

Harvesting and Post-harvest Management of Coconut

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Coconut palms are productive throughout the year. However, the yield may vary from season to season. Almost on a monthly basis, a normal bearing coconut palm usually produces one harvestable bunch. On an annual basis, the number of bunches harvested per palm reaches about 14 from Tall varieties and 16 from Dwarf trees.

Coconuts are harvested for different consumptions. For the sweetest and tastiest coconut water, seed nuts usually take seven to nine months to grow from the flower opening before it matures. For copra, coconut milk and other derived food products, seed nuts take 10- 13 months to mature from the flower opening, so that the kernel is thick enough for commercial use

Harvesting of nuts

Twelve months old nuts are harvested at the interval of 30-45 days for seed as well as copra making and culinary purposes. For household use keep the nuts in vertical direction. However, for tender nut purposes 7 to 8 months old nuts are harvested. Nuts which are 11 months old give fiber of good quality. This is suitable for coir fiber.

In case of tall variety, the nuts harvested for seed purpose can be stored for 2 to 3 months period before sowing, whereas in case of dwarfs and hybrids, nuts should be sown within a period of 10 –15 days of harvest. On an average, we can have eight harvests, though the coconut palm produces inflorescence every month.





varieties, the yield varies from 70 to 80 nuts/palm/year. In tall varieties the yield varies from 80 to 100 nuts/palm/year whereas in hybrids the yield is 100 to 130 nuts/palm/year

Post Harvest Management

Fully matured nuts should be harvested. For collection of seed nuts/tender coconuts the bunches should be harvested and brought down by using ropes to prevent the damage of nuts. Copra should be dried to 6% moisture by sun drying or by using copra driers. The storage period of copra can be increased up to 6 months by storing the copra in polythene tar coated gunny bags. For household storage, the nuts may be kept in vertical position.

Dehusking: Manual dehusking with the help of an iron rod driven to the ground is strenuous and skill oriented. Presently mechanical devices are used for dehusking.

Copra Processing: The optimum moisture content in copra is 5-6 percent. Sun drying, smoke drying, kiln drying and indirect hot air drying are the commonly used drying methods.

(i) Sun Drying: Traditional system of copra drying is by spreading the cups (Split open coconut) on any open surface for sun drying. It takes about 8 days for sun drying. The deposition of dirt and dust on wet meat during sun drying results in deterioration of copra quality. Further, cloudy weather and low atmospheric temperature also reduce the quality of copra.

(ii) Solar Dryer: Use of a closed type solar dryer avoids the quality deterioration of copra due to deposition of dirt. Drying time is reduced to 3-4 days. A batch type of solar cabinet dryer with a capacity of 100 nuts developed at CPCRI takes only 3 days for drying.

(iii) Indirect Drying

Small Holder Copra Dryer: An indirect copra dryer of 400 nuts per batch capacity (using agricultural waste as fuel) developed at CPCRI is gaining popularity among coconut growers. The dryer requires only 3 sq.m for housing and could be carried by 2-3 persons. The drying time required per batch is 36 hours spread over 4 days. Kerala Agro Industries Corporation (KAICU) is manufacturing this type of dryer.

Large Holders Copra Dryer: Large size copra dryer with the capacity for 3500-4000 nuts is developed at CPCRI. The unit is suitable for large holding and copra processing societies.

For oil extraction, nuts are generally sun dried for copra making. In this case there is a chance of dirt accumulation followed by oil quality deterioration, nuts can be dried in various types of driers available (Kiln, electric and solar driers) and also sun drying. Good quality copra can be obtained in short time by using these driers. Moisture content in copra for final use should be around 5-6%. Store the copra in polythene tar coated gunny bags. The oil yield of WCT palms under rainfed condition will be around 1.7 to 2 tons/ha.

Climbing, Power tiller operated ladder, Climbing cycle / equipment are the commonly used harvesting methods. Harvesting of coconuts is commonly done by climbing the tree with the help of a rope ring round the feet or ankles of the climber or by using a ladder. On reaching the top, the climber taps the nut in the lowermost bunch and if it is matured, he cuts the bunch at the base of the stalk when it drops down to the ground. If the ground is very hard or if tender nuts are to be harvested, the bunches are lowered by using a rope. The climber also cleans the crown and removes the dry leaves, sheaths and spathes.

