PROXIMATE AND MINERAL CONSTITUENTS OF SELECTED BOTANICAL GALACTAGOGUES IN THE SEMI-ARID NIGERIA

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Abstract

A study was conducted to determine the proximate and mineral constituents of some selected botanical galactagogues in Kano, semi-arid Nigeria. Five common plants indigenous to the semi-arid environment were collected and evaluated for the variables. The plant species were Ficus thonningii, Guiera senegalensis, Parkia biglobosa, Anogeissus leiocarpus and Tamarindus indica. The study was laid out in a complete randomized design where the different plant species served as treatments. Data collected were subjected to analysis of variance. Results obtained revealed significant (P< 0.05) differences across all the forage plants evaluated with respect to macro and micro minerals as well as proximate constituents. Dry matter values ranged from 92.75-90.72%, while Crude protein was in the range of 19.99-14.84%. The concentration of the macro-minerals though significant (P< 0.05) did not follow any particular pattern. Calcium content ranged from 0.02-0.23 ppm; phosphorus was 6.89-23.86 ppm and iron ranged from 8.27-14.13 ppm. In conclusion, the evaluated galactagogues could be fed to lactating ruminants because all values obtained are within the recommended levels for this category of livestock. However Guiera senegalensis and Parkia biglobosa is recommended for offer to lactating livestock due to their superior content of crude protein and organic matter relative to other species evaluated in the present study.

Key words: galactagogues proximate, minerals, livestock, semi-arid

Introduction

Browse plants, trees and shrubs have great potential, especially as a source of higher quality nutrients for ruminants being high in protein, minerals and vitamins (Raghuvansi *et al.*, 2007). Studies on browse fodders are very important as they allow the estimation of nutrients really available for animal nutrition and milk production. One of the most difficult problems in ruminant production in the tropics is the scarcity of energy and protein food stuffs during the dry season (Adegbola *et al.*, 1988). Minerals are essential inorganic substances that need to be obtained from feed (William and Manser 2012). They are divided into macro minerals and trace elements (micro minerals). Browses, shrubs, herbs and trees such as *Guiera senegalensis, Tamarindus indica, Parkia biglobosa, Anogeissus leiocarpus and Ficus thonningii* have been reported to increase milk yield in lactating animals, (Garba, *et al.* 2010). This necessitates the evaluation of the listed browses in order to maximize their use in ruminant diets (Njidda and Ngoshe, 2008) and evaluating the nutritional profile of botanical galactagogues (Garba, *et al.* 2010).

Browse plants, trees and shrubs fodders are of great potential, especially as a source of high quality nutrient for ruminants being high in protein, minerals and vitamins (Raghuvansi *et al.*, 2007). Galactagogues are substances or prescriptions typically, herbs or food that promotes lactation. It is therefore necessary to determine the nutritional value of these feed materials by evaluating the proximate and mineral constituents of common galactagogues in the semi-arid zone of Nigeria.

Materials and Methods

The study was conducted in the Animal Science and Soil Science laboratories, of the Faculty of Agriculture Bayero University Kano. Kano state is located at longitude 9°30' East and 12 30' north and latitude 9°30' and 8°42' within the Sudan savannah zone of the country (KNARDA, 2001). The annual rainfall varies from about 600mm to 1000mm. the length of wet season varies from 4 to 5 months(may-September/October). While the minimum and maximum temperatures are 13°c and 43°c respectively. (K-SEEDS, 2004).

Five (5) common galactagogues indigenous to the semi-arid environment were collected and evaluated for proximate and mineral contents. The plant species were: *Ficus thonningii* (Chediya), *Anogeissus leiocarpus* (Marke), *Guiera senegalensis* (Sabara), *Tamarindus indica* (Tsamiya) and *Parkia biglobosa* (Dorowa). All plant samples were collected within Kano

metropolis. The study was laid out in a complete randomized design (CRD) where the different plant species served as the treatments.

Leaf sample of the test materials were shade dried and ground into powder form. The ground samples were passed through a micro sieve. Prepared samples were labeled and taken to the Animal Science laboratory for analysis of proximate and fibre constituents as outlined by AOAC (2005).

Data collected with respect to the proximate, fibre constituents and mineral elements were subjected to analysis of variance (ANOVA). LSD test was used to separate means at 5% level of probability using the SAS (2000) statistical software.

Results and Discussion

Results revealed variation in concentration of macro minerals (P, K, Na, Ca, Mg) and micro minerals (Ca, Cr, Co, Cu, Fe, Pb, Ma, S) ($p<0.05$) among the selected galactagogues in the study area. National research council (1984), reported the recommended range of calcium (Ca), for all class of ruminants was 0.19-0.82% while Minson (1999) has reported that level of Ca range from 0.31-1.98% with mean value 0.63%. In this study, concentration of Ca was lower than the recommended levels. It has been reported that Ca contents more than 1% decrease the DM intake and excess of Ca can upset the absorption of trace minerals especially Zn (NRC, 2001). The need of Ca, than deficiency of Ca may appear in the form of broken bones, convulsions and death of animal. Green plants are remarkable sources of magnesium (Mg) for animals due to presence of chlorophyll (Wilkinson *et al*, 1990). The recommended requirement of Mg were 0.12-20% in the feed of ruminants (National Research Council, 1980, 1985) and according to Ensminger and Olantiine (1987) Mg requirements range from 0.90-0.21%. Findings in the present study with respect to Mg content revealed higher values than the recommended range for lactating sheep and goats.

