

Details on Recommended Varieties, Fertilizer Doses, Agronomical Practices, Application of Pesticide, Yield and Productivity of Oil Palm

1. Recommended varieties:

Tenera is the recommended variety grown all over the world. It is cross between thick shelled 'dura' (mother palm) and shell less 'pisifera' (pollen parent). Tenera (T) has thin shell, medium to high mesocarp content and high oil content. At present in India five seed gardens were established where Tenera hybrid seeds are being produced and supplied to the agencies for raising the oil palm nurseries.

During 1982 seed production programme was initiated at Thodupuzha with basic breeding materials introduced from Malaysia and Nigeria. From this material eleven promising dura palms were selected and crossed with pollen of four pisifera palms imported from Nigeria. The tenera hybrids thus produced were further improved through intensive selection based on combining abilities in the progeny trials. Selfing/*inter se* crossing among selected genotypes was done and this gave rise to advanced dura and T×T populations subsequently planted in five seed gardens established in the country.

The best performing dura and pisifera palms are being selected regularly for augmenting the seed production of these seed gardens. Selection criterion for parental palms:

- Fresh Fruit Bunch yield
- Oil to Bunch ratio
- Morphological parameters
- Fruit characters

Accordingly the following number of dura and pisifera palms were provisionally selected at various seed gardens for crossing programme and hybrid seed production:

S. No.	Name of seed garden	No. of dura palms selected	No. of pisifera palms selected
1.	National Research Center for Oil palm, Regional Station, Palode (Kerala)	98	8
2.	Oil Palm India Ltd., seed garden, Kottayam (Kerala)	160	11
3.	Department of Horticulture seed garden, Rajahmundry (A.P.)	163	13
4.	Department of Horticulture seed garden, Taraka (Karnataka)	111	14
5.	M/s Nav Bharat Agro-Products Ltd., Lakshmipuram (A.P.)	102	13

From these five seed gardens around 2.0 million tenera sprouts are being produced annually. The sixth seed garden is established at NRCOP, Pedavegi from where production is yet to start. However the present production of oil palm sprouts indigenously is not sufficient to meet the area expansion targets. Hence sprouts are being imported from sources like Malaysia, Thailand, ASD Costa Rica.

2. Fertilizer Dosages

Fertilizer Application: Oil palm is a gross feeder and demands a balanced and adequate supply of macro, secondary and micronutrients for growth and yield.

The following fertilizer schedule is recommended for oil palm under rainfed conditions.

Fertilizers per plant per year in grams								
Age of the plant	Nitrogen as		Phosphorous as			Potassium as	Magnesium as	Boron as
	Urea (or)	AS	DAP (or)	SSP (or)	RP	Murate of Potash	Magnesium Sulphate	Borax
1 st year	870	(or) 2000	-	1250	(or) 1000	667	125	25
			(or)					
2 nd year	700	(or) 1610	435	-	-	667	125	25
			(or)					
3 rd year and above	1740	(or) 4000	-	2500	(or) 2000	1333	250	50
			(or)					
3 rd year and above	1400	(or) 3215	870	-	-	1333	250	50
			(or)					
3 rd year and above	2610	(or) 6000	-	3750	(or) 3000	2000	500	100
			(or)					
3 rd year and above	2100	(or) 4825	1305	-	-	2000	500	100
			(or)					

AS - Ammonium Sulphate
SSP - Single Super Phosphate

DAP - Di Ammonium Phosphate
RP - Rock Phosphate

Under irrigated conditions in gardens where 20 to 25 tonnes Fresh Fruit Bunches(FFB)/ha is obtained by 5th or 6th year, an additional 20% of the recommended dose shall be applied to maintain the productivity. Further, these doses have to be modified based on the soil and leaf analysis results to make the recommendations site specific. Borax at the rate of 100g/palm/yr is recommended when the deficiency symptoms are noticed.

Time of Application: Two equal split doses should be applied during July-August and December- January. For irrigated oil palm apply fertilizers in 4 or more split doses. For the newly planted crop the first dose of fertilizer application may be given three months after planting. Add 50-100kg FYM or 100kg green manure per palm along with the second dose of fertilizer application. Five kilograms Neem Cake/palm can also be applied. Whenever organic fertilizers are used proportionately reduce nitrogen application through chemical fertilizers.

