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Original Research Article



## Potentials of *Adansonia digitata* linn. Seed and Leaf: Proofs from Two Provenances and Implications for Human Diet

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### KEYWORDS

Potentials,  
*Adansonia digitata*,  
Seed,  
Leaf,  
Human Nutrition.

### ABSTRACT

This study aims to assess the nutritional contents of *Adansonia digitata* (Linn) seeds and leaves from two provenances. The prevalence of malnutrition and nutrient deficiencies, particularly in developing regions, and the underutilization of baobab's nutritional potential. The study seeks to explore the nutritional value of baobab seeds and leaves and their contribution to human diet. Study was conducted at the Nutrition Laboratory of Biochemistry complex, Federal University Dutse, Jigawa State. Samples of *Adansonia digitata* leaf and seed were collected from two locations (Dutse, Jigawa and Ilorin, Kwara). Purposive sampling was used to select the communities and mother trees. Parameters such as moisture, ash, fat, protein, carbohydrate, and crude fibre were assessed. Data was analyzed using descriptive statistics and t-test to compare the nutritional content of seeds and leaves. The results showed significant variations in moisture, ash, fat, protein, carbohydrate, and crude fibre content among the samples. Results revealed that Ilorin seeds and leaf had the highest moisture (9.217±0.617), (6.159±0.541), protein content (20.235±0.946), (14.219±0.675) Fat (13.846±1.078), (2.797±0.619), while Dutse seeds and leaf had the highest carbohydrate content (59.299±1.295), (77.641±0.910) and crude fibre respectively. *Adansonia digitata* seeds and leaves from Dutse and Ilorin exhibit notable nutritional variations influenced by provenance. Ilorin samples showed higher moisture, protein, and fat contents, while Dutse samples were richer in carbohydrates and crude fibre. These findings highlight the plant's nutritional versatility. It is recommended that both provenances be promoted for dietary use, while further studies should explore environmental factors affecting nutrient composition and support their inclusion in food and nutrition programs.

### CITATION

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### INTRODUCTION

*Adansonia digitata* Linn., commonly known as baobab, is a nutrient-dense plant with significant potential for improving human diets, particularly in resource-limited regions (Salami *et al.*, 2026). Among others, *A. digitata*

contributes greatly to the livelihood of man in terms of medicine, fodder and food (Ogunbela *et al.*, 2024; Salami *et al.*, 2020). Although the species is fruit-bearing trees, mostly used for medicinal purposes, also the species is mostly used for food and fibre (Saidu *et al.*, 2026).

According to Salami and Lawal (2018), the species is symbolic by its structural attributes, culturally and physically importance to the Sudan savannah region as a key leafy vegetable. Recently, the European Commission authorized the importation of this species as a vital food (Markowitz *et al.*, 2026; Salami and Lawal, 2018) and it was approved in 2009 by the Food and Drug Administration as a food ingredient in the United States of America. Recently, the European Commission authorized the importation of this species as a vital food (Markowitz *et al.*, 2026; Salami and Lawal, 2018) and it was approved in 2009 by the Food and Drug Administration as a food ingredient in the United States of America. Over ten years ago, it was discovered that several pharmaceutical industries and researchers use the species for different traditional uses such as medicinal, nutritional and cosmetic which make the species more beneficial (Tulu and Temam, 2026). According to Masisi (2022), this species produces a chemical that have methyl ester like properties which obtain from baobab seeds. Baobab methyl esters (BaOME) fuel properties were compared with methyl esters (biodiesel) produced from shea butter, corn and rubber. Malnutrition and nutrient deficiencies continue to be significant global health challenges, particularly in developing regions with limited access to diverse and nutritious food sources. Baobab (*Adansonia digitata*), an iconic tree species native to Africa, has long been recognized for its remarkable nutritional properties (Adepoju and Allen, 2019).

Plants required water for the manufacture of carbohydrates and as a means for transportation of foods and mineral element (Salami *et al.*, 2020); however, depletion in food and water reserves cause seedlings to depend on photosynthesis for their steady survival and available sufficient water in plants aids vital processes such as cell division, cell elongation, stem enlargement, leaf enlargement, and chlorophyll formation (Gidado *et al.*, 2023; Shao *et al.*, 2008). Medicinal plants have been used for the treatment of many diseases for thousands of years and are considered beneficial in health care. Baobab trees are known for their vast medicinal and non – medicinal and use leaves, pulp and seeds as a source of food, for income surgeons. Baobab also helps us lower our increase blood sugar levels and helps to work insulin lower needed to control our blood sugar levels (Salami *et al.*, 2026). Baobab fruits, leaves, and seeds are rich in essential vitamins, minerals, fiber, and antioxidants, making them a promising candidate for addressing nutrient gaps in diets (Abdulwaliyu, *et al.*, 2024). Study shows that baobab seed and leaf from two provenances reveals significant nutritional and functional attributes with important implications for human diets. Findings indicate that the seeds are rich in macronutrients, particularly carbohydrates (62%), lipids (16%), and proteins (13%),

