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Phytoconstituent of *Allanblackia floribunda* Seeds

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Authors' contributions

This work was carried out in collaboration between both authors. Author OEE designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author FIhandled the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Allanblackia floribunda seed is one of the underutilized and under-exploited seeds in Nigeria, it is a flowering plant in the clusiaceae family that has been used over the years in folk medicine especially in managing hypertension in Africa. This study seeks to evaluate the phytoconstituents of *Allanblackia floribunda*. Qualitative phytochemical screening, proximate analysis and volatile compounds present in the seeds were evaluated using standard methods. The phytochemical screening showed the presence of alkaloids, flavonoids, tannins, triterpenoids and saponins in the seeds. The result from the proximate compositions showed that the seed had high fibre (4.21%), lipid (10.46%), protein (19.25%), and carbohydrate (61.26%) contents. The GCMS result revealed the presence of compounds with medicinal and nutritional potentials, among these compounds are caryophyllene (13.228%) and oleic acid (2.021%). This study revealed that *an Allanblackia floribunda seed has* phytoconstituent with nutritional and medicinal importance.

Keywords: Phytoconstituent; Allanblackia floribunda; proximate; volatile compounds; bioactive compounds.

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1. INTRODUCTION

Allanblackia floribunda, known in English as "tallow tree", is a species of flowering plant in the clusiaceae family that has been long used in traditional African medicine to treat hypertension [1].The wood is said to be resistant to termites but is not particularly durable.

Allanblackia floribunda seeds yield an edible fat used in cooking, soap making and the cosmetic industry. Recently the international food industry has become interested in the fat as a natural solid component for margarines and similar products. The seeds are eaten in times of food scarcity and are also used as bait in trap. The fruit's slimy pulp can be made into jams and jellies. In Nigeria the wood is used in the construction of local houses. Twigs have been used as candlesticks, in congo a decoction of the bark or leaves is taken to treat asthma, bronchitis and cough. Sap squeezed from the bark is a component of a medicine used to treat urethral discharge. Small twigs are used as chew-sticks or toothpicks.

Phytochemicals which are simply chemicals of plant origin are produced by plants through primary or secondary metabolism. They generally have biological activity in the plant host and play a role in plant growth or defense against competitors, pathogens, or predators [2]. These chemicals have been proven to be relevant in nutrition and medicine. This study is designed to determine phytochemicals in *Allanblackia floribunda* seeds.

Proximate analysis (quantitative analysis of macromolecules) employs a combination of different techniques, such as extraction, Kjeldahl, NIR to determine protein, fat, moisture, ash and carbohydrate level in food samples. In this study macromolecules in *Allanblackia floribunda* seeds were determined using standard method [3]. and the volatile compounds in the sample were analysed using GCMS.

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2. MATERIALS AND METHODS

2.1 Preparation of *Allanblackia floribunda*Seed Samples

Fresh *Allanblackia floribunda* fruit samples were collected from a farmland in Aluu, Rivers State, Nigeria and Identified in the Department of Plant Science, University of Port Harcourt, RiversState, Nigeria. The fruit was sliced and the seeds extracted, it was sorted to remove the spoilt seeds and dried in a laboratory oven set at 50^0C, after drying, it was ground into a fine powder using a manual blender and stored in freezer bag till analysis.

2.2 Phytochemical Screening

Phytochemical screening was done using a method by Evans and Trease[4].

2.3 Proximate Composition

Proximate analysis was done using a standard method [3].

2.3.1 Determination of volatile components of plant sample

This was done using the GC/MS method.

The milled sample was extracted in dichloromethane after soaking for 5 days. 10 g of the sample was weighed into a well stopper bottle and 20 ml of the organic solvent was added. The mixtures were vigorously agitated and were left to stand for 5 days. The crude extract was collected by filteration into a quartz beaker, the process was repeatedly carried out for two more consecutive times. The combined aliquot was concentrated on a steam bath to about 5 mland purified by passing through a pasture pipette packed with silica gel and anhydrous sodium sulphate on a membrane and air-dried to about 2ml for gas chromatographic analysis.

