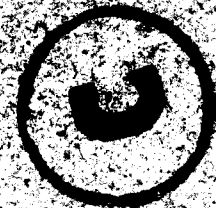
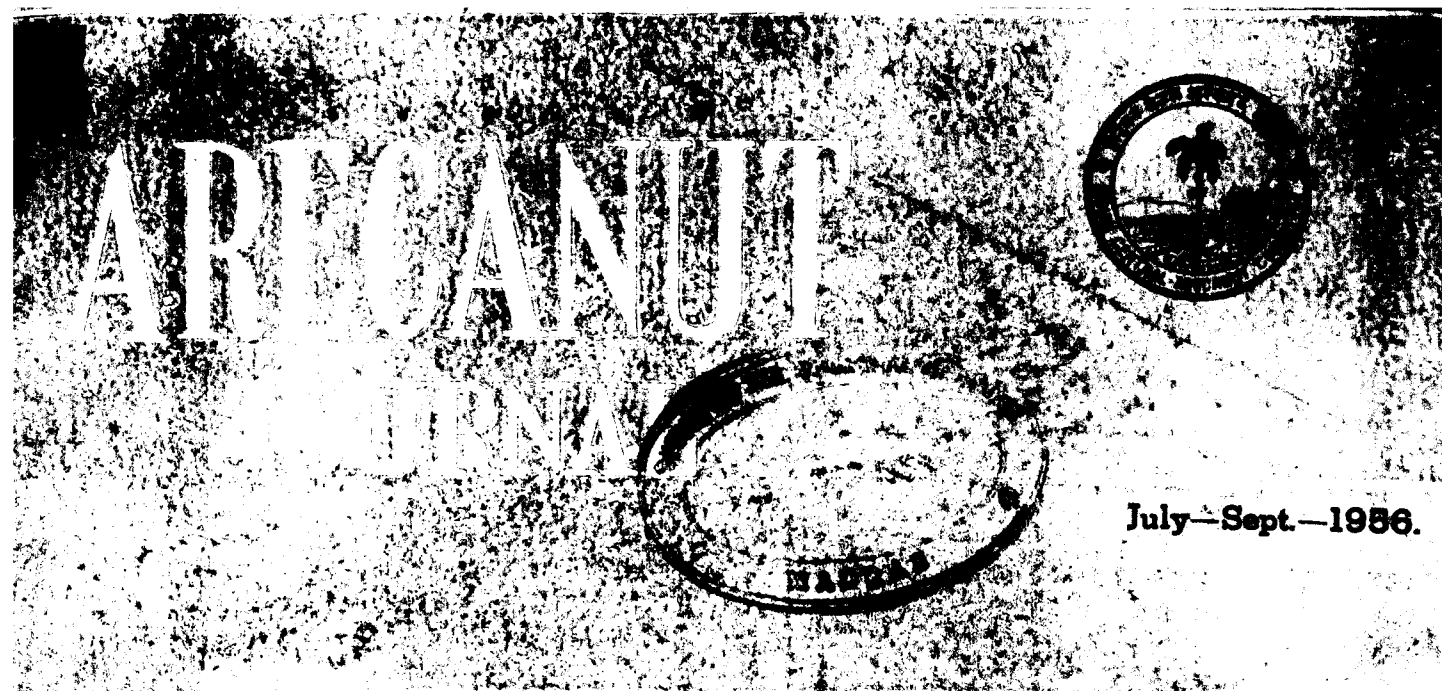


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## On certain aspects of the morphology of arecanuts

(*Areca catechu* Linn.)



V. RAGHAVAN & H. K. BARUAH,  
Department of Botany,  
Gauhati University,  
Assam.

### INTRODUCTION.

Arecanut (*areca catechu* Linn. Palmae) used extensively as a masticatory in the oriental nations is cultivated in the hot damp regions of Asia and the Malayan Islands. In India, arecanut cultivation is confined to Assam, Bengal, Bombay, Madras, Mysore and the South West Coast. In Assam, the palm grows chiefly in the Districts of Kamrup, Cachar, Nowgong, Sibsagar and the Khasi and Jaintia Hills, the total area under cultivation being 25,000 acres with an annual yield of 2.61 lakhs of maunds of arecanuts. There are three other species of *areca*, namely *A. Concinna* Thw., *A. nagensis* Griff., and *A. triandra* Roxb. which are distributed in the Indian Subcontinent (Hooker, 1894). In Assam, two species occur, namely, the economically important *A. catechu* and *A. nagensis*, latter being confined to the Naga Hills of Assam. The edible arecanuts belong exclusively to *A. catechu* Linn. There are, however, differences in the size and shape of fruits and other characters on which types\* may be distinguished.

So far there has been, however, no detailed investigation of the morphology of the different types

of Indian arecanuts; still much less is known about the variations in the characters exhibited by the different types. In no case the characters of the plants have been assessed in relation to the type of fruit or to the climatic and biotic conditions of the particular locality. The present investigation, therefore, is undertaken to determine the botanical characters of the different types of arecanuts in Assam and to evolve a system for their identification.

### MORPHOLOGY OF ARECA CATECHU LINN

The characters of the plants were assessed by observing random samples from different plantations. The characters of the various types occurring in different Districts of the State were also studied to observe the variations in the characters of a particular type. In sampling out the plants, the important characters observed include the size and shape of fruits such as round, oblong, long etc. and the characters of the inflorescence

The botanical characters of the different types of *Areca catechu* are described below:—

TRUNK. The palms are tall, erect with typically unbranched stems, the height of the palm varying from region to region but not generally exceeding 70 feet. No relation between the height of the tree and the size

\* 'Type' is used here in a restricted sense and does not necessarily indicate distinct types based on botanical characters.

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and shape of the fruit it bears has been observed, since in the same areas different types of fruits borne on palms of almost the same height are met with. The height of the palms appears to be influenced by the environmental and biotic factors prevailing in the area and on the density of plantation, the taller are the trees, (c. f. Nambiar, 1949; Raghavan and Baruah, 1956 b).

The stem is cylindrical, the circumference of the trunk about five feet from the base varying from 11—18 inches. The trunk is greyish brown in colour, sometimes with outgrowths of lichens and is ornamented with scars of fallen leaves in a regular annulated form. The girth of the tree and the type of fruit it bears are unrelated.

**LEAVES.** The leaves are formed at the tip of the unbranched, annulated, erect stem forming a compact crown having 8—10 pinnate leaves. The leaves are pinnatisect, basal region forming a broad sheath which partly encircles the stem and forms a protective covering for the developing inflorescence until a few days prior to its opening. The sheath measures more than 2 feet in length; the petiole bearing the leaflets ranges from 3.5—5.8 feet in length in the different types.

The leaflets partly fused and partly free are arranged alternately on either side of the petiole, number of leaflets varying from 30—50 on each side. At the distal end of the petiole 2—3 pairs of leaves of each side fuse to form a bifid tip. The leaflets generally vary in length from 22—23 inches; in some cases leaflets as long as 3 feet or more have been observed.

**INFLORESCENCE.** The palms are monoecious, male and female flowers being formed on the same inflorescence. Rarely bisexual flowers have also been found (Raghavan and Murthy, 1954). The flowers are formed in paniced spadices, whole inflorescence being covered by a glabrous boat-shaped spathe, 19—23.5 inches long and 5—6 inches broad. The secondary and tertiary and spadices are formed alternately on the transversely compressed main branches. In almost all the cases examined the number of groups of secondary rachises on the main branches was from 21—22. The female and male flowers are indefinite in number, the former being confined to the base and axils of the secondary and tertiary branches or terminally on special off-shoots

from the rachises and the latter forming serial alternate rows distally on either side of the compressed rachis forming filiform tips. Usually the female flowers are confined to the base of the rachis, solitary or in groups of two, or sometimes adjoining a female flower, a male flower may be found. The female flowers rarely extend to the middle or distal portion of the rachis. They are subtended by a broad scaly bract and two small hyaline bracteoles. The male flowers are smaller in size and much larger in number than the female flowers.

Each female flower has two whorls of perianth, the outer boat-shaped green whorl of 'sepals' and an inner whorl of ovate 'petals'. Each sepal has a triangular thickening on its outside. They vary in length from 1—2 cms. and present an imbricate aestivation. The petals are closely adpressed to the ovary and imbricately arranged.

The ovary is ovoid-globose with a dome shaped top formed by the three stiff stylar projections. The whorl outside the ovary is formed of six staminodes which wither very early during development of the flower.

The male flowers are minute cream coloured triangular structures. They are characterised by two whorls of perianth, outer whorl being conspicuously small (0.1 cm in length) with an acute apex and imbricately arranged. The inner whorl is 0.35—0.4 cm. long, sub-similar, with acute valvate tips. The whorl interior to the petal is occupied by a ring of stamens with basifixed anthers. The anthers are closely adpressed to a rudimentary ovary in the centre which may be termed 'pistillode' or 'rudimentary pistil' (c. f. Petlot, Frontou and Carton, 1926). The pistillode divides in the middle into three lobes.

**FRUITS.** Fruits maybe of various sizes and shapes such as round, long, oblong etc. Usually, about 100—250 fruits are formed in each bunch. In the younger stages they are green and as maturity approaches the colour gradually changes from orange yellow to yellow or scarlet red. The husk is thick and fibrous, enveloping a single seed which is generally known as the nut. The endosperm of the seed is reddish brown with dark wavy lines giving it a marbled appearance. There is a single embryo situated at the base of the seed.

## TYPES.

The different types of arecanuts are normally seedling races, which propagate true to seed except for some simple fluctuating variations. Beccari (1919) describes a few new varieties of arecanuts which occur in the Philippines and Sands (1926) and Nambiar (1954) have described the variations in Malayan arecanuts and designated them by local names. Different varieties have also been reported to occur in South India and Ceylon (Sands, 1926). According to Kannangara (1941) in Mysore there are apparently no distinct varieties of arecanuts though there are some trees with yellow fruits and others with green fruits. Rau (1915) has described a new variety of arecanut from Mysore (*A. catechu* var. *deliciosa*) based on the sweet kernels of the fruits when mature. Except for these, no precise data are, however, available regarding the delimitation of the Indian types.

It has become evident that the different types are strikingly similar in their morphological and floristic characters, showing no indication of a varietal distinction. Sands (1926) writes "As observations on the flowering of the betelnut palm have shown that the flowers are normally cross-pollinated and that in all plantations and gardens there are numerous types, it will be realised that in the absence of breeding experiments, it is an almost hopeless task endeavouring to decide which of the large number of forms are distinct varieties or races and which are merely unstable hybrids".

Varietal characters are mainly attributed to the fruits which exhibit marked differences in size and shape and the following types have been collected from different localities. This distinction is arbitrary and borderline types are also not uncommonly met with. Investigations on the pollen morphology (Raghavan and Baruah, 1956, a.) and anatomy of the flowering axis which show no variation in the different types indicate the causes for limited range of morphological and floral structures in the types.

| Locality.    | Types collected.                                    |
|--------------|-----------------------------------------------------|
| Cherrapunji. | Big oblong.<br>Small oblong.<br>Small apex pointed. |

|            |                                                                |
|------------|----------------------------------------------------------------|
| Dawki.     | Big oblong.<br>Big round.<br>Small oblong.                     |
| Gauhati.   | Big oblong.<br>Big round.<br>Small oblong.<br>Small round.     |
| Jorhat.    | Big oblong.<br>Small oblong.<br>Apex round.<br>Long.           |
| Nowgong.   | Large oblong.<br>Big round.<br>Big oblong.<br>Small ellipsoid. |
| Palasbari. | Big oblong.<br>Big round.<br>Small oblong.                     |
| Sibsagar.  | Big oblong.                                                    |

The same types have been collected from different sources to determine the range of size of the fruits.

