

**EVALUATION OF BIOACTIVE COMPONENTS OF *PARINARI EXCELSA* SEED OIL****Obomanu F. G.<sup>1</sup>, Dokubo A.<sup>2\*</sup> and James-Egesi I. N.<sup>1</sup>**<sup>1</sup>Department of Chemistry, Rivers State University, P.M. B 5080, Port Harcourt, Nigeria.<sup>2</sup>Department of Biochemistry, Rivers State University, P.M. B 5080, Port Harcourt, Nigeria.Article Received on  
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B 5080, Port Harcourt,  
Nigeria.**ABSTRACT**

This study investigated the bioactive components of seed oil of *Parinari excelsa* fruit using GC-MS (HP 6890 and mass spectrometer model 5973 AgilentTech). The result showed that twenty six (26) components were identified and analyzed in the seed oil of *P. excelsa*. 5,8,11,14,17-Eicosapentaenoic acid, methyl ester, (all-Z)- had the highest percentage (20.777%) with RT 23.914 followed by 1-Naphthamide, N-butyl-N-hexyl- (11.996%) with RT 29.478, followed by Sarcosine, N-(1-naphthoyl)-, octyl Ester 2- (11.683%), RT 29.556, Benzamide, 2-bromo-N-[2-(3-fluorophenyl)-5-benzoxazolyl]- (8.006%) with RT 29.255, (Octanoyloxy) propane-1,3-diyl

bis(decanoate) (8.005%), RT 29.652 and 5,8,11,14-Eicosatetraenoic acid, methyl ester, (all-Z)- (5.746%) with RT 24.892. On the other hand, Naphthalene, 2-methyl- had the lowest percentage (0.122%) with RT 6.275. The result showed the potentials of *P. excelsa* seeds to furnish medicinal compounds with potential application in human nutrition.

**KEYWORDS:** Arinari Excelsa, Bioactives, Seed Oil, Nutrition, Medicinal.**INTRODUCTION**

The plant kingdom has served as a source of wide range of secondary metabolites also known as phytochemicals or bioactive components that are known to influence physiological processes (Makkar *et al.*, 2007; Jimenez-Garcia *et al.*, 2013). The knowledge about their chemical composition and functional groups has facilitated the extraction, isolation and purification of several classes of phytochemicals for biological activity and medicinal purposes (Harbone, 1998; Harvey *et al.*, 2013). Furthermore, mechanisms in cell-cell interactions have been utilized in discovering pharmacologically active ingredients and

nutritional adjuvant that can address specific health challenges in the society (Brown and Wright (2016).

*Parinari excelsa* belongs to the Chrysobalanaceae family. It is widespread in tropical Africa and grows up to 40m high. The seed has a rough round skin with the nut inside (Burkill, 2004; Lemmens *et al.*, 2012). It is commonly called grey plum in English and in Nigeria known as gbafile (Itsekiri) and Esagho (Edo) (Enabulele and Ehiagbonane, 2011). The seed can be fermented and used in the production of beverages. It is also rich in oil content and often eaten when roasted or used as a spice in cooking soups. A decoction of the bark is used in formulation of tonic for the treatment of anaemia (Burkill, 2004). Varying species of the Chrysobalanaceae have been used in traditional medicine for the treatments of various diseases across Africa (Evanilson *et al.*, 2012; Neto *et al.*, 2013; Erinoso *et al.*, 2016). In Nigeria, the coconut water seed extract of *Parinari polyandra*. Benth exhibited anti-diabetic properties (Ighodaro *et al.*, 2012). *Parinari congensis* has also been investigated for hepatoprotective activity against paracetamol induced hepatotoxicity in wistar rats (Dokubo *et al.*, 2013). Thus, the aim of this work is to determine bioactive components of the seed oil of *Parinari excelsa*.

## MATERIALS AND METHODS

The dry seeds of *Parinari excelsa* were bought from Mile 3 Market, Diobu, Port Harcourt Rivers State. The seeds were authenticated by a Plant Taxonomist in the Department of Plant Science and Biotechnology, Rivers State University, Nigeria.

### GC-MS Analysis of *P. excelsa* oil

A hundred gram each of the milled seeds of *P. excelsa* was added to 3 dm<sup>3</sup> of distilled water. The oil was extracted by hydro-distillation and collected in hexane. The resulting solution was heated to evaporate the solvent at room temperature. The oil was analyzed using GC-MS (HP 6890 and mass spectrometer model 5973 AgilentTech), mounted with a capillary column HP-5 MS (5% phenylmethylsiloxane) 30.0 m × 250 μm × 0.25 μm and using helium as a carrier gas at initial column temperature of 120°C for 5 min and later increased to 320°C at 5°C per min for 5 min. The Electron impact ionization for mass spectroscopy was done at ionization energy of 70 eV. The oil was diluted with 98% hexane and 2 μl of the diluted sample was automatically injected into the mass spectrometer. The components were identified using the Chem-Office Software attached to the MS library. The names molecular

formula and molecular weights of the component oils were identified using the database of National Institute of Standard and Technology (NIST).

