Commercialised Technologies from CPCRI

- **1. Name of the product developed : Coconut chips**
- **2. Application**

  Edible ready to consume item, can be used as snacks and in confectionaries
- **3. Description**

  Coconut chips can be prepared by dehydrating the intermediate moisture coconut kernel. Intermediate moisture coconut kernel is the mature coconut kernel after removing the moisture content of the kernel partially by osmotic dehydration by using osmotic mediums like sugar syrup. Coconut Chips is crispy and can be packaged and marketed in laminated aluminium pouches, which will have shelf life of 6 months. Since it is in ready-to-eat form, it could be used as snacks at any time. Coconut chips with different flavour can be prepared by adding the required flavour essence in the osmotic medium. Instead of sweet, salted coconut chips and medicated coconut chips can also be prepared by suitable change in the osmotic medium.
- **4. Input**

  Matured coconuts -10 to 11 months maturity, coconut testa removing tool, slicing tool, electrical dryer, packing machine
- **5. Output capacity**

  300 coconuts / day
- **6. Specific benefits and impact**

  Value addition through product diversification is essential for the sustenance of coconut cultivation. Coconut chips is one of the value added product. It is a simple technology and can be produced as a cottage industry and women self help groups are the main beneficiaries.
- **7. Technology Transfer Fee : Rs. 10,000/-**

- **1. Name of the product developed** : Virgin Coconut Oil by hot process
- **2. Application**

  It's a newly emerging high value product which has lot of medicinal properties and cosmetic applications which is the need of the hour for the highly health conscious consumers.Hair and skin conditioner, oil base for various cosmetic and skin care products, carrier oil for aroma therapy and massage oils.
- **3. Description**
- Virgin coconut oil (VCO) is the oil obtained from fresh, mature endosperm (kernel-meat) of the coconut by mechanical or natural means, with or without use of heat, no chemical refining, bleaching or de odorizing and maintain the natural aroma and nutrients.
- It is the purest form of coconut oil, crystal clear, contains natural vitamin E and with very low, free fatty acid content (0.1%). It has a fresh coconut aroma ranging from mild to intense depending on extraction process.
- **4. Input**

  Fully matured nuts of 11-12 months old, Coconut dehusker,coconut testa remover, coconut pulverisor, coconut milk extractor, VCO Cooker
- **5. Specific benefits and impact**

  The major byproduct of this technology is VCO meal which can be used for fortification with wheat flour and make value added products like VCO Halwa, porridge, laddu, biscuits etc.
- **6. Technology Transfer Fee : Rs. 25,000/-**

- **1. Name of the product developed:** Virgin Coconut Oil by Cold Process
- **2. Application**

  It's a newly emerging high value product which has lot of medicinal properties and cosmetic applications which is the need of the hour for the highly health conscious consumers.Hair and skin conditioner, oil base for various cosmetic and skin care products, carrier oil for aroma therapy and massage oils.
- **3. Description**
- In fermentation method, the VCO can be produced in a home-scale operation using ordinary kitchen utensils after extracting the coconut milk. The oil produced in this method is water-clear in colour. The VCO produced could turn sour if the fermentation period is prolonged and the fermentation process conditions are not controlled properly.
- **4. Input**

  Fully matured nuts of 11-12 months old, Coconut dehusker,coconut testa remover, coconut pulverisor, coconut milk extractor, VCO Cooker, fermentation tank
- **5. Specific benefits and impact**

  The major byproduct of this technology is VCO meal which can be used for fortification with wheat flour and make value added products like VCO Halwa, porridge, laddu, biscuits etc.
- **6. Technology Transfer Fee : Rs. 25,000/-**

Lipid profile of coconut oil made through various processes

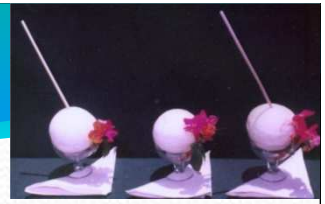
Name	Fermentation method	Hot processing method	DME method	Testa oil
C6- Caproic acid	0.143	--	0.112	0.106
C8- Caprylic acid	4.596	4.897	5.446	3.578
C10-Capric acid	4.542	4.956	5.418	3.208
C12-Lauric acid	51.092	50.394	51.350	38.07
C14- Myristic acid	20.885	20.911	19.741	21.029
C16- Palmitic acid	8.698	8.544	8.094	13.772
C17- Heptadecanioc acid	0.133	0.358	0.459	0.246
C18: 0 - Stearic acid	2.636	2.528	2.491	1.883
C18: 1 - Oleic acid	6.123	6.100	5.618	3.306
C18: 2 - Linoleic acid	1.152	1.150	1.109	4.802

