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Studies of Selected Physicochemical Properties of Fluted Pumpkin (*Telfairia occidentalis* Hook F.) Seed Oil and Tropical Almond (*Terminalia catappia* L.) Seed Oil

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Abstract: Oils from the seeds of fluted pumpkin (*Telfairia occidentalis* Hook F.) and Tropical almond (*Terminalia catappia* L.) were extracted with petroleum ether. The ether extract was evaluated for Wijs iodine value, saponification value, acid value and specific gravity. The result of the evaluation was compared with that of palm oil (*Eloesis guineensis*). The acid value of fluted pumpkin and Tropical almond were 3.51 mg KOH/g and 7.59 mgKOH/g respectively. The saponification value; fluted pumpkin (179.02 mgKOH/g) and Tropical almond (183.44 mgKOH/g) indicate that the oils have high molecular weight fatty acid and therefore provides good feedstock for lubricants, candles and soap production. The iodine values, fluted pumpkin (101.73) and Tropical almond (85.12) suggest a high degree of unsaturation compare to palm oil. This makes the oils good cooking oils and suitable for margarine production. Their specific gravities were also higher than that of palm oil fluted pumpkin (0.921) while Tropical almond (0.926).

Key words: Fluted pumpkin, tropical almond, petroleum ether

Introduction

Seeds have nutritive and calorific values, which make them necessary in diets. They are also good sources of edible oils and fats (Odoemelam, 2005). Apart from the domestic use of oils and fats as cooking oils, they also find wide application as sources of oleochemicals (Morrison *et al*., 1995). Oleochemicals are completely biodegradable (Kifli and Ahmad, 1986) and so could replace a number of petrochemicals.

In Nigeria, the major sources of edible oils are peanut (Arachis hypogoea) and oil palm (*Eloesis guineensis*). These oils are used mainly as cooking oils, for the production of soap, margarine, and cosmetics (Ong *et al*., 1995). With increasing demand, which has led to importation of cooking oils, there is need to source for local oil-bearing-seeds which can be used in production of oils, both for consumption and industrial applications. Again, there is an increasing trend toward production of alkyl esters as basic oleochemicals. This alkyl ester can be obtained from palm oils (Choo and Goh, 1987, Choo and Ong, 1987 and Choo *et al*., 1986). The production of palm oil is labour and capital intensive (Ong *et al*., 1995), hence, the need to source for other local raw materials that will not require large amount of labour and capital.

Fluted pumpkin (Telfairia occidentalis) is a creeping vegetative shrub that spread low across the ground with large lobed leaves, and long twisting tendrils (Horsfall and Spiff, 2005). Harvesting of fluted pumpkin takes place 120-150 days, after sowing. The seed contains 13% oil (Okoli and Nyanayo, 1988) and is used for cooking (Horsefall and Spiff, 2005), marmalade manufacturing (Egbekun *et al*., 1998) and cookie formulations (Giami and Barber, 2004). Several workers has reported the nutritional composition, chemical characterization and functional properties of fluted pumpkin seeds (Fagbemi *et al*., 2005, Fasuyi, 2006, Ganiyu, 2005 and Badifu *et al*., 1995). However, no information is available on the chemical characterization of the oil of fluted pumpkin seed. Tropical almond (*Terminalia catappia*, L) is a perennial tree which is grown mainly to provide shade during hot weather. The seed is edible and widely consumed among children. There is no information on the nutritional composition of the seed and oil from the seed. The present study aims at drawing attention to the some physical and chemical characteristics of these oils and comparing them with the palm oil with a view to providing useful information towards effective utilization of these oils.

Materials and Methods

Collection and preparation of samples: Fluted pumpkin seeds used for this work were obtained from local market in Benin City, Nigeria while the Tropical Almond seeds were collected under Tropical almond trees within Benin City, Nigeria. Both seed were screened to remove bad seeds. The screened seeds were shelled manually and further screened. The seeds were then dried in an air oven at 60°C for 24 hours and were powdered with a mechanical grinder, packaged and stored in a refrigerator at about 4°C until required for use.

Extraction of oil: The powdered seeds were extracted with petroleum ether (b.pt range 60-80°C) according to the method described elsewhere (Oshodi and Ekperigin, 1989).

Physicochemical parameters of the oils: The acid value, saponification value, Wijs iodine value were determined as described by Pearson (Pearson, 1976). The specific gravity was determined using a universal hydrometer.

Table 1: Physicochemical properties of fluted pumpkin and tropical almond seed oil

Parameter	value		
	TA	FP	PO*
Saponification value (mgKOH/g)	179.02	183.44	199.10
Iodine value (Wijs)	85.12	101.73	56.10
Acid value (mgKOH/g)	7.59	3.51	-
Specific gravity	0.926	0.921	0.891

*Source: Jacobsberg, 1983 and Cocks and Van Rede, 1966.
TA: Tropical Almond, FP: Fluted pumpkin, PO: Palm Oil

Results and Discussion

The physicochemical parameters of the oils are shown in Table 1. The saponification value are outside of range of (188-196) for most oils of plants origin (Pearson, 1976) and less than that of palm oil as shown in the Table. The low saponification value indicates that the oils have larger molecular weight than the common oils. This may be due to the presence of higher fatty acids. The low saponification value suggest that the oils can be used for candle and soap production and as chemical feedstocks for lubricants (Shiina *et al*., 1986 and Ooi *et al*., 1986). The oils also have a high iodine value compared with palm oil. The high iodine value indicates that the oil has a high content of unsaturated fatty acids relative to palm oil. This suggest that it may be used as edible oil for cooking or manufacturing of margarine. Again the specific gravity of the oils are higher than that of any other commonly known vegetable oil. The low acid value of both oil also indicate that the oils are edible.

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