The extract of the sample was subjected to GC/MS analysis for, characterization of different compositions. Gas chromatographic Model: 7890A (GC) analysis was performed on an Agilent Technologies interfaced with Mass Selective Detector model: 5975C (MSD). The electron ionization was at a 70 v with an ion source temperature at 250^oC. Highly pure helium gas (99.9% purity) was used as carrier gas, while HP-5 (30mm X 0.25mm X 0.320µm) was used as the stationary phase. The oven temperature was at 60^oC held for 0.5 minute and ramped to 14^oC at the rate of 4^oC/minutes holding for a minute, then ramped to 280 degrees while holding for 5 minutes at the rate of 8^oC /minutes. 1µ/l was auto injected.

3. RESULTS AND DISCUSSION

3.1 Phytochemical Screening

Table 1. Phytochemical Screening of *Allanblackia floribunda* seeds

Constituents	*A.*	Concentration
Alkaloids		+
Flavonoids		+
Tannins		++
Triterpenoids		+
Carbohydrates		++
Saponins		+

(+++) = High concentration; (++) = Moderate concentration; (+) = low concentration; (-) = Absent

3.2 Proximate Analysis

Table 2. Proximate composition of*Allanblackia Floribunda* seeds

Analysis	*A. Floribunda* seeds (%)
Moisture	2.24 ± 0.02
Ash	2.58 ± 0.02
Fibre	4.21 ± 0.03
Lipid	10.46 ± 0.03
Protein	19.25 ± 0.02
Carbohydrate	61.26 ± 0.05

The phytochemical screening of *Allanblackia floribunda* seed showed the presence of flavonoids, alkaloids, tannins, triterpenoids and saponin. Flavonoids and tannins are phenolic compounds and plant phenolics acts as primary antioxidants or free radical scavengers [5]. Terpenoids are reported to have anti-inflammatory, anti-viral, anti-malarial, inhibition of cholesterol synthesis and anti-bacterial [6]. Saponins are chemical compounds that reduce the uptake of certain nutrients.

The result obtained showed low moisture content. The high amount of moisture in foods makes them vulnerable to microbial attack, leading to spoilage. The moisture content of any food is an index of its water activity and is used as a measure of stability and susceptibility to microbial contamination. The value (62.26%) for carbohydrate content was significantly high,this might suggest that *Allanblackia floribunda* seeds can be used as source of energy. The protein content is 19.25, Effiong *et al*., stated that any plant food that provide about 12% of their caloric value from protein are considered good sources of protein [7]. Thus, the sample meets this requirement.

The proportion of ash is a reflection of the mineral contents present in the food materials [8-9]. The ash content was found to be 2.58 which suggest a substantial deposit of mineral elements in the *A. floribunda* seeds. Crude fibre provides the bulk of food to relieve constipation [10]. Fibre also protects the body against colon cancer, diabetes and cardiovascular illnesses [11]. The values of crude fiber obtained indicate that *Allanblackia floribunda* seeds can give bulk to food.