In the West Coast and certain other tracts where coconut leaves are required for thatching houses, one or two lowermost leaves are also cut down at the time of harvest. The cutting down of green leaves is considered undesirable as it affects the yield of trees to some extent. Nuts which are to be stored for making ball copra are not harvested till they are completely ripe and dry.

Yield

The average yield of coconut palm is 80 – 100 nuts/palm/year depending on the variety. In dwarf

3. Smoke Free Copra Dryer for Medium Holding

CPCRI has developed this dryer with a drying capacity of 1000 nuts per batch. This can dry coconut in 24 hours. It has got unique furnace where in the fuel used is only shell.

4. Electrical Copra Dryer: CPCRI has developed an electrically operated dryer with forced hot air circulation. Its capacity is 1000 nuts per batch with a drying time of 28 hrs.

(iv) Ball Copra: Ball copra is a superfine quality product which commands a premium price in the market. It is prepared by storing fully mature nuts for 10-12 months, when kernal get detached from the shell. CPCRI has developed dryer to prepare ball copra in shorter time by giving different heat treatments.

(v) Copra Grading: The copra is graded in the order of its market value. The grading is mainly based on moisture content, foreign matter and black copra. The maximum limits for the same are 10 per cent, 2 per cent and 5 per cent respectively. However, the good quality copra should have the following requirements:

The Good Quality Copra	
Particulars	(%)
Moisture	6
Oil content	71
Acid value	2.5
Foreign matter	0.5
Mouldy cups	5
Wrinkled cups	5 (free)
Black copra	1 (free)

Milling Copra	
Particulars	
Foreign matter (per cent by weight – maximum)	1.0
Mouldy and black kernels (per cent by count – maximum)	10.0
Wrinkled kernels (per cent by count – maximum)	10.0
Chips (per cent by weight – maximum)	10.0
Moisture content (per cent by weight – maximum)	6.0

Edible Ball Copra	
Particulars	
Size (diameter) minimum in mm	75.0
Foreign matter (per cent by weight – maximum)	0.2
Mouldy and black kernels (per cent by count –maximum)	2.0
Wrinkled kernels (per cent by count – maximum)	10.0
Chips (per cent by weight – maximum)	1.0
Moisture content (per cent by weight – maximum)	1.0

Safe storage of copra: Copra obtained from commonly cultivated varieties / cultivars is attacked by various insect pests in store. Among these ham beetle, *Necrobia rufipes* and saw toothed grain beetle, *Oryzophilus surinamensis* are of major importance, which can cause more than 15% loss to copra when stored for more than six months.

Precautions for safe storage of copra for more than three months:

Dry the produce to four per cent moisture content. Avoid heap storage, which causes maximum damage. Store copra in netted polythene bags or gunny bags.

Pests of Copra

Insects cause serious damage to copra in storage. Apart from loss in tonnage, insect attack adversely affects the quality. In severe cases, the financial loss on this account may even exceed that arising from loss by weight.

Carpophilus dimidiatus (Corn Sap Beetle)

It is the most common insect in copra godowns. In India also it is commonly present in copra stores. The beetle is small, flat, broad, and about 3 mm in length and 1.5 mm in width. It can be readily distinguished from the other beetles by its shorter wing covers, which do not completely cover the abdomen. The beetle completes its life cycle in about five weeks.

Necrobia rufipes (Copra beetle or Red – legged harm beetle)

Necrobia beetle has a world-wide distribution and is known as 'Harm Beetle' in America and 'Copra Bug' in the Pacific. It is generally metallic blue in colour but sometimes with a greenish lustre. Its

