VIRGIN COCONUT OIL

Virgin Coconut Oil (VCO) is growing in popularity as functional food and the public awareness of it is increasing. It is expected that VCO will experience a dramatic growth in the market.

Virgin coconut oil is the naturally processed, chemically free and additive free product from fresh coconut meat or its derivatives (coconut milk and coconut milk residue), which has not undergone any chemical processing after extraction. It is the purest form of coconut oil, water white in color, contains natural vitamin E and has not undergone hydrolytic or atmospheric oxidation as attested by its very low free fatty acid content and peroxide value. It has a mild to intense fresh coconut scent depending on the type of process used for production.

Virgin Coconut Oil (VCO) is extracted from fresh coconut milk obtained from matured coconut of 12 months old. VCO can be consumed in its natural state without the need for further processing.

Virgin coconut oil is known for its medium chain tryglycerides (MCTs). The most important medium chain fatty acid found in VCO is lauric acid. It constitutes 48 % of VCO. Lauric acid possess powerful anti microbial properties capable of destroying disease causing bacteria, fungi, viruses and parasites. Researches show that the presence of medium chain fatty acids in mother's milk is the primary ingredient that protects new born infants from infections for the first few months of their life, while their immune system is still developing. Dr. Jon J Kabara, Ph.D of Michigan State University and Consultant, USA has done pioneered studies on the antimicrobial properties of fatty acids in the 1980s. Two of his most important conclusions are that lauric acid is the most active antimicrobial fatty acid and that monolaurin is the most effective antimicrobial compound that can be derived from coco chemicals. According to him, medium chain fats in coconut oil are similar to fats in mother's milk and have similar nutraceutical benefits. VCO has considerable potential for therapeutic uses such as antimicrobial, anti-HIV/AIDS drug, for anti-cancer therapy and for the treatment of Alzhiemer's disease.

VCO is the best possible remedy to various skin ailments. Ms. Vermen M Verallo Rowell, Founder and program Director of VMV Skin Research Center + Clinic (VSRC), Philippine has told that since year 2000, VCO was used at VSRC for patients with dry

and often microbially colonized psoriasis, acne, atopic, contact dermatitis and rosacea lesion. VCO is the best skin care solution for babies, free from all chemical formulations and assures good protection to the baby skin.

Study by Department of Nutrition, University of Indonesia reveals that VCO also helps to improve blood glucose and lipid profile of type 2 diabetics, due to its readiness to provide energy to body cells.

Table 1: Essential Composition and Quality factors of VCO as per APCC

Sl. No	Parameters	
1	Moisture (%)	Max 0.1
2	Matters Volatile at 1200 C (%)	Max 0.2
3	Free Fatty Acid (%)	Max 0.2
4	Peroxide Value meq/kg	Max 3
5	Relative density	0.915 – 0.920
6	Refractive index at 400 C	1.4480 – 1.4492
7	Insoluble impurities per cent by mass	Max 0.05
8	Saponification Value	250 – 260 min
9	Iodine Value	4.1 -11
10	Unsaponifiable matter % by mass	max 0.2 - 0.5
11	Specific gravity at 30 deg./30 deg. C	0.915 – 0.920
12	Polenske Value	min 13
13	Total Plate Count	< 0.5
14	Color	Water clean
15	Odor and Taste	Natural fresh coconut scent, free of sediment, free from rancid odor and taste

