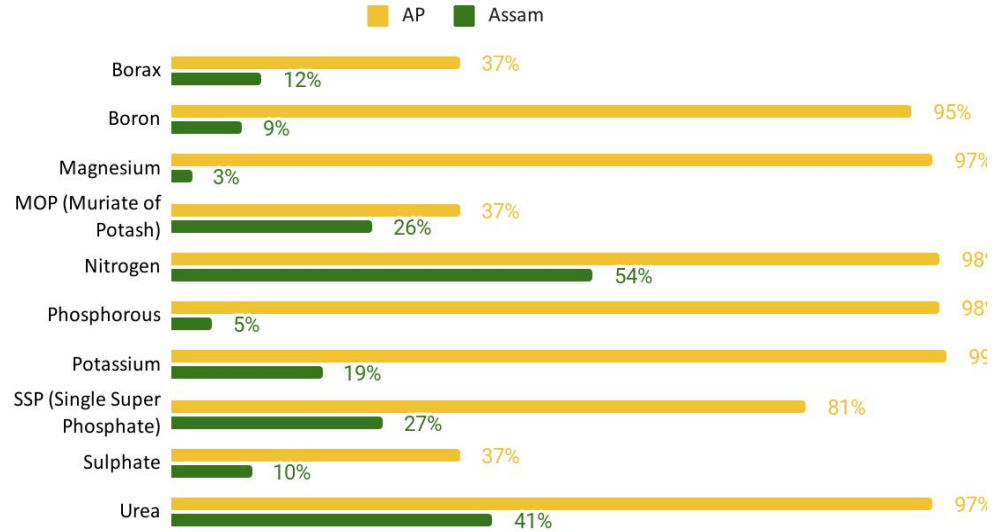
- **Lack of information** regarding fertilizers, the specific nutrient requirements of oil palm, and the importance of addressing nutritional imbalances.
- Farmers without land titles to the land parcels used for plantations **fail to avail govt subsidies for fertilizers**. Farmers are **reluctant to spend out to pocket on fertilizers** and any other inputs in the **absence of a proper market** and processing centres within the state, as they **do not receive proper price** on selling the harvest

### Cost of Fertilizer



The average cost of applying fertilizer is **around 4000 per acre in Assam** whereas it is **around 12000 per acre in AP**.

### List of fertilizers used by farmers in AP and Assam respectively



**In Assam, farmers with less than one year old plantations and those with 4-7 year old plantations report a greater usage of fertilizers as compared to plantations in the gestation period (1-4 years) or more than 7 year old plantations. This also indicates a negative sentiment few farmers have developed towards the crop, due to unavailability of buyers, and proper market in the Goalpara district**

## Fertilizers | Based on the available data on land profiles in Andhra Pradesh and Assam, farmers are not using the optimum amount of fertilizer which affects productivity

Nutrient	Andhra Pradesh				Assam			
	Usage <sup>1</sup>	Presence in soil <sup>2</sup>			Usage	Presence in soil <sup>2</sup>		
		High / Sufficient	Medium	Low / Deficient		High / Sufficient	Medium	Low / Deficient
<b>Nitrogen</b>	98%	2.73%	20.48%	76.79%	54%	23.58%	33.11%	43.32%
<b>Phosphorous</b>	98%	30.47%	50.36%	19.17%	5%	4.56%	63.13%	32.31%
<b>Potassium</b>	99%	77.03%	12.16%	10.82%	19%	1.53%	28.64%	69.83%
<b>Boron</b>	95%	91.25%	-	8.75%	9%	12.19%	-	87.81%

**Note:** Data was collected from smallholder farmers on the access of fertilizers and identification of fertilizer types used on fields, accurate data on the rate of application of fertilizers was not collected, also indicating the lack of knowledge of accurate measurements among farmers and need for technical training.

### Key Takeaways

- In AP, given the low presence of nitrogen and phosphorous in the soil, the high usage of these fertilizers seems to be a positive trend
- In Assam, there is low use of phosphorus, potassium and boron despite its deficiency in the soil potentially negatively impacting productivity and sustainability
- Boron, a key fertilizer promoting oil palm growth is being used by almost all farmers in Andhra Pradesh (~95%) despite most areas in the state with soil sufficient or high in it

*There seems to be unregulated use of fertilizers with underuse in Assam and both under and overuse in Andhra Pradesh.*

# Energy | In Assam the average cost incurred for energy consumption is fairly low as compared to AP as only 23% farmers in Assam use any source of energy

## Source of Energy

There are two main sources of energy, i.e. Renewable and Conventional energy.



