# PROXIMATE ANALYSES OF SELECTED BROWSES OF SOUTHEASTERN NIGERIA

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**ABSTRACT**
*This study evaluates the proximate composition of selected browses common in southeastern Nigeria and their endogenous uses, assessing their nutritional value and socio-economic importance. These species belong to different families including; Anacardiaceae, Bombacaeae, Burseraceae, Caesalpiniaceae, Memosaceae, Moraceae, Plamaea and Rutaceae with notable representatives such as Anacardium occidentale (cashew), Dialium guineense (Velvet tamarind), and Elaeis guineensis (oil palm). Proximate analysis showed significant variations in crude protein (CP), crude fiber (CF), and ether extract (EE) content. Albizzia ferruginea Dialium guineense and Dacroydes edulis were highest in protein levels (32.77, 19.74 and 19.69% respectively), making them good nitrogen sources for ruminant diets. Elaeis guineensis contained the highest ether extract value (6.80%), suggesting its potential as an energy-rich feed material. Citrus sinensis, Ficus elasticodes and Millitia excelsa on the other hand revealed high ash content (12.50, 13.60% and 12.00 respectively), suitable for supplementing essential minerals in livestock diets. These browses were also reported to offer economic, medicinal, and ecological benefits beyond their nutritional values. Acacia senegalensis and Albizzia ferruginea have termite-repellent and antimicrobial properties, while Elaeis guineensis and Dacroydes edulis provide fuel, timber, and edible fruit. In conclusion, these indigenous browse species are valuable for enhancing livestock productivity and sustainable animal production considering their nutritional values. Future research should investigate the effects of incorporating these browses into animal diets and their role in mitigating seasonal feed shortages in developing countries.*
**Keywords:** Browse Plants, Proximate Composition, Livestock Nutrition, Sustainable Agriculture

## INTRODUCTION

Browse plants are a critical component of livestock feeding systems, particularly in tropical and subtropical regions, where they provide a natural and sustainable source of nutrition for animals. These plants are especially valuable during periods of forage scarcity, such as the dry season, when conventional feed resources are insufficient (Gboshe and Ukorebi**,** 2020). In southeastern Nigeria, a region characterized by diverse vegetation and a mixed farming economy, browse plants not only support livestock production but also play a significant role in the socio-economic activities of rural communities (Okunlola *et al.*, 2020). Proximate analysis, which assesses the nutritional composition of feed, is essential in evaluating the suitability of browse plants for livestock diets. Parameters such as crude protein (CP), crude fiber (CF), ether extract (EE), ash, and nitrogen-free extract (NFE) provide insights into the plants' ability to meet dietary requirements. For instance, high CP content is crucial for improving livestock productivity, while low CF levels enhance digestibility (Edet and Gboshe**,** (2023). Additionally, the moisture content (MC) and dry matter (DM) of browse plants determine their storability and ease of incorporation into feed formulations (Olatunji *et al.*, 2023). Browse plants serve multifunctional roles in traditional farming systems. They provide materials for construction, firewood, medicinal purposes, and cultural rituals. For example, *Dacroydes edulis* (African pear) is a source of edible fruit and traditional medicine, while *Elaeis guineensis* (oil palm) is utilized for oil production, roofing, and soap making (Foroughbakhch *et al.*, 2009). This dual role in livestock nutrition and rural livelihoods highlights their value as essential resources for sustainable agriculture and agroforestry systems.

This study investigates the proximate composition compositions of selected browse plants in southeastern Nigeria. By analyzing their nutritional profiles and traditional applications, it seeks to identify species with high potential for enhancing livestock nutrition while supporting local economies.

## MATERIALS AND METHODS

### Study Location:

The study was carried out in Imo, Anambra and Enugu state in the Southeastern agro ecologicalzone of Nigeria. The climate data of these three states have been summarized by Okoli *et al.* (2003). The land area covered by the states lies between the latitude $5^0$N and $7^0$15E. The mean annual rainfall is 2500mm, while temperature and humidity range between 26 – 27.5$^0$C and 70 – 80% respectively. The arrange duration of the dry season is four months while mean annual evaporation is greater than 1450mm. The soil is sandy with an average pH of 5.50. The land surface is determined by plains 200m above sea-level, except for elevations associated with the Okigwe

uplands (Nwankwo, 2015). Vegetation is typically of highly distributed humid rainforest which has been variously modified by population pressure into farm fallow, oil bush and compound mosaic.

**Plant Sampling:**

Based on a previous study (Ebere, 2000) on the diversity Ethno veterinary uses and nutrient composition of plants used for ruminant feeding in Southeastern Nigeria and the number of browse plants listed by the department of forestry services ministry of Agriculture and environment, Owerri, Imo state, Nigeria a list containing about 180 plants consumed by ruminants in the study area was made. Twelve such plants were randomly selected for the study. They were *Anacardium occidentalis, Magnifera indica, Ceiba pentandra, Cananium schwafurtii, Dacroydes edulis, Acacia senegalensis, Dialium guineansis, Albizzia ferruginea, Ficus eleasticodes, Millitia excels, Elaeis guineansis* and *Citrus sinensis*.

**Botanical Identification of Selected Sample Plants**:

Identification of the listed sampled species was made at the department of forestry, Imo State Ministry of Agriculture and Environment with the help of the Director of forestry Services.

**Sample Collection and Preparation:**

The plant leaves were freshly collected and transported to the laboratory, cut into smaller pieces (2.5cm) then oven dried at $100^0$C for 24hours and ground through 1mm screen for subsequent analysis.

