Areca nut Cultivation Practices
Areca cultivaed in hectares with tonnes. It is Kerala, Assam, Bengal. The countries in Bangladesh, leads the world. China and Bangladesh are the profitable countries. Important tolerant variety

<table>
<thead>
<tr>
<th>Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.K.Local</td>
</tr>
<tr>
<td>*Mangala</td>
</tr>
<tr>
<td>*Sumangala</td>
</tr>
<tr>
<td>*Sreemanga</td>
</tr>
<tr>
<td>*Mohinaga</td>
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<tr>
<td>SAS-I</td>
</tr>
<tr>
<td>Thirthahalli</td>
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<tr>
<td>Sreevadhan</td>
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</tbody>
</table>

* Released by

January 2004
Arecanut Cultivation Practices

Arecanut (*Areca catechu* L.) is cultivated in India in an area of 3.13 lakh hectares with a production of 3.79 lakh tonnes. It is grown primarily in Karnataka, Kerala, Assam, Maharashtra and West Bengal. The major arecanut growing countries in the world are India, China, Bangladesh, Indonesia and Myanmar. India leads the world in production followed by China and Bangladesh. Arecanut, being a profitable commercial plantation crop, it is important to understand the package of practices to be followed and adopt the same to maximise the returns.

**Climate and soil**

Arecanut requires abundant and well distributed rainfall. It grows well within the temperature range of 14-36°C. It can be cultivated up to an altitude of 1000 m in deep and well-drained soils with low water table. Laterite, red loam and alluvial soils are most suited.

**Varieties**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Growth habit</th>
<th>Shape and size of nut</th>
<th>Chali yield (kg/palm)</th>
<th>Recommended for</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.K.Local</td>
<td>Tall</td>
<td>Round, Bold</td>
<td>2.00</td>
<td>Coastal Karnataka &amp; Kerala</td>
</tr>
<tr>
<td>*Mangala</td>
<td>Semi-tall</td>
<td>Round, Small</td>
<td>3.00</td>
<td>-do-</td>
</tr>
<tr>
<td>*Sumangala</td>
<td>Tall</td>
<td>Oval, Medium</td>
<td>3.20</td>
<td>Karnataka, Kerala</td>
</tr>
<tr>
<td>*Sreemangala</td>
<td>Tall</td>
<td>Round, Bold</td>
<td>3.28</td>
<td>-do-</td>
</tr>
<tr>
<td>*Mohitnagar</td>
<td>Tall</td>
<td>Oval to round, Medium</td>
<td>3.67</td>
<td>West Bengal, Karnataka and Kerala</td>
</tr>
<tr>
<td>SAS-1</td>
<td>Tall</td>
<td>Oval, Medium</td>
<td>4.60</td>
<td>Uttara Kannada District of Karnataka</td>
</tr>
<tr>
<td>Thirthahalli</td>
<td>Tall</td>
<td>Oblong small</td>
<td>2.60</td>
<td>Malnad areas of Karnataka</td>
</tr>
<tr>
<td>Sreevardhan</td>
<td>Tall</td>
<td>Oval, Medium</td>
<td>2.20</td>
<td>Raigad and Ratnagiri areas of Maharashtra</td>
</tr>
</tbody>
</table>

* Released by CPCRI.
Raising pi:

Mother palm should be 4-5 years old with a good fruit set and more than 35g seed weight per palm. Select healthy, disease-free, vigorous seedlings in sand beds 1m length with prepared beds at a spacing of 2.5m x 2.5m. Transplant the seedlings @ 5 tonnes per hectare at a spacing of 1.5m x 1.5m. Apply a basal dose of 1 @ 5 tonnes per hectare during December, during rainy seasons, and during monsoon, irrigate mulching 25x15cm, 1m mixture (topsoil: river sand: cow dung: 7:3:2) can also be used in the nursery.

Seedling selection:

One the basis of the seedlings with...
Raising planting material

Mother palm should be more than ten years old with early bearing nature and with good fruit set. Fully ripe nuts weighing more than 35g should be selected from mother palms. Selected seed nuts are sown 5cm apart in sand beds of 1.5m width and convenient length with their stalk ends pointing upwards. Beds are to be watered daily.

