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PHYTOCHEMISTRY, PROXIMATE COMPOSITION AND SOME ESSENTIALS MINERALS PRESENCE IN AQUEOUS EXTRACT OF *AZANZA GARCKEANA* FRUIT PULP

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ABSTRACT

The research was conducted to evaluate the proximate composition and Phytochemistry of aqueous extract of *Azanza garckeana* fruit pulp. The qualitative and quantitative Phytochemistry was determine using standard procedures as describe by Evans and Trease and proximate composition was determine using Association of Analytical Chemist procedures. The result of phytochemical screening of aqueous extract of *Azanza garckeana* fruit pulp revealed the presence of Alkaloids, Saponins, Tannins, flavonoids, while terpenoids and steroids were absent. Saponins of 3.16%. Alkaloids revealed a value of 2.51% Tannins 1.27% while Terpenoids and Steroids were absent both qualitatively and quantitatively; the following anti nutrients were present: Phenols (4.81%), Glycosides (0.41%) and Flavonoids (1.18%) respectively. The proximate composition revealed 2.67± 0.45 Moisture, 3.86± 0.12 Ash, 7.21± 0.56 Crude fibre, 9.29± 0.18 Crude Protein and 71.71± 0.68 Carbohydrate. However, essential minerals result shows Potassium having the highest value of mean plus standard error mean of 56.10 ± 0.09 followed by Sodium 20.10 ± 0.64, Magnesium 8.84 ± 0.02, Zinc 7.58 ± 0.14, and the least is Iron having 5.11 ± 0.01 and Calcium was absent. In conclusion the pulp Revealed the presence of secondary metabolites, proximate composition and some essential minerals will have a numerous applications Particularly in the Feed mill pharmaceutical industry.

Keywords: Aqueous, Extract, Composition, Proximate, Pulp, Phytochemistry

INTRODUCTION

Azanza garckeana it is the multipurpose edible fruit of tropical Africa. The plants have been used as source of medicine globally to preserve human health and are rich source of components with a variety of biological activities. *Azanza garckeana* has also been reportedly use in traditional medicine for treatments and management of more than 20 human diseases and ailments. The plant is used as herbal remedy for diseases like cough, chest pains, infertility and menstruation abnormalities. It is a fruit that is high in vitamins, minerals and carbohydrates (Sulieman, 2019). According to the author, important nutrients including calcium, salt, potassium and iron are also present in the fruit. It is also an excellent source of ascorbic acid, or vitamin C, which helps to maintain blood vessels and adds nutritious value to fruit juices. The presence of essential nutrients such as calcium, phosphorus, ascorbic acid, iron, magnesium and potassium in the fruit makes it a good nutritional supplement in the area where they are found (Yusuf *et al*; 2020). It is a local source of numerous biological benefits, such as anti-inflammatory, aphrodisiac, uterotonic, analgesic, anti-arthritic, hemostatic and wound-healing properties. It is used as a natural medicine for a number of ailments, including sexually transmitted diseases, infertility, cough and chest problems (Sulieman, 2019).

Phytochemicals which include alkaloids, flavonoids, glycosides, saponins, steroids, tannins and terpenoids are natural bioactive secondary metabolites present in plants and have applications in veterinary and human medicine. These phytochemicals have been reported to exhibit physiological action Peteros and Uy, 2010; Edeoga *el al*., 2005).

Okonbule *et al*., (2024) revealed the presence potassium (K), calcium (Ca), phosphorus (P), iron (Fe), zinc (Zn), magnesium (Mg) and sodium (Na) in varying proportion. The mineral's potassium (K) and calcium (Ca) play important role in stimulating action potential across nerve endings. Also, Momodu *et al.*, (2021) reveals the presences of alkaloid, phenols and saponins. The phenols content was found to be moderately high, while that of alkaloid and saponins were trace amounts and the following proximate composition and essential minerals contents as Moisture 10.9 %, Dry matter 89.10 % Ash 4.51%, Crude fat 3.16%, Crude Fiber 0.94%, Protein 6.43%, Nitrogen Free Extract 74.06% and Potassium (K)774.17 mg/kg, Calcium (Ca) 383.83 mg/kg, Phosphorus (P) 161.62mg/kg Iron (Fe) 28.49 mg/kg, Zinc (Zn) 19.92 mg/kg, Magnesium (Mg) 205.27mg/kg and Sodium (Na) 9.70 mg/kg. Ahmed *et al*, (2016) reported the presence of Alkaloids, Triterpens, Flavonoids, Saponins, Curamins, Tannins and Absence of Sterols, Anthraquinones and Cyanogenic in fruit pulp of *Azanza garckeana.*