Method of Application: Broadcast the fertilizers around the clean-weeded basin, about 50 cm away from the palm base and incorporate into the soil by forking. Irrigate the palms immediately after fertilizer application

3. Various Agronomical Practices

Climatic Requirements

Rainfall: Requires evenly distributed rainfall of 150 mm per month or 2500-4000 mm per annum. If rainfall distribution is not even and adequate grow the crop only with assured irrigation source.

Temperature: Crop comes up well between 29-35°C maximum and 22-24°C min. temperature.

Sunlight: Bright sunlight for atleast 5 hrs per day

Humidity: High humidity of more than 80%

Soils: Grows well on all types of soils. Best-suited soils are moist, well drained, deep, loamy alluvial soils, rich in organic matter with good water permeability. Avoid highly alkaline, highly saline, water logged and coastal sandy soils

Planting season: Planting can be done in any season. Best period is between June to December i.e. during monsoon season. In case of planting during summer season adequate irrigation, mulching and growing cover crops like sunhemp in the basin (1.5 meter radius) in two to three rows will help to overcome the summer

Age of seedlings for planting: 12-14 months old healthy seedlings with 1-1.3 m height from base and 13 functional leaves with good girth at collar

Plant Population: 143 plants per hectare or 57 plants per acre.

Spacing: 9m × 9m × 9m (triangular planting)

Planting Pit Size: 60cm × 60cm × 60cm

Take the pits prior to planting and allow to season. Transport quality seedlings to the planting site only at the time of planting. Apply 250g DAP or 400g Rock phosphate and 50g Phorate and mix with the soil at the base of the pit. Remove the bag by making a longitudinal cut and place the seedling in the pit along with the soil. Fill the gap in the pit with soil and press firmly leaving the top portion so that the seedling bowl will be 25 cm below the ground level. Immediately after planting form basin and give copious irrigation. Provide a wooden support if wind is more. Take care to see that the soil does not get accumulated at the crown region, which may lead to rotting of crown. In case of low-lying wetland soils planting should be done on raised mounds to avoid water logging and poor aeration.

Irrigation Management: 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 lead to reduction of the rate of leaf production, affects the sex ratio, results in inflorescence abortion and thereby yield reduction.

Quantity of water: Grown up yielding palms of 3 years age and above, require 200 - 250 liters of water per palm per day. However, in older plantations during hot summer this amount may be increased upto 300-350 liters.

Method of Irrigation:

i. **Basin Irrigation:** If irrigation water is not a constraint, basin irrigation can be taken up. Required quantity of water can be given at weekly intervals. Individual palms are connected separately by sub-channels. For light soils frequent irrigation with less water to be given. If more water is given at a time, leaching of nutrients will be more. In heavy soils, irrigation intervals can be longer.

ii. **Drip/Micro Sprinklers:** If irrigation water is limited and land is of undulated terrain drip or micro sprinkler irrigation can be advantageous. If drip system is installed, four drippers have to be placed for each palm. If each dripper discharges 8 liters of water per hour, 5 - 6 hr. of irrigation per day may be sufficient depending on age of palm. If microsprinkler system is installed two micro sprinklers (360⁰) have to be placed. In micro irrigation ensure adequate moisture supply every day through drip or micro sprinklers by periodically checking them for proper discharge. Basins should be adequately mulched and covered with soil, which will help to conserve moisture.

Drainage facility: If oil palm is grown in heavy soils and flood prone areas lay the drainage channels to allow drainage.

Weed Management: Take up regular manual weeding or use recommended herbicides. Use preferably contact herbicides. Glyphosate 750 ml/ha/ year or 17.5 ml/basin is recommended for effective weed control. Mulching, growing cover crops and intercrops minimizes weed growth. Do not use 2, 4-D, 2, 4, 5-T halogenated aliphatic acids, Dalapon and TCA. These compounds produce abnormalities in Oil Palm. See that the spray fluid does as not spill on the oil palm plants

Inter Crops: Oil palm is a wide spaced perennial crop with a long juvenile period of 3 years. This can be used to grow intercrops and generate income. Crop selected for intercropping should be compatible with the main crop and should not compete with oil palm for light, water and nutrients.

The most suitable intercrops for growing in juvenile oil palm plantations are banana, maize, tobacco, vegetables, flowers, etc. In mature gardens of 8-10 years age, intercrops

like cocoa, pepper, which require partial shade and which do not compete with oil palm for water, sunlight and nutrients can be grown.

