COCONUT WASTES CAN FIND MANY INDUSTRIAL APPLICATIONS

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WITH hardly a part going as waste, the coconut palm has well earned the merited approbation, the *Kalpa Vriksha*. Each and every part of the tree is useful in one way or other. The nut, of course, is the most valuable of the products of the tree. Tender, fresh and dried, the white kernel of the nut is being utilized in numerous ways. The husk is the source of valued coir. Coconut shell is being used as fuel as well as in industries. Leaves are plaited and used for thatching houses. The trunk or stem of the palm is a cheap timber which is commonly used in all coconut growing areas. The unopened inflorescence is tapped for neera from which jaggery, sugar and coconut honey are made. Fermenting neera, we get vinegar and arrack, etc. Unimportant products like spadix, spathes, bracts, etc., are used as fuel.

However, by-products which accumulate in the process of utilisation of the major products do not yet find any industrial application. The following are the more important of them.

COIR DUST

Known as 'Coco peat', coir dust is the light fluffy refuse consisting of a mixture of cork pith and fibre shorts left after extraction of useful fibre from the coconut husk. Coir dust accounts for nearly 70 per cent by weight of the husks. This is seen accumulated in large quantities in fibre extraction centres where retted husks are beaten to extract fibres and also near coir fibre mills producing fibre from unretted husks by mechanical means.

Diverse attempts have been made from time to time to explore avenues of

profitable utilisation of this product. It finds some agricultural use for reclamation of low-lying lands, for mulching soil, and in gardening. It absorbs as much as eight times its weight of water with which it parts fairly slowly. When mixed with sandy soil to the extent of two per cent, the water-holding capacity increases by 40 per cent. Its manurial value is very small except the one derived from "dry-milled" fibre which is reported to contain about 0.5 to 0.6 per cent potash. It is also burnt and the ash used for manuring fields.

The possibility of utilising the material for industrial purposes has been investigated by many. Attempts to make paper out of it did not succeed. It has been used as an absorbent for nitroglycerine in making explosives.

Trials have been carried out at using this material as a cheap filling material for various types of boards, such as insulation boards, hard boards, substitute for cork, etc., and possibilities claimed for some. In Ceylon encouraging results appear to have been obtained in using cork dust in combination with rubber to form composite flooring, ceiling boards, etc. Promising results have also been reported in attempts to prepare coir dust boards bounded with phenol formaldehyde resins. Work done at the Central Building Research Institute, Roorkee appears to have revealed the possibility of producing fire resistant, light welght building boards from pith of unretted coconut husk in combination with some other fibrous material. Promising results on the production of thermal insulating materials with a coir dust base are reported by Central Food Technological Research Institute, Mysore and Central Research Institute, Trivandrum. Department of Chemical Technology, University of Bombay, is reported to have worked out a process for the manufacture from coir dust and some other material of 'Coirolite', a product of high impact strength and electrical resistance. Suggestions have also been made that coir dust can be used as a source of furfural.

In spite of so much work done, resulting in some processes being patented, it cannot be said that any large scale industry based on coir dust has yet come into being in any part of the world. It is still being reckoned as an industrial waste, posing a difficult problem for disposal. In some areas it is actually proving a hindrance in successful cultivation, since it provides a congenial place for the rapid multiplication of rhinoceros beetle, a very serious pest of the coconut palm.

GREEN HUSK OF TENDER COCONUTS

The use of tender coconuts as a refreshing drink is fairly widespread in India and is particularly so in big cities like Calcutta and Bombay. Reliable statistics regarding the number of nuts used for tender nut purposes on an all-India basis are not available, but some earlier estimates have placed the figure at about 48 million. In Calcutta and its suburbs alone 6 to 8 million tender nuts are estimated to be consumed annually. In processing the nut for drinking purposes considerable quantity of tender husk gets accumulated in market areas. These husks are now going waste. It will certainly add to the returns of the growers if a profitable use for this waste product can be discovered.

The only reported work done in this direction is that of Sri S. R. K.

Menon from Ceylon. He has shown that green husks from tender nuts could be made use of for manufacturing artificial leather or 'Coconite' by pressing them hydraulically between heated plates. These boards are reported to have been used as a substitute for asbestos ceiling and panelling. No exploitation of this process on a commercial scale has yet been reported. It is worthwhile to explore the possibility of starting a small scale industry somewhere in Calcutta or Bombay where sufficient quantity of such husks can be gathered without difficulty. Of course, basic information on the quantity of husks that may become available has to be gathered and cost of production of boards as compared to competing material worked out on pilot plant scale before any decison is taken. In other areas the available material may be spread so far and wide that the cost of collection of materials itself may become prohibitive.

Reports have it that the tender husks may contain tannin. More information is necessary on the content and nature of tannin present and whether the material could be worked as a profitable source of useful tannin. According to an investigation extractable tannin present to the extent of 1.3 per cent of the weight of the husk is of no use for the tanning of leather.

In this connection the recent observations of Pillai and Pandalai (1959) that fallen buttons, i. e., female flowers less than three months old, also contain tannin, assumes importance. It is not known whether this tannin will fall into the same category as that from tender nut husk or will have some use in tannery practice. If some profitable use can be found for it, a systematic attempt at collection of fallen buttons from coconut plantations should make available an enormous quantity all through the year to keep a plant working in full capacity. The fallen buttons at present are a complete waste product.

COCONUT WATER

Coconut water is the fluid inside the hollow of the coconut fruit. Large quantities of this water from ripe coconuts are allowed to run off as waste product from copra and desiccated coconut manufacturing centres. The water from ripe coconuts contains about two per cent of total sugars which, research workers report, cannot be utilised as a source of sugar or alcohol. Suggestions have been made that this water may be used for the preparation of yeast and bacteria employed in the manufacture of antibiotics, that it may be used to spray compost heaps for enriching its potash content or that it can be utilised directly as a fertilizer to coconut palms preferably after neutralising with slaked lime; but their actual possibilities have yet to be worked out. On an average, coconut water from 1,000 mature coconuts is expected to contain 0.5 pound of potash.

The materials that can really be said to be wasted at present are coir dust, tender coconut husks and coconut water available in fairly large quantities at some centres. Though the possibilities of finding profitable industrial uses for them have been investigated by many, results of practical benefit do not appear to have been obtained yet. Further intensified technological research on the above is the need of the hour.

—Indian Farming