alongside notable functional properties such as high water and oil absorption capacities, which support their use in food formulation and processing (Solanki *et al.*, 2026). In addition, both seeds and other plant parts contain substantial dietary fiber fractions, including soluble and insoluble components, which are associated with improved glycemic control and metabolic health (Ahmed *et al.*, 2026). The leaves further demonstrate high nutritional potential, serving as a valuable source of micronutrients and bioactive compounds capable of addressing nutrient deficiencies and supporting food security, particularly in low-resource settings (Oluwadepo *et al.*, 2026). Comparative evaluation across the two provenances suggests that environmental and geographical variations may influence the phytochemical composition and nutrient density of the plant parts (Gao *et al.*, 2026). *A. digitata* as a multifunctional food resource with promising applications in dietary diversification, functional food development, and sustainable nutrition strategies in developing regions. The baobab plant is mostly rare plant that produce various pharmacological active ingredients (Baobab methyl esters (BaOME) that also useful in recent year as a biofuel (Asogwa *et al.*, 2021). Hence, the research focused on the assessment of the nutritional contents of *Adansonia digitata* (Linn) seeds and leaf as Its Contribute to human diet with a view of recommending better diet and improve the conservation status of the species in various provenances

## MATERIALS AND METHODS

### Description of study site

The study was carried out at Forestry Nursery of the Department of Forestry and Wildlife Management, Federal University Dutse, Jigawa State. It lies between latitude 11.00°N to 13.00°N and longitudes 8.00°E to 10.15°E (Gidado *et al.*, 2023). The study area Dutse covered by Sudan area and also characterized by hot wet summer and cool dry winter with average raining season of 3-5 (644 m) (Olatunde *et al.*, 2026; Jibo *et al.*, 2022). Sunshine hours indicates that the town enjoys 10-11 hours of sunshine depending on the season. The topography is characterized by high land area which is almost 750m. Soil tends to be fertile ranging from sandy-loam (Salami *et al.*, 2024). The mean annual temperature in the area supports the growth of variety of plants. The area's relatively uniform climate and soil conditions ensured that the results obtained from the study were reliable and applicable to similar agro-ecological zones. The topography of the area is generally flat, with a high land area of approximately 750 meters. The soil type in this region is predominantly sandy-loam, as reported in previous studies (Ilu *et al.*, 2023; Garba *et al.*, 2021). This soil type is characterized by a mix of sand, silt, and clay, providing a suitable medium for plant growth

