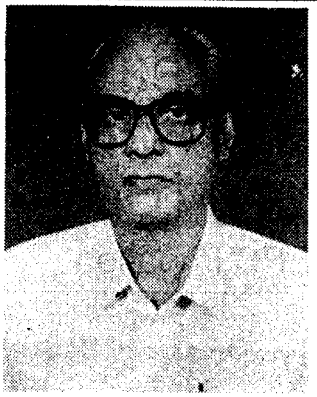

P. K. Thampan

Non-Traditional Coconut Food sector

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The coconut palm is a multiproduct tree crop. All the palm parts could be put to use for both edible and inedible purposes. While the benefits derived from the palm are widely recognised, not much development has taken place in India for the utilisation of all palm parts on a commercial scale. The most common commercial activities presently centred around the coconut palm are the manufacture of edible and milling copra, oil milling and coir processing. The production of desiccated coconut and the utilisation of coconut shell for various end uses have shown some development, but not conspicuous enough to attract general recognition. Though coconut, the main product of the palm, finds use in the manufacture of many traditional products, the non-traditional applications of coconut have not received adequate research and development support in India. Some of the non-traditional possibilities in the food sector for which economically viable technologies are available are discussed here. Most of the processes could be organised on cottage or small industry scale.

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Coconut Cream

Technologies for the commercial production of coconut cream are now in application in countries like Philippines, Western Samoa, Indonesia etc., and the cream produced there enjoys export market in many western countries. In India the technology has been developed by the Regional Research Laboratory at Trivandrum and the same pilot tested for techno-economic viability in the plant established by the Coconut Development Board at Cochin. As the cream could find applications in houschold food preparations as well as in food industry, the product is likely to enjoy good domestic demand in India. The processing technology developed in India involves paring of kernels, sterilization of pared kernels in hot water at 75 to 80°C for 10 minutes, comminution, regulation of moisture content of the comminuted kernel at 40-45 percent, extraction of milk in a screw press, passing the milk through a vibratory sieve of 150 microns, pasteurisation of milk at 75 to 80°C for 10 minutes in a plate heat exchanger, addition of preservatives and stabilizers such as potassium metabisulphite or nicine and Tween - 80 at 0.1 or 0.2 percent level along with carboxymethyl cellulose at 0.5 percent level, pressure homogenisation at 4000 psi, hot filling and crown corking.

Coconut Milk Powder

Spray dried coconut milk is produced on a commercial scale in the Philippines and Malaysia. The powder easily dissolves in water to form a milky white liquid with the flavour and texture of fresh coconut milk. It is very convenient to use in households as well as in food industries in place of fresh coconut. In the Philippines fresh coconut milk is blended with small amounts of additives such as

maltodextrin and casein and spray dried. The final product is marketed in laminated foil bags. In Malaysia the product is marketed in the domestic market as 'Santan' and overseas as Coconut Cream Powder.

Coconut milk is also preserved and marketed in the Philippines as sugar concentrate in condensed or concentrated forms such as coconut jam, coconut syrup, coconut honey etc. These products could substitute the traditional fruit jam and honey and also serve as the base for coconut based soft drinks. The technologies for the production of such concentrates are not complicated and are available in India.

Coconut Yoghurt and coconut cheese are other products of commercial importance. For the preparation of coconut Yoghurt, a formulation of 50 percent coconut milk and 50 percent or slightly more non-fat dry milk powder is used. The other ingredients are water, refined sugar and starter culture consisting of ***Streptococcus thermophilus*** and ***Lactobacillus bulgaricus.*** The coconut yoghurt is comparable in qualities to high quality yoghurt and could be consumed as snack or daily food. For the prepartion of coconut cheese a formulation of 60 percent coconut milk and 40 percent non-fat dry milk powder is used. The other ingredients required for the purpose are water, salt, starter culture consisting of ***Streptococcus lactis*** and ***S. diacetilactis*** and Rennet. The coconut cheese could find use as a bread spread and as garnishing for selected delicacies.

Coco-Soya Milk

Stabilised and homegenised coconut milk is blended with soya milk in the proportion of 2:1 parts by weight and heat sterilized to obtain the coco-soya milk. In this combination the nutritive value of coconut milk is enhanced by the incorporation of protein and unsaturated fat containing essential fatty acids in soya milk. The product could be used in cooking and in the preparation of icecream, desserts and puddings.

Preserved tender coconut kernel

Fresh unripe kernel derived from 7 to 8 months old nuts is possible to be preserved in sugar syrup and marketed. For processing, the tender kernel is cut into strips of about 6 cm long and 2 cm wide. The strips are put into cans, covered with hot syrup, exhausted to can centre temperature of 80°C, sealed and processed. The product has a shelf life of four to six months at ambient temperature. In the Philippines the production has been organised on a commercial scale. There the preserved product is also enriched with the addition of vitamin E. Dried kernel chips are also produced in the Philippines for use as snack food. The dried material could also be rehydrated with the addition of sugar syrup in order to consume it as fresh tender coconut kernel. Perhaps the process, if developed in India, could find domestic consumer demand.