Bukar *et al*, (2021) revealed the presence of flavonoids in high quantity, followed by alkaloids and tannins. Steroids and cardiac glycosides were present in much lower quantity, while saponins, terpenes and anthraquinones were absence. Also, Itodo *et al*, (2023) report the presence of Tannins, flavonoids, saponins, phenols and tannins were found in varying quantities in the extract and the following proximate composition; Dry matter 89.50 Crude protein (CP) 16.81 Ether extract (EE) 1.27 Crude fiber 8.65 Nitrogen free extract (NFE) 53.96 Ash 7.20 ME (kcal/kg) Tannins (14.9±0.4%), Flavonoids (25.5±2.4%), Saponins (18.9±0.2%), Phenols (36.5±3.7%) and Alkaloids (19.0 %) quantitatively. Egbejimi *et al*., (2024). However, Laz-Okenwa *et al* (2023) reported the presence Alkaloids, Triterpenoid/Steroid, Carbohydrates and absence of the following Cardiac glycosides, Anthraquinones, Saponins-Flavonoids, Phenolic, Cyanogenic glycoside, Fixed oil and Phobatannins. Also, Eziekiel *et al*., (2020) revealed the presence of Tannins, Alkaloids, Flavonoids, phenols, Terpenoids and Steroids quantitatively and Tannins (9.12mg), Alkaloids (6.10mg), Flavonoids (6.78mg), phenols (16.15mg), Terpenoids (0.23mg) and Steroids (0.6mg) quantitatively.

MATERIALS AND METHODS

Source and Processing of Fruit Pulp Extract

The fruit of *Azanza garckeana* was purchased from the Tula village market in Kaltungo Local Government Area of Gombe State, Northeast Nigeria. The fruit pulp was washed under tap water and sliced into smaller pieces to obtain the pulp and later dried under shade for 72 hours at 40^{o}C, ground using Mottar and Stick, and stored in an airtight container to initiate extraction process as described by Nurudeen *et al*, (2024). The quantities of the powdered material were macerated in an aqueous solvent at 25^{0} C for 48 hours. The mixtures were filtered using available filter paper and then subjected to evaporation using a rotary evaporator and obtained a sticky residue. The sticky residue of the extract was diluted with distilled water and obtained the required quantity of the fruit pulp extract (Nurudeen *et al*., 2023).

Determination of Phytochemicals

The determinations of phytochemicals (Saponins, Phenols, Glycoside, Flavonoid, Alkaloids Tannins and Terpenoids) of the extracts were conducted using Standard procedures as described by Trease and Evan (1989).

Determination of Proximate Composition

The proximate composition of the fruit pulp extract to determine the Moisture Content, Dry matter, Ash, Fat, Fibre, Protein, and Nitrogen free extract (NIFE) was carried out in accordance with the Association of Official Analytical Chemists (AOAC, 2025) technique.

Determination of Some Essential Minerals

Atomic absorption spectrophotometer was use in the determination of mineral content of calcium (Ca), Magnesium (Mg), Iron (Fe) and Zinc (Z). Flame Photometer was used to determine that of Sodium (Na), Potassium (K) and Spectrometer for Phosphorus (P) following the technique described by the (AOAC 2025).

Statistical Analysis

All data generated were entered into Statistical Package for Social Science (SPSS) Version 2.0 and subjected to Descriptive Statistics.

RESULTS AND DISCUSSION

Results

Table 1 shows the results of phytochemical composition of *Azanza garckeana* fruit pulp extract with presence of Saponins (Positive), while a quantity of 3.16% was obtained. Alkaloids revealed a value of 2.51% Tannins 1.27% while Terpenoids and Steroids were absent both qualitatively and quantitatively; the following anti nutrients were present: Phenols (4.81%), Glycosides (0.41%) and Flavonoids (1.18%) respectively.

