AN ASSESSMENT OF THE NUTRITIVE VALUE OF GRASSES IN HUTAWA GRAZING RESERVE, BIRNIN KEBBI, KEBBI STATE, NIGERIA

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ABSTRACT
A study was conducted to evaluate the proximate, mineral compositions and phytochemical constituents of grasses collected from Hutawa grazing reserve, Birnin Kebbi, Kebbi State. A 50m×50m plot size was measured and demarcated on a 5-km transect. Grasses along transect were harvested at about 2cm above the ground, using a sickle, tied together and weighed. The reading obtained from each quadrat was then recorded as fresh weight (in grams). The grasses were separated and recorded using common and botanical names. Representative sample for each grass species was dried, milled and taken to the laboratory for proximate, minerals and phytochemical analysis. Data collected were subjected to analysis of variance using SPSS software package. Results of the proximate composition of harvested grass species showed significant differences (P<0.05) in crude protein (CP), crude fibre, ether extracts, ash and nitrogen free extract. The CP was higher (P<0.05) in Dactyloctenium aegyptiumm (1.02%). The results of the mineral compositions of grasses harvested revealed a significant (p<0.05) difference on all the parameters evaluated. Commelina bunghalensis showed higher levels of Na (2.17g/kg), P (4.43g/kg) and Zn (2.03g/ kg) but with low concentration of K. The highest Ca (3.4g/kg) and Fe (2.17 g/kg) were observed in Digitaria horizontalis while Eragrostic tremula showed higher (p<0.05) concentrations of Mg (1.55g/kg) and K (3.03g/kg). Phytochemical screening revealed the presence of alkaloids, saponins and flavonoids while steroids were undetected. In conclusion, the grasses obtained in Hutawa grazing reserve of Kebbi State have high nutritive value.
Keywords: Grasses, Grazing reserve, nutritive value, assessment

INTRODUCTION

Grasses are a member of the monocotyledonous plant family (Poaceae). They have long narrow leaves and hollow stems examples *Pennisetum pedicellatum*, *Andropogon gayanus*, *Digitaria horizontalis*, *Cenchrus ciliaris*, *Eragrostic tremula*, *Commelina banghalensis*, *Setaria pallidefusa* etc. These forage grasses are found abundantly in grazing reserves and rangelands of Nigeria particularly during rainy season (Na-Allah *et al*., 2014; Sadiq *et al*., 2016). During rainy season, animals have abundance of forage grasses to feed on and as such, animals are well fed and fattened due to availability of highly nutritive forage materials. However, in the dry season ruminants usually experience loss of weight and remarkable decline in milk production as a result of low quality feed resources (Muhammad and Kallah, 2013; Lamidi and Ologbose, 2014). Similarly, feeds scarcity during dry season, overgrazing, bush burning and climate change are among the problems of many grazing reserves in Nigeria. These problems necessitated the practice of nomadic system of animal production (Kallah and Muhammad, 2012). Gefu (2008) noted that, movements of the pastoralists from one grazing reserve to another lead to frequent bloody clashes between arable crop farmers and the pastoralists. There is also the problem of competition for land arising from rapid urbanization and numerous deliberate administrative actions like building of dams, roads and industries (Hashimu, 2009). Hutawa grazing reserve is not an exception to these problems as such this study examined nutritive value of forage grasses with a view to assessing its potentials for pastoralism.

MATERIALS AND METHODS

Experimental Location

This research was carried out at the Hutawa grazing reserve, Birnin Kebbi, Kebbi State, Nigeria. Birnin Kebbi is located between latitude 12.4318º'N and longitude 4.1956ºE, with altitude of 900 m above the sea level (Ahmad, 2013). The area lies in the semi-arid Savannah zone, with an average

rainfall of 900mm and temperature 30-37^{0}C. The climate is generally characterized by dry and rainy seasons. The reserve settlers are mostly Fulani and Hausa with Islam as their major religion.

Data collection

The study was conducted in October-November, 2023. A 50m×50m plot size was randomly mapped out and demarcated on a 5-km transect. Grasses along transects were harvested at about 2cm above the ground, using a sickle, tied together and weight immediately using a pan scale. The reading obtained from each quadrat was then recorded as fresh weight (in grams). The forage grasses from each collection were later separated and recorded using common while botanical names were later identified using Blench (2007). Representative samples for each areas after collection was air dried, milled and taken to the laboratory for proximate, mineral and phytochemical analysis.

