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## FLORISTIC DIVERSITY OF ANGIOSPERMS IN AQUATIC AND MARSHY HABITATS WITHIN FLOODPLAIN AND RESIDUAL RELIEVES OF RANIPUR WILD LIFE SANCTUARY, U.P., INDIA

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### ABSTRACT

The Ranipur Wildlife Sanctuary located in the Chitrakoot district of Uttar Pradesh in the Northern India, with diverse wildlife. Factors such as terrain of foothills of the lower Vindhyan mountain range, forest cover, flood pulse and altitude must be considered for better understanding of diversity of this area. The dense forest cover, a network of water streams, river and river-lets, natural kunds and check dams have creating a perfect aquatic and marshy habitat. The present study aiming to assess and analyzes the floristic composition of the aquatic and marshy habitats. We recorded 112 species in 41 families, mostly annual (68.75%), annual/perennial (19.64%) and plurennial (11.61%). The most dominant family was Cyperaceae (26 species) followed by Poaceae (11 species). The most dominant genus is *Cyperus* with 13 species. The studied areas showed low floristic similarity, but higher resemblance of species between neighboring areas, and no relation with altitude.

**Key words:** Diversity, floodplain, floristics, sanctuary, vegetation, wild life.

### INTRODUCTION

Marshy habitat form a transition between the aquatic and terrestrial ecosystems mostly found at the edges of lakes and streams with a complex floristic composition. The Marshy habitat plants represent a diversified set of species with differential adaptations and ecological strategies for maintenance of diversity, allowing them to survive in waterlogged or flooded conditions. The set of various factors directly influence characteristics of each species, such as propagation, reproduction, germination, and competition, which may increase the species diversity over short distances (Capon and Brock, 2006 and Brock, 2011). Flood pulse is one of the most significant factors in wetlands which may occur in a periodical and irregular hydrological cycle. It can often be lead to changes in structure and species composition over a geographical gradient throughout the world (Kozlowski *et al.*, 1991; Muencher, 1994; Cronk and Fennessy, 2001; Cattanio *et al.*, 2002 and Diniz-Filho *et al.*, 2012).

The Ranipur area was one of the Forest and Game Reserves of Colonial India and remained for a long time after the independence. The Ranipur reserve was notified as the Ranipur Wildlife Sanctuary in 1977 by the Government of

Uttar Pradesh and is administrated by Environment, Forest and Climate Change Department. This Wildlife Sanctuary has a network of small streams and river-lets thus creating a perfect habitat for different kinds of vegetation along with birds, large and small mammal and reptiles. In India, the floristic diversity of aquatic and marshy habitats has been explored and recorded time to time by various workers from various regions (Hooker, 1872-1897; Duthie, 1903-1929; Biswas and Calder, 1937; Raizada, 1976; Cook, 1996; Subramanyam, 1962; Gopal, 1990; Singh and Ranjan, 2021). With special reference to vegetation in aquatic and marshy habitats of various part of Uttar Pradesh have been documented by various workers (Bhattacharyya and Malhotra, 1964; Sahai and Singh, 1968; Singh and Singh, 1972, 1991; Maheshwari and Tomar, 1983; Srivastava *et al.*, 1987; Sinha *et al.*, 1990; Sharma and Dhakre, 1993; Ranjan, 1996; Sinha and Dixit, 2000; Singh, 2006; Maliya, 2006; Narain and Singh, 2008; Narain and Mishra, 2008; Ansari and Tiwari, 2014; Yadav *et al.*, 2021). Uttar Pradesh is one of the largest states of Gangetic Plain and comprises a complex of ecosystems of aquatic and marshy habitats forming a mosaic with high species diversity that increases the spatial variability of their occurrence. In this context, considering that the factors influences characteristics of each species has