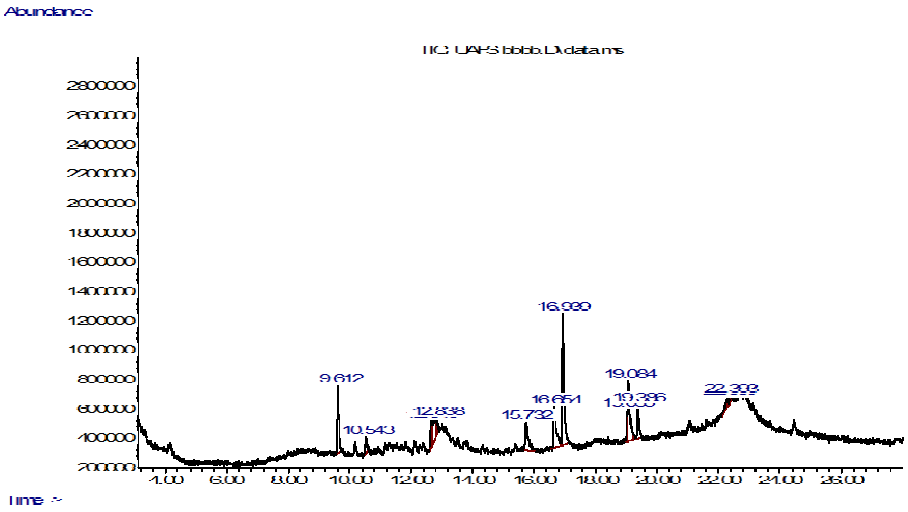


Fig. 1. GCMS Spectrum of *Allanblackia Floribunda* seeds

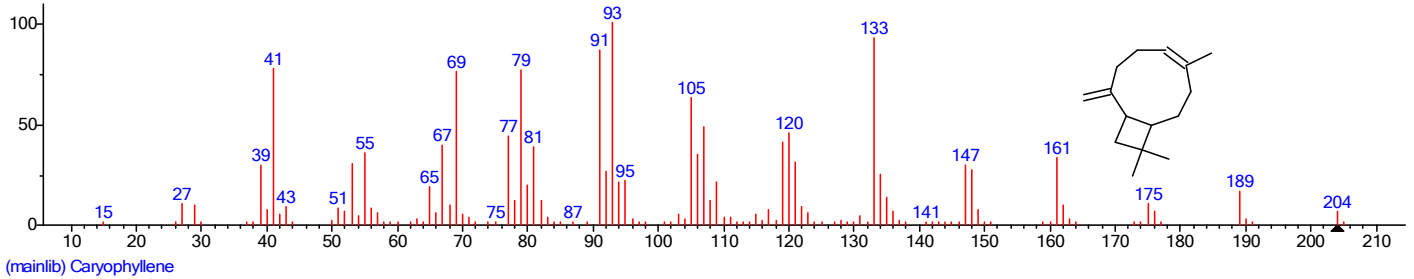


Fig. 1a.

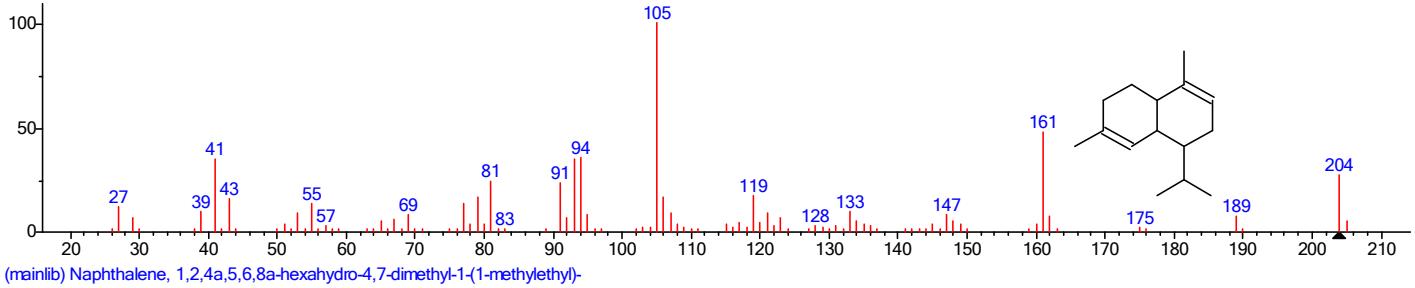


Fig. 1b.

