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EXTRACTION AND CLASSIFICATION OF LIPIDS FROM SEEDS OF *Persea americana* MILLER AND *Chrysophyllum albidum G. DON.*

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ABSTRACT
Seed lipids of Persea americana and Chrysophyllum albidum were studied. Lipids were extracted with chloroform-methanol, analysed with silicic column chromatography and thin layer chromatography. The total lipid content of Persea americana was 10.8% while that of Chrysophyllum albidum was 7.7%. Fractionation of the total lipid fraction of Persea americana using silicic acid column chromatography showed the occurrence of neutral lipids 6.5%, glycolipids 2.1% and phospholipids 2.2% while those of Chrysophyllum albidum were 4.2%, 1.7% and 1.8% for neutral lipids, gycolipids and phospholipids, respectively. Thin layer chromatography separation showed three classes of lipids in Persea americana and Chrysophyllum albidum which were oleic acid, palmitic acid and cholesterol. The colour of these lipids was yellow and solid at room temperature. These studies suggest that oil extracted from seeds of Persea americana and Chrysophyllum albidum could be used for the manufacture of industrial products.

INTRODUCTION
The contribution of plant lipids to our diet has been recognized for a long time (Holman, 1981). Plant lipids are of considerable economic importance. The overall annual world production of plant lipids (as triacyl-glycerols) is approximately 130 million tons with soybean oil making up approximately 50% of the total. Cotton seed (17%), peanut (10%), sun flower (9%) and rapeseed (6%) are other major sources of plant lipids with sesame seed, copra, palm oil, linseed and castor bean seed making up the remaining amount.

Persea americana belongs to the family *Lauraceae*. Oil extracted from the seeds has astringent properties, and an oral infusion of the leaves is used to treat dysentery (Etukudo, 2003). *Chrysophyllum albidum* belongs to the family *Sapotaceae*. It is cultivated for its fruits. The source of fruits has potential as an ingredient of soft drinks and can be fermented for wine or other alcohol production (Ajewole and Adeyeye, 1991). Essien *et al* (1995) have reported the lipid content of four lesser known tropical seeds, *Piper guvense, Chrysophyllum albidum, Garcinia kola* and *Dennethia tripetala.* Their results showed that the total lipids of these seeds in dry weight were *C. albidum* (32.8g/kg), *G. kola* (45.3g/kg), *D. tripetala* (32.3g/kg) and *P. guinense 68.9g/kg).* The ranges of values for neutral lipids, glycolipids and phospholipids were 17.3 – 58.0%, 15.0 – 49.6%, 3.0 – 7.2% and 3.7 – 11.2% respectively.

There is an acute shortage of edible oils and fats in Africa. The short fall is being largely met by increased imports of oils from the developed countries which is putting a heavy strain on the foreign exchange position of several African countries. This situation, therefore, calls for an all out effort to increase edible oil production in Africa. To meet this shortage not only calls for increased production of the conventional oil seed crops but also the expoitation of new sources of oil bearing crops. This study therefore aims to extract and classify the lipids from seeds of *Persea americana* and *Chrysophyllum albidum* in

order to ascertain the suitability of these lipids for edible and industrial purposes.

MATERIALS AND METHODS

The seeds used in this study were obtained from fresh fruits of *Persea americana* and *Chrysophyllum albidum* from a local farmer in Uyo, Akwa Ibom State. The seeds were taken to the pharmacognosy laboratory of the University of Uyo for extraction.

LIPID EXTRACTION AND ANALYSIS

The method of Pearce and Abdel (1980) was adopted for extraction. Lipids were extracted by grinding fifty grams of the seeds sample with 100ml of propanol to inactivate the enzymes in a mortar and pestle and the seeds were homogenated using 100ml of chloroform/methanol mixture (2:IV/V). The total lipids in the homogenate in each case were extracted without chloroform/methanol (2:IV/V) and purified (Folch and Stanley, 1975). Butylated hydroxytoluene (0.005%W/V) was added as antioxidant to protect polysaturated to dryness in a rotatory at 50^0c. The weight of the total lipids was determined gravimetrically. Total lipids were fractionated into neutral lipids, glycolipids and phospholipids on silicic acid column using chloroform, acetone and methanol successively (Rouser*, et al,* 1970).