While raising intercrops do not plough close to the palm base, which will cut the absorbing roots and thereby reduces intake of water and nutrients. Maximum number of green leaves should be retained on the palm. Only the lower dried and diseased leaves must be pruned. While pruning, give a clean cut to the petiole close to the stem with a sharp chisel. Any damage to petiole or stem will attract pathogenic infection. Severe pruning will adversely affect both growth and yield of the oil palm.

Flowering: Oil palm comes to flowering 14-18 months after planting. It produces both male and female flowers separately on the same palm. Male and female phases do occur naturally in a consequence cycles in a palm.

Large no of male flowers occur due to the following reasons resulting in low yields.

- a) Insufficient irrigation and irrigation at longer intervals.
- b) Non-application of recommended doses of fertilizers in appropriate quantities and time.
- c) Excessive pruning of fronds.
- d) Ploughing deeply and close to the palms damaging the active feeding roots.

Ablation: Ablation is the removal of male and female inflorescence produced in the juvenile phase of the palm. This enables the plant to gain adequate stem girth, vigour and develop adequate root system. Flowering starts from 14-18 months after planting and ablation can be continued up to 3 years of age. Remove the inflorescence immediately after emergence at the tender stage by hand pulling.

Pollination: Oil palm is highly cross-pollinated crop. Pollination is assisted by wind and insects. Release of pollinating weevil, *Elaeidobius kamerunicus* after 2¹/₂ years helps in good pollination and fruit set.

Mulching: Mulching of oil palm basins is essential to conserve soil moisture as well as to control weeds. Mulching can be done with dried leaves, male flowers, coconut husk, empty fruit bunches etc. In adult plantations all the cut leaves can be heaped in between two rows of oil Palm, which can act as mulch. Mulching in addition to conserving moisture, maintains soil temperature, adds organic matter and nutrients mainly potassium, and improves physical and biological properties of soil.

Cover cropping: Cover crops help in soil and water conservation and check weed growth. When incorporated in soil they also improve the organic matter content of soil and plant nutrient status. In pure plantations, cover crops can be sown at the time of planting oil palm seedlings and can be ploughed in after they are overgrown.

Green manuring: In young plantations of 1-3 years of age grow sunhemp around the palm basins in one or two rows within a radius of 3 feet from palm basin. When it reaches flowering stage incorporate in the basins. It will help in moisture conservation, improves soil condition, adds organic matter and inhibits weed growth.

Basin Management: During first year basins of 1 m radius to be taken around the palm removing the soil from inside so that the soil will not accumulate at the collar region. Basins must be widened to 2 m radius during second year and 3 m radius from third year onwards. Basin area of oil palm represents active root zone. Hence it must be kept clean and weed free to avoid competition for nutrients and water.

Harvesting: Proper and timely harvesting of fresh fruit bunches is an important operation which determines the quality and quantity of oil to a great extent. The following are the indicators of bunch maturity for harvesting:

- 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 colored oil exudates from the fruits.

Harvesting should be done at 10-12 days intervals. For harvesting in young plantations a sharp chisel attached to Aluminium or iron rod is used. For adult palms of 8ft height and above sickles fitted to Aluminium pole extendable up to 45 feet can be used.

4. Application of Pesticides

In general oil palm is affected by only a few pests and diseases. However in recent years the pests of other palm species are migrating to oil palm causing losses necessitating the farmers to go for control measures. A few of such pests, diseases and control measures are given below.

Pests/Diseases	Pesticides
Rhinoceros beetle	Lambda cyhalothrin (0.015%) <i>Metarhizium anisopliae</i> (biocontrol agent)
Psychid	Monocrotophos (0.036%)/ Quinalphos (0.05%)
Slug caterpillar	Quinalphos (0.05%)/ Lambda cyhalothrin (0.015%)/ <i>Beauveria bassiana</i> (biocontrol agent)
Leaf web worm	Quinalphos (0.05%)/Lambda cyhalothrin (0.015%)/ <i>Beauveria bassiana</i> (biocontrol agent)
Rats	Zinc phosphide/Bromodiolone/Brodifacum- baiting
Bunch rot	Carbendazim (0.1%)
Basal stem rot	Root feeding with 10 ml Calixin or Tridemorph in 100 ml water
Bud rot	Drenching the crown with 0.1% carbendazim solution and topical application of carbendazim paste in the spindle cluster region after doing surgery/removal of rotten tissue

5. Productivity and Yield

15 to 30 tonnes of Fresh Fruit Bunches(FFB)/ ha or 3 to 6 tonnes of Crude Palm Oil (CPO)/ ha under irrigated conditions