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Plant diversity of wetlands of Surha Tal of District Ballia, Uttar Pradesh

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Abstract- Surha Tal is a large wetland situated in the north of district Ballia near Jannayak Chandrashekhar University, Ballia. It is an oval-shaped lake with an area of 34.32 km^2 and is located about 10 km north of Ballia city along the river Ganges. This wetland is perennial, shallow containing freshwater and associated with agriculture fields. Surha Tal provides a good deal of favorable habitat to various plant communities and shows diverse type of aquatic life of flora and fauna. Monthly data from December 2023 to March 2024 have been recorded and the plants were classified according to their habit and habitats. The total number of families is 43 comprising 89 Genera and 104 Species. Out of these, 76 species belong to dicot, 25 species belong to monocot and 3 species belong to pteridophytes slightly in upland habitats.

Keywords: Plant diversity, Surha Tal, Wetlands, Ballia, Uttar Pradesh

INTRODUCTION

Surha Tal is a natural rain-fed farming area. It has been listed as a high priority wetland with high ecological and socio-economic potential. Surha Tal is currently under great biotic pressures such as fishing, weed invasion and drainage for cultivation. Surha Tal is an important natural resource for fisheries in the Ballia district of eastern Uttar Pradesh forming the vital support for rural economy and environment of this zone. It has an excessive entertaining value and it also supports local agriculture, irrigation and tourism. It is an open type oval 'U' shaped ox-bow natural lake in the flood plain of river Ganga, located 10 km north to the district headquarters of Ballia. It is a perennial meander of the river Ganga with an area of 2602.18 ha. which during monsoon season covers about 3642.25 ha. The lake circumference is about 25.6 km. According to Bhimsen (2024)[1] wetland is a mutual term used to define the term of humid habitats comprising marshes, swamps, bogs, fens, temporary ponds, riverbanks, and paddy fields and similar area. Such land has water present at or near the surface for important period that affect the land use. The wetlands act as water logged, creative and sometime uncreative natural water reservoirs on the earth. The waterlogged species serve as a food source for essential creatures. Such plants which are found in muddy place, have small roots. The aquatic and swampy plants are most significant component of wetland ecosystem. The bottomlessness of a wetland is two meters which does not exceed 6 metres. Biswas and Calder (1937)[2] published complete Hydrophytic Plants of India and Burma. Later, Subramanyam (1962)[3] published a volume on Aquatic plants of India and a record of Aquatic Plants of India was published by Deb (1976)[4]. Cook (1996)[5] published a volume on Aquatic and Wetland plants of India covering

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northern boundary of India. The papers have been arranged for only a few groups of aquatic plants.[6,7] Numerous botanists and plant surveyors have donated their work to the flora of various part of Uttar Pradesh. The plants found in wetlands of Uttar Pradesh were described by Sahai and Sinha A.B. (1968)[8] and in the present study of Surha Tal of Ballia District of Eastern Uttar Pradesh.

MATERIALS & METHODS

Surha Tal surrounded by Chapra (in east), Mau (in west), Deoria (in north) and Buxar (in south) is one of the diversity rich wetlands of North India (Fig.1). There are a number of wetlands in the region and fresh water marshes of Surha Tal is situated near Jannayak Chandrashekhar University Ballia and is about 18 km east to Ballia district occupying an area of about 1528 hectares (Fig.2). It lies between 25.858825° (N) Latitude and 84.187812° (E) Longitude. Various tours were made at short intervals to collect the plant specimen of the study area. During this period of field survey, collection of aquatic plants occurring in water saturated areas of the Surha Tal along with its photography was done. The collected plant specimens have been processed and pressed in the newspaper and identified in the Department of Botany, St. Andrew's College, Gorakhpur with the help of available literatures.