## DESCRIPTION OF THE TYPES.

The ranges of variations generally observed in the types collected are given below. The list of variable characters of the types of arecanuts is prepared from observations of the different types from different regions and of the same types from various sources for two consecutive seasons. It is possible that variable characters noted may serve as a basis for further studies on taxonomic classification of *areca*.

1. General appearance and size of the fruits.
2. Colour of the fruits at maturity.
3. Presence of persistent calyx in the mature fruit.
4. Dimensions of the fruit.
5. Weight of the fruits (average of 100 fruits).
6. Volume of the fruits (average of 100 fruits).
7. Weight of the husks separately (average of 100 husks).
8. Thickness of the husk.
9. Arrangement of the vascular bundles in the husk.

10. Volume of the husk separately (average of 100 husks).
11. General size of the nut.
12. Dimensions of the nut.
13. Weight of the nuts (average of 100 nuts).
14. Volume of the nuts (average of 100 nuts).
15. Nature of the lamella of the ruminant endosperm.
16. Pattern of the net work on the surface of the nut.
17. Size and dimensions of the embryo.

The average weight, volume and dimensions of the entire fruits, husks and endosperms of the different types are those taken from ripe fresh fruits.

The types have been divided into main groups.

1. *Big fruit type* where the fruits range from 1.5-2.3 in length and 1.2-1.75 inches in breadth.
2. *Small fruit type* where the fruits are of lesser dimensions. It may, however, be noted that though fruits as long as 1.75 inches have been included in this group, the breadth of the fruits of this group does not exceed 1.15 inches.

Further, a classification on the basis of the weight and volume of the fruits is as follows:—

1. *Big fruit type* where the weight of the fruits ranges from 24.8-46 gms. (28-49 cc. volume).
2. *Small fruit type* where the weight of the fruits ranges from 14-23.4 gms. (14.6-26.8 cc. volume).

However, in this grouping, 'Long type' included in the first group by virtue of its length should be included in the latter group since the fruits weigh only 23.6 gms (23.6 cc. volume).

Both groups include many geometrical variations in sizes based on which the following types have been demarkated. **Big oblong**, **Big round**, **Large oblong**, **Apex round**, **Long**, **Small oblong**, **Small ellipsoid**, **Small round** and **Small pointed apex**. An examination of the collections from various places will show that **Big oblong**, **Big round** and **Small oblong** are the dominant types, others being poorly represented.

#### BIG OBLONG TYPES.

1. *Big oblong* (Cherrapunji). Fruit big, ovoid or obovoid, reddish when ripe; about 1.8" long and 1.3" in diameter at its widest part; apex\* slightly conical with a small protuberance representing the remnants of the dried-up stigma; base\*\* more roundish than conical; covered by the persistent perianth lobes; average weight of fruits 26.2 gms; average volume of fruits 28.0 cc. Pericarp hard, smooth, 0.5 cm. thick enclosing the vascular bundles; vascular bundles of the husk girdling the nut and arching at its top enclosing a dome of wooly fibres; vascular fibres strong, anastomosing, intermingled with a mass of lignified non-vascular fibres; bundles not abundant; average weight of husk 15.3 gms; proportion of the husk to the entire fruit 73.3%. Nut more or less oval, flattened at the base and slightly hemispherical at the apex; 0.8" x 0.8", or rather longer than broad; average weight of the nuts 10.9 gms; proportion of the nut to the entire fruit 26.7%; endosperm ruminant, lamella confined to the sides, 25-28 in number, narrow and slender; central core wider in area than the ruminations white; lamella 0.9 cm in length; network on the surface of the nut in the form of polygonal areas. Embryo small, cylindrical, centrally placed; 0.4 cm. in length.

2. *Big oblong* (Dawki). Fruit big, ovoid, or obovoid; yellowish when ripe; 1.8" long and 1.4" in diameter; apex imperceptibly tapering into a rudimentary protuberance; base tapering, slightly roundish, covered by the persistent perianth lobes; average weight of fruits 25.8 gms; average volume of fruits 28.2 cc. Pericarp hard, 0.5-0.6 cm. thick, enclosing vascular bundles; vascular bundles arranged as in 1; average weight of husk 15.7 gms; proportion of the husk to the entire fruit 77%. Nut as in 1, 0.9" x 0.9" or generally longer than broad; average weight of nuts 10.1 gms; proportion of the nut to the entire fruit 23%; rumination on the endosperm confined to the sides; 20-22 lamella, band like, more or less extending to the central core; central core small; net work on the surface of the nut as in 1, but slightly larger. Embryo small, cylindrical, 0.4 cm. in length.

3. *Big oblong* (Gauhati). Fruit big, ovoid, reddish when ripe; 1.9" long and 1.35" in diameter; apex narrowing into a projection; base slightly conical

\* Apex-free end of the fruit.

\*\* Base-the end with which the fruit is attached to the bunch.

capped by the thick and coriaceous fruiting perianth; average weight of fruits 26.0 gms; average volume of fruits 28.6 cc. Husk 0.4 cm. thick; vascular fibres confined to 0.15 cm. in thickness; arrangement of the vascular and non-vascular fibres as in 1; average weight of husk 14.8 gms; proportion of the husk to the entire fruit 76%. Nut ovoid, as broad as long or longer than broad; average weight of nuts 11.2 gms; proportion of the entire fruit 24%; lamella of the ruminations narrow and band like, 18-20 in number; central core smaller than ruminant area; net work on the surface of the nut in the form of rectangular areas. Embryo cylindrical, 0.4 cm. long, centrally placed.

4. *Big oblong* (Jorhat). Fruit big, ovoid, reddish when ripe; 1.9" in length and 1.4" in breadth; average weight of the fruits 27.0 gms; average volume of fruits 32 cc. Pericarp 0.5 cm. thick; average weight of the husk 15.2 gms; proportion of the nuts to the entire fruit 25%. Rest of the description as in the previous type.

5. *Big oblong* (Nowgong). Fruit big, ovoid, orange red when ripe; 1.8" long and 1.2" broad; apex more or less hemispherical with a central depression and a prominent cylindrical projection representing the dried-up stigma; base conical, capped by the fruiting perianth lobes; average weight of fruits 33.95 gms; average volume of fruits 38 cc. Husk 0.4 cm. thick, vascular fibres arranged as in 1; average weight of husk 23.55 gms; proportion of the husk to the entire fruit 75%. Nut ovoid, 0.8" x 0.8"; average weight of nuts 10.4 gms; proportion of the nut to the entire fruit 25%; lamella of the rumination in the form of narrow bands, extending to the central core, 20-22 lamella; net-work on the surface of the nut in the form of rectangular curved areas. Embryo oval, situated centrally, 0.35 cm. long.

6. *Big oblong* (Palasbari). Description corresponds to the previous type.

7. *Big oblong* (Sibsagar). Fruit big, ovoid reddish when ripe; 2" long and 1.4" in diameter; apex imperceptibly tapering into a cylindrical protuberance; base conical, capped by the coriaceous lobes of the fruiting perianth; average weight of fruits 35.3 gms; average volume of fruits 39.8 cc. Husk hard, 0.5 cm. thick, vascular and non-vascular fibres arranged as in the first type; average weight of husks 24 gms; proportion of the husk to the entire fruit 77.9%. Nut ovoid, as long as broad, 1" x 1"; average weight of nuts 11.3 gms; proportion of the nut to the entire fruit 23.1%; lamella of

the ruminant endosperm narrow and long, 20-22 in number; net-work on the surface of the nut as in 1. Embryo conical, obliquely placed to one side of the fruit, 0.5 cm. long.

#### BIG ROUND TYPES.

8. *Big round* (Dawki). Fruit big, globose round, bright red when mature; 1.5" long and 1.5" broad or sometimes as long as broad; apex round or hemispherical with a slightly sunken protrusion; base more or less conical, enveloped incompletely by the fruiting perianth; average weight of fruits 24.8 gms; average volume of fruits 28.7 cc. Husk bright red, 0.45 cm. thick, vascular fibres arranged as in 1, but lesser in number; bundles occupying 0.2 cm. in area; average weight of husk 15.0 gms; proportion of the husk to the entire fruit 74.6%. Nut ovoid-globose, broader than long, 0.75" x 1.0", flattened at the apex and hemispherical at the base; average weight of nuts 9.8 gms; proportion of the nut to the entire fruit 25.4%; lamella of the ruminant endosperm slender, 22-24 in number, central core large and white; net-work on the surface of the nut as in 1. Embryo slightly conical, centrally situated, 0.4 cm. long.

9. *Big Round* (Gauhati). Fruit big, reddish when ripe; 1.5" long and 1.3" broad; apex round, remnants of the stigma poorly or not represented; base hemispherical slightly sunken and capped by the fruiting perianth; average weight of fruits 36.8 gms; average volume of fruits 40.4 cc. Husk 0.4 cm. thick, vascular fibres arranged as in 1, confined to 0.25 cm. in area; average weight of husk 24.9 gms; proportion of the husk to the entire fruit 79%. Nut round-globoid, broader than long, 0.7" x 1.0"; apex hemispherical; base flat; average weight of nuts 11.9 gms; proportion of the nut to the entire fruit 21%; lamella of the rumination in the form of linear bands converging to the centre leaving a white area towards the region of the embryo; 16-18 lamella; net-work on the surface of the endosperm in the form of rectangular bands with small polygonal areas; Embryo conical, placed obliquely to one side of the fruit, 0.4 cm. long.

10. *Big round* (Nowgong). Fruit deep reddish when ripe; 1.55" long and 1.5" broad; base hemispherical. Other characters correspond to the previous type.

11. *Big round* (Palasbari). General description of the fruits as in *Big round* (Gauhati).

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#### SMALL OBLONG TYPES.

12. *Small oblong (Dawki)*. Fruit small, oblong-ovoid, creamy yellow when mature; longer than broad, 1.5" x 1.1"; apex conical with a slight protrusion; base conical, covered partly by the fruiting perianth; average weight of fruits 14.8 gms; average volume of fruits 15.9 cc. Husk 0.3 cm. thick; vascular fibres less in number, confined to 0.2 cm. in area, arranged as in 1; average weight of husk 9.8 gms. proportion of the husk to the entire fruit 66.7%. Nut as long as broad, round or slightly ovoid, 0.8" x 0.8"; average weight of nut 5.0 gms; proportion of the nut to the entire fruit 33.3%; lamella of the rumination in the form of broad bands, 20-22 in number, central area large, white; net-work on the surface of the nut in the form of small polygonal or irregular areas. Embryo small, globoid-round, situated centrally, 0.3 cm. long.

