MEASURES TO ENHANCE RETURNS FROM ARECANUT GARDENS

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Arecanut palm, *Areca catechu* Linn is cultivated rimarily for its Kernel obtained from the fruit. t is one of the important cash crops of India and early six million people are engaged in its pro- uction, processing and trade. Arecanut is used y the people all over India for chewing in tender, ipe or processed form.

Commercial cultivation of arecanut is done only n India and Bangladesh. However, it is grown as stray crop in Indonesia and in some of the Pacific)cean Islands. In India about 90% of the area nd 95% of the production are concentrated in the hree States of Kerala, Karnataka and Assam as vident from the following data.

	Area (ha)	Production (Tonnes)
Assam	46,400	44,500
Karnataka	53,000	77,000
Kerala	62,700	50,600
Others	185,000	9,300
Total	180,600	181,400

On account of various developmental measures mplemented, arecanut production has now almost, eached a level of self-sufficiency. Uses for arecanut ther than chewing are negligible. Its export pros- pects are also very much limited. Therefore the resent policy is not to expand the area under recanut but to adopt intensive cultivaton and take p inter and mixed cropping in arecanut gardens vith the object of augmenting the income of the armers.

A. Adoption of Intensive cultivation

1. *Manuring*: Adequate and regular supplies of plant nutrients are essential for proper growth and ield of arecanut palm. Because of high rainfall xperienced in almost all the arecanut growing tracts, he soils are severely leached and eroded and are ery poor in plant nutrients. Judicious application f organic and inorganic manures are therefore ecessary to enhance the yield of arecanut palm.

Fertilizers to supply 100 g N (nitrogen) 40 g P_2O_5 (phosphorus) and 140 g K_2O (potash) and organic manures such as compost/cattle manure and green leaf at the rate of 12 Kg each per bearing palm may be applied annually in two split doses. One half of the recommended dose of fertilizers along with the full dose of compost/cattle manure and green leaf may be applied in September both for irrigated and rainfed gardens. For manuring, basins of 15 to 20 cm depth are taken at a radius of 75 cm from the base of the palms. After applying the manures the basins are covered with a thin layer of soil. The remaining half of the fertilizers may be applied in February in the case of irrigated gardens and May for the other. After weeding, the fertilizers may be broadcast around the base of the palms and worked into the soil by light forking.

2. *Liming*: Most of the arecanut growing soils are acidic in reaction. Application of lime corrects soil acidity and supplies calcium to the soil. Lime requirement of each soil may be determined and the recommended quantity broadcast around the palm and worked in. A general safe dose may be 500 g of lime per palm in alternate years. Liming should not be done during rainy season and also it should be completed at least three weeks prior to fertilizer application.

3. *Irrigation and drainage*: Arecanut palms respond well to irrigation. Research results show that in gardens under rainfed conditions, irrigation during the dry months combined with proper manuring has trebled the yield. Irrigation is given once in three to five days depending upon the soil type.

Adequate drainage is also essential for arecanut, as the palms cannot withstand water-logging. Channels may be dug at every two rows of palms 25 to 30 cm deeper than the bottom of the pits to facilitate good drainage. A main channel is also necessary to collect the water and drain it quickly. Annual cleaning of the drainage channels may be taken up at the beginning of the monsoon.

4. *Cultural practices*: A light digging or forking is required to be given towards the close of the monsoon to break up the surface soil as well as to uproot weeds. Since the maximum root concentration is within the top 50 cm layer of soil, deep

tillage injuries the roots therefore may be avoided. Periodic weeding may be necessary to keep the gardens clean.

5. *Cover cropping*: Growing of cover crops prevents soil erosion and weed growth, besides augmenting organic manure supply to the soil. If the cover crops grown are leguminous, they may further enrich the soil through the fixation of atmospheric nitrogen. Cover crops recommended for growing in arecanut gardens are *Mimosa invisa, Stylosanthes gracilis* and *Calopogonium muconoides*. The proper time for sowing cover crops is May, with the receipt of the pre-monsoon showers. The cover crops may be cut and applied to the palms at the time of manuring in September.

6. *Plant protection*: Arecanut palm is attacked by several pets and diseases causing varying degrees of crop loss. The important pests and diseases, their mode of attack and control measures recommended are given below:

Pests

(i) *Spindle bug* (*Carvalhoia arecae*): The adult bugs are red and black in colour and the nymphs pale greenish brown. Both nymphs and adults live in the innermost two leaf axils and suck the sap from the tender leaves and spindle. Necrotic spots develop in the attacked portions, which turn yellow, then dry up and finally form shot holes. Severely attacked spindles neither attain normal size nor open completely.

