



# Virgin Coconut Oil by Fermentation Method

specified values. The oil is colourless and has got natural sweet taste. It is clear and free from turbidity and rancidity.

The fatty acid profile of VCNO and commercial grade edible coconut oil was analyzed by capillary gas chromatography (Naresh Kumar, 2005) after forming the methyl esters of fatty acids (Pauda-Resurrection and Banzon, 1979). Results indicated that the VCNO had higher concentrations of short and medium chain fatty acids and lower concentrations of long chain fatty acids compared to the commercial grade edible coconut oil (Table 2). The VCNO is extracted from fresh kernel whereas the commercial oil is expelled from milling copra.

Coconut oil has several industrial applications (Naresh Kumar *et al.*, 2000, 2004). It is reported that lauric acid in coconut oil is used by the body to make the same disease fighting fatty acid derivative monolaurin that babies make from the lauric acid they get from their mother's milk (Enig, 2001). The monoglyceride, monolaurin, is the substance that keeps infants away from getting viral or bacterial or protozoal infections. The virgin coconut oil prepared by fermentation method is of high quality since no chemical or high-heat treatment is used, and this oil contains no *trans fatty acids*. As the coconut milk is not heated, there is no loss of nutrient.

Coconut oil obtained from coconut milk is called *virgin coconut oil*. Traditional and modern methods are available for the manufacture of virgin coconut oil. In the traditional method, the milk extracted from grated coconut kernel is boiled to get oil. Of late, the traditional method has been partially mechanized using a bridge press and mechanical grater. The modern method of extracting oil from fresh coconut kernel is known as *wet processing*. In this process, the coconut kernel is made into viscous slurry from which coconut milk is separated by pressing the slurry. The dried residue obtained is known as partially defatted desiccated coconut. The milk is sieved and concentrated. After separation of cream containing most of the fats from the milk, it can either be dried into powder or packed as such in aseptic packs. The cream is stirred vigorously to get virgin coconut oil by a process called phase inversion. The virgin coconut oil is considered superior for use as hair oil and baby oil because of its pleasing aroma and purity. It is applied on the body of babies to protect from skin troubles. Because of its low FFA content, this oil has a long shelf life. Maturity of coconut greatly affects the yield of coconut milk (Hagenmaler, 1980). Brown – husked nuts of 12 months maturity with no protruding sprouts produce higher yield of milk. At this stage the meat is hard and thick with a typical composition of 50 per cent moisture, 34 per cent oil, 3.5 per cent protein, 3.0 per cent fiber, 2.2 per cent ash, and 7.3 per cent carbohydrates (Julian A. Banzon *et. al* 1990).

*Virgin coconut oil by partially mechanized method* involves various steps in which coconut kernel is grated using a rotary grater initially. The grated coconut is then crushed in a bridge press to extract milk. Water is added during the second and third pressing. The extracted coconut milk is boiled in an open pan until oil separation takes place. Oil is separated from the oily residue by decantation. The residue obtained during the extraction of milk is dried and used for making sweets, chutney powder, etc.

In this study, virgin coconut oil is prepared by *fermentation of coconut milk*. Freshly harvested coconuts are used (within 24 hours of harvest) for this purpose. The fresh coconut meat is shredded (*wet milled*), and then *cold-pressed* to get coconut milk. The milk is then fermented for 28–36 hours, and the oil is then separated and filtered from the cream. The oil recovery is about 28 to 35 percentage of the volume of coconut milk. (The residue left over is thick coconut cream, which is heated to extract coconut oil, and the recovery of oil is 80 percent by volume). The oil quality is tested and the results are shown in Table 1. It can be seen that the values are better than the *Agmark*

**Table 1. Quality of virgin coconut oil samples**

Sample	FFA(G lauric acid)	Acid Value (mg KOH / g oil)	Saponificati on value (mg KOH/g oil)	Peroxide value (meq peroxide/ Kg oil)	Refractive index at 40°C
1	0.0094	0.263	263	0.0023	1.4491
2	0.1104	0.310	260	0.0005	1.4489
3	0.1224	0.343	253	0.0020	1.4489
4	0.2256	0.434	280	0.0014	1.4483
Agmark specified value for refined coconut oil	Not mentioned	Not more than 0.5	Not less than 250	Not mentioned	1.4481 to 1.4491



