

COCONUT PROCESSING TECHNOLOGIES



COCONUT DEVELOPMENT BOARD

Ministry of Agriculture, Government of India

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The Coconut development Board is a statutory body established by the Government of India for the integrated development of coconut culture and industry in the country. The Board which came into existence on 12th January 1981, functions under the administrative control of the Ministry of Agriculture, Government of India, with its headquarters at Kochi in Kerala and Regional Offices in Bangalore (Karnataka), Chennai (Tamil Nadu) and Patna (Bihar). There are six state centers situated in Hyderabad in Andhra Pradesh, Bhubaneswar in Orissa, Kolkata in West Bengal, Agartala in Tripura, Guwahati in Assam and Port Blair in the Union Territory of Andaman & Nicobar Islands. Technology development for the post harvest processing of coconut is one of the major programmes being undertaken by the Board. So far the Board has developed the following technologies for processing of coconut and its by-products under various sponsored research projects.

- ◆ Preservation and packing of coconut milk/cream
 - ◆ Charcoal making from coconut shell by drum kiln method
 - ◆ Manufacture of spray dried coconut milk powder
 - ◆ Production of coconut vinegar from matured coconut water.
 - ◆ Preservation and packing of tender coconut water
 - ◆ Production of Nata - de - coco from matured coconut water
- The following imported technologies are available within the country.
- ◆ Manufacture of coconut water concentrate
 - ◆ Manufacture of sparkling coconut water drink.

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COCONUT MILK / CREAM

Processed and packed coconut cream is an instant product which can either be used directly or diluted with water in various edible preparations like curries, sweets, desserts, puddings and cocktails such as pinnacola. Coconut cream when partially defatted is called coconut milk. Coconut milk /cream can be packed in pouches/glass bottles/cans / tetra packs. The residue after the extraction of milk from coconut kernel can be compounded with appropriate ingredients to make ready-to-use coconut chutney powder which can be served with rice snacks and meal. The technology has been developed by Regional Research Laboratory, Thiruvananthapuram, Kerala under a sponsored project of the Coconut Development Board.

MARKET

Export

Belgium, Italy, Netherlands, UK, Canada, USA, Republic of China, Hongkong, Japan, Saudi Arabia, Singapore and Australia are the major importers. Philippines, Indonesia, Malaysia, Sri Lanka, Thailand and Western Samoa are the major exporters

Domestic

Coconut cream/milk is widely used in households, hotels, sweet shops, ice-cream parlours, bakery, etc. in the country. It has a potential market in areas where coconut is not grown. Use of processed milk/cream can reduce the drudgery of domestic processing of coconut and reduce both labour and time. Besides, extraction of coconut milk by the traditional method is very inefficient, time consuming, unhygienic and labour intensive. Therefore the product has scope in the urban markets in the coconut growing states.

PROJECT AT A GLANCE

- | | |
|--|----------------|
| • Land requirement | - 1 acre |
| • Building (10000 sq. ft) | - Rs.40 lakhs |
| • Plant & machinery | - Rs.80 lakhs |
| • Preliminary and pre - operative expenses | - Rs. 15 lakhs |
| • Contingency | - Rs. 30 lakhs |
| • Other overheads | - Rs. 14 lakhs |
| • Margin money for working capital | - Rs. 30 lakhs |



ECONOMIC FEASIBILITY

- | | |
|------------------------|-----------------------------|
| • Capacity | - 10,000 nuts/day |
| • Sales turnover | - Rs. 5.27 crores per annum |
| • Net profit | - Rs. 50 lakhs |
| • Return on investment | - 33 per cent |
| • Know-how fee | - Rs.3 lakhs |

Source of Technology

Coconut Development Board, Kochi

SPRAY DRIED COCONUT MILK POWDER

Spray drying is the best method for the preservation of coconut milk. Spray dried coconut milk powder can be reconstituted to coconut milk by the addition of water. The product offers additional advantages such as less storage space, bulk packaging at reduced cost and longer shelf life. The technology has been developed by the CFTRI, Mysore under a sponsored project of the Coconut Development Board.