Table 1: Phytochemical Composition of *Azanza garckeana* Fruit pulp Aqueous Extracts

Composition (%)	Qualitative	Quantitative
Saponins	+	3.16
Alkaloids	+	2.51
Tannins	+	1.27
Terpenoids	-	-
Phenols	+	4.81
Steroids	-	-
Glycoside	+	0.41
Flavonoids	+	1.18

Key + means Positive – means negative

Table 2 shows the results of proximate composition of *Azanza garckeana* fruit pulp with carbohydrate having the highest value of mean plus standard error mean of 71.71 ± 0.68 followed by Crude protein 9.29 ± 0.18, Crude fibre 7.21 ± 0.56, crud lipids 5.23 ± 0.10, Ash 3.86 ± 0.12 and the least is Moisture Content with 2.67 ± 0.45.

Table 2: Proximate Composition of *Azanza garckeana* Fruit pulp Aqueous Extracts

Proximate	Mean+SEM (%)
Moisture	2.67 ± 0.45
Ash	3.86 ± 0.12
Crude fiber	7.21 ± 0.56
Crude lipids	5.23 ± 0.10
Crude protein	9.29 ± 0.18
Carbohydrate	71.71 ± 0.68

Triplicate samples were analyzed

Table 3 shows the results of Selected Essential Minerals presence in *Azanza garckeana* fruit pulp with Potassium having the highest value of mean plus standard error mean of 56.10 ± 0.09 followed by Sodium 20.10 ± 0.64, Magnesium 8.84 ± 0.02, Zinc 7.58 ± 0.14, and the least is Iron having 5.11 ± 0.01 and Calcium was absent.

Table 3: Some Essential Minerals of *Azanza garckeana* Fruit Pulp Aqueous Extracts

Minerals	Mean ±SEM
Fe	5.11 ± 0.01
Mg	8.84 ± 0.09
K	56.10 ± 0.09
Zn	7.58 ± 0.41
Ca	-
Na	20.10 ± 0.64

Triplicate samples were analyzed

Discussion

The result obtained in qualitative phytochemical composition revealed the presence of Saponins, Alkaloids, Tannins and Flavonoids while Terpenoids and Steroids were absent. However, the result further revealed the presence of the following anti-nutrients (Phenols and Glycosides). The result is in line with Ibrahim *et al,* (2024) reported the presence saponins, terpenes, phenols, flavonoids, tannins, carbohydrate, steroids, and alkaloids**.** Also, Micheal *et al,* (2015) Bukar *et al,* (2021), Ezekiel *et al,* (2020) and Itodo *et al,* (2023) who on their separate studies reported the presence of Alkaloids, Tannins, Saponins and Flavonoids and anti-nutrients Phenols and Glycoside However, the presence of anti-nutrients is not in-line with Momodu *et al,* (2021) who reported presence of Phenols and Absence of Glycoside and Peter *et al*., (2013) who reported absence of Alkaloid in citrus Sinensis peels. Also, Nwankudu *et al,* (2020) reported the presence of steroids in Albino rats treated with peanut. The presence of flavonoids, tannins and alkaloid is due to the ability to possess antioxidant properties while the antioxidant activity of flavonoid is due its ability to reduce free radicals in the pulp. The higher value obtained in Saponins (3.16 %) is higher than (3.7%) (2.71%) and (2.46%) reported by (Micheal *et al*., 2015; Ezekiel *et al*., 2020 and Zakawa *et al*., 2021) on azanza garckeana seed and fruit pulp extract. However, it is low when compared with (25.5%) reported by Itodo *et al,* (2023). The Alkaloids showed 2.71%. Is greater than (2.45%) Ezekiel *et al.,* (2020) reported. Also, the figure disagrees with (19.0%; 6.11%; 3.7 %) as revealed by (Itodo *et al*., 2023; Zakawa *et al*., 2021 and Micheal *et al*., 2015). The presence of Alkaloids might have enhanced the immune response of the Albino rats. The (1.27%) of Tannins disagrees with (15.05% and 3.85 %). values reported by (Nkafamiya *et al*., 2016 and Zakawa *et al*., 2021). The 1.27% of tannins in the fruit pulp extract might have boosted the immune response and prevent the semen from oxidative damage. The study further revealed the presence of Flavonoids in small quantities (1.18%). the presence of Flavonoids could be as a result of its wide range of biological activities, such as anti-oxidant, anti-inflammatory, anti-cancer, anti-allergic and ant-diabetic (Sallau *et al*.,2022). This result is higher than 1.0% reported by Micheal *et al*., (2015), but contrary to (1.76%, 2.10%, 10.28% and 25.5%) reported by Itodo *et al*., 2023; Zakawa *et al*., 2021; Bashir *et al*., 2022 and Ajiboso 2023) on their separate studies on azanza garckeana seed and fruit pulp extract. The presence of the following anti-nutrients: Phenols and Glycosides with Phenols having the highest value of 4.81% and 0.41% for glycoside. 4.81% is higher when compared with (2.60%) reported by (Micheal *et al*., 2015). On the other hand, the figures were lower than (16.54%, 18.11% and 24.92%) as reported by Zakawa *et al*., 2021; Ezekiel *et al*.,2020 and Hlabono *et al*., 2020) on their separate findings. The 0.41% of Glycosides content is closely similar with 0.33% reported by Micheal *et al*., (2015) on *Azanza garckeana* seed. On the other hand, the figure is lower than (0.77%) revealed by Zakawa *et al*., (2021) on azanza garckeana fruit pulp extract.

