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Identification, Availability and Dry Matter Yield of Uncultivated Pasture Species in the Semi-Arid Zone of Aliero Local Government Area of Kebbi State, Nigeria

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ABSTRACT: The abundance of uncultivated pasture species in the semi-arid zone of Aliero LGA of Kebbi State was investigated. The encountered pasture species comprises of; *D. alata*, *A. gayanus*, *C. banghalensis*, *B. radiate*, *C. biflorus*, *P. pedicellatum*, *S. spbacellata* and *I. hirsute*. The results showed that the pasture species varies in their frequencies and yields with the highest dominant and dried matter weight species from *D. alata* and *B. radiate* having 21.43% each and *I. hirsute* and *B. radiate* having 3.73kg each respectively while the least frequent and dry matter yield species are *S. spbacellata* and *C. biflorus* having 2.38% each and *A. gayanus* having 0.45kg respectively. These pasture species are the dominant in the study area during the 2018 rainy season. The study area constitutes grasses, legumes and forbs species which are of good pasture materials that could support ruminant production. Also the area comprises of decreaser and increaser pasture species which support the youths for their livelihood during the rainy season.

Key words: pasture, dominant, dry matter, rainy season, semi-arid

1. Introduction

Areas dominated by grasses, forbs and herbaceous plants are known as grassland. They are very special plants that sustain their growth regardless of weather condition and animal pressure. Grassland can therefore support a high population of grazing animal. Grasslands constitute about 26% of total land area and 80% of agriculturally productive land globally [1].

Most of the grasslands are located in tropical developing countries where they are particularly important to the livelihoods of hundred millions of rural dwellers [1]. In addition, grasslands provide valuable roles including rain water catchment, biodiversity conservations, cultural and recreational needs and potentially a carbon sink to alleviate greenhouse gas emission [2].

Productivity of natural grassland is affected by factors such as climate (rain), soil fertility, the number of browse species available, density of canopy and management practices such as grazing, stocking rate, fertilizer application, burning and length of resting period [3]. Naturally occurring pasture consists of several forage species and are often confined to unproductive soils and unfavorable climatic conditions which leads to low biomass yield with low forage quality [4]; [5].

Presently, the most frequently cultivated forage grass species in Nigeria are *Andropogon gayanus* (Northern Gamba), *Digitaria smutsii* (Woolly finger grass), *Sorghum almum*, (Columbus grass) *Penisetum pedicelatum* (Kyasuwa), *Setaria anceps* (Sataria) etc. However, the use of highly productive improved pasture species has increased the productivity of livestock in Nigeria [6]; [7]; [8]. Research into both indigenous and exotic forage species has been going on in Nigeria, particularly in the savanna zones since 1950s. The criteria used for the evaluation of pasture species were based on ease of establishment, high dry matter yield, nutritive value, persistence, good seeds yield and their suitability for conservation as hay or silage [9]; [10]; [7]; [11].

Pasture lands provide many benefits other than forage for livestock. Pasture species collection and hawking has become a means of livelihood among the youth for decades in the study area as it serves as a means of income from the sales of collected forages to interested individual during the rainy season (May-October) of every year when there is high abundant production of these uncultivated forages. The facts that information on the availability and yield of uncultivated herbaceous pasture species for sale in Aliero Local Government Area during the rainy season is missing, it is therefore necessary to investigate the availability and dry matter yield of forage species collected by the hawkers in order to have documentation of the common species in the study area.

2. Materials and Method

2.1. Study Area

The research was conducted during 2018 rainy season at Aliero LGA between the months of June to August. Aliero is a town located in the southeast of Kebbi State, the north-western part of Nigeria. The town lies between the latitude 12°19'06"N and longitude 4°30'10"E. It has a short wet season lasting from May to October. The people of the town embark mostly on onion and pepper production, although mixed farming is also common among the farmers along with cattle, sheep and goats reared, they also produce other crops like maize, groundnut, millet and tree crop like mango, cashew [12].

2.2. Samples Collection, Sorting and Weighing

A total of nine (9) visits on weekly basis were done for the purchase of the pasture samples contained in about 3 to 5 sacks of various sizes from three hawkers at different locations within the town. Personal interview with the hawkers revealed that the pasture species encountered were collected at both cultivated and fallow areas. The pasture species purchased were subjected to weighing using weighing balance to determine the bulk fresh weight from each sack. Thereafter the bulk fresh sample from each sack was sorted into various species encountered on weekly basis to determine the frequency of each species. The fresh weight of each encountered species was taken and recorded accordingly. The bulk fresh weight and the species encountered balanced fresh weights were carried out on every week of collection. Each of the pasture species encountered were identified by their local names with the aid of native farmers in the study area and their scientific names were identified from [13].

