Original Research Article

Comparative Study of Proximate Composition of Seed and Peel of (*AzanzaGarckeana*) Goron Tula

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ABSTRACT

Aims: This study aimed at assessing nutritional composition of the seed and peel of *Azanzagarckeana*.
Methodology: The fruit of *A. garckeana* was purchased from old Market in sokoto, sokoto State, Nigeria. The proximate compositions were determined using standard method of AOAC.
Results: The result of the analysis revealed that, the carbohydrate content (47.88% and 45.32%) was the most abundant biological component in both the seed and peel followed by crude fibre (29.00% and 28.05%) respectively. However, no significance difference was observed between the seed and peel for both carbohydrate and crude fibre. The crude lipid (10.70%) and crude protein (10.01%) of the peel was significantly higher than that of the seed (6.60% and 4.85% respectively). Ash (5.10%, 8.33%) and moisture content (6.66%, 5.00%) in both samples were also found in considerable amount.
Conclusion: This result shows that thepeel of *Azanzagarckeana*, which is ordinarily considered as waste, may possess nutritional benefits

Keywords: Keywords; Azanza, Garckeana, Composition, Peel, Proximate, Seed.

1. INTRODUCTION

Plants have maintained a backbone in everyday existence providing food, oxygen and serving as raw materials for so many industrial products. Azanzagarckeana (F. Hoffm.) Exell and Hillc commonly known as Goron Tula, (kola of Tula) in Hausa, belong to the family Malvaceae. In Nigeria, it is grown only in Tula village of Gombe State. It is a multipurpose edible fruit of tropical Africa. It is an important medicinal and food plant commonly used in Northern Nigeria as herbal medicines [1]. Azanzagarckeana has also been reportedly use in traditional medicine for treatments of management of more than 20 human diseases and ailments. The plant is used as herbal remedy for diseases like cough, chest pains, infertility, menstruation abnormalities, sexually transmitted infections and hepatic impairments [2].
The fruit bark and leaves of *Azanzagarkeana*are considered to be of great importance [3]. For instance, in many countries the edible indigenous fruit are widely distributed and used to supplement their diets [3, 4]. In addition, the ripe fruit carpels are widely used for food as well as food additives [5, 6]. Moreover, marketing surveys have revealed that A. garckeana already has commercial potential as the fruit is processed and marketed for household

income [7]. In Nigeria, it has a high social and economic value [3, 8]. Consequently, A. karkeana can be a great resource for the people living in the range lands. Nevertheless, there is limited information on its composition as well as its utilization in value addition of foods [9].

A. garckeana have been shown to have excellent nutritive value. They have been reported to be high in fibre, total carbohydrates, protein level, ash and low in fat [7, 10]. Similarly, Nkafamiya, Ardo [10] reported that A. garckeana can supply nine non-essential amino acids (alanine, arginine, aspartic acid, cysteine, glycine, glutamic acid, proline, serine and tyrosine) and eight essential amino acids (histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine and valine). This shows that this fruit may be important in the fight against protein energy malnutrition (PEM) [9]. Several reports indicate that, the fruit to contain variety of minerals [7, 8, 10, 11] as well as a massive amount of vitamin A, B1, B2, C and E [10-12]. Furthermore, various classes of bioactive metabolites including alkaloids, ascorbic acid, carotenoids, flavonoids, glucosides, phenols, lipids, tannins, saponinssteroids, terpenoidstriterpenes and cumarinshave been isolated from A. garckeana[1, 10, 12, 13]. However, more research is needed to provide adequate nutrient databases to promote its utilization in food. According to Grivetti and Ogle [14], the lack of adequate nutrient databases, due to limited and uneven compositional data, limits educational efforts to improve diets in many developing countries. Hence, this study aimed to evaluate proximate composition of *Azanzagarckeana*seed and peel.

2. MATERIALS AND METHOD

2.1 Sample Collection and Processing

Azanzagarckeana (Goron Tula) were purchase from Sokoto old market. It was authenticated in the botany unit, Biology department of Sokoto State University. The collected sample was peeled and then cut into small pieces separately before been dried at 28±2^{o}C for three weeks. The dried samples were grounded using pestle and mortar to obtain the powder which was used for the analysis.

