

Frequently Asked Questions in OIL PALM



National Research Centre for Oil Palm
(Indian Council of Agricultural Research)
Pedavegi - 534 450, W.G. Dist., Andhra Pradesh





National Research Centre for Oil Palm, Pedavegi



National Research Centre for Oil Palm, Regional Station, Palode

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Questions in
OIL PALM***



NATIONAL RESEARCH CENTRE FOR OIL PALM
(Indian Council of Agricultural Research)
Pedavegi, West Godavari District, Andhra Pradesh-534 450



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FOREWORD

Area under Oil Palm is increasing year by year steadily. Farmers are very much enthusiastic to know more about the crop. In this direction an effort has been made to compile the Frequently Asked Questions in Oil Palm by various people for it's cultivation. I hope, this bulletin will create awareness among the people who want to know about various aspects of oil palm cultivation which includes production & availability of seed sprouts, suitability of the land, growing of the crop in various situations, harvesting and processing facilities available etc.

I appreciate the efforts of Scientists and Training Associates for compiling and bringing out this publication.



Dr. M. Kochu Babu

Director

National Research Centre for Oil Palm

National Research Centre for Oil Palm is organising trainings, seminars, symposia, interface meets, group discussions, exhibitions and field visits on oil palm. Various questions raised and clarifications sought by the participants during the deliberations were compiled and documented along with answers.

This publication was brought out to create awareness about oil palm and clarify general doubts in oil palm cultivation. Suggestions and advises to improve this publications for the benefit of oil palm fraternity are welcome.

Authors

OIL PALM CULTIVATION ***(Requirements, Facilities provided by Government and Entrepreneurs)***

? What is the minimum area required to grow oil palm?

Ans.: The minimum area required to grow oil palm is one hectare and maximum is 15 hectares under the oil palm development programme.

? Where will we get literature on oil palm cultivation?

Ans.: Literature pertaining to oil palm cultivation is available at NRC for Oil Palm, Pedavegi -534 450, West Godavari district, Andhra Pradesh and its regional station, Palode, Trivandrum - 695 562, Kerala, Department of Agriculture/Horticulture in respective oil palm growing states.

? Who will supply seedlings, where it will be available?

Ans.: Seedlings are raised by the entrepreneur identified for the area. Farmers can directly approach the entrepreneur or the Department of Horticulture/ Agriculture of the area/district.

? Please tell us about marketing of oil palm and government support to cultivate oil palm and other subsidies?

Ans.: Oil Palm Development Programme (OPDP) is being implemented in 11 potential states (for oil palm cultivation) in India. As per that, oil palm potential areas were allotted to oil palm processing companies in respective states. Each company will take up area expansion in respective areas and collect the Fresh Fruit Bunches (FFB). Price Fixation Committee of the respective states will fix oil palm FFB price. These FFB rates will be paid to the farmers by the processors with in a fortnight/ month.

Following are some of the facilities / subsidies provided to Oil Palm growers in different states, with different components (may change every year). For further details please contact Agriculture / Horticulture Officer / Office of Asst. Director/ Entrepreneur of the area.

In Andhra Pradesh

1. Assistance for planting material (75%) not exceeding Rs. 7,500/ha. The maximum limit is 15 ha per beneficiary.
2. Cultivation subsidy 50% not exceeding Rs. 15,500/ha. over a period of 4 years. The maximum limit is 15 ha per beneficiary.

3. Drip irrigation subsidy upto 70% as per the Andhra Pradesh Micro Irrigation Project (APMIP) norms.
4. Subsidy on vermi compost units to encourage organic farming upto Rs. 15,000/ unit per farmer.
5. Fifty percent assistance on inter crop, 1. Cocoa plant material cost Rs. 2.50/ plant, 2. Pepper Rs. 3.00/plant, not exceeding for an area of 4 ha. per farmer.
6. Fifty percent assistance not exceeding Rs. 850/unit per beneficiary for purchase of harvesting tool.
7. Subsidy on Chaff cutter Rs. 20,000/unit.
8. Trainings will be organised for a group of 50 farmers either at NRC for Oil Palm and on farm; TA & DA will be provided to the participants by the department.

In Karnataka

1. Planting material subsidy up to 75 per cent of the total cost with a ceiling of Rs.7,500/- per hectare will be given for entire land holding of the farmer. This works to Rs. 50/seedling. This is given to entrepreneurs.
2. Assistance for cultivation cost of 15,500/- per hectare admissible up to 15 ha for individual Farmer.
3. Drip irrigation subsidy up to 75 % of the total cost for the first 2 ha, with a ceiling of Rs. 13,950/ha and for the next 2 ha 50% of the cost with a ceiling of Rs.9,300/ha is extended to the oil palm farmer.
4. For training / tour a sum of Rs. 15,000 has been allocated for a batch of 50 farmers. This will be conducted in joint collaboration with oil palm entrepreneurs and the department officials.
5. State government providing literature to the farmers about oil palm cultivation and also conducting method demonstrations to impart knowledge about oil palm.
6. Subsidy on diesel pump sets up to 50% of the cost with a maximum ceiling of Rs.10,000/- will be given to the farmers, who take up 2 ha. and more oil palm.
7. Demonstrations : Under oil palm demonstrations entire expenditure subject to the maximum of Rs. 10,000/- ha. For planting material and for cultivation during gestation period of 4-5 years, a maximum of Rs.30,950/- ha will be provided.
8. Assistance for purchase harvesting tools (ultra light weight alluminium poles) at the rate of 50%, with a maximum limit of Rs. 2000/- per beneficiary.
9. Assistance to the oil palm growers for purchase of light weight alluminium ladder,

subsidy is extended up to Rs. 10,000/- per ladder/beneficiary.

10. Assistance to the oil palm growers for purchase of leaf chopping machine, will be provided at the rate of 50%, with a maximum limit of Rs. 14,000/-
11. Assistance to the oil palm growers for purchase of grass cutter will be extended up to 50% cost to a maximum limit up to Rs. 16,000/-/farmer.
12. Assistance for bore well will be provided up to 50% subsidy to a maximum limit of Rs. 25,000/-per beneficiary to the new successful bore wells drilled.
13. Awards for the best oil palm growers at state level (Two awards), at District level (three awards) in 3 categories (Category I: > 5 ha; Category II: 1-5 ha; Category III: > 1 ac but < 1 ha) and 2 groups (group 1: young gardens between 4-8 years; group 2: mature gardens which are > 8 years and above).

