



PRELIMINARY PHYTOSOCIOLOGICAL SURVEY OF POACEAE DIVERSITY IN BAUCHI STATE UNIVERSITY GADAU, MAIN CAMPUS

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ABSTRACT

The Grass family of *Poaceae* is one of the largest and ecologically important plant families in the tropics and temperate region with about 11,000 species occupying almost all habitats on all continents. It is very necessary to have information about the family *Poaceae* which is need to serve as a biodiversity data base assessable for further research. Different sampling points were selected based on the presence of members of the family *Poaceae* and 1m x 1m quadrat was thrown at three random points in each sampling point; Frequency, Relative frequency, Cover, Relative cover, Density, Relative density and Important value were determined. The highest IVI value recorded in this study were that of *Dactyloctenium aegyptium* (0.9287), *Paspalum conjugatum* (0.6651) and *Brachiaria laticoma* (0.6428) meaning they were dominant in among the observed members of the *Poaceae* family. And the lowest IVI value observed was that of *Sorghum bicolor* (0.0209). The IVI value ranged between 0.0209 to 0.9287. This study provide baseline information about *Poaceae* in Bauchi State University Gadau Main Campus which is represented by 8 specie with 7 genera and almost total appearance of 894.

Keywords: *Poaceae*, Grass and Diversity

INTRODUCTION

The Grass family of *Poaceae* is one of the largest and ecologically important plant families in the tropics and temperate region with about 11,000 species occupying almost all habitats on all continents (Catalán *et al.*, 2016). Tropical and temperate grasslands make cover of almost 40 percent of the earth land White *et al.*, (2000). The family *Poaceae* is distributed worldwide and it covers about 20% of the world vegetation (Aboulaich *et al.*, 2009). The *Poaceae* is capable of developing in various habitats depending on the taxon (Fernandez *et al.*, 1999; Linder *et al.*, 2017).

Grasses of the family *Poaceae* are characterized by the spikelet, which is a floral arrangement that is not found in any family except Cyperaceae (Radaeski & Bauermann, 2018). The spikelets are grouped into spikes. The part of spikelet with florets is named rachilla. Usually spikelet is made up of two bracts at the base called glumes followed by a floret or florets. A floret is made up of the flower surrounded by two bracts, which include an external the lemma and the internal the palea (Cope & Gray, 2009; Aliscion *et al.*, 2016). Generally, with following characteristics; the stem of grasses called culms which are usually cylindrical and hollow, plugged at the nodes where the leaves are attached

some hairy node while some glabrous. The grass leaves are nearly alternate and kind simple and distichous and have parallel veins. Each leaf differentiated in to a lower sheath lugging the stem and blade with entirely smooth margins in which such blade is sharp to cut human skin. The flowers are characteristically arranged in spikelets each having one or more florets (Aliscioni *et al.*, 2016; Saarela *et al.*, 2018).

Since information on diversity of poaceae in Bauchi State University Gadau remain critical in biodiversity data assemblage within the study area. Therefore, this study seeks to identify, classify poaceae based on their morphological features in the selected area.

Since information on diversity of *poaceae* in Bauchi State University Gadau remain critical in biodiversity data assemblage within the study area. Therefore, this study seeks to identify, classify *poaceae* based on their morphological features in the selected area. The research will contribute in providing information on the classification,

$$\text{Frequency } F_i = \frac{\text{Number of quadrats with species } i}{\text{Total number of quadrats sampled}}$$

$$\text{Relative frequency } RF_i = \frac{F_i}{\text{Total plants frequency}}$$

$$\text{Cover } C_i = \frac{a_i}{A} \text{ where } a_i = \text{the area covered by species } i, \text{ while } A = \text{the total area}$$

$$\text{Relative cover } RC_i = \frac{\text{Cover of species } i}{\text{Total plant cover}}$$

$$\text{Density } D_i = \frac{A_i}{\text{Area}}$$

$$\text{Relative density } RD_i = \frac{D_i}{\text{Total plants density}}$$

$$\text{Important value (IV)} = RC_i + RD_i + RF_i \text{ (Sinha, 2017)}.$$

Collection of the Specimens

Representative of plant species which appear in the quadrat were collected. Collected plants species culm, leaves and

inflorescence were recorded and taken to herbarium for identification.

MATERIALS AND METHODS

Study Area

The study was carried out between July to October, 2019 at Bauchi State University Gadau (Main Campus) which lies on latitude 11° 40' 27" N and longitude 10° 16' 30" E. It falls within Sudan savannah, which is characterized by two major climatic seasons; rainy and dry season. The mean annual rainfall ranged between 615.6-985mm (July-October) while ambient temperature ranges from 22.5 to 33.0°C (Callo-Concha *et al.*, 2013).