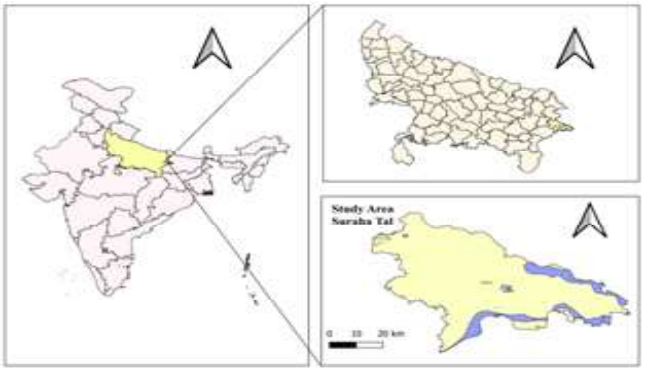


Fig.1: Study area of Ballia district, Uttar Pradesh

Fig.2: Field survey of Surha Tal of Ballia district

RESULT & DISCUSSION

The present study is based on the widespread investigation and study on aquatic and swampy angiosperms and pteridophytes of Surha Tal of Ballia district, Eastern Uttar Pradesh. We observed many common aquatic and marshy; macro and micro-plants of wetlands of Surha Tal. Aquatic and swampy plants which have been included in the present study are those plants normally found in nature growing along with standing water whose level is at or above the surface of the soil. During the present study maximum number of plant diversity were observed from the month of December 2023 to March 2024 and estimated inventory data showed that density of aquatic plants was greater during winter season supporting this field work. The present study estimated 104 major plant species of Surha Tal belonging to 43 families and 89 genera. Out of total, 76 species of dicot (73%), 25 species of monocot (24%) and 3 species belonging to the Pteridophytes (3%) were observed (Fig:3). According to habit wise contribution, herbs (75%), Shrubs (7%), Subshrubs (12%), Hydro-subshrubs (5%) and Small tree (1%) were observed (Fig:4). The life range is the ratio of life forms of the different species in terms of percentage. In this study, the floristic community comprised 61% plants as therophytes, 22% plants as hydrophytes, 16% hemicryptophytes, and 1% plants as chamaephytes. The vegetation represents that Asteraceae family was dominant in diversity among all the observed families. The dominancy of Asteraceae family in the similar physiographic region has also been reported by other workers. Ten major dominant families reported were Asteraceae, Amaranthaceae, Apiaceae, Poaceae,

Malvaceae, Solanaceae, Polygonaceae, Araceae, Fabaceae, and Cyperaceae. The other families included Hydrochritaceae, Potamogetonaceae, Rubiaceae, Verbenaceae, Onagraceae, Lamiaceae, Plantaginaceae, Salviniaceae, Brassicaceae, Euphorbiaceae, Convolvulaceae, Commelinaceae, Primulacae, Papaveraceae, Basellaceae, Cannaceae, Cannabaceae, Boraginaceae, Acanthaceae, Mazaceae, Ranunculaceae, Alismataceae, Eriocaulaceae, Ceratophyllaceae, Typhaceae, Oxiladaceae, Nympheaceae, Nelumbonaceae, Menynthaceae, Marsileaceae, Pontederiaceae, Lentibulariaceae and Aponogetaceae. The recorded plants have been enumerated in Table:1 with their habit, common or vernacular names, Raunkiaer's life forms and families arranged according to Bentham & Hooker's (1862-1883) system of classification. However, genera within a family and species within a genus are arranged alphabetically (Table 1).