been the less studied the floristic composition of the aquatic and marshy habitats of Ranipur Wildlife Sanctuary. Our aim was to perform a floristic survey in this Wildlife Sanctuary to evaluate and compare both species composition and richness. Ansari and Tiwari (2014) studied the floristic composition of this wild life sanctuary and stated that the habitats of this Sanctuary comprise a complex of ecosystems forming high species diversity. The area of floodplain and residual relieves of this sanctuary have not explored systematically so far. However, the pattern of hydrological cycle of floods effects the composition of diversified set of species with differential adaptations and ecological strategies for maintenance of diversity (Kozlowski *et al.*, 1991; Cronk and Fennessy, 2001; Cattanio *et al.*, 2002; Ferreira and Parolin, 2007; Costa *et al.*, 2009 and Sanches *et al.*, 2013). In this context, our purpose was to consider the factors influencing characteristics of each species, and to perform a floristic survey in this Wildlife Sanctuary to evaluate and compare both composition and richness of species in the areas of floodplain and residual relieves.

The aquatic and marshy plants of Raipur wild life sanctuary have not explored systematically so far. However, Ranipur Wild Life sanctuary is rich in aquatic and hydrophytic vegetation. Common habitats of hydrophytes are manmade check dams, natural kunds, ponds, streams, ditches, rivers and low lying areas which remain submerged for many months of the year which are integral and important component in food and water security for wild flora and fauna.

## MATERIALS AND METHODS

### Study Sites

Ranipur wild life sanctuary is located in the Chitrakoot district of Uttar Pradesh. It is geographically situated between 24°53" to 25°02" N latitude and 80°48" to 81°14" E longitude in the Vindhyan hills and plain. The sanctuary is spread over an area of 230 sq km and provide ideal habitat for several rare and endangered flora and fauna. It is not well connected by rail and road because of undulating terrain and dense forest. Nearest railway station is Manikpur junction, 120 km away from Prayagraj, on the Howrah-Mumbai rail route. Southern boundary of the sanctuary touches the state of Madhya Pradesh. Climatic condition shows much variation in different seasons of the year. Temperature falls to 3-4°C during the winter season and maximum temperature reaches up to 49°C during hot summer days. Soil of this area is sandy red and yellow in colour, maximum rainfall occur during the July to September by Southwestern monsoon and scanty rainfall occurs in winter season. The ever flowing rivers like Amha, Bardaha and Jamunhai drain, Lakhanpur drain, Kulludol drain, Vedhak Jaldhara, Panna kund are main natural source of water. Some man made check dams in the rivers make round the year availability of water in the different part of the sanctuary. Sanctuary is rich in aquatic and hydrophytic vegetation. Common habitats of hydrophytes are manmade check dams, natural kunds, ponds, streams, ditches, rivers and low lying areas which remain submerged for many months of the year and support luxurious growth of aquatic flora and fauna.

### Data Sampling and Methods

The study was carried out in six areas *viz.* Check Dam of Amha River (CDAR), Check Dam of Bardaha River

(CDBR), Sakrauha Pond (SP), Chaupata Foothill Dam (CFD), Unchadiah Dam Water Stream (UDWS) and Panna Kund (PK) of Ranipur Wild Life Sanctuary are given in Table 1. To cover a wide range of species diversity, the survey was performed in three collection sites in each area. Species identification was achieved by comparison with specimens of Indian herbarium, digital herbaria (e Floras, 2008; WCSP, 2012; The Plant List, 2013; POWO, 2019; GBIF, 2020; JSTOR, 2020 and The Herbarium Catalogue, 2021) and perusal of relevant literature. Both composition and richness of species in the areas of floodplain and residual relieves and verifying the pattern of ecological habitat, life period and flowering period as mentioned in Figs. 1-5 & Table 1-2.