MARKET

Export

Belgium, UK, Canada, USA, Republic of China, Hongkong, Japan, Singapore, Taiwan and Australia are the major importers. Malaysia, Philippines and Sri Lanka are the major exporters.

Domestic

Being a substitute to coconut milk, it has potential market throughout the country in households, bakeries, hotels and sweet shops.

PROJECT AT A GLANCE

- Land & building - Rs.60 lakhs
- Plant & machinery - Rs. 200 lakhs
- Contingencies - Rs.10 lakhs
- Preliminary & pre-operative expenses - Rs. 15 lakhs
- Working capital (Margin money) - Rs. 25 lakhs

ECONOMIC FEASIBILITY

- Capacity - 20,000 nuts/ day
- Sales turn over - Rs. 12 crore per annum
- Pay back period - 3 years.
- Employment potential - 40 persons
- Know how fee - Rs.5 lakhs



Source of Technology
Coconut Development Board, Kochi

PRODUCTION OF VINEGAR FROM MATURED COCONUT WATER

Vinegar is a preservative and flavoring agent for pickles and salads and used in the manufacture of ketchup and mayonnaise. Vinegar can be manufactured from coconut water, a waste product in coconut processing units. The technology has been developed by the CFTRI, Mysore under a sponsored project of the Coconut Development Board.

MARKET

Vinegar enjoys wide demand in households, pickle industry and hotels. Natural vinegar is preferred by the health conscious consumers all over the world. European countries and USA have potential markets for natural vinegar.

PROJECT AT A GLANCE

- | | |
|--|-----------------|
| • Land requirement | - 25 cents |
| • Building (roofed structure 750 sq. ft) | - Rs. 2.0 lakh |
| • Plant & machinery | - Rs. 1.5 lakhs |
| • Preliminary & pre-operative expenses | - Rs. 0.25 lakh |
| • Contingencies | - Rs. 0.20 lakh |

ECONOMIC FEASIBILITY

- | | |
|------------------------|-------------------------|
| • Capacity | - 100 litres / day |
| • Sales turn over | - Rs. 4 lakhs per annum |
| • Net profit | - Rs. 1 lakh |
| • Return on investment | - 20 per cent |
| • Know how fee | - Rs. 10,000 |



Source of Technology
Coconut Development Board, Kochi

PRESERVATION AND PACKING OF TENDER COCONUT WATER

Under this technology, tender coconut water is packed in aluminium cans and retortable pouches. The shelf life of the product is 3 months under ambient condition and 6 months under refrigerated condition. The product retains all the natural characteristics of the drink. The technology has been developed by the DFRL, Mysore under a sponsored project of the Coconut Development Board.

MARKET

It can be marketed as a natural health drink within and outside the country. Tender coconut water enjoys wide demand as a nutritious, thirst quenching health drink in Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal, Maharashtra and Delhi. The product has good market potential in hospitals as a health drink.

PROJECT AT A GLANCE

- | | |
|--|-----------------|
| • Land & building | - Rs. 25 lakhs |
| • Plant & machinery | - Rs. 30 lakhs |
| • Preliminary & pre-operative expenses | - Rs. 2 lakhs |
| • Contingencies | - Rs. 1.5 lakhs |
| • Working capital (Margin money) | - Rs. 15 lakhs |

ECONOMIC FEASIBILITY

- | | |
|------------------------|------------------------------|
| • Capacity | - 2500 litres / day |
| • Sales turnover | - Rs. 1.875 crores per annum |
| • IRR | - 18 percent |
| • Payback period | - 3-4 years |
| • Employment potential | - 30 persons |
| • Know how fee | - Rs.3 lakhs |



Source of Technology
Coconut Development Board, Kochi

SHELL CHARCOAL MAKING BY DRUM KILN METHOD

Shell charcoal is the raw material required for the manufacture of activated carbon. The shell charcoal is manufactured by burning shells of fully matured nuts in a limited supply of air sufficient for carbonization.