13. *Small oblong (Gauhati)*. Fruit small, oblong-ovoid, reddish when ripe; 1.6" long and 1" broad; apex conical with a prominent protrusion; base conical, covered by the fruiting perianth; average weight of fruits 14.4 gms; average volume of fruits 14.8 cc. Husk 0.3 cm. thick; vascular fibres less in number, confined to 0.1 cm. in area, arranged as in 1; average weight of husk 10.7 gms; proportion of the husk to the entire fruit 78.4%. Nut ovoid, longer than broad 0.8" x 0.75"; average weight of nuts 3.7 gms; proportion of the nut to the entire fruit 21.6%; lamella of the rumination small and band like, 18-20 in number; net-work on the surface of the nut in the form of small polygonal or irregular areas. Embryo small, globoid-round, situated centrally, 0.3 cm. long.

14. *Small oblong (Jorhat)*. Fruit as in the previous type, slightly smaller, 1.45" long and 0.9" broad; base round; average weight of fruits 14.0 gms; average volume of fruits 14.6 cc. Husk 0.2 cm. thick; vascular fibres lesser in number and arranged as in 1; average weight of husk 10.6 gms; proportion of the husk to the entire fruit 77.2%. Nut ovoid, as long as broad, 0.675" x 0.675" or slightly longer than broad; average weight of nut 3.4 gms; proportion of the nut to the entire fruit 22.8%; lamella of the rumination broad or linear; central core small; net-work on the surface of the nut in the form of small or big polygonal areas. Embryo small, linear, placed obliquely to one side of the fruit, 0.5 cm. long.

15. *Small oblong (Palasbari)*. General description corresponds to that of Small oblong (Jorhat).

16. *Small oblong (Cherrapunji)*. General description corresponds to that of Small oblong (Jorhat).

#### LARGE TYPE.

17. *Large oblong (Nowgong)*. Fruit large, roughly about the size of a hen's egg, deeply reddish when ripe, the pericarp splitting at the apex of the fruit at maturity; 2.3" long and 1.75" broad; apex slightly tapering into a small protuberance; base more hemispherical than conical, partly covered by the fruiting perianth; average weight of fruits 46 gms; average volume of fruits 49.4 cc. Husk 0.6 cm. thick; vascular fibres abundant and frequently anastomosing, arranged as in 1; non-vascular fibres intermingled with vascular fibres; vascular fibres confined to 2/3rds of the thickness of the husk; outer surface of the pericarp become fleshy at maturity of the fruit and peeling off easily; average weight of husk 31 gms; proportion of the husk to the entire fruit 24.2%; lamella of the rumination linear, wavy band like, extending into the central core of the fruits; lamella as long as 1.5 cm., 20-22 in number; net-work on the surface of the endosperm in the form of longitudinal bands. Embryo small, globoid, 0.3 cm. long.

#### SMALL ROUND TYPE.

18. *Small round (Gauhati)*. Fruit small, round-ovoid, orange yellow when ripe; 1.5" long and 1.15" broad; apex slightly conical, remnants of the dried-up stigma notched; base conical covered by the fruiting perianth; average weight of fruits 20.0 gms; average volume of fruits 24.2 cc. Husk orange red when ripe, 0.3 cm. thick; vascular fibres less in number, arranged as in 1; average weight of husk 14.0 gms; average volume of husk 72%. Nut broader than long, 0.8" x 0.95"; average weight of nut 6.0 gms; proportion of the nut to the entire fruit 28%; lamella of the rumination thick and extending to the centre, 20-22 in number; net-work on the surface of the endosperm in the form of wavy rectangular bands with small polygonal areas. Embryo globoid with slightly conical apex, 0.4 cm. long, situated centrally.

#### LONG TYPE.

19. *Long (Jorhat)*. Fruit long, yellowish green when ripe; length nearly double the breadth or more; 2.1" x 1.25"; ellipsoid with a slightly even depression towards the base; apex conical with a small projection, base more or less hemispherical, covered by the persistent perianth; average weight of fruits 20.6 gms; average volume of fruits 23.6 cc. Husk 0.45 cm. thick, increasing considerably in thickness towards the apex; vascular fibres strongly anastomosing, confined to

0.2 cm. area in thickness; arrangement of the fibres as in 1; average weight of husk 14.2 gms; proportion of the husk to the entire fruit 71.2%. Nut long, oval, length nearly double the breadth; 1.125" x 0.75"; average weight of nuts 6.4 gms; proportion of the nut to the entire fruit 28.8%; lamella of rumination short and broad and arranged symmetrically; central area white; large; net-work on the surface of the nut in the form of rectangular areas. Embryo round-globose, 0.4 cm. long.

Beccari (1919) describes a closely resembling type from the Philippines under the name *areca catechu* var. *longicarpa*. Similarly Sands (1926) describes closely allied types from Malaya and South India under the names 'Pinang Selung' and 'Long' respectively. However, in the local type the fruits were smaller in dimensions than the Philippine, Malayan or South Indian types.

#### APEX ROUND TYPE.

20. *Apex round (Jorhat)*. Fruit large, globose-ovoid, yellow when ripe; 1.7" long and 1.45" broad; apex wider than base and folded inwards in the form of a depression enclosing the projecting stylar remnants; base more or less tapering, capped by the fruiting perianth lobes; average weight of fruits 27.0 gms; average volume of fruits 31.9 cc. Husk 0.45 cm. thick, increasing to 0.75 cm. towards the apex of the fruit; vascular fibres arranged as in 1; confined to 0.25-0.35 cm. in thickness; average weight of husk 16.0 gms; proportion of the husk to the entire fruit 78.1%. Nut globose-ovoid, broader than long, 0.85" x 1.0"; average weight of nuts 11.0 gms. proportion of the nut to the entire fruit 21.9%; lamella of the rumination broad, 16-20 in number; central area large and white; net-work on the surface of the nut in the form of small rectangular areas. Embryo cylindrical with conical apex, 0.5 cm. long.

#### SMALL ELLIPSOID TYPE.

21. *Small ellipsoid (Nowgong)*. Trunk 50-60' high, 10-15" in diameter; leaves 2-2.5' long with about 30 pairs of leaflets. Spadix diffuse with slender floriferous branches. Male, female and bisexual flowers present (Raghavan and Marthy, 1954).

Fruit small, ovoid, ellipsoid, reddish yellow when ripe; 1.4" long and 0.9" broad; apex conical with a prominent projection; base conical; average weight of fruits 15.2 gms; average volume of fruits 18.2 cc. Husk 0.45 cm. thick; vascular fibres confined to 0.15 cm. in

area, arranged as in 1; average weight of husk 11.1 gms. proportion of the husk to the entire fruit 68.2%. Nut small, as broad as long, 0.7" x 0.7"; apex conical base flattened; average weight of nuts 4.1 gms; proportion of the nut to the entire fruit 31.8%; lamella of the rumination broad and closely arranged, 20-22 in number; net-work on the surface of the nut in the form of small areas. Embryo long, obliquely conical, 0.6 cm. long. Some of the fruits in the bunch have immature and undeveloped endosperm.

#### SMALL APEX POINTED TYPE.

22. *Small apex pointed (Cherrapunji)*. Fruit small or medium, yellow when ripe; convex shaped; 1.75" long and 1.15" broad; apex narrowing into a cylindrical projection, base of the projection marked by a ring-like thickening; average weight of fruits 23.4 gms; average volume of fruits 26.8 cc. Husk 0.2 cm. thick; vascular fibres less in number, closely adpressed to the nut inside the shell like endocarp forming a girdle round it, but arching from about its middle; average weight of husk 16.3 gms; proportion of the husk to the entire fruit 71.0%. Nut convex shaped, both ends more or less conical, 1.0" long and 0.95" broad; average weight of nuts 7.1 gms; proportion of the nut to the entire fruit 29%; lamella more or less converging to the centre; white softer endosperm more in area; net-work on the surface of the nut in the form of irregular areas. Embryo placed obliquely, 0.65 cm. long.

This fruit corresponds to that described by Sands (1926) from South India under the name 'Convex shaped'.

It appears that the same type collected from different regions exhibits minor variations in characters, some overlapping one another being border-line types. It is possible that the slight variations exhibited by the same type from different regions may be due to physiological peculiarities of nutrition or due to climatic and edaphic factors. The schedule is thus based mainly on the fruit's size and shape which are important characters applicable to differentiate the types. However, apart from fruit size and shape, the colour of the fruits at maturity, nature of the lamella in the ruminate endosperm, pattern of the net-work on the surface of the endosperm and nature of the husk have also been emphasised. The relative proportions of the husk to the volume of the nut in a fruit are also measured to determine the variations in the proportions of husk in fruits.

SUMMARY.

The range of floral variations usually met with in the cultivated types of arecanuts in Assam has been studied. A schedule based on the size, shape and certain other characters of the fruits showing the range of variations in the types is given.

| Ovoid oblong.                                                                              |                                                                                                                   | Big fruits (longer than broad)                                                                                        |                                                                                                                                                                                           |                                                                                                                                                                                                                                   | Small fruits longer than broad)                                                                                                                                                   |                                                                                                                     |                                                                             |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Big oblong                                                                                 | Large oblong.                                                                                                     | Round or spherical                                                                                                    | Ovoid globular                                                                                                                                                                            | Ellipsoid elongated                                                                                                                                                                                                               | Ovoid oblong                                                                                                                                                                      | Small apex pointed                                                                                                  | Round or spherical                                                          |
|                                                                                            |                                                                                                                   | Big round.                                                                                                            | Apex round.                                                                                                                                                                               | Long.                                                                                                                                                                                                                             | Small ellipsoid.                                                                                                                                                                  | Small oblong.                                                                                                       | Small round.                                                                |
| Fruits 1-8-2-0" long and 1-2-1-4" broad. Nuts longer than broad. Fruits reddish when ripe. | Fruits 2-3" long and 1-75" broad. Nuts broader than long. Fruits deep reddish when ripe; skin off peeling easily. | Apex round; 1-5" long and 1-3-1-4" broad or rarely as long as broad. Nuts broader than long. Fruits orange when ripe. | Apex round and broader than base, folded inwards in the form of a depression; base distinctly tapering. Fruits 1-7" long and 1-4" broad. Nuts broader than long. Fruits yellow when ripe. | Length of fruits nearly double the breadth or apex and base more; ellipsoid with an even 0-7" X 0-7" or depression to-wards base; ger than broad 2-1" X 1-25". Palms usually bearing male, female and bisexual flowers when ripe. | Fruits 1-45" long and 0-9" broad; both or apex and base conical. Nuts slightly bigger than in small ellipsoid but longer than broad. Spadi-ces with male and female flowers only. | Fruits as in Small oblong, convex shaped, apex narrow- ing into a pro-jection. Nuts broader than long 0-8" X 9-95". | Fruits as in Small oblong, apex round. Nuts broader than long 0-8" X 9-95". |

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## SOME FACTS ABOUT ARECANUT

By

Shama Bhat Khandige, N. Balakrishna & N. R. Adyanthaya,  
Senior Assistants,  
Arecanut Research Station, Vittal.

**INTRODUCTION.** Arecanut is grown in India, under varied conditions of soil, climate and altitude and it is needless to say that its agriculture is also carried out in diversified methods and practices. Hence it is difficult to generalise the method of cultivation of the crop. But it is the duty of scientific workers, especially at this hour, when maximum production per unit of labour and soil is aimed at, to find out the best and most economic method of cultivation of this crop. The attempts made at the Arecanut Research Station at Vittal of South Kanara on the above lines are described in this paper. The Arecanut Research Station at Vittal comprises 4-75 acres of garden taken on lease and has the conditions of semi-malnad parts of South Kanara. The main work of the station is primarily on the pathological aspects of the areca palms but work was also carried out, side by side, on other lines such as agronomical and certain fundamental facts also. The age of the garden is about 34 years.