Chemical analysis

The proximate analysis of dried harvested grass species were carried out at the Animal Science Laboratory, Kebbi State University of Science and Technology, Aliero using the standard method as described by AOAC (2005). The samples were analyzed in triplicate to determine the dry matter, crude protein, nitrogen free extract, ether extract and ash contents. Minerals such as calcium, phosphorus, magnesium, potassium, sodium, iron and zinc were analyzed using Atomic Absorption Spectrophotometer. The phytochemical screening was carried out using standard procedures as described by Harborne (1998) and articulated by Edeoga *et al.* (2005) with some modification.

RESULTS AND DISCUSSION

The result of the proximate composition of harvested grasses (Table 1) showed significant difference (P<0.05) on crude protein (CP), crude fibre (CF), ether extracts (EE), ash and nitrogen free extract (NFE) showed significance difference (P<0.05). The CP value varied from 0.23-1.02% with highest recorded in in *Dactyloctenium aegyptiumm*. However, the CP content recorded in this study is within the ranged of 10.93-26.01% reported by Ibeawuchi et al. (2002). Carbohydrate (NFE), being indispensable sources of energy to animals and humans was higher in *Sporobulus pyramidalis* (77.42%) and *Commelina banghalensis* (76.81%). The highest EE value was obtained in *Dactyloctenium aegyptiumm*.

Table 1: Proximate compositions of harvested pasture plants

Scientific name	Common name	Local name	Parameters (%)						
			MO	CP	CF	EE	NFE	Ash	DM
Andropogon gayanus	Gamba grass	Gamba	6.38	0.44^{cde}	2.10^{ab}	2.40^{cde}	52.29^{c}	5.43^{e}	92.62
Cenchrus ciliaris	Bar grass	Karangiya	8.64	0.65^{bc}	2.05^{abc}	3.50^{bc}	59.36^{bc}	4.44^{ef}	91.36
Commelina banghalensis	Banghaladay flower	Bulasa	10.0	0.28^{de}	1.86^{bcd}	2.47^{cd}	76.81^{a}	2.25^{g}	90.00
Dactyloctenium aegyptiumm	Crowfoot grass	Gude-gude	6.48	1.02^{a}	1.75^{bcd}	6.03^{a}	69.52^{ab}	2.67^{fg}	93.52
Digitaria horizontalis	Crab grass	Harkiya	7.10	0.73^{b}	1.27^{def}	0.88^{f}	65.30^{ab}	4.82^{e}	92.30
Eragrostis tremula	Love grass	Buburwa	6.97	0.49^{bcd}	1.78^{bcde}	4.32^{b}	52.00^{c}	3.40^{f}	93.03
Hyparrhenia rafa	Thatching grass	Shumci	8.22	0.44^{cde}	0.69^{fg}	2.76^{cd}	61.78^{bc}	4.00^{ef}	91.78
Pennisetum pedicellatum	Hairy fountain grass	Kyasuwa	6.00	0.23^{e}	1.19^{efg}	1.52d^{ef}	57.27^{bc}	3.80^{f}	94.42
Rottboellia cochinchinesis	Itch grass	Dawa-dawa	6.11	0.71^{b}	1.47^{cde}	3.46^{bc}	69.56^{ab}	3.47^{f}	91.89
Setaria pallidefusa	Cottail grass	Geron tsuntsu	8.89	0.54^{bc}	2.60^{a}	1.18^{ef}	65.61^{ab}	4.58^{ef}	91.11
Sporobulus pyramidalis	Phyramid drop seed	Tsintsiya fadama	6.73	0.72^{b}	0.63^{g}	2.24^{cde}	77.42^{a}	1.99^{g}	93.27
SEM			**2.41**	**0.05**	**0.12**	**0.25**	**2.55**	**0.42**	**2.41**

abc= means on the row having different superscript were significantly (P<0.05) different

KEYS: MO=moisture, CP=crude protein, CF=crude fibre, EE=ether extract, NFE-nitrogen free extract, DM=dry matter, SEM=standard error mean

Table 2 showed the result of the mineral composition of grasses revealed a significant (p<0.05) difference on all the parameters evaluated. However, *Commelina banghalensis* (Bulasa) showed higher levels of Na (2.17g/kg), P (4.43g/kg) and Zn (2.03g/kg) with low concentration of K (0.55g/kg). *Eragrostis tremula* (Buburwa) showed higher (p<0.05) concentrations of K (3.03g/kg) and

Mg (1.55g/kg). This finding affirms the report of White and Broadley (2010) that plants are good source of minerals. The range of Ca levels (1.03-3.40g/kg) obtained was within the level of 1.15g/kg recommended for ruminants (ARC, 1998). The P levels obtained (0.06-4.43g/kg) were higher than the level (1.60-2.70g/kg) recommended for grazing ruminants (McDowell *et al*., 1993). However, the observed differences in mineral compositions might be attributed to soil, environmental factors alongside pasture management (Kao *et al*., 2020).

