

# COCONUT CULTIVATION PRACTICES



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## COCONUT CULTIVATION PRACTICES

The coconut palm, *Cocos nucifera* L. is one of the most beautiful and useful palms in the world. In India it is cultivated over 1.52 million hectares with an annual production of 10043 million nuts. The productivity of coconut palm in India is very low and the main reason for such poor yields is that the cultivators do not pay much attention to its culture. There is enormous scope for improving yields of the existing plantations of coconut and for extending the area under this crop.

The coconut palm is found to grow under varying soil and climatic conditions and tolerate wide range in intensity and distribution of rainfall. However, a rainfall of about 200 cm per year and well distributed throughout, is the best for the proper growth and maximum yield. In areas of inadequate rainfall and with uneven distribution, irrigation is required.

**Cultivars and hybrids :** Coconut palms are broadly classified into two groups, the Talls and Dwarfs. The Tall cultivars largely grown in India are the West Coast Tall and East Coast Tall. For the agro-climatic conditions of Kerala and Karnataka, West Coast Tall, Lakshadweep Ordinary (Chandrakalpa) and Tiptur Tall are suitable. The dwarf cultivars are shorter in stature and start yielding earlier. The nuts of Dwarf cultivars are either green yellow or orange. The dwarf cultivars are generally grown for tender nuts and also for hybrid production.

The crosses between Tall and Dwarf forms show hybrid vigour for growth and yield. Laksha Ganga (LO x GB) is a T x D hybrid while Chandra Sankara (COD x WCT) is a D x T hybrid. Laksha Ganga, Chandra Sankara, Chandra Laksha (LO x COD), Ananda Ganga (AO x GB), Kera Ganga (WCT x GB) and Kera Sree (WCT x MYD) are superior hybrids, and yield 19-42 percent over other combinations and their parents. Laksha Ganga and Chandra Laksha also showed tolerance to drought.

**Establishing plantation :** Selection of seednuts and seedlings is of utmost importance in coconut as the performance of the new

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progeny can be evaluated only several years after planting.

**Selection of site :** Shallow soils with underlying hard rock, low lying areas subject to water stagnation and clayey soils are to be avoided. However, in lands reclaimed by heaping alternate layers of sand and clay, coconut thrives well. The depth of planting pits will depend upon the type of soil. In laterite soil with rocky substratum, deeper and wider pits, 1.2 x 1.2 x 1.2m, may be dug and filled up with loose soil, powdered cowdung and ash up to a depth of 60 cm before planting. In loamy soils with low water table, planting in 1.0 x 1.0 x 1.0m pits filled up to 50 cm depth is generally recommended. However, when the water table is high planting at the surface or even on mounds may be necessary. Even while planting at the surface or mounds, digging pits to plant seedlings and filling has to be done.

Normally while planting coconut seedlings arrange two layers of coconut husk at the bottom of the pit before filling up the soil with concave surface facing up and this will help in conserving soil moisture. In laterite soil addition of 2 kg of common salt will help in loosening the soil and easy root penetration.

**Spacing :** A spacing of 7.5 x 7.5m or 9 x 9m may accommodate 177 and 124 palms respectively, per ha under the square system of planting. If the triangular system is adopted an additional 20 to 25 palms can be planted. Also hedge system of planting can be adopted giving a spacing of 5.0 to 5.5 m along the rows and 9 to 10m between the rows.

**Planting and care :** It is advisable to plant seedlings at the beginning of south-west monsoon. If irrigation facilities are available planting can be done at least a month before the monsoon for better establishment. Planting can also be taken up before the north-east monsoon. In low lying areas seedlings are better transplanted after the cessation of the monsoon.

The transplanted seedlings should be shaded and irrigated properly during the summer months. Irrigation with 45 litres of water once in 4 days has been found to be satisfactory in sandy soils.

**Manuring :** To facilitate application of manures the pits are widened every year before the application of manure and gradually filled up as the seedlings grew. Fertilizers may be applied in two split doses. After the receipt of summer showers one-third of the recommended dose of fertilizers may be spread around the palms within a radius of 1.8m and forked in. Circular basins of 1.8m radius and 25 cm depth may be dug in August-September and green leaf or compost at 50 kg per palm may be spread in the pits. The remaining two-third of the recommended dose of fertilizers may be spread over the green leaf or compost and the basins covered.

Regular manuring from the first year of planting is essential to ensure good vegetative growth, early flowering and bearing and high yields.

#### Fertilizer Recommendation for Coconut (g/palm)

	May-June			September-October		
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
First year		Planting		50	40	135
Second year	50	40	135	110	80	270
Third year	110	80	270	220	160	540
Fourth year onwards	170	120	400	330	200	800

To supply the above quantity of nutrients for an adult palm it is required to apply about 1 kg urea, 1.5 kg Mussoorie phos/rock phosphate in acidic soil or 2 kg superphosphate in other soils and 2 kg muriate of potash. The fertilizers are applied in two split doses. If coconut mixture (10:5:20) is used, 5 kg of the mixture is applied in two split doses. It is preferable to add 1 kg dolomite or 1 kg lime plus 0.5 kg magnesium sulphate per palm per year to acidic soils.