4. Quality characteristics of Virgin Coconut Oil

Chemical parameters	Hot process VCO	Fermented VCO	Commercial Coconut Oil
Tocopherol (µg/g)	15-20	20-30	2-6
Polyphenols (µg/g)	500-700	350-500	150-250
Antioxidant activity (%)	80-90	65-75	35-45
Monoglycerides (%)	1.5-2.0	2.0-3.0	0.5-1.5
Phytosterol (µg/g)	2.5-3.0	2-2.5	0.5-1.0
Color (Lovibond)	0.1R+0.5Y	0.1R+0.1Y	0.1R+0.5Y
Refractive Index at 40℃	1.4480-1.4490	1.4480-1.449 0	1.4480-1.4490
Saponification value	250-260	250-260	250-260
Iodine value	7-8.6	7.5-8.4	7.4-8.1
Specific gravity	0.915-0.920	0.915-0.920	0.915-0.920

Hot processed VCO was found to contain more bioactive components compared to fermented and commercial coconut oil

- **1. Name of the Machinery developed :**
  Snow Ball Tender Nut Machine

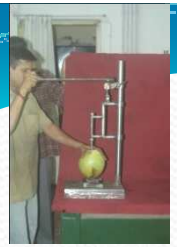


- **2. Application**
  To produce snowball tendernut from tender coconut
- **3. Description**
  The machine consists of a circular blade having 24 teeth of 8 mm width that rotates at a speed of 1440 rpm. The prime mover of the machine is a 0.5 HP single phase electric motor. The prime mover attached with the circular blade is fixed on an angle iron frame with a covering made of mild steel sheet. A stop cutter box of stainless steel with a clearance of 15mm is used to cover the circular blade. The adjustable stop cutter box helps the user to control the depth of cut and protects the user from possible injury while operating the machine. The machine is used to take a groove around the shell of the husked tendernut. A flexible knife, scooping tool, is used to scoop out the tender nut kernel from the shell. Remove the detached shell and keep the snowball tendernut in an ice cream cup with the eye portion facing up.
- **4. Input:** Snowball tendernut machine, scooping tool, 230V electric supply and 7 to 8 month old tender coconuts.
- **5. Output capacity:** Ten snowball tendernuts per hour
- **6. Specific benefits and impact**
  Snow ball tender nut is a health drink and a snack at the same time. It is pure white in colour and is in ready-to-serve form. It contains tender coconut water, that can be consumed by just inserting a straw. The coconut water is not exposed to the atmosphere and is natural and sterile. Since there is no refuse after the consumption; there is no scope of littering the premises. It can be produced in one place and marketed through different outlets like cool bar, hotel, hospitals etc.
- **7. Cost :** Rs.20,000/-

- **Name of the Machinery:** Shell Fired Copra Dryer
- **Application/Use:** For drying coconut to make copra for oil extraction
- **Description:** A natural convection copra dryer was designed and developed and performance evaluated to dry coconut. The capacity of the dryer developed is1000 nuts per batch. The drying air temperature in the drying chamber was 80 0C. Coconut shell was used as fuel in a specially designed burning chamber. The thermal efficiency is in the range of 25.25 to 26.4 % which indicates good performance of the dryer. The quality of copra obtained was light brown in colour which fetches good price in the market. The burner designed generated heat for 5 hours without tending and the heat is retained for one more hour. The average drying time was 23.5 h.
- **Input:** Copra Dryer, Coconut, Coconut shell
- **Out put Capacity:**1000 nuts per batch
- **Specific benefits and impact:** Drying time is reduced from six days to 2 days. Labour saving up to 75%
- **Cost:** Rs 33,000/-