9.29 % of crude protein in the present study is lower than 12.0 %, 16.81 % reported by Orwa *et al*., (2009) and Idodo *et al*., (2023) on their separate studies on *Azanza garckeana* fruit pulp. However, the value obtained is higher than 6.47 % and 4.85 % reported by Momodu *et al*., (2021) and Sirajo *et al*., (2020) on *Azanza garckeana* fruit pulp and seed on their separate research. 7.21 % of crude protein is higher than 0.94 % reported by Momodu *et al*., (2021) on *Azanza garckeana* fruit pulp. Also, the values were lower than 43.3 % and 21 % reported by Orwa *et al*., (2009) and Hlabono *et al*., (2020) on *Azanza garckeana* fruit pulp however, on related research on *Azanza garckeana* seed the values is lower than 29.00 % reporded by Sirajo *et al*., (2020) but the figure fall within 8.6 % reported by Itodo *et al*., (2020) on *Azanza garckeana* fruit pulp. 5.23 % of crude lipids figure is higher than 1.1 % and 3.16 % reported by Orwa *et al*., (2009) and Momodu *et al*., (2021) on their separate research on *Azanza garckeana* fruit pulp 3.86 % Ash content obtained in this study is lower than 21, 7.20 % and 5.10 % reported by Hlabono *et al*., (2020), Itodo *et al*., (2023) on their separate research on fruit pulp and Sirajo *et al*., (2020) on azanza seed. Also, the figure falls within 4.51 % reported by Momodu *et al*., (2021). 2.67 % moisture content is lower than 10.9 % and 70 % reported by Momodu *et al*., (2021) and Hlabono *et al*., (2020).

The result of the essential minerals reveals the presence of iron, magnesium, potassium, zinc in the aqueous extract of azanza garckeana fruit pulp. The presence of potassium in the pulp plays a vital role in stimulating action potential across nerve endings Okonbule *et al*., (2024). The presence of iron for the hemoglobin formation. Magnesium, iron and zinc are co-factors in several metabolic reactions such as oxidative phosphorylation, glycolysis and protein digestion Okonbule *et al*., (2024). The figures fall within the range reported by Nkafamiya *et al*., (2016) and Okunbule *et al*., (2024) who on their separate research reported the presence of Potassium (K), Iron (Fe), Zinc (Zn), Magnesium (Mg) and Sodium (Na). however, the values were lower than reported figures of Momodu *et al*., (2021) who reported 6.00, 56.00, 60.00 and 13.00 for iron, calcium, sodium and potassium respectively.

