



Taxonomic Survey and Morphological Studies on Some Monocot in Panchal Forest area

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Abstract

Monocot (Grass) are diverse in taxonomic study and exhibit wide range of tolerance against the environmental factors qualifying as a pioneer species of an ecosystem. The Panchal forest area of Bankura district is blessed with wide diversity of Monocot due to peculiar topographic and bioclimatic features. The present investigation revealed, the occurrence of 30 species of grass (Monocot) whose spikelet variations were taxonomically studied. A total of 18 species under 7 genera were collected and identified. Genus *Cyperus* found dominant having 8 species followed by *Scirpus* (3 species), *Eleocharis* and *Fimbristylis* (2 species) while *Bulbostylis*, *Carex* and *Pycreus* have 1 species each. Species were distributed widely in marshy places, rice fields, pond and in wetlands. The species are used economically as animal food, medicinal; while some as environmental and others are invasive. Total 30 monocot plant species belonging to 2 families, were collected during the survey. Morphologically, the characters of leaves, stems, roots and flower were observed. The family Poaceae was dominant. The plants were found to be well adapted to the environment of district Bankura. The morphological adaptations were presence of dense hair, powder and cuticle layer on leaves and stem. The leaves were found needle like and elongated. It was concluded that the studied plant species of panchal of district Bankura were well adapted in the extreme environment.

Keywords: Diversity, Environmental, Grasses, species, Taxonomy.

Introduction

The Poaceae (Gramineae) is a large family of monocotyledonous flowering plants with major economic and ecological importance. It comprise of about 11,290 species in approximately 707 genera. Wheat (*Triticum aestivum* L.), bamboos, forage grasses, and lawn grasses are most economically important flowering plants¹. Some grasses are highly ornamental, but most of the grasses rarely attract a second glance even though it is difficult to live without them. Many grasses have medicinal value and few were used as fodder. Monocot grasses are good soil binders. They were wall grass, aquatic and waste land grass, poisonous grass, grasses of good fodder

value, cultivated grass, medicinal grass². The study on grasses continues to be neglected subject especially in India. This is mainly because it is a difficult group for identification, small size of floral organs, special terminology and complicated structure of spikelet inflorescence³. Many monocot (grasses) had medicinal value due to their medicinal properties. Grasses have multiple uses in many aspects of human life. Several species of grasses are cultivated for their food value. many grasses have a significant medicinal properties and find the mention in ancient Indian medicine literature. Recent evidence suggests that grasses had already diversified during the Cretaceous.

The evidence came from phytochemical analyses, tiny crystals of silica formed in the epidermal cells of leaves or floral bracts of grasses and other plants. Silica contents vary greatly among the angiosperms, with high concentration occurring most commonly in the Poaceae and other related monocotyledonous families⁴. The study area Panchal forest is blessed with wide diversity of ecosystems, species and genetic resources. The peculiar topographic and bioclimatic features favored the high percentage of species diversity in the study area. It harbours plenty of grass diversity and extensive study is made yet⁵. So the present study was undertaken to study the morphological and reproductive features to identify closely related species. To understand the nature of the grass inflorescence, spikelet's were dissected.

Materials and Methods

The Panchal forest located in Bankura district India. The district has a favorable agro-climatic condition, which is suitable for growing a number of crops. The proximity of equator, its topography and other climate factors favor the growth of various crops. The soil of the study area is red and alluvial. The area experiences tropical climate.

Taxonomic survey:

Grasses were collected from Panchal forest. The collected grasses were identified, described, illustrated and photographed. Plant specimens were identified with the help of Flora of the Bankura District. Spikelets were dissected under compound microscope and photographs have been taken using digital camera⁶.

Sampling and Collection of Plant Specimens:

During the collection, Grass from the area were folded in news papers and then put into plastic bags. Two samples of each plant of monocot were collected⁷.

Drying and Preservation of Plant Specimens:

The Monocot (Grass) plants were properly sprayed with mercuric chloride, CuSO₄ and spirit to protect them from the decomposition⁸. After complete dryness and poisoning, all the plants were mounted on standard herbarium sheets with proper taxonomical identification.

Taxonomical Studies:

The proper identification and taxonomy of each and every Monocot (Grass) was carried out with the help of available literature.

Morphological Studies:

The general morphological descriptions of the characters like habit, root, stem, leaves and flowers were done according to method⁹. Fresh material of the collected Monocot was recorded along with their photographs.

