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POTENTIAL FOR VALUE ADDED COCONUT PRODUCTS IN LAKSHADWEEP

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Abstract
The importance of coconut in Lakshadweep, a predominantly coconut based economy, in providing livelihood options and improving the economic status of its population is of great significance. Inspite of this, the coconut economy in Lakshadweep has reached its peak and is stagnating mainly because of lack of product diversification. Copra, coconut oil and fresh coconut even today comprise its major product base. In order to meet the requirements of a fast growing population, income from these products alone will not suffice. Value added coconut products have huge prospects in the domestic and international markets owing to the health and nutritional attributes of the product, employment generation potential and prospects of better returns. Neera, the non-alcoholic sap of immature inflorescence of coconut has the potential to provide an array of products that can help rejuvenate this sector. This paper attempts to look into various value added products that can be developed from Neera and work out the economics behind the production of Neera.

Keywords: Neera, Coconut, Cost, Revenue, ASEAN, GDP

1. Introduction

Coconut is grown in more than 86 countries worldwide with Indonesia and Malaysia topping the charts with respect to area cultivated. India ranks only third. But in terms of production and productivity, India stands first. She accounts for 22.34 per cent of the world's coconut production and is one of the major players in the world's coconut trade. Currently the crop is grown in 1.91 million ha with an annual production of nearly 13000 million nuts. The share of coconut and coconut products to India's GDP comes to Rs.8000 crores, earning Rs.2000 crore worth foreign exchange for the country (CDB, 2012). Coconut oil, fresh coconut consumption, coir and coir products accounts for a greater part of this. Of the total production of coconuts, about 5 per cent is consumed in the tender form for drinking purposes. The rest is utilized as mature nuts and copra. Coconut oil production in the country is nearly 4.5 lakh tones and the contribution of coconut oil to the national edible oil pool is 6 per cent. Of this 40 per cent is consumed for edible purposes, 46 per cent for toiletry uses and 14 per cent for industrial uses (Markose, 1999).

Yet, coconut production in the country has been experiencing a decelerating trend. ASEAN countries like the Philippines, Indonesia and Vietnam have been adding value to this agricultural product tremendously using the state-of-the-art technologies in the food processing industry. They have made a big dent in India's food shelves too. But 80 per cent of India's production is still routed through the traditional low-valued copra-oil route, while out of the 61 billion nuts produced globally, only 50 per cent go through this way (John, 2013). Though, India is the third largest coconut growing country in the world, its contribution to international market remains insignificant. Value addition in coconut is confined to copra and coconut oil. Uncertainty in the price of coconut and coconut products, comparatively low prices of edible oils such as palm oil, lack of proper marketing and distribution channels for coconut, etc., have contributed to declining interest in cultivation and poor revenue earnings for domestic coconut growers. In a highly globalised market, with regional trade agreements like SAFTA and those with SAARC and ASEAN working towards a free market, limited trade restrictions, low to zero import duties, etc., have facilitated large scale import of coconut and edible oils, especially palm oil into the country. All of these factors combined together have contributed towards the drastic decline of this sector.

To rejuvenate growth in the coconut industry, all round efforts need to be made. Promoting cost effective coconut based farming systems, product diversification and value addition play a crucial role in the stabilization of the coconut oil driven domestic market. This is essential for reorienting and engineering the Indian Coconut Industry so as to make it cost effective and globally competitive. It will also help employment generation and bring better returns to coconut farmers. The production and marketing of value added products using coconut is slowly attracting commercial interest and bringing rejuvenation in the sector.

In this context Neera, the non-alcoholic nectar or sap of immature inflorescence of coconut has the potential to provide an array of products that can help rejuvenate this sector. Palm trees are of different types and among the nine sugar yielding varieties, only four general varieties are found in India, namely coconut palm, date palm, palmyrah palm and sago palm. Of this, Neera can be extracted throughout the year only from the coconut palm. This provides scope for a wide variety of stable income generating value added products. To ensure integrated development of the coconut sector in the areas of production, processing and marketing, the Coconut Development Board was set up by the Government of India in 1981. New vistas could be opened up in value addition and products development due to the timely interventions and concerted efforts of the organizations like Coconut Development Board, Central Plantation Crops Research Institute, Central Food Technological Research Institute, Defense Food Research Laboratory, Regional Research Laboratory, etc. by development and infusion of appropriate technologies which have resulted in value addition in coconut. This paper attempts to look at the various value added products that have been developed from Neera and work out the economics behind such an attempt.

