EXTRACTION OF AVOCADO OIL BY WET METHOD

Basuni Hamzah

Department of Agriculture Technology, Faculty of Agriculture, Sriwijaya University
Jalan Raya Palembang-Indralaya Km 12, Kabupaten Ogan Ilir,
Sumatera Selatan 30662

Corresponding author: basuni_h@yahoo.com

Avocado is a tropical fruit containing high in plant oil. Mostly, in the modern and high scale industry especially company has a large avocado farm the extraction of avocado oil is extracted through vacuum drying in low temperature. However, in rural area avocado tree spread out in small number of tree, so it needs alternative method of avocado oil extraction. In this experiment, wet method of avocado extraction was applied similar to traditional extraction of coconut oil in rural area. Avocado meat was added some water and homogenized, then heated at 100°C until the emulsion of water-oil broken down and avocado oil, then, can be separated. Yield and characteristics of avocado oil were determined. The results showed that the Yield of avocado oil was 20.06%. The characteristics of avocado oil were 78,0 of Iodine value (Wijs), 192 of Saponication Value, 1.72 of Acid Value, 3.3 of Peroxide (milli-equivalents of peroxide per 1000 g oil), 0.84% of Free Fatty Acid, 0.918 of Specific Gravity at 25°C, 1.493 of Refractive Index at 25°C, 181°C of Smoke Point, -15 °C of Cloud Point, 245 °C of Flash Point, and 1,58% of Unsaponifiable.

Keywords: Avocado oil, wet method extraction, homogenization

Introduction

Avocado (*Persea americana* Mill.) is native to the neo-tropics. Originally from Latin American, it is used to make dressings because of its high fat content. Furthermore, avocado oil was regarded as aphrodisiac in old Aztec and Maya civilization (Swisher and Harold, 1988), on the par with oyster and artichoke for Europeans. Later it was brought out of America to many other tropical and subtropical countries by the Europeans. Cultivars of Guatemalan, Mexican, and West Indian origin have spread, becoming important crops in those parts of the world.

Avocado oil is derived from the flesh pulp of the avocado fruit surrounding the pit. Avocado is a fruit of unusually high oil content (15% to 30% depending on the variety), especially in the pulp. In contrary, there is very little oil in the seed, approximately 2% of its

weight (Shahidi 2005). Avocado oil contains oleic acid (C18:1, 69–74% of total FA-fatty acids), palmitic acid (C16:0, 9–13% of total FAs), palmitoleic acid (C16:1, 3–4% of total FAs), linoleic acid (C18:2, 10–14% of total FAs), linolenic acid (C18:3, 1–2% of total FAs), stearic acid (C18:0, 0.4%-1% of total FAs), as well as desirable compounds like vitamins, phytosterols, chlorophyll and carotenes (O'Connor *et al.*, 2007: Choe and Min, 2006). Thus avocado oil is important high-oleic oil, making it as very good dietary cooking and salad oil. It is generally consumed in an unrefined state and therefore retains all of the natural unsaponifiable material, including valuable antioxidants.. It is rich in chlorophyll, making it green before processing. After refining and bleaching, its color changes into emerald greenish-yellow (Swisher and Harold, 1988). Avocado oil plays positive roles in reducing risk of coronary heart disease, cataracts, diabetes, chemoprevention, prostate cancer, and age-related macular disease (Ashton *et al.*, 2006). Its use is not solely in food products, but also in cosmetics and personal care uses. Avocado oil is claimed as one of the best natural oil regarding its ability as sunscreen, second only to mink oil (Swisher and Harold, 1988).

Due to its relatively high yield, avocado oil can be obtained by cold pressing the fruit pulp. Commercially, this method is the most economical way to extract the oil. But, solvent extraction is also able to get the oil out of its pulp, albeit not as good as cold pressing. The solvent has to be removed after extraction because its toxicity and odor. Another way to recover oil from the pulp is using centrifugation, but it is very expensive in small and medium scale, regarding amount of energy used to power the process (Swisher and Harold, 1988). Yet the oil is obtainable by using wet process, but researches related to this method are quite limited.

Avocado tree in Indonesia mostly spreaded over the land in small amount of plant. For a big scale of farm, most people like planting other than avocado. So it is hard to implement such a modern type of extractions. One of the method of extraction is wet method which could be applied by the people that has some productive avocado tree.

Method of Research

Wet Method of Extraction: Flesh part of avocado mixed with water with the proportion of 1:1 (w/w). The mixture then was homogenized by the use of blender (5000 RPM for 3 minutes) in order to break down water in oil emulsion. The homogenization mixture then was heated to 105°C until oil part significantly separated. And the data obtained could be used to determined the yield of avocado oil.

Shoxlet Extraction: As confirmation of of extraction, the oil of avocado also was extracted by shoxlet, And the data obtained could be used to determined the yield of avocado oil.
After the oil has been obtained, yield was determined using the following formula:

Yield = Percentage of oil obtained from the calculation that weight of oil divided by weight of avocado sample.

The oil then was characterized for Iodine value, saponification value, Peroxide, Free Fatty Acid, Specific Gravity, Refractive Index, Smoke Point, Cloud Point, Flash Point, and Unsaponifiable.

Result and Discussion

By wet method and by shoxlet of avocado extraction could get yield as following

Tabel 1: The amount of avocado oil extracted by wet method and shoxlet method

	Method of Avocado Oil Extraction	
	Wet Method	**Shoxlet**
Yield (%)	20.06	29.74

The data showed that the yield of avocado extracted by wet method was lower than that by shoxlet. In the process of extraction by wet method, avocado slurry was heated at the temperature of 105°C. The fact that the temperature of 105°C was not enough to break down emulsion. In the avocado, there were not only water but also proteins and carbohydrates. Linkage of oil with proteins and carbohydrate made the emulsion and the linkage slightly hard to break down during heating.

In Table 2 there were not much differences characteristics of avocado oil between wet method extraction and the shoxlet, except for free fatty acid. Free fatty acid of avocado extracted from wet method was higher than that from shoxlet. The higher content of free fatty acid in avocado oil extracted from wet method probably due to hydrolysis of some fatty acid in which the process using relatively high temperature (105°C)

Table 2: Characteristics of Avocado Oil Extracted by Wet Method and The Shoxlet

Characteristics	Method of Avocado Oil Extraction	
	Wet Method	Shoxlet
Iodine value (Wijs),	78.0	76.4
Saponication Value	192	194
Acid Value	1.72	1.77
Peroxide (milli-equivalents of peroxide per 1000 g oil),	3.3	3.5
Free Fatty Acid	0.84%	1.54%
Specific Gravity at 25°C	0.918	0.917
Refractive Index at 25°C,	1.493	1.499
Smoke Point	181°C	181°C
Cloud Point	-15 °C	-15 °C
Flash Point	245 °C	245 °C
Unsaponifiable	1,58%	1,56%

Summary

The Yield of avocado oil extracted from wet method was 20.06%. The characteristics of avocado oil extracted from wet method were 78,0 of Iodine value (Wijs), 192 of Saponication Value, 1.72 of Acid Value, 3.3 of Peroxide (milli-equivalents of peroxide per 1000 g oil), 0.84% of Free Fatty Acid, 0.918 of Specific Gravity at 25°C, 1.493 of Refractive Index at 25°C, 181°C of Smoke Point, -15 °C of Cloud Point, 245 °C of Flash Point, and 1,58% of Unsaponifiable.

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