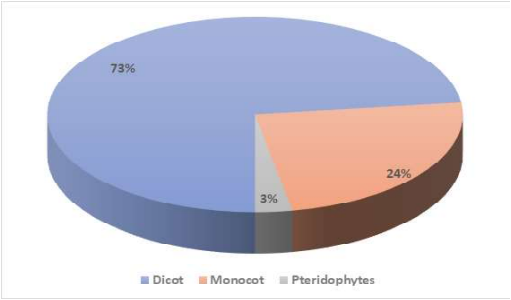


Fig. 3: Composition of plant species

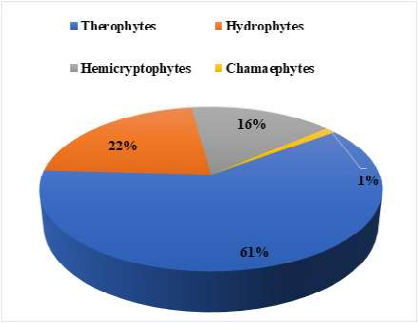


Fig.4: Biological spectrum of Raunkiaer's life form

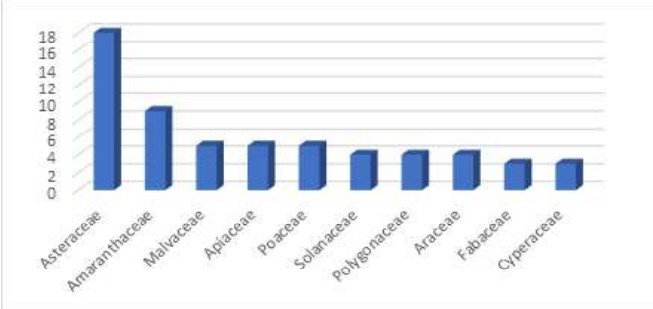


Fig. 5: Top 10 most dominating families found in the study area

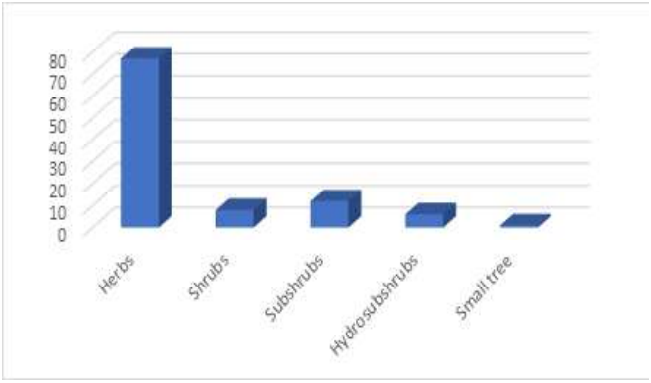


Fig. 6: Habit wise distribution of plant species

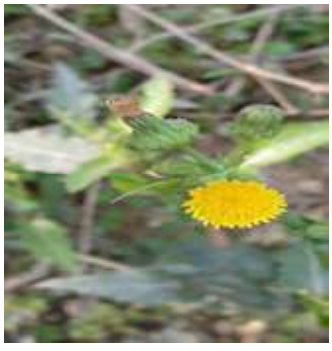
Some selected plants of Surha Tal of Ballia district

