



Assessment of Aquatic Angiosperms in District U. S. Nagar, Uttarakhand, India

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Abstract: Aquatic angiosperm plants play a vital role in the biodiversity and ecological balance of freshwater ecosystems. The present study was aimed to document the diversity of aquatic angiospermic plants in Udham Singh Nagar district lying in tarai region of Uttarakhand. The study area was visited regularly across different seasons and a total of 114 aquatic angiospermic plant species belonging to 85 genera and 42 families were collected from various lakes, taals, ponds, canals, riverbanks, etc. Out of these, 78% were native species and 22% were exotic species including 03 free floating, 04 fixed floating, 03 submerged, 36 semi- submerged and 68 moisture loving plant species. Among 42 families, 33 dicotyledonous families were represented by 62 genera and 79 species, while 09 monocotyledonous families comprised 23 genera and 35 species.

Key words: Aquatic angiosperms • Udham Singh Nagar • Tarai • Kumaun • Uttarakhand.

Introduction

The great Himalayan region in India is the source of several sacred rivers. Uttarakhand, located to the northwest part of this region, spans approximately 53,483 km² and boasts rich biodiversity due to its varied topography and climatic conditions. It is divided into two divisions: Kumaun and Garhwal, each consisting of 6 and 7 districts respectively. The state is renowned for its natural beauty, including several waterfalls, rivers, lakes, ponds, and taals, etc. The Ganga, a significant and sacred river of India, originates from the holy place Gomukh lying near Gangotri in Uttarakhand. As all the rivers flow from the hilly regions into the plains, they eventually branch into smaller rivers, creating a network of water streams that results in waterlogged conditions known as the tarai region. Plants that grow and flourish in water are known as aquatic or hydrophytic plants. They are essential components of aquatic ecosystems, serving as primary producers and providing food and shelter to several organisms. They also act as biological filters and are also

known as "Kidneys of the landscape (Adhikari and Babu 2008). Aquatic ecosystems provide

an excellent environment for the survival of aquatic, semi-aquatic, and moisture-loving plants and animals (Kumar et al 2022).

Aquatic angiosperms, a remarkable group of flowering plants, thrive in aquatic habitats and are largely unaffected by climatic and seasonal changes, unlike land plants. Earlier, A total of 117 taxa of aquatic plants belonging to 32 families were reported by Subramanyam (1962). They flourish in various water bodies such as rivers, ponds, canals, roadside ditches, waterfalls, lakes, tanks, puddles, etc. These plants, having less developed protective and conductive tissues, are structurally different from mesophytes or xerophytes. They have specific structures and adaptation for buoyancy and aeration (Lancar and Karke 2002). Based on their growth patterns, hydrophytes are categorised into different groups: floating hydrophytes, submerged hydrophytes, submerged anchored hydrophytes, floating-leaved anchored hydrophytes, floating shoot anchored hydrophytes, emergent anchored hydrophytes,



and wetland hydrophytes (Kumar et al 2012, Dalasingh et al 2019, Kumar et al 2022).

Uttarakhand wetlands harbour a rich diversity of aquatic flora. Several workers have reported hydrophytic flora from different regions of Uttarakhand (Adhikari & Babu 2008, Chaudhary & Sharma 2020, Dangwal et al 2010, Kumar et al 2022, Negi et al 2013 and Sharma & Singh 2017). Aquatic plants are facing significant challenges and are under threat due to urbanization, construction, pollution, and other factors. Recently, Kumar and Srivastava (2023) have highlighted the medicinal aspects of certain hydrophytic plants found in tarai belt of Kumaun Himalaya. There is lack of comprehensive systematic studies on aquatic vegetation of Udham Singh Nagar district, which is a part of tarai region of Uttarakhand and is home to various lakes, taals and reservoirs such as Girital, Drona Sagar Lake, Giri Sarovar etc. Therefore, the present study was aimed to document aquatic angiosperms in this area.