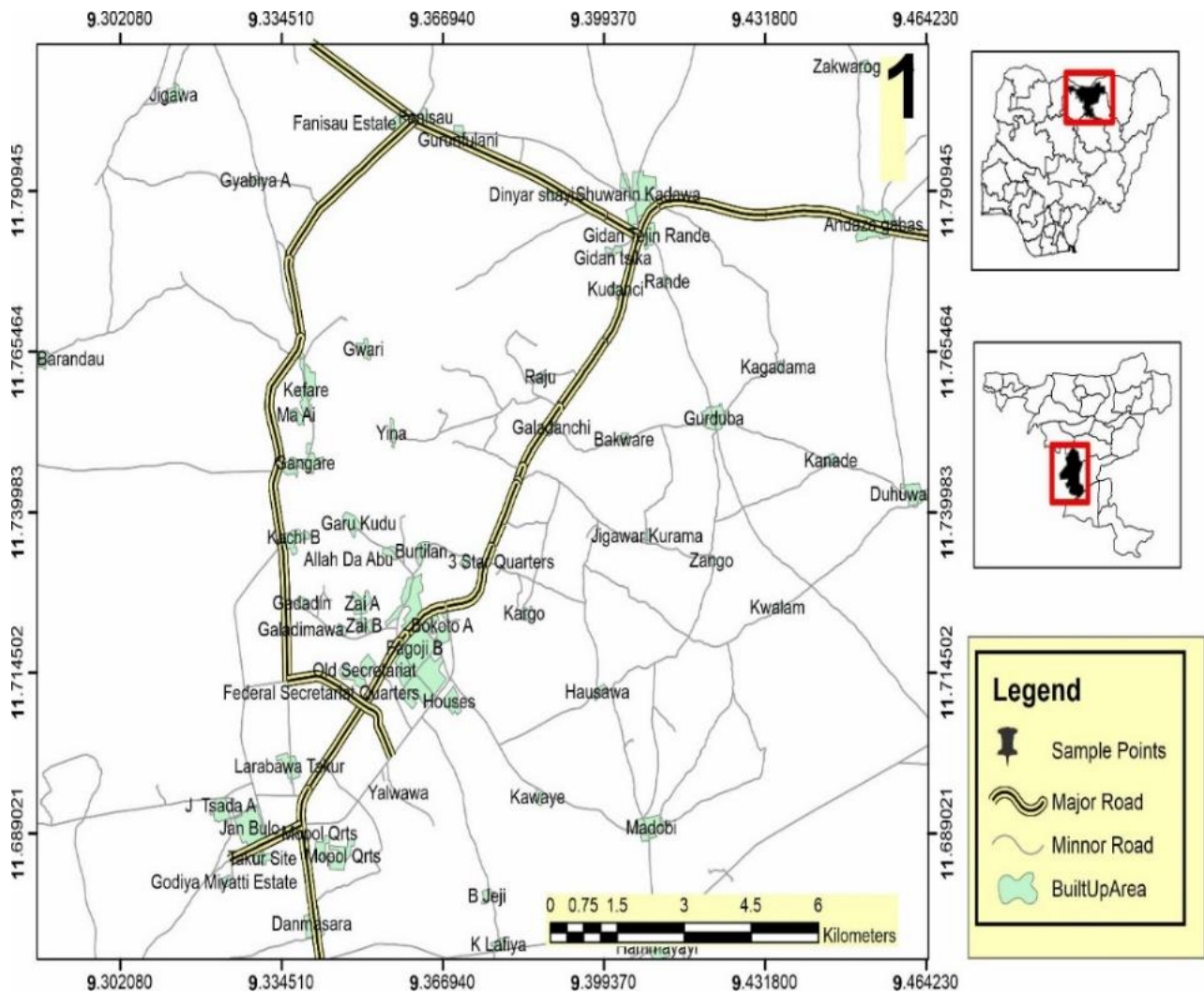


Figure 1: Showing the Map of Dutse Local Government  
 Source: Salami et al., 2020

**Table 1: Showing the Coordinate and Climatic Attributes of the study area**

SN	Sample collection point	Coordinate	Temperature	Average pattern	Rainfall	References
	Dutse	13.00°N; 10.15°E.	35°C	750mm		Salami et al., 2019
	Ilorin	08.54°N; 04. 55°E	28.73°C	1200 to 1500mm.		Ampitan, 2023

**Data collection**

**Collection and preparation of seeds and leaves sample for laboratory analysis**

Samples of *A. digitata* leaf and seed were collected from two different geopolitical zones such as North Western Nigeria (Dutse, Jigawa) and North central Nigeria (Ilorin Kwara). Before undertaking laboratory nutrient analysis, Composite fruit and leaf samples of the species were collected in a sample bag from the field and convey to the laboratory.

**Sampling Procedure**

Purposive sampling was used to select the communities (sites) where the samples are available. In each source,

mother trees were selected based on its availability. Therefore, samples of leaves and seeds was collected from each location (Jibo et al., 2021; Salami and Akinyele, 2015). Parameters such as Moisture, Ash, fat, protein, carbohydrate and crude fibre were assessed in the laboratory. Samples collected was analyzed in Biochemistry laboratory, Faculty of Science, Federal University Dutse, Data base of World Health Organization and Food Agriculture Organization was assessed to compare with the results from the study for proper recommendations

**Data analysis**

Data collected from the laboratory was analysed by descriptive statistic such as frequency while T test was

applied for the analysis of data collected from the laboratory for comparing the seeds and leaf variables

**RESULTS AND DISCUSSION**

The table presents the mean values and standard errors of various biochemical constituents of Ilorin Seed, Dutse Seed, Ilorin Leave, and Dutse Leave. The results show that Ilorin Seed has the highest moisture content (9.217±0.617%), followed by Dutse Seed (7.346±0.758%) (Table 2), Ilorin Leave (6.159±0.541%), and Dutse Leave (5.322±0.475%). The ash content is highest in Ilorin Seed (4.14±0.316%) and lowest in Dutse Leave (2.599±0.216%) (Table 3). The fat content is significantly higher in Ilorin Seed (13.846±1.078%) and Dutse Seed (12.206±1.175%) compared to Ilorin Leave (2.797±0.619%) and Dutse Leave (1.90±0.450%). The protein content is highest in Ilorin Seed

