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Assessment of grass diversity in the western part of Aizawl, Mizoram, India

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ABSTRACT

Study of Grass species diversity was conducted under humid and tropical climatic condition in Mizoram University Campus, western part of Aizawl, Mizoram, India. A total of 22 species under 19 genera of 2 families of grass were collected and identified. The study area falls under the tropical semi-evergreen forest and was divided into two experimental sites on the basis of disturbance gradients; disturbed site harboured 22 species, 19 genera and 2 families whereas in undisturbed site 4 species, 3 genera and 2 families were observed. Taxonomically, Poaceae was the dominant family in the study area. The most dominant grass species with highest Important Value Index (IVI) in disturbed site and undisturbed site were *Imperata cylindrica* (Linn.) Reuschel and *Ichnanthus vicinus* (Bail.) Merr., respectively.

Key words: Grass diversity; disturbed area; undisturbed area; community analysis; Mizoram University.

INTRODUCTION

Grasses (graminoids) are the fourth largest family of flowering plants, with about 500 genera and 11000 species. Graminoids are divided into three families, *viz*., Poaceae (or Gramineae) commonly known as 'true grasses', Cyperaceae 'sedges' and Juncaceae 'rushes'. They are cosmopolitan and main components of most degraded land and grassland ecosystems.[1] The fibrous roots and their dense growing potential keep soil wet, promote infiltration and prevent soil erosion.[2-7] Even if the above ground biomass has removed by human or animal's activities, only their roots can hold soil erosion.[5,8]

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MATERIAL AND METHODS

Mizoram University Campus was selected for the present study area. It is situated in the western part of Aizawl city and the area is nearly 1000 acres which lies between 23° 45'25" N and 23°43'37" N latitudes and 92° 38'39'' E and 92°40'23" E longitudes. The elevation is ranging from 300 m to 880 m above sea level. The climate is humid and tropical, characterized by short winter, long summer with heavy rainfall. The highest temperature is observed during April and May, and the lowest is during December and January. It receives rains from the south-west monsoon. The precipitation was heavy in summer, generally from May to September, and lasts till late October. Normally July and August were the rainiest months while December and January were the driest months. The average annual rain fall was about 182 mm.

Two experimental sites were sampled on the basis of disturbance gradient for the present study; they are: disturbed site and undisturbed site. The disturbed site is an open area where grasses and a few shrubs and trees are present. The undisturbed site is a natural forest in rocky area, about 30-50 years old. There are a number of small steams or brooks traversing the study area; those streams remain dry in almost all seasons except in rainy season.

Community analysis was carried out during rainy season when majority of the plants were at the peak of their growth. In each experimental site, 50 quadrats of 1 x 1 m (1 sq m) size were laid randomly. The specimens were identified with the help of various floras, *viz*., The Flora of Tripura,[9] flora of Meghalaya,[10] Flora of British India,[11] and Flora of Assam.[12] And some specimens were sent to the Botanical Survey of India, Shillong, for proper identification and visual confirmation.

The important quantitative analysis, such as density, frequency, and abundance and important values index of grasses were determined as per Curtis and McIntosh.[13]

RESULTS AND DISCUSSION

Two families of grasses such as Poaceae and Cyperaceae were identified from the study area. Taxonomically, Poaceae was the dominant family over the Cyperaceae in the two experimental sites. In the present study, 22 species under 19 genera belonging to 2 families were observed in the study area. Out of which, 22 species (19 genera and 2 families) and 4 species (3 genera and 2 families) were present in the disturbed site and undisturbed site, respectively.

In the disturbed site, *Imperata cylindrica* (Linn.) Reuschel (351200 individuals/ha) has the highest density. The other species having high density were *Ichnanthus vicinus* (Bail.) Merr. (8400 individuals/ ha) and *Paspalum logifolium* Roxb. (5600 individuals/ha). Frequency of the species like *I. cylindrica* (60), *I. vicinus* (14), *P. logifolium* (12) and *Eragrostis nutans* Nees ex. Steud.(12) were found to be more pronounced in the disturbed site. However, the most abundant species was *I. cylindrica* (59) followed by *Thysanolaena maxima* (Roxb.) Kurtz. (8), *Cyperus rotrundus* Linn. (7) and *Cyrtococcum patens* Camus.(7). Among the species, *I. cylindrica* was the dominant species with highest IVI (175.88) followed by *Erianthus logisetosus* Anders. ex. Benth (IVI = 18.98). The other co-dominant species were *T. maxima* (IVI = 9.39), *I. vicinus* (IVI = 8.70), *P. logifolium* (IVI = 8.39) and *E. nutans* (IVI = 7.31) (Table 1).

