



ADOPTION OF IMPROVED CULTIVATION PRACTICES IN ARECANUT FARMING IN INDIA: A DESCRIPTIVE ANALYSIS

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ABSTRACT

Agriculture is the backbone of the Indian economy, where most of the population is directly or indirectly involved in agriculture. In this sense, arecanut is a plantation crop cultivated in several parts of India, which plays a significant role in the economy. In recent years, 2023–2024, the area under arecanut cultivation has been 646.49 thousand hectares and produces 1,486 kg/ha in 2023–2024, which highlights the effective management practices. In the present study focuses on a descriptive overview of arecanut cultivation practices, with particular emphasis on crop cultivation, selection of varieties and planting materials, land preparation, planting methods, irrigation, nutrient, and harvesting. Additionally, the study highlights the value addition through the utilization of arecanut by-products. Overall, the study can contribute to improving productivity and sustainable production in the arecanut sector.

KEYWORDS: Arecanut, Varieties, Fertilizer, Pest, disease and management control-----

INTRODUCTION

Agriculture is the backbone of the Indian economy. It provides employment opportunities to about 46 per cent of the population directly or indirectly involved in agriculture sector across the country. There are several sub-sectors, such as crop production, animal husbandry, forestry, and Agriculture. The crop production sub-sector includes plantation crops and horticulture such as coconut, cashew, arecanut, rubber etc.

Arecanut is an economically significant plantation crop that supports farmers' livelihoods and holds cultural, religious, and medicinal importance. The cultivation of arecanut is often integrated with other crops, as it is a perennial crop. This crop improves farmers' income and contributes to environmental sustainability through carbon sequestration. It is mainly consumed in India and West Asia. Globally, the major arecanut-producing countries include India, Bangladesh, Indonesia, Myanmar, China, Sri Lanka, and Thailand. In our country, India ranks first globally in terms of arecanut area and production. Major producing states include Karnataka, Kerala, Assam, Meghalaya, West Bengal, Mizoram, and Tamil Nadu. Tamil Nadu ranks sixth Position in production. Being a profitable commercial plantation crop, it is important to understand the scientific principles of arecanut cultivation before establishing a new arecanut garden and to adopt appropriate strategies to obtain maximum profit.

Objective of the Study

- To know about arecanut cultivation Practices by the farmers.
- To examine the major pests and diseases affecting arecanut and management practices followed by farmers.

Cultivating Practices in Arecanut Plantation

Climate and Soil

Arecanut is a tropical plantation crop that performs well under warm, humid, and well-distributed climatic conditions. The cultivation of arecanut is mostly confined to 28° north and south of the equator. It grows well at temperatures ranging from 14°C to 36°C, while temperatures below 10°C or above 40°C adversely affect the plantation. The crop grows well in fertile, well-drained soils with adequate moisture-holding capacity, particularly in suitable red loamy, lateritic, and alluvial soils, when proper soil fertility, drainage, and moisture management are maintained. Soils that facilitate proper root development and adequate aeration are favourable for arecanut cultivation, whereas poorly drained, highly sticky clayey, sandy, brackish, and calcareous soils are generally unsuitable for arecanut cultivation. Thus, soil type, drainage, fertility, and moisture availability are important factors influencing the growth, productivity, and long-term sustainability of arecanut plantations.

Selection of Saplings

Being a plantation crop, careful attention must be given to producing quality planting material to obtain high-quality seedlings and ensure good yields in arecanut.

- Seed nuts are collected during starts from November to January.



- The mother palm should be more than 10 years old, with a shorter internodal length, a larger crown, and a greater number of leaves. It should be free from major pests and diseases and should have a stable yield.
- Healthy nuts should weigh more than 35 grams and have a large-sized kernel. To test their quality, the nuts should float vertically in water with the calyx end pointing upwards.
- Early-germinated seedlings with more than five leaves, adequate height, and a thicker stem should be selected.
- For transplanting into the main field, the seedlings should be 12 to 18 months old.