## RESULTS AND DISCUSSION

In the present investigation, 112 plant species belonging to 76 genera and 41 families were recorded from Ranipur Wild Life Sanctuary (Table 2, Fig. 1). Out of these 112 plant species, 54 species, 40 genera and 30 families belong to dicotyledons (Fig. 2) and remaining 58 species, 36 genera and 11 families belong to monocotyledons (Fig. 3). The dominant families are Cyperaceae (26 species), Poaceae (11 species), Asteraceae (5 species), Onagraceae (5 species), Linderniaceae (4 species), Araceae (4 species) Polygonaceae, Hydrocharitaceae, Commelinaceae, Lythraceae, Lemnaceae, Amaranthaceae with 3 species each (Fig. 4). The most dominant genus is *Cyperus* with 13 species followed by *Ludwigia* and *Lindernia* with 5 and 4 species, respectively. Observations showed that wetland hydrophytes were represented by 68 species, followed by emergent amphibious hydrophytes with 20 species, leaf floating hydrophytes with 8 species, free floating hydrophytes with 7 species, submerged attached hydrophytes with 5 species, suspended hydrophytes and shoot floating attached hydrophytes are represented by 2 species each (Fig. 5). According to ecological habitat 68.75% (77 plant species) were annual, 11.61% (13 plant species) plurennial and 19.64% (22 plant species) annual/perennial (Table 1). The sanctuary area are free from the pollution but ponds, rivers, ditches, kunds and check dams near the human settlement have pollution to some extent. These polluted water body support the luxurious growth of *Eichhornia crassipes*, *Nymphaea pubescens*, *Pistia stratiotes*, *Lemna paucicostata* etc.

In this work, we observed the floristic diversity and the differences in vegetation composition between the sampled areas, which contribute to the heterogeneity found in the Aquatic and Marshy Habitats of Ranipur Wild Life Sanctuary. With regard to the both permanent and seasonal flooded environments, the presence of Cyperaceae, Poaceae, Asteraceae, Onagraceae and Linderniaceae increased the diversity of aquatic macrophytes. The high diversity of aquatic plants is a consequence of their different life forms which allow them to grow in different habitats and hydric conditions, as observed in wetland hydrophytes which supports the influence of the vegetation types on the floristic composition of the various geographical region of the world (Irgang *et al.*, 1996; Scremin-Dias, 2000, 2011 and Bao *et al.*, 2018). The river-plain interaction in flooding periods has been considered important to explain the similarities of different groups of aquatic organisms (Bao *et al.*, 2014, 2018). Bornette *et al.* (1998) stated that understanding of such types of similarities may explain the patterns of species richness and rarity in wetlands, which allows to predict the

community dynamics and to develop guidelines for biodiversity conservation. In the present study we also revealed that the species richness and abundance increase due to different capabilities of seed retention and also by the physiological factors and function of the submersed period.

**Table1: General Information of the six studied areas of Ranipur Wild Life Sanctuary**

S. N.	Areas*	Vegetation Type	Altitude	Soil Type	Geographic Coordinates Lat., long.	Species Richness	Genus Richness	Family Richness
1	CDAR	Deciduous Forest and floodable Meadow	188m	Sandy loam	25°01'15.515"N 81°9'57.350"E	95	52	31
2	CDBR	Deciduous Forest and floodable Meadow	226m	Sandy loam	24°59'56.522"N 81°10.129"E	99	64	38
3	SP	Meadow	237m	Clay-Sandy	25°1'17581" N 81°11'11.732"E	54	17	22
4	CFD	Deciduous Forest	244m	Sandy	24°59'15.875"N 81°10'25.698"E	49	18	15
5	UDWS	Meadow	191m	Sandy	25°3'29.808"N 81°11'55.524"E	62	24	23
6	PK	Deciduous Forest	206m	Sandy	25°2'05.112"N 81°11'002" E	72	38	29

(\*Check Dam of Amha River: CDAR, Check Dam of Bardaha River: CDBR, Sakrauha Pond: SP, Chaupata Foothill Dam: CFD, Unchadhil Dam Water Stream: UDWS and Panna Kund: PK)