The proximate composition values obtained in the present study are in agreement with the values reported by Njidda (2010) for semi-arid browses. However, the dry matter values were lower than values reported by some authors. The differences obtained could be due to difference in study location. The investigated species had lower level of Fe than the critical levels. The change in the conditions of soil and climate as well as physiological status of plant species may affects the absorption of iron in plants species may affects the absorption of iron in plants (Kabata-Pendias and Pendias, 1992).

Conclusion

From the result of this study, it is concluded that the evaluated *galactagogues* could be fed to lactating ruminants because all values obtained are within the recommended level for this category of livestock.

Recommendation

It is recommended that *Guiera senegalensis* and *Parkia biglobosa* be offered to lactating animals due to their superior content in crude protein and organic matter, relative to other species evaluated. However, further studies for propagation of the forage species as additional source of feed to livestock in the region should be conducted.

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Table 1: Macro- mineral content of common Botanical Galactagogues in semi-arid Nigeria

	Treatments					
Elements	FT	GS	PB	AL	TI	LSD
Calcium (ppm)	0.30^{c}	0.08^{b}	0.23^{a}	0.07^{b}	0.02^{e}	0.094
Magnesium (ppm)	164.67^{a}	131.33^{c}	143.83^{b}	85.50^{d}	42.82^{b}	7.271
Phosphorous(ppm)	22.07^{b}	6.89^{e}	9.57^{d}	20.29^{c}	23.86^{a}	0.909
Potassium (ppm)	0.39^{a}	0.03a	0.02^{a}	0.04^{a}	0.02^{a}	0.504
Sodium (ppm)	0.0025^{a}	0.0010^{b}	0.0025^{a}	0.0025^{a}	0.0001^{b}	0.001

a,b,c,d,e means in the same row with different superscripts are significantly different(P<0.05)

FT – *Ficus thonningii*, GS- *Guiera senegalensis*, PB- *Parkia biglobosa*, AL- *Anogeissus leocarpus*,TI- *Tamarindus indica.*

Table 2: Micro Mineral content of Common Botanical Galactagogues in Semi-arid Nigeria

	Treatments					
Element	FT	GS	PB	AL	TI	LSD
Cadmium (ppm)	1.59^{a}	2.28^{a}	0.89^{c}	1.24^{bc}	2.63^{a}	0.545
Chromium(ppm)	0.19^{c}	0.65^{a}	0.19^{c}	0.11^{c}	0.42^{b}	0.163
Cobalt (ppm)	0.79^{c}	1.69^{b}	1.69^{b}	2.58^{a}	0.79^{c}	0.364
Copper (ppm)	7.6^{4b}	9.42^{a}	3.36^{c}	3.70^{c}	6.73^{c}	0.055
Iron (ppm)	13.15^{ab}	11.20^{ab}	10.24^{ab}	8.27^{b}	14.13^{a}	4.945
Lead (ppm)	0.26^{a}	0.13^{b}	0.13^{b}	0.26^{a}	0.26^{a}	2.571
Manganese(ppm)	0.46^{b}	0.23^{c}	0.70^{a}	0.46^{b}	0.23^{c}	4,945
Sulfur (ppm)	3.77^{b}	1.76^{c}	6.67^{a}	0.87^{c}	6.45^{a}	0.909

a,b,c,d,e means in the same row with different superscripts are significantly different (p<0.05)

Table 3: Proximate and fibre constituent of Botanical Galactagogues in Semi-arid Nigeria

	Treatments					
Elements	FT	GS	PB	AL	TI	LSD
MC (%)	7.56^{b}	9.28^{a}	7.25^{b}	7.43^{b}	7.48^{b}	0.26
DM (%)	92.44^{a}	90.72^{b}	92.75^{a}	92.57^{a}	92.52^{a}	0.26
ASH (%)	19.80^{a}	4.20^{d}	6.20^{c}	8.05^{b}	6.75^{c}	0.38
OM (%)	72.64^{c}	86.52^{a}	86.55^{a}	84.51^{b}	85.77^{a}	0.37
CP (%)	16.27^{a}	19.99^{a}	16.90a	14.84^{b}	16.09^{ab}	0.41
CF (%)	22.71^{a}	19.23^{b}	16.25^{c}	13.73^{d}	11.53^{e}	0.31
EE (%)	14.28^{ab}	6.74^{c}	1194^{b}	11.23^{b}	16.87^{a}	1.26
NFE (%)	12.64^{b}	16.52^{cd}	18.40^{c}	23.64^{b}	34.74^{a}	1.59
NDF (%)	30.31^{a}	28.47^{b}	26.94^{c}	25.22^{d}	21.90^{d}	0.21
ADF (%)	23.64^{a}	25.17^{a}	23.57^{b}	22.84^{c}	21.25^{d}	0.16
HEMCELL(%)	6.66^{a}	3.30^{b}	3.37^{b}	2.38^{b}	0.65^{c}	0.35

a,b,c,d,e means in the same row with different superscripts are significantly different(P<0.05)