Three months old sprouts can be transplanted in secondary nursery beds of 1.5m width and convenient length. Apply basal dose of well decomposed cattle manure @ 5 tonnes per ha. The sprouts can be planted at a spacing of 30x30cm with the onset of monsoon, irrigate and provide partial shade during December to May and assure drainage during rainy season. Periodical weeding and mulching are required. Polythene bags (25x15cm, 150 gauge) filled with potting mixture (top soil: farm yard manure: sand 7:3:2) can also be used to raise secondary nursery.

Seedling selection

One to one and a half years old seedlings with more than five leaves and minimum height should be used for transplanting to the main field.

Planting time

Planting should be done in May-June in well drained soils. In clay soils prone to water logging and heavy rainfall areas, planting may be postponed to August-September.

Spacing and alignment

Planting is to be done at a spacing of 2.7m x 2.7 m. The rows may be aligned in north-south direction by deflecting the north-south line at an angle of 35° towards west to minimize sun scorching. Protect outer row of plants on South - West and Southern sides from sun scorching by covering the stem with areca leaves or leaf sheaths or by growing tall and quick growing shade trees. When arecanut is planted as a mixed crop with other crops, a spacing of 3.3m x 3.3m is optimum.

Planting

A pit of size of 90 x 90 x 90 cm is preferred when the soils are deep and well drained. In heavy soils with added impedance to drainage, pit size of 60 x 60 x 60 cm is preferable. Pits should be filled with top soil, farm yard manure and sand up to 50cm. Seedling should be planted at the centre of the pit and put soil to cover up to the collar region of the seedling. Banana can be raised as a shade crop in the interspaces during the initial years.
Fertilizer application

A fertilizer dose of 100g N, 40g P₂O₅ and 140g K₂O (220g of urea; 200g of rock phosphate and 230 g of muriate of potash) per palm per year is recommended along with 12kg of green leaf and 12kg compost or farm yard manure. For seedlings, 1/3 of the recommended dose of chemical fertilizers is sufficient during the first year; 2/3 during the second year and full dose from third year onwards.

Under rainfed conditions, 1/3 of the recommended dose in April-May and 2/3 in September-October should be applied. Under irrigated conditions, the April-May dose can be applied in February.

During February or April-May, broadcast the fertilizer around the base of each palm after weeding and mix with the soil by light forking. During September-October open the basin to a radius of 75-100cm and to a depth of 15-20cm, apply the fertilizer and cover with dug soil.

Organic matter recycling

On an average, 5.5 - 6 tonnes of organic wastes/ha/year will be available in arecanut garden. Direct recycling of these wastes do not meet the crop demand immediately. Vermiculture technique is proved to be an efficient method of composting. To prepare vermicompost, areca wastes are chopped into small pieces of 5-10cm. Fill it in tanks alternately with layers of cow dung @10% by weight of waste materials. Maintain moisture content of about 30-40%. Incubate for 2-3 weeks and introduce worms @ 1kg per 1000kg waste. The wastes are converted into fine granular, odourless vermicompost within 60 days. During this period the earthworm population is doubled. About 8kg/palm/year of vermicompost meets the crop nutrient demand. The two cultured species of earthworms *Eudrilus eugeniae* and *Eisenia fetida* can be used.

Irrigation and drainage

Under Dakshina Kannada conditions, palms are irrigated once in 7 days during November-December, every 6 days during February and every 4 days during March-May @175 litres of water per day per palm. In drip irrigation, 16-20 litres of water per day per palm is sufficient resulting in saving of 44 per cent of water over hose method. Micro tubes / drippers (2-3nos.) should be placed in the basin opposite to each other or in a triangle. Adequate drainage with 75-100 cm deep drainage channels should be provided during rainy season.

Cultural operations

Soil should be loosened with light digging in October-November. Terracing should be provided in undulated lands to prevent soil erosion.

Cover cropping

* Mimosa invisa, Stylosanthes gracilis, Calapogonium maconoides and Pueraria javanica are the main rate required. Sowing of the above varieties is done during October- November.

Mixed Cropping

The land investment and labour requirement are the main rates required to take up it is economical to be grown in coastal Karnataka, betel vine and Maidan part of arecanut plantations.
*Javanica* are suitable as cover crops. The seed rate required per hectare for *Mimosa, Stylosanthes, Calapogonium* and *Pueraria* is 15kg, 9kg, 11kg and 11kg, respectively. Sowing of these crops may be done during May-June and can be cut and incorporated during October.