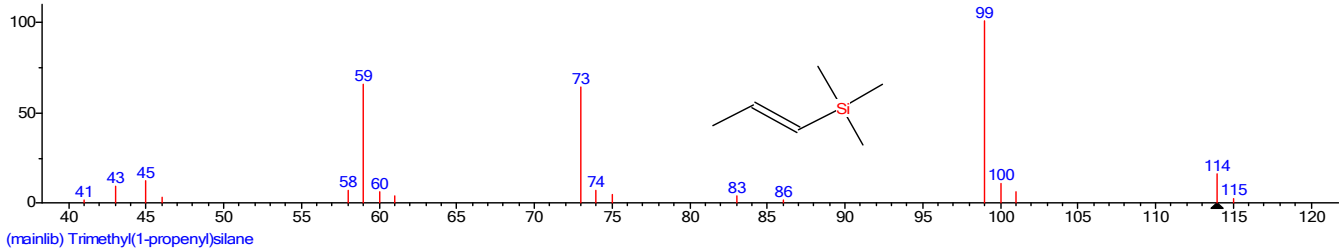


Fig. 1c.

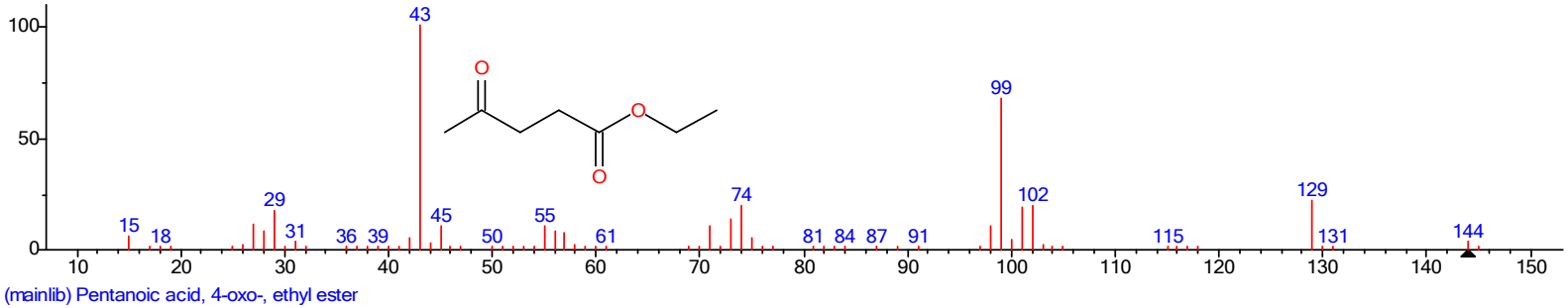


Fig. 1d.

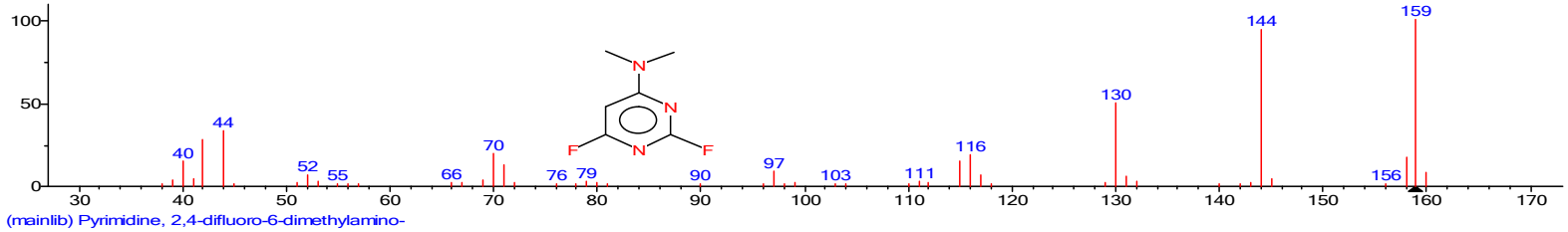
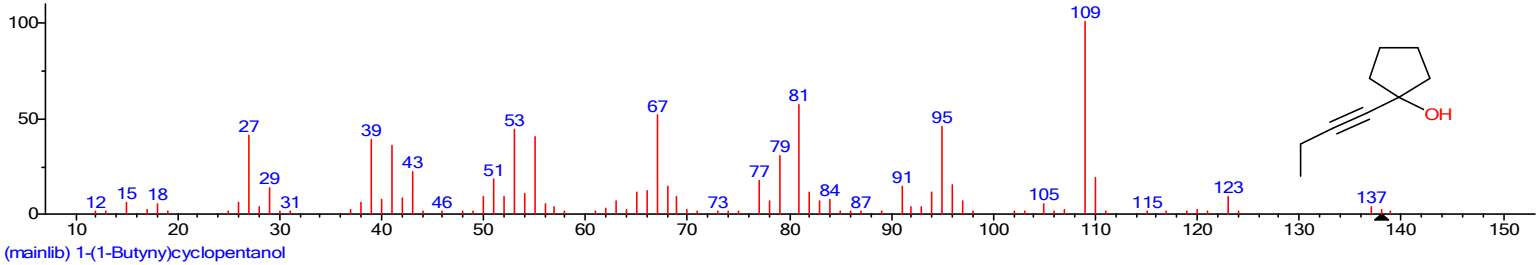