A

B

C

D



E

F

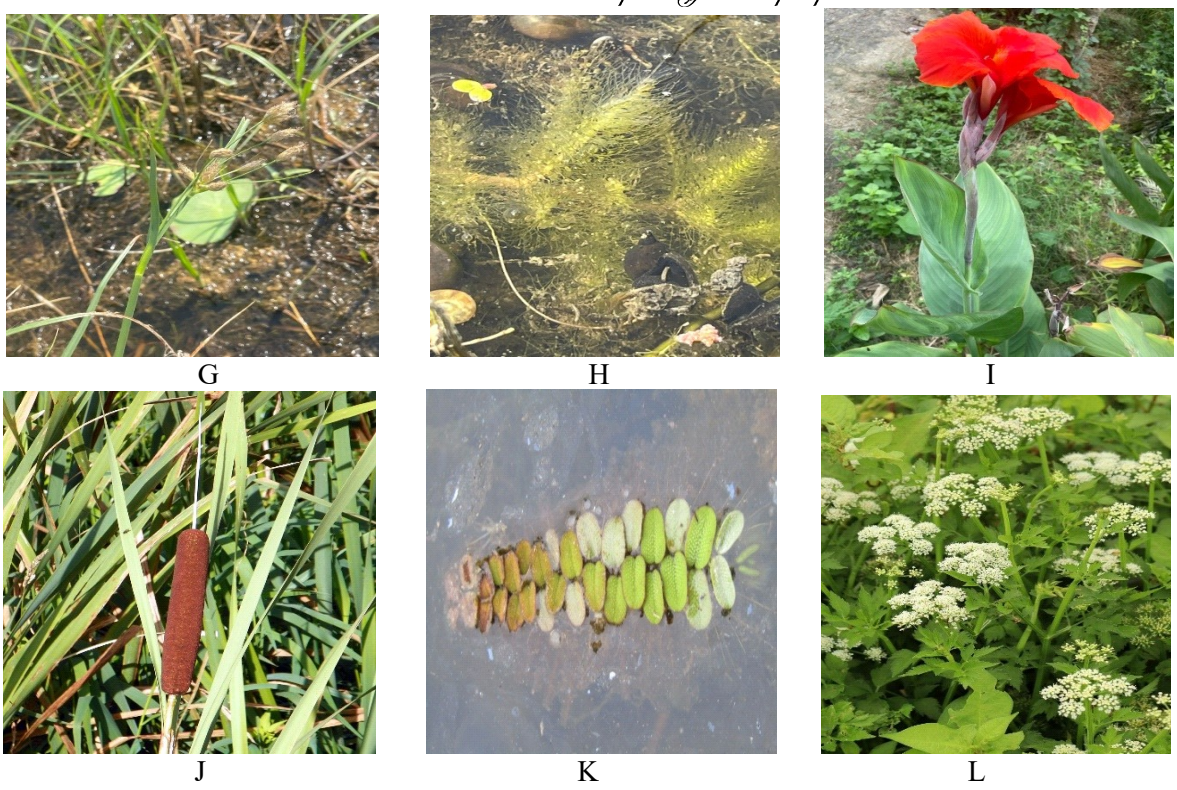


Fig.7: A (*Eriocaulon cinereum*); B (*Amaranthus viridis*); C (*Alternanthera sessilis*); D (*Eclipta prostrata*); E (*Sonchus arvensis*); F (*Nymphaea nouchali*); G (*Nelumbo nucifera*); H (*Utricularia vulgaris*); I (*Canna indica*); J (*Typha latifolia*); K (*Salvinia natans*); L (*Psammogeton diffusus*)

Table 1: List of aquatic and swampy plant species of wetlands of Surha Tal of District Ballia, Uttar Pradesh