**DETAILS OF WORK.** The cultivation practices that are followed at this station are described below :—

1. *Seeds and sowing.* With a view to select trees of very high performance, the yields obtained from all the palms in the garden are recorded separately with full details of number of bunches harvested, number of nuts per bunch, weight, size, shape and colour of nuts etc. Seednuts are selected from trees which are high yielders and healthy. Care is also taken to follow the methods of selecting seednuts that are locally adopted, such as harvesting middle bunches, selecting nuts from middle portions of bunches, nuts which are medium sized etc. The methods of raising seedlings are also those followed locally, viz. dibbling small sprouts which were allowed to germinate in baskets

or straw bundles. Seedlings of 1½ to 2½ years of age are used for planting in the main field. The cost of raising such seedlings comes to about 9 pies to an anna per seedling

2. *Planting.* At the Arecanut Research Station, the seedlings are planted wherever gaps are formed by the mortality of the palms due to various causes. The stumps of dead areca trees are dug out and pits 3' x 3' x 3' are formed. The pits are refilled to a height of about one foot from their bottom level. Care is taken to see that refilling is done in such a manner as to form a cone of earth at the centre of the pit. Then the seedling which is removed from the nursery with a ball of earth is placed over the cone so formed and some more earth is added and the plant is firmly fixed to the soil by pressing the sides of the cone. The formation of cone and planting the seedlings prevents stagnation of water at the collar region of the plant facilitating its early establishment. No manure is added while planting except spreading some green leaf round the base of the seedling to prevent the soil splashing to the tender spindle during heavy rains. About a fortnight after planting, they are manured with cattle manure or compost and ash. Planting is usually done either in the beginning or end of August. But it has been the experience that they can be planted during other months also if good irrigation and drainage facilities are available.

3. *Leaf-fall and flowering.* Under best conditions, the palm is said to flower in about 4 to 5 years after planting, though normally it takes about 6 to 8 years. Flowering is seen throughout the year but the peak period is between the months of November and April which is evidenced by the following table:—

I. Table showing the number of spadices produced during 1953-54 and 1954-55 at the Research Station, Vittal.

| Month     | Number of inflorescences developed in 1953-1954. | Number of inflorescences developed in 1954-1955. | Average | % of the total production in the month. |
|-----------|--------------------------------------------------|--------------------------------------------------|---------|-----------------------------------------|
| July      | 52                                               | 150                                              | 101.0   | 1.5                                     |
| August    | 36                                               | 137                                              | 86.5    | 1.3                                     |
| September | 83                                               | 154                                              | 118.5   | 1.9                                     |
| October   | 182                                              | 390                                              | 286.0   | 4.4                                     |
| November  | 342                                              | 763                                              | 552.5   | 8.3                                     |
| December  | 533                                              | 824                                              | 678.5   | 10.3                                    |
| January   | 646                                              | 1451                                             | 1048.5  | 16.0                                    |
| February  | 816                                              | 1310                                             | 1063.0  | 16.2                                    |
| March     | 948                                              | 1301                                             | 1124.5  | 17.1                                    |
| April     | 854                                              | 878                                              | 866.0   | 13.2                                    |
| May       | 685                                              | 298                                              | 491.5   | 7.5                                     |
| June      | 228                                              | 68                                               | 148.0   | 2.3                                     |
| Total.    | 5405                                             | 7724                                             | 6564.5  | 100.0                                   |

II. Table showing the average number of leaves shed and the number of inflorescences developed during the years 1953-1954 & 1954-1955.

| S. No. | Month     | Average No. of leaves shed from 1575 trees | Average No. of inflorescences developed in 1575 trees. | % of inflorescences to the leaf-fall. |
|--------|-----------|--------------------------------------------|--------------------------------------------------------|---------------------------------------|
| 1.     | July      | 549.5                                      | 101.0                                                  | 18.5                                  |
| 2.     | August    | 543.5                                      | 86.5                                                   | 15.9                                  |
| 3.     | September | 541.5                                      | 118.5                                                  | 21.9                                  |
| 4.     | October   | 871.5                                      | 286.0                                                  | 32.8                                  |
| 5.     | November  | 1014.0                                     | 552.5                                                  | 54.5                                  |
| 6.     | December  | 891.5                                      | 678.5                                                  | 76.1                                  |
| 7.     | January   | 1205.5                                     | 1048.5                                                 | 87.0                                  |
| 8.     | February  | 1208.5                                     | 1063.0                                                 | 88.0                                  |
| 9.     | March     | 1206.5                                     | 1124.5                                                 | 93.2                                  |
| 10.    | April     | 1006.0                                     | 866.0                                                  | 86.1                                  |
| 11.    | May       | 851.0                                      | 491.5                                                  | 57.8                                  |
| 12.    | June      | 611.5                                      | 148.0                                                  | 24.2                                  |
| Total. |           | 10500.5                                    | 6564.5                                                 | 62.5                                  |

Even though the leaf-fall is seen during all the months of the year, yet the percentage of inflorescences to the leaf-fall is observed to be more during the months of October to May than in other months (as evidenced in table II above) and more than 80% of the

inflorescences is developed during the months of November to April (as is evidenced in table I). The average number of leaves shed per palm per year was recorded to be 6.7 and the number of inflorescences produced was only 4.2.

4. *After-cultivation.* This consists of weeding whenever found necessary, digging to about 6 to 8 inches deep with mammuti fork during the month of November and attending to the general cleanliness of the farm by picking 'sogais' (dry leaves) and removing dead inflorescences etc. Another important operation that is included under after cultivation is the spraying of areca bunches against fruit-rot or Koleroga with 1% Bordeaux mixture twice during an year, once towards end of May or early June and for a second time during the middle of July. The tender palms are protected by tying areca leafsheaths or leaves over them which helps to minimise the sun scorch of stems. The life of older trees with cavities or fissures can be prolonged by tying split pieces of areca stems over such portions.

5. *Manurial practices.* The method of manuring adopted at the station was slightly different from that which is generally practised by local growers. The manure is applied in a circular trench 1 foot wide and 9"-10" inches deep, dug 2 feet away from the base of the tree. Half a pound of Superphosphate per tree is spread at the bottom and over this 20 Lbs. each of green leaf and 20 Lbs. of cattle manure or compost is spread and 1½ Lbs. of wood ash is also applied at the top layer and the manures are finally covered up with earth. Manuring is usually taken up during August of every year. Compost required for the farm was prepared from materials available in the farm itself such as dry leaves of areca, banana and other farm rubbish.

Attempts were also made to make the farm self-sufficient with respect to its green manure requirements. For this purpose plants of *Gliricidia maculata* and *Indigofera teysmunii* were planted in the marginal areas of the garden. *Gliricidia* was also planted as a hedge crop on the fence line of the garden which gave a good portion of the green leaf requirement of the station. Besides these, cover crops such as *Peuraria javanica*, *Centrosema pubescens* and *Calapogonium muconoides* were tried with success. Seeds of the above cover crops are sown in between rows of areca trees during the month of January. The advantages of sowing the seeds during January are as follows;—

(1) The crop gets itself well established before the beating South-West monsoon rains commence in June or July; (2) the crop gives good protection to the surface of the ground from the direct rays of sun during the summer months. (3) the crop prevents the surface erosion of manurial ingredients during the rainy season. (4) it improves the texture of the soil and finally a good green manure crop becomes available at the month of August for manuring.

6. *Irrigation.* The garden needs to be irrigated from the middle of November to the end of May or till the onset of South west monsoon rains. The tanks and irrigation channels are to be rectified during October and November. Water is let in through the channels from the middle of November or early December and splashed to the surface of the garden by using a small bucket made out of the leaf sheath of areca. Irrigation is given once in 5 or 6 days.

7. *Harvesting and curing.* (a) Nuts are harvested when they are fully mature, i. e. when they change to orange red or yellow or crimson in colour. The bunch becomes ready for harvest on an average, after eleven months of the leaf-fall and appearance of inflorescence, though the period varies from 9½ months to 13 months (as is evidenced in table III given below).

III. Table showing the dates of appearance of inflorescence and harvesting of bunch.

| Tree No. | Date of leaf-fall or appearance of spadix.                     | Date of harvest of ripe bunches.                                 | Period taken for maturity in months and days.                |
|----------|----------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------|
| 1.       | 14-4-1954<br>28-5-1954                                         | 10-3-1955<br>1-4-1955                                            | 10 months and 27 days<br>10 months and 3 days                |
| 2.       | 13-1-1954<br>3-3-1954<br>4-4-1954<br>1-5-1954                  | 21-12-1954<br>18-1-1955<br>17-2-1955<br>10-3-1955                | 11 " 15 days<br>10 " 15 "<br>10 " 13 "<br>10 " 2 "           |
| 3.       | 18-1-1954<br>8-3-1954<br>30-3-1954<br>10-5-1954                | 17-11-1954<br>19-1-1955<br>18-2-1955<br>10-3-1955                | 10 " 4 "<br>10 " 11 "<br>10 " 16 "<br>10 " 0 "               |
| 4.       | 22-9-1953<br>22-10-1953<br>27-12-1953<br>7-2-1954<br>14-3-1954 | 18-11-1954<br>18-11-1954<br>22-12-1954<br>20-1-1955<br>18-2-1955 | 13 " 26 "<br>12 " 26 "<br>11 " 26 "<br>11 " 13 "<br>11 " 4 " |
| 5.       | 17-11-1953<br>25-12-1953<br>6-3-1954<br>10-5-1954              | 18-11-1954<br>23-12-1954<br>20-1-1955<br>19-2-1955               | 12 " 1 "<br>11 " 29 "<br>10 " 14 "<br>9 " 9 "                |

Average 11 months 0 days

(b) *Size and shape of nuts.* The size and shape of nuts are found to vary within the same bunch and in different bunches of the same tree. The length of nuts vary from 3.2 cms. to 6.8 cms. and breadth (at the widest point) from 2.9 cms. to 5.3 cms. Different shapes, viz. oval, oblong, spherical and pyriform are also seen, but colour is a more or less consistent factor for fruits of individual tree.

(c) *Period of harvest.* Harvesting of ripe arecanuts is done in almost all the months, but the bulk or major harvests are made between October and March. During other months, only stray bunches become available for harvest. The percentage of the number of nuts harvested at each month to the total harvest of the year at the Research Station, Vittal, is given below:—

TABLE IV. PERCENTAGE OF TOTAL FOR THE YEAR.

| S. No. | Month.    | 1953-54. | 1954-55. | 1955-56. |
|--------|-----------|----------|----------|----------|
| 1.     | July      | 0.10     | 0.04     | 0.07     |
| 2.     | August    | 0.65     | 0.30     | 0.48     |
| 3.     | September | 1.35     | 1.25     | 1.30     |
| 4.     | October   | 9.52     | 1.87     | 5.70     |
| 5.     | November  | 12.94    | 16.20    | 14.57    |
| 6.     | December  | 20.06    | 34.79    | 27.42    |
| 7.     | January   | 35.10    | 24.83    | 29.97    |
| 8.     | February  | 15.10    | 15.42    | 15.26    |
| 9.     | March     | 4.90     | 4.01     | 4.45     |
| 10.    | April     | 0.19     | 1.16     | 0.67     |
| 11.    | May       | —        | 0.13     | 0.06     |
| 12.    | June      | 0.09     | —        | 0.05     |
| Total  |           | 100.00   | 100.00   | 100.00   |

From the above table, it is also gathered that more than 87% of total produce is harvested between November and February.