Fig. 1e.



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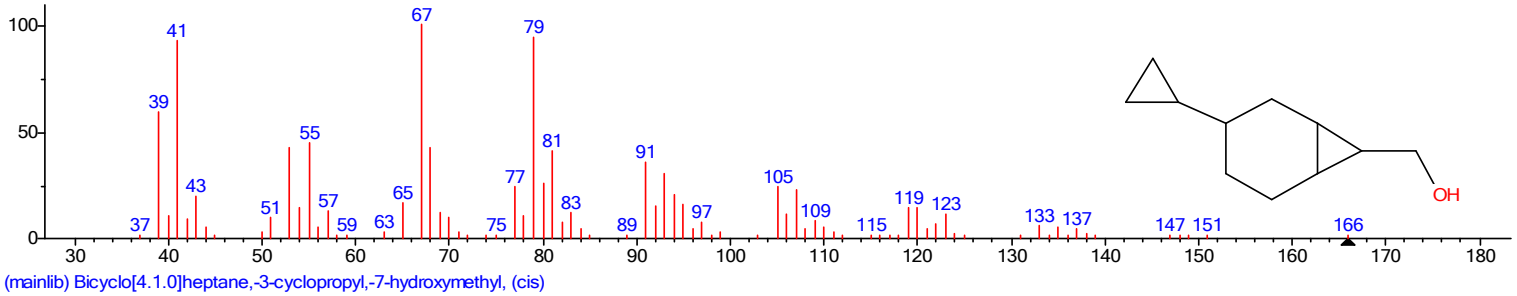
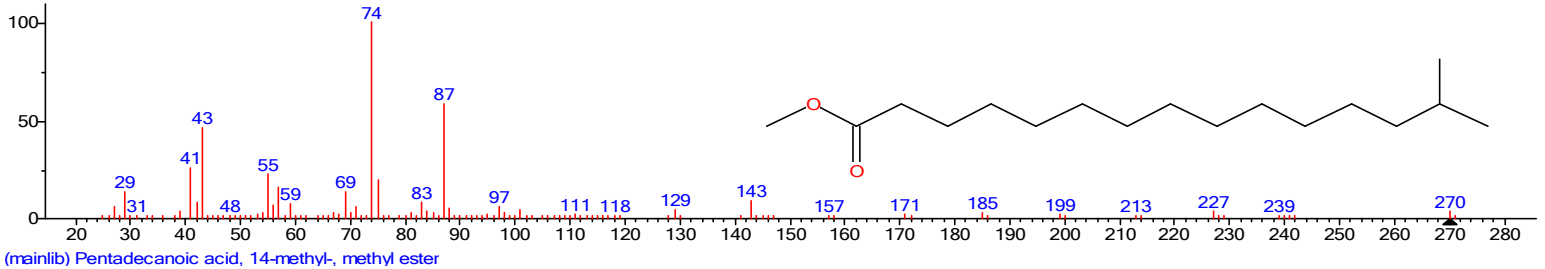


Fig. 1g.