Material and method

Study site: The present study was conducted in the district Udham Singh Nagar located in tarai region of Kumaun division in Uttarakhand. This district spans 3055 km² geographical area with lush diversity of flora and fauna. It lies between 28° 53' N to 29° 23' N latitude and 78° 45' E to 80° 08' E longitude at an elevation of 214 meters. This district is bordered by Nepal in the east, Champawat district in the northeast, Nainital district in the north, Uttar Pradesh state in the south and west, and it comprises seven tehsils: Jaspur, Kashipur, Bazpur, Rudrapur, Kichha, Khatima and Sitarganj. The climate of the study area is warm, humid subtropical comprising three distinct seasons i.e. summer, monsoon (rainy) and winter. The maximum & minimum temperature goes up to 42°C and 01°C respectively. The monsoon season, particularly in June and July, brings the highest rainfall, contributing to the lush greenery of the region.

Due to its location in the tarai region, the district has extensive and intensive drainage pattern with several rivers (such as Kosi, Gola, Sharada, Baigul, Kailash etc.) and their tributaries flowing through it, that is why the study area has a number of major reservoirs such as Tumaria (Jaspur), Gularbhoj (Gadarpur), Nanak Sagar, Dhora and Baigul (Sitarganj), and Sharada Sagar (Khatima) which cater the irrigation demand. The abundant water resources and fertile land in this district result in lush vegetation of hydrophytic plants and large-scale farming (Fig. 1, A-D).

Data collection and herbarium preparation

The study area, Udham Singh Nagar, was extensively surveyed throughout the year to assess the angiospermic vegetation in various aquatic habitats such as lakes, ponds, rivers, canals, riverbanks, wetlands, marshy wastelands, agricultural lands, and other relevant water bodies. Plant specimens were collected and identified with the help of eminent floras and other scientific literature such as Duthie (1903-1929), Subramanyam (1962), Babu (1977), Pant (1986), Gaur (1999), Singh et al. (2016) and Pusalkar & Srivastava (2018). During plant collection, field characters of plants such as habit, habitat, locality, flower colour etc. were recorded in the field book and live photographs of plant species were taken. Depending on their habitat range, some plant specimens were poisoned and pressed into blotting paper for drying, while others were stored in formalin bottles. After the drying process, specimens were mounted on a standard herbarium sheet as per Jain and Rao (1977). Botanical name and nativity of the plants were checked by “Plants of the World Online” (POWO) launched by the Royal Botanical Garden, Kew. All the plant specimens were matched with the authentic herbarium specimens housed at Forest Research Institute, Dehradun (DD), Botanical Survey of India, Dehradun (BSD), and National Botanical Research Institute,



Lucknow (LWG). Finally, the prepared Botany department of R.H. herbarium specimens were submitted in the Government P.G. College Kashipur, U. S. Nagar, Uttarakhand.



Fig. 1. Panoramic views of water bodies in the study area.

Results

The present study exhibited that a total number of 114 taxa under 85 genera and 42 families were collected from different water resources (ponds, canal, bank, rivers, wetlands etc.) of district Udham Singh Nagar, Uttarakhand. These hydrophytic plants were classified into five groups viz. free floating, fixed floating, submerged, semi-submerged and moisture loving plants. Table-1 represents a checklist of all aquatic angiospermic plants including their botanical name, family, plant group (dicotyledon and monocotyledon), habitat, flower colour and nativity. The collected aquatic angiosperms comprised 03 (3%) free floating, 04 (3%) fixed floating, 03 (3%) submerged, 36 (31%) semi-submerged and 68

(60%) moisture loving plant species. (Fig. 2). The top most families were Asteraceae with 10 genera and 13 species, followed by Poaceae with 11 genera and 12 species, Cyperaceae with 3 genera and 10 species, Scrophulariaceae with 7 genera and 9 species, Amaranthaceae with 3 genera and 5 species. These five families, comprising 34 genera and 49 species, represented 42.98% of the total hydrophytic plants in the study area. The habitat analysis revealed that the aquatic angiosperms diversity of Udham Singh Nagar district is dominated by 89 (78%) native species while 25 (22%) non-native or exotic species. Live photographs of 20 aquatic plant species taken in their natural habitats are displayed in Fig. 3 (A-T).