(d) *Curing of arecanuts.* The ripe arecanuts are harvested from the trees by using bamboo poles. After harvest the nuts are spread in the sun for drying in the specially prepared curing yards. They are allowed to dry in the sun for about 35 to 40 days. To ensure uniform drying and easy separation of kernel from kusk, the fruits are turned upside down once in 3 days. They are then husked by using special knives called "Mettukaties" and sorted. The superior nuts form the 'Biligotu' portion and the inferior ones are separated as 'Koka'. The relation between the nuts at different stages of curing is furnished in table V.

TABLE V.

| S. No. | Particulars.                                                | 1952-53. | 1953-54. | 1954-55. | Average.     |
|--------|-------------------------------------------------------------|----------|----------|----------|--------------|
| 1.     | Average number of fruits (wet) for Lb.                      | 14       | 14       | 13       | 13.7 or 14.0 |
| 2.     | Average number of dry nuts (with husk) per Lb.              | 35.5     | 35.2     | 34.2     | 25.0         |
| 3.     | Percentage of drying (after 40 days of drying)              | 59.7     | 59.9     | 62.2     | 60.6         |
| 4.     | Average number of cured and husked nuts per Lb.             | 59.0     | 57.7     | 57.2     | 58.0         |
| 5.     | Percentage of Koka in husked nuts by weight.                | 3.7      | 4.5      | 3.2      | 3.8          |
| 6.     | Percentage of husked nuts over total wet weight of nuts.    | 23.5     | 24.4     | 22.5     | 23.5         |
| 7.     | Percentage of husked nuts over dry weight (nuts with husk). | 58.3     | 60.9     | 59.7     | 60.0         |

From the above table, it is estimated that on an average 100 pounds of fruits give, after drying, 39.4 Lb. of dried areca, which, after dehusking, gives 15.9 Lbs. of husk and 23.5 Lb. of husked nuts of which 0.9 Lb. will be 'Koka' and 22.6 Lb. will be 'Biligitu'.

(e) *Yield.* The average yield per acre of the garden (with only 338 bearing trees per acre) was 1,132 pounds of cured and husked nuts. The details regarding the yields per tree of bearing age recorded at the Research Station during the last three years is given below :—

TABLE VI.

## AVERAGE YIELD PER TREE.

| S. No. | Particulars.                                                    | 1952-53. | 1953-54. | 1954-55. | Average. |
|--------|-----------------------------------------------------------------|----------|----------|----------|----------|
| 1.     | Average number of bunches per palm.                             | 2.2      | 2.4      | 2.9      | 2.5      |
| 2.     | Average number of fruits per bunch.                             | 96.0     | 68.7     | 72.5     | 79.0     |
| 3.     | Average yield of areca-nuts with husk per palm (nos.)           | 208.0    | 164.9    | 210.0    | 194.0    |
| 4.     | Average yield (cured and husked nuts) per palm by weight (Lbs.) | 3.5      | 2.8      | 3.6      | 3.3      |

From the foregoing figures it is gathered that only 2.5 bunches per palm is available for harvest even though the spadices produced is 4.2 and the average number of leaves shed is 6.7 per palm per year. Hence, it is evident that 37.3% of the leaves that shed are barren without spadices and out of the 62.7% which produce spadices, 25.4% are infertile spadices and get dried up

and only 37.3% of the spadices get fertilised and develop into good bunches.

8. *Subsidiary crops* Several subsidiary crops like coconuts, banana, pine apples, pepper vines etc. are grown primarily with the object of shade to the garden and also to increase the revenue.

9. *Cost of maintenance and Balance Sheet.* An effort is made to arrive at the cost of cultivation and to fix up the balance sheet for maintaining an acre of the existing garden. The economics are as follows :—

TABLE VII.  
BALANCE SHEET.

| S. No. | Cost of cultivation                                                                                                                      | 1953-54<br>Rs. A. P. | 1954-55<br>Rs. A. P. | Average<br>Rs. A. P. |
|--------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|----------------------|
| 1.     | Preparatory cultivation—digging pits (3'x3'x3') for filling up gaps.                                                                     | 4-11-10              | 3-6-0                | 4-0-11               |
| 2.     | Manures and manuring—including cost of manures...                                                                                        | 161-6-8              | 164-15-9             | 163-3-3              |
| 3.     | Seeds and sowing—cost of areca seedlings utilised for planting and also labour.                                                          | 8-14-3               | 4-14-1               | 6-14-2               |
| 4.     | After cultivation—weeding, digging, repairing fence and drainage channels, picking dry leaves, spraying twice with Bordeaux mixture etc. | 57-7-1               | 78-11-1              | 68-1-1               |
| 5.     | Irrigation—rectifying irrigation channels and irrigating the garden.                                                                     | 78-9-4               | 64-2-11              | 71-6-1               |
| 6.     | Harvesting, curing, husking etc. including proportionate cost of construction of yard.                                                   | 48-6-4               | 51-2-4               | 48-12-4              |
| 7.     | Cost of cultivation and harvesting charges of subsidiary crops.                                                                          | 27-12-9              | 27-2-5               | 27-7-7               |
|        | Total.                                                                                                                                   | 385-4-3              | 394-6-7              | 389-13-5             |

## RECEIPTS.

| Produce                                               | 1953-54                |              | 1954-55                |              | Average   |
|-------------------------------------------------------|------------------------|--------------|------------------------|--------------|-----------|
|                                                       | Yield per acre.<br>Lb. | Value<br>Rs. | Yield per acre.<br>Lb. | Value<br>Rs. |           |
| 1. Husked areca.                                      | 925.5<br>(Nos.)        | 1344-12-8    | 1216.5<br>(Nos.)       | 1655-10-0    | 1500-3-4  |
| 2. Ripe arecanuts sold.                               | 717                    | 10-12-0      | 757                    | 13-6-11      | 12-1-5    |
| 3. Miscellaneous receipts coconuts, banana, jack etc. | —                      | 106-9-2      | —                      | 200-14-7     | 153-11-11 |
| Total.                                                |                        | 1462-1-10    |                        | 1869-15-6    | 1666-0-8  |

## ARECANUT

The average annual cost of cultivation per acre. ..Rs. 389-13-5  
The average annual receipt per acre. 1666-0-8  
Gross profit. .. 1276-3-3

The net profit of the garden is arrived at after making allowances for the following items :—

| S. No. | Particulars                                                                        | Amount<br>Rs. As. Ps. |
|--------|------------------------------------------------------------------------------------|-----------------------|
| 1.     | Interest at 5½% on Rs. 12,000 (which is the market rate of an acre of the garden). | 660-0-0               |
| 2.     | Proportionate watchman charges (actuals).                                          | 114-0-0               |
| 3.     | Land assessment.                                                                   | 8-0-0                 |
| 4.     | Supervision charges (actuals).                                                     | 161-0-0               |
| 5.     | 1/10 expenditure (of Rs. 943-11-0) on dead stock. (actuals).                       | 19-14-0               |
|        | Total..                                                                            | 962-14-0              |
|        | Gross profit..                                                                     | 1276-3-3              |
|        | Less allowances to be made on other items as shown above.                          | 962-14-0              |
|        | Net profit..                                                                       | 313-5-3               |

**SUMMARY.** The method of raising arecanut varies from tract to tract. One such method as followed at the Arecanut Research Station, Vittal, is explained in detail. The economics of maintaining an areca garden also is given. An attempt has also been made in this paper to record the various fundamental facts and figures gathered at the above mentioned Station during its 3 years of existence.

**ACKNOWLEDGEMENT.** We are highly grateful to the Indian Central Arecanut Committee for having partly financed the scheme under whose auspices this work was carried out. We also wish to express our deep sense of gratitude to Sri T. S. Ramakrishnan and Sri M. Kandaswamy, former and present Mycologists respectively, under whose guidance this work was carried out. Thanks are also due to our colleagues Sris K. M. Vijayan and N. Thirumaleswara Bhat, who were also associated in the working of the scheme. Finally, we wish to record our appreciation of the work rendered by all other members of the staff engaged in the work.

Extension Training  
Programme \*

By

M. S. RANDHAWA, I. C. S.,  
Vice-President, I. C. A. R. & Addl. Secretary,  
Ministry of Food & Agriculture.

The backbone of the whole programme of intensive rural development envisaged under the First and Second Five Year Plans of the Government of India is the village worker. As the strategic and vital link between all the rest of the development programme organisation and the village people, he is the solid nucleus around which the whole extension programme is built. The task of training these village workers, which is vested in the Directors of Extension and Training, Ministry of Food & Agriculture, is, therefore, one of almost frightening responsibility—but also a stimulating challenge. For how well *Gram Sevaks* succeed in their careers depends to a marked extent upon the training which they have received.

The history of the training institutions working under the guidance of Directors of Extension and Training is well-known. It was in 1952 that five Extension Training Centres were established at Mandya (Mysore), Sindewahi (M. P.), Burdwan (W. B.), Bakshi-ka-talab (U. P.) and Anand (Bombay). In October of that year, the Community Projects Programme envisaged the establishment of 1,200 blocks, which needed 12,000 trained extension workers at the village level, in addition to the various supervisory personnel at the block level. To meet this urgent need the Ministry of Food and Agriculture immediately took in hand the establishment of 29 more Extension Training Centres, in co-operation with the State Governments.

To-day, there are 43 Extension Training Centres in the country and 54 Basic Agricultural Schools for

pre-extension training, where carefully selected young men are undergoing an exacting programme of training for the service of the rural people in all spheres, viz. Agriculture, Health, Education, Rural Industries, Co-operation, Rural Organisation etc.

In addition, a comprehensive programme of Home Science Extension Training has also been taken in hand. When the National Extension Service was inaugurated in the country on October 2, 1953, there was no attempt at introducing a programme for women and girls in the villages. This was due to the fact that the obstacles in developing a Home Science Programme in India seemed to be formidable. Not only was there an acute lack of trained women workers for implementing this programme, but the conserving outlook of the people, the resistance to change in the social and cultural patterns of their lives, the difficulty of reaching the villages, the poverty and illiteracy of the village folk, and the difficulties experienced by women workers living and working in villages seemed to present insurmountable difficulties.

Nevertheless, it was soon realised that unless the women of the village were carried along, the whole Extension Programme was not likely to achieve any great success. During the year 1952-53, these vague feelings took a concrete shape. The Development Commissioners and Project Officers in the various States pointed out that their efforts at village improvement, such as bettering environmental hygiene, food, kitchen gardening, latrines, compost pits, etc., could not progress because women failed to understand the objectives. Thus a national programme for rural women in Home Science was found necessary and for training the *Gram Sevikas* for this purpose, a National Home Science Wing has been sanctioned to be established in the various States, each with one Chief Instructress and two Assistant Instructresses.