In Goa

1. Area expansion and maintenance subsidy (Rs. 17,350/-)
2. Assistance for drip irrigation (Rs. 6,000/-)
3. Training of farmers (Rs. 300/farmer)
4. Demonstrations including maintenance for 4 years (Rs. 17,850/-)
5. Assistance for diesel pump set (Rs. 10,000/-)
6. Other components
 - a) Improved implements like harvesting poles/sickles
 - b) Gypsum / soil conditioners
 - c) Micro nutrients
 - d) Publicity material
 - e) Training of farmers and officers
 - f) Productivity linked incentives for oil palm growers.

In Tamil Nadu

1. Cultivation and maintenance subsidy for 3 years.
2. Training to oil palm growers on the cultivation aspects.
3. Innovative components like
 - i). Database of oil palm growers association.
 - ii). Precision farming at grower's field.

4. New components like
 - i). Assistance for submersible pump sets.
 - ii). Assistance for purchase of harvesting tools
 - iii). Assistance for purchase of bunch/ leaf chaff cutters.
5. Awards for the best farmers of six districts.
6. State level award by purchase of machinery and equipment or any other kind.
7. Extension support-Training will be provided to farmers and officers.
8. Subsidy for installation of drip irrigation or microirrigation.

In Mizoram

1. Assistance for planting materials @ Rs. 7500 / ha
2. Assistance for cost of cultivation for 4 years @ Rs. 4600/, Rs.3300/,Rs.3500/, Rs.4100/ for 1st,2nd,3rd and 4th year respectively.
3. Assistance for diesel pump set @ Rs. 10,000/set
4. Assistance for drip irrigation @ Rs. 8000/- per beneficiary
5. Assistance for construction of water harvesting structure @ Rs. 25,000/- per unit
6. Farmers training @ Rs. 15,000/ per 50 farmers
7. Providing facilities i.e supply of plant protection chemicals, fertilizers, HDPE pipes, polythene sheet for storage of water, tools & implements, knapsack sprayer for plant protection etc.,

In Kerala

1. Subsidy to farmers
 - a. Seedling subsidy Rs. 7,500/ha
 - b. Planting subsidy Rs. 15,500/ha
2. Providing technical / extension assistance to farmers.

? Who are supplying indigenous seed sprouts in India ?

Ans.: Following agencies / organizations are supplying indigenous seed sprouts from respective Oil Palm seed gardens in India.

1. NRC for Oil Palm, Pedavegi-534 450, West Godavari District, Andhra Pradesh.
2. NRC for Oil Palm, Regional Station, Palode, Pacha Post -695 562, Kerala.

3. Asst Director of Horticulture, Oil Palm Seed Garden, Rajahmundry-533 103, A.P.
4. Assistant Director of Horticulture, Oil Palm Seed Garden, Taraka, Mysore571 114, Karnataka.
5. M/s. Oil Palm India Ltd., Regd. Office:XIII-354, Old Star Theatre Road, P.B. No:1715, Kottayam South P O-686 039, Kerala.
6. M/s. Navabharat Agro Products Ltd., Uppalametta, Jangareddygudem-534 447, West Godavari District, A.P.

? Who are the entrepreneurs available in our area/ state and what are the processing facilities available?

Ans.: You are requested to contact area Agricultural Officer / Horticultural Officer / office of the Assistant Director of Agriculture/Horticulture for area allotment details including the allotment of an entrepreneur. Following are the entrepreneurs located in respective areas / states. Details of the extraction capacity of the processing mills and location furnished below .

S. No.	State and Name of the Entrepreneur	Location	Capacity (Mt/hr)
A	ANDHRA PRADESH		
1	M/s. Simhapuri Agro Product Pvt. Ltd.	Nellore, Nellore District	5
2	M/s. Navabharat Agro Products Ltd.	Uppalametta, West Godavari Dt.	5
3	M/s. Godrej Agrovet Ltd.	Dwarakaturumala, West Godavari Dt.	10
4	M/s. Palm Tech India Ltd.	Peddapuram, East Godavari Dt.	15
5	M/s. Radhika Vegetable Oils Pvt. Ltd.	Garividi, Vizianagaram Dt.	7
6	M/s. Food Fats &Fertilizers Ltd.	Yernagudem, West Godavari Dt.	10
7	M/s. MAC Oil palm	Ampapuram, Krishna Dt.	10
8	M/s. AP OILFED Ltd.	Pedavegi, West Godavari Dt.	4
9	M/s. Srinivasa Enterprises	Srikakulam Dt.	4
10	M/s. Sri Lakshmi Balaji Oil palm Ltd.	Parvatipuram, Vizianagaram Dt.	--
11	M/s. Ruchi Soya industries,	Madhuranagar Colony, Srikakulam Dt.	--
12	M/s. Agro Co-Operative Corporation,	Asilmetta, Visakhapatnam Dt.	5
13	M/s. AP OILFED Ltd.	Aswaraopet, Khammam Dt.	10

