

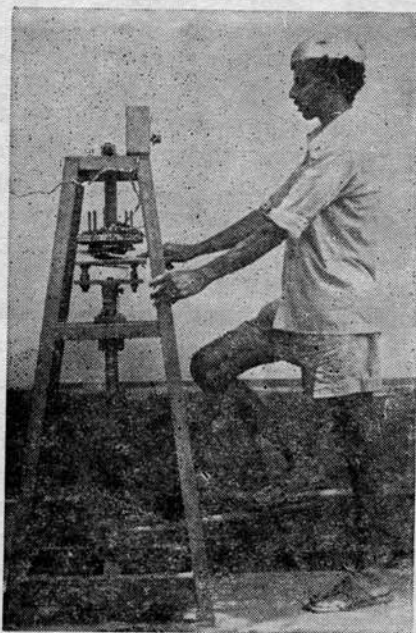
# OTHER USES OF ARECANUT

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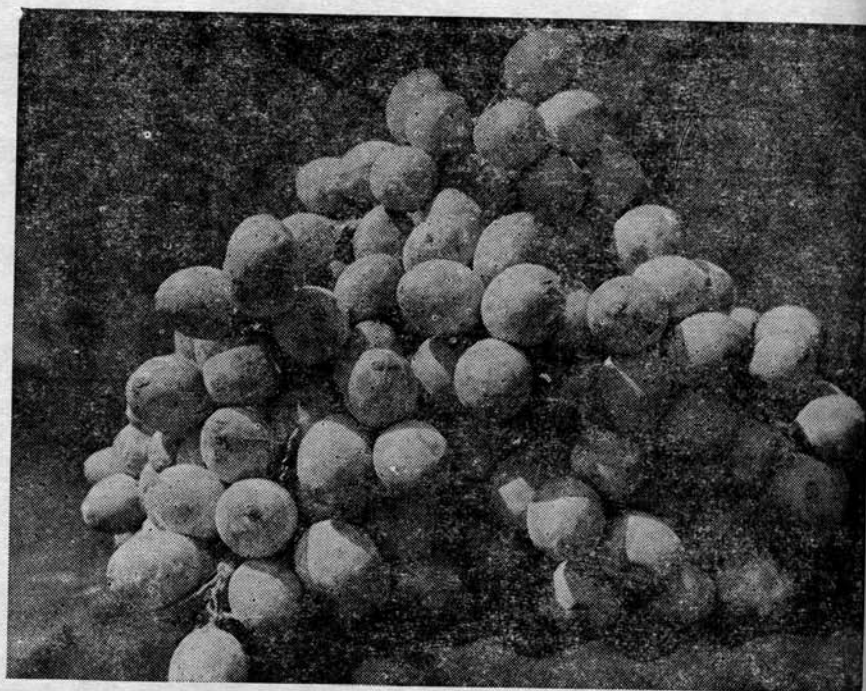
**A**RECANUT is traditionally used as a masticator in the countries of Indo-Malayan peninsula. Its ethno-religious importance particularly in India is unique. The chewing of *supari* with *paan* (betel leaf) is nothing short of a ritual with many people. Other ingredients of the quid are a dash of slaked lime paste and a pinch of tobacco roll of the chewing variety. Almost the entire quantity of about two lakh tonnes of arecanut produced in India goes into the traditional use of chewing, either in the cured form or uncured form.

## What Constitutes Arecanut?

The nut contains fat, polyphenols (tannins), alkaloids, polysaccharides and a small quantity of protein. The husk is composed of cellulose, lignin and hemicellulose with traces of tannins. The following Table (page 42) gives the range of different constituents of arecanut.



'Pala' cup making machine



A bunch of arecanuts

In addition to this, the nut contains vitamin B6 and vitamin C at concentrations of 286.9 and 416.2 mg per cent respectively.

## Arecanut Fat as an Edible Fat

The fat which constitutes about 14 to 15 per cent is extractable with organic solvents like hexane or chloroform. The extracted fat has a white plastic appearance on cooling with no particular odour. Following is the comparison of arecanut fat with coconut oil.

Since the fat is rich in myristic acid this can be a good indigenous source for manufacturing myristic acid and its derivatives. Also the blended product of the areca fat with cocoa butter in the ratio of 1:1 can be substituted for cocoa butter or hydrogenated coconut oil in confectionary and in the manufacture of imitation dairy products.

The total extractable quantity of fat in arecanut is certainly not high enough to attract manufacturing industry. Since the defatted fraction need not go waste and could be exploited as a source of polyphenols and also for the manufacture of scented supari, the industrial potential remains. The fact that defatted arecanuts will not cause any irritation to mucous membrane is an added advantage for processing the same for scented supari.

