CHEMICAL COMPOSITION OF SOME SELECTED PLANTS USED AS FEED FOR RUMINANTS AT ODORAGUSHIN OF EPE LOCAL GOVERNMENT, LAGOS STATE

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ABSTRACT
A study was conducted to evaluate the chemical composition of Sandocrium kotjape, Andropogon gayanus, Malosma laurina, Commelina benghalensis and Manihot esculenta. The resulting products were collected, 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 9.74 in Malosma laurina to 22.43% in Manihot esculenta. The content of the neutral detergent fibre (NDF) differed significantly (P<0.05) with values ranging from 64.97 in Sandocrium kotjape to 73.22% in Andropogon gayanus. Significant (P<0.05) highest value of 28.40% was obtained for cellulose in Commelina benghalensis. The study concluded that the selected plants evaluated had high crude protein contents which would make them good protein supplement to poor quality feeds particularly during periods of feed scarcity.
Keywords: Chemical composition Forages, Nutrition, Proximate composition, Ruminants.

INTRODUCTION

Ruminants are important sources of animal protein where they contribute to the cultural and socio-economic life of people (Adebayo *et al.,* 2017). The potentials of forage plants as alternative fodder resources in ruminant nutrition have attracted the attention of researchers' worldwide. Several indigenous and exotic browse species have been investigated and evaluated for inclusion in ruminant feeding systems in Nigeria (Fadiyimu *et al*., 2011). Forage quality and availability vary greatly from season to season which however, affect the output of the animals. One possible way to mitigate this challenge and maintain production in the tropics is to introduce unconventional feeds which cannot be consumed by man but can be converted by ruminants into desirable human food. This will go a long way in reducing the cost of production without a decrease in productivity as there is no competition between man and livestock for unconventional feedstuffs (Odeyinka, 2001). This study was undertaken to determine the chemical composition *Sandocrium kotjape, Andropogon gayanus, Malosma laurina, Commelina benghalensis* and *Manihot esculenta.*

MATERIALS AND METHODS

Experimental site: The experiment was carried out in the premises of Yaba College of Technology, Epe Campus, Lagos State. It is situated at latitude 6.58°N and longitude 3.98°E. It is 42m above the sea level along Epe Ijebu-ode road on km 16. Epe lies in lowland rain forest vegetation zone within the savanna agro-ecological zone of Southwest Nigeria (Google earth, 2020).

Sample collection and preparation: Five native forage species *Sandocrium kotjape, Andropogon gayanus, Malosma laurina, Commelina benghalensis* and *Manihot esculenta* were used for the study. The fresh samples of the forage species were collected after being identified as the major consumable plants by sheep and goats in the area by a botanist. The plants were collected from different mature plants within the premises of Yaba College of Technology Epe campus. Laboratory analysis was carried out at Biological laboratory, Federal university of Agriculture, Abeokuta, South- West, Nigeria. A portion of the harvested samples was weighed and oven-dried at 65^0 C for 72hours, ground through a 1 mm screen and stored in a polythene bag prior to chemical analysis.

Chemical analysis procedure: Chemical composition (CP, CF, EE, Ash and NFE) of the plant sample was determined according to AOAC 2005 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, where NDF= Neutral detergent fibre, ADF= Acid detergent fibre and ADL= Acid detergent lignin.

Statistical analysis and experimental model: Data collected were subjected to one way analysis of variance and significant differences among means were compared using Duncan Multiple Range test (SAS, 2005)

$$Y_{ij} = \mu + T_i + \varepsilon_{ij}$$

Where, Y_{ij} = Observed value of dependent variable, μ =Population mean
T_i = Mean effect of selected browse plants, ε_{ij} = Random residual error

RESULTS AND DISCUSSION

Table 1: Proximate composition (%) of the selected plant

Plant	DM	CP	EE	ASH	CF	OM	NFE
Sandocrium kotjape	92.55[b]	14.96[c]	3.28[a]	7.70[d]	29.17[d]	92.29[b]	44.89[b]
Andropogon gayanus	91.85[d]	10.46[d]	2.51[c]	11.46[c]	38.33[a]	88.54[c]	37.25[c]
Malosma laurina	91.11[c]	9.74[e]	3.13[ab]	6.49[e]	25.45[e]	93.51[a]	55.20[a]
Commelina benghalensis	92.40[b]	18.03[b]	2.95[b]	22.23[a]	31.11[c]	77.77[e]	25.69[e]
Manihot esculenta	92.89[a]	22.43[a]	2.35[c]	14.93[b]	33.32[b]	85.07[d]	26.98[d]
SEM	0.05	0.07	0.09	0.04	0.07	0.04	1.01
P value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