Frequently Asked Questions in Oil Palm

S. No.	State and Name of the Entrepreneur	Location	Capacity (Mt/hr)
B	KARNATAKA		
1	M/s. Palm Tech India Ltd.	Kabini	1
2	M/s. Bhadravathi Balaji Oil Palm Ltd.,	Bhadravathy	10
3	M/s. Food Fats &Fertilizers Ltd.	Koppal	--
4	M/s. Simhapuri Agro Product Pvt. Ltd.	Hospet	--
C	KERALA		
1	M/s. Oil Palm India Limited	Kottayam	20
2	NRC for Oil Palm	Palode, Thiruvananthapuram	1
3	M/s. United Oil palm planters & extractors Ltd.	Kuravilangad	0.3
D	TAMIL NADU		
1	M/s. Cauvery Oil palm Ltd.	Perumbalur	2.5
2	M/s. Food Fats &Fertilizers Ltd.	Thoothukudi	--
3	M/s. Vaidehi Properties Private Ltd.	Arakkonam, Vellore Dist.	--
4	M/s. Godrej Agrovet Ltd.	Tirunalveli	--
5	M/s. Ruchi Soya Industries	Theni	--
E	GUJARAT		
1	M/s. Kalyan cooperative mill	Navsari	2.5
2	M/s. Food Fats &Fertilizers Ltd.	Vyara, Surat	--
3	M/s. Godrej Agrovet Ltd.	Bilad, Valsad Dist.	--
4	M/s. Ruchi Soya Industries	Anand	--
F	Goa		
1	M/s. Godrej Agrovet Ltd.	Valpoi	2.5
G	Andaman & Nicobar Islands		
	M/ s. A & N islands Forest and Plantations Development Corporation	Little Andamans.	5
H	Orissa		
1	M/ s. Food Fats &Fertilizers Ltd.	Dhenkanal	--
2	M/s. Godrej Agrovet Ltd.	Berhampur, Ganjam District	--
3	M/s. Vaidehi Properties Private Ltd.	Nayagadh	--
4	M/s. Ruchi Soya Industries	Balator	--
5	M/s. Sri Lakshmi Balaji Oil Palm Ltd.	Attada, Raigadh	2.5
I	Mizoram		
1	M/ s. Food Fats &Fertilizers Ltd.	Serchhip	
2	M/s. Godrej Agrovet Ltd.	Kolasib, Mamit	
3	M/s. Ruchi Soya Industries	Lunglei	
4	M/s. Palm Tech India Ltd.	Lawngelai	

? What are the potential districts to grow oil palm in different states in India and what is the extent of potential in those states ?

Ans.: Following are the potential districts to grow oil palm in respective states in India.

State	Districts
Andhra Pradesh	East Godavari, West Godavari, Khammam, Krishna, Nalgonda, Nellore, Srikakulam, Visakhapatnam, Vizianagaram
Chhattisgarh	Bilaspur, Dantewada, Durg, Jagadapur, Korba, Kanker, Mahasamund, Raigarh, Raipur
Goa	North Goa, South Goa
Gujarat	Anand, Bharuch, Bhavnagar, Godhra, Kheda, Narmada, Navsari, Surat, Vadodara, Valsad
Karnataka	Belgaum, Uttar Kannada, Davangere, Haveri, Bellary, Gadag, Koppal, Raichur, Chamarajnar, Hassan, Kodagu, Mandya, Mysore, Chikmagalur, Shimoga, Bagalkote, Bijapur, Gulbarga
Kerala	Alappuzha, Ernakulam, Idukki, Kannur, Kasaragod, Kollam, Kottayam, Kozhikode, Malappuram, Palakkad, Pathanamthitta, Thiruvananthapuram, Trissur, Wynad
Mizoram	Aizawl, Champhai, Kolasib, Lawngtlai, Lunglei, Mamit, Saiha, Serchhip
Orissa	Dhenkanal, Gajapati, Ganjam, Jaipur, Kendrapada, Koraput, Nayagarh, Rayagada, Sundergarh
Tamil Nadu	Cuddalore, Karur, Nagapattinam, Perambalur, Thanjavur, Tiruvarur, Tirunelveli, Thiruvallur, Theni, Trichy, Thoothukudi, Vellore, Villupuram

Potential areas identified in different states

State	Potential area identified earlier (ha)	Reassessed potential area (ha) 2006
Andaman & Nicobar	-	0
Andhra Pradesh	4,00,000	4,00,000
Assam	10,000	0
Chhattisgarh	0	40,000
Goa	10,000	2,000
Gujarat	61,350	90,000
Karnataka	2,50,000	2,50,000
Kerala	5,000	6,500
Maharashtra	10,000	0
Mizoram	0	61,000
Orissa	10,000	25,000
Tamil Nadu	30,000	1,62,000
Tripura	5,000	0
West Bengal	10,000	0
TOTAL	8,01,350	10,36,500



CROP PRODUCTION

(Climatic Requirements, Pre planting, Planting, Irrigation, Fertilisers, Intercultural operations and Intercropping)

? What are the factors to be considered while selecting the plot for oil palm cultivation?

Ans.: Good soil i.e., well drained, deep, loamy alluvial soils rich in organic matter with good water permeability. Avoid high alkaline, highly saline (more than 8.5 pH), water logged and coastal sandy soils. Adequate water availability and power supply.

? Whether oil palm will come up well in black cotton soils?

Ans.: Soils having pH from 6.5 to 8.5 are suitable to grow oil palm under irrigated conditions. Oil palm will not come up well in black cotton soils. Ill drained soils, saline and alkaline soils are also not suitable to grow oil palm. However, if some one is particular to grow oil palm in black cotton soils, drainage needs to be improved. It was observed that application of 1 truck load of red earth / sand / murrum at a depth of 1 -3 ft from the surface into the basin of 3 m diameter, improved soil and plant growth over a period of 3 years. Yield was also increased significantly.

? What are the precautions to be taken up while planting of oil palm in clay soils/ new clay soils needed to bring for oil palm cultivation?

Ans.: Permeability of the soil has to be improved. This can be achieved through application of sand and copious amounts of organic matter. However, all these would involve additional expenditure.

? How many plants can be accommodated in one Ac/ha?

Ans.: Triangular method of planting must be followed with 9 meter spacing to accommodate 57 plants per acre or 143 plants per hectare.

? What is the best season for planting oil palm?

Ans.: Monsoon period is the best season for planting i.e., June to December. However planting can be done in other seasons as well with assured irrigation facility but will require additional care.

? How to manage irrigation in oil palm?

Ans.: Oil palm requires sufficient irrigation, as it is a fast growing crop with high productivity and biomass production. Do not grow oil palm if assured and adequate

irrigation facility is not available. Insufficient irrigation will reduce the rate of leaf production, affects the sex ratio and results in inflorescence abortion and yield reduction.

For grown up yielding palms of 3 years age and above a minimum of 200-250 liters of water per day is must. However, in older plantations during hot summer this amount may be increased up to 300-350 liters.

When irrigation is not a constraint, basin irrigation can be taken up. Prepare irrigation channels in such a way that, the individual palms are connected separately by sub channels.

If irrigation water is limited and land is of undulated terrain drip or micro sprinkler irrigation will be of advantage.