2.3. Dry Matter Weight

The fresh sorted encountered species were air dried under a shade with an ambient temperature of 27°C until constant weight was achieved for seven (7) days to determine the dry matter weights with the use of weighing balance.

2.4. Data Analysis

Data generated from the species frequencies were analyzed using descriptive statistics of percentages and frequencies. Analysis of variance was used to determine species variation in their fresh and dry matter weights among the bulk sample using [14]. Means separation was carried out by using Duncan multiple range test (DMRT).

3. Results and Discussion

Table 1 presents the various species encountered at different locations in the study area. A total of eight (8) pasture species were encountered comprising of six (6) grass species namely; *Pennisetum pedicellatum*, *Cenchrus biflorus*, *Digitaria alata*, *Andropogon gayanus*, *Setaria sphacellata* and *Bororia radiata*; one forbs and leguminous species namely; *Commelina banghalensis* and *Indigofera hirsute*

respectively. These species were perennial type as most author [15] reported that in the Sudan and Sahel rangelands, the vegetation consist mainly the annual plants. Presently, the most frequently cultivated forage grass species in Nigeria are northern gamba (*Andropogon gayanus*), wooly finger grass (*Digitaria smutssi*), *Sorghum alnum* (Columbus grass), kyasuwa (*Pennisetum pedicellatum*), setaria (*Setaria anceps*) [6]; [16]; [17]. However the encountered species in the study area were uncultivated types.

Table 1: Common Pasture Species found in Aleiro Local Government Area during 2018 rainy Season

Botanical names	Family names	Common names	Local names (Hausa)
<i>Pennisetum pedicellatum</i>	Poacea	Hairy fountain grass	<i>Kyasuwa</i>
<i>Andropogon gayanus</i>	Poacea	Gamba grass	<i>Gamba</i>
<i>Digitaria alata</i>	Poacea	Crab grass	<i>Harkiya</i>
<i>Cenchrus biflorus</i>	Poacea	Bursal grass	<i>Karangiwa</i>
<i>Commelina banghalensis</i>	Commelinisea	Banghal day flower	<i>Bulasa</i>
<i>Indigofera hirsute</i>	Legumenisea	Hairy indigo	<i>Gadagi</i>
<i>Bororia radiate</i>	Poacea	Ant wheat	<i>Alkamar turuwa</i>
<i>Setaria sphacellata</i>	Poacea	Blue stem grass	<i>Tubin jaki</i>

Source: Field survey, 2018

Percentages and frequencies of pasture species encountered in the study area during the nine (9) weeks of collection in the rainy season were presented in Table 2. The highest occurred species are *Digitaria alata* and *Bororia radiate* with 21.43% each. The species; *Commelina banghalensis* has 19.05%, *Pennisetum pedicellatum* and *Andropogon gayanus* were having 14.29% each, while *Indigora hirsute* had 4.76% and the least occurred species are *Cenchrus biflorus* and *Setaria sphacellata* having 2.38% each. The variations in the frequencies of these species are in agreement with the findings of [6] who reported that the frequency of defoliation due to overgrazing results in compositional changes of plant species. The increaser species were reported to be rejected by livestock during the rainy season grazing [18], however consumed by livestock when they are dried during the early dry season [19] in the absence of any other feeds [20], among the decreaseers herbage species *I. hirsute* and *S. sphacellata* had the lowest frequencies (1) and percentages (2.38%) respectively in the study area.

Table 2: Percentages and Frequencies of Pasture Species in Aliero Local Government Area during 2018 rainy Season

Weeks	Pasture species								Total
	P.p	C.b	C.b*	A.g	I.h	D.a	B.r	S.s	
1	1	1	1	1	1	1	1	1	8
2	1	0	1	1	0	1	1	0	5
3	0	0	1	0	1	1	1	0	4
4	1	0	1	1	0	1	1	0	5
5	0	0	1	0	0	1	1	0	3
6	0	0	1	1	0	1	1	0	4
7	1	0	1	1	0	1	1	0	5
8	1	0	1	1	0	1	1	0	5
9	1	0	0	0	0	1	1	0	3
Total	6	1	8	6	2	9	9	1	42
(%)	14.29	2.38	19.05	14.29	4.76	21.43	21.43	2.38	Total