2.2 Proximate Analysis

The method of Association of Official Analytical Chemistry AOAC [15] was used for general proximate analysis of the sample.

2.2.1 Determination of Moisture Content

A clean crucible was dried to a constant weight in hot air oven, cooled in a desiccator and weighed (W_1). 2g of the sample was placed in the crucible and weighed (W_2) and dried in the oven for eight hours. The crucible and its contents were cooled in a desiccator and weighed (W_3). The procedure was continued until a constant weight was obtained out of which the percentage moisture was calculated using the formula in equation.

$$\% \text{ moisture } = \frac{W2 - W3}{W2 - W1} X\ 100$$

Where W_1 = Weight of empty crucible

W_2 = Weight of sample + Crucible before drying

W_3 = Weight of dry sample + Crucible after drying

2.2.2 Determination of total Ash Content

2g of the finely ground sample was weighed (W_2) into a previously weighed clean crucible (W_1) which had been ignited in the muffle furnace at 600^{0}C for one hour and cooled in a

desiccator. The crucible containing the sample was heated in a muffle furnace at 600^0C for five hours to burn off all the organic matter after which the crucible was cooled in a desiccator and weighed (W_3). The percentage ash of the sample was calculated using the formula in the equation.

$$\% \text{ Ash } = \frac{W3 - W1}{W2 - W1} X\ 100$$

Where W_1 = weight of empty crucible
W_2 = weight of dry sample + empty crucible
W_3 = weight of ash sample

2.2.3 Determination of lipid content

Soxhlet extractor with reflux condenser and a small round bottom flask was used. 2g (W_0) of the grounded sample was placed in the thimble. The mouth of the porous thimble was covered with clean white cotton in order to distribute the draping n-hexane and then placed in the extractor. Extraction flask which was pre-weighed (W_1), was half filled with n-hexane was heated for five hours. After extraction, the n-hexane was evaporated in a water bath and the extraction flask coating the oil was weighed (W_2) to know the content of the crude lipid. The percentage lipid of the sample was calculated using the formula in the equation.

$$\% \text{ Crude lipid } = \frac{W2 - W1}{W0} X\ 100$$

Where W_0 = Weight of sample
W_1 = Weight of empty flask
W_2 = Weight of flask containing oil

2.2.4 Determination of Crude Fibre

The residue (2g) obtained from crude lipid extraction was placed in a conical flask; 200ml of distilled water and 20ml of H_2SO_4 was added and fixed on a heater and boiled for 30 minutes to maintain a constant volume. The sample was filtered in a muslin cloth, rinsed with warm water and spatula was used to scrape the sample into the flask, 20ml of $H_2SO_4$and 10% of NaOH was added to the contents. The content was placed for 30minutes then filtered with muslin cloth and the sample was rinsed with petroleum ether. It was then allowed to drain and the residue was scraped into a crucible and placed in an oven to dry for one hour at 105^0C and allowed to cooled in a desiccator and weighed (W_1). It was then placed in a muffle furnace to ash for two hours at 600^0C and allowed to cool in a dessicator and weighed (W_2). Percentage fibre was then calculated using the equation below.

$$\% \text{ Crude ibre } = \frac{W1 - W2}{\text{Weight of sample}} X\ 100$$

Where W_1 = weight after drying
W_2 = weight after ashing

2.2.5 Determination of Crude Proteins

Digestion: 2g of the grounded sample was collected in a clean dry 500ml Kjeldahl flask. One tablet of the mixed catalyst and 20ml of H_2SO_4 was added. Little amount of distilled water was also added into the flask to digest the organic matter present. The flask was heated in a fume cupboard until clear solution was obtained. The content was cooled and transferred into a volumetric flask.

1. Distillation: 10ml of the aliquot was pipetted into a Kjeldahl flask and make the volume up to 50ml with distilled water. 20ml of 40% NaOH was added to extract the

ammonia out of the sample which will be evaporated into 20ml boric acid indicator that was used as the receiver of nitrogen extracted. The ammonia was liberated into the boric acid until the volume is made up to 40mls in the conical flask. The color changes from pink to green.