In drip system, a minimum of four drippers has to be placed for each palm. If each dripper discharges 8 liters of water per hour, 7 hours of irrigation per day is sufficient to discharge 224 liters per day. Drippers should be checked periodically for proper discharge of water. Basins must be adequately mulched, which will help to conserve moisture. Do not run irrigation channels along the palm rows.

? What is the frequency of irrigation in basin system?

Ans.: Required quantity (@ 200- 250 lit per day / palm normally and 300-350 lit/day/palm during hot summer) of water could be given at weekly intervals. For light soils frequent irrigation with less water is to be given. If more water is given at a time, leaching of nutrients would be more. In heavy soils, irrigation intervals can be longer.

Basins must be adequately mulched and covered with soil, which will help to conserve moisture effectively in basin system of irrigation.

? Whether drip irrigation can be provided to oil palm, any subsidy is available?

Ans.: Yes, drip irrigation can be provided to oil palm. In drip system, four drippers have to be placed for each palm (in light soils dripper number need to be increased). If each dripper discharges 8 liters of water per hour, 7 hours of irrigation per day is sufficient to discharge 224 liters per day. Drippers should be checked periodically for proper discharge of water.

Subsidy for drip irrigation for oil palm is available on the drip material, 50-70%, not exceeding Rs. 50,000/- per farmer. Please contact the office of the Assistant Director of Horticulture/Agriculture of the respective district.

? What are the water stress symptoms?

Ans.: If water is adequate, normally one unopened spindle, one partially opened spindle and one fully opened spindle can be seen in the crown of oil palm. If palm is under severe water stress two or more unopened spindles will be seen in the crown of the palm. More the severity of drought more the unopened leaves.

? How to manage oil palm during summer?

Ans.: When temperature reaches $\geq 40^{\circ}\text{C}$ and RH is low, if heat waves exist during summer, the adverse climate will affect oil palm growth and yield. Hence necessary precautions need to be taken during summer in oil palm plantations (Water stress to the palm can be identified in oil palm with the presence of two or more unopened spindles on the crown).

If irrigation is provided through basin method, in light soils provide more frequently with recommended quantity. In heavy soils provide recommended quantity in less frequency. If irrigation is provided through micro irrigation, check the discharge of drip/jets.

Mulching : In order to avoid losses through evaporation, check weed growth and conserve moisture, practice mulching in the palm basins with coconut husk, oil palm empty fruit bunches, oil palm/coconut fiber, maize stalk, dried oil palm fronds etc.

? If irrigation is not given for some time, what will happen to oil palm?

Ans.: If irrigation is not given to oil palm for some time, palm will be subjected to water stress. All biological activities will be stopped and three or four unopened spindles will appear in the crown, which is an indication of water stress. Insufficient irrigation will reduce the rate of leaf production, affects the sex ratio and results in inflorescence abortion and yield reduction. Although reduction in rate of leaf production can be seen immediately, yield reduction will be visualized only after several months to 3 years.

? What to do if power supply is very less and water is a constraint?

Ans.: Avoid growing oil palm in such conditions.

? How to provide good drainage in heavy soils?

Ans.: Provide trenches (1 feet width, 3 feet depth and to a required length) across the slope for every three or four rows of oil palm.

? What are the advantages of mulching?

Ans.: Mulching in addition to conserving moisture, maintain soil temperature, add organic matter and nutrients mainly potassium, improve physical and biological properties of soil and check weed growth in the basin area.

? What is the quality of water required to irrigate oil palm?

Ans.: The pH of the water should be neutral to acidic and Electrical Conductivity can be in the range of 1-2 m mhos.cm⁻¹.

? What is the fertilizer requirement for oil palm?

Ans.: Oil palm is a heavy feeder and demands a balanced and adequate supply of macro, secondary and micro - nutrients for growth and yield. For newly planted crop, the first dose of fertilizer can be applied three months after planting. Nutrient requirements are 400 gm of nitrogen, 200gm of phosphorous, 400 gm potash and 125 gm of magnesium sulphate in the first year; 800 gm of nitrogen, 400gm of phosphorous, 800 gm potash and 250 gm of magnesium sulphate in the second year; 1200 gm of nitrogen, 600gm of phosphorous, 1200 gm potash and 500 gm of magnesium sulphate need to be applied in third year onwards.

Borax @ 100 gm per palm per year is recommended when the deficiency symptoms are noticed. Fertilizers are to be applied in a minimum of three to four equal splits in a year. If good FYM is available, add 50 – 100 kg FYM or 100 kg green manure per palm along with the second dose of fertilizer application. Five kg of neem cake per palm can also be applied. However care should be taken to reduce the nitrogen through chemical fertilizer in proportion to that available in FYM.

Broadcast the fertilizers around the clean weeded basin, about 50 cm away from the palm base as the absorbing roots are concentrated there and incorporate fertilizer into the soil by forking. Irrigate the palms immediately after fertilizer application.

If the native soil fertility is high, nitrogen application can be reduced. Where yields are 30-35 t/ha amount of potash may be increased to 1800-2400 gms/palm/year. (3-4kg of muriate of potash/palm/yr.)

Frequently Asked Questions in Oil Palm

If fertilizers are applied in the form of urea, single super phosphate and muriate of potash, following quantities may be applied in three to four equal splits.

Age of the palm	Urea (gms/palm/yr)	Single super phosphate (gms/palm/yr)	Muriate of potash (gms/palm/yr)
First year	870	1250	667
Second year	1740	2500	1333
Third year and above	2610	3750	2000

If fertilizers are applied in the form of DAP, urea, and muriate of potash, following quantities may be applied in three to four equal splits.

Age of the palm	Urea (gms/palm/yr)	Diammonium phosphate (gms/palm/yr)	Muriate of potash (gms/palm/yr)
First year	700	435	667
Second year	1400	870	1333
Third year and above	2100	1305	2000

If fertilizers are applied in the form of Ammonium sulphate, Single super phosphate and muriate of potash, following quantities may be applied in three to four equal splits.

Age of the palm	Ammonium sulphate (gms/palm/yr)	Single super phosphate (gms/palm/yr)	Muriate of potash (gms/palm/yr)
First year	1942	1250	667
Second year	3883	2500	1333
Third year and above	5825	3750	2000

If fertilizers are applied in the form of Urea, complex fertilizers (10:26:26) and muriate of potash, following quantities may be applied in three to four equal splits.