**Table 2 : The name of plant species, family their ecological habitat, life period and flowering period.**

S. No.	Plant species	Family	Ecological habitat*	Life period	Flowering period
<b>Dicotyledons</b>					
1	<i>Ranunculus sceleratus</i> L.	Ranunculaceae	WLH	Annual	March-June
2	<i>Nymphaea nouchli</i> Burm.	Nymphaeaceae	LFA	Plurennial	Aug.-Nov.
3	<i>Nymphaea pubescens</i> Willd.	Nymphaeaceae	LFA	Plurennial	Aug.-Nov.
4	<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	LFA	Plurennial	Aug.-Oct.
5	<i>Rorippa indica</i> (L.) Hiern.	Brassicaceae	WL	Annual/Perennial	Dec.-June.
6	<i>Bergia capensis</i> L.	Elatinaceae	EA	Annual	Aug-Dec.
7	<i>Corchorus capsularis</i> L.	Tiliaceae	WL	Annual	Sep.-Dec.
8	<i>Corchorus olitorius</i> L.	Tiliaceae	WL	Annual	Oct.-Jan.
9	<i>Oxalis corniculata</i> L.	Oxalidaceae	WL	Plurennial	Oct.-March
10	<i>Oxalis debilis</i> var. <i>corymbosa</i> (DC.) Lourteig	Oxalidaceae	WL	Plurennial	March-June
11	<i>Aeschynomene indica</i> L.	Fabaceae	EA	Plurennial	Mar. - Jun.
12	<i>Sesbania bispinosa</i> (Jacq.) WF Wight.	Fabaceae	EA	Plurennial	Oct.-Dec
13	<i>Neptunia oleracea</i> Lour.	Mimosaceae	FF	Annual/Perennial	Oct. -Jan.
14	<i>Ammannia auriculata</i> Willd.	Lythraceae	EA	Annual	Aug.-June
15	<i>Ammannia baccifera</i> L.	Lythraceae	EA	Annual	Dec.-April
16	<i>Trapa natans</i> L.	Lythraceae	LFA	Annual	Sep.-Jan.
17	<i>Ludwigia octovalvis</i> (Jacq.) P.H. Raven.	Onagraceae	EA	Annual	Round the year
18	<i>Ludwigia adscendens</i> (L.) Hara.	Onagraceae	FSA	Annual/Perennial	Jan.-June
19	<i>Ludwigia hyssopifolia</i> (G.Don) Excell.	Onagraceae	EA	Annual	Round the year
20	<i>Ludwigia perennis</i> L.	Onagraceae	EA	Annual	Nov.-Feb.
21	<i>Ludwigia prostrata</i> Roxb.	Onagraceae	EA	Annual	Nov.-April
22	<i>Centella asiatica</i> (L.) Urban.	Apiaceae	WL	Annual	Oct.-March
23	<i>Eclipta prostrate</i> L.	Asteraceae	WL	Annual/Perennial	Round the year
24	<i>Enydra fluctuans</i> Lour.	Asteraceae	EA	Annual/Perennial	Jan.-April
25	<i>Gnaphalium pensylvanicum</i> Willd.	Asteraceae	WL	Annual	Dec.-May
26	<i>Gnaphalium polycaulon</i> Pers.	Asteraceae	WL	Annual	Nov.-March
27	<i>Sphaeranthus senegalensis</i> DC.	Asteraceae	WL	Annual	Dec.-April
28	<i>Sphenoclea zeylanica</i> Gaertn.	Sphenocleaceae	WL	Annual	Aug.-Dec.
29	<i>Hoppea dichotoma</i> Willd.	Gentianaceae	WL	Annual	Oct.-Dec.

