

EVALUATION OF THE NUTRITIONAL POTENTIALS OF BAOBAB (*Adansonia digitata*) AS SMALL RUMINANTS FEED

*¹Dahiru, M., ²Umar, A.M., ²Abdurrahaman, S.L., ¹Muhammad, Y., ¹Muhammad. A.S and ³Kani, M.M.

¹School of Agriculture, Department of Animal Health and Production, Binyaminu Usman Polytechnic, P.M.B. 013 Hadejia, Jigawa State, Nigeria

²Faculty of Agriculture, Department of Animal Science, Federal University Dutse, P.M.B. 7156, Dutse, Jigawa State, Nigeria

³Ministry of Agriculture and Natural Resources Dutse, Jigawa State, Nigeria

*Corresponding author: mansurdahiru@bupoly.edu.ng (+234 706 147 2838)

ABSTRACT

This research was conducted to evaluate the nutritional potentials of *Adansonia digitata*. The experiment was conducted at the Department of Animal Health and Production, Binyaminu Usman Polytechnic, Hadejia, Jigawa State, Nigeria. Twenty (20) *Adansonia digitata* trees were selected within four (4) Communities, followed by identified Five (5) *Adansonia digitata* trees per Community. After that, from each tree, samples were collected manually and making one comprehensive sample from fresh and dried leaves, fruits pulp and seeds making four treatments designated as T1, T2, T3 and T4 respectively and were replicated three times. The results were significantly ($P < 0.05$) different in the parameters assessed. Fresh leaves resulted in highest moisture content (9.90%) while the seeds had the lowest value (1.53%). Ash content was highest in dried leaves (12.00%) whereas fresh leaves resulted in smallest value (3.80%). Seeds revealed in highest CP content (14.00%), while the fruits pulp had the lowest value (3.00%). Fruits pulp had the highest crude fibre (25.20%), while the fresh leaves had the lowest value (3.30%). Neutral detergent fibre (NDF) content was higher in fresh leaves (54.00%) whereas the fruits pulp had the lowest (18.40%). The highest value of acid detergent fibre (ADF) 36.00% was also recorded in fresh leaves while fruits pulp also had the lowest value 12.00%.

Keywords: Crude fibre, Nutritional potential, Pulp, Seed and Small ruminant

INTRODUCTION

Fodder trees and shrubs constitute a vital component in livestock productivity in the arid and semi-arid tropical zones where about 52% of the cattle, 57% of the sheep, 65% of goats and 100% of the camels in tropical Africa are found. However, these fodder trees and shrubs play some essential and multiple roles in the balance of the Sahelian and Sudanian ecosystems exploited by man and his animals (Abdurrahaman *et al.*, 2015). The tree and shrubs legume forages are rich in most essential nutrients such as proteins and minerals and tend to be more digestible than grasses and crops residues. They also serve other useful purposes such as the provision of food and drugs. Some parts of browse species can be found during the dry season including pods, fruits and leaves. The leaves of the evergreen tree and shrub are used as emergency food by sheep and goat in the semi-arid region of North-Eastern Nigeria (Njidda, 2010). Baobab tree (*Adansonia digitata*) is one of the indigenous tree species whose drought tolerance, ability to store water during raining season for use during dry season, combat desertification, prevent erosion, and improve the soil nutrients and adaptability has made it particularly suitable to the climate condition of sudano-sahelian region of Nigeria (Shuaibu, 2014). The tree is important to the livelihood of the people in arid zones, because it provides food, shelter and medicine as well as material for hunting and fishing (Gebauer *et al.*, 2002). Small ruminants occupy a substantial fraction of the livestock production in Nigeria due to their ability to utilize readily available and cheap fibrous feeds that are otherwise not consumed by humans and their monogastric counterpart. Key to their ability to utilize feeds of high fiber content is the existence of rumen fibro-lytic bacteria (Abdurrahaman *et al.*, 2021). This study was conducted to evaluate the nutritional potential of *Adansonia digitata*'s fresh, dried leaves, fruits pulp and seeds and determine the best part and form to feed small ruminant.

MATERIALS AND METHOD

Description of the study area

The research was conducted in Hadejia Local Government Area, Jigawa State, Nigeria. Hadejia lies between latitudes $12^{\circ} 13' - 13^{\circ} 60' N$ and longitudes $9^{\circ} 22' - 11^{\circ} 00' E$. The climate of the area is semi-arid. It is characterized by long dry season from October to May and a short wet season from June to September. The location has an average annual temperature of $27.2^{\circ}C$, annual rainfall 600mm to 762mm. However, the environment is conducive to different species of livestock production, such as cattle, sheep, goats, rabbits, donkeys, horses and poultry (Dahiru *et al.*, 2022).

Sampling technique and treatments

Twenty (20) *Adansonia digitata* trees within the study area were selected. The procedure is that; Four (4) Communities were selected, followed by identified Five (5) *Adansonia digitata* trees per Community. Thereafter from each tree, samples of fresh leaves and matured fruits were harvested manually and making one comprehensive sample of fresh and dried leaves, fruits pulp and seeds of *Adansonia digitata* making four (4) treatments as shown in Table 1.