26% farmers use only renewable sources, 50% farmers rely on only conventional/grid energy while the remaining use both sources of energy in AP

5% farmers in Assam use renewable energy and rest 18% use conventional/grid energy

## Cost of Energy



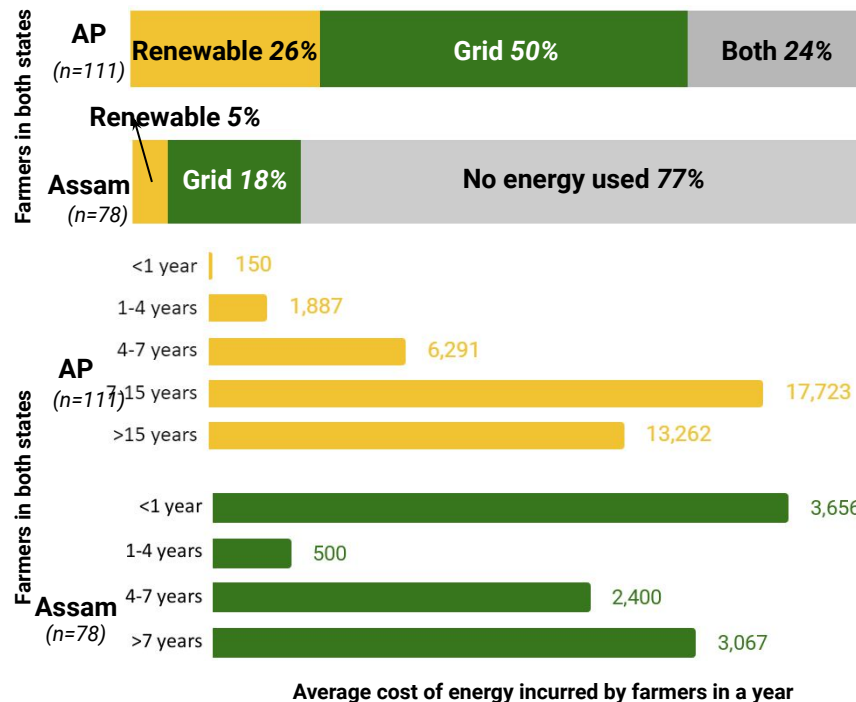
Govt provides free electricity to most of the farmers however there are few farmers who use fuel as a source of energy, these farmers incur a substantial cost.

23% farmers incur the cost of energy of which the average cost is ~INR 3000\* per year in Assam

66% farmers incur the cost for energy consumption of which the average cost is around ~INR 9000 per year in AP

The cost of energy is same in both the states however in Assam very few farmers (23%) use any energy for cultivation, on the other hand AP has a high percentage of farmers utilizing energy within the plantations. Conducive environment and geographical features of Assam reduces the need for extensive irrigation, thereby lowering the need of energy required for water supply.

\*This data has been optimized and extreme figures of farmers who have incurred cost more than 30,000 have been removed from the average calculation.



# Labour | Most farmers do not hire external farm labour in Assam whereas there is a greater reliance on external labour in AP

Assam, n=78

AP, n=111



Fencing for plantations is not required in AP, however in Assam **~80%** of farmers hire **external labour** for **fencing their plantations** to protect from animal attacks.



**1 in 2** farmers hire external labourers for **weeding** in Assam, while **84%** farmers in AP hire external labourers for the same.



Farmers in Assam also need labourers for land preparation before plantations to carry out **digging and land clearance**, **28%** hire external labourers for the same.



**50%** farmers in Assam hire external labourers for planting seedlings, compared to AP where **~2X** farmers hire **external labourers for planting seedlings**.



Farmers in AP extensively use bio/organic manure. **77%** farmers within the sample in AP hire **external labour for manure application**. Assam farmers do not use organic manure extensively.



**84%** farmers in AP hire **external labourers for Irrigation** largely to oversee irrigation on plantations while in Assam irrigation is largely rainfed, requiring no labour usage.