**Chemical Analysis of the Sampled Plants**:

Proximate composition of the samples was determined using the standardized procedures outlined by AOAC International (2016).

**Ranking of the Plant Samples**:

Direct interviews of at least 5 ruminant farmers in the study areas were conducted to determine the various endogenous uses of selected plants.

**Statistical Analysis**:

Data generated from the proximate analysis of the plant was further compiled in a table and subjected to analysis of variance (ANOVA) using the start-view statistical program. Statistical differences in the means were established using the least significant difference method.

## RESULTS AND DISCUSSION

The classification of selected browse plants as shown in Table 1 reflects a diverse range of plant families with significant agricultural and ethnobotanical importance. Notably, the Anacardiaceae, Caesalpiniaceae, Moraceae, and Plamaea families contain species that are widely recognized for their multipurpose uses

**Table 1: Botanical Classification of the Study Plants**

| Family | Genus | Igbo |
|---|---|---|
| Anacardiaceae | *Anacardium occidentalis* | Kashu |
| | *Magnifera indica* | Mangolo |
| Bombacaeae | *Ceiba pentandra* | Akwu |
| Burseraceae | *Cananium schwafurtii* | Ube agba |
| | *Dacroydes edulis* | Ube |
| Caesalpiniaceae | *Acacia senegalensis* | Ahaba |
| | *Dialium guineansis* | Icheku |
| Memosaceae | *Albizzia ferruginea* | Ngwu |
| Moraceae | *Ficus eleasticodes* | Ogbu |
| | *Millitia excelsa* | Orji |
| Plamaea | *Elaeis guineansis* | Igunkwu |
| Rutaceae | *Citrus sinensis* | Oroma |

**Proximate Composition and Nutritional Value of Browse Plants**

Table 2 presents the proximate composition of the selected browse plants, indicating significant variability in moisture content (MC), dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE), ash content (ASH), and nitrogen-free extract (NFE). The Moisture and Dry Matter Content shows that *Dacroydes edulis* (6.05% MC, 93.95% DM) exhibited the highest dry matter content, suggesting a high potential for storage and reduced susceptibility to microbial spoilage. Ceiba pentandra (1.35% MC, 88.65% DM) had the lowest moisture content, aligning with previous findings that dry leaves of certain browse species maintain better feed stability (Olajide and Baiyeri, 2021). *Albizzia ferruginea* (32.77% CP) had the highest protein content, making it an excellent nitrogen source for ruminant nutrition. This is consistent with previous research that identifies *Albizzia spp* as high-protein fodder species (Bouazza *et al*., 2012; Chitra and Balasubramanian, 2016). *Dialium guineense* (19.74% CP, 37.40% CF) also showed high protein and fiber content, indicating its potential for improving rumen function while balancing energy supply (Odoemene *et al*., 2022). *Magnifera indica* on the other hand

(10.00% CP, 34.50% CF) had relatively lower protein but higher fiber, which may reduce digestibility, similar to results reported by Abdul-Aziz *et al.* (2012). *Ficus elasticodes* (13.60%) and Citrus sinensis (12.50%) had the highest ash content, indicating a rich source of minerals for livestock, similar to the findings of Dube *et al.* (2015). *Elaeis guineensis* (6.80% EE) showed the highest ether extract, reinforcing its role in energy supplementation due to its oil-rich composition (Dahlan, I. (2000).

**Table 2: Proximate Composition of Selected Browses**

| Plant | MC% | DM% | CP% | CF% | ASH% | EE% | NFE |
|---|---|---|---|---|---|---|---|
| *Anacardium occidentalis* | 8.40 | 91.60 | 13.13 | 24.60 | 5.00 | 1.57 | 47.30 |
| *Magnifera indica* | 8.86 | 91.14 | 10.00 | 34.50 | 6.50 | 1.40 | 38.74 |
| *Ceiba pentandra* | 1.35 | 88.65 | 11.93 | 19.90 | 7.00 | 1.85 | 47.97 |
| *Cananium schwafurtii* | 12.00 | 88.00 | 10.59 | 27.50 | 6.00 | 1.92 | 41.99 |
| *Dacroydes edulis* | 6.05 | 93.95 | 19.69 | 19.6 | 11.00 | 0.80 | 42.86 |
| *Acacia senegalensis* | 7.86 | 92.14 | 11.24 | 24.80 | 7.00 | 0.96 | 48.18 |
| *Dialium guineansis* | 9.50 | 88.50 | 19.74 | 37.40 | 9.00 | 2.40 | 19.96 |
| *Albizzia ferruginea* | 11.34 | 88.66 | 32.77 | 31.70 | 4.92 | 1.27 | 18.50 |
| *Ficus eleasticodes* | 12.08 | 87.92 | 13.85 | 19.00 | 13.60 | 4.40 | 37.07 |
| *Millitia excelsa* | 8.56 | 91.44 | 13.85 | 12.80 | 12.00 | 4.60 | 48.19 |
| *Elaeis guineansis* | 9.36 | 90.64 | 11.67 | 30.10 | 6.00 | 6.80 | 36.07 |
| *Citrus sinensis* | 11.62 | 88.38 | 16.58 | 28.60 | 12.50 | 1.80 | 28.90 |

MC= moisture content, DM = dry matter, CP = crude protein, CF = crude fiber, EE = ether extract, NFE = neutral detergent fiber

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