**Irrigation and soil moisture conservation :** Where palms are irrigated application of 200 litres of water per palm once in 4 days will be beneficial. For drip irrigation only 30 litres of water per day per palm is required. Where there is scarcity of water this method can be adopted by giving 30 litres on alternate days.

Addition of coconut pith (coir dust) as a mulch at 25kg/palm basin or mulching using coconut husk with the convex side upwards will help in conserving soil moisture.

**Intercultivation :** In sandy soils, which are generally of low fertility and where luxuriant growth of weeds is not observed regular intercultivation may not be necessary; but in other soils intercultivation will be necessary to keep weeds under control.

**Cover cropping:** Cover cropping with *Mimosa invisa*, *Stylosanthes gracilis*, and *Calopogonium mucunoides* is generally recommended to prevent soil erosion and enrich organic matter content of the soil. This practice can be followed in places where inter and mixed cropping is not done. Green manure crops like sunhemp (*Crotalaria juncea*) and klinji (*Tephrosia purpurea*) can also be raised and ploughed in during August-September. These crops can be sown in April-May when pre-monsoon showers are received.

**Inter and mixed cropping and mixed farming :** A variety of inter-crops like pineapple, banana, elephant foot yam, groundnut, chillies, sweet potato and tapioca can be raised in coconut gardens after the palms attain a height of 5 to 6 meters. In older plantations, cocoa, pepper, cinnamon, clove and nutmeg can be grown as mixed crops. In places where rainfall is not well distributed, irrigation may be necessary during summer months. However, these crops are to be adequately and separately manured in addition to the manures applied to the coconut palms. Raising fodder grasses/legumes in coconut gardens and maintaining milch cows helps the farmers to enhance their income.

## **Plant Protection :**

**Rhinoceros beetle :** This is the most serious pest of coconut. The affected frond when fully opened will show characteristic geometric cuts. Infestation on spathes often destroys the inflorescence and thus prevents production of nuts.

Rhinoceros beetle is a prolific breeder and it can multiply whenever there are accumulation of decaying organic debris. As such, sanitation in coconut gardens by proper disposal of decaying organic debris is important in the management of rhinoceros beetle. Mechanical method of control is possible by extracting the beetle with beetle hooks, without causing any further injury to the growing point of the palm. Filling the innermost three or four leaf axils of palms with a mixture of 5 per cent BHC dust and sand in equal proportions is an effective prophylactic measure. Three applications in April, September and December are adequate to give sufficient protection to palms in heavily infested tracts. Thorough treatment of all the possible breeding sites of the beetle with 0.1 per cent BHC is an effective method of controlling the immature stages of the pest. This will help in reducing spathe attack and increasing the yield of the palms. Biological control using the pathogen *Baculovirus oryctes* is also a good and effective method.

**Leaf eating caterpillar :** It is another serious pest of coconut in the coastal and backwater tracts. The caterpillars live on the under surface of leaflets inside silken galleries and feed voraciously on the chlorophyll-containing functional tissues. The infestation is severe during the summer months (February to June). With the onset of south west monsoon the pest population declines.

In case of epidemic outbreak, spray the infested palms once with Dichlorvos (0.02%). Spray the under surface of leaves so as to give a thorough coverage to the larval galleries of the pest.

Biological control measures involving release of parasites like *Goniosus parasierola nephantidis*, *Elasmus nephantidis*, *Brachymeria nosatoi* and *Xanthopimpla punctatea* in the infested fields would control the pest population. The parasites can be obtained from breeding stations established in the major pest-infested regions and Central Plantation Crops Research Institute.

**Red palm weevil :** Generally palms of the age group 5-20 years are affected by red palm weevil. The major diagnostic symptoms of red palm weevil infestation are the presence of holes, oozing of a viscous brown fluid and extrusion of chewed up fibres through

the holes, longitudinal splitting of leaf bases and wilting of inner leaves.

Affected palms can be saved by injection of Carbaryl (Sevin) or Endosulfan 0.1 percent. One litre of the insecticide per palm may be introduced into the trunk through a hole above the infested portion, using an auger and funnel. All the holes on the affected stem should be plugged after injecting the insecticide suspension to the palm. A prophylactic treatment of filling all the leaf axils of young palms with equal portions of BHC or chlordane 5 percent dust and sand mixture in April, September and December reduces the weevil infestation.

**Root eating cockchafer :** The soil inhabiting white grubs cause damage to the roots of coconut besides infesting tuber crops like tapioca, colocasia, sweet potato etc., grown as intercrops in coconut gardens. The leaves of affected palms become sickly pale yellow. Heavy infestation causes immature nutfall.

Tilling or deep ploughing of infested soil will reduce the pest population to a great extent. Application of Thimet 10G @ 100g/palm in the basin during June and September and raking the top 15 cm soil would give effective control of the pest.