**Mixed Cropping**

The long pre-bearing period and high investment and low returns in the initial years are the main reasons which make it essential to take up inter/mixed cropping in arecanut plantations. Banana, pepper and cocoa can be grown in inter-spaces as mixed crop in coastal Karnataka and Kerala. Acid lime and betel vine are suggested in West Bengal and Maidan parts of Karnataka.

Banana can be planted simultaneously with arecanut in the centre of four palms. Besides main crop, two ratoon crops can be taken up and after three years, entire crop is to be replanted. When areca palms attain the age of 6-8 years, two rooted cuttings of pepper are to be planted on the northern side of the palm at 75cm distance. Cocoa is an ideal mixed crop in arecanut garden.
<table>
<thead>
<tr>
<th>Crop</th>
<th>Pit size(cm)</th>
<th>Spacing (m)</th>
<th>Fertilizer N.P.K g/plant</th>
<th>Suitable varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana</td>
<td>50x50x50</td>
<td>2.7 x 5.4</td>
<td>160:160:320</td>
<td>Mysore poovan, Karpuravally, Robusta, Malbhog</td>
</tr>
<tr>
<td>Pepper</td>
<td>50x50x50</td>
<td>2.7 x 2.7</td>
<td>100:40:140</td>
<td>Karimunda and Panniyur-I</td>
</tr>
<tr>
<td>Cocoa</td>
<td>50x50x50</td>
<td>2.7 x 5.4</td>
<td>100:40:140</td>
<td>Grafts, F1 hybrids</td>
</tr>
<tr>
<td>Acid lime</td>
<td>50x50x50</td>
<td>2.7 x 5.4</td>
<td>300:250:500</td>
<td>-</td>
</tr>
<tr>
<td>Betelvine</td>
<td>50x50x50</td>
<td>2.7 x 2.7</td>
<td>100:40:140</td>
<td>-</td>
</tr>
</tbody>
</table>

**High density multispecies cropping system**

When more than one mixed crop is grown in an arecanut garden simultaneously, it is called as high density multispecies cropping system. In coastal Karnataka and Kerala, banana, pepper and cocoa can be grown together. Banana, pepper and acid lime can be profitably grown together in Maidan parts of Karnataka. In West Bengal, cultivation of banana, betel vine and acid lime together in arecanut gardens is suggested for higher profits.

**Plant protection**

**Pests**

**Mites** (red and white) *(Raoiella indica and Oligonychus indicus* Hirst.)*

Mites feed on lower surface of arecanut leaves. The colony is found under white webs. Leaf shows yellow speckles and bronzed appearance. The attack is severe in summer months. The pest can be controlled by spraying Kelthane (Dicofol) 2ml/l of water to the under surface of infested leaves. Repeat spraying at an interval of 15-20 days if there is recurrence of pest.

**Spindle bug** *(Carvalhoia arecae)*

Symptom appears as linear dark brown necrotic lesions on spindles and the opened leaves show these lesions as patches.

Spraying the spindles of areca palms in infested areas with Dimethoate (Rogor 30EC) 15ml/10 litres of water will effectively control the pest. Very fine spraying must be done, avoiding the sunny hours of the day.

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Placenta (Thimet 10G) in the innermost weeks, during April maintenance of arenabs in severe

**Root grub** *(Larva)*

Grubs feed in the innermost part of the palm. palms show yellowing of leaf, reduction in yield.

The following steps are for controlling the grub:

- Provide a 10ml of premix
- Collect grubs in the morning hours of the day of premix

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Placement of 2g Phorate granules (Thimet 10G) in perforated poly-sachets in the innermost two leaf axils of areca palms during April is an effective practice for maintenance of the gardens free of spindle bugs in severely infested tracts.

**Root grub** (*Leucopholis burmeisteri*)

Grubs feed on growing roots. Infested palms show a sickly appearance with yellowing of leaves, tapering of stem and reduction in yield.

The following measures can be adopted for controlling the pest:

- Provide good drainage.
- Collect adult beetles in the evening hours of 6.30-7.30PM, after 8-10 days of premonsoon showers and kill them.

- Apply 15g Phorate (Thimet 10G) per palm twice a year during May and September-October and repeat it for 3 years. Apply organics like neem cake (2kg / palm / year) for improving the soil structure and thereby enabling the regeneration of roots.

