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PHYTOCHEMICAL ANALYSIS, PROXIMATE COMPOSITION AND MINERAL CONTENTS OF THE SEED OF *ANNONA MURICATA*

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ABSTRACT

Plant is a major source of food for human and other animals. The nutritional and medicinal composition of plants and their various parts vary according to the type of plant, geographical location and other factors. The purpose of this study was to carry out phytochemical, proximate and mineral analyses of *Annona muricata* seed obtained from Ilorin, Kwara State, Nigeria. *Annona muricata* seeds were removed from the fruit pulp, dried at room temperature and blended using a mill. The seed powder was extracted by cold extraction method with hexane and methanol. Phytochemical and proximate analyses were carried out using standard procedures. Atomic Absorption Spectroscopy was used to determine the mineral contents of the seed. Phytochemicals from the hexane and methanol extracts of the seed were; saponins, alkaloids, phenols, tannins, glycosides, terpenoids, steroids and flavonoids. Quantitative phytochemical screening showed high content of alkaloids and saponins. Proximate analysis revealed high contents of fat, fiber and protein. Mineral analysis of the seed showed that Calcium was the most abundant element in the seed (3.5 mg/g). Iron, Manganese, Copper and Zinc were also detected. The nutrients composition of *Annona muricata* seed revealed that the seed can be used in feed formulation and other industrial purposes.

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INTRODUCTION

Annona muricata belongs to the family annonaceae. It is also called sour sop because the plant produces edible fruits which has characteristic sour taste [1]. *Annona muricata* is native to tropical South and North America, it is now widely distributed throughout the tropical regions of the world. Different parts of the tree have been utilized traditionally in the tropics including the bark, leaves, root and fruits for the treatment of diseases such as hypertension, fever, and wounds [2]. Ethno botanical study of plants revealed that *Annona muricta* leaf is used by Agboville people in Cote-D'Ivoire for the treatment of diabetes [3]. The fruit of *Annona muricata* is used to treat diarrhea, heart and liver diseases [4]. [5], reported that the seed oil of *Annona muricata* contain saturated and unsaturated fatty acids such as hexadecenoic acid, hexadecanoic acid, octadecadienoic acid, octadecanoic acid and eicosanoioc acid. *Annona muricata* fruit contain considerable amount of seeds, but the seeds are usually discarded without consideration for domestic or industrial applications. This study was therefore conducted to determine the proximate, phytochemical and mineral contents of the seed of *Annona muricata* grown in Ilorin, Kwara State, Nigeria. This will enable the assessment of the potentials of the seed.

MATERIALS AND METHODS

The fruits of *Annona muricata* were gotten from Ilorin, Kwara State, Nigeria. The fruits were washed, peeled, and the pulp was squeezed to remove the seeds. The seeds were then dried at ambient temperature. The seeds were blended into powder and stored in a sample for further analysis.

QUALITATIVE AND QUANTITATIVE PHYTOCHEMICAL ANALYSIS OF THE SEED EXTRACTS OF *ANNONNA MURICATA*

60 g of the seed powder was soaked in n-hexane for two days. The crude extract solution was decanted, filtered and concentrated *in vacuo*. The n-hexane crude extract was stored in a sample bottle for further analysis. Methanol was used to soak the residual plant material for two days. The crude extract was decanted, filtered, concentrated and stored in a sample bottle for further analysis. Qualitative phytochemical screening of the hexane and methanol extracts of the seed was carried out using the procedure of [6]. The Phytochemicals considered were; alkaloids, steroids, phenolic compounds, flavonoids, saponins, tannins,

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glycosides and terpenoids. **P**hytochemicals in the hexane and methanol extracts of *Annona muricata* were quantified following the procedures described by [7].

PROXIMATE COMPOSITION OF THE SEED OF *ANNONA MURICATA*

The proximate analysis of the seed of Annona muricata was carried out using standard procedures [8].

MINERAL ANALYSIS OF THE SEED OF *ANNONA MURICATA*

One gram (1g) of A*nnona. muricata* seed powder was weighed into a crucible and heated at 600 ^{0}C for three hours in a muffle furnace. The ash obtained was dissolved in 5 mL of 10% hydrochloric acid. The solution was filtered and transferred into a 100 mL volumetric flask. The volume was adjusted to 100 mL with distilled water. The solution was analyzed for minerals of interest using Buck Scientific ACCUSYS 211 Atomic Absorption Spectrophotometer (AAS) at the University of Ilorin Research Laboratory. The minerals that were analyzed for were; Ca, Fe, Cr, Mn, Ni, Cu, Zn and Pb.