Age of the palm	Urea (gms/palm/yr)	Complex fertilizer (10:26:26) (gms/palm/yr)	Muriate of potash (gms/palm/yr)
First year	703	769	333
Second year	1405	1538	667
Third year and above	2108	2308	1000

If fertilizers are applied in the form of Urea, complex fertilizer (17:17:17) and muriate of potash, following quantities may be applied in three to four equal splits.

Age of the palm	Urea (gms/palm/yr)	Complex fertilizer (17:17:17) (gms/palm/yr)	Muriate of potash (gms/palm/yr)
First year	434	1176	333
Second year	870	2353	667
Third year and above	1304	3529	1000

? Is it good to give fertilizer through drip system?

Ans.: If provision exists in the drip system, it is always good to give fertilizers through drip irrigation.

? What is the quantity of fertilizer to be applied for oil palm, in case through fertigation?

Ans.: Although this has not been established for oil palm, studies with other crops indicate that the fertilizer requirement can be reduced up to 50% through fertigation.

? What is the frequency of fertilizer application in oil palm?

Ans.: Fertilizers can be applied in 3 / 4 splits in oil palm. Based on the soil (sand) type more number of splits is also advised.

? What is the method of fertilizer application?

Ans.: Fertilizers are to be applied in 3 / 4 equal split doses starting from June. After application of fertilizers, magnesium and boron can be applied with a 2/3 days gap respectively.

Broadcast the fertilizers around the clean weeded basin, about 50 cm away from the palm base as there exist the absorbing roots and incorporate fertilizer into the soil by forking with iron rake. Irrigate the palms immediately after fertilizer application.

? Whether oil palm needs copper?

Ans.: Yes, it needs copper in minute quantities. But no deficiency has been observed so far in areas where oil palm is grown presently.

? What type of intercrops can be grown in oil palm? What are the precautions to be taken while growing intercrops ?

Ans.: Oil palm is a wide spaced perennial crop with a long juvenile period of three years. A lot of horizontal and vertical space both above and below ground is available. This space can be used to generate income during the juvenile phase of the crop.

Crop selected for intercropping should be compatible with the main crop and should not compete with the oil palm for light, water and nutrients. Crops like vegetables, banana, flowers, tobacco, chillies, turmeric, ginger and pineapple etc. can be grown.

In case of maize, sorghum, and sugarcane proper spacing needs to be given. Oil palm crop should not be affected due to shade and root competition of inter crop.

While growing pulses like green gram, black gram, cowpea and oilseeds like gingelly,

groundnut which do not require frequent irrigation, care must be taken to irrigate oil palm regularly, so that oil palm does not suffer for lack of water.

While raising intercrops avoid tying or cutting of oil palm fronds, which will reduce photosynthetic activity and avoid ploughing close to the palm base, which will cut the absorbing roots and there by reduce intake of water and nutrient. Allow oil palm to grow freely.

Maximum number of green leaves should be retained on the palm, only the lower dried and senile leaves must be pruned. Severe pruning must be avoided, as it will adversely affect the growth and yield.

? Whether cocoa can be grown as intercrop in oil palm?

Ans.: Yes, Cocoa can be grown as intercrop in oil palm when, oil palm attains age of 10 – 12 years or 5 – 6 meters height. Cocoa should be planted in a single row in the inter row spaces of oil palm @ 158 plants per acre or 395 plants per hectare. Care should be taken to avoid excess sunlight or complete shade while cocoa is planted. Cocoa should not compete for water and nutrients with oil palm, hence water and nutrients need to be provided separately as per recommendation.

? How many leaves have to be retained in the crown?

Ans.: In order to have better photosynthetic activity in the palm and for good growth of the palm, 45-50 leaves needed to be retained in the palm crown.

? Whether pruning can be done?

Ans.: No, pruning cannot be done in oil palm. However older leaves, senile leaves, pest or disease affected leaves can be removed selectively.

? How to control weeds?

Ans.: Regular manual weeding should be taken up. Herbicides, preferably contact herbicides should be used. Among systemic herbicides, Glyphosate (750 ml/ha/year or 17.5 ml/basin) is recommended for effective weed control. Weedicide is applied while weeds are in early growth stage for effective control. Weedicide is applied on a clear sunshine day, with 8 hours of dry atmosphere after spray. Avoid irrigation while weedicide is applied. The effect of weedicide would be seen in one week after application. Apply 2/3 times in a year if weed density is more. Mulching, growing cover crops and intercrops also reduce weed growth.

? Whether ploughing can be done in oil palm?

Ans.: No, ploughing shouldn't be done in oil palm. Oil palm roots are at a very shallow depth. Ploughing close to the palm base, will cut the absorbing roots and there by

reduce intake of water and nutrients. This will lead to reduction in the rate of leaf production, affects the sex ratio and results in inflorescence abortion and yield reduction.

? Some palms are giving more male flowers only, why?

Ans.: Stress caused due to lack of sufficient irrigation, lack of adequate nutrition, severe ploughing, severe leaf pruning, pest/disease incidence, will increase the sex ratio resulting more male flowers than female flowers.

? Why some bunches are aborting?

Ans.: Stress caused due to lack of sufficient irrigation, lack of adequate nutrition, severe ploughing, severe leaf pruning, pest/disease incidence can lead to abortion of bunches.

? Some palms are huge and robust, but not yielding, why?

Ans.: Tenera oil palm which is commonly grown commercially is a hybrid, obtained by crossing a female parent Dura and a male parent Pisifera. Some times few palms show Pisifera characters, which is huge, robust without any yield.

? Whether hard soil will affect yield?

Ans.: Hard or compact soil will severely affect root growth, which in turn affect the uptake of water and nutrients, ultimately lead to less leaf production, affects sex ratio and results in emergence of more male flowers and affects the yield.

? What is ablation?

Ans.: Ablation is the removal of male and female flowers produced in the early stages in plantation. This helps the plant to gain adequate stem girth, vigour and develop adequate root system. Ablation should be done immediately after appearance of inflorescence. Inflorescence can be removed easily by hand pulling. Ablation can be extended up to two and half to 3 years depending on the plant growth and vigour.