Table 1- Checklist of aquatic plants of Udham Singh Nagar

SN	Plant name	Family	Plant group	Habitat	Flower colour	Native/ Exotic
1	<i>Hygrophila polysperma</i> (Roxb.) T.Anderson	Acanthaceae	D	SS	Blue to white	Nat
2	<i>Hygrophila ringens</i> (L.) R.Br. ex Spreng.	Acanthaceae	D	SS	Purple	Nat
3	<i>Ruellia prostrata</i> Poir.	Acanthaceae	D	MLP	Light purplish white	Nat
4	<i>Trianthema portulacastrum</i> L.	Aizoaceae	D	MLP	Pinkish white	Nat
5	<i>Sagittaria guayanensis</i> subsp. <i>lappula</i> (D.Don) Bogin Kunth	Alismataceae	M	FXP	White	Nat
6	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Amaranthaceae	D	SS	White	E
7	<i>Alternanthera sessilis</i> (L.) DC.	Amaranthaceae	D	MLP	White	Nat
8	<i>Amaranthus viridis</i> L.	Amaranthaceae	D	MLP	Green	E
9	<i>Digera muricata</i> (L.) Mart.	Amaranthaceae	D	MLP	Pink	Nat
10	<i>Alternanthera paronychioides</i> A.St.-Hil.	Amaranthaceae	D	MLP	White	E
11	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	D	MLP	Pink	Nat
12	<i>Pistia stratiotes</i> L.	Araceae	M	FFP	White	Nat
13	<i>Acmella ciliata</i> (Kunth) Cass.	Asteraceae	D	MLP	Yellow	E
14	<i>Acmella radicans</i> (Jacq.) R.K.Jansen	Asteraceae	D	MLP	Creamy-white	E
15	<i>Ageratum conyzoides</i> L.	Asteraceae	D	MLP	White	E
16	<i>Caesulia axillaris</i> Roxb.	Asteraceae	D	MLP	Pinkish	Nat
17	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	D	SS	White	E
18	<i>Gamochaeta pensylvanica</i> (Wills.) Cabrera	Asteraceae	D	MLP	Pale brown	E
19	<i>Gnaphalium uliginosum</i> L.	Asteraceae	D	MLP	Brownish yellow	Nat
20	<i>Sonchus arvensis</i> L.	Asteraceae	D	MLP	Yellow	E
21	<i>Sonchus oleraceus</i> L.	Asteraceae	D	MLP	Yellow	E
22	<i>Grangea maderaspatana</i> (L.) Poir.	Asteraceae	D	MLP	Yellow	Nat
23	<i>Soliva anthemifolia</i> (Juss.) Sweet	Asteraceae	D	MLP	Greenish	E
24	<i>Sonchus wightianus</i> DC.	Asteraceae	D	MLP	Yellow	Nat
25	<i>Youngia japonica</i> (L.) DC.	Asteraceae	D	MLP	Yellow	Nat
26	<i>Cardamine flexuosa</i> With.	Brassicaceae	D	MLP	White	E
27	<i>Lepidium didymum</i> L.	Brassicaceae	D	MLP	Pale Green	E
28	<i>Nasturtium officinale</i> W.T.Aiton	Brassicaceae	D	SS	White	Nat
29	<i>Rorippa dubia</i> (Pers.) H.Hara	Brassicaceae	D	MLP	-	Nat
30	<i>Rorippa indica</i> (L.) Hiern	Brassicaceae	D	MLP	Yellow	Nat
31	<i>Canna indica</i> L.	Cannaceae	M	SS	Red	E
32	<i>Stellaria aquatica</i> (L.) Scop.	Caryophyllaceae	D	MLP	White	Nat
33	<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	D	MLP	White	Nat
34	<i>Ceratophyllum demersum</i> L.	Ceratophyllaceae	D	S	Greenish brown	Nat