THIN LAYER CHROMATOGRAPHY

The method of Esenowo (2004) was adopted. Fifty grams of silica gel was prepared in 120ml of distilled water in 250ml beaker. Four glass plates measuring 20cm x 20cm with 0.4mm thickness were used for the TLC. The flour plates were pre-washed with acetone to remove any contaminating lipid materials. The plates were coated by spreading the slurry with automatic spreader drawing by hand to a thickness of 0.25mm. The coated plates were dried and then activated by heating at 110^0c for 30 minutes before use. The neutral lipid, glycolipid and phospholipids fractions were dissolved in 5ml chloroform – methanol applied on the plates at 1.5cm from the edge of spotting with capillary tube. Authentic standard solution of palmitic acid, cholesterol and oleic acid were applied to different lanes on the plates using capillary tube. The neutral lipids, glycolipids and phospholipids chromatoplates were developed with a mixture of petroleum ether, diethyl ether and acetic acid (90:10:1) as the solvent system. When the solvent ascended up to 2cm to the top, the plates were removed and air dried. Spots were made visible by viewing under ultraviolet light and made more visible with iodine vapour. The RF ratio of each lipid was calculated.

RESULTS

The seed lipid of *Persea americana* and *Chrysophyllum albidum* contain 10.8% and 7.7% of the total lipids, respectively. Fractionation of the total lipids by silicic acid column chromatography into neutral lipids, glycolipids and phospholipids showed that the total lipids of *Persea americana* contained 6.5% neutral lipids, 2.1% glycolipids and 2.2% phospholipids while *Chrysophyllum albidum* contained 4.2% neutral lipids, 1.7% glycolipids and 1.8% phospholipids (Tables 1 and 2). The point of origin on the plate was 7.1cm and the solvent front was 16.0cm.

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TABLE 1: TOTAL LIPID CONTENTS OF *Persea americana* AND *Chrysophyllum albidum*

Seed used	Weight of the total lipid (g) 50g of seed tissue	Total lipid expressed as percentages
Persea americana	5.40	10.8
Chrysophyllum albidum	3.83	7.7

TABLE 2: LIPID FRACTION OF *Persea americana* AND *Chrysophyllum albidum* (%)

Seed used	Neutral lipids	Glycolipids (%)	Phospholipids (%)	Total lipids (%)
Persea americana	6.5	2.1	2.2	10.8
Chrysophyllum albidum	4.2	1.7	1.8	7.7

DISCUSSION

The lipids extracted were yellow and solid at room temperature. The characteristic yellowish colour of most fats and oils are due to the presence of various carotenoid pigments, which are highly unsaturated hydrocarbon chain (Ravern and Evert, 1981). The thin layer chromatographic analysis of *Persea americana* and *Chrysophyllum albidum* suggested three lipid classes which were oleic acid, palmitic acid and cholesterol. Fractionation of the total lipids by silicic acid column chromatography into neutral lipids, glycolipids and phospholipids showed that both *Persea americana* and *Chrysophyllum albidum* lipids contain high amounts of neutral lipids 6.5% and 4.2%, respectively. This showed that neutral lipids form the bulk of these seeds, while glycolipids and phospholipids were the minor components. The lipid classes of *P. americana* and *C..albidum* were oleic acid, palmitic acid and cholesterol.

The works of Eke (1980) indicate oils with fatty acid profiles rich in oleic, palmitic, lauric and myristic acids have a good potential value as edible oil and for production of soaps, cosmetics and margarine. Moreso, Vine and Rees (1984) have suggested that oleic acid, the most widely distributed of all the fatty acids, is present in most edible oils such as palm oil and is consumed for its nutritive values. The sterol in form of plant cholesterol, could act as precursors to cholesterol synthesis in mammals, as well as offer protective role against atherosclerotic cardiovascular disease (Osagie and Odutung, 1986). It was observed that *Persea americana* and *C. albidum* have a relatively lower oil content of 10.8% and 7.7%, respectively when compared with *Irvingia gabonensis* (51.3%), *Arachis hypogea* (46%), Mustard seed *Brassica compestus* (35%). Therefore, the seed lipids of *Persea americana* and *Chrysophyllum albidum* could be used as edible oil and for industrial purposes.

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