2. Methodology

The study is based on secondary data from publications of the Coconut Development Board, Kerala and Coconut Development Board, Karnataka and the Kadhi and Village Industries Commission. It also uses data provided by Deejay farms, Karnataka.

3. Results and Discussions

Farmers' perception of coconut as just a commercial oilseed often hampers the development of new coconut products. Exploiting the potentials of this crop to enable production of value added products will help cushion farmers from the annually recurring price fluctuations and output decline. It is in this context that products from the coconut inflorescence sap like Neera, coconut palm syrup, jaggery, coconut sugar etc gain importance. The vascular sap collected from immature inflorescence is popularly known as *Neera* in fresh form. Neera is a non-alcoholic, nutritious drink made from immature inflorescence of coconuts. It is sweet, oyster white, translucent and a rich source of sugars, minerals and vitamins. It can be consumed in fresh form or treated form. If filtered, pasteurized, and bio preservatives are added, treated Neera can be preserved up to 2 months at room temperature. Tapping can be done for 6 months in a year. Products like coconut flower syrup, jaggery and coconut palm sugar can be produced from Neera. Such products provide potential for even further value addition, employment and income generation to the farmers. This Coconut nectar is widely consumed in countries such as India, Sri Lanka, Africa, Malaysia, Indonesia, Thailand and Myanmar.

3.1 Composition of Neera

The nutrient-rich sap, Neera has a low Glycemic Index (GI of only 35) and hence is diabetic-friendly since very low amounts of the sugar is absorbed into the blood. It is an abundant source of minerals, 17 amino acids, vitamin C, broad-

spectrum B vitamins, and has a nearly neutral pH. Coconut crystals can be made out of this pure, low glycemic natural sap which contains only 0.5 per cent glucose, 1.5 per cent fructose, 16 per cent sucrose, and 82 per cent insulin – a prebiotic that promotes digestive health. It can be used as an ideal sweetener too and fetches much better returns compared to copra (CDB, 2012).

Table 1. Composition of Neera

Total Solids (g/100 ml)	15.2-19.7
pH	3.9-4.7
Specific Gravity	1.058-1.077
Total Sugars (g/100 ml)	14.40
Original Reducing Sugars (g/100 ml)	5.58
Total Reducing Sugars (g/100 ml)	9.85
Total Ash (g/100 ml)	0.11-0.41
Citric acid (g/100 ml)	0.50
Alcohol (%)	nil
Iron (g/100 ml)	0.15
Phosphorus (g/100 ml)	7.59
Ascorbic Acid (mg/100 ml)	16-30
Total Protein (g/100 ml)	0.23-0.32

Source: CDB, 2013

3.2 Production of Neera

Neera can be collected daily only at dawn before sunrays start falling. Once the rays of the sun fall, the extract quickly ferments. Hence tapping has to be completed at least by 8 in the morning. So, the number of trees that can be tapped is constrained. The sap is extracted from the cut flower (inflorescence) into an earthen pot or container fastened to the flower stump. The thick white liquid that collects is sweet and non- alcoholic. The Neera collected is filtered and contains all the constituents of a cool and healthy drink with food and mineral value. Neera is highly susceptible to natural fermentation at ordinary temperatures within a few hours of extraction, unless it is quickly treated with some preservative (Swamy, 2013). Once fermented it transforms to toddy with 4 per cent alcohol.

