

Proximate and Phytochemical Composition of Dried African Grape (*Lannea Microcarpa*) Leaf Meal

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Abstract

African Grape (*Lannea microcarpa*) dried leaf meal was analyzed for chemical and anti-nutritional factors. The results of chemical analysis showed that African Grape (*Lannea microcarpa*) dried leaf meal has high crude protein (18.05%), dry matter (92.60%), crude fibre (26.68%), ether extract (33.75%), low ash (5.13%), nitrogen free extract (16.39%), acid detergent fibre (29.80%), neutral detergent fibre (48.50%), organic matter (87.48%) and hemicelluloses (18.70%). Results of anti-nutrients contents showed that the dried leaf meal of African Grape has high flavonoids ($2.25 \pm 0.15\text{g}/100\text{g}$), alkaloids ($1.71 \pm 0.34\text{g}/100\text{g}$), low tannins ($0.26 \pm 0.05\text{g}/100\text{g}$) and saponins ($0.32 \pm 0.06\text{g}/100\text{g}$). The various anti-nutrients contents investigated in the dried leaf meal were within tolerance level. The results obtained for proximate composition is an indication that the dried leaf meal of African Grape can be used as feed supplement for ruminant livestock particularly during the dry season when feed resources are scarce and of poor quality.

Keywords: Proximate, phytochemicals, dried, leaf, African Grape, composition

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1. Introduction

According to Afolayan *et al.* (2017) browse plants are one of the cheapest sources of feed for ruminants and pseudo – ruminants. Shrubs and tree leaves are important feed resources in the diet of grazing animals (Ajiji *et al.*, 2013). The leaves from the evergreen tree and shrubs are used as emergency source of feed by the ruminants in the semi-arid region of Northern Nigeria (Njidda and Ikhimioya, 2010). They are potential sources of fodder throughout the year, especially during the dry season when grassland and fresh pastures are not available (Oji *et al.*, 2007). Several indigenous and exotic browse plant species have been investigated and evaluated to be used in ruminant feeding system in Nigeria. African grape (*Lannea microcarpa*) also known as African grapes or „Faru“ in Hausa language is a tropical tree distributed in different African regions known for its economic value and medicinal properties. It belongs to the family Anacardiaceae. It is found in the savanna and the drier forest re-growth zone of West Africa. The unripe fruits are green in colour while ripe ones are purplish black. Traditional remedies prepared from its leaves, bark, roots and fruits are used to treat several human diseases such as mouth blisters, rheumatism, sore throat, dysentery, conjunctivitis, stomatitis, skin eruption and ulcer (Bazango *et al.*, 2014). The grape like fruit, as a source of vitamins are eaten fresh or squeezed and drunk as juice whereas the leaves are used for feeding ruminant animals (Haarmeyer *et al.*, 2013). There are various multipurpose plant leaves and fruits which remain still relatively unexploited as feed supplement in ruminant production. This study is therefore aimed at determining the chemical composition and anti-nutritional factors present in *Lannea microcarpa* dried leaf meal.

2. Materials and Methods

African grape (*Lannea microcarpa*) leaves used in this study were collected from *Lannea microcarpa* (LM) tree around the livestock unit of the Plateau State College of Agriculture, Garkawa. Fresh leaves were harvested from *Lannea microcarpa* trees, air dried at room temperature to maintain nutritive value for 72 hours and then processed by milling the dried leaves. The dried and milled samples were taken to the Nutrition and Biochemistry Laboratory of the National Veterinary Research Institute Vom, Plateau State for the determination of proximate composition and phyto-chemical analysis. The Dry Matter (DM), Crude Protein (CP), Ash, Crude Fibre (CF), Ether extract (EE) and Nitrogen Free Extract (NFE) were determined as described by AOAC (2005), Neutral Detergent Fibre (NDF) and Acid Detergent Fibre (ADF) according to Van Soest and Robertson (1985). Qualitative and quantitative determination of phyto-chemical constituents comprising :alkaloids, flavonoids, tannins, saponins, steroids, glycosides and anthraquinones was carried in the laboratory by using standard methods as described by Harborne (1998) and Sazada *et al.* (2009).