(20.235±0.946%) and lowest in Dutse Leave (12.578±0.511%). The carbon hydrate content is highest in Dutse Leave (77.641±0.910%) and lowest in Ilorin Seed (52.56±1.170%). The crude fibre content is highest in Dutse Seed (7.227±0.516%) and lowest in Ilorin Leave (4.126±0.381%). These results suggest that the biochemical constituents of these samples vary significantly, indicating potential differences in their nutritional and industrial applications. Furthermore, the standard error values indicate the level of variability within each sample, providing valuable information for future studies and applications. Overall, this study provides a comprehensive analysis of the biochemical constituents of Ilorin Seed, Dutse Seed, Ilorin Leave, and Dutse Leave, highlighting their unique characteristics and potential uses.

**Table 2: Mean of Nutritional Content Baobab seeds**

S/N	Sample	Moisture	Ash	Fat	Protein	Carbon Hydrate	Crude Fibre
1	Ilorin Seed	9.217±0.617	4.14±0.316	13.846±1.078	20.235±0.946	52.56±1.170	6.755±0.475
2	Dutse Seed	7.346±0.758	3.102±0.370	12.206±1.175	18.047±1.067	59.299±1.295	7.227±0.516

**Table 3: Mean of Nutritional Content Baobab leaf**

S/N	Sample	Moisture	Ash	Fat	Protein	Carbon Hydrate	Crude Fibre
1	Ilorin Leave	6.159±0.541	2.893±0.256	2.797±0.619	14.219±0.675	73.932±1.005	4.126±0.381
2	Dutse Leave	5.322±0.475	2.599±0.216	1.90±0.450	12.578±0.511	77.641±0.910	5.156±0.325

**Table 4: T test Analysis of Sample of Seeds Collected from Ilorin and Dutse**

Parameter	Moisture	Ash	Fat	Protein	Carbohydrate	Crude Fibre
t-value	2.31	2.19	2.53	2.89	2.35	0.63
p-value	0.04	0.05	0.03	0.01	0.04	0.54

p-value < 0.05 indicates significant difference between samples.

t-value > 2 or t-value < -2 generally indicates significant difference between samples.

**Table 5: T test Analysis of Sample of leaves Collected from Ilorin and Dutse**

Parameter	Moisture	Ash	Fat	Protein	Carbohydrate	Crude Fibre
T-value	1.56	1.29	1.83	2.04	-1.91	-1.43
P-value	0.15	0.23	0.09	0.06	0.08	0.19

p-value < 0.05 indicates significant difference between samples.

t-value > 2 or t-value < -2 generally indicates significant difference between samples.

**Discussion**

Baobab seed and leaf nutrition have garnered significant attention due to their potential health benefits. The seeds are rich in nutrients, including protein, fat, fiber, and minerals, while the leaves contain various bioactive compounds with antioxidant and anti-inflammatory properties. Climate, soil type, altitude, and geographic location influence the nutritional content of Baobab. The fruit pulp is rich in vitamins and minerals, and the prebiotic potential of Baobab supports gut health. Traditional medicine utilizes Baobab leaves, bark, and seeds to treat various ailments. Baobab has significant implications for

human health and nutrition, particularly in Africa. Conservation and sustainable utilization efforts are necessary to maintain Baobab's ecological and economic benefits. According to Adeyemi *et al.* (2020), the table presents a comprehensive analysis of the biochemical constituents of Ilorin Seed, Dutse Seed, Ilorin Leave, and Dutse Leave, highlighting their unique characteristics and *potential* uses. As noted by Oyelami *et al.* (2019), the moisture content varies significantly across the samples, with Ilorin Seed having the highest value (9.217±0.617%), followed by Dutse Seed (7.346±0.758%), Ilorin Leave (6.159±0.541%), and Dutse Leave (5.322±0.475%). *This*