30	<i>Nymphoides cristata</i> (Roxb.) Kuntze.	Menyanthaceae	LFA	Annual/Perennial	Jan.-Mar.
31	<i>Nymphoides indica</i> (L.) Kuntze.	Menyanthaceae	LFA	Annual/Perennial	Aug.-Dec.
32	<i>Hydrolea zeylanica</i> (L.) Vahl.	Hydroleaceae	EA	Annual	Nov.-Mar.
33	<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	FSA	Plurennial	Sep.-Feb.
34	<i>Ipomoea Carnea</i> Jacq.	Convolvulaceae	WL	Plurennial	Round the year
35	<i>Bacopa monnieri</i> (L.) Wettst.	Plantaginaceae	WL	Annual/Perennial	July-Dec.
36	<i>Limnophila indica</i> (L.) Druce.	Plantaginaceae	EA	Annual/Perennial	Aug.-Mar.
37	<i>Mazus pumilus</i> (Burm. F.) Steenis.	Phrymaceae	WL	Annual	Nov.-April
38	<i>Lindernia anagalis</i> (Burm.f.) Pennell.	Linderniaceae	WLH	Annual	Aug.-Dec.
39	<i>Lindernia ciliata</i> (Colsm.) Pennell.	Linderniaceae	WLH	Annual	July-Oct.
40	<i>Lindernia cordifolia</i> (Colsm.) Merrill.	Linderniaceae	WLH	Annual	Sep.-Oct.
41	<i>Lindernia crustacea</i> (L.) F. Muell.	Linderniaceae	WLH	Annual	Sep.-Oct.
42	<i>Veronica anagallis-aquatica</i> L.	Plantaginaceae	WLH	Annual	Feb.-June
43	<i>Utricularia gibba</i> subsp. <i>exoleta</i> (R.Br.) P.Taylor	Lentibulariaceae	SH	Annual	Dec.-June
44	<i>Hygrophylla auriculata</i> (Sch.) Heine.	Acanthaceae	WLH	Annual	Oct-Dec.
45	<i>Phyla nodiflora</i> (L.) Greene.	Verbenaceae	WLH	Annual	Sep.-March
46	<i>Plantago ovata</i> Forsk.	Plantaginaceae	WLH	Annual	Sep.-March
47	<i>Alternanthera sessilis</i> (L.) R.Br.exDC.	Amaranthaceae	WLH	Annual	Aug.-Mar.
48	<i>Amaranthus tenuifolius</i> Willd.	Amaranthaceae	WLH	Annual	Sep.-April
49	<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	Amaranthaceae	WLH	Annual	Sep-Mar.
50	<i>Mallotus polycarpus</i> (Benth.) Kulju & Welzen	Euphorbiaceae	WLH	Annual	Jan.-Mar.
51	<i>Persicaria hydropiper</i> (L.) Delarbre	Polygonaceae	EAH	Annual/Perennial	Aug.-Mar.
52	<i>Polygonum longisetum</i> var. <i>rotundatum</i> A.J. Li.	Polygonaceae	EAH	Plurennial	Aug.-April
53	<i>Rumex dentatus</i> L.	Polygonaceae	EAH	Annual/Perennial	Jan.-June
54	<i>Ceratophyllum demersum</i> L.	Ceratophyllaceae	SH	Annual	Sep.-Nov.
<b>Monocotyledons</b>					
55	<i>Hydrilla verticillata</i> (L.F.) Royle.	Hydrocharitaceae	SAH	Plurennial	Sep.-Dec.
56	<i>Ottelia alismoides</i> (L.) Pers.	Hydrocharitaceae	SAH	Annual	Sep.-Dec.
57	<i>Vallisneria spiralis</i> L.	Hydrocharitaceae	SAH	Annual	Oct.-Mar.
58	<i>Eichhornia crassipes</i> (Mart.) Solms.	Pontederiaceae	FFH	Annual	Sep.-Dec.
59	<i>Monochoria hastata</i> (L.) Solms.	Pontederiaceae	EAH	Annual	July-Nov.
60	<i>Cyanotis axillaris</i> (L.) D. Don ex Sweet	Commelinaceae	WLH	Annual	Aug.-Jan.
61	<i>Cyanotis cristata</i> (L.) D. Don	Commelinaceae	WLH	Annual	Aug.-Nov.
62	<i>Murdannia nudiflora</i> L. Brenan	Commelinaceae	WLH	Annual	Aug.-Nov.
63	<i>Juncus bufonius</i> L.	Juncaceae	WLH	Plurennial	Jan.-March
64	<i>Juncus prismatocarpus</i> R.Br.	Juncaceae	WLH	Plurennial	Oct.-April
65	<i>Typha domingensis</i> Pers.	Typhaceae	WLH	Annual	Oct.-May
66	<i>Pistia stratiotes</i> L.	Araceae	FFH	Annual	Aug.-Nov.
67	<i>Lemnaea equinoctialis</i> Welw.	Araceae	FFH	Annual	May-June
68	<i>Spirodela polyrhiza</i> (L.) Schleid	Araceae	FFH	Annual	Feb. April
69	<i>Wolfia arrhiza</i> (L.) Schleid	Araceae	FFH	Annual	Sep.-Nov.
70	<i>Sagittaria guayanensis</i> Kunth	Alismataceae	EAH	Annual	Sep.-Oct.
71	<i>Sagittaria sagittifolia</i> L.	Alismataceae	EAH	Annual/Perennial	Oct.-Feb.
72	<i>Aponogeton crispus</i> Thunb.	Aponogetonaceae	LFA	Annual/Perennial	Aug.-Nov.
73	<i>Aponogeton natans</i> (L.) Engle & Krause	Aponogetonaceae	LFA	Annual/Perennial	Aug.-Nov.
74	<i>Potamogeton crispus</i> L.	Potamogetonaceae	SAH	Annual	Dec.-April
75	<i>Stuckenia pectinata</i> (L.) Borner	Potamogetonaceae	SAH	Annual	Jan.-April
76	<i>Bolboschoenus glaucus</i> (Lam.) S.G.Sm.	Cyperaceae	WLH	Annual/Perennial	Mar.-July
77	<i>Bulbostylis barbata</i> (Rottb.) C.B. Clarke	Cyperaceae	WLH	Annual	Feb.-Sept.
78	<i>Carex fedia</i> Nees	Cyperaceae	WLH	Annual	Feb.-April
79	<i>Cyperus compactus</i> Retz.	Cyperaceae	WLH	Annual/Perennial	June-Oct.