3. Results and Discussion

Results of the chemical composition of African Grape (*Lannea microcarpa*) dried leaf meal are shown in Table

1. The variables Dry Matter(DM); Crude Protein(CP); Crude Fibre(CF); Ether Extract(EE); Ash; Nitrogen Free Extract (NFE); Acid Detergent Fibre(ADF); Neutral Detergent Fibre(NDF); Organic Matter(OM) and hemicelluloses of *Lannea microcarpa* (LM) dried leaf meal were 92.60%, 18.05%, 26.68%, 33.75%, 5.13%, 16.39%, 29.80%, 48.50%, 87.48% and 18.70% respectively. In this study, the crude protein content obtained for LM dried leaf meal was 18.05% which is relatively higher than 9 – 14% CP requirement for ruminant animals (Aduku, 2005) and above 5.89% reported by Clarisse et al. (2015). *Lannea microcarpa* dried leaf meal is high in crude fibre (26.68%) and higher than the levels (15 – 20%) recommended by Buxton (1996) for ruminant animals. The variation could be attributed to differences in climate, location, processing and analytical methods used in this study. The value (5.13%) recorded for ash in this study indicates that LM dried leaf meal could be a potential source of minerals for grazing animals. This is also in agreement with the findings of Okoli et al. (2001) who reported that the ash content in most browse plants falls within a range of 3.0 – 9.6%. The organic matter value (87.48%) of LM dried leaf meal obtained in this study did not agree with the findings of Clarisse et al. (2015) who reported a value of 93.3% for LM leaf meal. This could be related to the high ash content observed in this study. The acid detergent fibre (ADF) and neutral detergent fibre (NDF) values obtained are 29.80% and 48.50%. These results were higher than the findings of Clarisse et al. (2015), who reported lower values of 25.99% and 34.07% for acid detergent fibre (ADF) and neutral detergent fibre (NDF) of LM leaves. This could be due to differences in stage of maturity at which the leave samples were collected.

Table 1: Chemical Composition (%) of *Lannea microcarpa* Dried Leaf Meal

Nutrients	Composition(%)
Dry Matter(DM)	92.60
Crude Protein(CP)	18.05
Crude Fibre(CF)	26.68
Ether Extract(EE)	33.75
Ash	5.13
Nitrogen Free Extract(NFE)	16.39
Acid Detergent Fibre(ADF)	29.80
Neutral Detergent Fibre(NDF)	48.50
Organic Matter(OM)	87.48
Hemicellulose	18.70

The results of quantitative determination of phytochemicals in LM dried leaf meal are presented in Table 2. The quantitative values recoded for anti-nutrients (Table 2) contained in LM dried leaf meal in this study were in moderate amount and may falls within tolerance level for livestock except for the flavonoid ($2.25 \pm 0.15\text{g}/100\text{g}$) which is relatively higher and tannins had the lowest value of $0.26 \pm 0.05\text{g}/100\text{g}$ which may not have toxic effect. Flavonoid value ($2.25 \pm 0.15\text{g}/100\text{g}$) was higher than the value ($1.27 \pm 0.05\text{mg}/100\text{mg}$) reported by Bationo et al. (2012) for LM leaves. However, the result in the present study were quite lower than that of Ouattara et al. (2011) who reported higher flavonoid value of $6.45 \pm 0.18\text{g}/100\text{g}$ for bark extracts of LM tree. This is an indication that flavonoid content was higher in the bark extracts of LM tree than in the leaves. The presence of high flavonoid content in this study was within the tolerable limit for consumption by ruminant animals.

Table 2: Quantitative Phytochemicals Properties of *Lannea microcarpa* Dried Leaf Meal

Phyto-chemicals	Quantitative Screening (g/100g)
Alkaloids	1.71 ± 0.34
Flavonoids	2.25 ± 0.15
Tannins	0.26 ± 0.05
Saponins	0.32 ± 0.06

4. Conclusion and Recommendation

The various anti-nutrients investigated in LM dried leaf meal were below toxic level. The values obtained for chemical composition in this study is evidence that LM dried leaf meal contained adequate nutrients to meet the requirement of ruminants. It can be concluded that LM dried leaf meal could be used as feed supplement for ruminants particularly during the dry season when feed resources are scarce.

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