SN	Plant name	Family	Plant group	Habitat	Flower colour	Native/ Exotic
35	<i>Chenopodium album</i> L.	Chenopodiaceae	D	MLP	White yellow	Nat
36	<i>Commelina benghalensis</i> L.	Commelinaceae	M	MLP	Blue	Nat
37	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	M	SS	Bright blue	Nat
38	<i>Cyanotis axillaris</i> (L.) D.Don ex Sweet	Commelinaceae	M	SS	Violet blue	Nat
39	<i>Cyanotis cristata</i> (L.) D.Don	Commelinaceae	M	MLP	Purple	Nat
40	<i>Murdannia nudiflora</i> (L.) Brenan	Commelinaceae	M	MLP	Purple	Nat
41	<i>Evolvulus nummularius</i> (L.) L.	Convolvulaceae	D	MLP	White	E
42	<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	D	FXP	Whitish pink	Nat
43	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	D	SS	Whitish pink or purple	E
44	<i>Cyperus brevifolius</i> (Rottb.) Hassk.	Cyperaceae	M	SS	Light green	Nat
45	<i>Cyperus compressus</i> L.	Cyperaceae	M	MLP	Pale green	Nat
46	<i>Cyperus difformis</i> L.	Cyperaceae	M	SS	Pale Green	Nat
47	<i>Cyperus iria</i> L.	Cyperaceae	M	MLP	Pale brown	Nat
48	<i>Cyperus michelianus</i> subsp. <i>pygmaeus</i> (Rottb.) Asch. & Graebn.	Cyperaceae	M	MLP	Green	Nat
49	<i>Cyperus mindorensis</i> (Steud.) Huygh	Cyperaceae	M	MLP	White	Nat
50	<i>Cyperus rotundus</i> L.	Cyperaceae	M	MLP	Reddish brown	Nat
51	<i>Fimbristylis bisumbellata</i> (Forssk.) Bubani	Cyperaceae	M	SS	Brown	Nat
52	<i>Fimbristylis dichotoma</i> subsp. <i>podocarpa</i> (Nees) T.Koyama	Cyperaceae	M	SS	Pale brown	Nat
53	<i>Abildgaardia ovata</i> (Burm.f.) Kral	Cyperaceae	M	MLP	Green	Nat
54	<i>Euphorbia heterophylla</i> var. <i>cyathophora</i> (Murray) Griseb.	Euphorbiaceae	D	MLP	Yellowish green	E
55	<i>Aeschynomene indica</i> L.	Fabaceae	D	SS	Yellow	Nat
56	<i>Grona triflora</i> (L.) H.Ohashi & K.Ohashi	Fabaceae	D	MLP	Reddish-violet	Nat
57	<i>Melilotus albus</i> Medik.	Fabaceae	D	MLP	White	Nat
58	<i>Fumaria indica</i> (Hauskn.) Pugsley	Fumariaceae	D	MLP	White- pale pink	Nat
59	<i>Hydrilla verticillata</i> (L.f.) Royle	Hydrocharitaceae	M	S	White	Nat
60	<i>Hydrolea zeylanica</i> (L.) Vahl	Hydroleaceae	D	SS	Blue	Nat
61	<i>Lamium amplexicaule</i> L.	Lamiaceae	D	MLP	Bright pink	Nat
62	<i>Salvia plebeia</i> R.Br.	Lamiaceae	D	MLP	Purplish white	Nat
63	<i>Spirodela polyrhiza</i> (L.) Schleid	Lemnaceae	M	FFP	Green	Nat
64	<i>Utricularia</i> sp.	Lentibulariaceae	D	S	Yellow	Nat
65	<i>Ammannia auriculata</i> Willd.	Lythraceae	D	SS	Orange	Nat
66	<i>Ammannia baccifera</i> L.	Lythraceae	D	SS	Purplish	Nat
67	<i>Ammannia multiflora</i> Roxb.	Lythraceae	D	SS	Pink to purple	Nat



