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THE CLASSIFICATION OF FATTY ACIDS OF LIPIDS FROM SEEDS OF *Persea grattisima MILLER* AND *Chrysophyllum albidum G. DON.*

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ABSTRACT

The fatty acids from seed lipids of *Persea grattisima* and *Chrysophyllum albidum* were studied inorder to identify, classify and to ascertain the suitability of these lipids for edible and industrial purposes. Lipids were extracted with chloroform-methanol (2:1) and quantified with Gas Liquid chromatography. Gas liquid chromatographic analyses of *Persea grattisima* and *Chrysophyllum albidum* seed lipid extracts indicated that cholesteryl heptadecanoate (C17.0), 1,3 dipalmitin 2-stearin (16.0, C18.0), triolein (C18.1), trilinolein (C18.2), trilinolenin (18.3), and tristearin (C18.0) were the major fatty acids present in *Persea grattisima* while cholesteryl myristate (C14.O), cholesteryl palmitate (C16.0), and triolein (C18.1) were the fatty acids present in *Chrysophyllum albidum*. These studies show that *Persea grattisima* and *Chrysophyllum albidum* have high oil content hence can be classified as oil seeds and the fatty-acids of seed lipids could be potential sources of industrial oil.

Keywords: Classification, fatty acids, GLC and Lipids.

INTRODUCTION

Persea grattisima commonly called avocado tree belongs to the family Lauraceae, usually grows in height between 9 m and over 18 m with a trunk between 32 to 60 cm in diameter. It may also be short with the branches spreading close to the ground. The fruit, pear-shaped, often more or less necked, oval, or nearly round, 7.5 to 33 cm long and up to 15 cm wide (Morton, 1987). Growing of avocado pear is a major industry in the Southern States of Nigeria. The tree is grown for its nutritious fruit that has long been important in the diets of the people of Southern States of Nigeria. High in monosaturated oil next to olives among fruit (Pamplona, 1999). Oil extracted from the seeds has astringent properties, and an oral infusion of the leaves is used to treat dysentery (Etukudo, 2003). Leaf and seed extracts have been used for a variety of medical application including treatment of diarrhea, dysentery and as antibiotic (Koch, 1983).

Chysohyllum albidum commonly called white or African star-apple belong to the family Sapotaceae. It is a forest tree very big and tall in life form. The plant is partially covered with rusty brown long hairs, with irregular and rotundate leaves (Hutchinson and Daiziel, 1973). The fruit is a potential ingredient of soft drinks, wine or other alcohol production following due fermentation process (Ajewole and Adeyeye, 1991). The seeds are used for games in nursery and primary schools (Etukudo, 2003).

Lipid composition varies from one plant to another. Analyses of *Vitellaria paradoxa* show that it contains 45.6% oleic acid and 44.3% stearic acid (Sawadog and Bezard, 1982; Booth and Wickens, 1988). Osagie *et al* (1986) analysed the lipid content of several local seeds. The results show that 12 seed species have over 40% oil content. Most of the oils were characterized as having high levels of oleic (18:1) and linoleic (18:2) acids. Plants from the earliest times of man have been sources of food, drinks, shelter, clothing, dental care and medicine. They are also source of fragrant oils for perfume, cosmetic and spice making industries (Hegnaer, 1982; Burkill 1985). However, only very few of these tropical plant species have been found useful in medicine because their biochemical constituents are not clearly documented. As such the aim of this work is to study the fatty acid composition of *Persea grattisima* and *Chrysophyllum albidum* seeds.

MATERIALS AND METHODS

The seeds used in this study were obtained from fresh fruit of *Persea grattisima* and *Chysophyllum albidum* from a local farmer in Uyo local Government Area of Akwa Ibom State. The seeds

were authenticated by a taxonomist in the Department of Biological Sciences, Akwa Ibom State University.

The methods of Pearce and Abdel (1980) were adopted for lipids extraction. Lipids were extracted by homogenizing 50 g (fresh weight) each of the samples in 100 mI of propanol, filtering and re-homogenizing the pellet in l00 ml of chloroform-methanol (2:1). The residue was washed with 50 m1 chloroform-methanol (2:1). A solution containing 0.005% (w/v) butylated hydroxyltoluene was added as antioxidant. The extract was evaporated to dryness at 40 °C. The weight of the total lipids was determined gravimetrically.