Low Cost desiccated coconut

The Regional Research Laboratory at Trivandrum has perfected a technology for the partial extraction of oil from desiccated coconut in order to produce a low cost desiccated coconut for use in such areas where the demand for desiccated coconut is low solely because of its high price. Besides the partially defatted product, the processing yields superior quality coconut oil which could fetch better price than the other grades of oil. The defatted product is preferred in some food processing units as it does not induce rancidity in the final product compared to the original desiccated coconut. The shelf life of the

FORM IV

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I, K.P. Ganesan, hereby declare that the particulars given above are true to the best of my knowledge and belief.

(Sd) K.P. Ganesan
Signature of Publisher

The Regional Research Laboratory at Trivandrum has perfected a technology for the partial extraction of oil from desiccated coconut

product stored in sealed aluminum foil pouches is four to six months at ambient temperature and more than one year under refrigerated conditions. The process has been standardised to produce products of different oil contents tailored to specific end uses.

In a different method, the pared coconut kernels are first comminuted and the milk extracted partially at desired levels before the kernel mass is desiccated. The extracted milk is subjected to a three phase centrifugation yielding coconut cream, aqueous phase and sludge. The cream is either preserved as cream or converted into oil. The aqueous phase is sprayed back to the fluffy fibrous residue left after the extraction of milk and the product dried and packed as second grade desiccated coconut. With the admixture of the aqueous phase before desiccating, the resulting product retains the flavour and aroma of original desiccated coconut.

Coconut water beverage

Coconut water of ripe nuts could be preserved and sold as bottled soft drink. The technology for the same has been developed by the Regional Research Laboratory at Trivandrum. The process involves collection of water, upgradation and pasteurisation, filtration and bottling. To start with, the pH of fresh coconut water is adjusted to 4.5 or less and the total sugar content enhanced by the addition of refined sugar and maintained at 8-10 percent. The acidulent used to adjust the pH is citric acid plus 0.15 percent sodium citrate. The use of 0.01 to 0.05 per cent sodium chloride has been found useful in improving the taste. The formulation is pasteurised and the temperature maintained at around 94°C for about 25 to 30 minutes. When the temperature reaches 70°C, supercell is added to aid sedimentation by co-precipitation. The pasteurised product is filtered under vacuum, filled in sterilised returnable bottles and crown corked under sterile conditions. The bottles could be stored at ambient temperature for three months without spoilage.

Nata de Coco

This is a product developed in the Philippines in the early seventies. The product is now in great demand both in the domestic markets and export markets. Nata de coco is a gelatinous product formed by the action of micro-organisms, ***Acetobacter xylinium*** in a culture medium of sugared coconut water. The organism can be cultured either in coconut water or diluted coconut milk. The product is prepared from coconut water or diluted coconut milk by mixing sugar, glacial acetic acid and a culture liquor at a stipulated proportion and by allowing the mixture to remain undisturbed either in wide mouthed glass jars or plastic basins for about 15 to 20 days. During this period a white or cream coloured jelly like substance forms and floats on the top of the culture medium. The surface growth is harvested, sliced into cubes, acid washed out, boiled in sugar syrup and preserved in either tin containers or bottles. The product is served in syrup as a dessert or mixed with other fruits and served.

The recommended proportion of the ingredients for the production of Nata-de-coco is as follows:

Boiled, cooled and filtered coconut water	1 kg
Sugar	65 g
Glacial acetic acid	25 g
Mother liquor	165 g
or	
Grated coconut for extraction of milk	100 g
Water	2.8 l
Sugar	200 g
Glacial acetic acid	40 g
Mother liquor	500 g

The left over liquid medium after the harvest of Nata is used as the mother liquor for subsequent production. For the initial preparation of the starter medium, three cups of pineapple residue left after the extraction of juice is mixed with six cups of water and one cup of sugar and the mixture left undisturbed in wide mouthed glass jars covered with thin cloth for about two to three weeks. The jelly like growth which forms on the surface during this period is taken out, sliced into small cubes and used as the starter medium.

Coconut Vinegar

A product that could be made from coconut water is vinegar. The coconut water is strained and mixed with brown sugar to adjust the sugar concentration of the medium to 10 to 12 percent. The sweetened water is then heated, but not allowed to boil. The water is allowed to cool and dry yeast at the rate of 0.5 g per litre of water is added as a starter culture. Before adding, the yeast is activated by dissolving in warm water and allowed to foam. The coconut water is then stored in closed containers and left to ferment undisturbed for about ten days. At this stage mother vinegar or acetic acid starter culture is added at the rate of 10 percent by weight of the original coconut water. After 10 days, half of the total volume of the mixture is harvested, then replaced with alcoholic coconut water and the cycle is repeated ever 10 days. ★

Disciple: "O Master, I have come to serve you".

Master (Guru): "Drop the "I" and service shall follow on its own"

Moral: Service to God with "I" is no service at all. Noble deeds, charity and service to the poor cannot bear fruit if you have even the slightest trace of the "Ego". *-Tattvaloka*