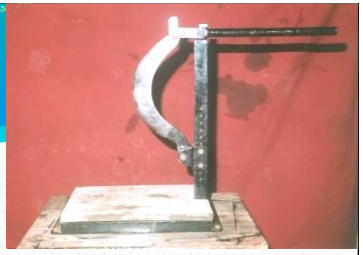
Name of the Machinery: Coconut de-shelling machine

- **Application/Use:** For separating shell and copra after partial drying
- **Description:**Traditionally after partial drying of split coconut, the kernel and copra is separated using a traditional wooden mallet by taking the individual cups in hand. To over come this problem, a power operated coconut de-shelling machine was designed and developed. The capacity of the machine was 400 half cups per batch. The optimum average moisture content for maximum de-shelling efficiency (92.16 %) was 35 % d.b. The optimum speed of the de-shelling machine is 10 RPM and the time taken for de-shelling was 4 minutes per batch.
- **Input:** Partially dried copra
- **Out put Capacity:** 5000 nuts / hr
- **Specific benefits and impact:** Useful for large scale copra processing units
- **Cost:** Rs 50,000/-



Tender nut Punch

•Tender nut Cutter



- **Name of the Machinery developed:** Tender nut punch and cutter
- **Application/Use:** For drinking tender nut water
- **Description:** In tendernut punch, the tender nut is placed on the nut holder which is a circular and hollow in shape with a diameter of 10 cm. The tender nut can be placed on the nut holder and by operating the lever mechanism a hole of 12mm diameter is made in just 4-5 seconds. As the lever is spring loaded it automatically tries to move upwards. A straw is put in the hole and one can drink the nut water. A simple Tender Coconut Cutter was developed. The cutting blade is mounted concentric to the stand and retained at a height of 15-20 cm. The serrated curved blade or knife is made of leaf spring of 6 mm thickness and is 45cm in length. The hand lever is pivoted to the other end of the blade through a horizontal hinge. One stopper or limits provided on the lower side to apply concentrated load for easy cutting.
- **Input:** tender coconut
- **Out put Capacity:** 150 – 200 nuts/hr
- **Specific benefits and impact:** Risk of injury using traditional knife is eliminated
- **Unit cost:** Rs 10,000/-

- **Name of the Machinery developed:**
  Telescopic sprayer for Palms
- **Application/Use**: For spraying palms from the ground up to 40ft height
- **Description:** This invention relates to development of telescopic sprayer. The developed sprayer comprises of two co – axial pipes of ultra – light weight (0.5 kg /m), which can be used to spray up to a height of 12.5m (40ft) from the ground. The pipe height can be locked at any desired level above 6.25m (20 ft). The spray lance can be directed in any direction up to 170 degree by pulling the rubber hose connected to the lance. A spring is connected to the lance so that it comes back to 90 degree angle when released from other angles. The sprayer can be used to spray at 45 degree also if the trees are smaller.
- **Input:** Telescopic pipe assembly with rocker sprayer
- **Out put Capacity:** Arecanut-100 palms/hr, Coconut-15-20 palms/hr
- **Specific benefits and impact:** In view of acute shortage of skilled labour, this device will be very help ful for large scale spraying in a short period of time
- **Unit cost:** Rs 20,000/-

- **Name of the Machinery developed:** A safety attachment Paddle type coconut climbing device
- **Application/Use**: It is for the safety and comfort of the coconut climbers to climb the coconut tree using the coconut climbing device.
- **Description:** Small modification is done to the climbing device by providing two metal loops at the bottom of the handle of the right leg unit of the climbing machine. The attachment is a 6mm steel rope with hooks provided at both the ends. The wire rope is taken through the loops around the palm to make it a noose and the free end is connected to a commercially available body harness. The wire rope moves up and down along with the climbing machine during operation. In case of any eventuality, failure of the machine or accidental falling of the climber from the machine, the wire rope noose gets tightened to the coconut trunk and prevents the climber from further falling. The climber after falling can lock the machine and step back to it and continue climbing.
- **Specific benefits and impact:** The safety attachment is independent of the climbing machine and gives full proof safety to the climber from falling. This could provide much needed confidence, especially for beginners to attempt climbing coconut using the Paddle type climbing machine.
- **Cost:** Rs 10,000/-

- **Name of product developed** : Trichoderma Coir Pith Cake
- **Application/ Use** : A very useful biocontrol agent, with long shelf life of 12 months as well as to increase the population by a simple activation process.
- **Description:**

  New, simple and low cost technology developed, thus, contains cheap coir pith, a waste from coconut industry converted into value added and environment friendly commercial organic product for management of plant diseases.