Results and Discussion

Total of thirty different grass species have been collected, identified, described and illustrated from the Panchal forest of Bankura district. The recorded plants had medicinal, food, fodder, ornamental values¹¹. Out of the thirty grasses, ten plant species were used as food and fodder namely *Oryza sativa*, *Sorghum bicolor*, *Zea mays*, *Setaria viridis*, *Pennisetum glaucum*, *Brachiaria reptans*, *Brachiaria subquadrifida*, *Dactyloctenium aegyptium*, *Eleusine indica*, *Eleusine coracana*, fifteen were used for ornamental purposes namely *Melinis repens*, *Oplismenus hirtellus*, *Echinochloa colona*, *Axonopus compressus*, *Pennisetum polystachyon*, *Paspalum conjugatum*, *Bambusa vulgaris*, *Eragrostis tenella*, *Chloris barbata*, *Sacciolepis interrupta*, *Themeda triandra*, *Andropogon glomeratus*, *Paspalum distichum*, *Panicum notatum*, *Paspalum scrobiculatum*. and five species were medicinally useful namely *Cymbopogon citratus*, *Apulda mutica*, *Vetiveria zizanioides*, *Tragus roxburghii*, *Cynodon dactylon* [Fig-1,2]. The collected grass species were listed below (Table 1). Grasses are the most primitive family of flowering plants and they show specialization in their external morphology¹². During survey and collection of grasses of Panchal forest 30 different grasses were recorded. Study of grass species with their ethonobotanical use and morphological characters were documented¹³. Most of the grass species were recorded to be used as fodder by local people in the study area. The remedy of *Cynodon dactylon* grass is used in treating almost all ailments that trouble the urinary tract¹⁴. The remedy is also useful in treating nosebleed, blood vomiting. Root decoction of *Cynodon dactylon* is given to cattle for respiratory diseases in different localities of Panchal forest [Table – 1].

[Table-1]

NO.	Botanical name	uses
1	<i>Oryza sativa</i>	Food and fodder
2	<i>Zea mays</i>	Food and fodder
3	<i>Setaria viridis</i>	Food and fodder
4	<i>Pennisetum glaucum</i>	Food and fodder
5	<i>Brachiaria reptans</i>	Food and fodder
6	<i>Sorghum bicolor</i>	Food and fodder
7	<i>Brachiaria subquadripara</i>	Food and fodder
8	<i>Dactyloctenium aegyptium</i>	Food and fodder
9	<i>Eleusine coracana</i>	Food and fodder
10	<i>Eleusine indica</i>	Food and fodder
11	<i>Paspalum scrobiculatum</i>	Ornamental purpose
12	<i>Panicum notatum</i>	Ornamental purpose
13	<i>Paspalum distichum</i>	Ornamental purpose
14	<i>Andropogon glomeratus</i>	Ornamental purpose
15	<i>Themeda triandra</i>	Ornamental purpose
16	<i>Sacciolepis interrupta</i>	Ornamental purpose
17	<i>Chloris barbata</i>	Ornamental purpose
18	<i>Eragrostis tenella</i>	Ornamental purpose
19	<i>Bambusa vulgaris</i>	Ornamental purpose
20	<i>Paspalum conjugatum</i>	Ornamental purpose
21	<i>Pennisetum polystachion</i>	Ornamental purpose
22	<i>Axonopus compressus</i>	Ornamental purpose
23	<i>Echinochola colona</i>	Ornamental purpose
24	<i>Oplismenus hirtellus</i>	Ornamental purpose
25	<i>Melinis repens</i>	Ornamental purpose
26	<i>Cynodon dactylon</i>	Medicinal
27	<i>Vetiveria zizanioides</i>	Medicinal
28	<i>Tragus roxburghii</i>	Medicinal
29	<i>Apulda mutica</i>	Medicinal
30	<i>Cymbopogon citratus</i>	Medicinal

Similarly the leaves of *Cynodon dactylon* with coconut oil are used to cure skin diseases Bankura district. The essential oil extracted from *Cymbopogon citrates*, used in the manufacture of perfumes, soaps, detergents and creams¹⁵. It has also been used to inhibit platelet aggregation, treat diabetes, anxiety, malaria, flu fever, and pneumonia, as well as in aromatherapy.

Spikelet of selected grasses:

The variations in spikelet of nine grasses were taxonomically studied and photographed:

Melinis repens :

Inflorescence of *Melinis repens* was branched panicles, 7 cm long, with many hairy flower spikelets.

These flower spikelets were densely covered with silky hairs and reddish in colour, pyramidal. Flowering occurs throughout the year. Spikelets was 5 mm long, ovate, pedicels 2 mm long, pilose at the tip. Lower glume 1 mm long, oblong. upper glume boat – shaped, lower floret, upper floret bisexual. stamens 3; Stigma feathery like, brownish in colour.