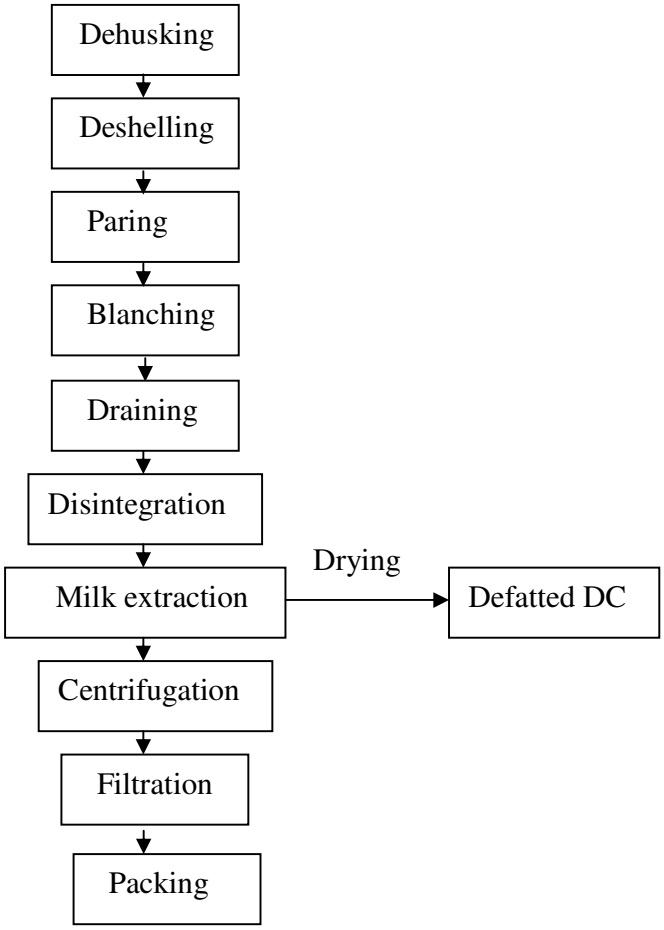
Table 2: Gas Liquid Chromatography (GLC) Ranges of Fatty Acid Components

Sl.No	Common Name	Composition	(%)
1	Caproic acid	C6:0	0.10-0.95
2	Caprylic Acid	C8:0	4-10
3	Capric Acid	C10:0	4-8
4	Lauric Acid	C12:0	45-56
5	Myristic Acid	C14:0	16-21
6	Palmitic Acid	C16:0	7.5-10.2
7	Stearic Acid	C18:0	2-4
8	Oleic Acid	C18:1	4.5-10
9	Linoleic Acid	C18:2	0.7-2.5

Raw Material Requirement

It is assumed that to produce 1 litre of VCO, 7 kg of dehusked coconut is required, which is around 17 coconuts.

Processing Method



Dehusking: Husk is removed manually or with the help of coconut dehusking machine.

Deshelling: It is done to remove the shell of the coconut. This is done without breaking the kernel.

Paring: It is done to remove the brown skin of the kernel with the help of a paring machine.

Blanching: Pared coconuts are dipped in boiling water for few minutes in a blanching tank.

Draining: It can be done with the help of vibratory screener. This will remove the excess water present in the blanched coconuts.

Disintegration: Pared coconuts are fed into a disintegrator where pared nuts are cut into small pieces and will be ready for extraction.

Milk extraction: Shredded coconuts are put into a milk extractor (screw press/ hydraulic press) and coconut milk oozes out of the extractor. Extracted milk is collected in collecting vessels. Extracted coconut milk is then filtered to remove if any solids are present. Residue obtained after extraction is dried in an oven and packed a defatted desiccated coconut.

Centrifugation: This process is used to separate two immiscible substances. Coconut milk is the natural oil in water emulsion. After centrifugation, oil and skim milk is separated. Coconut oil is separated from coconut milk.

Filtration: The oil is passed through the filter and packed in consumer packs. Vacuum dehydration of oils will remove the excess moisture present in oils.

Critical points to consider in VCO processing

Coconut Selection:

Maturity of coconut is a very important factor in the quality and recovery of VCO especially in processes involving the coconut milk route. Coconut kernels from fully mature coconut have the highest oil content and are relatively low protein content. Coconut milk is an emulsion of oil and water stabilized by protein. To release the oil from coconut milk, the protein bond has to be broken so more oil can be recovered if the kernel from which the coconut milk is obtained has high oil content and lower protein content. As an indicator of maturity of nut, husk and shell is brown in color and gives sloshing sound when shaken.