## RESULTS AND DISCUSSION

Phytochemicals are the anti-nutrient or bioactive elements obtained from secondary metabolism of plants (Sexena *et al.*, 2013). Recently researchers have started to reveal the structure and function of some small bioactive molecules known as lipid mediators that exhibit potent anti-inflammatory responses (Serhan *et al.*, 2008). These bioactive molecules recently discovered are oxygenated metabolic products of eicosapentaenoic acid (EPA) and dosohexaneic acid (DHA) called resolvins (resolution-phase interaction products). Those originating from (EPA) are classified as E series, RVE1 and those from DHA are D series RVD. Other anti-inflammatory lipid mediators are the protectins that are involved in immunoregulatory and neuroprotective activities (Kohli and Levy, 2009; Levy, 2010).

The result of the GC-MS analysis of the oil components is given in Table 1. The result showed that twenty six (26) components were identified and analyzed in the seed oil of *P. excelsa*. 5,8,11,14,17-Eicosapentaenoic acid, methyl ester, (all-Z)- had the highest percentage (20.777%) with RT 23.914 followed by 1-Naphthamide, N-butyl-N-hexyl- (11.996%) with RT 29.478, followed by Sarcosine, N-(1-naphthoyl)-, octyl Ester 2- (11.683%), RT 29.556, Benzamide, 2-bromo-N-[2-(3-fluorophenyl)-5-benzoxazolyl]- (8.006%) with RT 29.255, (Octanoyloxy) propane-1,3-diyl bis(decanoate) (8.005%), RT 29.652 and 5,8,11,14-Eicosatetraenoic acid, methyl ester, (all-Z)- (5.746%) with RT 24.892. On the other hand, Naphthalene, 2-methyl-had the lowest percentage (0.122%) with RT 6.275. Eicosapentaenoic acid can prevent easy clotting of blood (Simopoulos, 1991). Cardiovascular diseases resulting to morbidity and mortality have been reported to be related to risk factors like hypertension, hypertriglyceridemia, hypercholesterolemia, high blood platelet aggregation etc. It has now been observed that fatty acid composition derived from EPA and DHA have shown tremendous improvement on risk factors associated with cardiovascular diseases (Marcheselli *et al.*, 2003; Cottin *et al.*, 2011).

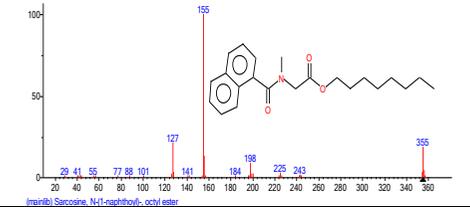
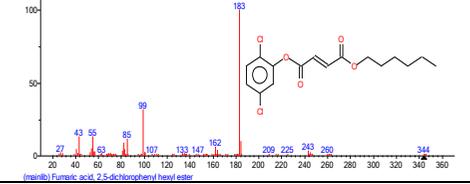
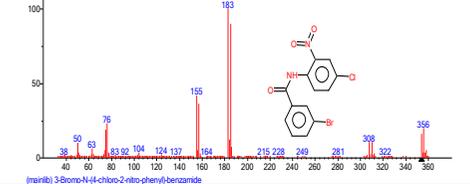
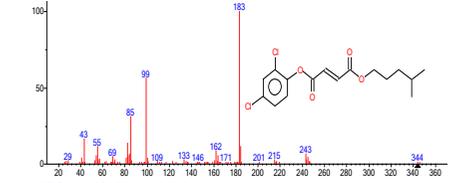
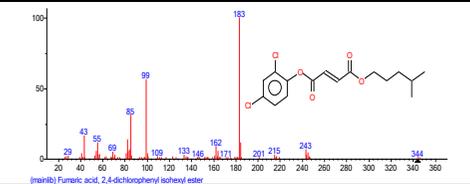
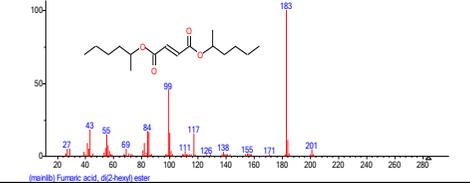
Table 1: GC-MS Analysis of *P.excelsa* Seed Oil.