The demand for the Second Five Year Plan is for 58,000 *Gram Sevaks*. To fulfil this need, an additional 18 Extension Training Centres and 41 Basic Agricultural Schools will have to be established during the Second Five Year Plan period. The number of Home Science Wings will also have to be increased.

When Extension Training was originally started, there was a good deal of confusion about what "Extension" really meant. Even the administrators and the workers in the field were not quite clear about its

conception and implications. In the popular imagination, "Agricultural Extension" simply meant the sale of seeds, fertilisers, pumps and ploughs, with lectures and directives inculcating the use of improved practices. It was, therefore, assumed by many that there was nothing very new in "Extension" as work of this nature had been carried on in India for a number of years.

The conception of an all-round development of the community through activities carried on in various spheres such as Health, Sanitation, Education, etc. in addition to Agriculture, through multi-purpose workers was still more difficult to appreciate.

The word "Extension" is used widely and rather loosely to-day to cover all types of social developmental work in the rural areas. But if the so-called "Extension", as it was practised in the past, was good enough for the re-orientation and development of the people it is strange indeed, that the yields per acre had remained as low as they were and the progress of the people in the rural areas had been almost negligible.

It is essential, therefore, that we should appreciate the real meaning and conception of "Extension". "Extension" as a specialised system, was evolved in the United States of America, as early as 1912, as an out-of-school method of education for the people. That growing country, in her endeavour to come to the forefront as speedily as possible as one of the leading nations, realised that education for all must go hand in hand with increased income through efficient production, thus ensuring an improved standard of living.

How could this be achieved in the shortest possible time? Was it possible to establish schools for vocational training as well as for training in the humanities in every parish and village in the country? Even if that could be done, would those schools be able to handle the education of the adults and, last but not the least, would such class-room lectures and routine institutional training succeed in imparting practical skills in the various occupations in the shortest possible time? The answer was in the negative in every case and the solution was to introduce a system of out-of-school education, where adults and youths would be enthused to learn by practising the improved skills in their own professions and motivated to endeavour for a better way of life in every respect through knowledge and work.

"Extension", therefore, is fundamentally a system of out-of-school education for adults and youths alike. It is a system, where people are motivated through a proper approach to help themselves by applying science in their daily lives, in farming, home-making and community living.

It is a system where the Extension teacher trains his pupil to be a teacher to teach without a school and, where the trained pupil in turn motivates the village people to accept the improved practices for better living directly or through village leaders and local institutions. It is a system, where through personal contacts, meetings, method demonstrations, result demonstrations, audiovisual aids, etc., the people are educated and enthused even without regular class rooms and institutions regarding the adoption of improved scientific practices on their farms and in their homes. It is a constant process of education and, is fundamentally an educational method where education is imparted without school room lectures. The problems of various services for development or welfare is actually secondary, the fundamental point being how to approach people at all levels and standards correctly and motivate them to learn and practise better ways of life.

Extension Training, therefore, is a heavy responsibility. *Gram Sevak* trainees come to our training institution with little technical training in the various subjects in which they must develop competence if they are to help villagers in understanding and dealing with their many problems. Even less is their knowledge of and experience with "Extension Methods" which must be adopted to stimulate villagers' interest and participation in development activities.

By and large, it can be said that our training institutions have made a promising start in imparting training in this new sphere. The passing of the years brings its own testing difficulties to such an experiment. All the excitement of the launching has died away. The enthusiast must submit to rigour of sustained effort. The idealism that inspired the championship of an idea must now be directed to its fulfilment in plain hard work.

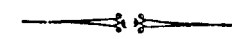
At this stage some too-impetuous hopes are bound to have been disappointed. Critics who have stood aside for a while return to murmur "We told you so".

Plain work wins little praise from those who have taken no part in it. Only results will tell. By this test alone, quite properly, must the Extension Training institutions now be judged.

The eve of the Second Five Year Plan shows the Extension Training institutions, scattered throughout the length and breadth of the country, passing from the experimental stage and becoming an integral and accepted part of our national life. Their contribution to the rural sector of our national economy has been of a high significance. The thousands of *Gram Sevaks* whom they have trained, form a living proof of their achievements.

The Extension Training institutions may be settling into sustained work, but they have no complacent belief that their achievements and methods are already adequate. There are newer heights to scale. Training methods have to be constantly improved to meet the increasing challenge of the expanding Extension programme.

In fact, all the problems of Extension Training were recently discussed in detail at the Third Conference of the Principals of Extension Training Centres and Superintendents of Basic Agricultural Schools held at Simla recently. This conference has made elaborate recommendations regarding the organisation, curriculum and teaching techniques, as well as the equipment and facilities necessary to make the training programmes more effective. These recommendations are receiving careful consideration and it is hoped that their implementation will go a long way in improving the effectiveness of the training programmes working under the guidance of the Directorate of Extension and Training, Ministry of Food and Agriculture.



\* From the "Madras Agricultural Journal", Vol. XLIII, No. 7, July, 1956.

# Indian Council of Agricultural Research, NEW DELHI.

Farm News Release No. 186/56.

## OVER 72 MAUNDS OF WHEAT CROP THAT WON PRIZE

The use of fertilizers and good seed have given a Madhya Pradesh farmer the high yield of over 72 maunds of wheat per acre. The farmer, Shreemanth Seth Rishabh Kumar of Khurai Village in Sagar district of Madhya Pradesh was declared "Krishi Pandit" in wheat for 1954-55.

Rishabh Kumar grew the wheat on the black cotton soil of his farm.

He grew a crop of sannhemp for green manuring the wheat. In addition, he applied 30 cartloads of compost per acre before the rains started.

He gave one ploughing and six discings to the field. For sowing, he used the H-65 variety of wheat obtained from the Pawarkhera Government Seed Farm and drilled the seed, using 80 pounds of seed per acre. The row to row distance was seven inches. The seed was sown on the 17th of October, 1954.

The farmer applied 250 pounds of the fertilizer mixture per acre with the seed. He irrigated the field after a fortnight. Two more irrigations were given during the life of the crop. A hundred pounds of ammonium sulphate per acre was applied after one month of sowing.

The crop was harvested on the 26th of March, 1955, and gave a yield of 72 maunds 28 seers 9 chhataks of wheat.

Farm News Release No. 197/56.

## SUPERPHOSPHATE BETTER USE RECOMMENDED.

Farmers are advised to take to the use of superphosphate to get better yields from crops.

Superphosphate is a phosphate fertilizer. It is suitable for application to all crops. Along with

nitrogenous fertilizers superphosphate increases the yield of cereals like rice, wheat and barley. It is particularly suitable for vegetable crops, especially root and tuber crops like potato, carrot, radish and onion. It also improves the size and quality of the produce. Fruit trees benefit a great deal by the application of superphosphate. Application of superphosphate to green manure crops like sannhemp and dhaincha (*Sesbania Aculeata*) increases the yield of the cereal crop grown after the green manure crop.

Superphosphate can be applied before or at the time of sowing or transplanting. It should not be used in lateritic soils. The fertilizer should be used in conjunction with bulky organic manures like farmyard manure and compost.

For cereal crops, 100 to 200 pounds of superphosphate per acre along with sufficient quantity of nitrogenous fertilizer is recommended. For vegetables, sugarcane, tobacco and similar other crops, heavier applications will be required.

Farm News Release No. 213/56.

## CALOTROPIS (AKAND) A GOOD GREEN MANURE.

The wide-growing *akand* or *madur* (*Calotropis procera*) can be used for green manuring with profit.

At Sabour in Bihar, when wheat was manured with the green leaf of *akand* at 200 maunds per acre, the wheat yield went up 150 to 300 per cent over that of the unmanured plot.

*Akand* can be raised as a green manured crop, if desired, by sowing seed at a seer per acre of land, and ploughing the crop in three to four months.

Three to four plucking can be had from wild-growing plants, and 300 to 400 maunds of leaf can be obtained from an acre of the crop.

Farm News Release No. 208/56.

## RAISING PAPPER VINES A NEW METHOD.

A new method of raising pepper vines has been evolved at the Pepper Research Station, Panniyur.

The method consists in taking single-node cuttings with about two inches of stem above and below the node and planting them in the nursery.

# News and Notes.

## 1. Import Licensing Policy.

Gazette of India Extraordinary Part I Section I dated 30th June 1956 laying down the Import licencing Policy for the period July-December 1956.

The import licensing policy for the period July-December, 1956 so far as betelnuts are concerned remains the same as in the January-June 1956 period. Betelnuts are included in the list of items for which it is not considered to have detailed quantitative restrictions. Licences will be issued liberally to actual users also. Established importers will be granted licences for reasonable amounts. The period of validity of licences will be six months. The licensing authorities are the Import Trade Controllers at the ports including Saurashtra and Bhuj.

Normally, farmers propagate pepper plants by taking cuttings with three to five nodes in each cutting.

At the Station, trials were conducted with cuttings with the leaves attached to the node as well as without the leaves.

The trials showed that single-node cuttings without the leaf attached start growing quicker than the cuttings with the leaf attached. But, the survivals are greater in the case of the latter type. Some of these cuttings developed shoots and roots within 18 days of putting in the nursery. Some developed roots not only from the node but also from the lower end of the cuttings.

Better results were obtained when cuttings were placed vertically in the nursery.

The new method economizes in plant material. It also makes uniform planting material available from a single vine in large numbers and in a short period.

## 2. Lease of forest lands for arecanut cultivation.

### ABSTRACT.

Forests - South Kanara District Areca Plantation -  
Discontinuance of - Revision of policy -  
Proposal - Orders issued.

### AGRICULTURE DEPARTMENT

G. O. Ms. No. 1689. Dated 28th June 1956.  
Read the following:-

Read again: G. O. Ms. No. 1994, Development dated 15-8-38.

Read also: From the Chief Conservator of Forests, Ref. No. 3150/54-C 1, dated 15-6-1954.

From the Board of Revenue (L. R.)  
B. P. Rt. 1767 dated 1-4-1956.

### ORDER.

The Chief Conservator of Forests has reported that the grant of land inside the reserved forests on lease for raising plantation of long term tree crops is beset with various difficulties and inconveniences from the point of view of the Forest Department, besides facilitating illicit cutting and removal of forest produces. He has therefore suggested that the general policy laid down in G. O. Ms. 1994, Development Dated 15-8-38 for the grant on lease suitable areas inside the R. Fs. for raising areca plantations may be revised and the practice may be given up. He has also suggested that exceptional cases may be considered and decided upon their merits.

2. The Board of Revenue (L. R.) is of the view that there is no need for any change in policy and has stated that when a particular plot is considered as not required for preservation of forests, there appears to be no need to refuse to grant the land for plantation on suitable conditions. As regards the lessees who violate the conditions of lease and resort to objectionable activities, the Board considers that there is provision to proceed against them and it is always open to the Government to refuse to renew leases in their favour. It has also stated that the Government can slow down the policy of granting leases for arecanut plantations, and decline to renew leases when the existing ones expire after taking into account the results achieved on the present policy adopted for filling up the gap in

imports with reference to Government Memo. No. 1173-1/38-2 Development dated 2-5-38.