Varieties of Arecanut

- Semi-tall and high- yielding: Mangala, Shata Mangala
- Tall and high yielding: Sumangala, Sree Mangala, Mohit Nagar, samrudhi, SAS-1, Swarnamangala, kahikuchi, Madhuramangala, Nalbari
- Dwarf hybrids: VTLAH-1 (Hirehali Dwarf X Sumangala), VTLAH 2 Hirehali Dwarf X Mohitnagar)

Planting Practices

Arecanut is generally planted during May–June. In flood-prone riverbank areas and low-lying regions with a high-water table, planting is preferably carried out after the southwest monsoon, during September–October. Arecanut palms are usually planted in north–south rows, with an approximately 35° westward alignment to reduce direct sunlight exposure and prevent sun scorching of young palms. A spacing of 2.7 × 2.7 m is recommended between palms is followed. Planting pits of about 90 × 90 × 90 cm should be prepared 2–3 weeks before planting. The topsoil and subsoil should be kept separately, and the lower half of the pit should be refilled with topsoil mixed with 5–10 kg FYM one week before planting. Proper drainage should be maintained using drainage channels or raised ridges around the basins, keeping them 15–30 cm deeper than the planted area.

Post Planting Care and Irrigation Practices

The young plant of areca can be break due to exposures of sunlight on the south-west during afternoon. The Arecanut intercropping pattern like banana, red gram, ivy gourd can be planted during initial stage or covering through arecanut leaves, coconut leaves or green shade net to minimize the direct sun exposures can be prevented. Areca requires frequent moisture frequency of once in 7-8 days during November-December then once in 6 days during January – February and once in 4-5 days during march- May basically areca need 175-200 litre per palm for per irrigation. Avoid waterlogging: keep basins a bit above surrounding furrows so excess drain off. In rainfed gardens, supplemental irrigation is given in critical dry spells. Proper mulching and weed control (see below) help conserve soil moisture.

Nutrient Management in Arecanut Palm

Arecanut palms have a relatively high requirement is macro nutrient (NPK) with micro nutrients. A high-yielding palm absorbs macro nutrient (N:P:K) approximately straight fertilizer rate of 100:40:140. The exclusive use of either organic manure or chemical fertilizers can disturb the nutrient balance in the soil and palm and also, 12 kg of FYM and green manure need per tree. Hence, adopting an integrated and balanced nutrient management strategy is essential for healthy Palm and sustained productivity.

Table 1: Macro Nutrients (NPK) with Green Manure or FYM used in Year Wise Establishment of Arecanut Cultivation (In grams)

Macro Nutrition Fertilizer (NPK)	First year (Per tree)	Second year (Per tree)	Third year Onwards (Per tree)	FYM/Green Leaf (Per tree)
Nitrogen (N) Urea	33.33 (73.33)	66.66 (146.65)	100 (220)	12kg
Rock Phosphate (P) Phosphorus	13.33 (66.65)	26.66 (133.3)	40 (200)	12 kg
MOP (K) Potash	46.66 (78.32)	93.33 (156.33)	140 (235)	12kg

Source: ICAR-CPRI

Table 2: Micro Nutrients of Arecanut Farming (per acre)

Fertilizer	Quantity for (per palm)	Quantity for (per acre)
Zinc Sulphate	5g	2.6kg
Boric Acid	4.5g	2.4kg
Magnesium Sulphate	50 to 60 g	30kg