[a,b,c,d,e] means along the same column with different superscripts are significantly different (P<0.05)
SEM= Standard error of mean DM= Dry matter CP= Crude protein EE= Ether extract ASH= Ash CF= Crude fibre OM= Organic matter NFE= Nitrogen free extract

Table 2: **Fibre fraction (%) of the selected plants**

Plant	NDF	ADF	ADL	Cellulose	Hemicellulose
Sandocrium kotjape	64.97[e]	48.73[e]	22.21[e]	26.52[d]	16.24[c]
Andropogon gayanus	73.22[a]	54.07[a]	27.31[a]	26.76[c]	19.15[b]
Malosma laurina	70.30[c]	50.48[d]	23.03[d]	27.45[b]	19.82[a]
Commelina benghalensis	70.80[b]	51.97[b]	23.57[c]	28.40[a]	18.83[b]
Manihot esculenta	69.64[d]	50.72[c]	24.99[b]	25.73[e]	18.92[b]
SEM	0.10	0.07	0.05	0.01	0.16
P value	0.0001	0.0001	0.0001	0.0001	0.0001

[a,b,c,d,e] 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 results of the proximate composition shown in Table 1 revealed that there was significant (P<0.05) variation in the parameters measured. The dry *matter* (DM) ranged from 91.11% to 92.89% in *Malosma laurina* and *Manihot esculenta* respectively. The highest crude protein (CP) content (22.43%) in all the selected forages was observed in *Manihot esculenta* while the least value (9.74%) was observed in *Malosma laurina*. Crude fibre (CF) was significantly varied from 25.45% to 38.33% in *Malosma laurina* and *Andropogon gayanus* respectively. Ash content in *Commelina benghalensis* (22.23%) was (P<0.05) higher when compared to other plants. *Sandocrium kotjape* had the highest value (3.28%) of Ether extract (EE) while the least value (2.35%) was observed in *Manihot esculenta.* Organic matter (OM) (93.51%) was higher in *Malosma laurina* when compared to other forages.

The range of dry matter (91.85 – 92.89%) obtained for browse plants in this study was higher than the range (85.70 – 91.50%) reported by Adebayo *et al*., 2019 for some air-dried plants. The range of crude protein obtained for all the forages (9.74-22.43%) used in this study was far above 8% crude protein required to satisfy the maintenance of ruminants (Norton, 2003). The range of crude protein observed was also above the minimum level required by rumen microorganisms to provide sufficient nitrogen for optimum activity (Lamidi and Ologbose, 2014). However, range of ash content obtained was higher than those reported in the previous findings (Yeshamel *et al* 2012; Norton 2003).

The ash content is an indication of the presence of minerals.The ash content of all the browse plants was considered high when compared with values obtained elsewhere (Aye and Adegun, 2010), this indicates that the plants contained substantial amount of inorganic elements which are critical in the formation and function of blood and bones (Animashahun *et al*., 2006). The high ash content will make enough minerals available for livestock production. The range (2.35-3.28%) ether extract content obtained in this study is lower than the reported range (7.00-14.00%) by Adebayo *et al*., 2019.

As shown in Table 2, *Andropogon gayanus* recorded significant highest value of 73.22% in NDF while the least value (64.97%) was observed in *Sandocrium kotjape*. ADF values ranged from 48.73 to 54.07% in *Sandocrium kotjape* and *Andropogon gayanus* respectively. The highest significant (P<0.05) ADL value (27.31%) was observed in *Andropogon gayanus* . Cellulose was least (P<0.05) in *Manihot esculenta* (25.73%) and highest content was obtained in *Commelina benghalensis* (28.40%). Hemicellulose significant highest value (19.82) was obtained in *Malosma laurina.*

The NDF, ADF and ADL contents reported for the browse plants in this study was similar to those in previous studies (Aye and Adegun, 2013; Omoniyi *et al.*, 2013). Factors causing variation in the chemical composition of forages include soil type and location, age of the plant used, species or variety as well as ambient temperature as supported by Agriculture (2011).

CONCLUSION

From the result of this study, it was concluded that the selected plants have the potential to offer better nutritional value especially during the periods of feed scarcity.

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