A drenching spray to the crown with BHC 50% Wp @ 250 g in 100 litres of water is very effective in controlling the pest. The spraying may be repeated once a month if recurrence is noticed. Application of granular insecticides like phorate 10%, carbaryl 4% or thiodemeton 5% at the rate of 10 g per palm to the leaf axils around the spindle also controls the pest.

(ii) *Mites* Res mites—*raoiella indica*, White mites— *Oligonychus indicus* and Calyx mites—*Dolichotetranychus sp.*): The red and white mites attack palms of all ages. The attack is more severe in seedlings and during summer. The mites colonise on the under-surface of the leaves and suck the sap resulting in yellowing and withering of the plants. These mites could be effectively controlled by spraying the undersurface of the leaves with dicofol (Kelthane) at the rate of 186 ml in 100 litres of water and the spraying repeated at 15 to 20 days intervals, if necessary. Before spraying, severely infested leaves showing bronzed apperance may be removed and burnt.

The calyx mites feed on the sap at the calyx region of tender arecanuts causing immature shedding of the nuts. Spraying the bunches with dimethoate 0.1% or formothion 0.2% is effective in controlling the pest.

(iii) *Inflorescence caterpillar* (*Tirathaba mundella*): The dull white caterpillars with brown head tunnel into the unopened inflorescence and feeds on the flowers inside, turning the inflorescence into a wet mass of frass. Belated or unopened spathe with damages or traces of frass outside is a sure indication of the caterpillar attack. Such spadices may be force opened, severely infested portion removed and the rest sprayed with malathion 0.125 per cent.

(iv) *Root grub* (*Leucopholis burmeisteri*): The white coloured grubs found in low lying and clayey soil feed first on tender and then on older roots. As a result of this yellowing of leaves, tapering of stem and reduction in yield take place. Once the attack reaches the bole, the palm becomes unsteady and succumbs to wind. The grubs can be effectively controlled by the soil application of phorate 10% granules at the rate of 8 g per palm two times in a year i.e. in May just before the onset of the monsoon and in October at the close of the monsoon.

Diseases

(i) *Fruit-rot* (*Mahali* or *Koleroga*): It is caused by the fungus *Phytophthora arecae* and prevalent in high rainfall areas. The disease assumes severe form during south-west monsoon in Kerala and Karnataka causing crop damage to the extent of 10 to 75%. Initially water soaked patches appear near the calyx of affected nuts and they slowly enlarge giving a dark colour to the nuts. Finally the nuts drop down and the fallen nuts are covered by the felt of white mycelial growth. Spraying with 1% Bordeaux mixture to the bunches first just before the onset of the south-west monsoon and second 40 days after that may be done to prevent the disease incidence. A third spraying may be required if the rainy season prolongs.

(ii) *Bud-rot*: The causal organism of this disease is also *phytophthora arecae* and it occurs in gardens of high rainfall areas. The infection starts at the tender base of the spindle, which turns yellow, then brown and ultimately slumps down. As some as the eviated symptoms are noticed, scoof off the infected tissues by making a longitudinal side spilt and treat the exposed healthy tissues with Bordeaux paste and give a drenching spray to the crown with 1% Bordeaux mixture. Removal of dead palms and also bunches affected by fruit-rot and spraying the surrounding healthy plams with 1% Bordeaux mixture can minimise the disease incidence.

(iii) *Foot-rot*: This disease caused by the fungus *Ganoderma lucidum* is widely prevalent in Assam, Maharashtra, Karnataka, Kerala and Tamil Nadu. It appears in severe form in neglected, ill drained and over crowded gardens. The disease is primarily soil borne and secondary through air-borne spores. The first visible symptom is discolouration of the outer whorl of leaves which then spread to inner whorls, imparting gradually a dull yellow colour to the crown. The leaves then droop down, dry up

and fall off leaving the stem bare. The base of the stem shows brown discolouration and ooze of a dark fluid. In advanced stages fungal brackets develop at the basal part of the stem. The affected plams should be isolated by digging trenches of about 60 cm depth all round. The stumps of dead palms should be dug out and burnt.

(iv) *Yellow leaf disease*: This dreadful disease of unknown etiology occurs in Kerala and Karnataka and it is a rampant form in Southern Kerala. The disease is characterised by yellowing of leaves which progresses along the margin of leaflets leaving their mid rib green. Reduction in the size of leaves and nuts, tapering of the stem and immature nutfall occur subsequently. Colour of the nut kernel turns brown and it becomes unsuitable for consumption. The death of the palm is gradual. There is effective measure for the malady. Inter and mixed cropping and also mixed farming practices in the disease affected gardens can provide additional income to the farmers.