S. No.	Botanical Name	Family	Common Name/Vernacular Name	Habit	Raunkiaer Life Form
1.	*Achyranthes aspera* L.	Amaranthaceae	Latjeera, Chirchira	Herb	Ch
2.	*Acmella uliginosa* (Sw.) Cass.	Asteraceae	Akarkar, Pipulka	Herb	Th
3.	*Ageratum conyzoides* L.	Asteraceae	Jungli pudina	Herb	Th
4.	*Ageratum houstonianum* Mill.	Asteraceae	Sota ka Ful	Herb	Th
5.	*Alternanthera sessilis* (L.) DC	Amaranthaceae	Gudrishak, Kanchari	Herb	Th
6.	*Alternanthera philoxeroides* (Mart.) Griseb	Amaranthaceae	Alligator weed	Herb	Th
7.	*Amaranthus spinous* L.	Amaranthaceae	Kanta chaulai	Herb	Ch
8.	*Amaranthus viridis* L.	Amaranthaceae	Jungle chaulai	Herb	Ch
9.	*Anagallis arvensis* L	Primulaceae	Krishna neel	Herb	Ch
10.	*Aponogeton crispus* Thunb.	Aponogetaceae	Water hyssop	Herb	Hy
11.	*Argemone mexicana* L.	Papaveraceae	Mexicon poppy	Herb	Th
12.	*Avena sativa* L.	Poaceae	Oat	Herb	He
13.	*Azolla pinnata* R.Br.	Salviniaceae	Mosquito fern	Herb	Hy
14.	*Basella alba* L.	Basellaceae	Poi	Herb	Ch
15.	*Berula erecta* (Huds.) Coville	Apiaceae	Lesser water parsnip	Herb	Th
16.	*Blumea lacera* (Burm.f.) DC.	Asteraceae	Kukrondha	Herb	Th
17.	*Blumea lanceolaria* Roxb.	Asteraceae	Sembung	Herb	Th
18.	*Brassica rapa* L.	Brassicaceae	Peeli Sarson	Herb	Th
19.	*Caesulia axillaris* Roxb.	Asteraceae	Pink node flower	Herb	Th
20.	*Bromus inermis* Leyss.	Poaceae	Smooth brome	Herb	He
21.	*Canna indica* L.	Cannaceae	Indian shot	Shrub	He
22.	*Cannabis sativa* L.	Cannabaceae	Bhang	Herb	Th
23.	*Centella asiatica* (L.) Urb.	Apiaceae	Brahmi	Herb	Th
24.	*Ceratophyllum submersum* L.	Ceratophyllaceae	Soft hornwort	Herb	Hy
25.	*Chenopodium album* L.	Amaranthaceae	Bathua	Herb	Th
26.	*Chenopodium murale* (L.) S.Fuentes, Uotila & Borsch	Amaranthaceae	Nettle-leaved goosefoot	Herb	Th
27.	*Commelina benghalensis* L.	Commelinaceae	Kana, kankawa, Buchna	Herb	He
28.	*Corchorus oliotorius* L.	Malvaceae	Tossa jute	Shrub	Th
29.	*Coriander sativam* L.	Apiaceae	Dhaniya	Herb	Th