The method of Esenowo (2004) was adopted for Gas Liquid Chromatography. The methyl esters were prepared as follows: 3 ml of lipid extracts were saponified in a test tube with 0.5 M KOH in methanol at room temperature. The medium was neutralized with excess 0.7 M HCI. The mixture was heated in a water bath for about 10 minutes at 60 °C, 3 ml of 14% boron trifluoride methanol complex (BE_3) was then added to methylate the mixture. Analysis of the fatty acid esters by Gas liquid Chromatography was done using Varians 3000 series GC with SPI and FID.

RESULTS

The results show that the seeds of *Persea grattisima* and *Chrysophyllum albidum* contained 10.8% and 7.7% total lipids respectively. Gas liquid chromatographic analysis showed, the fatty acid components of *Persea grattisima* seeds as cholesteryl heptadecanoate (C17.0), 1,3-dipalmitin 2-sterin (C16.0, C18.0), triolein (C18.1), trilinolein, (C18.2), trilinolenin (C18.3), tristearin (C18.0) (Table I and Figures 1-3). The fatty acid components of *Chrysophyllum albidum* seeds are cholesteryl heptadecanoate (C17.0), 1, 3-triolein (C14.0), Cholesteryl palmitate (C16.0), triolein (C18.1) (Table 2 and Figures 4-6).

Table 1: Fatty Acids of *Persea grattisima* Seeds Expressed As Percentage of the Total Fatty Acids

Type of seed used	Types of lipid	Lipid fraction %	Cholesteryl Heptadecanoate C17.0	Cholesteryl myristate C14.0	1.3 – dipamitin 2-stearin C16.0, C18.0	Cholesteryl Palmitate C16.0	Triolein C18.1	Trilinolein C18.2	Trilinolenin C18.3	Tristearin C18.0
Persea grattisima	Neutral lipids	6.5	15.891	0	17.825	0	19.736	20.351	21.115	0
	Glycolipids	2.1	15.894	0	0	0	19.669	20.282	21.128	19.211
	Phospholipids	2.2	15.896	0	17.636	0	19.777	20.237	0	19.211
	Total	10.8								

Table 2: Fatty Acids of *Chrysophyllum albidum* Seeds Expressed As Percentage of the Total Fatty Acids

Type of seed used	Types of lipid	Lipid fraction %	Cholesteryl Heptadecanoate C17.0	Cholesteryl myristate C14.0	1.3 – dipamitin 2-stearin C16.0, C18.0	Cholesteryl Palmitate C16.0	Triolein C18.1
Chrysophyllum albidum	Neutral lipids	4.2	15.886	0	17.814	0	0
	Glycolipids	1.7	15.914	14.882	17.625	15.507	19.734
	Phospholipids	1.8	15.885	0	17.675	0	0
	Total	7.7					