3. The Government accept the views of the Board of the Revenue (Land Revenue). They consider that the forest land should be put to the best possible use and that there can be no objection to lease suitable areas for valuable crops like cardamom, arecanut, plantains etc. provided they do not involve any damage to the soil, especially as the lessee would be generally able to devote more attention to make a success of the plantation resulting in profit to him and Revenue to Government. Further as the increase in production of arecanut is envisaged in the Second Five Year Plan, it is considered necessary to use for arecanut more of such places, as are suitable for it. The Government therefore consider that there is no need for a change in the policy as suggested by the Chief Conservator of Forests.

4. The Government also direct that the rate of lease amount may be enhanced, if necessary, so as to provide for meeting the cost of additional staff, if any that may be employed effectively to protect the forests from being illicitly exploited.

*3. Remission of land revenue on arecanut gardens.*

Government of Bombay,

Revenue Department.

Government Circular, No. REV 1055-B.

Sachivalaya, Bombay, 4th July 1956.

**CIRCULAR OF GOVERNMENT.**

The Indian Central Arecanut Committee at its Ninth Ordinary meeting held at Bangalore on 7th June 1955 recommended that arecanut gardens (lands) should be assessed only after the trees begin to bear fruit. Government has considered this recommendation and it has decided that there is no objection to remit land revenue till the trees begin to bear fruit, provided that no other crop is raised in the land during the period of such remission. The Collectors concerned are therefore requested to consider such cases under Land Revenue Rule 39.

By order and in the name of the Governor of Bombay.

V. C. THAKORE,

Assistant Secretary to Government.

*4. Establishment of Regional Arecanut Research Station in Ponnani.*

The Government of Madras have requested the Director of Agriculture, Madras and the Collector of Malabar District to make available to the Indian Central Arecanut Committee about 30 acres of land fit for arecanut cultivation in Ponnani Taluk, for establishing a Regional Arecanut Research Station.

*5. Establishment of Regional Arecanut Research Station in West Bengal*

The Government of India have sanctioned the establishment of a Regional Arecanut Research Station in Mohitenagar in Jalpaiguri District of West Bengal at a cost of Rs. 2.69 lakhs. The Government of West Bengal have agreed to place at the disposal of the Committee about 20 acres of land free of cost, for establishing the Station.

**INDEPENDENCE DAY CELEBRATION.**

The Independence Day on August 15th, 1956 was celebrated by the Indian Central Arecanut Committee at its office premises by hoisting the National flag. The office was tastefully decorated on the occasion.

**EXHIBITION.**

The Indian Central Arecanut Committee participated in the Second Five Year Plan Exhibition organised by the Collector of Malabar District at the premises of the Government B. T. College, Kozhikode. Among the important items displayed, the samples of felt prepared from the arecanut husk, hitherto wasted, attracted the attention of the public and the press has given publicity to the same.

## Market Report.

Average weekly prices of arecanut during the months of JUNE, JULY and AUGUST 1956.  
(Price in Rupee per St. Md. of 82  $\frac{3}{4}$  Lbs.)

### I. AT SHIMOGA MARKET IN MYSORE STATE.

| Week ending dates | Name of quality. |            |         |              |           |  |
|-------------------|------------------|------------|---------|--------------|-----------|--|
|                   | Pheeton.         | Deshavaram | Rajalu. | Vanti Bette. | Gorabalu. |  |
|                   | Rs. As.          | Rs. As.    | Rs. As. | Rs. As.      | Rs. As.   |  |
| 2-6-1956.         | 153 14           | 151 6      | 144 13  | 110 11       | 68 13     |  |
| 9-6-1956.         | 154 5            | 152 3      | 145 4   | 109 14       | 69 15     |  |
| 16-6-1956.        | 154 5            | 154 5      | 145 10  | 109 0        | 69 2      |  |
| 23-6-1956.        | 153 14           | 153 14     | 146 8   | 111 9        | 72 7      |  |
| 30-6-1956.        | 155 8            | 156 5      | 148 2   | 111 12       | 72 7      |  |
| 7-7-1956.         | 155 8            | 156 12     | 148 2   | 110 11       | 72 7      |  |
| 14-7-1956.        | 157 2            | 156 12     | 148 2   | 110 11       | 72 7      |  |
| 21-7-1956.        | 156 2            | 156 5      | 146 8   | 111 15       | 72 7      |  |
| 28-7-1956.        | 156 5            | 156 5      | 147 5   | 111 15       | 73 7      |  |
| 4-8-1956.         | 156 5            | 156 5      | 148 2   | 111 15       | 73 4      |  |
| 11-8-1956.        | 158 13           | 159 10     | 149 12  | 112 6        | 73 4      |  |
| 18-8-1956.        | 158 13           | 159 10     | 148 2   | 110 4        | 70 12     |  |
| 25-8-1956.        | 163 6            | 167 1      | 153 8   | 111 15       | 65 12     |  |

### II. IN BOMBAY STATE.

| Week ending dates | BOMBAY MARKET.                        |               |             |             |                | SIRSI MARKET.    |             |           |         |
|-------------------|---------------------------------------|---------------|-------------|-------------|----------------|------------------|-------------|-----------|---------|
|                   | Mangalore Navi Vachar Best.           | Sirsi Toanchi | Sirsi Safed | Ceylon nuts | Singapore nuts | Betelnut (Rashi) | Tathi Bette | Kempugotu | Chali   |
|                   | Rs. As.                               | Rs. As.       | Rs. As.     | Rs. As.     | Rs. As.        | Rs. As.          | Rs. As.     | Rs. As.   | Rs. As. |
| 2-6-1956          | 125 0                                 | 237 8         | 114 0       | 115 0       | 110 8          | 92 0             | 85 0        | 75 8      | 95 8    |
| 9-6-1956          | 125 0                                 | 237 8         | 114 0       | 115 0       | 110 8          | 93 2             | 85 8        | N. R.     | 100 0   |
| 16-6-1956         | 125 0                                 | 175 0         | 117 8       | 119 0       | 115 0          | 50 4             | 82 12       | 72 0      | 97 8    |
| 23-6-1956         | 120 0                                 | 237 8         | 114 0       | 110 0       | 110 0          | 90 10            | N. R.       | 72 0      | 97 0    |
| 30-6-1956         | 125 0                                 | 237 1         | 114 0       | 110 0       | 115 0          | 91 0             | N. R.       | 71 8      | 99 0    |
| 7-7-1956          | 125 0                                 | 225 0         | 114 8       | N. R.       | 112 8          | 89 8             | N. R.       | 70 8      | 96 8    |
| 14-7-1956         | 125 0                                 | 222 8         | 114 0       | 110 0       | 110 0          | 89 8             | 83 0        | 71 8      | 98 8    |
| 21-7-1956         | 125 0                                 | 212 8         | 114 0       | 116 8       | 115 0          | 91 0             | 85 0        | 71 8      | 101 12  |
| 28-7-1956         | 125 0                                 | 212 8         | 116 0       | 113 0       | 115 0          | 86 8             | 80 0        | 75 0      | 102 0   |
| 4-8-1956          | 125 0                                 | 212 8         | 119 0       | 117 0       | 112 8          | 86 0             | 80 0        | 70 0      | 108 0   |
| 11-8-1956         | (Market closed on account of strike.) |               |             |             |                | 84 0             | 83 0        | 75 8      | 115 0   |
| 18-8-1956         | 130 0                                 | 212 8         | 126 8       | 118 0       | 115 0          | 99 8             | 80 0        | 77 8      | 110 12  |
| 25-8-1956         |                                       |               |             |             |                | 98 0             | 89 0        | 83 8      | 115 0   |

N. R. = No Report.

| III. AT CALCUTTA MARKET IN WEST BENGAL STATE. |                              |                         |                            |                         |
|-----------------------------------------------|------------------------------|-------------------------|----------------------------|-------------------------|
| Week ending dates.                            | Sundried (sliced)<br>Rs. As. | Ceylon Nuts.<br>Rs. As. | Singapore Nuts.<br>Rs. As. | Penang Nuts.<br>Rs. As. |
| 2-6-1956.                                     | N. R.                        | N. R.                   | N. R.                      | N. R.                   |
| 9-6-1956.                                     | 100 0                        | 115 0                   | 111 0                      | 111 0                   |
| 16-6-1956.                                    | 100 0                        | 115 0                   | 111 0                      | 111 0                   |
| 23-6-1956.                                    | 100 0                        | 115 0                   | 111 0                      | 111 0                   |
| 30-6-1956.                                    | 100 0                        | 115 0                   | 111 0                      | 111 0                   |
| 7-7-1956.                                     | 110 0                        | 120 0                   | 118 0                      | 115 0                   |
| 14-7-1956.                                    | 110 0                        | 125 0                   | 122 0                      | 120 0                   |
| 21-7-1956.                                    | 110 0                        | 123 0                   | 118 0                      | 118 0                   |
| 28-7-1956.                                    | 110 0                        | 123 0                   | 118 0                      | 118 0                   |
| 4-8-1956.                                     | 100 0                        | 124 0                   | 121 0                      | 120 0                   |
| 11-8-1956.                                    | 100 0                        | 123 0                   | 126 0                      | 124 0                   |
| 18-8-1956.                                    |                              |                         |                            |                         |
| 25-8-1956.                                    |                              |                         |                            |                         |

| IV. IN TRAVANCORE-COCHIN STATE. |                    |                   |                  |                      |                     |  |
|---------------------------------|--------------------|-------------------|------------------|----------------------|---------------------|--|
| Week ending dates.              | TRICHUR MARKET.    |                   |                  | ALLEPPEY MARKET.     |                     |  |
|                                 | Erasel.<br>Rs. As. | Iylon.<br>Rs. As. | Choor<br>Rs. As. | Assorted.<br>Rs. As. | Garbled.<br>Rs. As. |  |
| 2-6-1956.                       | 213 14             | 181 12            | 183 4            | 113 2                | 124 14              |  |
| 9-6-1956.                       | 228 5              | 187 3             | 211 4            | 117 9                | 132 4               |  |
| 16-6-1956.                      | 193 5              | 170 11            | 194 4            | 118 5                | 132 4               |  |
| 23-6-1956.                      | 191 4              | 168 10            | 199 12           | 119 0                | 132 4               |  |
| 30-6-1956.                      | 199 8              | 169 7             | 199 12           | 120 8                | 133 11              |  |
| 7-7-1956.                       | 203 10             | 176 7             | 194 4            | 121 4                | 134 7               |  |
| 14-7-1956.                      | 180 15             | 163 4             | 164 9            | 122 5                | 135 9               |  |
| 21-7-1956.                      | 139 12             | 133 10            | 132 13           | 120 14               | 135 9               |  |
| 28-7-1956.                      | 156 4              | 136 9             | 146 0            | 122 11               | 136 5               |  |
| 4-8-1956.                       | 154 4              | 131 8             | 148 3            | 122 11               | 136 5               |  |
| 11-8-1956.                      |                    |                   |                  | 122 11               | 136 5               |  |
| 18-8-1956.                      |                    |                   |                  | 122 11               | 136 5               |  |
| 25-8-1956.                      |                    |                   |                  |                      |                     |  |

| V. IN HINDUPUR MARKET IN ANDHRA STATE. |                   |                   |                  | VI. IN DELHI MARKET. |                       |
|----------------------------------------|-------------------|-------------------|------------------|----------------------|-----------------------|
| Week ending dates.                     | Billa.<br>Rs. As. | Churu.<br>Rs. As. | Podi.<br>Rs. As. | Week ending dates.   | Betelnuts.<br>Rs. As. |
| 1-6-1956.                              | 157 11            | 152 9             | 77 2             | 1-6-1956.            | 123 8                 |
| 8-6-1956.                              | 160 5             | 150 0             | 77 2             | 8-6-1956.            | 124 8                 |
| 15-6-1956.                             | 159 7             | 150 0             | 77 2             | 15-6-1956.           | 124 0                 |
| 22-6-1956.                             | 159 7             | 150 0             | 77 2             | 22-6-1956.           | 125 0                 |
| 29-6-1956.                             | 164 9             | 159 7             | 80 9             | 29-6-1956.           | 125 0                 |
| 6-7-1956.                              | 164 9             | 159 7             | 80 9             | 6-7-1956.            | 123 8                 |
| 13-7-1956.                             | 165 7             | 166 5             | 87 7             | 13-7-1956.           | 123 8                 |
| 20-7-1956.                             | 165 7             | 166 5             | 87 7             | 20-7-1956.           | 123 8                 |
| 27-7-1956.                             | NO REPORT         |                   |                  | 27-7-1956.           | 122 8                 |
| 3-8-1956.                              | 162 14            | 161 2             | 82 5             | 3-8-1956.            | 122 8                 |
| 10-8-1956.                             | 161 2             | 159 7             | 78 14            | 10-8-1956.           | 122 8                 |
| 17-8-1956.                             | 167 2             | 159 7             | 78 14            | 17-8-1956.           | 125 0                 |
| 24-8-1956.                             |                   |                   |                  | 24-8-1956.           | 125 0                 |