## Tannins

Polyphenols (tannins) form the major constituent in arecanut. Tender nut contains about 38 to 47 per cent tannins whereas ripe nuts have only about 16 to 22 per cent. When arecanut pieces are boiled with water in an earthen or copper vessel, a red coloured solution known as 'chogaru' is obtained.



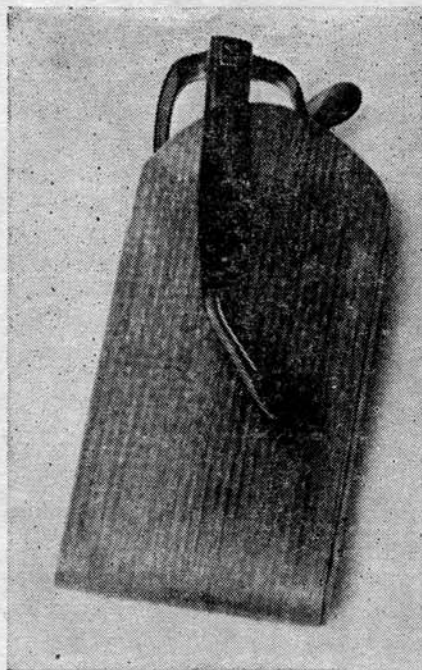
Snuffbox made out of areca kernel

This red colour is due to tannins. Isolation of this matter is possible and this can be successfully used as a natural colouring agent in food products and as dyes. It is worthwhile to mention here that the tannins can be used in leather industry also for retanning chrome leathers.

#### Areca Alkaloids as Pharmacological Tools

The most active fraction in arecanut is the alkaloids which are six in number, namely arecoline, arecolidine, arecaidine, guvacine, isoguvacine, and guvacolidine. Together they constitute about 1.5 per cent of the total nut weight, of which arecoline alone accounts for 0.24 per cent. The anthelmintic property of arecoline is mentioned in Ayurvedic texts which is also scientifically proved. It is effective against tape-worms and round worms. The non-arecoline fraction can be used as a miotic agent for constricting the pupils in the eye. This has got implication in ophthalmic treatments. Since the compounds in current use for miosis are imported, isolation of the non-arecoline fraction signifies import substitution. It is interesting to see that arecanut potentiates the action of phenobar-

bitone. Hence it is useful as a central nervous system depressant drug. Specifications are made on the antibacterial property of arecanut in Indian Ayurvedic literature and British Pharmacopoeia, which is in accordance with the research studies conducted recently. Thus arecanut extract inhibits the growth of bacteria like *Escherichia coli*, *Salmonella typhi* and *Streptococcus aureus*. This is of high medicinal importance. The effect of arecanut in



Case for spectacles

reducing the blood sugar levels in diabetes is mentioned in Ayurveda. This is being verified on modern lines. This looks important in the field of clinical diabetes where there is scarcity of insulin and since many of the hypoglycaemic drugs are known to have side effects.

#### Chewing Gums Containing Arecanut

Areca phenolics can be incorporated in chewing-gum preparations. The studies are at a preliminary stage but encouraging results are expected. The method is now being optimised to get the best combination of taste, flavour and chewing characteristics.

#### Industrial Uses of Arecanut Husk

Arecanut husk, the lignocellulosic



Cups

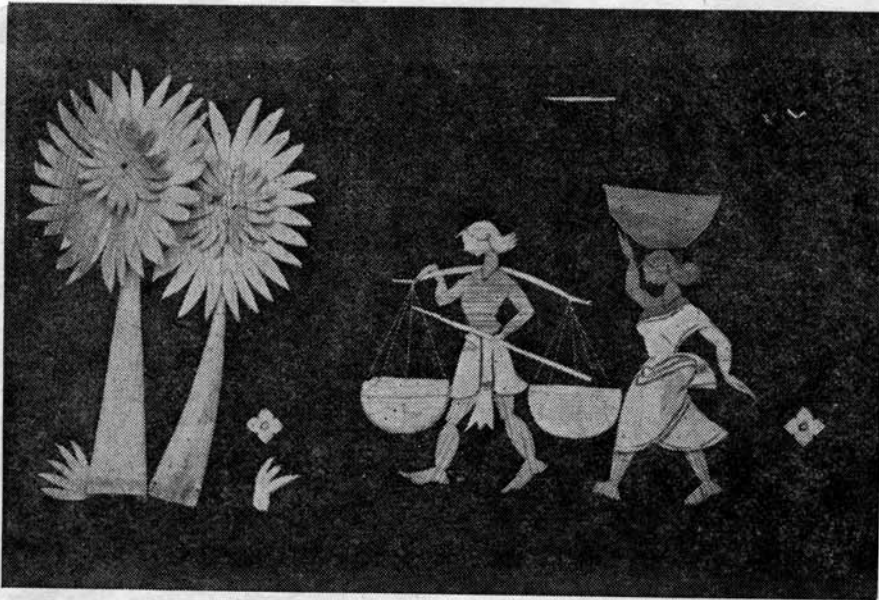
by-product from the arecanut garden has been found to have a great scope in many industrial applications. About 60,000 tonnes of arecanut husk is available in our country every year. At present the husk is mostly used as a domestic fuel. In Thailand and Philippines it is used for tooth brushes.