- Shell charcoal is superior in quality when compared to wood charcoal.
- It is an ideal raw material for the manufacture of high quality activated carbon.
- It has better calorific value than other agro wastes and hence ideal for use as fuel in smelters, bakeries and foundries.
- Shell charcoal briquettes are used for barbecue in many countries.
- Shell being a renewable agro waste, there will not be any constraints in its use or availability.

MARKET

Export

France, Netherlands, Japan, South Korea, Belgium, UK, Hongkong, USA, Malaysia, Taiwan, etc are the major importers. Philippines, Indonesia and Sri Lanka are the major exporters.

Domestic

Shell charcoal is widely used by smelters, bakeries and foundries. The major consumers are activated carbon units. It is also used as low cost fuel in iron and steel industry, paper factory, etc. and to manufacture charcoal briquettes.

PROJECT AT A GLANCE

- | | |
|--|-----------------|
| • Land requirement | - 35 cents |
| • Building (1000sq.ft.) | - Rs. 1.5 lakhs |
| • Plant & machinery | - Rs.6.5 lakhs |
| • Preliminary & pre-operative expenses | - Rs. 1.0 lakh |
| • Contingencies | - Rs. 0.5 lakh |
| • Margin money for working capital | - Rs.2.0 lakhs |



ECONOMIC FEASIBILITY

- | | |
|------------------------|-------------------------|
| • Capacity | - 1 tonne / day |
| • Sales turn over | - Rs.15 lakhs per annum |
| • Net profit | - Rs. 1.5 lakhs |
| • Return on investment | - 15 per cent |
| • Know how fee | - Rs.10,000 |

Source of Technology
Coconut Development Board, Kochi

NATA - DE - COCO

Nata de- coco is an edible jelly manufactured from coconut water or coconut skim milk by the action of micro organism, *Acetobacter xylinum*. It is an ideal ingredient for desserts, fruit cocktails and ice cream. It is sweetened by boiling in sugar solution. It is reported to be used for the manufacture of cone speakers of audio products, acoustics diaphragms of audio instruments, computer chips and in the pharmaceutical industry for manufacturing capsule shells, surgical gloves and thread.

MARKET

EXPORT

About 25 countries import Nata-de-coco, Philippines being the major exporter. Japan, Korea, USA and Canada are the major importers.

DOMESTIC

As a new product, its domestic market is yet to be explored. Being a fruit jelly it is likely to be accepted as other jellies, provided organised market promotion activities are undertaken.

PROJECT AT A GLANCE

- | | |
|--|---------------------------|
| • Land requirement | - 5 cents (cost variable) |
| • Building (500sq.ft.) | - Rs. 2.0 lakhs |
| • Equipment/ glassware | - Rs. 0.5 lakh |
| • Preliminary & pre-operative expenses | - Rs 0.15 lakh |
| • Contingencies | - Rs 0.05 lakh |
| • Margin money for working capital | - Rs 0.25 lakh |



ECONOMIC FEASIBILITY

- | | |
|------------------------|---------------------------|
| • Capacity | - 100 kg of nata per day |
| • Sales turn over | - Rs.10 lakhs per annum |
| • Net profit | - Rs.1.25 lakhs per annum |
| • Return on investment | - 40 per cent |

Source of Technology
Coconut Development Board, Kochi

Technologies Available from Other Sources

Technologies for large scale processing of coconuts into copra by using indirect modern hot air dryers and adopting Waste Heat Recovery Technology are available in the country. They have been developed through individual efforts. Alfa Laval, Sweden possesses integrated processing technology for wet processing of coconut in which coconut milk, virgin coconut oil, skim milk beverages, tetra packed coconut water and desiccated coconut are obtained. Wet processing of coconut has also been developed by CFTRI, Mysore. Technology for the manufacture of coconut water concentrate has been developed by Winter Umweltechnik of Germany which is available with M/s. Miracle Food Processors International Ltd, Perinthalmanna, Kerala on turnkey basis. The Regional Research Laboratory, Thiruvananthapuram has developed the technology for the upgradation and preservation of matured coconut water. The drink can be carbonated and marketed as a beverage. Technologies for the manufacture of snowball tender coconut and coconut chips have been developed by the CPCRI, Kasaragod under a sponsored project of the Board.