RESULTS AND DISCUSSION

RESULTS OF PHYTOCHEMICAL ANALYSIS

The qualitative phytochemical investigation of the hexane and methanol extracts of *Annona muricata* seed showed the presence of saponins, phenols, tannins, glycosides, steroids, terpenoids, alkaloids and flavonoids. The results are reported in Table 1. Alkaloids have significant pharmacological functions such as; antimalarial, anticancer, analgesic, anti-hyperglycemic and antibacterial functions [9]. Terpenoids have antioxidant activity and Steroids are used to remedy inflammatory conditions. Glycosides have antimicrobial and anticancer activities. Saponins have been evidenced to possess anticoagulant, anti-carcinogenic, hypoglycemic, immuno modulatory, neuroprotective, and anti-inflammatory and antioxidant potentials [10]. Phenolic compounds are reported to have high antioxidant activities [11]. [12], revealed that tannins has antibacterial activity against *Staphylococcus aureus, Streptococcus pyrogens, Salmonella typhi, Pseudomonas aeruginosa, Proteus vulgaris* and *Escherichia coli*. Flavonoids have antioxidant and chelating properties. They are also known to have cardio-protective effects due to their ability to inhibit lipid peroxidation [13]. Table 2 shows the quantity of the phytochemicals present in the two extracts. All the extracts showed high contents of alkaloids and saponins.

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Table 1: Qualitative phytochemical content of *Annona muricata* seed extracts

Phytochemicals	Hexane extract	Methanol extract
Saponins	+	+
Phenols	+	+
Tannins	+	+
Glycosides	+	+
Steroids	+	+
Terpenoids	+	+
Alkaloids	+	+
Flavonoids	+	+

+ = present; - = Not present

Table 2: Quantitative phytochemical content of *Annona muricata* seed extracts

Extracts	Hexane	Methanol
Tannins (mg/g)	0.36	5.70
Phenols (mg/g)	1.93	2.26
Flavonoids (mg/g)	0.17	0.23
Glycosides (mg/g)	49.51	67.23
Alkaloids (mg/g)	316.63	340.12
Saponins (mg/g)	375.52	322.85

RESULTS OF PROXIMATE COMPOSITION OF THE SEED OF *ANNONA MURICATA*

Results of the proximate composition is shown in Table 3. The results indicated that the seed has high fiber and oil contents. [14], reported 40 % fat content for seeds obtained from Congo-Brazzavlle. This value is quite high compared with the results of our findings. They also reported very low fiber contents (5.2 %) as against the high fiber content of our sample.

Table 3: Proximate composition of the seed of *Annona muricata*

Proximate composition	% contents
Moisture	6.13
Ash	1.50
Fat	26.75
Fiber	35.20
Protein	10.37
Carbohydrate	20.05

RESULTS OF MINERAL CONTENTS OF THE SEED OF *ANNONA MURICATA*

The results of the mineral contents analysis revealed that Calcium had the highest concentration in the seed (3.5 mg/g). The presence and quantity of the different minerals in plants are attributed to the composition of the soil, selectivity and absorbability of plants for the accumulation of these micronutrients [15]. The presence and

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variations in concentration of these minerals are therefore attributed to the type of plant and its surroundings.

Some minerals play important roles in biological functions of plants and animals. Minerals are mostly responsible for medicinal and toxic properties in plants. Calcium performs a significant function in the uptake of dietary Vitamin B and activation of lipase. It also functions in the synthesis of neurotransmitter acetylcholine. Calcium supplements lowers blood pressure [16]. [17], reported that Calcium helps in building and maintaining bone mass. Iron is the main component of hemoglobin and many enzymes that play significant function in the oxygenation of red blood cells. It is needed to improve the immune system and for energy production, its deficiency results in anaemia. Chromium is a micronutrient required for glucose metabolism. Its function in regulating insulin contributes to normalize blood sugar levels. Excess Chromium in the body can lead to stomach problem and low blood sugar (hypoglycemia). Manganese is a part of pyruvate carboxylase and superoxide dismutase. It helps in the metabolism of protein [18].

Nickel and Lead are toxic to the body. They are non-essential minerals to the human body. The availability of these micronutrients in plant could be attributed to pollution from industrial activities. Copper is a vital catalyst for iron absorption. Deficiency of Copper may cause osteoporosis and anemia. Zinc is a major component of many enzymes. It plays a significant function in alcohol dehydrogenase, ribonucleic polymerases, alkaline phosphatase and carbonic anhydrase. Deficiency of Zinc during pregnancy may lead to developmental disorder in offspring. Zinc deficiency can also cause coronary disease [19].

Table 4: Mineral contents of the seed of *Annona muricata*

Minerals	Conc. (mg/g)
Ca	3.5
Fe	0.1
Cr	ND
Mn	0.03
Ni	ND
Cu	0.02
Zn	0.06
Pb	ND

ND = Not detected

CONCLUSION

The study revealed that important phytochemicals abound in the seed of *Annona muricta*. It is also a rich source of vital minerals, fat and fiber. These components could be utilized to enhance health and prevent diseases. It is recommended that the seed of *Annona*

muricta could be used in feed formulation as well as other industrial purposes.