Farmers (**91%**) in AP hire **external laborers for fertilizer application on their fields**, however in Assam labour utilization is less on this activity as the rate of fertilizer application is low there.



Most farmers across both state utilize household labor for harvesting the crop. Only **26%** farmers in Assam and **34%** farmers in AP hire **external labourers for harvesting**.

*There exists variation in Labour usage across both states, in Assam labour is being used largely by farmers who have been farming for <1 year and 4-7 years, i.e. in setting up the plantation and the initial harvesting years, while more farmers in AP rely on external labour for specific activities such as manure application, weeding and overseeing irrigation.*

**Labour I** The external labour is largely local contractual workers and not migrant in Assam (91%) and AP (71%), these workers are hired for carrying out various farming activities

### Migrant vs. Local Contractual Labourers

Oil Palm cultivation in both the states is carried out mostly labours hired locally on contract basis.

9% farmers in Assam reported that they hire migrant labourers (n=45)

29% farmers in AP reported that they hire migrant labourers (n=103)

### Male vs. Female Labourers

Oil Palm is a mainly a male dominated activity. This is true for the labourers hired for carrying out various farming operations as well.

73% farmers in Assam hire only men, 24% hire men and women both whereas **only 2%** farmers hire only female labourers.

6% farmers in AP hire only male labourers and rest **94%** hire both male and female labourers

### Cost of Labour

The farmers in **Assam** incur a **labour cost of ~3500** on an average per acre for a year. On the contrary, the average spending of a farmer in **Andhra Pradesh** is around **~11000 per acre**.

“  
We hire women labourers only for cleaning activities in the field... for other activities like harvesting and loading of bunches on tractor they are not suitable as it requires a lot of manual strength  
- Farmer (M, 63), West Godavari, AP  
”



From L-R: 1. Farm labourer harvesting FFBs in Goalpara, Assam  
2. Farm labourers applying fertilizers in West Godavari district, AP



# III. Constraints Faced by Smallholders

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# Constraints | Key Pre-farm constraints and % of farmers across various archetypes facing them

	Assam			Andhra-Pradesh		
	Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years	Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years
Fertilizers	100% Farmers using less than 5 fertilizers	30% Farmers using less than 5 fertilizers	25% Farmers using less than 5 fertilizers	9% Farmers using less than 5 fertilizers	0% Farmers using less than 5 fertilizers	2% Farmers using less than 5 fertilizers
Irrigation	84% Farmers don't have irrigation system	78% Farmers don't have irrigation system	63% Farmers don't have irrigation system	0% Farmers don't have irrigation system	0% Farmers don't have irrigation system	0% Farmers don't have irrigation system
Disease Infestation	2% Farmers suffering with disease infestation	26% Farmers suffering with disease infestation	13% Farmers suffering with disease infestation	43% Farmers suffering with disease infestation	64% Farmers suffering with disease infestation	72% Farmers suffering with disease infestation
Seeds	2% Farmers are not receiving subsidies / paying cost for seeds	13% Farmers are not receiving subsidies / paying cost for seeds	0% Farmers are not receiving subsidies / paying cost for seeds	30% Farmers are not receiving subsidies / paying cost for seeds	32% Farmers are not receiving subsidies / paying cost for seeds	48% Farmers are not receiving subsidies / paying cost for seeds



# Constraints | Key Constraints and % of farmers across various archetypes facing them

		Assam			Andhra-Pradesh			
		Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years	Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years	
Intercropping		<b>38%</b> Farmers are not doing intercropping	<b>38%</b> Farmers are not doing intercropping	<b>12%</b> Farmers are not doing intercropping	<b>83%</b> Farmers are not doing intercropping	<b>100%</b> Farmers are not doing intercropping	<b>98%</b> Farmers are not doing intercropping	
	Energy		<b>13%</b> Farmers incur more than average cost of energy	<b>22%</b> Farmers incur more than average cost of energy	<b>13%</b> Farmers incur more than average cost of energy	<b>26%</b> Farmers incur more than average cost of energy	<b>20%</b> Farmers incur more than average cost of energy	<b>26%</b> Farmers incur more than average cost of energy
		Labour		<b>24%</b> Farmers incur more than average labour cost	<b>35%</b> Farmers incur more than average labour cost	<b>50%</b> Farmers incur more than average labour cost	<b>39%</b> Farmers incur more than average labour cost	<b>32%</b> Farmers incur more than average labour cost
Market Linkage			<b>NA</b>	<b>96%</b> Farmers are not receiving NMEO-OP price	<b>88%</b> Farmers are not receiving NMEO-OP price	<b>N/A</b>	<b>16%</b> Farmers are not receiving NMEO-OP price	<b>9%</b> Farmers are not receiving NMEO-OP price

