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A PRELIMINARY SURVEY OF SUB-FAMILY PANICOIDEAE OF GRASSES IN ROHILKHAND REGION OF UTTAR PRADESH INDIA

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ABSTRACT

Rohilkhand region is a part of north-west Uttar Pradesh where grasses are found wild as well as in cultivated state. During the investigation 86 grass species under 4 tribes of sub-family Panicoideae were recorded from different climatic conditions. Tribe Paniceae showed maximum representation of grass species with 45. Two tribes namely Arundinelleae and Paspaleae are poorly represented in the study area.

Keywords: Panicoideae, grasses, herbarium, Rohilkhand region.

Introduction

The grasses not only serve as food for human consumption, but also hold greater values. Some grasses like *Dicanthium annulatum*, *Imperata cylindrica* and *Elusine indica* have fibrous roots which help in soil binding and also check the soil erosion (Silvy Mathew *et al.*, 2014) and sand dunes (Patel *et al.*, 2012). The members are mostly annual or perennial herbs with Bamboos (*Bambusa* and *Dendrocalamus*) as woody members. GPWG-II (2012) classified grasses and all grasses were placed in 12 subfamilies and 51 tribes.

Materials and methods

Study area: Rohilkhand is a part of north-western Uttar Pradesh and made up of nine districts namely Moradabad, Rampur, Sambhal, J.P. Nagar, Bijnor, Bareilly, Budaun, Pilibhit and Shahjahanpur and has physical area of about twenty-six hundred square kilometre (Fig.1). It is situated between latitudes 27°35' to 29°58' N and longitudes 78°0' to 80°27' E. The name Rohilkhand was given by Ahmad Shah Abdali in 1748. The winter average maximum temperature 13.75°C and minimum temperature 6°C whereas summer average daily maximum temperature is 42.20°C. The average rain fall was recorded 932 mm. during the survey period.