? How many leaves can be removed during harvesting?

Ans.: In oil palm dead, dried and diseased leaves only can be pruned. The leaves, which are obstructing harvesting, can be removed.

? What are the management practices for cyclone affected palms?

Ans.: The methodology followed for cyclone affected palms depends on the extent of damage are as under:

Management of uprooted palms: Two strategies may be adopted depending on damage. **Replanting of uprooted palms:** A pit of one cubic meter is dug close to

the bole without disturbing the root system adhering to the soil. The leaves of the fallen palms are cut off leaving six leaves on the crown from the top to avoid excessive transpiration losses. Apply 25 gm Phorate granules in the pit to avoid termite damage. The pit is filled with soil around the bole and pressed hard to avoid air pockets. After replanting each palm is applied 1 kg rock phosphate and 2 kg vermi compost or FYM to accelerate root growth. The crown is sprayed with 0.2 per cent Carbendazim followed by heavy irrigation to avoid sudden drying. Application of 20 percent more fertilizers than recommended (i.e. 1440 gm N, 720 gm P and 1440 gm K) is also recommended.

Replanting with new seedlings: In this case, the uprooted palms have to be removed and new seedlings with the age of 12 – 14 month old should be planted.

For crown damaged palms the leaves that are damaged should be cut and give a protective spray of Carbendazim and apply 20 percent more fertilizers than recommended (i.e. 1440 gm N, 720 gm P and 1440 gm K).

For slanted palms which are tilted more than 25 degrees are advised to put maximum effort to make them straight rather than leaving them to grow naturally otherwise it may lead to breaking of palms after some years. Apply 20 percent more fertilizers than recommended (i.e. 1440 gm N, 720 gm P and 1440 gm K)

? What are the cost effective management practices to get higher yields in oil palm?

Ans. The cost effective management practices are : 1. Use all the organic residues from the oil palm gardens to recycle the nutrients. This can cut the cost of fertilizers up to 75%. Apply fertilizers continuously as per recommendations. 2. Adopt micro irrigation system, which may involve large initial investment, but in the long run works out to be more cost effective, as it saves water and produce more yield per unit of water used. It also reduces weeding costs.

? How to over come salt water problem in oil palm?

Ans.: Normally oil palm does not come up well in saline as well as alkaline soils. Therefore, try to avoid growing oil palm with salt water. If already planted and encountering with salt water problem, try to leach the salts with additional water and also add organic matter continuously to minimize the adverse affects.

? What are the causes for premature fruit dropping in oil palm?

Ans.: During initial years of bearing, immature fruit drop is common. But with advance of age this will be stopped. Some times it may be due to physiological imbalance

or due to fluctuations in temperature and humidity during summer. Try to provide irrigation at frequent and regular intervals during summer. Add mulch in the palm basins. If it appears to be due to a pathological problem try to contact area Horticulture Officer / office of Assistant Director of Horticulture / Factory personnel or NRC for oil palm for remedial measure.

? From which stage onwards intercultural operations are to be taken up in oil palm?

Ans.: Intercultural operations are most important immediately after the seedlings are transplanted in the main field. At this stage the seedlings are very small and widely spaced, hence the seedlings should not face any competition from weeds. To achieve this, basins should be kept clean all the time. Secondly, during the first three years as the seedlings don't occupy all the land that is provided, care should be taken to raise some intercrops or green manure crops so that the seedlings will not experience, hot winds or excessive soil heating, which may hinder the seedling growth.

? What are the causes for getting yields in high and low quantities alternatively in a year in oil palm?

Ans.: Yield cycles with in a year and between years is common in oil palm i.e. when the palms yield continuously high yields in certain years, sometimes they will be followed by low yields in the following year later with good yields in the following year/s if managed well. This should not worry the farmer. However, care should be taken to provide consistently good management through out the productive life of the palm.

? What is the cause for producing male inflorescences in high proportions in some palms, though good water management conditions are existing?

Ans.: The reasons could be 1. The palm might have produced high bunch number in the previous year. 2. Palm may be of male parent type. For additional information please contact Horticultural officer / office of Assistant Director of Horticulture / Factory personnel or NRC for Oil Palm.

? How to grow oil palm on hill slope areas, how to irrigate and apply fertilizers ?

Ans.: Planting can be done on the terraces with three meters radius on one side and bund on the other side. Half moon shaped basin can be prepared around oil palm after planting for irrigation. Fertilizers can be applied with in the basin.

? How much yield can be obtained from one ha Oil Palm plantation ?

Ans.: Oil Palm starts flowering from 18 months after planting, ablation will be practiced till $2\frac{1}{2}$ years to 3 years. Under well managed conditions, during initial stages (4 to 6 years), it gives upto 20-24 small bunches (weight ranging from 3-15 kgs.). Over the years gradually the bunch size will increase and the average bunch number would be 10-14. In adult plantations the bunch average size ranges from 20-35 kgs. From well managed plantations, an average yield of 12-25 tonnes/ha can be obtained during 5-9 years of age and 25-30 tonnes/ha from 10 years of age and above.

? Which variety of seedling is good? Whether Costa Rica, Ivory Coast, PNG or Palode and which will yield best?

Ans.: Research results showed that, they are all uniform in their yield performance, hence all of them are equally good.

? If I burn the crown region of the palm (which is giving only male flowers, not giving bunches)? Whether I get good bunches?

Ans.: There is no scientific reason that it will give bunches. Hence could not be recommended.

? Whether I can grow coconut, cashew, and citrus as inter crops in adult oil palm?

Ans.: Coconut should never be grown in oil palm plantations. Cashew and citrus can be grown in adult oil palm plantations if sufficient light and water is available. However, no scientific study is conducted on this aspect.

? Can I plant the seedlings, which are emerged from the falling fruits in my garden?

Ans.: No, commercially grown oil palm is a hybrid, hence the seeds obtained from them should never be used to raise new garden in view of segregation.

? Many farmers are telling that in adult palms, entire root system was spread all over, Can I irrigate 4 palms by making a big basin or flooding the entire row?

Ans.: Yes, if water is not a constraint, and field is levelled, wetting the whole plantation can be done using check bunds. However, care should be taken to see that all the palms are uniformly irrigated.