Experimental Procedure

Five different sampling points of 10m² were selected based on the presence of members of the *Poaceae* family and 1m x 1m quadrat was thrown three times randomly in each sampling point and the following were determined:

RESULTS

Identification

Eight different grasses belonging to the Poaceae family were recorded. During the survey, total frequency of identified species was 69 and the dominant species were *Cenchrusbiflorus*(12), *Dactylocteniumaegyptium*(14), *Paspalumconjugatum* (15), *Pennisetumviolaceum* (12), *Leptochloafiliformis* (3),

Pennisetumglaucum (2), *Brachiarialata*(10) and *Sorghum bicola*(1).

Important Value Index

Frequency is represented by symbol (Fi) is equal to the number of quadrats with specie Divided by the total number of quadrats sampled i.e. fifteen (15) while the relative frequency (RFi) is equal to the frequency with specie divided by the total plant frequency as presented in the table below.

Table 1: Relative Frequency of the Species

SN	SPECIES	Total number of quadrats thrown	Total number of occurrences in quadrat	Frequency	Relative frequency
1	<i>Cencherusbiflorus</i>	15	12	0.8000	0.1739
2	<i>Dactylocteniumaegyptium</i>	15	14	0.9333	0.2029
3	<i>Paspalumconjugatum</i>	15	15	1	0.2174
4	<i>Pennisetumviolaceum</i>	15	12	0.8000	0.1739
5	<i>Leptochloafiliformis</i>	15	3	0.2000	0.0435
6	<i>Pennisetumglaucum</i>	15	2	0.1333	0.0289
7	<i>Brachiarialata</i>	15	10	0.6667	0.1449
8	<i>Sorghum bicola</i>	15	1	0.0667	0.0145

Cover (Ci) is equal to the (ai) = the area covered by specie i divided by (A) the total area. While relative cover (RCi) is equal to the cover of specie i divided by the total plant cover as presented in the table below.

Table 2: Relative Cover of the Species

SN	SPECIES	Total number of quadrat present	Total cover of specie divided by total cover	Cover	Relative Cover
1	<i>Cencherusbiflorus</i>	10	102/894	0.1141	0.1249
2	<i>D. aegyptium</i>	2	196/894	0.2192	0.2399
3	<i>Paspalumconjugatum</i>	8	184/894	0.2058	0.2252
4	<i>Pennisetumviolaceum</i>	0	104/894	0.1163	0.1273
5	<i>Leptochloafiliformis</i>	0	3/894	0.0034	0.0037
6	<i>Pennisetumglaucum</i>	0	24/894	0.0268	0.0293
7	<i>Brachiarialata</i>	28	200/894	0.2237	0.2448
8	<i>Sorghum bicola</i>	0	4/894	0.0045	0.0049
				0.9138	1

Density represent by symbol (D_i) and is equal to the (A_i) the total area with specie all over (a) the area. While relative density (RD_i) is equal to (D_i) density all over the total plant density in a table below.

Table 3: Relative Density of the Species

S/N	SPECIES	Total number of quadrats	Total area with specie divided by area	Density	Relative density
1	<i>Cencherusbiflorus</i>	15	92/15	6.1333	0.1159
2	<i>Paspalumconjugatum</i>	15	177/15	11.8000	0.2229
3	<i>Dactylocteniumaegyptium</i>	15	189/15	12.6000	0.4859
4	<i>Pennisetumviolaceum</i>	15	104/15	6.9333	0.1309
5	<i>Sorghum vulgare</i>	15	3/15	0.2000	0.0038
6	<i>Leptochloafiliformis</i>	15	24/15	1.6000	0.0302
7	<i>Brachiariatalata</i>	15	201/15	13.4000	0.2531
8	<i>Sorghum bicola</i>	15	4/15	0.2667	0.0015
				52.9333	1.2442

Table 4: Important Value Index

S/No.	Plant species	Relative frequency (R.F)	Relative density (R.D)	Relative cover (R.C)	I.V.I (R.F. + R.D. + R.C.)
1	<i>Cencherusbiflorus</i>	0.173	0.1159	0.1249	0.4138
2	<i>Paspalumconjugatum</i>	0.217	0.2229	0.2252	0.6651
3	<i>D. aegyptium</i>	0.2029	0.4859	0.2399	0.9287
4	<i>Pennisetumviolaceum</i>	0.1739	0.1309	0.1273	0.4321
5	<i>Pennisetumglaucum</i>	0.0289	0.0038	0.0293	0.062
6	<i>Leptochloafiliformis</i>	0.043	0.0302	0.0037	0.0769
7	<i>Brachiariatalata</i>	0.1449	0.2531	0.2448	0.6428
8	<i>Sorghum bicola</i>	0.0145	0.0015	0.0049	0.0209