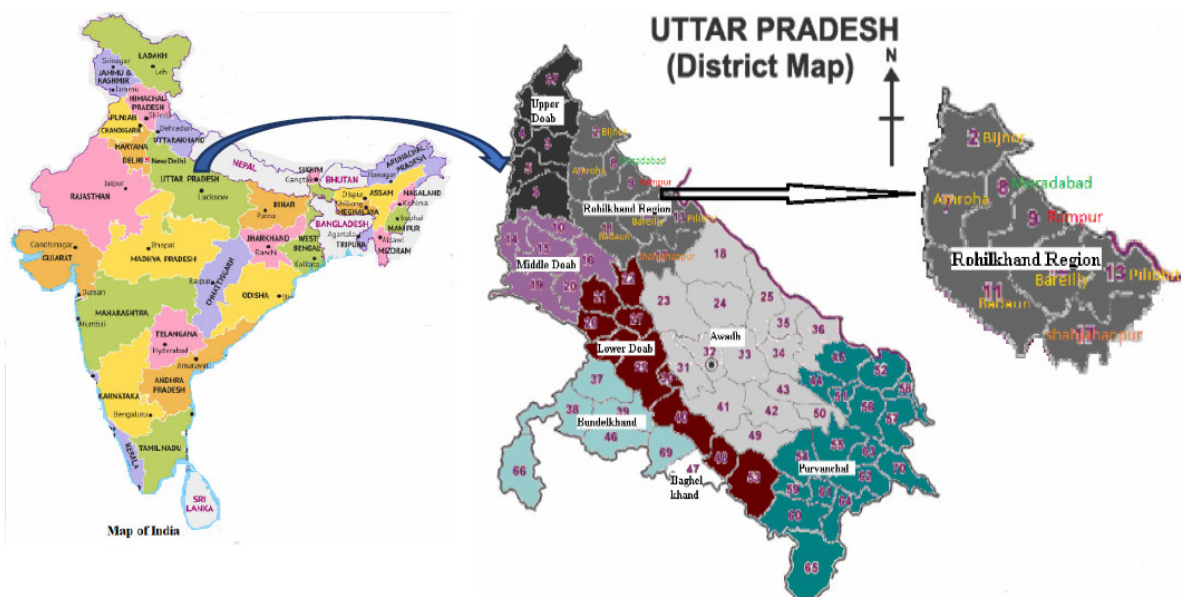


Fig. 1 : Map of India, U.P. and Rohilkhand region

Methodology: The present study on sub-family Panicoideae of grasses in Rohilkhand region of U.P. was carried out during the years 2017-2019. Several field trips were organized to collect grass specimens in all three seasons. During study period, all possible localities for grasses in Rohilkhand region have been observed. Photographs of various species were also taken in the field. Information about habitat type, flowering and fruiting time was collected in field notebooks. Grass specimens were identified with the help of available floras like Bor, (1960), Clayton & Renvoize (1989), Watson & Dallwitz (1994), Moulik (1997), Barkworth *et al.* (2007) and Ashwini *et al.* (2014). Identification of unsure specimens were complete in FRI herbarium, Dehradun and BSI herbarium, Allahabad. Online databases e.g., the Kew, 'Grass Base-the Online World Grass Flora' at <http://www.kew.org/data/grasses-db.html> was also consulted. Herbarium was prepared according to Jain and Rao (1976) and submitted in the Department of Botany, Hindu College, Moradabad for future use.

Results and Discussion

A total 86 grass species were recorded from the study area (Table 1). Subfamily Panicoideae represented by 4 tribes namely Andropogoneae, Arundinelleae, Paniceae and Paspaleae. District Pilibhit showed maximum number of species (58) followed by Bijnor (42) because these areas have suitable conditions for the growth of grasses (Table 2). District Moradabad exhibited 33 species whereas

Shahjahanpur and Badaun shared equal number of species (32). District Amroha with 24 species while both Bareilly and Sambhal showed 22 species. District Rampur had lowest number of species (20). Different number of species occurred in different parts of Rohilkhand region due to various soil types, variation in temperature and availability of water. Nineteen grass species viz. *Bothriochloa bladhii* (Retz.) S.T. Blake, *Capillipedium assimile* (Steud.) A. Camus, *Chrysopogon fulvus* (Spreng.) Chiov., *Cyrtococcus patens* (L.) A. Camus, *Eriochloa procera* (Retz.) C.E. Hubb., *Eulalia leschenaultiana* (Decne.) Ohwi, *Eulalia trispicata* (Schult.) Henrard., *Eulaliopsis binata* (Retz.) C.E. Hubb., *Hymenachne amplexicaulis* (Rudge) Nees, *Ischaemum rugosum* Salisb., *Mnesithea laevis* (Retz.) Kunth, *Oplismenus compositus* (L.) P.Beauv, *Panicum paludosum* Roxb., *Pogonatherum crinitum* (Thunb.) Kunth, *Pogonatherum paniceum* (Lam.) Hack., *Saccharum narenga* (Nees ex Steud.) Hack., *Sacciolepis indica* (L.) Chase and *Sorghum nitidum* (Vahl) Pers were recorded from only Pilibhit district. Ten grass species viz. *Arundinella nepalensis* Trin., *Brachiaria subquadripara* (Trin) Hitchc., *Coix aquatica* Roxb., *Cymbopogon martinii* (Roxb.) Wats., *Digitaria longiflora* (Retz.) Pers., *Digitaria violascens* Link, *Paspalidium punctatum* (Burm. F.) A.Camus, *Paspalum scrobiculatum* L., *Pennisetum flaccidum* Griseb. and *Themeda anathera* (Nees ex Steud) Hack were found only in Bijnor district whereas one species, *Themeda quadrivalvis* (L.) O. Kuntz was recorded from only Budaun district.

Table 1 : Showing number of tribes, genus and species in subfamily-Panicoideae.