80	<i>Cyperus corymbosus</i> Rottb.	Cyperaceae	WLH	Annual	Jul.-Dec.
81	<i>Cyperus cuspidatus</i> Kunth	Cyperaceae	WLH	Annual	Aug.-Dec.
82	<i>Cyperus cyperoides</i> (L.) O. Kuntze.	Cyperaceae	WLH	Annual	Aug.-Oct.
83	<i>Cyperus difformis</i> L.	Cyperaceae	WLH	Annual	Sep.-Nov.
84	<i>Cyperus digitatus</i> Roxb.	Cyperaceae	WLH	Annual	Aug.-Dec.
85	<i>Cyperus dubius</i> Rottb (Rottb.) Endle.	Cyperaceae	WLH	Annual	Aug.-Dec.
86	<i>Cyperus exaltatus</i> Retz.	Cyperaceae	WLH	Annual	Sep.-Dec.
87	<i>Cyperus iria</i> L.	Cyperaceae	WLH	Annual	Aug.-Oct.
88	<i>Cyperus michelianus</i> (L.) Delile	Cyperaceae	WLH	Annual	June-Oct.
89	<i>Cyperusmichelianus</i> (L.) Link.	Cyperaceae	WLH	Annual/Perennial	Sep.-May
90	<i>Cyperus platystylis</i> R.Br.	Cyperaceae	WLH	Annual	April-June
91	<i>Cyperus tenuispica</i> Steud.	Cyperaceae	WLH	Annual	April-Dec.
92	<i>Eleocharis atropurpurea</i> (Retz.) J. Presl & C.Presl	Cyperaceae	EAH	Annual/Perennial	Nov.-Mar.
93	<i>Eleocharis palustris</i> (L.) Roem. & Schult	Cyperaceae	EAH	Annual/Perennial	Nov.-Mar.
94	<i>Fimbristylis bisumbellata</i> (Forsk.) Bub.	Cyperaceae	WLH	Annual	Nov.-Mar.
95	<i>Fimbristylis dichotoma</i> (L.) Vahl	Cyperaceae	WLH	Annual	May-Oct.
96	<i>Fimbristylis falcata</i> (Vahl) Kunth	Cyperaceae	WLH	Annual	Aug.-Oct.
97	<i>Fimbristylis littoralis</i> Gaudich	Cyperaceae	WLH	Annual	Sep.-Mar.
98	<i>Kyllinga brevifolia</i> Rottb.	Cyperaceae	WLH	Annual/Perennial	Aug.-Oct.
99	<i>Lipocarphus quarrosa</i> (L.) Goetgh.	Cyperaceae	WLH	Annual	Sep.-Dec.
100	<i>Rhynchospora colorata</i> (L.) H. Pfeiff.	Cyperaceae	WLH	Annual	July-Oct.
101	<i>Schoenoplectiella articulata</i> (L.) Lye	Cyperaceae	EAH	Annual/Perennial	Sep.-Jan.
102	<i>Brachiaria ramosa</i> Stapf.	Poaceae	WLH	Annual	July-Oct.
103	<i>Brachiaria reptans</i> (L.) C.A. Gardner & C.E. Hubb.	Poaceae	WLH	Annual	July-Oct.
104	<i>Chrysopogon zizanioides</i> (L.) Roberty.	Poaceae	WLH	Annual/Perennial	July-Nov.
105	<i>Echinochloa colona</i> (L.) Link	Poaceae	WLH	Annual	July-Nov.
106	<i>Echinochloa crusgalli</i> (L.) P.Beauv.	Poaceae	WLH	Annual	July-Nov.
107	<i>Hygroryza aristata</i> (Retz.) Nees ex. Wight and Arn.	Poaceae	FFH	Annual	Oct.-Nov.
108	<i>Leptochloa panicea</i> (Retz.) Ohwi	Poaceae	WLH	Annual	June-Sep.
109	<i>Oryza rufipogon</i> Giff.	Poaceae	WLH	Annual	Oct.-Nov.
110	<i>Panicum paludosum</i> Roxb.	Poaceae	WLH	Annual	July-Nov.
111	<i>Paspalidium flavidum</i> (Retz.) A. Camus	Poaceae	WLH	Annual	July-Nov.
112	<i>Paspalum distichum</i> L.	Poaceae	WLH	Annual	July-Oct.