**Tender nut drop** (*Halyomorpha marmorea*)

This can be due to various reasons, one of them being caused by a bug, *Halyomorpha marmorea*.

Premature drop of the nuts and pin-prick like black puncture marks on the shed nuts are the identifying symptoms.
Spray Endosulphan 0.05% (15 ml in 10 l of water) to the tender bunches in the affected gardens after checking the cause of tender nut drop.

**Scale insect (Aonidiella orientalis and Ischnaapsis longinostris)**

The scale insects are seen feeding on nuts, rachillae and leaves. The damage is done by sucking the sap from the plant tissues. As a result of continuous sucking, the tissues become yellow in colour and severe feeding leads to withering and shedding of buttons/fruits. Damage is very heavy during drought conditions.

Lady bird beetles, *Chilocorus nigrita* and *Chilocorus circundatus* are found to be effective biocontrol agents against the scale insects attacking arecanut. These can be released in affected areca garden to control the scale insects.

**Inflorescence caterpillar (Tirathaba mundella)**

The pest causes damage to areca inflorescence, feeding on the tender rachillae and female flowers. Mechanical injury is a pre-disposing factor for infestation.

Affected spadices may be force opened and if the female flowers are damaged, the inflorescence should be removed and burnt. If damage is partial, remove affected portion.

**Diseases**

**Koleroga or Mahali (Phytophthora meadii)**

Heavy shedding of nuts during rainy season is the major symptom. Water soaked lesions are formed near the perianth end and as a result the nuts become dark green and finally shed.
The following measures should be taken to control the disease.

- Spray Bordeaux mixture (1%) to the bunches at least two times at an interval of 45 days. The first spray should be given immediately after the first few monsoon showers. If the monsoon prolongs, a third spray is essential.

- Collect all the infected nuts and other plant parts and destroy them. Covering the bunches with polybags gives a complete control.

**Bud rot and Crown rot** (*Phytophthora meadii*)

Symptoms of bud rot appear as yellowing of spindle leaf and rotting of growing bud and surrounding tissues. Palm emits a disagreeable smell.
odour. Crown rot symptom initiates from the leaf sheath of outermost leaves during South-West monsoon and gradually spreads towards the growing bud. Severe infection leads to death of the palm. Both the diseases are seen during monsoon and subsequent cooler months up to February.

Remove the infected tissue completely and treat the wound with Bordeaux paste. Spray Bordeaux mixture (1%) to the crown of healthy palms which are in the vicinity of the affected palm.

Inflorescence dieback and Button shedding

Caused by several factors including the fungus, Colletotrichum gloeosporioides.

The symptom appears as yellowing and drying of rachis from the tip towards the base followed by shedding of female flowers.

Control measures are as follows:
- Spray Indofil M 45 (@ 3g/l) or Dithane Z 78 (@4g/l) on opening of female flowers in most of the inflorescences. This should be followed by a second spray after 25 days.
- Remove the fully affected inflorescences and destroy them by burning to prevent the spread and severity of the disease.

Anabe roga or foot rot (Ganoderma lucidum)

Symptom initiates as yellowing of outer whorl of leaves gradually extending to inner whorls. In advanced stages, the leaves droop and drop off, finally leaving only one or two leaves along with spindle. Rotting of roots and internal tissues of the basal portion of the stem are other symptoms. It is difficult to identify the diseased palm in the early stages of infection.

The following measures are recommended to control the disease:
- Proper nutrition is best way to improve immunity of the palm.
- Drench palms with Calixin (I/4 l/pal) at 20 l/pal.
- Apply 21 day interval.
- Phytosan and burn the affected material strictly. Taking the distance of minimum 60 cm from the infected palm.
The following measures can be taken to control the disease:

- Proper management of the garden is the best way to check the occurrence of the disease.
- Improve the drainage.
- Drench the root zone of the affected palms with 0.3% Calixin (3ml/l) @ 15-20 l/palm + Root feeding of 1.5% Calixin (15ml/l) @ 125ml/palm at quarterly intervals.
- Apply 2kg neem cake per palm per year.
- Phytosanitary measures like cutting and burning of the dead palms along with bole and roots should be followed strictly. Isolate the diseased palms by taking trenches of 30cm wide and 60cm deep around the palm.

**Band disease**

This may be due to improper drainage or physiological disorder. Symptoms include small crinkled dark green leaves, tapering stem and reduced internodal length. Roots are poorly formed and they are brittle, short and crinkled.