SN	Plant name	Family	Plant group	Habitat	Flower colour	Native/ Exotic
68	<i>Mimosa pudica</i> L.	Mimosaceae	D	MLP	Light pink	E
69	<i>Trigastrotheca pentaphylla</i> (L.) Thulin	Molluginaceae	D	MLP	White	Nat
70	<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	D	FXP	Pink	Nat
71	<i>Nymphaea pubescens</i> Willd.	Nymphaeaceae	D	FXP	White	Nat
72	<i>Ludwigia adscendens</i> (L.) H.Hara	Onagraceae	D	SS	White with yellow centre	Nat
73	<i>Ludwigia hyssopifolia</i> (G.Don) Exell	Onagraceae	D	SS	Yellow	E
74	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	Onagraceae	D	SS	Yellow	Nat
75	<i>Oxalis dehradunensis</i> Raizada	Oxalidaceae	D	MLP	Purplish pink	E
76	<i>Phyllanthus urinaria</i> L.	Euphorbiaceae	D	MLP	Greenish white	Nat
77	<i>Peperomia pellucida</i> (L.) Kunth	Piperaceae	D	MLP	Greenish	E
78	<i>Chrysopogon zizanioides</i> (L.) Roberty	Poaceae	M	SS	Yellowish	Nat
79	<i>Coix lacryma-jobi</i> L.	Poaceae	M	SS	Green	Nat
80	<i>Desmostachya bipinnata</i> (L.) Stapf	Poaceae	M	MLP	Pale brown	Nat
81	<i>Digitaria sanguinalis</i> (L.) Scop.	Poaceae	M	MLP	Green	Nat
82	<i>Echinochloa colonum</i> (L.) Link	Poaceae	M	SS	Green to purple	Nat
83	<i>Echinochloa crus-galli</i> (L.) P.Beauv.	Poaceae	M	SS	Green	Nat
84	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	M	MLP	Pale green	Nat
85	<i>Eragrostis tenella</i> (L.) P.Beauv. ex Roem. & Schult	Poaceae	M	MLP	Greenish	Nat
86	<i>Poa annua</i> L.	Poaceae	M	MLP	Light green	Nat
87	<i>Arundo donax</i> L.	Poaceae	M	SS	Greenish	Nat
88	<i>Paspalum distichum</i> L.	Poaceae	M	SS	Purplish brown	E
89	<i>Saccharum spontaneum</i> L.	Poaceae	M	MLP	Bright white	Nat
90	<i>Persicaria barbata</i> (L.) H.Hara	Polygonaceae	D	SS	White	Nat
91	<i>Persicaria glabra</i> (Willd.) M.Gómez	Polygonaceae	D	SS	Pink or white	Nat
92	<i>Polygonum plebeium</i> R.Br.	Polygonaceae	D	MLP	Pink-white	Nat
93	<i>Rumex dentatus</i> L.	Polygonaceae	D	SS	Green	Nat
94	<i>Pontederia crassipes</i> Mart.	Pontederiaceae	M	FFP	Lavender blue	E
95	<i>Pontederia hastata</i> L.	Pontederiaceae	M	SS	Purple	Nat
96	<i>Pontederia vaginalis</i> Burm.f.	Pontederiaceae	M	SS	Light purple	Nat
97	<i>Portulaca oleracea</i> L.	Portulacaceae	D	MLP	Liliac blue	E
98	<i>Portulaca pilosa</i> L.	Portulacaceae	D	MLP	Bright pink	E
99	<i>Androsace umbellata</i> (Lour.) Merr.	Primulaceae	D	MLP	White with yellow centre	Nat
100	<i>Ranunculus sceleratus</i> L.	Ranunculaceae	D	SS	Yellow	Nat