Table 2: Mineral compositions of grasses, legumes, shrubs and forbs during early dry season

Scientific name	Common name	Local name	Mineral composition (g/kg)						
			Na	P	Mg	Ca	Zn	Fe	K
Andropogon gayanus	Gamba grass	Gamba	1.20^{h}	0.06^{j}	1.28^{d}	2.13^{f}	1.30^{d}	1.37^{d}	1.02^{f}
Cenchrus ciliaris	Bar grass	Karangiya	2.00^{ab}	0.06^{j}	1.28^{d}	1.03^{k}	0.98^{g}	1.02^{f}	0.90^{h}
Commelina banghalensis	Banghaladay flower	Bulasa	2.17^{ab}	4.43^{a}	1.37^{c}	3.17^{b}	2.03^{a}	1.57^{b}	0.55^{k}
Dactyloctenium aegyptiumm	Crowfoot grass	Gude-gude	1.20^{e}	0.19^{i}	1.52^{b}	1.27^{j}	1.00^{f}	1.27^{e}	0.69^{j}
Digitaria horizontalis	Crab grass	Harkiya	1.33^{d}	3.50^{b}	1.23^{f}	3.40^{a}	1.32^{c}	2.17^{b}	0.87^{kj}
Eragrostis tremula	Love grass	Buburwa	1.60^{d}	0.88^{c}	1.55^{a}	1.63^{h}	1.00^{f}	0.68^{h}	3.03^{a}
Hyparrhenia rafa	Thatching grass	Shumci	1.72^{c}	0.77^{e}	1.15^{g}	2.50^{c}	0.59^{j}	1.07^{f}	1.88^{b}
Pennisetum pedicellatum	Hairy fountain grass	Kyasuwa	0.97^{g}	0.72^{e}	1.00^{h}	2.17^{e}	0.79^{h}	1.18^{e}	1.87^{c}
Rottboellia cochinchinesis	Itch grass	Dawa-dawa	1.60^{d}	0.57^{g}	1.35^{c}	2.45^{d}	1.23^{e}	0.75^{g}	1.64^{d}
Setaria pallidefusa	Cottail grass	Geron tsuntsu	1.83^{b}	0.65^{f}	0.75^{i}	1.80^{g}	1.50^{b}	1.48^{c}	1.53^{e}
Sporobulus pyramidalis	Phyramid drop seed	Tsintsiya fadama	1.55^{d}	0.25^{h}	1.25^{e}	1.35^{i}	0.68^{i}	0.77^{g}	0.98^{g}
SEM			**0.01**	**0.03**	**0.01**	**0.03**	**0.03**	**0.03**	**0.02**

KEY: Na=sodium, P=phosphorus, Mg=magnesium, Ca=calcium, Zn= zinc, Fe=iron, K=potassium, SEM=standard error mean

Results of the phytochemical analyses are shown in Table 3. The presence of saponins, tannins, flavonoids and alkaloids in the grasses support the earlier reports of Onyeonagu *et al.* (2013) that species and season influenced the phytochemical concentrations in the forage grasses. The finding was also in line with the findings of Norton (1994) who reported that the variations in the phytonutrient contents of plants might be due to plant parts, season, location, soil type and age.

Table 3: Phytochemical analysis of harvested pasture species

Scientific name		Tannin	Saponin	Flavonoid	Alkaloid	Steroid
Andropogon gayanus	Gamba	–	–	–	+	–
Cenchrus ciliaris	Karangiya	–	+	+	+	–
Commelina banghalensis	Bulasa	–	+	–	–	–
Dactyloctenium aegyptiumm	Gude-gude	–	–	–	+	–
Digitaria horizontalis	Harkiya	–	–	+	–	–
Eragrostis tremula	Buburwa	+	–	–	–	–
Hyparrhenia rafa	Shumci	–	–	–	–	–
Pennisetum pedicellatum	Kyasuwa	–	+	–	–	–
Rottboellia cochinchinesis	Dawa-dawa	–	–	+	–	–
Setaria pallidefusa	Geron tsuntsu	–	–	+	–	–
Sporobulus pyramidalis	T/fadama	–	–	+	–	–

+ indicates the present of phyto-nutrient in the sample
– indicates the absence of phyto-nutrient in the sample

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