# Constraints | Key Constraints and % of farmers across various archetypes facing them

		Assam			Andhra-Pradesh		
		Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years	Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years
Cooperatives		96% Farmers are not part of FPOs / Cooperatives	57% Farmers are not part of FPOs / Cooperatives	38% Farmers are not part of FPOs / Cooperatives	83% Farmers are not part of FPOs / Cooperatives	80% Farmers are not part of FPOs / Cooperatives	69% Farmers are not part of FPOs / Cooperatives
	Human-animal Transportation	NA	72% Farmers incurring transportation cost with no reimbursement	88% Farmers incurring transportation cost with no reimbursement	NA	0% Farmers incurring transportation cost	0% Farmers incurring transportation cost
Human-animal Conflict		51% Farmers reporting this challenge	9% Farmers reporting this challenge	0% Farmers reporting this challenge	0% Farmers reporting this challenge	0% Farmers reporting this challenge	0% Farmers reporting this challenge
	Land Rights	7% Farmers do not have ownership of land	26% Farmers do not have ownership of land	13% Farmers do not have ownership of land	13% Farmers do not have ownership of land	24% Farmers do not have ownership of land	12% Farmers do not have ownership of land

# Constraints | Key Constraints and % of farmers across various archetypes facing them

		Assam			Andhra-Pradesh		
		Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years	Farmers in Gestation Period	Farmers Harvesting <5 years	Farmers Harvesting >5 years
Soil Quality		<b>89%</b> Farmers do not have access to soil testing	<b>83%</b> Farmers do not have access to soil testing	<b>75%</b> Farmers do not have access to soil testing	<b>55%</b> Farmers do not have access to soil testing	<b>37%</b> Farmers do not have access to soil testing	<b>47%</b> Farmers do not have access to soil testing
		<b>4%</b> Farmers reported climate change & extreme weather events as a challenge	<b>22%</b> Farmers reported climate change & extreme weather events as a challenge	<b>0%</b> Farmers reported climate change & extreme weather events as a challenge	<b>35%</b> Farmers reported climate change & extreme weather events as a challenge	<b>60%</b> Farmers reported climate change & extreme weather events as a challenge	<b>72%</b> Farmers reported climate change & extreme weather events as a challenge

## IV. Andhra Pradesh

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# Subsidies in Andhra Pradesh

Sl. No.	Name of the Component/ Services	Unit	Total Unit cost (Rs)	Financial Assistance (%)	Financial Assistance (Rs)	Maximum subsidy limit (Rs)	Remarks
1	Plant Material	Ha	20000 Indigenous & 29000 Imported per Ha	100	20000 Indigenous & 29000 Imported per Ha	entire landholding	
2	Maintenance Cost	Ha	42000.00	50	21000	21000	@ Rs.5,250/- per Ha for 4 years
3	Drip Irrigation	Ha			24035		As per PMKSY guidelines
4	Pump sets/ Diesel engine	No	45000.00	50	22500	22500	
5	Bore well	No	100000.00	50	50000	50000	
6	Inputs for inter crop	Ha	42000.00	50	21000	21000	Rs.5,250/-for 4 years
7	Vermi Compost units	No	30000.00	50	15000	15000	
8	<b>Machinery &amp; Tools</b>						
	a) Oil palm cutter.	No	5000.00	50	2500	2500	
	b) Oil palm protective wire mesh	No	40000.00	50	20000	20000	
	c) Motorized chisel	No	30000.00	50	15000	15000	
	d) Aluminum Portable ladder	No	10000.00	50	5000	5000	
	e) Chaff Cutter	No	100000.00	50	50000	50000	
	f) Small tractor	No	400000.00	50	200000	200000	
9	Farmers Training	No			30000		for a batch of 30 farmers for 2 days
10	Training of extension officers	No			40000		for a batch of 20 officers for 2 days
11	Replanting of old oil palm garden	No	250.00	100	250		

Source: Information shared by Additional Director of Horticulture (Planning, Establishment, RKVY & NMOOP), Andhra Pradesh

# Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs)

The Government of India launched this Central Sector Scheme in the year 2020 with a total budgetary outlay of INR 6865 Crores to enable farmers to enhance their bargaining power, leverage economies of scale, reduction in cost of production and enhancing farmers' incomes through aggregation of their agricultural produce, thus playing a major role towards sustainable incomes.