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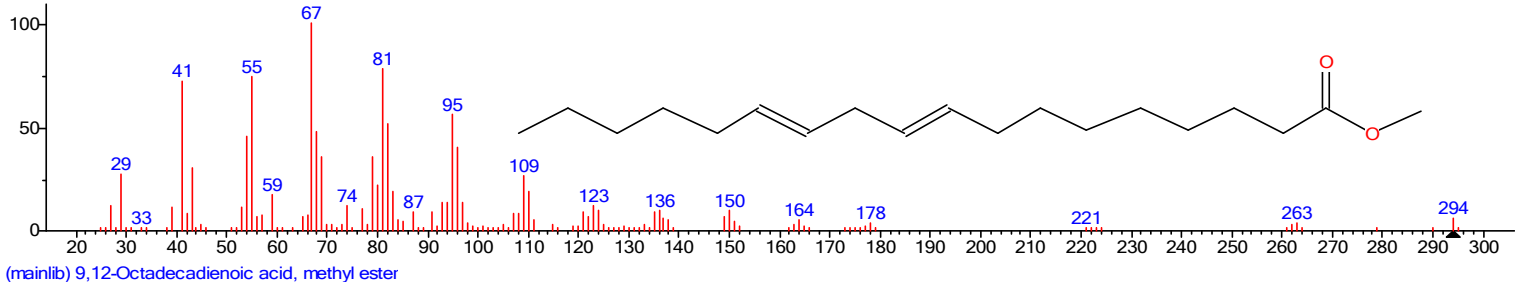
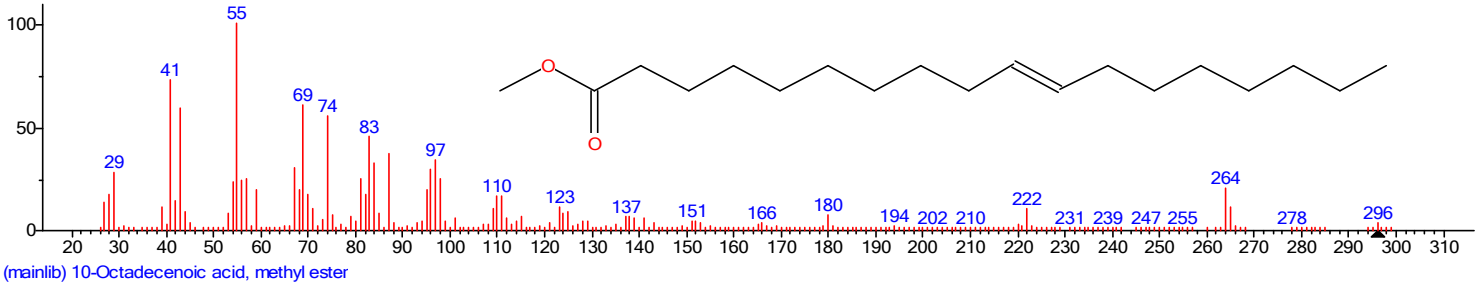


Fig. 1i.



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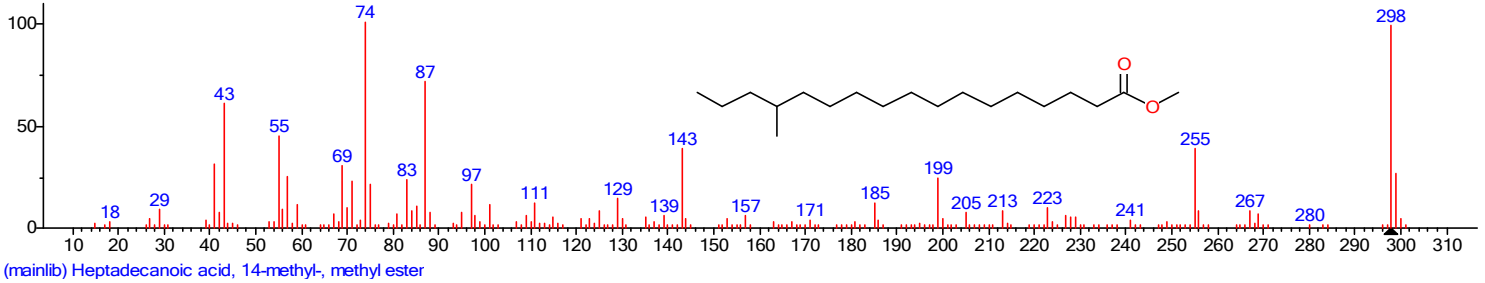