Coconut - DOs and DON'Ts

DOs
Select good mother palm
Plant the seedlings in the right season
Remove seed nuts that not germinated within 5 months
Transplant 9-12 month old seedlings
Fill up seedling pit with soil gradually every year by cutting from sides as the seedling grows
Remove soil accumulating at the collar region of the seedlings during rains
Adopt drip irrigation and fertigation wherever possible
Apply balanced manures and fertilizers based on soil test valve
Provision of proper drainage facilities to prevent bud rot
Follow drip irrigation to prevent spread of Basal Stem Rot
Follow waiting period of 45 days for each harvest when chemical pesticides are used
Use plant products and biocontrol agents always for pest and disease management
Hybrids should be grown under well managed conditions with assured irrigation

DON'Ts
Trees growing closer to house holds, cattle shed, compost pits and other favourable conditions to be avoided for mother palm selection.
Trees habitually producing barren nuts are to be avoided even though they may produce high yield for use as mother palm.
Don't collect immature nuts as seed nuts
Avoid over crowding in storage.
Avoid planting in rainy season in low lying areas.
Avoid nursery in open area
Avoid horizontal sowing and too close / wide planting
Don't transplant seedlings below 9 months and after 12 months of age.
Don't plough the garden frequently
Excessive irrigation should be avoided
Avoid non judicious use of fertilizers
Avoid injuries to the stem/roots
Don't cut green leaves
Don't adopt flood irrigation
Pheromone traps should not be placed in direct sunlight

length varies from 3.5 mm to 5.5 mm. The first five joints of the antennae are brown, the rest black, and the terminal three are expanded. It completes its life cycle in about 40 days.

(c) *Ahasverus advena* (Foreign grain beetle)

It is known as "Foreign Grain beetle," and is present throughout the world. It has been recorded feeding upon a variety of stored products. It is abundant in copra stores, but is practically mycetophagous. The adult beetle is very small, measuring about 2 mm in length and 0.75 mm in width, and is chestnut brown in colour. The life cycle of the beetle is completed in about thirty days.

(d) *Oryzaephilus surinamensis* (Saw-toothed Grain Beetle)

This Cucujid beetle is commonly known as "Saw Toothed Grain beetle," and it is a serious pest of

stored grains; copra and other stored food products throughout the world. The adult beetle is small, flat, elongate, dark brown, about 3 mm in length and 0.75 mm in width. The pro-thorax has three longitudinal ridges with two depressed areas and its lateral margins are each armed with six prominent tooth-like projections. The beetle breeds throughout the year in the moulds and crevices of degenerated copra, and completes its life cycle in about thirty days.

(e) *Tribolium castaneum* (Red flour beetle)

It is commonly known as "Red Flour beetle", and is primarily a pest of cereal products like wheat flour, 'suji' and 'maida' but causes damage to quite a number of other stored products including copra. The beetle is small, flat, elongated, reddish brown, about 3.5 mm in length and 1.25 mm in width. The

first seven joints of the antennae show a gradual increase in size and the last three are thickened into a club. In India, its life cycle varies from six to twelve weeks.

(f) *Trogoderma granaria* (Khapra beetle)

This pest is known as 'Khapra' in the towns and villages of India, and its principal food is wheat. The adults are harmless, and only the grubs are destructive. The beetle is about 3.5 mm in length and 1 mm in width, and has a characteristic oval shape. The head is disproportionately small and is concealed from above by the pronotum. The life cycle in humid places is completed in about two months.

(g) *Corcyra cephalonica* (Rice moth)

This pest is commonly known as the Rice Moth and is a serious pest of stored paddy, rice, cereals, copra and other stored food products. The head and thorax of the moth are brownish in colour. The fore-

wings are brown with a pinkish tinge, speckled with darker scales running longitudinally. The hind wings are shiny and silver grey. The wing expanse is about 25 mm.

(h) *Ephestia cautella* (Fig moth or Almond)

This is frequently referred to as the 'Almond' or the 'Fig Moth' and is one of the most important insects infesting dried fruits, cocoa, spices, cashew nut, copra and groundnut. The moth is about 6 mm in length with a wing expanse of 15 mm. Its colour varies with food and environments, but mostly the fore-wings are greyish-brown, somewhat mottled with a distinctly darker coloured transverse band. The average life cycle on mouldy copra is six weeks.

Reference: http://www.agritech.tnau.ac.in/expert_system/coconut/coconut/coconut_harvest_postharvest.html ■