

Plant Diversity of Grassland Vegetation at Khonjom, Manipur

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Abstracts: A total of 90 plant species were recorded from the study area belonging to 73 genera and 90 families. Out of 90 species 8, 12, 4, 13, 42 and 11 were trees, shrubs, leguminous, non leguminous, grasses and sedges respectively. Among them 25 species belonging to 23 genera have been reported here for the first time as new record for Manipur. *Cymbopogon fleuosus*, *Eulalia fastigiata*, *Arundinella setosa*, *Imperata cylindrical*, *Dicanthium annulatum* and *Heteropogon contortus* were the dominant grass species in the grassland vegetation. The present study reveals that this grassland vegetation is not only rich in plant species diversity but also harbor highly nutritive grass species to meet the demand of fodder for the development of animal husbandry in north eastern region.

Keywords: biodiversity, herbage, grassland, subtropical, ecosystem

1. Introduction

Grasses are also one of the major components of living organisms. In grassland studies the biotic factor is stressed in determining the character of vegetation. The process of grassland creation, grassland vegetation and the progression from grassland to forest, especially the important part played by domesticated grazing animals. Conversion of grasslands into seeded pastures or croplands has a significant influence on biodiversity and ecosystem functioning.

Grassland is one of the most important terrestrial biomes occupying an area of about 33×10^6 km². According to Shantz (1954) approximately 25% of the world vegetation cover of the earth's surface is grassland. Grasslands are worldwide in distribution and occur in areas having at least a period in a year where soil water availability falls below the requirement for the forests yet they receive sufficient rainfall during the parts of the year to sustain grasses as the dominant or at least a major component of the vegetation.

In India, grasslands cover about 119×10^3 km² of the total geographical area. There are 400 species of grasses in India out of which 139 species are endemic (Shukla, 1996). Of the total land area in North - East India, pastures and grazing lands comprises only 0.93% (Yadava, 1990). Rangelands covered less than 2% of the total geographical area in N. C. Hills and Barak Valley (Shukla, 1996). The grasslands of North - Eastern India were notably studied by Kakati (1985); Ramakrishnan and Ram (1988); Kakati and Yadava (1990); Pandey *et al.*, (1993); Radzirani (1994); Ram and Ramakrishnan (1988, 1992); Astapati (2008). Manipur is also one of the rich in biological diversity among the north - eastern states. This paper deals with an assessment of plant diversity in the grassland at Khongjom, Thoubal district of Manipur.

2. Materials and Methods

Study area

The study site is located between 24°15' - 24°45'N latitude and 93°45' - 94°15'E longitude at Khongjom in Thoubal district of Manipur state at an altitude of 922 m above mean sea level and 35 km far away from Imphal city. It is an open higher altitudinal grassland and the climate of the area is monsoonic with warm moist summer and cool dry winter.

For detail investigation of plant biodiversity, whole area of the study site has been divided roughly into five parts as per depend on different grassland vegetation. Five quadrats of 5m × 5m are laid down at randomly and sampling are taken at monthly intervals. The identification of collected specimen is carried out by consulting various literature and comparing with the herbarium specimens lodged in NBRI, Lucknow; Botanical Survey of India, Shillong, and then the specimens are deposited in the herbarium of Department of Life Sciences, Manipur University, Imphal.

3. Results and Discussion

A total of 90 plant species are recorded from the study area representing 73 genera and 20 families. Among the different plant species 8 species as trees, 12 species as shrubs and 4 species as Leguminous forbs, 13 species as non - leguminous forbs belonging to 6, 8 and 11 families respectively. However, 42 species as grasses and 11 species as sedges representing Poaceae and Cyperaceae family (Table 1).

The distribution of plants into families, genera and percentage of the total species has been recorded and set in Table 2. Among the 20 families, Poaceae is the dominant family representing 33 genera contributing 46.67% of the total species whereas Cyperaceae is the co - dominant family exhibiting 6 genera representing 12.22% of the total species.

Two families namely Fabaceae and Verbinaceae exhibits 5 genera each representing 5.56% of the total species. Asteraceae and Euphorbiaceae families contributing 4.44% of the total species, And another three families such as Lauraceae, Rubiaceae and Anacardiaceae representing 3.33% and 2.22% of the total species respectively. While the remaining other 11 families contributed by a single species (1.11%).

