

DETERMINATION OF CHEMICAL AND PHYTOCHEMICAL COMPOSITION OF DRIED AFRICAN GRAPE (*Lannea microcarpa*) LEAF MEAL

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ABSTRACT

African grape (*Lannea microcarpa*) dried leaf meal was evaluated for chemical and anti-nutritional factors. The results of chemical analysis showed that LM 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 LM dried leaf meal 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 LM dried leaf meal were within tolerance level. The results obtained for chemical composition is an indication that LM dried leaf meal can be used as feed supplement for ruminants particularly during the dry season when feed resources are scarce.

Key words: Chemical, phytochemicals, dried, *Lannea microcarpa*, leaf.

INTRODUCTION

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 (Afolayan *et al.*, 2017). 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. African grape (*Lannea microcarpa*) leaves have the potential in this regard; this study is therefore aimed at evaluating the chemical composition and anti-nutritional factors present in *Lannea microcarpa* dried leaf meal.

MATERIALS AND METHODS

African grape (*Lannea microcarpa*) leaves used for this study were collected from *Lannea microcarpa* tree around the livestock unit of the Faculty of Agriculture and Agricultural Technology, Kano University of Science and Technology Teaching and Research Farm located in Gaya Local Government Area of Kano State.

Sample Processing and Preparation

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 from which sub samples were then taken to the laboratory and were analyzed for chemical and phyto-chemical composition.

Chemical analysis

Representative sample of dried *Lannea microcarpa* leaves was taken to the Department of Animal Science Laboratory, Bayero University, Kano for proximate and fibre fraction composition; The dry

matter (DM), nitrogen (N) for crude protein (CP) determination, ash, crude fibre (CF), ether extract (EE) and nitrogen free extract (NFE) were determined as described by AOAC (2005), NDF and ADF according to Van Soest and Robertson (1985).

Phyto-chemical analysis

Sample of dried *Lannea microcarpa* leaves were taken to the Laboratory of the Department of Food Science and Technology, Kano University of Science and Technology, Wudil for qualitative and quantitative determination of phyto-chemical constituents comprising; alkaloids, flavonoids, tannins, saponins, steroids, glycosides and anthraquinones by using standard methods as described by Harborne (1998) and Sazada *et al.* (2009).

RESULTS AND DISCUSSION

Results of the chemical composition of LM dried leaf meal are shown in Table 1. The variables DM, CP, CF, EE, Ash, NFE, ADF, NDF, OM and hemicelluloses of 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 the present 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 (LML)

Nutrients	Composition (%)
Dry matter	92.60
Crude protein	18.05
Crude fibre	26.68
Ether extract	33.75
Ash	5.13
Nitrogen Free Extract	16.39
Acid Detergent Fibre	29.80
Neutral Detergent Fibre	48.50
Organic matter	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

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

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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