Faculty of Natural and Applied Sciences Journal of Scientific Innovations
Print ISSN: 2814-0877 e-ISSN: 2814-0923
www.fnasjournals.com
Volume 5; Issue 1; December 2023; Page No. 158-160.

PHYTOESTER PROFILING OF THE NUT OF *SPONDIAS MOMBIN*

***[1]Uzoekwe, N.M., & [2]Odokwo, E.O.**
[1] Department of Physical Sciences, Benson Idahosa University, Edo State, Nigeria
[2] Department of Chemistry, Federal University Otuoke, Bayelsa State, Nigeria

***Corresponding author email:** nuzoekwe@biu.edu.ng

Abstract
The phytoester content of the nut of *Spondias mombin* has been carried out. The nut of *Spondias mombin* was crushed and macerated in n-hexane at room temperature. The n-hexane extract was concentrated under a vacuum and then profiled for the presence of phytoesters using the gas chromatography-mass spectrometry, GC-MS instrumentation method of analysis. Six phytoesters were identified with tetradecanoic acid, 12-methyl-, methyl ester,(S)- (41%) as the major candidate while acetic acid, fluoro ethyl ester (9%) and butanoic acid, methyl ester (9%) as the minor candidates respectively. The present study has established the presence of phytoesters in the nut of *Spondias mombin*.

Keywords: Phytoesters, *S. Mombin* Nut, Profiling, *Spondias Mombin*, Gas Chromatography-Mass Spectrometry

Introduction
Phytoesters are plant esters just like the common plant sterols and stanols. They are normal constituents of the various tissues of plants and constitutes human and animal diets. Phytostanol and phytsterol esters are known chemically stable esters, fat-like materials with relative or comparative physicochemical properties similar to those of edible lipids (Cantrill, 2008). Plant esters have been implicated in lowering of plasma lipid and carotenoids such as the alpha-, beta-carotene and beta-cryptoxanthin (Judd et al., 2002). Plant phytochemicals such as alkaloids, steroids, terpenes, terpenoids, flavonoids, saponins, tannins and glycosides are complex biomolecules with established profound physiological myriads of activities (Ovais et al., 2018). The leaves of *S. mombin* have been shown to have active classes of bioactive compounds such as tannins, saponins, flavonoids, alkaloids and phenols (Njoku & Akumefula, 2007). The presence of alkaloids, flavonoids, saponins, tannins, cyanogenic glycosides, oxalates and phytates in comparative levels has been observed in both the leaves and stem bark of the plant (Kpomah & Odokwo, 2020). The present study is designed to investigate the scarce data on the phytoesters present in the nut of *S. mombin*.

Materials and Methods
The plum-like fruit was purchased from a local vendor's outlet in Yenagoa, Bayelsa State, Nigeria. The fruit was identified at the Department of Biology, Federal University, Otuoke, Bayelsa State by a Biologist. The fruit was prepared by removing both the pericarp and mesocarp. The nut (endocarp) was then investigated for its phytoester content.