Table 1: Plant biodiversity in grassland ecosystem

Plant type	Species name	Family
Trees		
	<i>Emblca officinalis</i> Graertn.	Euphorbiaceae
	<i>Litsaea polyantha</i> Juss.	Lauraceae
	<i>L. sebifera</i> Pers.	Lauraceae
	<i>Machilus bombycina</i> King.	Lauraceae
	<i>Pinus kesiya</i> Royle ex Gordon.	Pinaceae
	<i>Quercus serrata</i> Thunb.	Fagaceae
	<i>Rhus javanica</i> L.	Anacardiaceae
	<i>Wendlandia grandis</i> Cowan.	Rubiaceae
Shrubs		
	<i>Artemisia vulgaris</i> Linn. Roxb.	Asteraceae
	<i>Baliospermum meeboldii</i> Pax et Hoffin.	Euphorbiaceae
	<i>Callicarpa rubella</i> Lindl.	Verbenaceae
	<i>Clerodendrum serratum</i> Spreng.	Verbenaceae
	<i>Desmodium floribundum</i> (D. Don)	Fabaceae
	<i>Eupatorium odoratum</i> Linn.	Asteraceae
	<i>Lantana camera</i> Linn.	Verbenaceae
	<i>Maesa indica</i> (Roxb.) Wall.	Myrsinaceae
	<i>Osbeckia nepalensis</i> Hk. f.	Melastomaceae
	<i>Pegia nitida</i> Colebr.	Anacardiaceae
	<i>Rubus moluccanus</i> Linn.	Rubiaceae
*	<i>Stachytarpheta jamaicensis</i> (L.) Vahl.	Verbenaceae
Grasses		
	<i>Andropogon ascinodes</i> C. B. Clarke	Poaceae
*	<i>A. munroi</i> C. B. Clarke	"
*	<i>Apluda aristata</i> Linn.	"
*	<i>A. mutica</i> L. var.	"
	<i>Arundinella setosa</i> Trin.	"
*	<i>Axonopus compressus</i> (S. W.) Beauv.	"
	<i>Bothriochloa intermedia</i> (R. Br.) A. Camus	"
*	<i>Capillipedium assimile</i> (Steud)	"
	<i>Chrysopogon aciculatus</i> (Retz.) Trin.	"
	<i>Cymbopogon flexuosus</i> (Steud.) Wats.	"
	<i>C. martinii</i> (Roxb.) Watson.	"
	<i>Cynodon dactylon</i> (L.) Pers.	"
	<i>Cyrtococcum accrescens</i> Stapf.	"
	<i>Dactyloctenium aegypticum</i> (L.) Beauv	"
	<i>Dichanthium annulatum</i> (Forssk.) Stapf.	"
	<i>Digitaria bifasciculata</i> (Trin.) Henr.	"
	<i>D. cruciata</i> (Nees.)	"
	<i>D. stricta</i> Roth & Schutt	"
*	<i>D. longiflora</i> Retz. Pers.	"
	<i>Eulalia bipinnata</i>	"
	<i>Eragrostis uniloides</i> (Retz.) Nees.	"
*	<i>Hackelochloa granularis</i> O. Kuntz.	"
*	<i>Heteropogon contortus</i> (L.) Roem & Schutt	"
	<i>Imperata cylindrica</i> (L.) Beauv.	"
*	<i>Isachne albens</i> Trin.	"
	<i>Microstadium ciliatum</i> (Tirin.) A. Camus	"