# VII. AT MANGALORE MARKET IN MADRAS STATE.

| Week ending dates | New Supari<br>Rs. As. | Choll<br>Rs. As. | Koka<br>Rs. As. |
|-------------------|-----------------------|------------------|-----------------|
| 7-6-1956          | 115 5                 | No stock         | 73 8            |
| 14-6-1956         | 115 11                | Do.              | 71 10           |
| 21-6-1956         | 119 0                 | Do.              | 75 5            |
| 28-6-1956         | 117 9                 | Do.              | 77 2            |
| 5-7-1956          | 118 5                 | Do.              | 75 5            |
| 12-7-1956         | 114 15                | Do.              | 75 5            |
| 19-7-1956         | 113 14                | 117 15           | 75 5            |
| 26-7-1956         | 115 12                | 120 14           | 75 5            |
| 2-8-1956          | 113 14                | 121 4            | 77 14           |
| 9-8-1956          | 121 4                 | 128 9            | 82 10           |
| 16-8-1956         | 123 1                 | 130 7            | 80 13           |
| 23-8-1956         | N. S.                 | 131 4            | 80 13           |
| 30-8-1956         |                       |                  |                 |

# VIII. IN ASSAM STATE.

| Week ending dates | Tezpur Market          |                        | Silchar Markets    |                        |                             |
|-------------------|------------------------|------------------------|--------------------|------------------------|-----------------------------|
|                   | Poka Tamol.<br>Rs. As. | Bura Tamol.<br>Rs. As. | Supari.<br>Rs. As. | Dried nuts.<br>Rs. As. | Raw nuts.<br>(per 100 Nos.) |
| 2-6-1956          | 20 0                   | N. R.                  | 120 0              | 122 3                  | 1 15                        |
| 9-6-1956          | 20 0                   | N. R.                  | 120 0              | 122 3                  | 1 15                        |
| 16-6-1956         | 23 0                   | N. R.                  | 125 0              | 122 4                  | 2 0                         |
| 23-6-1956         | 24 0                   | N. R.                  | 126 0              | 122 8                  | 2 4                         |
| 30-6-1956         | 24 0                   | N. R.                  | 126 0              | 122 8                  | 2 4                         |
| 7-7-1956          | 24 0                   | 25 0                   | 125 0              | 122 8                  | 2 4                         |
| 14-7-1956         | 25 0                   | 25 0                   | 125 0              | 123 0                  | 2 5                         |
| 21-7-1956         | 25 0                   | 25 0                   | 120 0              | 123 0                  | 2 5                         |
| 28-7-1956         | 28 0                   | 26 0                   | 120 0              | 123 8                  | 2 8                         |
| 4-8-1956          | 28 0                   | 26 0                   | 120 0              | 123 8                  | 2 9                         |
| 11-8-1956         | 28 0                   | 26 0                   | 120 0              | 124 0                  | 2 12                        |
| 18-8-1956         | 28 0                   | 26 0                   | 120 0              | 124 0                  | 2 12                        |
| 25-8-1956         |                        |                        |                    |                        |                             |

Import of arecanuts into India during the period APRIL to JUNE, 1956.

| Port to which imported. | Places from which imported.   |                |                              |                |                              |                                 |                           |                |                                            |
|-------------------------|-------------------------------|----------------|------------------------------|----------------|------------------------------|---------------------------------|---------------------------|----------------|--------------------------------------------|
|                         | Ceylon<br>Quantity<br>(Cwts.) | Value<br>(Rs.) | Singapore<br>Qty.<br>(Cwts.) | Value<br>(Rs.) | Federated<br>Qty.<br>(Cwts.) | Malaya States<br>Value<br>(Rs.) | Others<br>Qty.<br>(Cwts.) | Value<br>(Rs.) | Total<br>Qty.<br>(Cwts.)<br>Value<br>(Rs.) |
| Bombay.                 | 11,071                        | 6,92,514       | 7,781                        | 4,59,018       | 84,766                       | 53,20,858                       | —                         | —              | 1,03,618 64,72,390                         |
| Calcutta                | 7,512                         | 4,81,262       | 99,761                       | 60,86,313      | 4,117                        | 2,59,088                        | —                         | 24             | 1,11,420 68,26,687                         |
| Madras.                 | 2,258                         | 1,58,089       | 4,101                        | 2,36,030       | 9,070                        | 4,62,153                        | —                         | —              | 15,429 8,56,272                            |
| Saurashtra.             | —                             | —              | 158                          | 9,289          | —                            | —                               | —                         | —              | 158 9,289                                  |
| Total.                  | 20,841                        | 13,31,865      | 1,11,831                     | 67,90,650      | 97,953                       | 60,42,099                       | —                         | 24             | 2,30,625 1,41,64,638                       |

JOURNAL

Statistics of Export of Arecanuts to Foreign Countries from  
Bombay Port during the period APRIL to JUNE 1956.

| Destination.         | Quantity<br>(Cwts.) | Value<br>(Rs.)  |
|----------------------|---------------------|-----------------|
| Aden                 | 30                  | 8,570           |
| Bahrein Islands      | 5                   | 1,263           |
| Federation of Malaya | 12                  | 3,577           |
| Fiji Islands         | 52                  | 11,041          |
| Iraq                 | 6                   | 870             |
| Mozambique           | 38                  | 8,823           |
| New Zealand          | 3                   | 660             |
| Nyasaland            | 37                  | 9,049           |
| Rhodesia North       | 8                   | 3,125           |
| Rhodesia South       | 22                  | 6,107           |
| Saudi Arabia         | 52                  | 12,209          |
| Singapore            | 41                  | 11,846          |
| Zanzibar and Pemba   | —                   | 22              |
| Tanganyika           | 11                  | 2,154           |
| Uganda               | 25                  | 6,190           |
| United Kingdom       | 5                   | 1,826           |
| Kenya                | 355                 | 82,368          |
| A. E. Sudan          | 4                   | 1,250           |
| <b>Total.</b>        | <b>706</b>          | <b>1,70,950</b> |

WHAT ARECA GROWERS SHOULD DO IN THE  
MONTHS OF SEPTEMBER, OCTOBER AND NOVEMBER.

SEPTEMBER: Harvesting of seednuts in Malabar and Travancore - Cochin State. Second if required third spraying of Bordeaux mixture. Collecting forest leaves for the preparation of compost. Sowing of Sann hemp especially in the areca gardens on plains by the beginning of Sept.

OCTOBER: Burying the Sann hemp for green manuring. This is buried near the palm 1' all round in the soil. Preparation of water channels. Addition of fertiliser while preparing.

NOVEMBER: Transplanting of areca seedlings.

Foreign Markets.

I. Average weekly prices of arecanut in Colombo Market, Ceylon during  
the months of JUNE, JULY & AUGUST, 56.  
(Price in Indian Rupees per St. Maund of 82 2/7 Lbs.)

| Week ending<br>dates | Average<br>quantity | Whole<br>No. 5 | Whole<br>No. 6 | Whole<br>No. 7 | Vedial. |
|----------------------|---------------------|----------------|----------------|----------------|---------|
| 2-6-1956             | 35 4                | 41 14          | 40 7           | 34 8           | 8 2     |
| 9-6-1956             | 35 4                | 41 14          | 40 7           | 34 8           | 8 2     |
| 16-6-1956            | 34 8                | 41 3           | 39 11          | 33 13          | 8 2     |
| 23-6-1956            | 34 8                | 41 3           | 39 11          | 33 13          | 8 2     |
| 30-6-1956            | 34 8                | 41 3           | 39 11          | 33 13          | 8 2     |
| 7-7-1956             | 36 12               | 43 5           | 41 14          | 36 0           | 10 5    |
| 14-7-1956            | 36 12               | 43 5           | 41 14          | 36 0           | 10 5    |
| 21-7-1956            | 36 12               | 43 5           | 41 14          | 36 0           | 10 5    |
| 28-7-1956            | 36 12               | 43 5           | 41 14          | 36 0           | 10 5    |
| 4-8-1956             | 36 12               | 43 5           | 41 14          | 36 0           | 10 5    |
| 11-8-1956            | 8                   | 44 1           | 42 10          | 36 12          | 11 0    |
| 18-8-1956            | 40 3                | 47 12          | 46 5           | 40 7           | 11 0    |
| 25-8-1956            |                     |                |                |                |         |

ARECANUT

II. Average weekly prices of arecanut in DACCA  
and NARAYANGANJ markets of East Bengal  
(Pakistan) during MAY and JUNE 1956,  
(Price in Indian Rupees per St. Maund of 82 2/7 Lbs.)

| Week ending<br>dates | Dacca<br>Rs. | Narayanganj<br>Rs. |
|----------------------|--------------|--------------------|
| 6-5-1956             | 80/-         | 80/-               |
| 13-5-1956            | 85/-         | 80/-               |
| 20-5-1956            | 85/-         | 78/-               |
| 27-5-1956            | 85/-         | 76/-               |
| 2-6-1956             | 85/-         | 75/-               |
| 9-6-1956             | 94/-         | 90/-               |
| 16-6-1956            | 94/-         | 90/-               |
| 23-6-1956            | 90/-         | 90/-               |
| 30-6-1956            | 90/-         | 90/-               |

III. Average weekly prices of arecanut in  
SINGAPORE during JUNE, 1956.

| Name of variety. | Split Bukit Batu.<br>Price in Malayan dollars<br>per picul. |
|------------------|-------------------------------------------------------------|
| 1st week.        | 48                                                          |
| 2nd week.        | 50                                                          |
| 3rd week.        | 48                                                          |
| 4th week.        | 47                                                          |

1 picul = 133 1/3 Lbs. and 1 Malayan dollar =  
Indian Rupees 1.9 (approximately).



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