Neera can be processed and preserved in its natural form to retain vitamins, sugar and other nutrients. Pasteurization is normally used to extend the shelf life of Neera. Technologies for the preservation and processing of Neera were developed by the National Chemical Laboratory (NCL), Pune, Central Food Technological Research Institute (CFTRI), Mysore and Defense Food Research Laboratory (DFRL), Bangalore. The Regional Agricultural Research Station at Pilicode under the Kerala Agricultural University have also developed technology for the preservation of Neera and the production of many non alcoholic value added products like soft drinks, concentrates, granules, toffee, jam, cake, wine etc from coconut inflorescence sap.

3.3 Value Added Products from Neera

3.3.1 Neera Soft Drink

Neera is appropriate as a soft drink due to its natural sweetness. It can be bottled or canned and stored for 45 days with preservatives. It contains a number of minerals and salts; acids like ascorbic acid, nicotinic acid and riboflavin, and also proteins and vitamin C. It has been medically proved that Neera is better than mineral water (Maya, 2013). Once the shelf life of Neera is increased properly stored and packed, the drink could be transported to longer distances. Neera is a nutritious drink offering a healthy alternative to aerated beverages.

3.3.2 Coconut Palm Syrup

Coconut Palm Syrup is produced when fresh Neera is heated and concentrated into syrup. Fresh Neera is rich in carbo-hydrates with sucrose as its main constituent with sucrose as its main constituent. In many countries, Coconut syrup is used as a health and wellness drink and is prevalently used in ayurveda and other systems of medicine (Jayashree and Muralidharan, 2012).

3.3.3 Coconut Palm Jaggery

Neera converted into a solid or a semisolid crystalline mass ready for direct consumption is called Coconut jiggery. It is used as a sweetening agent. It is made by boiling raw coconut sap and then delimed by adding either phosphoric acid or triple super phosphate solution. When the juice thickens, it can be rolled into ball shapes. The quality jaggery is hard, crystalline and golden colored. It is also used in liquid form or semi solid form. It is very fine and chemical free liquid syrup (Ripple, 2012).

3.3.4 Coconut Chips

Wafer thin chips can be produced from coconuts which can also be baked.

3.3.5 Coconut Palm Wine

Coconut Palm wine is an alcoholic beverage created from the sap. Within two hours, fermentation yields an aromatic wine of up to four per cent alcohol content, mildly intoxicating and sweet. The wine if allowed to ferment longer, yields a stronger, more sour and acidic taste.

3.3.6 Coconut Palm Sugar and Palm Honey

Crystalline sugar made from Neera is known as Coconut sugar. It is delimed, filtered and boiled. Chocolates, toffees and confectionery items are made from it. Transition of coconut jaggery into a ground granule sweetener is more accepted by global markets. The recovery of palm sugar from coconut palm jaggery is 15 per cent. Low Glycemic Index and the high nutrient content make it most suited as an alternative sweetener. **Palm Honey** is thick liquid syrup like honey which can be used as table syrup or sweetener in confectionary items like ice creams. It is a rich source of iron for anemic patients and hence it is mainly used in pharmaceuticals formulation.

3.3.7 Coconut Palm Candy

Like Coconut jaggery, coconut candy has also its importance among the products of neera; it is being produced and used since procuring sweet neera from Coconut tree has been known. It has got its various uses in Ayurvedic medicinal preparations.

3.3.8 Molasses

Coconut molasses is a material obtained as a byproduct of coconut sugar. Golden syrup and cattle feed are the other products made from Molasses. Bio-chemical products like ethyl alcohol, acetic acid, citric acid etc. can be prepared out of molasses by fermentation methods.

3.3.9 Coconut Vinegar

Coconut vinegar can be produced from the inflorescence sap other than from matured coconut water. Fresh sap is poured in a wide large plastic container with clean netted cover to allow aeration and prevent entry of dirt and foreign objects. After about ten day's fermentation in well ventilated room, the sap can be harvested as vinegar. Vinegar has extensive use as preservative in pickle industry and flavoring agent in food processing sector. The Coconut vinegar has good export potential as compared to the synthetic vinegar.

3.3.10 Other products

There are also other value added products from coconut that are produced around the world such as sweetened coconut cubes, coconut milk yoghurt, coconut milk ice cream, coconut milk smoothies, coconut flavoured coffee drink, desiccated coconut, coconut milk powder, coconut milk cream, coconut sunscreen lotion.