*	<i>Monocymbium ceresiiforme</i> Stapf.	"
	<i>Lophatherum gracile</i> Brongn.	"
*	<i>Oplismenus burmanii</i> (Retz.) Beauv.	"
*	<i>Panicum montanum</i> Roxb.	"
	<i>P. paludosum</i> Roxb.	"
	<i>Pogonatherum crinitum</i> Kunth.	"
	<i>Paspalum orbiculare</i> Forst.	"
*	<i>Paspalidium flavidum</i> (Retz.) A. Camus.	"
*	<i>Scleria pergracilis</i> Kenth.	"
*	<i>Setaria pallide - fusca</i> Stapf & Hubb.	"
*	<i>Setaria palmifolia</i> (Koen) Stapf.	"
*	<i>Sporobolus diander</i> (Retz.) P. Beauv.	"
	<i>S. indicus</i> L. R. Br.	"
	<i>Sorghum nitidum</i> Pers.	"
	<i>Themeda villosa</i> (Poir.) A. Camus	"
	<i>Festuca leptopogon</i> Stapf.	"
Forbs		
	Leguminous forbs	
	<i>Desmodium monoflorum</i> L.	Fabaceae
	<i>Desmodium griffithianum</i> Benth.	"
	<i>D. triflorum</i> (L.) D. C.	"
	<i>Crotalaria alata</i> Buch - Ham.	"
	Non Leguminous forbs	
*	<i>Borreria pusilla</i> (Wall) DC.	Rubiaceae
*	<i>Elephantopus scaber</i> Linn.	Asteraceae
	<i>Eupatorium odoratum</i> Linn.	"
	<i>Jasminum coarctatum</i> Roxb.	Oleaceae
	<i>Ludwigia perennis</i> Linn.	Onagraceae
	<i>Oldanlandia diffusa</i> (willd) Roxb.	Olacaceae
*	<i>Ophiopogon wallichianus</i> Hk. f.	Haemodoraceae
*	<i>Phyllanthus nirurii</i> L.	Euphorbiaceae
*	<i>P. vestigiata</i> Frost.	"
	<i>Rungia pectinata</i> (L.) Nees.	Acanthaceae
	<i>Urena lobata</i> Linn.	Acanthaceae
	<i>Viola serpens</i> Wall ex Roxb.	Violaceae
Sedges		
	<i>Carex cruciata</i> Wahlenb.	Cyperaceae
	<i>C. speciosa</i> Kunth.	"
	<i>Cyperus pillosus</i> Vahl.	"
	<i>C. rotundus</i> Linn.	"
	<i>Fimbristylis dichotoma</i> (L.) Vahl.	"
	<i>F. rigidula</i> Nees	"
	<i>F. tristachya</i> Thw.	"
*	<i>Kyllinga triceps</i> (Rottb.)	"
*	<i>Scirpus mucronatus</i> Roxb.	"
	<i>Scleria elata</i> Thw.	"
	<i>S. pergracilis</i> Kunth.	"

* New recorded to the flora of Manipur.

Table 2: Distribution of plants into families, genera, number of species and percentage (%) of the total species during the study period

Family	Genera	No. of species	% of the total species
Poaceae	33	42	46.67
Cyperaceae	6	11	12.22
Fabaceae	4	5	5.56
Verbenaceae	5	5	4.44
Asteraceae	4	4	3.33
Lauraceae	2	3	3.33
Rubiaceae	3	3	2.22
Anacardiaceae	2	2	4.44
Euphorbiaceae	3	4	1.11
Acanthaceae	1	1	1.11
Fabaceae	1	1	1.11
Haemodoraceae	1	1	1.11

Malvaceae	1	1	1.11
Melastomaceae	1	1	1.11
Myrsinaceae	1	1	1.11
Olacaceae	1	1	1.11
Oleaceae	1	1	1.11
Onagraceae	1	1	1.11
Pinaceae	1	1	1.11
Violaceae	1	1	1.11
Total	73	90	

The present study of grassland vegetation is mainly dominated by *Cymbopogon flexuosus* and *Eulalia fastigiata* whereas co - dominant species are *Imperata cylindrica*, *Arundinella setosa*, *Heteropogon contortus* and *Dichanthium annulatum* consisting the multilayered stratification by trees, shrubs, forbs, grasses and sedges. The sub - tropical grassland of Manipur harbour over 2197 species of flowering plants out of the 17, 000 species described from India. Recently, Khan *et al.* (2007) has also been reported 15 plant species of both grasses and sedges, an additions to the flora of Manipur. Out of 90 or 4.07% plant species representing 20 families occurred in the grassland of Khongjom, Manipur. Among the 20 families, Poaceae family contributes 46.67% followed by Cyperaceae family (12.22%) and both the family of Fabaceae and Verbinaceae contributing 5.56%. Bujarbarua and Sarma (2006) also studied the diversity of family Poaceae in Gibbon Wildlife Sanctuary, Assam, North East India. They suggested that the members of this family constitute the World's most important crops.

Perhaps, the sub - tropical grassland vegetation is characterized by species richness. Out of 90 collected plant species, 29 are new plant species exhibiting 23 genera which have not been reported earlier from Manipur, Khongjom, while the study area is known as an "Ecological Park" which is protected by the Department of Science and Technology, Government of Manipur. Thus the present study reveals that this grassland vegetation is not only rich in plant species diversity but is also rich in diversity of families. Hence this is an urgent need to conserve for meeting the basic needs of present and future generation of human being as well as herbage production for the cattles.

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