S.N.	Tribes	Species	No.G.	No.S.	Status
1.	I-Andropogoneae	<i>Apluda mutica</i> L.	1	2	Wild
2.		<i>Apluda mutica</i> subsp. <i>aristata</i> (L.) Babu			Wild
3.		<i>Bothriochloa bladhii</i> (Retz.) S.T.Blake	1	2	Wild
4.		<i>Bothriochloa pertusa</i> (L.) A.Camus			Wild
5.		<i>Capillipidium assimile</i> (Steud.) A.Camus	1	1	Wild
6.		<i>Chrysopogon aciculatus</i> (Retz.) Trin.	1	3	Wild
7.		<i>Chrysopogon fulvus</i> (Spreng.) Chiov.			Wild
8.		<i>Chrysopogon zizanioides</i> (L.) Roberty			Wild
9.		<i>Coix aquatica</i> Roxb.	1	2	Cultivated
10.		<i>Coix lacryma-jobi</i> L.			Wild
11.		<i>Cymbopogon citratus</i> (DC.) Stapf.	1	2	Wild
12.		<i>Cymbopogon martinii</i> (Roxb.) Wats.			Wild
13.		<i>Dichanthium annulatum</i> (Forssk.) Stapf	1	2	Wild
14.		<i>Dichanthium aristatum</i> (Poir) Hubb.			Wild
15.		<i>Eulalia leschenaultiana</i> (Decne.) Ohwi	1	2	Wild
16.		<i>Eulalia trispicata</i> (Schult) Henrard			Wild
17.		<i>Eulaliopsis binata</i> (Retz.) C.E.Hubb.	1	1	Wild
18.		<i>Hackelochloa granularis</i> L. Kuntze	1	1	Wild
19.		<i>Hemarthria compressa</i> (L.f.) R.Br.	1	1	Wild
20.		<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult.	1	1	Wild
21.		<i>Imperata cylindrica</i> (L.) Raeusch.	1	1	Wild
22.		<i>Ischaemum rugosum</i> Salisb.	1	1	Wild
23.		<i>Iseilema laxum</i> Hack.	1	1	Wild
24.		<i>Miscanthus nepalensis</i> (Trin.) Hack.	1	1	Wild
25.		<i>Mnesithea laevis</i> (Retz.) Kunth	1	1	Wild
26.		<i>Pogonatherum crinitum</i> (Thunb.) Kunth	1	2	Wild
27.		<i>Pogonatherum paniceum</i> (Lam.) Hack.			Wild
28.		<i>Saccharum bengalense</i> Retz.	1	6	Wild
29.		<i>Saccharum narenga</i> (Nees ex Steud.) Hack.			Wild
30.		<i>Saccharum officinarum</i> L.			Cultivated

