RECYCLING OF ARECANUT WASTE

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ARECANUT palm scores the second position among the important plantation crops in India. The area under production is about 184,500 ha and the annual production is approximately 191,400 tonnes. The nuts are used for chewing either in the raw or processed form. Kerala, coastal and Malnad areas of Karnataka and Assam are the major arecanut growing tracts of India. It is also cultivated on a smaller scale in parts of Tamil Nadu, West Bengal, Andhra Pradesh, Goa, Maharashtra and Meghalaya. The state-wise acreage and production of arecanut is given in Table 1.

TABLE 1. STATE-WISE AREA AND PRODUCTION OF ARECANUT IN INDIA* (ESTIMATE FOR 1980-1981)

States	*Area ('000ha)*	*Production ('000 tonnes)*
Andhra Pradesh	0.2	0.2
Assam	50.8	49.8
Karnataka	54.3	79.2
Kerala	60.9	53.2
Maharashtra	2.1	2.5
Meghalaya	6.5	0.9
Tamil Nadu	4.3	3.0
Tripura	0.6	0.4
West Bengal	3.1	0.8
Goa, Daman, Diu	1.4	1.3
Mizoram	0.3	0.1
Total	184.5	191.4

*Source : Indian Cacao, Arecanut and Spices Journal

Being a perennial crop it produces considerably large quantities of waste materials such as leaf and leaf sheath besides husk. Arecanut processing industry produces, as a byproduct large quantity of 'chogaru', an effluent, a waste obtained after boiling tender nuts in water. The sediments of this liquid are rich in tannin, which can be exploited for use in several industries. It is reported that with other tannin materials, this could be used in the leather industry for tanning purposes.

Leaf and Leaf Sheath

A normal healthy palm will have 10-12 green leaves and usually the annual leaf fall is 7-8 leaves/palm. At this rate from one hectare of land with 1,370 palms, 10-11 thousand leaves will be shed in a year—approximating to 21.3-23.4 tonnes. Bulk of this material is being wasted but for some proportions being used either for thatching or for fuel. Similarly the leaf sheath, which forms 45 per cent of total leaf weight, also has little or no use. In some coastal regions of Karnataka the leaf sheath is used to make headgear and protectives from rain and in parts of Kerala it is being used as a cattle feed. The rest is wasted. Studies indicated that the leaf as well as the leaf sheath are fairly rich in plant nutrients such as nitrogen, phosphorus and potassium as indicated below.

PERCENTAGE COMPOSITION OF MAJOR PLANT NUTRIENTS IN WASTE FOLIAGE OF ARECA

	N	*P*	*K*
Leaf	0.924	0.096	1.000
Leaf-sheath	0.730	0.370	0.780

Besides the above nutrients, the leafsheath is rich in cellulose (40-42 percent) and crude fibre (30-32 per cent). It also contains smaller amounts of ash (4-5 per cent).

If leaf and leafsheath can be recycled properly it is possible to return 187 kg of N, 49 kg of P_2O_5 and 201 kg of K_2O from one hectare of land. In terms of money value it works out to Rs 1720/ha/annum as savings from fertilizers.

Husk

The fibrous pericarp of arecanut is the major waste product of the arecanut industry. The husking percentage is about 30-33 giving an annual production of 59.3 thousand tonnes of husk. The different chemical constituents and nutrients present in husk are given below.

CHEMICAL COMPOSITION AND PLANT NUTRIENT CONTENTS IN ARECA HUSK

Chemical constituents (%)		*Major plant nutrients (%)*	
Cellulose	35. 0-64.80	Nitrogen	1.064
Lignin	13. 0-27.04	Phosphorus	0.420
Pectin	1. 5- 3.60	Potassium	1.480
Proto-pectin	1. 5- 2.10		
Hemicellulose	9. 0-16.00		
Furfuraldehyde	18.75		
Ash	4.44		

If the husk is collected and utilized properly it is possible to get 641.5 tonnes of N; 253.2 tonnes of P_2O_5 and 892.3 tonnes of K_2O. In order to conserve these valuable nutrients, there is a need to create awareness among the areca cultivators to conserve and utilize these materials properly.

Composting

One way of organic solid waste utilization is compos-

CONTINUED ON PAGE 51

per cent in 1974 over that in 1973. While the price of Mangalore 'Choll' in 1974/75 at Mangalore was Rs 740/q it shot up to Rs 1838/q in 1980-/81, an increase of 148 per cent within a seven years period. This is really a substantial achievement so far as price incentive for the producer is concerned. The CAMPCO can certainly claim a pride of place in arecanut industry for this significant endeavour.

		'Iylan' Type (Trichur)	*'Chali' Type (Jalpaiguri)*
1)	Producer's share	51.30	61.07
2)	Curer's margin	5.36	Curing was done by producer
3)	Wholesaler's margin	12.89	8.02
4)	Retailer's margin	14.95	9.31
5)	Processing charges	2.85	4.96
6)	Grading charges	0.52	8.78
7)	Packing, storing and transporting	1.60	4.12
8)	Purchase and sales tax (market fees)	5.83	2.25
9)	Commission	4.70	1.49
10)	Consumer's price	100.00	100.00

CONTINUED FROM PAGE 47

RECYCLING OF WASTE

ting. With a little addition of nitrogen source, these materials can be converted into a good manure. The cellulose and hemicellulose components in the husk undergo decomposition in the presence of sufficient nitrogen. It is reported that to every 40-50 units of cellulose and hemicellulose one unit of available nitrogen has to be added to meet the nitrogen demand of micro-organisms. Cattle-dung supplemented with urea or any other starter material comparatively rich in nitrogen can be added to get a good quality compost out of husk, leaf and leaf sheath or other farmyard wastes.

Husk can be utilized also as a mulch. Experiments conducted at this station revealed that mulching with husk improved the moisture-holding capacity of the soil and also the texture by way of better aeration and bulk density. It also reduced the soil temperature up to a depth of 15 cm and suppressed the weed growth.

The lignocellulosic nature of the husk has a negative effect on its efficient use as a source of organic manure. Under natural conditions it will take longer period for decomposition. It is possible to reduce the period of decomposition by introducing efficient saprophytic micro-organisms. This way the nutrients locked up in the lignocellulosic fibrous material may be made readily available to plants.

Laboratory studies conducted at CPCRI, Vittal indicated that degradation of husk can be enhanced by introducing micro-organisms provided sufficient moisture is available. Further studies to identify potential saprophytes for field level experiments are in progress.

The highly lignocellulosic nature of the husk provides scope for cultivation of edible mushrooms or production of single cell proteins.

From the data available it is seen that by proper management of waste materials namely, leaf, leaf sheath and husk we will be saving approximately Rs 324.4 million per annum as detailed below.

Source of nutrient	*Quantity available ('000 tonnes)*	*Approximate cost* (in million Rs)*
Nitrogen	35.16	183.4
Phosphorus	9.29	52.2
Potassium	38.10	88.8
	Cost of chemical fertilizers at	
Urea	Rs 120/50 kg (46% N)	
Phosphorus	Rs 45/50 kg (16-18% P)	
Potassium	Rs 70/50 kg (60% K)	

An average farmer may find it difficult to meet the demand of the ever increasing cost of chemical fertilizers. An alternative, the best method to compensate this situation is adoption of recycling of various kinds of organic materials, which are otherwise considered as wastes. With some effort, the farmer could get a good compost manure which conditions the physical, chemical and biological properties of the soil. Application of modern technology on the recycling process will help to enhance the net returns from the crop.