(\*Presence of ecological habitat-Free floating hydrophytes: FSH, Suspended hydrophytes: SH, Submerged attached hydrophytes: SAH, Leaf floating attached hydrophytes: LFA, Shoot floating attached hydrophytes: SFA, Emergent amphibious hydrophytes: EAH, Wetland hydrophytes: WLH.)

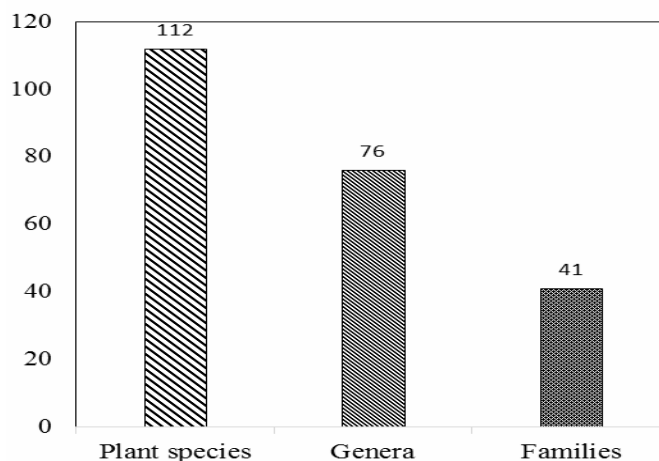