CONCLUSION

Azanza garckeana fruit pulp as a nutritionally and pharmacologically relevant plant resource. The phytochemical analysis confirmed the presence of key bioactive compounds, including saponins, alkaloids, tannins, phenols, flavonoids, and glycosides, which are associated with antioxidant, antimicrobial, and anti-inflammatory activities. Variations observed in phytochemical composition, particularly the absence of terpenoids and steroids, suggest possible influences of environmental conditions, geographical location, and extraction methods.

The proximate and mineral analyses further demonstrate the nutritional value of the fruit pulp, revealing substantial levels of carbohydrates, moderate protein content, and essential

minerals such as potassium, calcium, magnesium, iron, zinc, sodium, and phosphorus. These findings support the potential role of *A. garckeana* in addressing nutritional deficiencies and promoting metabolic, hematological, and skeletal health.

The results provide scientific validation for the traditional use of *Azanza garckeana* and highlight its potential application as a functional food and source of bioactive compounds. Further investigations into toxicity, bioavailability, and molecular mechanisms are recommended to facilitate its development for nutraceutical and pharmaceutical use.

REFERENCES

Ajiboso S.O (2023) Determination of chemical profile of *Azanza garckeana*. International journal of recent research thesis and desertification. 4(2):1-6.

AOAC. (2005). *Association Official methods of analysis of association of analytical chemists, International (18th ed., Vol. 1&2, pp. 774-784)*. In W. Horowitz (Ed.), AOAC International, Maryland, USA.

Bukata Bukar, B., Orshi, O. D. G., & Amagon, L. (2021). Antioxidant and ameliorative effects of single daily dose of aqueous extract of *Azanza garckeana* on formalin-induced testicular toxicity in male rats.

Edeoga, H. O., Okwu, D. E., & Mbaebie, B. O. (2005). Phytochemical constituents of some Nigerian medicinal plants. *African Journal of Biotechnology*, *4*(7), 685-688.

Egbejimi M.A, S.O Ojeka, and D.Y Dopper (2024) Proximate Analysis and Gas Chromatography Mass Spectrometry Identification of Bioactive Constituents of the Hydro-Methanolic seed extract of Azanza Garckeana European Journal of Biomedical and Pharmaceuticals Sciences ISSN 2349-8870 Vol 11(4).

Ezekiel T. Williams, P2PSimon Ambrose and P3PNachana'a Timothy (2020) Assessment of Nutritional Composition of Azanza Garckeana (Goron Tula) Seed in Gombe, Nigeria. IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 7 Issue 11, November 2020 ISSN (Online) 2348 – 7968 | Impact Factor (2020) – 6.72

Joy Iyojo Itodo, Tagang Aluwong, Chidiebere Uchendu, Ngozi Ejum Ogbuagu, John Shiradiyi Bugau, Bode Abdulmujeeb Adewuyi, Felix Uchenna Samuel, Kenneth Owoicho Abah, Matthew Shinkut and Kanayo Peter Ogbuagu (2023) Comparative effects of *Azanza garckeana* fruit pulp and melatonin on serum and testicular oxidative stress changes, live sperm cells and spermatozoa abnormalities evoked by chronic administration of bisphenol A in rabbit bucks Veterinary Integrative Sciences 2023; 21(2): 523 - 543 DOI; https://doi.org/10.12982/VIS.2023.037.

Laz-Okenwa JOA, Amah-Tariah FS and Ojeka SO (2023) Evaluation of the phytochemical/active ingredients composition of the hydroethanol extract of the fruit pulp of *Azanza garckeana* and its toxicity profile. Journal of Medicinal Plants Studies 2024; 12(1): 38-42

Maryam Ibrahim1, Ali S. Idoko, Aderounmu I.G, Nura. L, Paul A, Jennifer I, Friday M, Suleiman N and Fadila Y (2023) Phytochemical analysis of hexane, chloroform, Ethyl acetate and aqueous extractnof azanza garckeana leaf. *Sahel journal of life sci.* FUDMA 1(1) 25-31.

Michael, K., Onyia, L., & Jidauna, S. B. (2015). Evaluation of phytochemicals in *Azanza garckeana* (goron tula) seed. *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, *8*, 2319-2372.