**Table 2. General fatty acid profile of the VCNO in comparison with the commercial grade edible coconut oil**

Fatty Acids	Commercial grade edible coconut oil	Virgin coconut Oil
	<i>Short and medium chain fatty acids</i>	
C6 (Caproic acid)	0.08	0.63
C8 (Caprylic acid)	4.85	9.60
C10 (Capric acid)	4.99	6.88
C12 (Lauric acid)	50.44	52.53
Total	60.35	69.65
	<i>Long chain saturated fatty acids</i>	
C14 (Myristic acid)	20.94	17.69
C16 ((Palmitic acid)	8.15	5.90
C18:0 (Stearic acid)	3.01	2.30
Total	32.2696	25.89
	<i>Long chain unsaturated fatty acids</i>	
C18:1 (Oleic acid)	5.83	3.79
C18:2 (Linoleic acid)	1.45	0.67
<b>Total</b>	<b>7.34</b>	<b>4.46</b>

This high-grade virgin coconut oil has a long shelf life due to coconut oil's natural anti-oxidant properties. (Banzon, J.A. 1991). Moreover it does not require any machinery and so can be produced at cottage industry level. The better qualitative aspects of VCNO are advantageous for its use as edible oil apart from its immense medicinal properties. This virgin oil produced by fermentation from organic coconuts has got very good export potential as it is also approved by US-Department of Agriculture as an edible oil.

**References**

Banzon, J.A. 1991. Coconut oil. *Philippine Journal of Coconut Studies*. XVI (2): 45-46

Cox, H.E. and Pearson, D. 1962 *The Chemical Analysis of Foods*, New York, Chemical Publishing Co. Inc., 420 pp

Enig, M. G. 2001 *Coconut oil: An anti-bacterial, anti-viral ingredient for food, nutrition and health*. Coconut Today. October (Special Issue): 46-56.

Hagenmaier 1980 *Coconut aqueous processing*, 2<sup>nd</sup> ed. Univ. of San Carlos, Cebu City, Philippines

Horowitz, W. 1975 *Official Methods of Analysis of AOAC*, Washington, Association of Official Analytical Chemists, 12<sup>th</sup> edition 490 pp

Julian A. Banzon, Olympia N Gonzalez, Sonia Y. de Leon, Pricilla C. Sanchez 1990 *Coconut as food*, Phillipine Coconut Research and Development Foundation, Inc. Quezon City, Philippines

Naresh Kumar, S. 2005. A capillary gas chromatography method for fatty acid analysis of coconut oil (*Communicated*)

Naresh Kumar, S., Champakam, B. and Rajagopal, V. (2000) Fatty acid composition of coconut oil among the cultivars – An insight into industrial application, *Indian Coconut J*, 31 (3) 25-28

Naresh Kumar, S., B. Champakam and V. Rajagopal (2004). Variability in coconut cultivars for lipid and fatty acid composition of oil. *Tropical Agril.* (in press)

**K. Madhavan, S. Naresh Kumar and Shamina Azeez**  
Central Plantation Crops Research Institute, Kasaragod - 671 124, Kerala

**CDB Invites Articles for Special Issue of ICJ**

The Coconut Development Board has completed its 24 years of existence and celebrating its Silver Jubilee in 2005-06. In Commemoration of Silver Jubilee Year the Board proposes to release special issue of *Indian Coconut Journal*. Informative articles and success stories based on coconut and related enterprises in the coconut R & D Sector are invited for the purpose. Selected articles and features will be published.

Contributors may kindly follow the regulations of the Board while sending articles • **The article should be sent in soft copy in Ms Word Format along with the hard copy latest by 31st July 2005.** • **Photographs along with the article should be given in Tiff Format Resolution 300** • **Hard copy has to be submitted in duplicate** • **Graph is to be in Excel Format** • **Tables, illustrations, photographs, etc. should be cited in the text appropriately** • **It should be sent through the Head of the Institution / Department to get it in full proof in the case of R&D Organizations in Govt. sector.**

Those articles which do not follow the regulations will not be accepted for publication.

- Editor-in-chief