31.		<i>Saccharum procerum</i> Roxb			Wild
32.		<i>Saccharum ravennae</i> (L.) L			Wild
33.		<i>Saccharum spontaneum</i> L.			Wild
34.		<i>Sorghum bicolor</i> (L.) Moench	1	3	Cultivated
35.		<i>Sorghum halepense</i> (L.) Pers.			Wild
36.		<i>Sorghum nitidum</i> (Vahl) Pers			Wild
37.		<i>Themeda anathera</i> (Neesex Steud.) Hack.	1	2	Wild
38.		<i>Themeda quadrivalvis</i> (L.) O. Kuntz.			Wild
39.		<i>Zea mays</i> L.	1	1	Cultivated
40.	II-Arundinelleae	<i>Arundinella nepalensis</i> Trin.	1	1	Wild
41.	III-Paniceae	<i>Alloteropsis cimicina</i> (L.) Stapf	1	1	Wild
42.		<i>Brachiaria distachya</i> (L.) Stapf	1	5	Wild
43.		<i>Brachiaria eruciformis</i> (Sm.) Griseb.			Wild
44.		<i>Brachiaria ramosa</i> (L.) Stapf			Wild
45.		<i>Brachiaria reptans</i> (L.) C.A.Gardner & C.E. Hubb.			Wild
46.		<i>Brachiaria subquadrifida</i> (Trin) Hitchc.			Wild
47.		<i>Cenchrus biflorus</i> Roxb.	1	4	Wild
48.		<i>Cenchrus ciliaris</i> L.			Wild
49.		<i>Cenchrus pennisetiformis</i> Hochst			Wild
50.		<i>Cenchrus setiger</i> Vahl			Wild
51.		<i>Cyrtococcum patens</i> var. <i>latifolium</i> (Honda) Ohwi	1	2	Wild
52.		<i>Digitaria abludens</i> (Roem. & Schult.) Veldkamp	1	7	Wild
53.		<i>Digitaria bicornis</i> (Lam.) Roem. & Schult.			Wild
54.		<i>Digitaria ciliaris</i> (Retz.) Koeler			Wild
55.		<i>Digitaria longiflora</i> (Retz.) Pers.			Wild
56.		<i>Digitaria setigera</i> Roth			Wild
57.		<i>Digitaria stricta</i> Roth			Wild
58.		<i>Digitaria violascens</i> Link			Wild
59.		<i>Echinochloa colona</i> (L.) Link	1	5	Wild
60.		<i>Echinochloa crus-galli</i> (L.) P.Beauv.			Wild
61.		<i>Echinochloa frumentacea</i> Link			Wild
62.		<i>Echinochloa stagnina</i> (Retz.) P.Beauv.			Wild
63.		<i>Eriochloa procera</i> (Retz.) C.E.Hubb.			Wild
64.		<i>Oplismenus burmanni</i> (Retz.) P.Beauv.	1	2	Wild
65.		<i>Oplismenus compositus</i> (L.) P.Beauv.			Wild
66.		<i>Panicum antidotale</i> Retz.	1	5	Wild
67.		<i>Panicum curviflorum</i> Hornem.			Wild
68.		<i>Panicum paludosum</i> Roxb.			Wild
69.		<i>Panicum repens</i> L.			Wild
70.		<i>Panicum sumatrense</i> Roth			Wild
71.		<i>Paspalidium flavidum</i> (Retz.) A.Camus	1	2	Wild
72.		<i>Paspalidium punctatum</i> (Burm. f.) A.Camus			Wild
73.		<i>Paspalum distichum</i> L.	1	2	Wild
74.		<i>Paspalum scrobiculatum</i> L.			Wild
75.		<i>Pennisetum glaucum</i> (L.) R.Br.	1	3	Cultivated
76.		<i>Pennisetum flaccidum</i> Griseb.			Wild
77.		<i>Pennisetum orientale</i> Rich.			Wild
78.		<i>Sacciolepis indica</i> (L.) Chase	1	2	Wild
79.		<i>Sacciolepis myosuroides</i> (R.Br.) A. Camus			Wild
80.		<i>Setaria intermedia</i> Roem & Schult.	1	5	Wild
81.		<i>Setaria italica</i> (L.) P.Beauv.			Wild
82.		<i>Setaria pumila</i> (Poir.) Roem. & Schult.			Wild
83.		<i>Setaria verticillata</i> (L.) P.Beauv.			Wild
84.		<i>Setaria viridis</i> (L.) Beauv.			Wild
85.		<i>Urochloa panicoides</i> P.Beauv.	1	1	Wild
86.	IV-Paspaleae	<i>Hymenachne amplexicaulis</i> (Rudge) Nees	1	1	Wild

Table 2 : District wise distribution of grass species of subfamily Panicoideae in Rohilkhand Region of Uttar Pradesh.