 Provision of good drainage and better soil management are important to reduce disease incidence. Removing hard pan of sub soil and application of micronutrients are effective measures to reduce the disease intensity. Application of a total quantity of 225g of copper sulphate and lime in equal quantities are also found to improve the condition of the affected palms. The band affected palms may respond to basal application of Borax (25g/palm/year).

**Nut splitting**

This is a physiological disorder. Sudden flush of water after a period of water stress is the main cause.

Initial symptom appears as premature yellowing of nuts when they are half to three fourth mature. This is followed by splitting of nuts from both sides or the tips which expand longitudinally towards the calyx exposing the kernel.
Improvement of drainage and spraying of Borax @2g/l in the initial stages of disease are found effective in controlling the disease.

**Leaf spot** (*Colletotrichum gloeosporioides; Phyllosticta*)

The disease appears during South West monsoon season. Plants up to 10 years are more susceptible. Small brown to dark brown or black round spots are seen on the lamina. Severe infection causes stunted growth in seedlings.

**Yellow leaf disease**

This is caused by Phytoplasma and transmitted by the vector, *Proutista moesta*.

Yellowing of leaves is the main symptom. Yellowing starts from the tip of the leaflets of the outer leaves and sometimes seen in the middle whorl. Yellowing spreads gradually extending from the margin to the middle of lamina; portions near the midrib remain green. In advanced stages, yellowing spreads to all leaves completely and they dry and fall off. Kernel of the nuts of affected palms become soft, show blackish discolouration and assumes a spongy texture.

Phytosanitary measures including removal and destruction of diseased leaves are to be followed strictly. Control can be achieved by spraying Bordeaux mixture (1%) or 0.3% Dithane M-45 (3g / l of water).

Since the disease is not amenable to control by conventional plant protection measures, other disease have to be 

- Yields of palm may not be sustained. It is recommended to be followed such as *NPK @ 12 kg per plant; 80%* of summer phosphorus. 

Applicable 12kg/pal unloading of summer improved.

- Remove mildly affected palm. Spread occurrence of the disease against other palms.

**Harvesting and storage**

Harvesting is very important. Yield of better quality. Only ripe nuts alone of chali. The quality be more if unripe nuts alone of chali.
measures, other means of controlling the disease have to be adopted.

- Yield of the disease affected garden can be sustained by adopting the recommended management practices such as balanced fertilizer application (NPK @100: 40: 140g/palm/year) and application of additional dose of Super phosphate with lime (1kg/palm). Application of organic manure @ 12kg/palm/year along with provision of summer irrigation and drainage can improve the condition of the palms.

- Remove the diseased palms in the mildly affected areas to prevent the spread of the disease and adopt need based plant protection measures against other pests and diseases.

**Harvesting and processing**

Harvesting of nuts at correct stages is very important for obtaining the produce of better quality. It should be ensured that fully ripe nuts alone are harvested for preparation of chali. The out-turn of Patora and Koka will be more if unripe or under-ripe nuts are harvested, which fetches only lower price in the market. The harvested nuts will have to be sundried for about 45 days. It is essential to spread the nuts uniformly in a single layer for drying. Turning of nuts once a week may be attended for ensuring uniform drying and better quality of produce. Proper drying of the nuts is important to prevent fungal infection of the nuts in the drying yard.

**Tender nut processing**

If the market requirement is for the processed tender nuts, harvesting green fruits at an appropriate stage of about 6 months maturity is essential since produce prepared out of matured fruits fetches lower price in the market. The tender nut processing consists of dehusking, cutting the soft nuts into pieces, boiling cut pieces with water or dilute extract from a previous boiling and drying. After boiling, the arecanut pieces are given a coating with kali (a concentrated, thick extract obtained after boiling 3-4 batches of arecanut) to get a good glossy appearance. Both sun and oven drying can be adopted.
For further details

For further details on the technologies covered in this pamphlet and also to obtain advice on the problems faced by the farmers in arecanut cultivation, they are welcome to visit the Regional Station or write to:

The Head
CPCRI Regional Station, Vittal - 574 243
Dakshina Kannada, Karnataka.
Tel : 08255-239222 (Head), 239238 (PABX)
Fax : 91-08255-239666
E-mail : research @ sancharnet. in

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