SN	Plant name	Family	Plant group	Habitat	Flower colour	Native/ Exotic
101	<i>Torenia crustacea</i> (L.) Cham. & Schtdl.	Scrophulariaceae	D	MLP	Purple-white	Nat
102	<i>Yamazakia viscosa</i> (Hornem.) W.R.Barker, Y.S.Liang & Wannan	Scrophulariaceae	D	MLP	Yellowish white	Nat
103	<i>Bonnaya antipoda</i> (L.) Druce	Scrophulariaceae	D	MLP	Pale blue	Nat
104	<i>Bonnaya ciliata</i> (Colsm.) Spreng.	Scrophulariaceae	D	MLP	White	Nat
105	<i>Lindenbergia macrostachya</i> (Benth.) Benth.	Scrophulariaceae	D	MLP	Yellow	Nat
106	<i>Mazus pumilus</i> (Burm.f.) Steenis	Scrophulariaceae	D	MLP	Purple-white	Nat
107	<i>Misopates orontium</i> (L.) Raf.	Scrophulariaceae	D	MLP	White	Nat
108	<i>Veronica anagallis-aquatica</i> L.	Scrophulariaceae	D	SS	White or Bluish	Nat
109	<i>Veronica polita</i> subsp. <i>polita</i>	Scrophulariaceae	D	MLP	Pinkish white	Nat
110	<i>Sphenoclea zeylanica</i> Gaertn.	Sphenocleaceae	D	SS	White	Nat
111	<i>Corchorus capsularis</i> L.	Tiliaceae	D	SS	Yellow	Nat
112	<i>Gonostegia pentandra</i> (Roxb.) Miq.	Urticaceae	D	MLP	Greenish white	Nat
113	<i>Pouzolzia zeylanica</i> (L.) Benn.	Urticaceae	D	MLP	Pale Green	Nat
114	<i>Phyla nodiflora</i> (L.) Greene	Verbenaceae	D	MLP	White pink	Nat

Abbreviations: D- Dicot; E- Exotic; FFP- Free floating plant; FXP- Fixed floating plant; M- Monocot; MLP- Moisture loving plant; Nat- Native; S- Submerged; SS- Semi submerged.

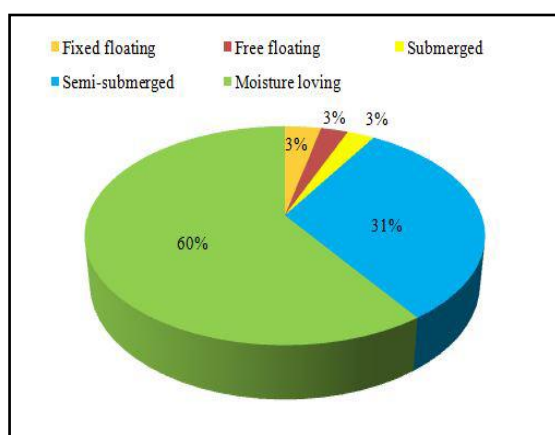


Fig. 2. Percentage composition of various growth forms of hydrophytes

Discussion

The present study of hydrophytic plants in Udham Singh Nagar district is remarkable and impressive. Various earlier studies on different aspects of aquatic plants conducted in Uttarakhand reports 178 plant species from Baanganga wetland (Adhikari and Babu 2008), 38 plant species from Tehri Garhwal (Dangwal et al., 2010), 42 plant species from Deoria taal (Chaudhary and Sharma 2020), 27

plant species from Haridwar (Kumar et al 2022) and 10 plant species from tarai belt (Kumar and Srivastava 2023). The present study highlights 114 plant species out of which 35 were monocots, represented by 23 genera across 9 families, and 79 were dicots, represented by 62 genera across 33 families (Fig. 4). Out of the 42 families identified, 23 were monotypic, each represented by only a single genus and single species.