Fig. 1: General Scenario of Investigation

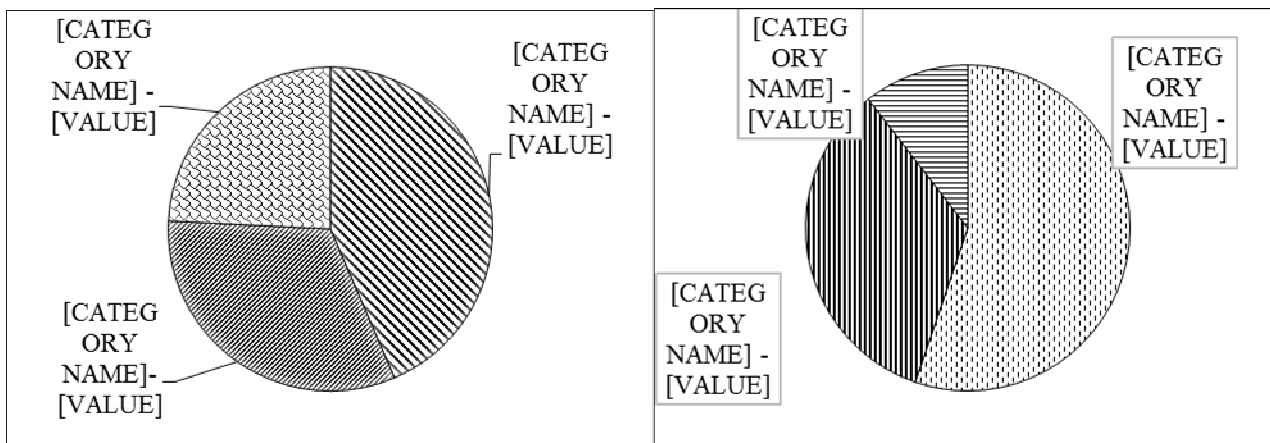


Fig. 2: Dicotyledons

Fig. 3: Monocotyledons

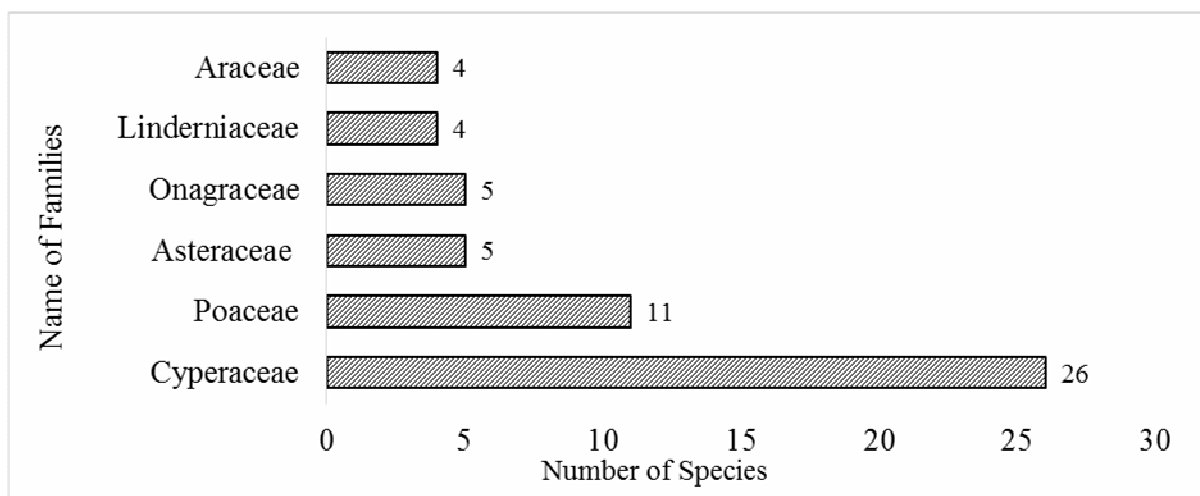


Fig. 4: Dominant Families

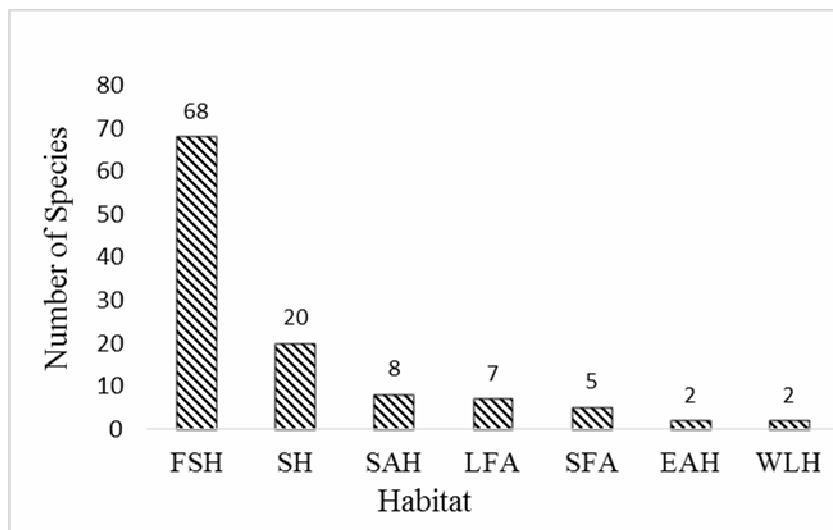


Fig. 5: Nature of Habitat

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