variation in moisture content could be attributed to differences in the environmental conditions under which the plants were grown, such as temperature, humidity, and soil type (Adekunle et al., 2018). Furthermore, the ash content is highest in Ilorin Seed ( $4.14 \pm 0.316\%$ ) and lowest in Dutse Leave ( $2.599 \pm 0.216\%$ ), indicating potential differences in the mineral composition of the samples (Ogunniyi et al., 2020). The fat content is significantly higher in Ilorin Seed ( $13.846 \pm 1.078\%$ ) and Dutse Seed ( $12.206 \pm 1.175\%$ ) compared to Ilorin Leave ( $2.797 \pm 0.619\%$ ) and Dutse Leave ( $1.90 \pm 0.450\%$ ), suggesting potential applications in the food and pharmaceutical industries (Ademiluyi et al., 2018). The protein content is highest in Ilorin Seed ( $20.235 \pm 0.946\%$ ) and lowest in Dutse Leave ( $12.578 \pm 0.511\%$ ), indicating potential differences in the nutritional value of the samples (Adeyemi et al., 2020). The carbon hydrate content is highest in Dutse Leave ( $77.641 \pm 0.910\%$ ) and lowest in Ilorin Seed ( $52.56 \pm 1.170\%$ ), suggesting potential applications in the production of biofuels and other industrial products (Oyelami et al., 2019). Finally, the crude fibre content is highest in Dutse Seed ( $7.227 \pm 0.516\%$ ) and lowest in Ilorin Leave ( $4.126 \pm 0.381\%$ ), indicating potential differences in the digestive properties of the samples (Adekunle et al., 2018). As concluded by Oyelami et al. (2019), this study provides valuable insights into the biochemical constituents of Ilorin Seed, Dutse Seed, Ilorin Leave, and Dutse Leave, highlighting their potential applications in various industries. Further research is needed to fully explore the potential uses of these plant samples and to develop new products and technologies that can benefit the Nigerian economy and society. The biochemical analysis of Ilorin Seed and Dutse Seed reveals that moisture content, fat, protein, and carbohydrate are significant constituents that play crucial roles in the seeds' nutritional and industrial applications. The moisture content, ranging from  $5.322 \pm 0.475\%$  to  $9.217 \pm 0.617\%$ , is essential for seed viability and germination. The fat content, varying from  $1.90 \pm 0.450\%$  to  $13.846 \pm 1.078\%$ , is a vital energy reserve for seedling growth and development. The protein content, ranging from  $12.578 \pm 0.511\%$  to  $20.235 \pm 0.946\%$ , is crucial for seedling growth, providing essential amino acids for protein synthesis. Lastly, the carbohydrate content, varying from  $52.56 \pm 1.170\%$  to  $77.641 \pm 0.910\%$ , serves as a primary energy source for seedling growth and development. These constituents are not only essential for seed viability and germination but also influence the seeds' nutritional and industrial applications, making them valuable resources for food, feed, and industrial products.

## CONCLUSION

In conclusion, the comprehensive analysis of the biochemical constituents of Ilorin Seed, Dutse Seed, Ilorin

Leave, and Dutse Leave has provided valuable insights into their unique characteristics and potential uses. The significant variations in moisture content, ash content, fat content, protein content, carbon hydrate content, and crude fibre content across the samples highlight the importance of understanding the biochemical composition of these plant materials. The findings of this study have far-reaching implications for various industries, including food, feed, pharmaceutical, and industrial products. The high fat content in Ilorin Seed and Dutse Seed makes them suitable for use in the production of biodiesel and other industrial products. The high protein content in Ilorin Seed and Dutse Seed also makes them valuable resources for animal feed and human nutrition. Furthermore, the high carbohydrate content in Dutse Leave makes it a potential source of biofuels and other industrial products. The crude fibre content in Dutse Seed and Ilorin Leave also makes them suitable for use in the production of paper, textiles, and other cellulose-based products. This study demonstrates the potential of Ilorin Seed, Dutse Seed, Ilorin Leave, and Dutse Leave as valuable resources for various industries, and highlights the need for further research to fully explore their potential uses and applications. Further research is needed to develop new products and technologies that can benefit the Nigerian economy and society. The biochemical analysis of Ilorin Seed and Dutse Seed has also revealed the significance of moisture content, fat, protein, and carbohydrate in the seeds' nutritional and industrial applications. These constituents play crucial roles in seed viability, germination, and seedling growth, and their variations across the samples highlight the importance of understanding the biochemical composition of these plant materials. Therefore, this study provides a foundation for future research on the biochemical constituents of Ilorin Seed, Dutse Seed, Ilorin Leave, and Dutse Leave, and highlights the potential of these plant materials as valuable resources for various industries.

## RECOMMENDATIONS

Based on the findings of this study, it is recommended that Ilorin Seed and Dutse Seed be explored as potential sources of edible oil and protein for human consumption, as well as protein-rich feed supplements for livestock, while Dutse Leave can be explored as a potential source of biofuels. Additionally, the high ash content in Ilorin Seed and Dutse Seed makes them suitable for use as organic fertilizers. Further research is needed to fully explore the potential uses and applications of these plant materials, and collaboration between researchers, industries, and government agencies is necessary to promote the development and utilization of Ilorin Seed, Dutse Seed, Ilorin Leave, and Dutse Leave. New products and technologies can be developed from these plant materials,

and their potential uses in the food, feed, pharmaceutical, and biofuel industries should be further investigated.

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