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Evaluation and Characterization of Lipids from Different Parts of Fluted Pumpkin Seeds

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Abstract: Column chromatography and gas-liquid chromatography were used in the evaluation and characterization of oil extracts from different parts of fluted pumpkin seeds. The results show phospholipids (40-58%), glycolipids (26-36%), free fatty acids (1-6%), free sterols (1-2%), neutral lipids (10-24%) and steryl esters (0.8-4%). The fatty acid profiles showed more than 60% instauration comprising mainly C_{18} fatty acids. The seed coat oil showed more than 70% saturated. Fatty acids, contributed mainly by C_{16} and C_{18} fatty acid. The oil extracts in all the sample showed traces of C_{18}: 3 fatty acids.

Key words: Fluted pumpkinseeds, phosphohipids, glycolipids, sterols, fatty acid, raw material

INTRODUCTION

Fluted pumpkin (*Telfaria occidentals*) hook is a perennial plant of cucurbitaceous family. It is a vegetable crop that grow mostly in the tropics in the West Africa countries of Ghana, Togo, Chad, Nigeria, Cameroon[1]. It is a drought tolerant plant but grow best at lower altitude under medium rainfall in a sandy[1,2]. The yield of fluted pumpkin is significantly enhanced in a well drained soil. For commercial production, the use of fertilizers and irrigation the crops productive life span[1,2]. The leaves and roots of fluted pumpkin are each have herbal medicinal applications[3,4]. Fluted pumpkin seed contain 47% oil, 31% crude protein; substantial amount of vitamins, minerals carbohydrate[2,4]. We, therefore repot the quantities yield and characterization of lipid classes in oil extra from different parts of fluted pumpkin seeds.

MATERIALS AND METHODS

Sample collection: Fluted pumpkin pods were harvested from university of Nigeria, Nsukka demonstration farm, Enugu, State. The pods were identified by DR. E.U Onugbo of Crop Science department University of Nigeria Nsukka.

Sample preparation and analysis: The seeds were harvested manually from the pods, washed clean.

The seeds were separated into seeds and seed coats using knife. The seeds and seeds were divided into two portions each for fresh and dry processing. The seeds and seed coats for dry processing were air-dried for 72h. Both fresh seeds, seed coats and dried seeds, seed coats were reduced into small sizes with Electric hopper, then each ground into power using electric blender. Each powdered seed and seed coat sample were sieved using 2 mm-steel and each pondered sample was storied in a labeled plastic container until required for analysis. Powdered seed and seed coat samples (fresh and dried) (40 g each) was extracted with 100 mL petroleum-ether in a soxhlet apparatus for $2^{1/2}$ h. the petroleum-ether extract of each sample was concentrated using a rotary evaporator at 45°$_c$ and in hot air circulating oven to get an oil extract for each sample. The oil extract of each sample was weighted.

Folch *et al.* extraction: Ten grams of each powdered seed and seed coat sample both (fresh and dried) were transferred into different concial flasks and each homogenized for five min using 30 mL chloroform-methanol (2:1) volume/volume. Each homogenized mixture was filtered using glass-funnel filted what man No 40 filter paper. Each residue was rehomogenised twice. Each residue was then homogenized again with 30 mL chloroform and 30 mL methanol for 10 min each and

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filtered. The combined filtrates of each extract was dehydrated by adding ten grams of anhydrous sodium carbonate, for 10 min each, filtered and each extract was weighed,[5].

Both the petroleum-ether oil extract and chloroform methanol oil extract for each seed and seed coat sample (fresh and dried) were chromatographed and eluted with specific eluting solvents, thus; 30 mL each of 2, 5 and 50% ether in hexane, 30 mL each of 5, 10, 30 and 50% methanol in chloroform and 50 mL pure methanol. Each eluted fraction; neutral lipids, glycolipids and phospholipids respectively were quantified using UV-visible spectrophotometer at specified wavelength of absorption.

The first fraction, neutral lipids were measured at 570 nm using chromo tropic acid reagent for colour development, the second fraction, phospholipid were measure at 660 nm using trichloride reagent for colour development. The third fraction glycolipids were measured at 560 nm using ferric chloroacetic acid reagent for colour development[1,6-8].