  Biological control of pests and diseases is an alternative to noxious chemical pesticides to curtail the hazards of intensive use of toxic chemicals.

  For large scale production of biocontrol agents inexpensive agricultural wastes would be of great relevance.

- **Specific benefits and impact** : This approach is self sustaining, efficient and eco-friendly with long term action.
- Cost : Rs. 5,000/-

- **Name of technology developed** :
- Technology for growing oyster mushrooms on coconut waste
- **Application/ Use** : Utilization of waste for production of edible mushrooms
- **Description:**
- A low cost technology has been developed for cultivation of oyster mushroom utilizing coconut wastes such as leafstalk, bunch waste, leaflets, etc. Coconut wastes are chopped to 5-7 cm long pieces and soaked in water overnight. Excess water is drained off and substrates are sterilized by steam pasteurization in an autoclave at 1.02 kg cm2 pressure for 1½ h. The substrate is then filled in polybags and inoculated with spawn @ 100 g per bag containing 3-3.5 kg substrate. Sterilized rice bran is added @ 5% as an organic supplement. The bags are incubated for spawn run in a mushroom house for 15-20 days. After the spawn run, the polythene cover is ripped open and the compact cylindrical bed is sprayed with water two or tree times daily. The first flush of mushroom fruiting bodies is ready in 5-10 days after opening of the bag. There to four crops can be harvested from each bed.

- **Input needed** : Coconut leaflets, leaf stalk and bunch waste, rice bran, polybags, *Pleurotus* sp. spawn.
- **Output capacity** : 700 g fresh mushrooms per kg of dry waste substrate
- **Specific benefits and impact** : Mushroom produced on coconut wastes is nutritionally rich and medicinally important food item. It contains 20-30% protein on dry weight basis. It is also a rich source of minerals, vitamin C, and vitamin B complex. It can be safely included in the diet of patients with hypertension, obesity and diabetics because of its low sodium-potassium ratio, low starch and calorific value and high fiber content. The spent mushroom substrate obtained after harvesting of mushrooms can be used for compost/ vermicompost production.
- **Unit cost** : Rs. 18/- per kg

- **Name of product developed** : Coconut leaf vermicompost
- **Application/ Use** : For improving seedling establishment, crop growth and yield
- **Description:**
- The coconut leaf vermicompost is dark brown coloured granular organic material. It has a C : N ratio of 9.95, organic carbon content of 17.8 % and 10-13 % humic acid, besides 1.8 % nitrogen, 0.21 % phosphorus and 0.16 % potash. It is rich in plant growth promoting hormones viz. indole acetic acid, gibberellic acid and phenolics, and harbours high population of nitrogen fixing, phosphate solubilizing, cellulose degrading and plant growth promoting bacteria.
- **Input needed** : Dry coconut leaves and leaf biomass waste of other component crops in coconut-based cropping systems, cow dung, *Eudrilus* sp. earthworms
- **Output capacity** : 700 kg per tonne of waste biomass
- **Specific benefits and impact** : Low cost organic fertilizer for improving soil health and fertility
- **Unit cost** : Rs. 3/- per kg

- **Name of technology developed** : Utilization of cocoa wastes for production of mycological culture media and mass production of fungal bio-control agents

- **Application/ Use** : Utilization of waste for production of edible mushrooms

- **Description:** Developed production technologies for mycological culture media and mass production of fungal biocontrol agents utilizing cocoa wastes such as bean shell, sweating and pod husk.

- **Cost of Production:**

  Total cost of production of 50 lit. *Trichoderma* (or other fungal bio-agents) using cocoa sweating medium Rs. 982.00 (including recurring and non-recurring expenditure).

  Total cost of production of *Trichoderma* (or other fungal bio-agents) using cocoa bean shell as substrate (inoculum prepared in cocoa sweating) Rs. 1,232/- for 100 kg bean shell.

Thank you