(v) *Band*: This is also a disease of unknown etiology. The affected palms produce smaller dark green crinkled and erect leaves and in advanced stage the crowns exhibit cabbage like appearance. The stem tapers, internodal length shortens, the successive leaves become smaller and smaller and finally the leaves end in stubby structures. Providing good drainage and removal of hard pan in the soil, if present may help to overcome the malady to a great extent. The gardens should be properly manured and irrigated. Application of 1 : 1 mixture of copper sulphate and lime in the basins at the rate of 225 g per palm once in six months has been found effective in restoring the normal condition of the palm.

(vi) *Stem breaking*: The palms standing on the southern and western sides of the gardens get scorched due to exposure to the sun especially during the period from November to March. The tissue of the scorched portion dies, which later on gets infected by fungus and when this process continues for sometime, cracks develop and the stem breaks up at this portion during strong winds. To avoid sun scorch, the palms may be protected from the south-west sun by tying with arecanut leaf sheath/leaves or opaque polythene film. Quick and tall growing leafy trees may be grown on the south-western side of the garden to provide protection to the palms against sun and wind.

(vii) *Inflorescence die-back and button shedding*: The disease which occurs during summer is caused by *Collectotrichum gloeosporiodes*. Rachille of the infected inflorescence become yellow, then turn dark brown. This is followed by shedding of female flowers (buttons). The disease can be controlled by spraying the inflorescence with Dithane Z-78 at a concentration 4 g in one litre of water.

B. Inter and mixed cropping

The choice of crops to be grown in arecanut gardens depends on their canopy size, root system, ability to tolerate shade and withstand heavy rain water dropping from arecanut palms during monsoon, market demand of the commodities etc. The crops which could be successfully cultivated in arecanut gardens without detriment to the main crop are cash crops like pepper, betelvine, clove, cardamom, cocoa and ginger; food crops such as banana, yams, tapioca, pineapple, arrow root and fodder crops like guinea grass. The methods of planting of some of these crops in arecanut gardens are outlined here. Their manuring, plant protection etc. are the same as grown as mono-crops.

Pepper: Arecanut palms serve as supports for pepper vines. Two rooted cuttings of pepper are planted 30 to 35 cm away from the base of each palm in pits of 50 cm cube filled with cattle manure, top soil and sand. While planting, southern side of the palm is to be avoided.

Cocoa: It is interplanted in arecanut gardens at a spacing of 2.7 × 5.4 m in alternate rows of arecanut which were planted at 2.7 m × 2.7 m spacing. Planting is done in pits of 60 cm cube filled with compost and top soil.

Clove and Nutmeg: In arecanut gardens planted at a spacing of 2.7 m × 2.7 m, the seedlings of clove and nutmeg may be planted on every third row of arecanut so that within the square formed by four seedlings of clove/nutmeg there will be nine arecanut palms. For planting pits of 75 cm cube are taken and filled with a mixture of farm yard manure, sand and top soil.

cardamom: Medium height, compact size, shallow root system and shade loving nature of cardamom makes it an ideal inter-crop in arecanut gardens situated at elevations above 600 m MSL. The seedlings are planted in between the rows of arecanut in pits of 60 cm cube filled with mixture of soil and compost/cattle manure. Spacing depends upon the types of cardamom.

Ginger: Beds of 0.75 m width, 15 cm height and of convenient length are to be prepared in the interspaces of arecanut palms. Seed rhizomes weighing 15 g are planted in small pits at a spacing of 25 cm × 25 cm.

Banana: Selected suckers are planted in pits of 60 cm cube at a spacing of 2.7 m × 5.4 m where arecanut palms are raised at 2.7 m × 2.7 m spacing.

Elephant foot yam: Two pits at a distance of 90 cm are dug in between two palms along the rows of arecanut planted at 2.7 m × 2.7 m. The seed material weighing 0.75 to 1.0 kg is planted in pits of 50 cm cube during February-March.

Pineapple: Pineapple cultivated as an inter-crop in arecanut garden is very profitable in the early years of the garden. Trenches of 60 cm width and depth and one metre length are dug in between the arecanut palms in the same row. Three suckers are planted in each trench.

Betelvine: Three or four vine cuttings of 45 cm length are planted 30 cm away from the base of arecanut palm in pits of 50 cm cube which are well manured. The planting is generally done in May.

Guinea grass: Two trenches of 20 cm. width and depth are taken at 50 cm apart in the inter-spaces between two arecanut palms. Guinea grass can also be planted on the edges of drains.

Acknowledgement

The author is grateful to the Director and staff of the Directorate of Cocoa, Arecanut and Spices Development, Calicut for their valuable help in the preparation of this article.

COCOA PRICES

The International Cocoa Organisation, London has agreed to supply the prices of Cocoa in the International Markets regularly. Therefore the prices of cocoa in the International Market will start appearing in the International Section of the market report in the Journal from the next issue onwards.

—Editor