CHEMICAL COMPOSITION OF SOME SELECTED PLANTS USED AS FEED FOR SHEEP AND GOATS AT ODORAGUSHIN OF EPE LOCAL GOVERNMENT, LAGOS STATE.

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ABSTRACT

A study was conducted to evaluate the chemical composition of *Pentaclethra macrophylla, Sida acuta, Moringa oleifera, Morinda lucida* and *Ficus exasperata*. The resulting products were collected, fermented, sun-dried and kept in a polythene bag for further investigation. Samples were investigated for proximate composition and crude fibre fractions. Results obtained showed that, there were significant differences in proximate composition with crude protein (CP) ranging from 18.05 in *Sida acuta* to 28.02% in *Moringa oleifera*. The content of the neutral detergent fibre (NDF) differed significantly ($P<0.05$) with values ranging from 51.35 in *Pentaclethra macrophylla* to 61.48% in *Ficus exasperata*. Significant ($P<0.05$) highest value of 17.32% was obtained for cellulose in *Pentaclethra macrophylla*. The study concluded that, the selected plants evaluated had high crude protein contents which would make them good protein supplement to poor quality feeds especially during feed scarcity without adverse effect.

Keywords: Forages, Nutrition, proximate composition, Ruminants, supplements.

INTRODUCTION

A major constraint to small ruminants production in Nigeria is the scarcity and fluctuating quantity and quality of the year-round feed supply (Fajemisin *et al*., 2013). This has been the basic reason for poor performance of livestock. Tropical grass fodder and crop by-products available during dry season in tropics have a low nutritive value due to their low protein and fermentable energy though they grow rapidly during the period of heavy rainfall and high temperature and this leads to grass maturing early and so contains high level of lignin. Seasonal fluctuations and scarcity of forage in Nigeria is the major factor limiting the productivity of ruminants as animals rapidly loss weight gained during the lush season which may lead to death, thus resulting in a great economic loss to farmers (Babayemi *et al*., 2003).

The nutritive value of any feedstuff is determined by its chemical composition and this is related to the forage and its environment. Conservation of forage as hay or silage is the major technique used in developed countries to address the deficit in forage supply to ruminants during periods of insufficient pasture growth (Vicente-Chandler, 2001).

Thus, this study was undertaken to determine the chemical composition of *Pentaclethra macrophylla, Sida acuta, Moringa oleifera, Morinda lucida* and *Ficus exasperata* used as feed for goats and sheep at Odoragunshin of Epe Local Government, Lagos State.

MATERIALS AND METHOD

Collection of samples

Five plants were harvested around the premises of Yaba College of Technology School of Agriculture Odoragunshin, Epe campus, Lagos State, Nigeria. The forage plants were: *Pentaclethra macrophylla* (African oil bean), *Sida acuta* (Wireweed), *Moringa oleifera* (Moringa), *Morinda lucida* (Brimstone tree) and *Ficus exasperata* (Sandpaper tree).

Processing of selected plants

The selected plants were harvested from different stands of each individual forage species around the premises of Yaba College of Technology, School of Agriculture Odoragunshin, Epe campus, Lagos State, Nigeria. About 10kg of each plant was subjected to fermentation (the leaves were chopped into about 2-3cm to allow for compaction and consolidation at ensiling in black polyethylene bags. The black polyethylene bags were double lined stacked on each other with heavy metal discs placed on them to remove as much air as possible before being taped to prevent air from getting into the chopped materials and allowed to undergo natural fermentation inside the black polyethylene bags under anaerobic condition for 14 days and were later spread under direct sunlight for another 3days to avoid mould).

Chemical analysis

Harvested samples from each of the five selected forages were pooled for each individual plant species and sub-samples were taken and oven dried at 65^0C to constant weight for 3 days to determine the dry matter. Dried samples were milled and sieved to 1.0mm particle size, bulked individually and stored in an air tight container till the time required for chemical analysis. Chemical composition of the selected plants was carried out at Institute for Agricultural Research and Training (IAR & T), Ibadan, Oyo State.

Chemical Analysis Procedure

Chemical composition (CP, CF, EE, Ash and NFE) of the plant sample was determined according to AOAC (1995) protocol. Neutral detergent fibre (NDF), Acid detergent lignin (ADL) and acid detergent fibre (ADF) were determined according to the procedure of Van Soest *et al*., (1991). Cellulose and hemicellulose were derived from NDF, ADF and ADL by simple calculation as follows: Hemicellulose = NDF – ADF, Cellulose = ADF – ADL

Statistical Analysis

Data collected were subjected to One way Analysis of Variance and significant differences among means were compared using Duncan multiple Range test (SAS, 2005).