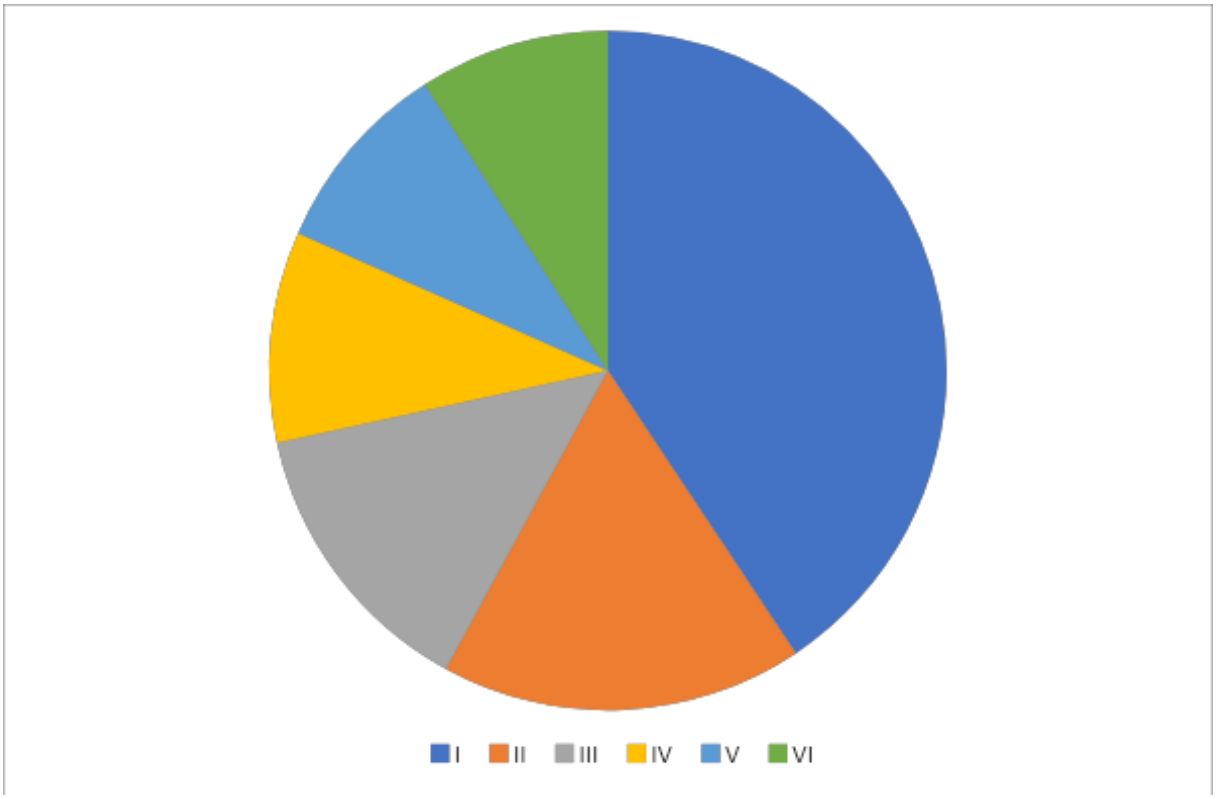
The nut was crushed, blended and then macerated using n-hexane as the extracting medium at room temperature. The crude extract, ED1 was recovered via concentration under pressure using rotatory evaporator (RV10 V-C) and then profiled for the presence of phytoesters using gas-liquid chromatography and mass spectrometry (GC-MS), using Agilent technologies (GC system 7890A coupled with MSD 5975C) equipment with an injection mode 7683B series (Odokwo & Uzoekwe, 2022; Hamilton-Amachree & Odokwo, 2022).

Results

Table 1. Phytoester profiling

SN	Phyto esters	Retention time (min)	Molecular formula	Molecular weight
1.	Acetic acid, fluoroethyl ester	16.91	$C_4H_7FO_2$	106.0956
2.	Formic acid, ethyl ester	0.17	$C_3H_4O_2$	72.0672
3.	Butanoic acid, methyl ester	0.08	$C_5H_{10}O_2$	102.1317
4.	Carbamic acid, ethyl ester	0.04	$C_3H_7NO_2$	89.094
5.	Glycin,N-(3-methyl-1-oxobutyl-),methyl ester	0.4	$C_8H_{15}NO_3$	173.2096
6.	Tetradecanoic acid,12-methyl-,methyl ester,(S)-	0.11	$C_{16}H_{32}O_2$	256.42

The phytoester profiling of ED1 has been reported in Table 1. Six (6) phytoesters were identified. The percentage composition of the identified phytoesters is reported in Figure. 1.



I- tetradecanoic acid, 12-methyl-, methyl ester,(S)- (41%), **11-** glycin,N-(3-methyl-1-oxobutyl-),methyl ester (17%),**III-** carbamic acid, ethyl ester (14%), **IV-**formic acid, ethyl ester (10%), **V-**acetic acid, fluoro ethyl ester (9%) and **VI-**butanoic acid, methyl ester (9%)

Discussion

The major phytoester being tetradecanoic acid, 12-methyl-,methyl ester,(S)- also known as (12-methyl myristic acid methyl ester) is a fatty acid methyl ester and can be formed by the addition-elimination reaction involving 12-methyl tetradecanoic acid (fatty acid) and methanol. Pharmacologically, the activities of tetradecanoic acid, 12-methyl-,methyl ester,(S)- phytoesters within the limit of the literature search have not been reported. The other phytoesters

Cite this article as:
Uzoekwe, N.M., & Odokwo, E.O. (2023). Phytoester profiling of the nut of *spondias mombin. FNAS Journal of Scientific Innovations*, *5*(1), 158-160

are short-chained aliphatic esters which could aid the synergistic effect of phytochemicals present in the nut of *S. mombin*. Acetic acid, fluoro ethyl ester or simply fluoroacetic acid ethyl ester has the plant physiological property of a toxin (O'Neil et al., 2013). Formic acid, ethyl ester also known as ethyl formate (ethyl methanoate) is a non-fatty acid ester that has been associated with the main smell of rum and flavor of raspberries (Sample, 2009).