## Provisions of the scheme are as follows:

- FPOs being provided financial assistance upto Rs.18.00 lakh per FPO for a period of 03 years.
- In addition to this, provision has been made for matching equity grant upto Rs.2,000 per farmer member of FPO with a limit of Rs.15.00 lakh per FPO
- Credit guarantee facility upto Rs.2 crore of project loan per FPO from eligible lending institution to ensure institutional credit accessibility to FPOs.
- Rs.25 Lakhs are given to Cluster Based Business Organizations (CBBO) for hand holding each FPO over a period of five years.

## Progress in Andhra Pradesh

As on 30.11.2023, under the said scheme so far, 461 FPOs were allocated in the State of Andhra Pradesh of which 355 FPOs are registered.

The following table represents district-wise number of FPOs allocated for the districts covered under the study:

District	No. of FPOs
East Godavari	20
Eluru	28
Srikakulam	12
West Godavari	5
Krishna	23

Source: [FORMATION OF FPOS IN ANDHRA PRADESH](#)

Notes: Out of the study districts, Nellore was not mentioned in the list and the crops were not specified in the document

# *References*

---



## Sources for Secondary Research (1/2)

#	Source and Link
1	<a href="#">NMEO-OP Guidelines (Nov 2021)</a>
2	<a href="#">Andhra Horticulture Department</a>
3	<a href="#">Oil palm in Andhra Pradesh: prosperity at what cost?</a>
4	<a href="#">Oil palm expansion in northeast India gives rise to human-elephant conflict concerns</a>
5	<a href="#">Oil palm plantations proved to be a disaster in Mizoram – is Assam next?</a>
6	<a href="#">3F Oil Palm signs Rs 550 crore pact with Andhra for plantation, processing</a>
7	<a href="#">Vision 2050 - IIOPR</a>
8	<a href="#">Sustainable Palm Oil Good Agriculture Practices Guideline</a>
9	<a href="#">Palm Oil Market and Sustainability in India (2013)</a>
10	<a href="#">FERTILE GROUND – INDIA'S DOMESTIC PALM OIL INITIATIVE IS A SPRINGBOARD FOR SUSTAINABLE PRODUCTION</a>
11	<a href="#">Responsible Business Practices in the Indian Palm Oil Sector (2014)</a>
12	<a href="#">India needs to make palm oil production sustainable</a>
13	<a href="#">India's palm oil drive faces reality check</a>
14	<a href="#">Oil palm farmers in Arunachal Pradesh lose hope in absence of processing mills, market, road linkage</a>
15	<a href="#">India's Palm Oil Push Leaves Northeast Indian Farmers, Forests at Risk</a>
16	<a href="#">Why Meghalaya plans to stay away from Palm Oil plantations</a>
17	<a href="#">Oil palm in the 2020s and beyond: challenges and solutions</a>
18	<a href="#">STATUS PAPER ON OIL PALM</a>
19	<a href="#">Andhra Pradesh sets sight on Oil Palm Cultivation</a>



## Sources for Secondary Research (2/2)

#	Source and Link
20	<a href="#">Oil palm push in the northeast may impact biodiversity, water table, say experts   Latest News India - Hindustan Times</a>
21	<a href="#">Oil palm in Assam: Non-remunerative price and adverse impact on intercropping compel a section of farmers in Goalpara and Kamrup to withdraw from it</a>
22	<a href="#">Improving the Livelihoods of Palm Oil Smallholders: the Role of the Private Sector</a>
23	<a href="#">Oil Palm Cultivation Best Practices by IOPR-ICAR</a>
24	<a href="#">Wastelands of India – PeepLi</a>
25	<a href="#">How India's palm oil push is changing land relations in the North East</a>