Always ensure that the nut while fully mature do not have haustorium. This is because the oil content of the kernel and quality of the oil starts declining once the haustorium is formed.

Sanitation and Handling of Equipments:

Coconut meat/kernel and coconut milk are low acid foods so they are very susceptible to microbial contamination. Because of this, strict sanitation in the plant area, personnel and equipment should be practiced at all the times. Food grade stainless steel is the recommended material of construction for all parts of VCO process equipments that will come in contact with coconut kernel or milk. Water to be used as diluent or rehydrating agent should be of high quality, free from microbial contamination and from too much mineral content.

Handling of VCO product

Presence of water in oil will make the product's shelf life short i.e. water in oil will cause rancidity upon storage. Ensure that the water content of the virgin coconut oil is less than 0.1% and that any process container or packaging material to be used for VCO are thoroughly dried and clean.

By products in VCO units:

Major byproducts in VCO units are shell, parings (brown skin) and defatted desiccated coconut powder.

Export Potential of VCO

The demand for VCO in the international market has increased considerably. In 2013-14, the export of VCO was Rs 5 crore, which increased to Rs 25 crore and Rs. 26.22 crores in 2014-15 and 2015-16 respectively. The major export destinations are US, Japan, Australia, UK and UAE.

A total of 818.33 MT of VCO was exported during the year 2015-16 which comes to Rs.26.22 crores.

Export Promotion Activities

Government of India has provided promotional measures to boost India's exports under Foreign Trade Policy 2015-20. Entrepreneurs are entitled to receive the following incentives for exporting of coconut products:

(1) Merchandise Exports from India Scheme (MEIS)

Under the MEIS scheme, the Government of India provides incentive for exporting notified goods/products to notified markets. The rate of benefit ranges from 2-5% of the realized FOB value of exports.

(2) Duty Drawback Scheme

Duty Drawback has been one of the popular and principal methods of encouraging export. It is a method of refund of custom duties paid on the inputs or raw materials and service tax paid on the input services used in the manufacture of export goods. The duty drawback benefits are as stated in the table below.

Benefits Secured Under MEIS (Merchandise Exports From India Scheme) and Duty Drawback Scheme

ITC HS Code	Products	MEIS benefits in percentage of FOB Value	Duty Drawback Scheme benefit in percentage of FOB Value	
			Drawback rate when cenvat facility has not been availed	Drawback rate when cenvat facility has been availed
15131900	Virgin Coconut Oil	-	1	0.15

Capital Investment Cost of the Project (5000 coconuts per day)

Sl. No	**Item**	**Amount (Rs. in Lakhs)**
1	Land (30 cents)	Leased/Own
2	Building (4000sq. feet @ Rs. 1000/sq. feet)	40
3	Machinery and Equipment	55.98
4	Electrification	3.00
5	Effluent Treatment Plant	5.00
6	Preliminary & Pre-op Expenses	2.11
7	Working Capital (Margin)	4.40
	Total	**110.49**

Details of Plant and Machinery

Sl. No.	Items
1	Coconut Deshelling machine
2	Blanching Tank SS 304
3	Primary Cutter
4	Disintegrator
5	Centrifuge Coconut Milk Extractor
6	Coconut Milk Extractor (Screw press)
7	Tubular Centrifuge Machine
8	Extra Bowl for Centrifuge
9	Oil Micro Filter
10	Overhead Tank SS 304
11	Defatted Coconut Powder Electrical Dryer
12	300 Liters VCO Storage Tank SS 304
13	500 Liters Milk storage Tank SS 304

CDB Scheme for Promotion of Coconut Industries

Coconut Development Board under Technology Mission on Coconut extends financial assistance to the limit of 25% of the eligible project cost limited to Rs. 50 lakhs per project. Under this scheme, CDB has supported 44 vrigin coconut oil manufacturing units with a processing capacity of 161.85 million nuts per.

For technical enquiries and for availing subsidy, please send email to cdbtech@gmail.com. For export related enquiries, please send email to epccdb@gmail.com