30.	*Croton bonplandianus* Baill.	Euphorbiaceae	Ban tulsi	Shrub	Th
31.	*Cyamopsis tetragonaloba* (L.) Taub.	Fabaceae	Guar	Herb	Th
32.	*Cynodon dactylon* (L.) Pers.	Poaceae	Doob	Herb	He
33.	*Cyperus difformis* L.	Cyperaceae	Rice sedge	Herb	He
34.	*Cyperus rotundus* L.	Cyperaceae	Motha	Herb	He
35.	*Dentella repens* (L.) J.R.Forst. & G.Forst.	Rubiaceae	Bhuipat	Herb	Th
36.	*Eclipta prostrata* (L.) L.	Asteraceae	Bhringraj	Herb	He
37.	*Eichhornia crasipes* (Mart.) Solms	Pontederiaceae	Jhalkumbhi	Herb	Hy
38.	*Elymus repens* (L.) Gould	Poaceae	Couch grass	Herb	He
39.	*Eriocaulon cinereum* R.Br.	Eriocauloceae	Piperwort	Herb	He
40.	*Erigeron canadensis* L.	Asteraceae	Horse weed	Small tree	Th
41.	*Euphorbia hirta* L.	Euphorbiaceae	Dudhi	Herb	Th
42.	*Gnaphalium affine* D.Don	Asteraceae	Cotton weed	Herb	Th
43.	*Grangea moderaspatana* (L.) Poir.	Asteraceae	Mukhtari, Mustaru	Herb	Th
44.	*Heliotropium indicum* L.	Boraginaceae	Hathi shud	Herb	Th
45.	*Hydrilla verticulata* (L.f) Royle	Hydrocharitaceae	Sewar	Herb	Hy
46.	*Hygrophila spp.* R.Br.	Acanthaceae	Kokilaksha	Herb	Th
47.	*Ipomoea aquatica* Forssk.	Convolvulaceae	Kalmi sag	Herb	Th
48.	*Lathyrus sativus* L.	Fabaceae	Latari, khesari	Herb	Th
49.	*Launaea procumbens* (Roxb.) Ramayya & Rajagopal	Asteraceae	Jangi gobi	Herb	Th
50.	*Lemna minor* L.	Araceae	Duckweed	Herb	Hy
51.	*Lippia alba* (Mill.) N.E.Br. ex Britton & P.Wilson	Verbenaceae	Bushy matgrass	Herb	Th
52.	*Ludwigia adscendens* L H.Hara.	Onagraceae	Pokal Panlawang, WaterPrimrose	Hydrosubshrub	He
53.	*Ludwigia octovalvis* (Jacq) P.H. Raven	Onagraceae	Banlong	Subshrub	He
54.	*Marsilea minuta* L.	Marsileaceae	Water clover	Herb	Hy
55.	*Mazus pumilus* (Burm.f.) Streenis	Mazaceae	Maalti jhar	Subshrub	Th
56.	*Mecardonia procambens* (Mill.) Small	Plantaginaceae	Baby jump-up	Herb	Th
57.	*Melochia corchorifolia* L.	Malvaceae	Thulak,Bundava, Chitrabeez	Subshrub	Th
58.	*Najas graminea* Delile	Hydrocharitaceae	Kholali	Herb	He
59.	*Nelumbo nucifera* Gaertn.	Nelumbonaceae	Lotus	Herb	Hy
60.	*Nicotiana plumbiginifolia* Viv.	Solanaceae	Tobacco plant	Herb	Th
61.	*Nymphaea nouchali* Burm.f.	Nymphaeaceae	Water lily	Herb	Hy
62.	*Nymphoides indica* Kuntz.	Menyanthaceae	Chandmala	Herb	Hy
63.	*Oenanthe javanica* (Blume) DC.	Apiaceae	Pennywort	Herb	Th
64.	*Oldenlandia corymbosa* L.	Rubiaceae	Pitpapara	Subshrub	Th
65.	*Oldenlandia pumila* (L.f.) DC.	Rubiaceae	Dwarf diamond flower	Subshrub	Th
66.	*Oxalis corniculata* L.	Oxalidaceae	Yellow woodsorrel	Herb	Th
67.	*Parthenium hysterophorus* L.	Asteraceae	Ghazar ghas	Subshrub	Th
68.	*Persicaria glabara* (Willd.) M. Gomez	Polygonaceae	Pani-mirch	Shrub	Th
69.	*Persicaria maculosa* Gray	Polygonaceae	Lady's thumb	Shrub	Th
70.	*Phyla nodiflora* (L.) Greene	Verbenaceae	Jalbuti, jal pippali	Subshrub	Th
71.	*Physalis pruinosa* L.	Solanaceae	Rasbhari	Subshrub	Th
72.	*Pistia stratiotes* L.	Araceae	Water lettuce	Herb	Hy
73.	*Polygonum aviculare* L.	Polygonaceae	Birdweed, Doorweed, Knotgrass	Herb	Th
74.	*Potamogeton crispus* L.	Potamogetonaceae	Curly-leaf pondweed	Hydrosubshrub	Hy
75.	*Potamogeton natans L.*	Potamogetonaceae	Floating pondweed	Hydrosubshrub	Hy
76.	*Potamogeton nodosus Poir.*	Potamogetonaceae	Longleaf pondweed	Hydrosubshrub	Hy
77.	*Psammogeton diffuses* (Roxb. Ex Sm.) Rech.f. ex Pimenov	Apiaceae	Indian celery	Herb	Th