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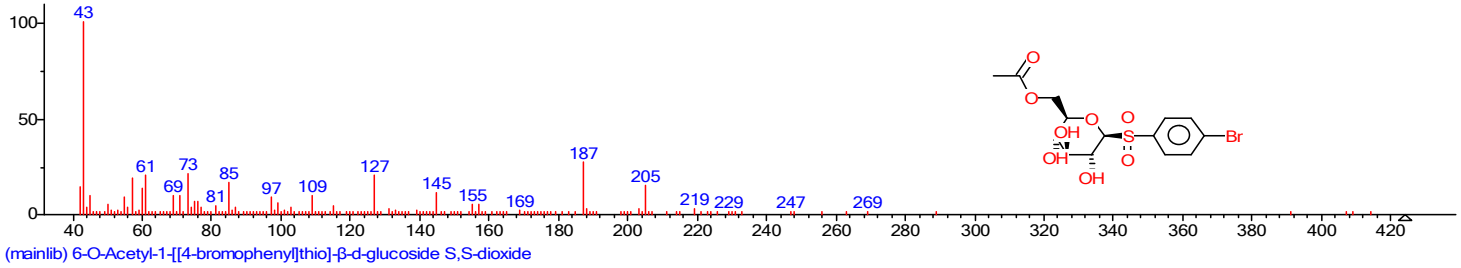

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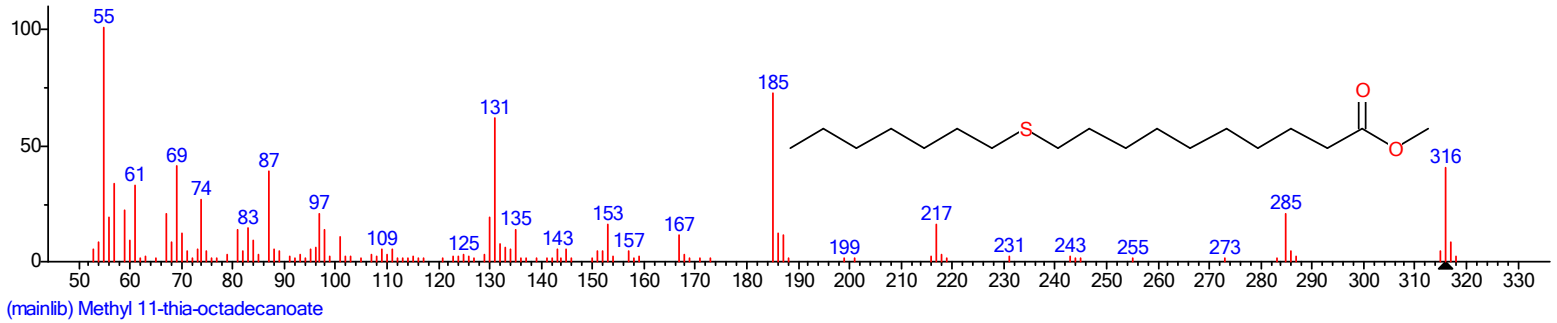