The fatty acid profile of the petroleum-ether oil extract and chloroform-methanol oil extracts for seed and seed coat samples both fresh and dried, were determined using-carrier gas at flow rate of 50 mL per minute and column temperature of 180°c. Each peak areas arising from the chromatograms were measure by an electronic digital integrator. The identification of each fatty acid methyl ester was made by comparison with known standard fatty acid methyl esters. The concentration of each component of fatty acid in each seed and seed coat samples (both fresh and dried) were calculated from each peak area of chromatogram by triangulation and expressed as percentage weight of the total fatty acid methyl ester hexane extract,[9].

RESULTS AND DISCUSSION

The lipid content of different parts of fluted pumpkin in seeds is shown in Table 1. The phospholipids content was very high on dried seeds (58%), followed by fresh seeds, which contained (48%) of phosplipids while fresh seed coat and dried seed coat contained 40% and 42% of phospholipids respectively.

Lecithin known, as phoshatidylcholine is a member of phoshohpid is used as emulsifying agent in foods; chocolate, candies, among others,[10,11]. Lecithin when hydrolyzed by snake venom enzymes yields lysolecithin and lysocephalin that are useful medicinal hemolytic in biological organisms[12]. Apart from phospholipids, other lipid class constituents of different parts of fluted pumpkin seeds quantified include glycolyids (Table 2). Substantive quantify of glycolipids were found in different parts of fluted pumpkin seeds, (36%) in seed coat (fresh), followed by (35%) in seeds while fresh seed contained (32%) glycolipids. Monogalactosylyceride and digelactogyl-diglyceride. Two members of glycolipids are essential constituents of brain chemicals. These two glycolipids members are the principal constituents of cerebrosides,[10,4]. Cerebrosides are found in high concentrations in the white matters of the brain cells and in the myelin sheath of the nerves[10-12]. The presence of glycolipid; monogalectoslgyceride and digalactosy-diglyceride, in different parts of fluted pumpkin seeds investigated, are essential bioactive fatty acids. Cephalin a blood coagulants in human brain tissues are derived from stearic acid (C_{18}:o), oleic acid, (C_{18}:1) and linoleic acid (C_{18}:2). The presence of these essential fatty acids fluted pumpkin seed may be the reasons why they are used herbal medicine pratice.

Table 1: Lipid content of oil extracts from different parts fluted pumpkin seeds

	Percentage weight of total oil extracts soxhlet extraction method folch							
Lipid content of oil extract	Dry seed	Wet seed	Dry seed coat	Wet seed coat	Dry seed	Wet seed	Dry seed coat	Wet seed coat
Phospholipids	55	50	45	40	58	48	42	40
Lysophoshatidycholine	25	35	25	20	30	25	20	20
Phosphatidylcholine	20	10	15	10	12	18	12	10
Phosphatidylinositol	10	5	5	10	8	5	12	10
Glycolipids	35	30	35	36	26	32	34	36
Monogalactosy/diglyceride	15	10	15	16	12	14	16	16
Digalactosyldiglyceride	10	10	10	10	8	10	10	10
Stery/glycoside	8	8	8	6	4	5	6	6
Unidentified	2	2	2	4	2	3	2	4
Neutral lipids	10	20	20	24	16	20	24	24
Triglyceride	4	4	4	2	6	4	2	2
Diglyceride	2	4	4	2	?	4	2	2
Monglyceride	0. 8	4	2.8	8	0.8	4.5	8	8
Stery/esters	0. 8	5	2.8	4	1.2	1	4	4
Free sterols	1.4	1	1.4	2	1	1	2	2
Free fatty acids	1	5.5	4	6	5	5.5	6	6

Values are means of three determinations

Table 2: Fatty acid profile of oil extracts from different parts fluted pumpkin seeds

		Percentage of fatty acid based on based on total weight of oil extracts							
of seed	Conditions	Method of extraction	C14:0	C16:0	C18:0	C18:1	C18:2	C18:3	Percentdegree Parts of instauration
Seed	Dry	Soxhlet	Tractce	1.43	8	33	33	trace	67.14
Seed	wet	,,	tractce	12	20	33	33	trace	67.34
Seed coat	dry	,,	8	30	32	15	10	trace	26.32
Seed coat	wet	,,	10	30	30	15	10	trace	26.32
Seed	dry	folch *et al.*	tractce	16	20	30	30	trace	62.5
Seed	wet	,,	tractce	20	20	35	20	trace	57.89
Seed coat	dry	,,	12	35	35	10	8	trace	18.37
Seed coat	wet	,,	18	30	27	12	10	trace	22.68

These findings indicates that oils from different parts, of fluted pumpkin seeds are nutritive, possess medicinal property and are essential source of raw materials for food and pharmaceutical industries.

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