Momodu, I.B, Agoreyo, B.O, Okungbowa, E.S, Igiebor, S. E. and Igbo, I.O.L (2021) Phytochemical Screening and Proximate Composition of Aqueous-Methanol Pulp Extract of Azanza garckeana (Goron Tula) Dutse Journal of Pure and Applied Sciences (DUJOPAS*), Vol. 7 No. 4*

Notabo Hlabano, Londiwe C. Nkiwane, Pethile Dzingai, Sithabisiwe Gadlula (2020) Proximate analysis and evaluation of total phenolic compounds in *Azanza garckeana* fruit for use as gelatin crosslinking agent Zimbabwe Journal of Science & Technology pp 157-166 Vol.15 [2020] e-ISSN 2409-0360 Zimbabwej.sci.technol.

Nkafamiya, I. I., Nkafamiya, B. P., Ardo, S. A., Osemeahon, & Ayodele, A. (2016). Evaluation of nutritional, non-nutritional, elemental content and amino acid profile of *Azanza garckeana* (Goron Tula). *British Journal of Applied Science & Technology*, *12*(6), 1-10.

Nwankudu, O. N., Uchendu, C. N., & Obidike, I. R. (2020). Phytochemical, hematologic and histopathologic evaluation of male albino rats treated with peanut (Arachis hypogaea) extract. *World Journal of Innovative Research*, *8*(6), 62-72. Retrieved from www.wjir.org

Nurudeen, Q.O., Asinmi, M.R., Falana, M.B. and Dikwa, M.A. (2023). Aphrodisiac Potentials of Aqueous Extract of Azanza garckeana Fruit Pulp in Fluoxetine-induced Sexually-impaired Female Rats. Journal of Science and Technology, 15(2): 11 -22.

Okogbule F.N.C Abadi, Opiah, J. N Ihunnaya C. K Martins N. P, Ogunrombi, S. B (2024) Anti-nutrients and Mineral Contents of Azanza garckeana (goron tula): journal of biology and Genetic research vol 10:3 doi: https://doi.org/10.56201/jbgr.v10.no3.2024.pg10.16.

Orwa, O., Inngjerdingen, K., Nergard, S. C., Diallo, D., Mounkoro, P. P., & Paulsen, B. (2009). An ethnopharmacological survey of plants used for healing in Dogonland, Mali, West-Africa. *Journal of Ethnopharmacology & Ethnomedicine, 2004*, 92, 233-

Peteros, N. P., & Uy, M. M. (2010). Antioxidant and cytotoxic activities and phytochemical screening of four Philippine medicinal plants. *Journal of Medicinal Plant Research*, *4*(5), 407-414.

Sallau, M, Maiha, B.B, Ejiofor, I (2024) sub-acute toxicity studies of methanol root bark extract of *azanza garckeana* (f hoffm.) exell and hillc. in rats Nig. J. Pharm. Res. 2024, 20 (S) pp 51-63

Sirajo, K., Shehu, Z., & Usman, M. (2022). Study of Proximate Composition of Seed and Peel of (*Azanza garckeana*) Goron Tula. 1(2), 76–81.

Sulieman, A. M. (2019). Azanza garckeana: Distribution,Composition, Nutritive Value and Utilization. Wild Fruits: Composition, Nutritional Value and Products, 25(2): 379-393.

Trease, G. and W. Evans (1983). Textbook of Pharmacognosy. (Balliere Tindall, London: 57-59.

Yusuf, A. A., Lawal, B., Sani, S., Garba, R., Mohammed, B. A., Oshevire, D. B., & Adesina, D. A. (2020). Pharmacological activities of *Azanza garckeana* (goron tula) grown in Nigeria. *Clinical Phytoscience*, *6*, 27-33. https://doi.org/10.1186/s40816-020-00173-0

Zakawa, N. N., Yusuf, C. S., Oyebanji, E. O., Timon, D., 3Isa, A., Bala, U. and William, N. (2021) Anti-microbial activities and phytochemical screening of aqueous fruit pulp extracts of *azanza garckeana* (f.hoffm.) NJB, Volume 34(1), June, 2021.https://dx.doi.org/10.4314/njbot.v34i1.8

APPENDIX

Figure 1: *Azanza Garckeana* Fruit Pulp

Figure 2: *Azanza garckeana* Pulp Under Shade

Figure 3: Extracts of *Azanza garckeana*