Cymbopogon citrates:

Inflorescence was paniculate. Spikelets have 1 basal sterile florets; 1 fertile florets; without rhachilla extension. Spikelets of *Cymbopogon citratus* was linear, well-developed, 2 in number. Basal sterile spikelet's was equalling fertile. Glume dissimilar, exceeding apex of florets. Upper glume lanceolate. anthers 3, stigma feathery dark brown color.



A



B



C



D



E



F



G



H



I

[Fig 1: A-*Setaria viridis*, B-*Melinis repens* C- *Oplismenus burmannii*, D- *Fimbristylis umbellaris*, E- *Typha angustifolia*, F-*Oryza sativa* G- *Cyperus rotundus*, H-*Echinochola colona*, I-*Urochloa setigera*]



J



K



L



M



N



O



Q



R



S

[Fig 2: J-*Eragrostis coarctata*, K-*Setaria barbata*, L-*Pennisetum glaucum*, M-*Fimbristylis ferruginea*, N-*Lipocarpa sp.*, O-*Cynodon dactylon*, P-*Sporobolus diander*, Q-*Eleusine indica*, R-*Kyllinga monocephala*]

***Setaria viridis* :**

Spikelets *Setaria viridis* was very short panicle branches, each spikelet elliptical. The lower glume was one third the length of the spikelet. Lower lemma sterile, like the upper glume, upper lemma fertile.

***Pennisetum glaucum*:**

The inflorescence *Pennisetum glaucum* was panicle, 30cm long. Length of Anther was 3. Anther tip was penicillate. Inflorescence have a compound terminal spike called panicle. Inflorescence consists of a central rachis covered with soft short hairs and bears fascicles on rachillae. A spikelet was contain 3 flowers.

***Oplismenus hirtellus*:**

Inflorescence was racemes. Spikelets packing contiguous and regular, 2-rowed in pairs. Fertile spikelet's comprising 1 basal sterile florets; 1 fertile florets; without rhachilla extension, lanceolate. Glumes dissimilar; thinner. Lower glume ovate; 1 length of upper glume; 0.5 length of spikelet. Lower glume surface glabrous; upper glume awn 3mm long. Florets basal sterile florets barren; with palea. Lemma margins involute. Anther 3. Stigma feathery like pink in colour.

***Echinochola colona* (L.) Link:**

Inflorescence branches raceme. Spikelet length 2mm, the glume has no awn. Spikelets green tinged with purple, crowded, arranged alternately, about 3 mm long. Rarely with a short point up to 1mm long. First glume, 1.2 mm long, 3-nerved, nearly half as long as the spikelet; second glume, 2.5 mm, the first lemma is similar to the second glume, first palea ovate, glabrous, second lemma, broadly ovate. 3 anther. Feathery brown small stigma.

***Oryza sativa*:**

Inflorescence a panicle. Primary branches ascending, angular. Spikelets solitary. Fertile spikelets. The seeds grow on branch-like spikes which arch over. Inflorescence an erect panicle, spikelet about 7mm long, flat, one-flowered, with awns of varying length. Fertile spikelet's comprising 2 basal sterile florets, elliptic; laterally compressed. Anther 5. Feathery white coloured stigma.

***Sorghum bicolor*:**

Inflorescence a panicle, straight, ovate. Spikelets comprising 1 basal sterile florets, 1 fertile florets, without rhachilla extension. Spikelets obovate. Companion sterile spikelet lemmas enclosed by glumes. Glumes dissimilar with lower wider than upper, parallel to lemmas. Without significant palea. The hairy on the spiral. Palea present. Anther 3. Feathery yellow coloured stigma.

***Zea mays*:**

Inflorescence panicle. Each spikelet has one fertile floret and one infertile floret; the pistillate spikelet has short fleshy glumes, a short membranous lemma, a short palea, and an ovary with a pair of styles. The two styles are fused together, except near their tips; they are long, silky and filamentous. The filamentous styles are exerted from tip of the pistillate inflorescence and stigmatic along their sides. 3 long anther.

Conclusion

In this study recording grass species used for various purposes such as fodder, medicine, fuel etc in local area. Among the 30 species of grasses were collected, 10 were used for medicinal purposes in the study area for fever, stomach problems, respiratory tract infections, high blood pressure etc. Some species of grasses used for roof thatching and animal living places, chicks, brooms, baskets, ladders stabilization. Grasses are mainly used as a fodder for cattle in local area of Panchal. The researcher to know more about the morphological and reproductive features to identify closely related species.

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