2. Titration: the collected sample with ammonia was then titrated against 0.1N HCl to end point which give the actual amount of protein in the sample. The color changes from green to pink at the end point and the titre value was recorded.

$$\% \text{ Nitrogen} = \frac{\text{Ty x N x 0.014 x dilution factor (50ml)}}{\text{Weight of sample x mls of aliquot}} \text{X } 100$$

Where Tv = titre value
N = normality of acid (0.1N)

Dilution factor = 50
% Crude protein = %N x Conversion factor (6.25)

2.2.6 Carbohydrate by Difference

Total carbohydrate is determined by subtracting the total percentages of crude protein, crude lipid, moisture content and ash from 100%. Thus,
% Total Carbohydrate = (% crude protein + % crude lipid + % ash + % moisture).

3. RESULTS AND DISCUSSION

The result for the proximate composition for the seed and peel was shown in table 1. The result revealed that, there was no significance difference in moisture content of the samples. Nkafamiya, Ardo [10]reported moisture content of 6.50% from *Azanzagarkeana*fruit similar to that obtained from the seed. However, the result is at variance with that of Suliman, Difa and Salih [16] and Abass and Ahmed [7] who reported moisture content of 13.542% and 15.07% respectively. The low moisture content in both samples would hinder microbial growth and higher shelf life.

Table 1. Proximate composition of Seed and Peel of A. kackeana

Nutrients %	Seed	Peel
Moisture	6.66±1.66[a]	5.00±0.32[a]
Lipid	6.60±1.21[a]	10.70±0.20[b]
Ash	5.10±1.33[a]	8.33±1.62[a]
Crude Protein	4.85±0.89[a]	10.01±0.23[b]
Fibre	29.00±0.45[a]	28.05±0.62[a]
Carbohydrate	47.88±1.70[a]	45.32±1.65[a]

Values were expressed as mean ± standard error of the mean of three replicates and significance difference between the means was determine using the mean test at (P≤0.005) mean in the raw followed by the same letter (S) are not significantly difference at 5% level.

It was found that peel contains higher crude lipidand crude protein than the seed (table 1). The high crude lipid content observed in this study is much higher than those reported in literatures [7, 10, 16, 17]. This may be as a result of difference in climate and soil condition in which the plant developed. Moreover, this finding indicates that the *Azanzagarkeana* can be an excellent source of fat. Conversely, the protein content of the seed (10.01%) is slightly lower than that reported by Saka and Msonthi [17] (12.0%) and Nkafamiya, Ardo [10] (12.0%) and higher than that of [7]. On the other hand the finding is in agreement with that

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of[16](10.05%). As for the peel, the protein content is lower than those found on literature [7, 10, 16, 17]. There is also significance difference between the seed and peel crude protein (CP) with peel having higher CP.
The ash content of seed and peel are not statistically significant (table 1). Since ash content is a measure of minerals content, it can be deduce that, the peel has higher mineral content than the seed. While the ash content of the peel is somewhat higher than that of [16] (7.3%) and [10] (6.7%), it is also higher than that [7] (4.04%).
The crude fibre of the samples was not significantly different (P<0.05) (table 1). Both the results were in disagreement with that of [16] and [10] who reported 45.424% and 45.3% respectively. The results are also slightly lower than that reported by [7] who observed 30.58%.
There was no significant differences (P<0.05) in carbohydrate content of the samples (table 1). The results obtained for carbohydrate were lower when compared to higher content of carbohydrate (87.65%) obtained by [7].
The Appreciable amount of Carbohydrate and lipid makes*Azanzagarkeana* to be a good source of energy. Despite the low fibre content than found in literatue, intake of *Azanzagarkeana* may help reduce serum cholesterol.

Comment [Mt4]: literature

4. CONCLUSION

The presence of carbohydrate and lipid in both which is a good source of energy, the plant also have higher content of lipid which is also good source of energy and help in other bodymetabolism. The plant also has desired fibre content which helps in digestion and prevents the accumulation of cholesterol and hypertension.

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