Fig. 3- Collected aquatic plants species: A- *Alternanthera philoxeroides* (Mart.) Griseb., **B-** *Caesulia axillaris* Roxb., **C-** *Canna indica* L., **D-** *Coix lacryma-jobi* L., **E-** *Gonostegia pentandra* (Roxb.) Miq., **F-** *Hydrolea zeylanica* (L.) Bahl, **G-** *Hygrophila polysperma* (Roxb.) T.Anderson, **H-** *Hygrophila ringens* (L.) R.Br. ex Spreng., **I-** *Ipomoea aquatica* Forssk., **J-** *Ludwigia adscendens* (L.) H.Hara, **K-** *Ludwigia octovalvis* (Jacq.) P.H.Raven, **L-** *Nasturtium officinale* W.T.Aiton, **M-** *Nelumbo nucifera* Gaertn., **N-** *Nymphaea pubescens* Mart., **O-** *Persicaria glabra* (Wills.) M.Gómez, **P-** *Pistia stratiotes* L., **Q-** *Pontederia crassipes* Mart., **R-** *Pontederia hastata* L., **S-** *Pontederia vaginalis* Burm.f., **T-** *Sagittaria guayanensis* Kunth

During field survey, it was observed that *Cyperus* with 7 species was the dominant genera followed by *Alternanthera*, *Ammannia*, *Fimbristylis*, *Ludwigia*, *Pontederia*, *Sonchus* with 3 species each, comprising a total of 23 species. Several plant species such as *Alternanthera philoxeroides* (Mart.) Griseb., *Hydrilla verticillata* (L.f.) Royle, *Ipomoea*

aquatica Forssk., *Ipomoea carnea* Jacq., *Nelumbo nucifera* Gaertn., *Nymphaea pubescens* Willd., *Pontederia crassipes* Mart., *Persicaria glabra* (Willd.) M.Gómez, *Ranunculus sceleratus* L., *Veronica anagallis-aquatica* L. etc. were observed to be growing commonly in different aquatic habitats throughout the study area.

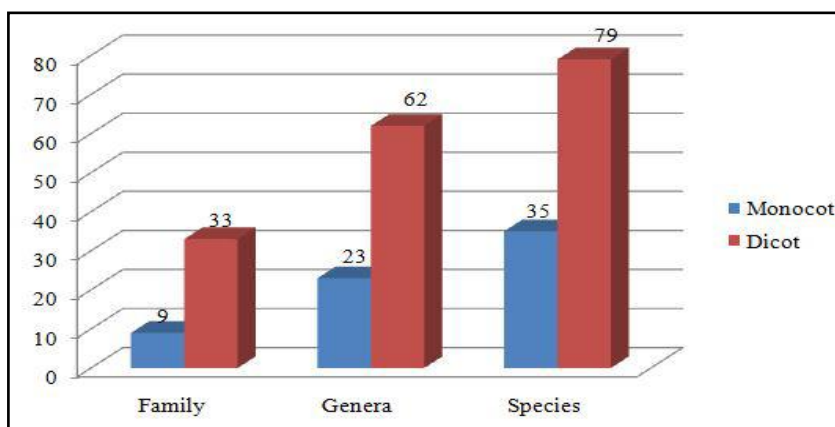


Fig. 4- Distribution of genera and species in monocot and dicot.

Conclusion

Wetlands play a crucial role in the aquatic ecosystem, providing essential resources like food, fodder, and medicine, as well as offering shelter and food for aquatic fauna. The tarai region of Uttarakhand, including Udham Singh Nagar, has abundant water leading to rich terrestrial and aquatic vegetation. However, modernization, urbanization, and infrastructure development such as building and road constructions are causing the rapid shrinkage and disappearance of aquatic lands like ponds, puddles, and rivers. Consequently, aquatic plant populations are also declining at the same rate. They are primary producers within aquatic ecosystems and are important for ecological studies and regional climate maintenance. This study presents a database of hydrophytes, which will be valuable for future research focused on the conservation, protection, and management of local flora.

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