78.	*Pseudognaphalium lutaeoalbum* (L.) Hilliard & B.L.Burtt	Asteraceae	Gersey cudweed	Herb	Th
79.	*Ranunculus sceleratus* L.	Ranunculaceae	Jal-dhaniya	Herb	He
80.	*Rorippa indica* (L.) Hiern	Brassicaceae	Indian field cress	Herb	Th
81.	*Rumex dentatus* L.	Polygonaceae	Banpalak	Herb	Th
82.	*Sagittaria sagittifolia* L.	Alismataceae	Katniss	Herb	Hy
83.	*Salvia sylvestris* L.	Lamiaceae	Sage	Herb	Th
84.	*Salvia verbenaca* L.	Lamiaceae	Wild clary	Herb	Th
85.	*Salvinia natans* (L.) All.	Salviniaceae	Floating fern	Hydrosubshrub	Hy
86.	*Schoenoplectus tabernaemontani* (C.C.Gmel.) Palla	Cyperaceae	Bulrush	Herb	He
87.	*Setaria parviflora* (Poir.) Kerguelen	Poaceae	Mission grass	Herb	He
88.	*Sida acuta* Burm.f.	Malvaceae	Baraira	Subshrub	Th
89.	*Sida cordifolia L.*	Malvaceae	Flannel weed	Subshrub	Th
90.	*Solanum nigrum* L.	Solanaceae	Makoy	Shrub	Th
91.	*Solanum virginianum* L.	Solanaceae	Kantakari	Subshrub	Th
92.	*Soliva anthemifolia* (Juss.) Sweet	Asteraceae	Button burweed	Herb	Th
93.	*Soliva sessilis* Ruiz & Pav.	Asteraceae	Bindi weed	Herb	Th
94.	*Sonchus arvensis* L.	Asteraceae	Gutweed	Herb	Th
95.	*Spirodela polyrhiza* (L.) Schleid.	Araceae	Duckmeat	Herb	Hy
96.	*Tridax procumbens* L.	Asteraceae	Coat button	Herb	Th
97.	*Trifolium alexandrinum* L.	Fabaceae	Barshim	Herb	Th
98.	*Typha latifolia* L.	Typhaceae	Great reedmace	Herb	Hy
99.	*Urena lobata* L.	Malvaceae	Bachita	Shrub	Th
100.	*Utricularia vulgaris* L.	Lentibulariaceae	Bladderwort	Hydrosubshrub	Hy
101.	*Vallisneria spiralis* L.	Hydrocharitaceae	Tapegrass	Herb	Hy
102.	*Veronica anagallis-aquatica L.*	Plantaginaceae	Water speedwell	Subshrub	Hy
103.	*Wolffia globosa (Roxb.) Hartog & Plas*	Araceae	Duckweed	Herb	Hy
104.	*Xanthium strumarium* L.	Asteraceae	Chhota-dhatura, Chhota Gokhuru	Shrub	Th

CONCLUSION

This study summarizes the monthly and seasonal variations of occurrence of aquatic plants and their influences on aquatic community of rainy water wetlands of Surha Tal with an exploration of statistical data output. From this minor research work of 104 species and 43 families, maximum species evenness was recorded for Asteraceae and minimum for Ranunculaceae, Typhaceae, Alismataceae, Oxiladaceae, Menynthaceae, Nympheaceae, Nelumbonaceae, Mazaceae, Acanthaceae, Boraginaceae, Eriocaulaceae, Pontederiaceae, Commeliaceae, Cannaceae, Cannabaceae, Papaveraceae, Aponogetonaceae, Primulaceae, Basellaceae, Lentibuliaceae, and Marsileaceae. Study of aquatic community is very significant because they act as primary producers, food reservoir for variety of aquatic organisms and an efficient bio-indicator for water quality. The large population of phytoplankton is thriving in this wetland which enhances its productivity. The ecosystem is under heavy anthropogenic pressure due to agriculture practices around the wetland catchment area which led to habitat loss and degradation of some parts of wetlands that have been drained and transform into the rice field. Hence, there is need to conserve biotic and abiotic components of water body and to make people aware of the importance and threats to wetlands and their conservation through various government institutions.

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