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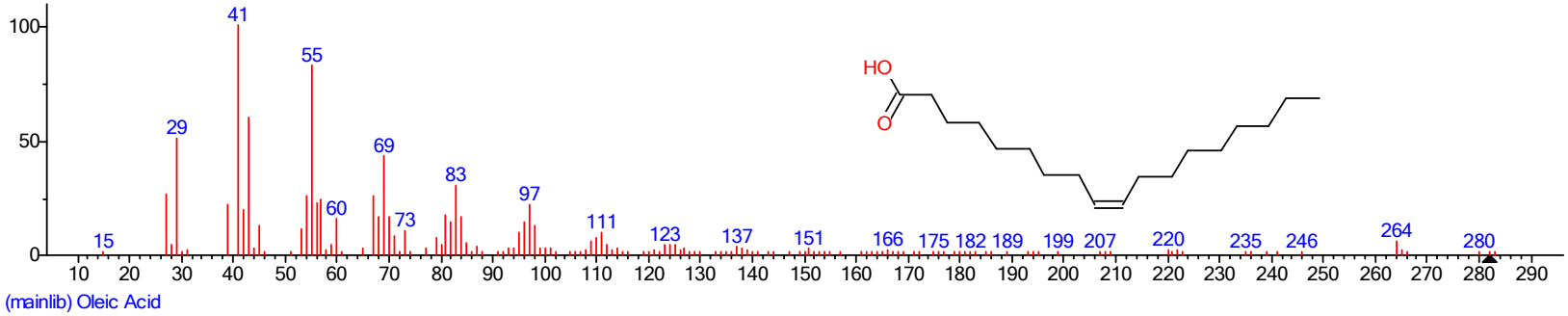

Fig. 1n.

Fig. 1a-n. Spectrum and molecular structure of chemical compounds present in*Allanblackia Floribunda* seeds

Table 3. Chemical compounds present in*Allanblackia Floribunda* seeds

Peak	IUPAC name	RetentionTime	Percentage yield
1	Caryophyllene	9.612	13.228%
2	Naphthalene	10.543	2.805%
3	Trimethyl(1-propenyl)silane	12.640	3.094%
4	Pentanoic acid, 4-oxo-, ethyl ester	12.742	8.507%
5	Pyrimidine, 2,4-difluoro-6-dimethylamino-	12.838	2.089%
6	1-(1-Butyny)cyclopentanol	15.732	8.596%
7	Bicyclo[4.1.0]heptane,-3-cyclopropyl,-7-hydroxymethyl	16.654	13.221%
8	Pentadecanoic acid, 14-methyl-, methyl ester	16.939	23.340%
9	9,12-Octadecadienoic acid, methyl ester	19.035	3.444%
10	10-Octadecenoic acid, methyl ester	19.084	13.092%
11	Heptadecanoic acid, 14-methyl-, methyl ester	19.386	5.759%
12	Oleic Acid	22.291	2.021%
13	6-O-Acetyl-1-[[4-bromophenyl]thio] -beta-d-glucoside S,S-dioxide	22.323	0.376%
14	Methyl 11-thia-octadecanoate	22.366	0.132%
15	Oleic Acid	22.393	0.295%

The determination of volatile compounds of *A. floribunda* seed using gas chromatography-mass spectrometry (GCMS) showed that it contains caryophyllene as a major component (13.228%), this compound is a common component of food that has GRAS (Generally Recognized as Safe) status and is approved by the FDA for food use. Caryophyllene is the primary sesquiterpene contributing to the spiciness of some foods. It has a therapeutic effect in the treatment of inflammation, pain, atherosclerosis, and osteoporosis [12]. In cancer studies, β-caryophyllene demonstrated synergy with the chemotherapy drug Paclitaxel on human tumor cell lines, and alone it stimulates apoptosis and suppresses tumor growth [13]. The sample contains oleic acid which has a percentage yield of 2.021% (Fig. 1n and Table 1). Oleic acid is used as an emulsifying or solubilizing agent in aerosol products. Oleic acid is also a common monounsaturated fat in the human diet. Monounsaturated fat consumption has been associated with decreased low-density lipoprotein (LDL) cholesterol, and possibly increased high-density lipoprotein (HDL) cholesterol. Methyl ester has a molar mass of 294g/mol, molecular formula of $C_{19}H_{34}O_2$ and percentage yield of 3.444%, it possesses remarkable anti-inflammatory, antihistamine and anti- arthritics properties.

4. CONCLUSION

This study revealed that *Allanblackia floribunda* seeds contain a high amount of lipid, protein and carbohydrate. The result from GCMS revealed that the sample contains bioactive compounds with nutritional and medicinal importance.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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