REFERENCES

1. Bora PS, Holschuh HJ, Vasconcelos MA, 2004. Characterization of polyphenol oxidase of soursop (*Annona muricata L*.) fruits and a comparative study of its inhibition in enzyme extract and pulp. *Cienc Tech Ali.* 4(4): 267-273.
2. Moghadamtousi SZ, Fadaeinasab M, Nikzad S, Mohan G, Ali HM, Kadir HA, 2015. *Annona muricata* (Annonaceae): A review of its traditional uses, isolated acetogenins and Biological Activities. *Int J Mol Sc*. 16: 15625–15658.
3. Koffi N, Edouard KK, Kouassi K, 2009. Ethanobotanical study of plants used to treat diabetes in traditional medicine by Abbey and Krobou people of Agboville (Cote-d'Ivoire). *Am J Scien Res*. 4: 45-58.
4. Gavamukulya Y, Wamunyokoli F, El-Shemy HA, 2017. *Annona muricata*: Is the atural therapy to most disease conditions including cancer growing in our backyard? A systematic review of its research history and future prospect. *Asian Pac J Trop Med*. 10(9): 835-848.
5. Nwaehujor IU, Olatunji GA, Afolayan SS, Abel GI, Oladipo AK, Abdullahi S, 2016. Physicochemical properties of the seed oil of *Annona muricata* grown in Ilorin, Kwara State. *Equity J Sc Tech* 4(1): 1-4.
6. Tiwari P, Kumar B, Kaur M, Kuar G, Kuar H, 2011. Phytochemical screening and extraction: A review. *Int Pharm Sci*. 1(1): 98–106.
7. Vijay DT, Rajendra SB, 2014. Estimation of total phenol, tannin, alkaloid and flavonoid in *Hibiscus tiliaceus* Linn. wood extracts. *J Pharm Phytochem.* 2(4): 41–47.
8. AOAC, 2000. Official Methods of Analysis of Association of Official Analytical Chemists International. Suit 500481 North Frederick Avenue.

Gaithersburg, Maryland, USA. 17th Edition, Vol. 1.

9. Qiu S, Sun H, Zhang AH, Xu HY, Yan GL, Han Y, Wang XJ, 2014. Natural alkaloids: Basic aspects, biological roles and future perspectives. *Chin J Nat Med*. 12(6): 401-406.
10. Rao AV and Gurfinkel DM, 2000. The Bioactivity of saponins: Triterpenoid and steroidalglycosides. *Drug Metab Drug Inter*. 17(1-4): 211–235.
11. Cai Y, Luo Q, Sun M, Corke H, 2004. Antioxidant activity and phenolic compounds of 112 traditional Chinese medicinal plants associated with anticancer. *Life Sc*. 74(17): 2157-2184.
12. Doss A, Mohammed MH, Rangasamy D, 2009. Antibacterial activity of tannins from the leaves of *Salanum trilobatum* Linn. *Indian J Sc Tech*. 2(2): 40-43.
13. Heim KE, Tagliaferro AR, Bobilya DJ, 2000. Flavonoids antioxidants: Chemistry, metabolism and structure-activity relationships. *J Nutr Biochem*. 13(10): 572-584.
14. Kimbonguila A, Nzikou JM, Matos L, Loumouamou B, Ndangu CB, Pambou-Tobi NPG, Abena AA, Silou T, Scher J, Desobry S, 2010. Proximate composition and physicochemical properties of *Annona muricata* grown in Congo-Brazzaville. *Res J Environ Earth Sc*. 2(1): 13-18.
15. Zafar M, Khan MA, Ahmad M, Jan G, Sultana S, Ullah K, Marwat SK, Ahmad F, Jabeen A, Nazir A, Abbasi AM, Rehman Z, Ullah Z, 2010. Elemental analysis of some medicinal plants used in traditional medicine by atomic absorption spectrophotometer (AAS). *J Med Plant Res.* 4(19): 1987–1990.
16. Wang L, Manson JE, Buring JE, Lee IM, Sesso HD, 2008. Dietary intake of dairy products, calcium and Vitamin D and the risk of hypertension in middle-aged and

 DOI- 10.22270/jmpas.v8i2.806

older women. *Hyperten*. 51(4): 1073-1079.

17. Olaniyi MB, Lawal IO, Olaniyi AA, 2018. Proximate, phytochemical screening and mineral Analysis of *Crescentia cujete* L. Leaves. *J Med Plants Econ Dev*. 2(1): a28.
18. Aziz S, Saha k, Sultana N, Nur HP, Ahsan MA, Ahmed S, Hossain MK, 2016. Comparative studies of elemental composition in leaves and flowers of *Catharanthus roseus* growing in Bangladesh. *Asian Pac J Trop Biomed* 6(1): 50–54.
19. Karpiuk UV, Al Azzam KM, Abudayeh HM, Kislichenko V, Naddaf A, Cholak I, Yemelianova O, 2016. Qualitative and quantitative content determination of macro-minor elements in *Bryonia alba* L. roots using atomic absorption spectroscopy technique. *Adv Pharm Bull*. 6(2): 285–291.