Following the result of Figure 1, the percentage composition of phytoesters, butanoic acid, methyl ester (methyl butyrate) is notable for its fruity flavor like those of apples and pineapples. Butanoic acid, methyl ester has been implicated in the alleviation of experimental autoimmune encephalomyelitis and in the regulation of the balance of effector T cells and regulatory T cells (Wang et al., 2022). Carbamic acid, ethyl ester, although reported to be carcinogenic, has been reported to have been used biomedically as a co-solvent for water-insoluble analgesics and as well be used as an antineoplastic agent (Nomura, 1975).

Conclusion

The study has investigated the phytoester profiling of the nut of *S. mombin*. Six phytoesters were identified as tetradecanoic acid, 12-methyl-, methyl ester,(S)-, glycin,N-(3-methyl-1-oxobutyl-), methyl ester, carbamic acid, ethyl ester, formic acid, ethyl ester, acetic acid, fluoro ethyl ester and butanoic acid, methyl ester. These phytoesters are some of the phytochemicals responsible for some of the observed bioactivities of *S. mombin*.

References

Cantrill, R. (2008). Phytosterols, phytostanols and their esters. Chemical and Technical Assessment. 69th JECFA

Hamilton-Amachree, A., & Odokwo, O.E. (2022). GC-MS analysis of the volatile activity of the crude honey residue from Takum Local Government Area of Taraba State, Nigeria. *African Scientist*, 23(3), 193-199.

Judd, J.T., Baer, D.J., Chen, S.C., Clevidence, B.A., Muesing, R.A., Kramer, M., & Meijer, G.W. (2002). Plant sterol esters lower plasma lipids and most carotenoids in mildly hypercholesterolemic adults. *Lipids*, 37(10), 33-42.

Kpomah, E.D., & Odokwo**,** E.O.(2020). Comparative photochemical, proximate and some mineral composition of the leaves and stem bark of *Spondia mombin* (*L. Anacardiaceae*). *Annual Research and Review in Biology*, 35(6): 90- 98.

Njoku, P.C., & Akumefula, M.I. (2007). Phytochemical and nutrient evaluation of Spondias mombin leaves. *Pakistan Journal of Nutrition*, 6(6). Doi: 10.3923/pjn.2007.613.615.

Nomura, T. (1975). Urethan (ethyl carbamate) as a cosolvent of drugs commonly used parenterally in humans. *Nomura Cancer Research*, 35(10), 2895-2899.

O'Neil, M.J., Heckelman, P.E., Dobbelaar, P.H., & Roman, K.J. (2013). The Merck Index, An encyclopedia of chemicals, drugs, and biological, 15th Ed. Cambridge, UK: The Royal Society of Chemistry.

Odokwo, O.E., & Uzoekwe, N.M. (2022). Gas chromatography-mass spectrometry analysis of the solvent-solvent extract of *Vernonia hymenolepsis* leaves. *Communication in Physical Sciences*,8(4), 620-625.

Ovais, M., Khali, A.T., Islam, N.U., Ahmad, I., Saravanan, M., Shinwari, Z.K., & Mukherjee, S. (2018). Role of plant phytochemicals and microbial enzymes in biosynthesis of metallic nanoparticles. *Applied Microbiology and Biotechnology*, 102, 6799-6814.

Sample, I. (2009). Galaxy's centre tastes of raspberries and smells of rum, say astronomers. The Guardian.

Wang, C., Yang, J., Xie, L., Saimaier, K., Zhuang, W., Han, M., Liu, G., Lv, J., Shi, G., Li, N., & Du, C. (2022). Methyl butyrate alleviates experimental autoimmune encephalomyelitis and regulates the balance of effector T cells and regulatory T cells. *Inflammation*, 45, 977-991.