S.N.	Species	MB	RM	AM	SA	PI	BI	BA	BU	SH
1.	<i>Alloteropsis cimicina</i> L. Stapf					+	+			
2.	<i>Apluda mutica</i> L.	+		+		+	+		+	
3.	<i>Apluda mutica</i> subsp. <i>aristata</i> (L) Babu								+	+
4.	<i>Arundinella nepalensis</i> Trin.						+			
5.	<i>Bothriochloa bladhii</i> (Retz.) S.T.Blake					+				
6.	<i>Bothriochloa pertusa</i> (L.) A.Camus	+	+			+			+	
7.	<i>Brachiaria eruciformis</i> (Sm.) Griseb.							+		+
8.	<i>Brachiaria distachya</i> (L.) Stapf					+	+			
9.	<i>Brachiaria ramosa</i> (L.) Stapf	+	+	+	+	+			+	+
10.	<i>Brachiaria reptans</i> (L.) C.A.Gardner& C.E. Hubb.	+				+		+		
11.	<i>Brachiaria subquadripara</i> (Trin) Hitchc.						+			+
12.	<i>Capillipedium assimile</i> (Steud.) A. Camus					+				
13.	<i>Cenchrus biflorus</i> Roxb.			+						+
14.	<i>Cenchrus ciliaris</i> L.	+	+	+	+		+	+	+	
15.	<i>Cenchrus pennisetiformis</i> Hochst						+			+
16.	<i>Cenchrus setiger</i> Vahl	+								+
17.	<i>Chrysopogon aciculatus</i> (Retz.) Trin.					+	+			
18.	<i>Chrysopogon fulvus</i> (Spreng.) Chiov.					+				
19.	<i>Chrysopogon zizanioides</i> (L.) Roberty	+			+	+	+	+	+	+
20.	<i>Coix aquatica</i> Roxb.						+			
21.	<i>Coix lacryma-jobi</i> L.	+	+	+	+	+	+	+	+	+
22.	<i>Cymbopogon citratus</i> (L.) Stapf	+	+	+	+		+	+	+	
23.	<i>Cymbopogon martinii</i> (Roxb.) Wats.						+			
24.	<i>Cyrtococcum patens</i> (L.) A.Camus					+				
25.	<i>Dichanthium annulatum</i> (Forssk.) Stapf	+	+	+	+	+	+	+	+	+
26.	<i>Dichanthium aristatum</i> (Poir) Hubb.		+							+
27.	<i>Digitaria abludens</i> (Roem. & Schult.) Veldkamp					+	+			
28.	<i>Digitaria bicornis</i> (Lam.) Roem. & Schult.					+	+			+
29.	<i>Digitaria ciliaris</i> (Retz.) Koeler	+							+	
30.	<i>Digitaria longiflora</i> (Retz.) Pers.						+			
31.	<i>Digitaria setigera</i> Roth	+	+	+	+			+	+	+
32.	<i>Digitaria stricta</i> Roth					+			+	
33.	<i>Digitaria violascens</i> Link						+			
34.	<i>Echinochloa acolona</i> (L.) Link	+	+	+	+	+	+	+	+	+
35.	<i>Echinochloa crus-galli</i> (L.) P.Beauv.					+		+		
36.	<i>Echinochloa frumentacea</i> Link					+				+
37.	<i>Echinochloa stagnina</i> (Retz.) P.Beauv.					+	+		+	
38.	<i>Eriochloa procera</i> (Retz.) C.E.Hubb.					+				
39.	<i>Eulalia leschenaultiana</i> (Decne.) Ohwi					+				
40.	<i>Eulalia trispicata</i> (Schult.) Henrard.					+				
41.	<i>Eulaliopsis binata</i> (Retz.) C.E.Hubb.					+				
42.	<i>Hackelochloa granularis</i> (L.) Kuntze					+	+			
43.	<i>Hemarthria compressa</i> (L.f.) R.Br.	+		+	+	+			+	
44.	<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult.	+		+	+	+	+		+	
45.	<i>Hymenachne amplexicaulis</i> (Rudge) Nees					+				
46.	<i>Imperata cylindrica</i> (L.) Raeusch.	+	+	+	+	+	+	+	+	+
47.	<i>Ischaemum rugosum</i> Salisb.					+				