RESULTS AND DISCUSSION

Table 1: Proximate composition (%) of the fermented plant species

Selected plants	DM	CP	EE	Ash	CF	OM	NFE
Pentaclethra macrophylla	86.09^{b}	25.17^{b}	0.78^{d}	4.87^{a}	14.41^{c}	95.13^{b}	47.98^{a}
Sida acuta	85.00^{d}	18.05^{c}	1.62^{c}	7.62^{c}	18.62^{b}	92.35^{b}	39.10^{b}
Moringa oleifera	85.03^{d}	28.02^{a}	5.19^{a}	7.74^{c}	27.31^{a}	92.26^{b}	22.79^{e}
Morinda lucida	86.71^{a}	18.88^{c}	3.58^{b}	8.01^{b}	12.18^{e}	91.89^{c}	34.47^{c}
Ficus exasperata	85.66^{c}	27.79^{a}	1.59^{c}	9.05^{a}	14.29^{d}	90.95^{d}	32.97^{d}
SEM	0.18	1.16	0.43	0.37	1.44	0.37	2.20

^{abcde} Means along the same column with different superscripts are significantly different (P<0.05)

DM= Dry matter, CP= Crude protein, EE= Ether extract, CF= Crude fibre, OM= Organic matter, NFE= Nitrogen free extract, SEM= Standard error of mean.

Table 2: **Fibre fractions (%) of the fermented plant speciess**

Selected plants	NDF	ADF	ADL	Cellulose	Hemicellulose
Pentaclethra macrophylla	51.35^{c}	35.51^{a}	18.19^{a}	17.32^{a}	15.84^{e}
Sida acuta	61.37^{a}	30.67^{b}	14.72^{b}	15.95^{b}	30.70^{b}
Moringa oleifera	54.56^{b}	28.28^{c}	12.52^{c}	15.77^{b}	26.30^{d}
Morinda lucida	54.68^{b}	25.80^{e}	10.64^{d}	15.17^{c}	28.88^{c}
Ficus exasperata	61.48^{a}	27.34^{d}	18.38^{a}	8.96^{d}	34.04^{a}
SEM	1.08	0.91	0.82	0.78	1.66

^{abcde} Means along the same column with different superscripts are significantly different (P<0.05)

SEM= Standard error of mean, NDF= Neutral detergent fibre

ADF= Acid detergent fibre, ADL= Acid detergent lignin.

The proximate composition of the fermented forages as presented in Table 1 showed that there were significant (P<0.05) differences among the parameters measured. The DM ranged from 85.00% to 86.71% in *Sida acuta* and *Morinda lucida* respectively. The highest CP content (28.02%) was observed in *Moringa oleifera* while the least value (18.05%) was observed in *Sida acuta*. The CP values recorded for all the plants were above 8% required to satisfy the maintenance requirement for ruminants (Norton, 2003) and above the minimum level necessary to provide sufficient nitrogen required by rumen microorganisms to support optimum rumen activity

(Mc Donald *et al*., 2002) and also for adequate intake of forages. Higher values of CP of examined browse plants when compared to CP of *Panicum maximum* confirmed the report of Getachew *et al.,* (2004) that browse forages are higher in CP than tropical grasses and roughages such as hay, straw and stover. This also supports the findings of Okoruwa (2019) that browse plants have high crude protein content and could be useful feed resources to improve ruminants' productivity in the tropics. Difference observed in the CP content can be explained by inherent characteristics of each species related to the ability to extract and accumulate nutrients from soil and/or to fix atmospheric nitrogen, which is the case of leguminous plants as corrobated by Njidda *et al*., (2013). The other factors causing variation in the chemical composition of browse forages include soil type (location), the plant part (leaf, stem, pod), age of leaf, season and processing methods.

As shown in Table 2, NDF values ranged from 51.35 to 61.48% in *Pentaclethra macrophylla* and *Ficus exasperata* respectively. *Pentaclethra macrophylla* recorded significantly highest value of 35.51% in ADF while the least value of 25.80% was recorded in *Morinda lucida*. The values of NDF reported in the current research were higher compared to the reported values of NDF obtained in the *Leuceana leucocephala* (29.21g/100g), *Moringa oleifera* (26.31g/100g) and *Gliricidia sepium* (29.61g/100g) by Asaolu *et al* (2011). Disparity observed could be probably due to differences in species, climatic and edaphic factors as confirmed by Fadiyimu *et al*., (2012).

CONCLUSION

The forage species investigated have appreciable nutrients above recommended minimum levels to support growth and maintenance of ruminants. These plants have potential to boost inadequate feed supply and low level of nutrients encountered by ruminants especially in the dry season.

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