S/N	Compound	Retention Time (min)	Percentage of the total	Molecular formula	Molecular weight	Structure
1	Ethyl-2-benzofuran	4.466	0.884	C <sub>10</sub> H <sub>10</sub> O	146.1858	
2	1H-Indene, 2,3-di hydro-1,2-di methyl-	4.525	2.314	C <sub>11</sub> H <sub>14</sub>	146.2289	
3	Benzene, (3-methyl-2-butenyl)-	4.591	1.487	C <sub>11</sub> H <sub>14</sub>	146.2289	
4	Naphthalene, 1,2,3,4-tetra hydro-5-methyl-	4.622	4.413	C <sub>11</sub> H <sub>14</sub>	146.2289	
5	Naphthalene, 2-methyl-	6.275	0.122	C <sub>11</sub> H <sub>10</sub>	142.1971	

6	Hexadecanoic acid, methyl ester	15.573	1.191	$C_{17}H_{34}O_2$	270.4507	
7	n-Hexadecanoic acid	16.576	1.427	$C_{16}H_{32}O_2$	256.4241	
8	Methyl stearate	18.636	1.562	$C_{19}H_{38}O_2$	298.5038	
9	9,12-Octadecadienoic acid (Z,Z)-	19.133	2.900	$C_{18}H_{32}O_2$	280.4455	
10	9,12-Octadecadienoic acid (Z,Z)-	19.182	0.768	$C_{18}H_{32}O_2$	280.4455	

11	Hexadecanoic acid, pentyl ester	21.296	2.480	$C_{21}H_{42}O_2$	326.5641	
12	1-[2-Deoxy-.beta.-d-erythro-pento furanosyl]pyrrole-2,4-bishydro xamide	21.540	2.642	$C_{13}H_{15}N_2O_8P$	358.2430	
13	Phosphorochloridic acid, diethyl ester	22.004	2.526	$C_4H_{10}ClO_3P$	172.547	
14	Phosphorochloridic acid, isohexyl propyl ester	22.327	2.445	$C_9H_{20}ClO_3P$	242.6800	
15	4,8,12,16-Tetra methylheptadecan-4-olide	22.492	2.140	$C_{21}H_{40}O_2$	324.5411	

16	5,8,11,14,17-Eicosapentaenoic acid, methyl ester, (all-Z)-	23.914	20.077	$C_{21}H_{32}O_2$	316.4800	
17	5,8,11,14-Eicosa tetraenoic acid, methyl ester, (all-Z)-	24.892	5.746	$C_{21}H_{34}O_2$	318.4935	
18	2-(Octanoyloxy) propane-1,3-diyl bis(decanoate)	29.099	2.030	$C_{31}H_{58}O_6$	526.7886	
19	Benzamide, 2-bromo-N-[2-(3-fluorophenyl)-5-enzoxazolyl]-	29.255	8.006	$C_{13}H_8BrF_2NO$	312.1140	
20	1-Naphthamide, N-butyl-N-hexyl-	29.478	11.996	$C_{21}H_{29}NO$	311.4600	

21	Sarcosine, N-(1-naphthoyl)-, octyl ester	29.556	11.683	$C_{22}H_{29}NO_3$	355.4706	
22	2-(Octanoyloxy) propane-1,3-diyl bis(decanoate)	29.652	8.005	$C_{31}H_{58}O_6$	526.7886	
23	Fumaric acid, 2,5-dichlorophenyl hexyl ester	30.407	0.821	$C_{16}H_{18}Cl_2O_4$	345.2180	
24	3-Bromo-N-(4-chloro-2-nitrophenyl)-benz Amide	30.525	1.910	$C_{13}H_8BrClN_2O_3$	355.5720	
25	Fumaric acid, 2,4-dichlorophenyl isohexyl ester	30.575	0.289	$C_{16}H_{18}Cl_2O_4$	345.2160	
26	Fumaric acid, di(2-hexyl) ester	30.625	0.139	$C_{16}H_{28}O_4$	284.3900	

Regular consumption either as a pharmaceutical ingredient or as a food adjuvant will be effective in reducing inflammatory responses and aid in the development of novel drugs for the treatment of human disorders linked with inflammation such as cardiovascular diseases, depression and hypertension (Helgadottir *et al.*, 2004, Lane *et al.*, 2008). These bioactive components have multifunctional properties and could serve as prime metabolic components that will be effective in managing other conditions such as hyperglycemia, dyslipidemia, elevated serum liver markers, nephropathy renal failure and oxidative stress.

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