#### Hard Boards and Plastic Boards

Detailed studies at the Forest Research Institute, Dehra Dun have shown that plastic and hardboards of comparable strength properties could be made from arecanut husk. The boards when tempered with cashewnut shell liquid (CNSL) were found to have good water resistance, higher strength and less microbial growth. Plastic boards made from the husk by thermal condensation process with sodium thiosulphate and tempered with CNSL were found to have comparable strength properties of PF plastics.

#### Insulation Wool

The husk has a low thermal conductivity and can be used for making insulation wool. The insulation wool prepared by beating air-dry husk with wooden mallet compares favourably in respect to thermal conductivity, density of packing,



An object of art prepared from areca leaf sheath

etc. with standard products like Palcowool, defibrated teak bark and granulated cork. Its utility in thermal installations, accoustical correction, packing, etc. is promising. The only drawback of the husk is its short staple length.

#### Cushions

The husk softened by pectinolytic bacteria is an excellent cushion material. Studies at the CFTRI, Mysore have revealed that soft cushion pads obtained from softened spongy fibres of husk compare well with standard cushion pads. These could be used for packing for books also. Thick boards or fluffy cushions like Felaxon can be made with the non-woven fabric from areca husk fibres. Thick felts or mattresses can also be made from areca husk fibre in admixture with coir fibre.

#### Paper and Paper Boards

Areca nut husk can be chemically pulped by digesting with chemicals at 170°C for 4 hours with 45-50 per cent yield. This pulp is found to be suitable for making brown wrapping paper with strength properties considerably improved when mixed with jute or bamboo pulp (40 per cent).

#### Furfural

Areca husk contains 18.75 per

cent furfuraldehyde and when distilled with acid, the husk fibre yields 5.5 per cent furfural and the residue after distillation can be used as a filler in plastics.

#### Xylose

Areca husk is a good source of xylose. Xylose is a monosaccharide and xylitol derived from xylose by hydrogenation is sweet and can be used instead of sucrose in diabetic patients. It is pertinent to note that xylitol for our present use is imported. The yield of xylose from areca husk by acid hydrolysis process is about 2-3 per cent.

#### Activated Carbon and Charcoal

The residue of husk after extraction of xylose gives charcoal, when mixed with zinc chloride and heated to 800°C for 2 hours. The charcoal thus produced compares well with standard charcoal of E-Merck and it has got excellent decolourising property. The yield is about 25-28 per cent.

#### Industrial Uses of Areca Leaf Sheath

Areca leaf sheath, another raw material available from areca palm is available in huge quantities. It is estimated that about 1000 million leaf sheaths are shed down every year from areca palms. (1400 palms per hectare and 5-6 leaf sheaths are shed/palm). A large portion

of this secondary produce from areca plantation is being wasted except for use to some extent as inferior fuel and as packing leaf, for making head caps for farm workers, as eating bowl, as containers, for toddy, etc. in some places of Kerala and Karnataka.

Recent research has shown that areca leaf sheath has desirable properties in developing active economic uses for the material. The natural variation and heterogeneity in the shape, colour and appearance of the leaf sheath have been ingeniously exploited to develop various art objects.

#### Plyboards

Areca leaf sheath plyboards (3-ply) prepared were found to have tensile strength of 1/3-1/2 of that of conventional 3 ply wood, and better flexibility.