MANAGEMENT OF NUTRITIONAL DISORDERS

? **What is magnesium deficiency?**

Ans.: Normally magnesium deficiency symptoms appear in the form of yellowing of older leaves. With in a leaf also the portion of leaflets exposed to sun turn whitish yellow, while the shaded portion remain green. Application of 500 g of Magnesium Sulphate per plant per year will overcome this problem.

? **Why leaves are becoming yellow?**

Ans.: Leaves become yellow for any one of the following reasons. 1) Deficiency of Nitrogen or Magnesium, 2) Due to diseases like, bud rot, stem wet rot etc. Therefore, care should be taken to ascertain the exact cause.

? **Why leaves are twisting?**

Ans.: This may be due to severe boron deficiency or palm is reviving from bud rot infection or reviving from the rhinoceros beetle damage.

? **Why white stripes symptoms appear?**

Ans.: White stripes in the leaves occur when the N: K ratio in the leaves is more than 2.5, boron deficiency and excessive application of nitrogenous fertilizers. Application of 3 to 4.5 kg of Muriate of Potash per palm along with temporary cessation of nitrogenous fertilizers will control the imbalance.

? **Why leaves become small and crinkle in some palms?**

Ans.: Symptoms viz., hooked leaf / fish bone leaf / crinkled leaf occur due to deficiency of Boron. Soil application of borax at the rate of 100 g per palm per year is recommended.

? **In some oil palm plantations, the leaves in the crown region are bent and crinkled and could not rectified after the application of borax and the symptoms are persisting for 2 to 3 years. What might be the reason and how to overcome the problem?**

Ans.: Boron deficiency is the most elusive of the deficiencies of oil palm. The symptoms manifest in the form of hooked leaf, rounded frond tip, blind leaf, leaflet chaffer, brittle tip, crinkled leaf and fish bone. There would be reduction of leaf area in the younger leaves and produce incipient "little leaf" and advanced little leaf with extreme leaf area reduction. If these symptoms continuously exist this may lead to low yields over a period of time.

A complex fertilizer, sodium tetraborate (which consists of 20.5 per cent B as boric acid) can be applied in three splits i.e., 50: 50: 100 grams to overcome the deficiency.

? Is there any Zinc deficiency in oil palm? If yes, what are the symptoms?

Ans.: Zinc deficiency symptoms are not observed in adult palms.

? At what age onwards the micro nutrient deficiency symptoms appear?

Ans.: These may appear right from nursery stage onwards.

? Why leaf ends of oil palm are showing rust like colour?

Ans.: Rust coloured spots on leaves and leaf edges are characteristic symptoms of potash deficiency. Confirm this with leaf analysis and then apply recommended dose of potash.

? Where are the boron fertilizers available?

Ans.: Normally they are available along with other fertilizers in the market. However if they are not available, you may seek the help of area Horticultural Officer / Assistant Director of Horticulture / area factory personnel. They will be able to make necessary arrangements, if there is shortage or the quality is not good.

? In some oil palm plantations leaves are bending and breaking, what are the reasons and how to manage the problem ?

Ans.: The problem of leaf breaking / buckling was observed during summer months or immediately after summer on occurrence of first monsoon showers; in the plantations of 8-12 years age; across all the different sources of planting material and mostly in sandy soils. The problem of leaf breaking is noticed in the plantations, where number of leaves are more and leaf size is unusually big, suggesting it may be due to excessive application of nitrogen fertilizers. Keeping these above observations in mind, it is suggested that care should be taken not to over fertilize, especially nitrogen, in light soils. Extra precaution should be taken to irrigate adequately during summer months.

However, a detailed scientific study to understand and workout strategy to prevent such leaf breaking is envisaged.



PEST MANAGEMENT

? Why pollinating weevils are essential in oil palm?

Ans.: In oil palm, male and female flowers are borne on different inflorescences. For fruit development, the pollen from male flowers should reach the female flowers. Weevils are found to be the best agents to transfer pollen from male to female flowers. In the absence of weevils bunch failure will be common and the yields will be reduced drastically.

? Some palms are giving half filled bunches, why?

Ans.: This may be due to inadequate pollination, inadequate nutrient status and irrigation especially during the time of high yields.

Management: There is no recovery once bunch failure has started and hence all control measures must be aimed at avoiding those conditions which favor bunch failure. Providing adequate nutrients especially for palms newly in production. Where bunch failure is a result of inadequate pollination, efforts should be taken to release the pollinating weevil, *Elaeidobius kamerunicus* and correct the situation.

? Petioles are having holes, why?

Ans.: This is a symptom of rhinoceros beetle damage.

? How to control Rhinoceros beetle?

Ans.: Rhinoceros beetle damage symptoms are seen as wedge shaped gaps in the leaf silhouette, permanently marked hole on the leaf petioles due to the beetles penetration. Adult beetles tunnels into crown of the palm at the base portion and eat the soft tissue or sap.

Adopt any one or more of the following measures to manage the incidence of pest. To prevent the pest incidence maintain sanitation in the orchard. Destroy the grading sites apply green Muscardine fungus *Metarrhizium anisopliae*. Do not apply partially rotten farmyard manure or compost to the palms as they may contain grub stages of the pest. Use only completely rotten farmyard manure or compost. Treat compost pits with insecticides like Carbaryl or Quinalphos regularly to kill the young stages of the pest.

To control the pest incidence extract and kill the insects from spindle portion with metallic hook. Trap the adults with fermented castor cake bait/pheramone trap

and kill the adult beetles. In the young palms, keep Phorate granule sachets (with perforations) in the crown to avoid pest incidence.

? How to control Rhinoceros beetle with caster cake baiting?

Ans.: Take fresh caster seeds, roast and grind them to powder form. This powder should be mixed in rice washed water or thadi or yeast for fermentation and keep this for 12 days. After 12th day keep sufficient quantity in individual wide mouthed earthen pots (4-6 /ac) and place them near (among) oil palm plants to attract the adult beetles. Change the bait if it is dried or diluted with rain water

? How to control leaf-eating caterpillar?

Ans.: Root feeding with Monocrotophos @10 ml with 10 ml of water. Drenching the basin with Malathion or Quinalphos @ 2 ml per litre of water.