Source: ICAR-CPRI



Pest Control Management System

S.no	Pest name	Symptoms	Measures
1	Root grub/White grub (<i>leucopholis app</i>)	The grubs damage the roots by feeding on them, reducing the plant's uptake of water and nutrients. This initially causes yellowing of the leaves and fronds. In severe infestations, the stem gradually becomes thinner, resulting in tapering of the trunk.	- Neem Cake: Apply 1 kg to 2 kg of neem cake per palm basin during May–June and September–October or - Imidacloprid 17.8% SL@0.7 ml per litre, 3–4L of spray solution per m² area or chloropyriphos 20% EC @ 4 ml per litre@3–4l
2	Spindle bug (<i>Mircarvalhoia Arecae</i>)	Nymphs and adults feed on the sap of tender spindle leaves, producing linear, dark-brown lesions that gradually turn necrotic. Heavy infestation can affect leaf unfurling, and severely affected leaves may dry and eventually fall off.	Thiamethoxam 25%Wg (0.25 g per litre of water on the spindle and after two weeks spray or copper oxychloride (2g per litre) or Bordeaux mixture (1%) to prevent fungal infection.
3	Pentatomid Bug (<i>Halyomorpha picus</i>)	Nymphs and adults suck sap from developing kernels and immature fruits, causing kernel shrivelling, browning, and premature nut drop.	Neem oil emulsion (5ml per litre) or azadirachtin 10000 ppm at 1ml can be sprayed or use clothianidin 50% WDG (0.24 g per litre or pymetrozin 50% WG (0.6 g per litre) or Thiamethoxam 25% wg (0.25 g per litre) use when its serve condition
4	Mite:Red mite (<i>Raoiella indica</i>) and White mite (<i>Oligonychus indicus</i>)	Nymphs and adults colonize the lower leaf surface and spread into the inner whorl, causing yellowing and drying of leaves. They also attack bunches, causing premature fall of tender nuts.	Neem oil emulsion (5ml per litre) or wettable sulphur 80% WP (2g per litre) can be sprayed twice at 15 day interval or Dicofol (Rogar) at 186 ml in 100l of water or in severe case spiromesifen 22.9%SC (1 ml per litre) or Propargite 57% EC (1 ml per litre) can use
5	Red palm weevil (<i>Rhynchophorus spp</i>)	The pest enters through wounds or damaged tissues, causing internal feeding, oozing, weakening of the palm, and severe damage to the green region of the stem near the crown point.	Imidacloprid 17.8% SL at 1ml per liter
6	Inflorescence caterpillar (<i>Tirathaba SPP</i>)	Larvae attack the inflorescence and developing floral parts. Webbing, frass accumulation and damage to flowers and young nuts may be observed. Severe infestation can lead to drying of inflorescences and reduced nut.	Lambda-chyalothrin 5% EC(0.3ml per ;itre of water) or indoxacarb 14.51% SC (1 ml per litre of water or chlorantraniliprole 18.5% SC (0.3 ml per litre of water
6	Scale insects (<i>Aonidiella orientalis</i> and <i>ischnaspis longirostris</i>)	Insect attack spindles, leaves, spathe, leave sheathes and bunches, it mostly observed between October and February but damage is higher on drought condition it led to shedding of nuts	Neem oil emulsion (5ml per litre of water) should spray twice at 15 day break
7	Ambrosia beetle (<i>Euplatyus parallelus</i>)	The pest usually enters the palm through wounds or damaged parts. It feeds inside the affected tissues, causing oozing, weakening of the palm, and, in severe cases, damage to the growing point, which may lead to the collapse of the palm.	Inject chloropyriphos 20% EC (5 ml per litre) or imidacloprid 17.8% SC @ 1 ml per litre in to the bored holes

Source: ICAR–CPCRI



Disease Management Practices

S.no	Disease name	Symptoms	Measure
1.	Leaf spot (<i>collectotrichum Gloeosporidies</i>)	Small spots appear on the leaflets and gradually enlarge, becoming brown or dark. In severe cases, the spots merge, causing leaf drying and early deterioration.	At starting stage, spraying 1% Bordeaux mixture or copper oxychloride 50% WP (2 g per litre of water).
2	Collar rot (<i>Fusarium spp and Rhizoctonia spp.</i>)	The disease affects the collar region near the base of the palm, causing the tissues to become soft, discoloured and rotten. Severe infection leads to yellowing, wilting, and eventually the death of the palm	Bordeaux mixture (1%) or copper oxychloride 50% WP (2 g per litre of water)
3	Root decay (<i>fusarium Falciforme</i>)	The disease mainly affects 1–3-year-old palms, causing root decay and poor nutrient uptake. Severe infection leads to yellowing, wilting, drying of leaves and seedling death.	Bordeaux mixture (1%) or copper oxychloride 50% WP (2 g per litre of water) to the seedling or carbendazim 12% + mancozeb 63% WP (2g per litre of water) can be drenched at 2-5l per seedling.
Seasonal Diseases in Adult Plantation			
4	Inflorescence Dieback and button shedding (January to May)	The disease affects the inflorescence, causing darkening and drying of the affected portions. Flowers and young nuts may dry and fall prematurely. In severe cases, the entire inflorescence may dry up, resulting in reduced fruit set.	Spray the palm clusters with 1% Bordeaux mixture or a Mancozeb +Carbendazim formulation
6	Furit rot or Koleroga mahali (<i>phytophthora meadii, P.heveae, P.prsiana</i>) (July-September)	The disease is commonly observed during the southwest monsoon. Dark, water-soaked lesions develop on immature nuts, usually near the stalk end. The affected nuts rot, turn dark, and fall prematurely. Under severe infection, a large number of nuts may be shed.	Spraying 1% Bordeaux mixture to bunch thrice during monsoon period by the interval 35- 40 days or mandipropamid 23.8% Sc (1ml per liter of water) can be sprayed 3 times.
Common Diseases			
8	Foot rot and basal stem rot and anabergal (<i>Ganoderma lucidum</i>)	The disease affects the roots and basal portion of the stem. Initial symptoms include yellowing and drooping of the lower leaves, followed by gradual drying and decline of the palm. The roots decay, reducing water and nutrient uptake. In advanced stages, the basal stem may become discoloured and decayed, and bracket-like fungal fruiting	Isolation is very important for this disease.it should be trenching around them to prevent spread to the other palm and spraying hexaconazole 5% (20 ml per litre) at 125 ml per palm quietly interval at root zone of the palm.