In the undisturbed site, *I. vicinus* (11000 individuals/ ha) has the highest density. The other species having high density were *C. patens* (5667 individuals/ ha) and *T. maxima* (2000 individuals/ ha). The species like *I. vicinus* (20) and *C. patens* (10) were found to be more frequent in the undisturbed area. However, the most abundant species was *T. maxima* (5) followed by *Cyrtococcum accrescens* (Trin.) Stapf. (3), *C. patens* (3) and *I. vicinus* (3). Among the species, *I. vicinus* was the dominant species with highest IVI (162.88), and followed by *C. patens* (IVI = 74.17), *T. maxima* (IVI = 37.78) and *C. accrescens* (IVI = 25.18) (Table 2).

The experimental results revealed that the diversity of Grasses were higher in the disturbed site than the undisturbed sites. Grasses are a pioneer species in plant succession in the deforested area due to sufficient intensity of sunlight and spaces. They reduce biodiversity of indigenous communities, change ecosystem processes, retard ecosystem restoration and reduce profits from agriculture. Their spread has been facilitated by domestic livestock, disturbance, long-distance transport and nitrogen addition to soils.[14] Biological invasion are now one of the main threats to global diversity,[15,16] and have a major impact on structure and function of ecosystem.[17]

Though Grasses may be treated as noxious weeds, they help in binding the soil together, reduce sediment flow and retain dissolved chemicals in runoff.[18] They are also a major

Table 1. Density, frequency %, abundance and IVI of grass species in disturbed area.

Sl. No.	Botanical Name	Density Indv. ha^{-1}	Frequency %	Abundance	IVI
1	*Carex spiculata* Boott.	1600	8	2	4.14
2	*Coix lacryma-jobi* Linn.	800	4	2	3.02
3	*Cynodon dactylon* (Linn.) Pers.	5200	10	5	6.45
4	*Cyperus cyperoides* (Linn.) Kuntz.	5000	10	5	6.53
5	*Cyperus iria* Linn.	3000	8	4	4.54
6	*Cyperus rotrundus* Linn.	5200	8	7	5.37
7	*Cyrtococcum accrescens* (Trin) Stapf.	1200	6	2	3.05
8	*Cyrtococcum patens* Camus.	5200	8	7	5.01
9	*Eragrostis nutans* Nees ex. Steud.	6600	12	6	7.31
10	*Erianthus longisetosus* Anderss. ex. Benth.	3600	6	6	18.98
11	*Fimbristylis dichotoma* (Linn.) Vahl.	3000	6	5	3.60
12	*Ichnanthus vicinus* (Bail) Merr.	8400	14	6	8.70
13	*Imperata cylindrica* (Linn.) Raeuschel.	351200	60	59	175.88
14	*Kyllingia brevifolia* Rottb.	2800	6	5	3.50
15	*Neyraudia reynaudiana* (Kunth.) King. ex. Hitch.	2200	6	4	6.29
16	*Paspalum longifolium* Roxb.	5600	12	5	8.39
17	*Pennisetum polystachyon* Schult.	1400	6	2	3.55
18	*Saccolepis indica* Chase.	1600	8	2	4.67
19	*Scleria terrestris* Linn.	1200	2	6	2.69
20	*Setaria palmifolia* (Koenig) Stapf.	3000	8	4	4.65
21	*Sporobolus diander* (Retz) Beauv.	1800	6	3	4.29
22	*Thysanolaena maxima*(Roxb.) Kuntz.	4600	6	8	9.39

Table 2. Density, frequency %, abundance and IVI of grass species in undisturbed area.

Sl. No.	Botanical Name	Density Indv. ha^{-1}	Frequency %	Abundance	IVI
1	*Cyrtococcum accrescens* (Trin) Stapf.	1667	4	3	25.18
2	*Cyrtococcum patens* Camus.	5667	10	3	74.17
3	*Ichnanthus vicinus* (Bail) Merr.	11000	20	3	162.88
4	*Thysanolaena maxima*(Roxb.) Kuntz.	2000	4	5	37.78

producer of our oxygen due to its enormous geographic range, spatial coverage and biomass.

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