DISCUSSION

The highest IVI value recorded in this study were that of *Dactyloctenium aegyptium* (0.9287), *Paspalum conjugatum* (0.6651) and *Brachiariatalata* (0.6428) meaning they were dominant in among the observed members of the *Poaceae* family. And the lowest IVI value observed was that of *Sorghum bicola* (0.0209). The IVI value ranged between 0.0209 to 0.9287. These findings were contrary to the findings of Sinha, (2017). Eight (8) species of *Poaceae* family were found in the study,

Dactylocteniumaegyptium, *Paspalum conjugatum*, *Cencherusbiflorus* and *Brachiariatalata* were abundant followed by *Pennisetumviolaceum*, *Sorghum bicolor*, *Pennisetumglaucum* and *Leptochloafiliformis* are rarely distributed in the study area. This result contrary to the findings of (Sinha, 2017) where more than eighth species were recorded.

Most of the species are used as a stable food to human and fodder to the animal and some are medicinal. Grasses may be annual or perennial herbs. It is sincerely hoped that the study of grasses diversity from Bauchi

State University Gadau main campus. Can stand as valuable information for the further investigation of researchers who are facing some difficulties to know about the species and anyone looking for the grass's family information.

CONCLUSION

This study is the first to provide baseline information about *Poaceae* in Bauchi state university Gadau main campus which is represented by 8 specie with 7 genera and almost total appearance of 894. The species *Dactyloctenium aegyptium* was identified as the most dominant specie due to the high important value index it recorded compared to others.

REFERENCES

- Aboulaich, N., Bouziane H., Kadiri M., Trigo M.M., Kazzaz M. &Merzouki A. (2009) Pollen production in anemophilous species of the Poaceae family in Tetouan (NW Morocco). *Aerobiologia* 25:27–38
- Aliscioni, S. S., Ospina, J. C., & Gomiz, N. E. (2016). Morphology and leaf anatomy of *Setaria* s.l. (Poaceae: Panicoideae: Paniceae) and its taxonomic significance. *Plant Systematics and Evolution*, 302(2).
- Callo-Concha, D., Gaiser, T., Webber, H. A. &Tischbein, B. (2013). Farming in the West African Sudan Savanna: Insights in the context of climate change. *African journal of agricultural research* 8(38):4693-4705 DOI: 10.5897/AJAR2013.7153
- Catalán, P., López-Álvarez, D., Bellosta, C., & Villar, L. (2016). Updated taxonomic descriptions, iconography, and habitat preferences of *Brachypodium distachyon*, *B. stacei*, and *B. hybridum* (Poaceae). *Anales Del Jardin Botánico de Madrid*, 73(1).
- Cope, T. & Gray, A. (2009). Grasses of the British Isles. London, U. K. *Botanical Society of Britain and Ireland*.
- Fernandez-Gonzalez, D., Valencia-Barrera, R. M., Vega, A., Diaz de la Guardia, C., Trigo, M. M. &Carin˜anos, P. (1999). Analysis of grasses pollen concentrations in the atmosphere of several Spanish sites. *Pollen*, 10, 123–132.
- Linder, H. P., Lehmann, C. E. R., Archibald, S. & Osborn, C. P. (2017). Global Grass (Poaceae) Success Underpinned by Traits Facilitating Colonization, Persistence and Habitat Transformation. *Biological reviews of the Cambridge Philosophical Society*, 93(1):1-8.
- Radaeski, J. N., & Bauermann, S. G. (2018). Poaceae pollen grains from Southern Brazilian grasslands: Pollen grain size in species from dry and humid environments. *Neotropical Biology and Conservation*, 13(2).
- Sinha, M. K. (2017) 'Studies on Weed Diversity and its Associated Phytosociology under Direct Dry Seeded Rice Systems in Koria District (C.G.) India', *Advances in Plants & Agriculture Research*, 7(2).
- Saarela, J. M., Burke, S. V., Wysocki, W. P., Barrett, M. D., Clark, L. G., Craine, J. M., ... Duvall, M. R. (2018). A 250 plastome phylogeny of the grass family (Poaceae): Topological support



under different data partitions. *PeerJ*,
2018(2).
White, R., Murray, S. & Rohweder, M.
(2000). Pilot analysis of global

ecosystems:
ecosystems. World
Institute. 81p.

Grassland
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