		bodies may sometimes appear near the base of the palm.	
9	Yellow leaf disease	Yellowing begins at the leaflet tips and gradually spreads across the leaf, while the midrib remains green. The root tips turn black and rot, causing the leaves to dry and fall. Affected nuts develop black discoloration and soft kernels, resulting in reduced yield and poor quality.	• Regular monitor is important for gardern • Soil test based nutirents application • Spraying 1% Nitrogen,1% Potassium,0.1% Zinc and 0.1% boron on the leaves
10	Arecanut necrotic ringspot disease(ANRSV2)	In the initial stage, the diseased palms show chlorotic ring spots on the lower and middle leaves. Later, these spots turn necrotic and dry.	No cure for this disease has been reported Farm equipment should be clean frequently and destroying servely affected palm should be followed.

Source: ICAR–CPCRI

Harvesting and Post-harvest Practices

Arecanut harvesting is generally carried out when the nuts attain the required stage of maturity. Since different bunches mature at different times, harvesting is undertaken periodically throughout the year depending on the variety, maturity stage, climatic conditions and intended use. Tender green nuts (Kalipak), also known as *kempekai*, *red supari* or processed tender nuts, are harvested at about 6–7 months of age, mainly during October–December.

Ripe nuts (Chali) are harvested mainly during December to may , at about 9–11 months of age, when the fruits turn bright orange-yellow. The harvested nuts are spread uniformly in a single layer on a flat drying surface and sun-dried for about 35–55 days. Fallen nuts may require 50–55 days, particularly during September–November, while nuts from the third and fourth harvests may dry within 35–40 days due to summer season. Regular turning ensures uniform drying and helps maintain quality and prevent fungal infection. Modern methods such as solar tunnel dryers and sloped drying yards can improve drying efficiency. After drying, the nuts are dehusked manually or using mechanical dehushing machines, followed by grading and storage or marketing.

By Product's

Arecanut by-products offer significant opportunities for value addition and sustainable utilization. The leaf sheath, which is often treated as agricultural waste, can be converted into eco-friendly and biodegradable disposable plates and related products using leaf-sheath moulding machines. It can also be utilized as cattle feed and as a suitable substrate for the multiplication of beneficial microorganisms such as *Trichoderma*. Further, the tannin-rich extract obtained during the boiling of tender arecanut can be used as a natural dye for textiles when combined with an appropriate mordant. There is also considerable scope for expanding the use of these natural extracts as colouring agents in other value-added products. Thus, the efficient utilization of arecanut by-products can help reduce waste, promote environmental sustainability, and create additional opportunities for value addition.

CONCLUSION

Arecanut or betel nut is a commercial and economic important plantation. Arecanut cultivation is involve series of interconnected practice beginning with selection of variety, healthy planting material, post planting care, irrigation practice, nutrients management, pest and diseases management and harvesting and post harvesting practice is necessary to maintain health and productivity of arecanut palms. The need for improved cultivation and effective pest and disease management practices to enhance productivity and ensure sustainable arecanut production. In addition to the main produce, arecanut cultivation offers considerable scope for value addition through the utilization of its by-products. Overall existing cultivation practice will help the farmer to improve the appropriate crop management technologies and promoting sustainable cultivation.

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