Table 1: Sample Collected from Different Parts of *Adansonia digitata*

Treatment	Part of <i>Adansonia digitata</i>
T1	Fresh Leaves
T2	Dried Leaves
T3	Fruits pulp
T4	Seeds

T1= fresh leaves, T2= dried leaves, T3= fruit pulp and T4= seeds

Chemical analysis

The collected samples were oven dried at 65°C for 48 hours and determination of moisture was carried out. Thereafter sub-samples were grounded in hammer miller to pass a 1mm mesh sieve for the determination of crude protein (CP), crude fibre (CF), ether extract (EE) and ash (ASH) according to procedures described by AOAC (2010). Fibre fractions; neutral detergent fibre (NDF) and acid detergent fibre (ADF) according to procedures as described by Van Soest *et al.* (1991). Hemicellulose was calculated as the difference between NDF and ADF.

Statistical analysis

All the data collected from the nutritional potential evaluation were subjected to analysis of variance (ANOVA) using General Linear Model of SAS 2013. While means differences were separated by Fisher's least significant difference (FLSD) at 5% level of probability.

RESULTS AND DISCUSSION

Results

The proximate compositions of different parts of *Adansonia digitata* were presented in Table 2. The parameters evaluated were significantly difference ($p < 0.05$). Fresh leaves (T1) resulted in highest moisture content (9.90%) while the seeds (T4) had the lowest value (1.53%). In term of ash content dried leaves (T2) had the highest value (12.00%) whereas fresh leaves (T1) resulted in smallest value (3.80%). Seeds (T4) revealed in highest CP content (14.00%), while the fruits pulp (T3) had the lowest value (3.00%). The fruits pulp (T3) had the highest crude fibre content value of 25.20%, while the fresh leaves (T1) had the lowest value (3.30%). The value of ether extract (EE) content was higher in the seeds T4 (15.70%) whereas dried leaves (T2) revealed in lowest value (5.00%).

Table 2: Proximate Composition of Different Parts of *Adansonia digitata*

Parameters (%)	Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
Moisture	9.90 ^a	7.83 ^b	8.80 ^{ab}	1.53 ^c	0.361
Ash	3.80 ^c	12.00 ^a	4.50 ^b	4.20 ^b	0.483
CP	11.00 ^b	11.00 ^b	3.00 ^c	14.00 ^a	0.910
CF	3.30 ^d	14.60 ^b	25.20 ^a	5.50 ^c	0.532
EE	8.50 ^{ab}	5.00 ^c	7.00 ^b	15.70 ^a	0.683

The fibre fractions of different parts of *Adansonia digitata* evaluated are presented in Table 3. The values were significantly difference ($p < 0.05$). The results revealed that neutral detergent fibre (NDF) content was higher in fresh leaves (T1) with value of 54.00% whereas the fruits pulp (T3) resulted in lowest value 18.40%. The highest value of acid detergent fibre (ADF) 36.00% was also recorded in fresh leaves (T1) while fruits pulp (T3) also had the lowest value 12.00%. Hemicellulose content ranges from 6.40 - 23.00% in fruits pulp (T3) and seeds (T4) respectively.

Table 3: Fibre Fractions of Different Parts of *Adansonia digitata*

Parameters (%)	Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
NDF	54.00 ^a	35.40 ^c	18.40 ^d	40.00 ^b	1.333
ADF	36.00 ^a	28.20 ^b	12.00 ^d	17.00 ^c	1.753
HEM	18.00 ^b	7.20 ^c	6.40 ^d	23.00 ^a	0.184

Discussion

Fresh young leaves of baobab have a protein content of 4% as reported by Gebauer *et al.*, (2002) which is lower than that of the current research (11.00%). However, the fruits pulp has a very high vitamin C content, almost ten times that of oranges. It content 2.6%CP, 5.3%Ash and 6.7%Moisture (Gebauer *et al.*, 2002) which is in-line with the current research findings. Danbature *et al.*, (2014) reported 5.37%Moisture, 7.36%Ash, 7.89%CF and 20.13% CP this is also similar with the current research. The percentage Ash and crude protein of the fruits pulp evaluated is in-line with that reported by Mohammed *et al.*, (2014) but the %CF (25.20) is higher than that of their report. The Neutral detergent fibre (NDF) and acid detergent fibre (ADF) contents evaluated were similar to that of cereal husk (%NDF; 51.15 and %ADF; 37.05) as reported by Abdurrahman *et al.*, (2021).

CONCLUSION AND RECOMMENDATION

Conclusively, fresh leaves have more nutritional potential as compare to dry one, except in Ash and crude fibre contents. However, the seeds have high crude protein content. For recommendation; further research work should be conducted on feeding *Adansonia digitata* seeds as supplement.

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