Addresses of research institutes who have undertaken / are undertaking research on post harvest processing of coconut:-

1. Central Food Technological Research Institute (CFTRI), Mysore, Karnataka
2. Defence Food Research Laboratory (DFRL), Mysore, Karnataka
3. Regional Research Laboratory (RRL), Thiruvananthapuram, Kerala
4. Central Plantation Crops Research Institute (CPCRI), Kasaragod
5. Dairy Science Department, Kerala Agricultural University, Vellanikkara, Thrissur, Kerala

COCONUT WATER CONCENTRATE

Spray Evaporation Technique (SET) is adopted in this technology. The special advantage of the technology is that the product retains vitamins enzymes, aroma, taste, etc. which are originally present in the coconut water. The technique has been developed by Winter Umwelttechnik of Germany. The concentrated coconut water has a shelf life varying from 6 to 24 months depending upon the degree of concentration.

MARKET

There is both domestic and export market for coconut water concentrate especially in areas where coconut is not grown. Due to its convenience and cost effectiveness, it can be served as a soft drink on various occasions after diluting with drinking water.

PROJECT AT A GLANCE

- Land & building - Rs. 17.25 lakhs
- Plant & machinery - Rs. 95.50 lakhs
- Preliminary & pre - operative expenses - Rs. 17.00 lakhs
- Contingencies - Rs. 5.0 lakhs
- Working capital (Margin money) - Rs. 20.00 lakhs



ECONOMIC FEASIBILITY

- Capacity - 1,80,000 kg/ month
- Sales turnover - 2.18 crores per annum
- Net profit - 44.5 lakhs
- IRR - 29.69%
- Employment potential - 75 personnel

Source of Technology

Miracle Food Processors International Ltd
Perinthalmanna, Kerala

SPARKLING COCONUT WATER DRINK

This is an aerated and bottled ready-to-drink coconut water beverage manufactured from the coconut water concentrate.

MARKET

Sparkling coconut water is likely to find demand as a thirst quenching soft drink and as a good mix with hot drinks such as Gin, Vodka etc. in hotels and clubs.

PROJECT AT A GLANCE

- Land & building
- Plant & machinery
- Working capital
- Rental
- Rs. 5.65 lakhs
- Rs. 3.00 lakhs

ECONOMIC FEASIBILITY

- Capacity
- Sales turnover
- Net profit
- IRR
- Employment potential
- 5,40,000 bottles per annum
- 32.4 lakhs per annum
- 2.33 lakhs
- 20%
- 30 personnel



Source of Technology

Miracle Food Processors International Ltd
Perinthalmanna, Kerala

COCONUT JAM

Coconut jam is prepared from coconut skim milk, sugar and glucose. It is an ideal spread for bread.

MARKET

The product is likely to find export market in Middle East and European countries. As a new product, its domestic market is yet to be explored. However, like other fruit jams, the product is likely to be accepted in the households and bakeries.

PROJECT AT A GLANCE

- | | |
|--|-----------------|
| • Land requirement | - 20 cents |
| • Building (1000 sqft AC roofing) | - Rs.3 lakhs |
| • Equipment | - Rs.4 lakhs |
| • Preliminary & pre-operative expenses | - Rs.0.25 lakh |
| • Contingencies | - Rs.0.20 lakh |
| • Working capital (Margin money) | - Rs.5.00 lakhs |

ECONOMIC FEASIBILITY

- | | |
|------------------------|-------------------------|
| • Capacity | - 450 kg/ month |
| • Sales turnover | - 2.18 crores per annum |
| • Net profit | - 44.5 lakhs |
| • IRR | - 29.6 % |
| • Employment potential | - 75 personnel |



Source of Technology

Miracle Food Processors International Ltd
Perinthalmanna, Kerala