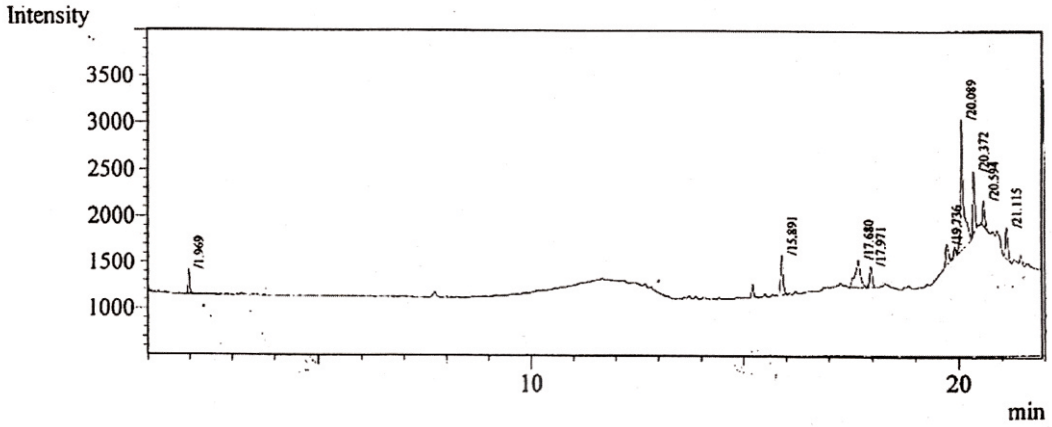

Figure 1: Fatty acid profile of neutral lipids of *Persea americana*

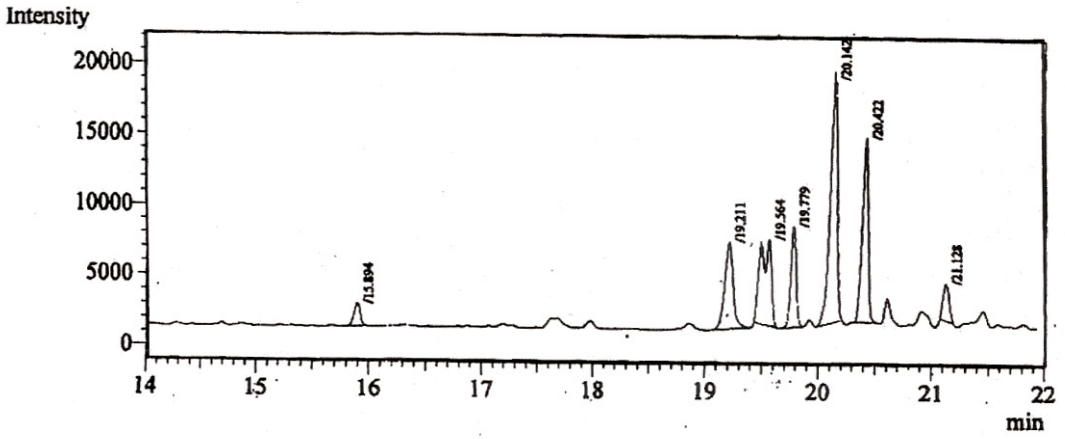

Figure 2: Fatty acid profile of Glycolipids of *Persea americana*

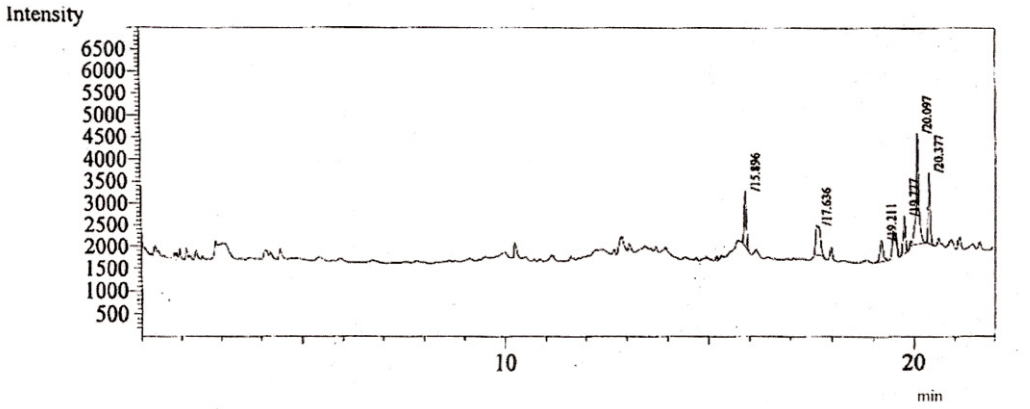

Figure 3: Fatty acid profile of Phospholipids of *Persea americana*

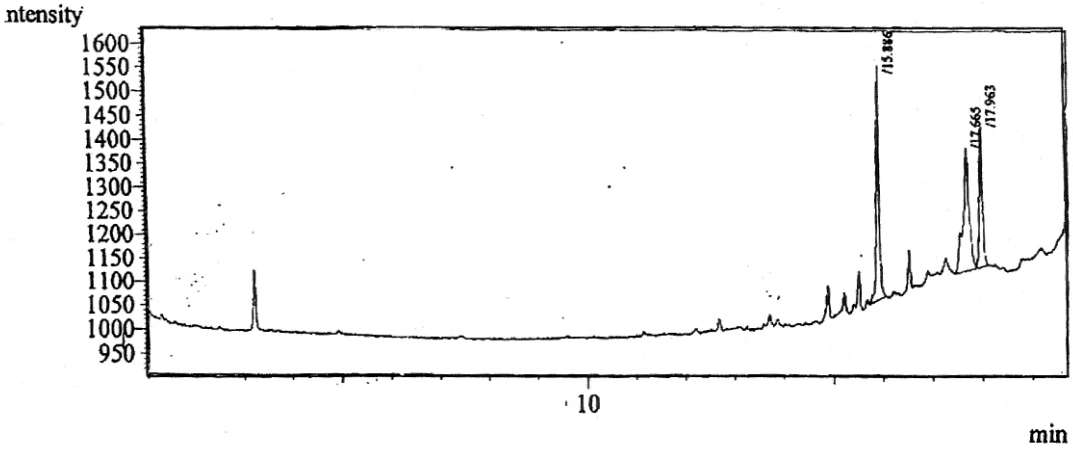

Figure 4: Fatty acid profile of Neutral lipids of *Chrysophyllum albidum*

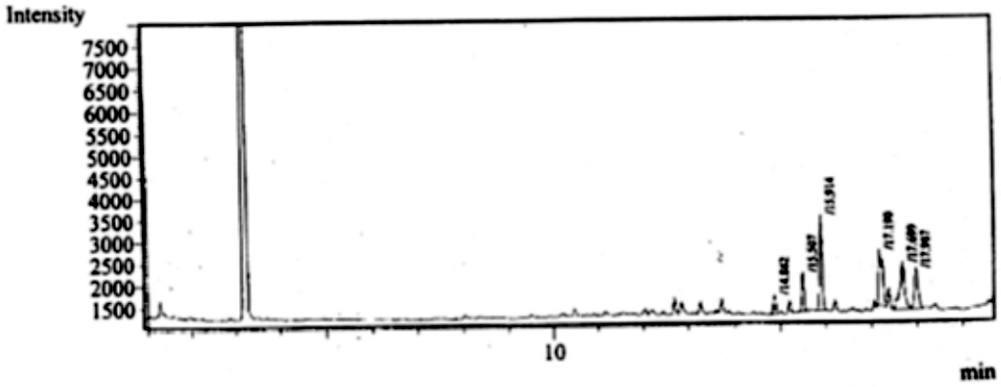

Figure 5: Fatty acid profile of Glycolipids of *Chrysophyllum albidum*

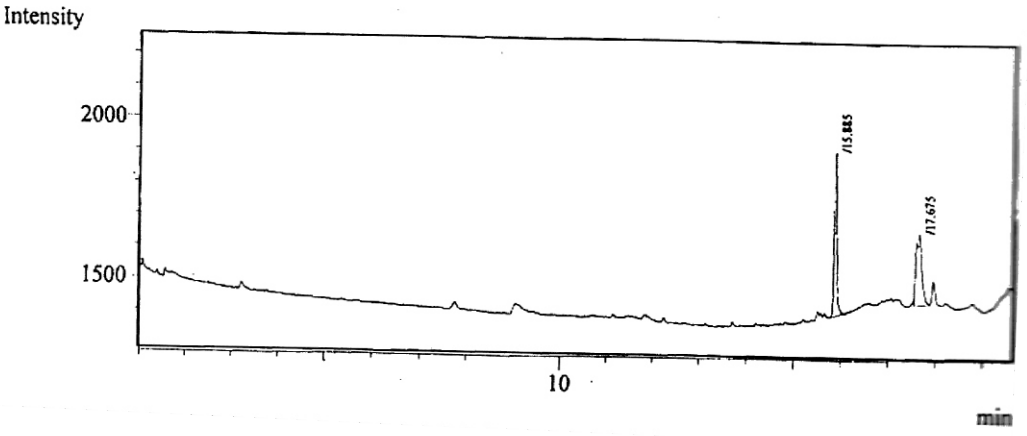

Figure 6: Fatty acid profile of Phospholipids of *Chrysophyllum albidum*

DISCUSSION

The lipids extracted were yellow and solid at room temperature. The characteristic yellowish colour of most fat and oils are due to the presence of various carotenoid pigments, which are highly unsaturated hydrocarbon chains (Ravern and Evert, 1981).

Gas Liquid Chromatographic estimation of fatty acids indicated the presence of cholesteryl heptadecanoate, 1, 3- dipalmitin 2-stearin, triolein, trilinolein and trilinolenin in *Persea grattisima* while cholesteryl heptadecanoate, 1, 3-dipalmitin 2-stearin, cholesteryl myristate, cholesteryl palmitate and triolein were present in *Chrysophyllum albidum*. These results are in line with the works of Tyler *et al*, (1998) who reported the presence of myristic acid, stearic acid, palmitic acid and linolenic acid in *Glycine soja, Gossypium hirsutum* and *Arachis hypogea*. Results also confirmed that unsaturated fatty acids are the main components of the oil of *Chrysophyllum albidium* and hence suitable in the context of heart disease risk reduction (Ajemole and Adeyeye, 1991). The high unsaturated fatty acid content of *Persea grattisima* is of importance since they offer protective role against atherosclerotic cardiovascular disease. Moreso, it has potential value in the manufacture of soaps and cosmetics (Hegnaer, 1982; Burkill 1985).

CONCLUSION

The seed oil of *Persea grattisima* and *Chrysophyllum albidum* has been studied. These investigations reveal that *Persea grattisima* and *Chtysophyllum albidum* have high oil content hence can be classified as oil seeds. The unsaturated fatty acid content of *Persea grattisima* and *Chrysophyllum albidum* are of importance since they offer protective role against atherosclerotic cardiovascular disease and the oils are potential sources of industrial oil.

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