? How to control mealy bug?

Ans.: Spray Phosphamidon or Dimethoate @ 2ml in 1 litre of water or Methyl parathion @1 ml in 1 litre of water.

? How to control rats?

Ans.: Use integrated management practices. Use zinc phosphide bait or different types of rat traps. Keep Aluminum phosphide tablets in rat holes. Cover the bole region of seedlings with wire mesh at the time of planting against the burrowing rats and porcupines.

? How to protect the bunches from bird damage?

Ans.: Cover bunches with chicken wire mesh. Use bird scaring device. Hang nylon fishnets of 9 m X 1 m in between two palms @ 5 nets per ha.

? How to control termites?

Ans.: Destroy the termite colonies by killing the queen. Spray Chlorpyrifos @ 5 ml per litre of water in basins and infested parts.

? How to protect from wild pigs and animals?

Ans.: Use wild animal scaring devices and electric fence.

? Whether insecticides can be sprayed on oil palm?

Ans.: Generally not recommended, however need based application is recommended. Care should be taken not to harm the pollinating weevils.



DISEASE MANAGEMENT

? Why the spindle is rotting and what is the control measure?

Ans.: This symptom is due to bud rot incidence. Bud rot affected oil palm shows yellowing of spear leaves subsequently turning to brown. The spear leaves collapse and can be easily pulled out. To control this, disease affected tissues in the crown should be removed and drenched with fungicide solution, like Carbendazim 0.1% or Thiram 0.2%. To treat advance stage disease, leaves surrounding the spear should be cut and affected tissues should be removed layer by layer till fresh tissues are seen and smeared with 1% carbendazim solution.

? Why bunches are rotting at maturity?

Ans.: Due to bunch rot. During the early stages of infection, strands of mycelium of the fungus *Marasmuis palmivorus* can be seen spreading over the bunch surface. Mycelium development is particularly more at the back of the bunch against the subtending frond where conditions are very moist. In later stages mycelium grows over the fruit surface and penetrates the mesocarp to produce wet rot.

? Why some bunches are rotting in immature stage itself?

Ans.: Due to bunch rot disease. In early stages of infection strands of mycelium can be seen spreading over the bunch surface, mycelium development is particularly more at the back of the bunch against subtending frond where conditions are very congenial. In later stages mycelium grows over the fruit surface and penetrates the mesocarp to produce wet rot. This may be due to retention of affected bunches on the palm which favor spreading of mycelium from one part to other parts of the palm.

Management : Remove the dead inflorescence, bunch stalks, aborted bunches before onset of the monsoon. Infected palms should be thoroughly cleaned and sprayed with carbendazim 0.1% (1 g in 1 litre of water) solution during pre-monsoon, monsoon, post-monsoon periods.

? Why bunch is detaching at half during harvesting?

Ans.: The fruits at the distal end rot and abort from the distal portions of the bunch. In most cases the rotten portions detach from the bunch leaving a crater in the proximal part of the bunch. This is called bunch end rot.

Management : To prevent extensive rotting and to check invasion of microorganisms and insects on affected bunches, a solution containing

Carbendazim 0.1% and Monocrotophos 0.01% (1ml in 1 litre of water) maybe sprayed during immature stage

? Lower leaves are becoming dry and palm dies, why?

Ans.: This may be due to stem-wet rot

? What is the white fungus appearing on the fruits?

Ans.: It is not fungus, white appearance is due to infestation of scales on fruits.



HARVESTING

? What are the good harvesting indices?

Ans.: When the bunch is matured and ready for harvesting, the indices are;

- a) Fruits in the bunch turn yellowish orange.
- b) 5-10 fruits from each bunch drop on their own.
- c) When pressed hard with the fingers, orange yellow coloured oil exudes from the fruit.

? How to harvest oil palm fresh fruit bunches (FFB) from tall palms?

Ans.: In tall and older plantations harvesting can be done with the help of sickle attached to a aluminum pole of 12ft. height. (1.5" inner diameter and 2 mm thickness). By using male and female joint, the height of the pole can be increased by fixing additional poles of 12ft height.

? Why bunches are not maturing uniformly?

Ans.: This may be due to water/nutrient stress and adverse climatic conditions.

? Harvesting is not feasible in 5 meters height plantations? How to harvest from such palms?

Ans.: For adult palms of 8 feet height and above, harvesting sickle fitted to aluminum pole extendable up to 45 feet can be used.

For further details please contact

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OIL PALM AT A GLANCE

Oil palm	:	Highest vegetable oil yielder per unit area (3-6 t/ha)
Family	:	Palmae
Species	:	<i>Elaeis guineensis</i> (African Oil Palm) <i>Elaeis oleifera</i> (American Oil Palm)
Source of oil	:	Palm oil : Mesocarp, Kernel oil : Kernel
Fruit forms (Variety)	:	<i>Dura</i> (thick shell) ; <i>Pisifera</i> (shell less) ; <i>Tenera</i> (thin shell)
Economic cropping period	:	25-30 years
Climatic requirements	:	Above 2000 mm distributed rain/irrigation Max. temp. 29-36°C Min. temp. 18-24°C Sunshine hours - 5 & above
No. of palms/ha	:	143 (9 x 9 x 9 m triangular)
Nursery period	:	12 - 18 months
Pollination	:	Insect (<i>Elaeidobius kamerunicus</i>)
Tree height	:	20 - 30m
Leaf production /year	:	24-30
Leaf length	:	6 - 8 m
First harvest	:	36 months after planting
Yield of FFB/ha	:	15 - 30 t
No. of bunches / palm/year	:	5 - 12
No. of fruits/bunch	:	Above 2000
Av. bunch weight	:	25 kg.
Weight of fruit	:	30 gm.
Fruit to bunch	:	42 - 65%
Mesocarp to fruit	:	60 - 83%
Oil to mesocarp	:	77 - 81%
Kernel to fruit	:	7 - 12%
Oil to kernel	:	49 - 52%
Shell to fruit	:	3 - 11%
Palm oil yield/palm	=	Bunch weight/palm x fruit/bunch x mesocarp/fruit x oil/mesocarp

Potential States for Oil Palm Cultivation in India