Source field survey, 2018

Keys:P.p=*Pennisetum pedicillatum*; C.b=*Cenchrus biflorus*; C.b*=*Commelina banghalensis*; A.g=*Andropogon gayanus*; I.h=*Indigofera hirsute*; D.a=*Digiteria alata*; B.r= *Bororia radiate*; S.s=*Setaria sphacellata*

Table 3 presents the mean fresh weights, dry weights and dry matter yields of the uncultivated pasture species. The results indicated that all the pasture species were significantly ($P < 0.05$) affected by their fresh weights, dry weights and dry matter yields measurements. The difference in the value obtained from the fresh weights, dry weights and dry matter yields does not follow a definite pattern among the species. However, species like *Indigofera hirsute* and *Setaria sphacellata* were statistically ($P > 0.05$) the same in their dry matter yield. *P. pennisetum* and *S. sphacellata* had the highest (2.48kg) and the lowest (0.11kg) fresh weights respectively. Also *C. banghalensis* recorded the highest dry weight of 0.72kg while *S. sphacellata* had the lowest dry weight measurement of 0.03kg. The species *I. hirsuta* and *B. radiate* had the highest dry matter yield of the same value (3.73kg), while *A. gayanus* had the lowest dry matter value of 0.45kg.

The variation that existed among the species in their dry weights, fresh weights and their dry matter yields might be due to the fact that those species were collected at different locations in the study area where different soil existed with varying organic matter content and also with different vegetation density existed within the study area. This observation was similar to the report of [21], who reported that a lower vegetation density in the northern and southern zone was due to the lower organic matter

content in the soil. Similar observation was reported by [22] who observed variations in the productivity yield of pasture species within the same ecological zones. Also reported by [23]; [24]; [25] that the mean dry matter yield of pasture species varies among them. Also, the fresh weight of the species is related to the stage of growth which is greater in younger plants than in older plants as observed by [26]. These observations were in agreement with the present study.

Table 3: Fresh weight, Dry weight and Dry matter yield of pasture species in the study area during 2018 rainy season

Species	Family names	Local names (Hausa)	Fresh weight (kg)	Dry weight (kg)	Dry matter yield (kg)
<i>P. pedicellatum</i>	<i>Poacea</i>	<i>Kyasuwa</i>	2.48 ^a	0.27 ^c	2.21 ^b
<i>C. biflorus</i>	<i>Poaceae</i>	<i>Karangiya</i>	0.15 ^g	0.06 ^e	0.09 ^f
<i>C. banghalensis</i>	<i>Commelinacea</i>	<i>Bulasa</i>	1.62 ^b	0.72 ^a	0.90 ^c
<i>A. gayanus</i>	<i>Poacea</i>	<i>Gamba</i>	0.72 ^e	0.27 ^c	0.45 ^e
<i>I. hirsuta</i>	<i>Luguminosae</i>	<i>Gadagi</i>	0.39 ^b	0.18 ^d	3.73 ^a
<i>D. alata</i>	<i>Poacea</i>	<i>Harkiya</i>	1.49 ^c	0.60 ^b	0.89 ^c
<i>B. radiate</i>	<i>Poacea</i>	<i>Danfarkami</i>	1.31 ^f	0.62 ^{ab}	0.80 ^d
<i>S. sphacellata</i>	<i>Poacea</i>	<i>Tubin jaki</i>	0.11 ^b	0.03 ^e	3.73 ^a
SEM			0.022	0.170	0.200

abcdefg: means on the same column with different superscripts are not significant ($P < 0.05$).

4. Conclusion

The study area constitutes grasses, legumes and forbs specie which are of good pasture materials that could support ruminant production. The encountered pasture species which varies in their frequencies and yields comprises of; *Digiteria alata*, *Andropogon gayanus*, *Commelina banghalensis*, *Bororia radiate*, *Cenchrus biflorus*, *Pennisetum pedicellatum*, *Setaria sphacellata* and *Indigofora hirsute*. These pasture species are the dominant in the study area during the rainy season. Also the area comprises of decreaser and increaser pasture species which serves as feed to the animals and support the hawkers for their livelihood during the rainy season. Management such as fertilization, irrigation, conservation practices and proper storage are necessary to sustain the all year round production of these pasture species.

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