Minor pests like coreid bug (nut crinkler) causing button shedding can be controlled by spraying the affected bunches with Carbaryl or Endosulfan 0.1 per cent

**Mammalian pests :** Rats damage tender nuts and cause severe crop losses in many places. Rats can be controlled by providing mechanical barriers (bands), poison baits using zinc phosphide or application of 10g single dose anticoagulant bromadiolone (0.005%) wax cake @ 30 bait points/ha. The baits may be kept two times at an interval of 12 days on the crown of one tree out of every five trees. G.I. Sheet bands, 40 cm wide, fixed around the trunk of palms at a height of 2 m from the frond will serve as mechanical barriers for rats.

Coconut bunches can be protected from the ravages of frugivorous bats (*Pteropus edwardsii*) by covering the bunches with thorny twigs of the wild plant, *Ziziphus* sp.

**Bud rot :** This disease is caused by a fungus, *Phytophthora palmivora* and is more frequent in the young palms. The first

symptom of the disease is yellowing of one or two young leaves surrounding the spindle. The spindle withers and droops down. The tender leaf bases and the soft tissues of the crown rot into a slimy mass of decayed material, emitting a foul odour. The disease proves fatal if it is not checked in the early stage.

If the disease is detected in the early stage when the spindle is just withering, the infected tissue should be removed thoroughly by cutting the infected spindle along with two leaves surrounding it and the cut portion protected by application of Bordeaux paste. The treated wound should be given a protective covering with polythene sheet till the next normal shoot emerges. Badly affected trees which are beyond recovery should be cut and burnt. As a prophylactic measure, all the healthy palms in the vicinity of the diseased palms should be sprayed with 1 per cent Bordeaux mixture.

The same fungus infects nuts causing *Mahali* disease. The affected nuts fall off and decay. Prophylactic spray with Bordeaux mixture 1 per cent on the bunches will prevent the disease incidence.

**Root (wilt) disease :** The important visual diagnostic symptoms of the disease are abnormal bending or ribbing of the leaflets, termed as 'flaccidity', a general yellowing and marginal necrosis of the leaflets. The yield is reduced, the nuts are smaller and the kernel thin. The oil content of copra is also reduced. Mycoplasma like organism (MLO) is the causative agent of the disease. The disease is transmitted by lace bug *Stephanitis typica*.

Since the disease is not lethal but debilitating and no curative control measure is known at present, the approach will be to manage the disease in the already infected gardens.

**Leafrot :** This disease, caused by fungi like *Exserolium rostratum*, *Colletotrichum gloeosporioides* etc. is mostly prevalent in the southern districts of Kerala and generally occurs on palms already affected by root (wilt) disease. The spindle is first infected and in due course of time, all the leaves of the tree show disease symptoms. The reduction in leaf surface adversely affects the yield.

Spraying the leaves sequentially with Bordeaux mixture (1.0%), Dithane M45 (0.3%) and Fytolan (0.5%) at quarterly

intervals after removing all severely affected leaves, reduces further incidence of the disease to a considerable extent.

**Stem bleeding :** The typical symptom of the disease is the exudation of a reddish brown liquid through cracks developing on the trunk. The bleeding patches are generally noticed at the lower portion of the stem but they spread throughout as the disease advances. On drying, the liquid turns black. The affected tissues decay and in advanced cases only fibres can be seen at the site underneath the bark. Fatal instances of stem bleeding are not uncommon. The disease is caused by a fungus *Thielaviopsis paradoxa*.

Remove completely the affected tissues and apply Calixin 0.1 per cent followed by coal tar after 2-3 days. Through root feeding supply 100ml of calixin 5 per cent at quarterly intervals. Add 5 kg neem cake per palm along with the second dose of fertilizer application during September-October. Provide summer irrigation.

**Ganoderma wilt (Thanjavur wilt) :** The disease is caused by *Ganoderma lucidum* and *G. applanatum*. Drooping of the outer whorl of leaves followed by yellowing and gradual drying of inner whorls, appearance of bleeding patches at the basal portion of the stem, premature nut fall and decay of root system are the salient features of the disease. Adoption of phytosanitary measures, isolation of diseased palms from healthy ones by digging trenches all around, applying 2 ml of Calixin in 100ml of water or Aureofungin sol 1.3 g/100 ml water through root feeding at quarterly intervals and application of 5 kg neem cake per palm are beneficial in controlling the disease.

**Leaf blight or grey leaf spot :** This fungal disease caused by *Pestalotia palmarum* is common in most of the coconut growing states. The disease symptoms develop in the mature leaves of the outer whorl. Minute yellow spots encircled by greyish bands appear on the leaf surface which later become greyish white. These spots coalesce into irregular necrotic patches. Complete drying and shrivelling of the leaf blade are common when the infection is severe. Removal of the older affected leaves and spraying the foliage with 1 percent Bordeaux mixture will check the spread of the disease.