48.	<i>Iseilema laxum</i> Hack.	+								
49.	<i>Miscanthus nepalensis</i> (Trin.) Hack.	+							+	
50.	<i>Mnesithea laevis</i> (Retz.) Kunth					+				
51.	<i>Oplismenus burmanni</i> (Retz.) P. Beauv.	+				+		+	+	+
52.	<i>Oplismenus compositus</i> (L.) P.Beauv					+				
53.	<i>Panicum antidotale</i> Retz.	+	+	+	+	+	+		+	
54.	<i>Panicum curviflorum</i> Hornem	+			+	+	+			+
55.	<i>Panicum paludosum</i> Roxb.					+				
56.	<i>Panicum repens</i> L.								+	+
57.	<i>Panicum sumatrense</i> Roth					+	+			
58.	<i>Paspalidium flavidum</i> (Retz.) A.Camus	+		+		+		+	+	+
59.	<i>Paspalidium punctatum</i> (Burm. F.) A.Camus						+			
60.	<i>Paspalum disticum</i> L.	+		+		+				
61.	<i>Paspalum scrobiculatum</i> L.						+			
62.	<i>Pennisetum flaccidum</i> Griseb.						+			
63.	<i>Pennisetum glaucum</i> (L.) R.Br.	+	+	+	+	+	+	+	+	+
64.	<i>Pennisetum orientale</i> Rich.					+	+			
65.	<i>Pogonatherum crinitum</i> (Thunb.) Kunth					+				
66.	<i>Pogonatherum paniceum</i> (Lam.) Hack.					+				
67.	<i>Saccharum benghalense</i> Retz.	+	+	+	+	+	+	+	+	+
68.	<i>Saccharum narenga</i> (Nees ex Steud.) Hack.					+				
69.	<i>Saccharum officinarum</i> L.	+	+	+	+	+	+	+	+	+
70.	<i>Saccharum procerum</i> Roxb.					+	+			
71.	<i>Saccharum ravennae</i> (L.) L.						+			+
72.	<i>Saccharum spontaneum</i> L.	+	+	+	+	+	+	+	+	+
73.	<i>Sacciolepis indica</i> (L.) Chase					+				
74.	<i>Sacciolepis myosuroides</i> (R.Br.) A.Camus					+				
75.	<i>Setaria intermedia</i> Roem & Schult.	+				+		+	+	+
76.	<i>Setaria italica</i> (L.) P.Beauv.					+				+
77.	<i>Setaria pumila</i> (Poir.) Roem. & Schult.					+				+
78.	<i>Setaria verticellata</i> (L.) P.Beauv	+	+	+	+	+	+	+	+	+
79.	<i>Setaria viridis</i> (L.) Beauv.					+	+			
80.	<i>Sorghum bicolor</i> (L.) Moench	+	+	+	+			+	+	+
81.	<i>Sorghum halepense</i> (L.) Pers.	+	+	+	+		+			
82.	<i>Sorghum nitidum</i> (Vahl) Pers					+				
83.	<i>Themeda anathera</i> (Nees ex Steud) Hack.						+			
84.	<i>Themeda quadrivalvis</i> (L.) O. Kuntz.								+	
85.	<i>Urochloa panicoides</i> P.Beauv.	+	+	+	+		+	+	+	+
86.	<i>Zea mays</i> L.	+	+	+	+	+	+	+	+	+

Note- MB= Moradabad, RM= Rampur, AM= Amroha, SA= Sambhal, PI= Pilibhit, BI= Bijnor, BA= Bareilly, BU=Budaun and SH= Shahjahanpur.



Apludamutica L.



Chrysopogon zizanioides (L.) Roberty



Coix lacryma-jobi L.



Cymbopogon martinii (Roxb.) Wats.



Dichanthium annulatum (Forssk.) Stapf



Hemarthria compressa (L.f.) R.Br.

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