NUT	Percentage
Polyphenols	11-18
Fat	14-15
Alkaloid (Arecoline)	0.22- 0.24
Total sugars (hydrolysable)	4. 3-25. 7
Crude fibre	1. 3-15. 4
Protein	0- 7. 0

HUSK	Percentage
Cellulose	46.0
Lignin	21.9
Moisture content	10.0
Ash	6.8
Hemicellulose	15.3

Constituent	Areca fat	Coconut oil per cent
Decanoic acid	—	6.10
Lauric acid	17. 4	44-52
Myristic acid	42-44	13-17
Palmitic acid	14-15	8-11
Stearic acid	2.7	1- 3
Oleic acid	13.0	5- 8
Linoleic acid	10.6	Traces to 2.5

Even though, the areca ply boards do not show the strength properties of plywood, they appear to be suitable for making packing cases, like tea chests for internal movement of tea within the country, and for medicines, tobacco, etc. In certain applications, as illustrated above,

a high strength as exhibited by a material like plywood may not be required but in the absence of a suitable material, plywood may have been so far employed. Further studies on these aspects are in progress at CPCRI, Kasaragod. Use of these plyboards in such applications shall save a considerable quantity of softwood timber which can be channelled for other sophisticated uses.

The flexibility of the plyboards can enable their application in suitcase manufacture also. The satisfactory bursting strength, and the ability to bend them to short curvature are desirable properties for making file boards, brief cases and tubular packages. The file boards made of areca leaf sheath plyboards have been put to use in CPCRI, Vittal for the past five years.

#### **Throw-away Plates and Cups**

The flexibility and mouldability of the sheath when wet makes it a good material for heat moulding. The CFTRI, Mysore has developed a machine for making cups and throw-away plates which may substitute the paper plates and cups now being used. The machine is manually operated by leg and is

capable of producing 100 cups per hour with one skilled operator and helper. The leaf sheath is subjected to 158°C for 10 seconds in the machine for moulding. Such plates and cups are already being produced in small scale units in south Karnataka.

#### **Decorative Veneer Panels and Picture Mounts**

Aesthetically attractive and imaginative novelties can be made from areca leaf sheaths taking advantage of the natural colour and grain variation in the surface. For this, the sheath surface, given a finish in varnish or French polish, makes a beautiful picture mount or a decorative panel. The dark and white faces of the outer and inner surfaces of the sheath have been exploited to prepare decorative panels of wooden almirahs and teapots.

#### **House Chappals**

The easy yielding of the sheath for stitching and its resemblance to animal hide, suggest its usefulness as a cheap substitute for leather sole-tops in house chappals and cheap summer wear chappals in the drier regions of India.

#### **Other Applications**

Briefcases, brief bags, spectacle

cases, tea or coffee trays are the other products that can be prepared out of areca leaf sheaths. Possibilities for using the sheaths in manufacture of low grade paper boards for packing purposes look promising.

The exploitation of areca husk and areca leaf sheaths for these application will fetch an additional income to the arecanut growers and also generate additional employment in the rural sector of our country.

The comfortable status of arecanut industry at present depends on the traditional demand for chewing. The marketing system is fairly sound and stable. It can take care of the minor shocks due to the tilts in the balance of demand and supply. But one has to be watchful as to how far the generations to come show tendencies to break-off from traditions. A drastic break-off means a bigger shock to the industry leading to the inevitable glut. It is here the diversification has got to come into full play. We are now fairly clear about the potentialities of the raw product in manufacturing industry.

CONTINUED FROM PAGE 39

### **MICROBIOLOGY OF ROOT REGION**

plantation with cowpea, NB-21 (hybrid napier) and Guinea grass increased the nitrogen fixing *Beijerinckia*, *Azotobacter* and phosphate solubilizing micro-organisms. The areca and cocoa mixed cropping has shown synergetic effects as it increased the yield of arecanut crop. This could be mainly due to the constant addition of organic matter by way of cocoa leaf fall. The leaf litter serves as natural mulch in summer and help in moisture conservation by preventing the evaporation loss and also increases the microbiological activities of the soil. Leaf litter decomposition releases nutrients slowly and continuously and makes it available to the palm.

Several micro-organisms are found inhabiting in the root region of arecanut palm. The *Trichoderma* sp., and *Aspergillus* sp. are the fungi covering nearly 30 to 50 per cent of the fungal flora. The actinomycetes observed are *Streptomyces* sp., *Nocardia* sp., *Micromonospora* sp. and *Actinomyces* sp. The potential antagonistic micro-organisms such as *Trichoderma* and actinomycetes group can be used in the biological control of root inhabiting pathogens. The exploitation of asymbiotic nitrogen fixers, phosphate solubilizers and endogon V-A mycorrhizae are possible for increasing the plant growth. The inter or mixed cropping practice in arecanut plantation increases the microflora and microbiological activity of the soil.

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