3.4 The Economics of Neera

The Coconut Development Board, Kochi estimates one litre of Neera can be sold at Rs.50/-. This is estimated for a coconut plantation of one hectare with 175 palms of which 80 are tapped for Neera. Table 2 gives the details. The Coconut Development Board, Karnataka estimates price for one litre of Neera as Rs.70/-. The Coconut Development Board, Andhra Pradesh estimates one litre of Neera can be sold at the rate of Rs.10 a litre, amounting to Rs.6 lakhs for a season of five months for the growers. According to them, one palmyrah tree yields four litres of Neera a day; so the extract from a hundred trees would come to 400 litres. At the same time one tapper could climb 30 trees on an average a day and at a fixed rate of Rs.3 per litre, which would amount to a daily netting of Rs.360 (Bhattacharjee, 2005). The cost of processing was estimated by CDB to be Rs. 3.80 in the case of bottled Neera (200 ml), Rs. 8.10 in case of canned Neera (200 ml) and Rs. 5.30 in flexible packages. Table 2 gives details of estimated cost for Neera production.

Table 2. Estimated Returns from Neera

Item	**Yield of Neera**		
Yield of Neera in litres	1 litre/tree/day	2 litre/tree/day	3 litre/tree/day
Yield of Neera from 80 palm (3 months)	7200 litres	14400 litres	21600 litres
Returns from Neera at Rs. 50 per litre	3.6 lakhs	7.2 lakhs	10.8 lakhs
Returns per palm	Rs. 4,500/-	Rs. 9,000/-	Rs. 13,500/-
Returns to farmer in the proportion of 75 % of production	2.7 lakhs	5.4 lakhs	8.1 lakhs
Returns to Tapper in the proportion of 25 % of production	0.9 lakh	1.8 lakhs	2.7 lakhs

Source: CDB, (2012)

Table 3. Estimated Project Cost for Neera Production (1000 liters capacity/day)

Land Required	40 cents
Building (3000 sq. ft.)	21.00 lakhs
Plant and Machinery	45.00 lakhs
Electrification	03.00 lakhs
Pre-operative Expenses	03.00 lakhs
Working Capital	03.00 lakhs
Total Project Cost (Excluding land)	**Rs 75 lakhs**

Source: CDB, (2012)

3.5 The Indonesian Experience

Production of Neera in Indonesia is a thriving industry (CDB, 2012). Highlights of the Indonesian experience are detailed below:

- Average coconut produces 3-4.5 liters of fresh sap per day.
- An average collector can manage 30-50 trees/day and tapping can be done twice a day.
- Final yield per day is an average of 15 kg/producer family or 450kg per month.
- Indonesia currently has over 100,000 farmers that rely on Neera and coconut palm sugar as their primary income bringing over 50,000 mt of coconut sugar to market domestically every month.
- Over 600,000 mt of coconut sugar produced and mostly consumed domestically in Indonesia every year.

4. Conclusion

The production of Neera and other value added products provide immense potential for the Lakshadweep economy. From the producer's point of view, when 25 per cent of inflorescences in a palm are marked for production of Neera, it earns the farmer greater returns from the production of diversified products. From the consumer's point of view, production of Neera and related products offers greater diversity of products with low Glycemic Index. From a marketing point of view, arrival of coconut into the market as coconut, copra and coconut oil only has diminished the market prospects for this potential crop resulting in recurring price fall. Diversification into more useful and healthy products will enable stabilization of demand for the varied products. Finally from an economic point of view, production of Neera, coconut palm syrup, jaggery and sugar generates rural employment and rural income, which adds to the GDP of the state. Since the cash flow from tapping of inflorescence is daily and steady, the standards of living of the coconut farming community is also improved. Increased stabilized returns will bring in more investments into the sector resulting in sustainable overall development of the society. For the future growth of Lakshadweep's coconut economy, it is in her best interact to take necessary measures to promote Neera production in the island.

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