

## Limnological studies of Mangesh lake, Kalghatgi taluk, Dharwad district, Karnataka

Nehakousar B.,<sup>id</sup> Shreyas B.,<sup>id</sup> Vanaja G. Patgar\*,<sup>id</sup> and K. Kotresha<sup>id</sup>

Taxonomy and Floristic Laboratory, Department of UG, PG and Research Botany, Karnataka University, Karnataka Science College, Dharwad-580001, India

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Corresponding Author: Vanaja G. Patgar | E-Mail: [vanajapatgar3373@gmail.com](mailto:vanajapatgar3373@gmail.com)

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### ABSTRACT

Limnological studies is based on the water system, the study of Mangesh lake reports seasonal varies with physicochemical parameters like, Temperature, pH, TDs, Alkalinity, DO, COD, Total hardness, Calcium hardness and Magnesium hardness from January to July 2024. Phytoplankton were recorded 57 taxa, in that Bacillariophyceae is dominant class of the phytoplankton, the highest number of phytoplankton record in the summer season. Angiosperm recorded 83 species, in that Fabaceae(9), Asteraceae(7), Solanaceae(5), Convolvulaceae(5), Euphorbiaceae(4), Nictaginaceae(3), Acanthaceae(3), Boraginaceae(4) are the dominat families. And the analyzing of the result concluded that water is good in quality.

**Keywords:** Angiosperm diversity, Mangesh lake, Physicochemical parameters, Phytoplanktons, Soil analysis.

### INTRODUCTION

Limnology is the branch of ecosystem, it deals with physical, chemistry, biology and geology of water systems like, lakes, streams, rivers, wetlands, and ground waters [15]. Limnological Study on Rajasthan water bodies, as the result of physicochemical parameters Electric conductance, DO and Hardness were higher these are effect on water quality [17]. Limnological studies on Kolaramma Lake, Kolar, Karnataka by the result of physico-chemical parameters concluded that water quality is not good for drinking and domestic purpose because of abundance growth of algal bloom [16]. Limnological study with physico-chemical (Temperature, pH, Rainfall, DO, BOD, EC, Alkanity and Hardness) analysis on Malaprabha River, M. K. Hubli, Karnataka reports water is good quality, suitable for drinking and agricultural purpose [21]. Worked on the Chlorophyceae in the lake of Navalgund, Dharwada, reported as Temperature, PH, Turbidity, Alkalinity, Total hardness, DO, BOD, Nitrates, Phosphate and COD were affect on the diversity of Chlorophyceae [1]. Limnological study on two water bodies in Uttara Kannada, Kali and Aghanashini River, reports drinking water quality standard based on the 25 physico-chemical factors and two years study of phytoplankton reveals that there were 226 taxa belonging to 40 genera. Among that Bacillariophyceae was the dominant with 116 taxa. Among these rivers Kali river(74) is the less phytoplankton diversity than Aghanashini(191) river [8]. The algal diversity of freshwater in the Brahmaputra valley, revealed that 194 taxa belonging to seven group Charophyta, Chlorophyta, Bacillariophyta, Euglenozoa, Ochrophyta, Cyanobacteria and Mioza and Desmidaceae was the dominant belongs to 49 species among them Coasmarium is dominant with 23 species [4]. Studies on Hirehonnalli lake dharwad reports 60 phytoplanktons, which is highest record in summer season and

96 taxa of angiosperms were recorded. Along with water analysis concluded that to water is good for drinking and agricultural purpose [18]. The comparative account of vascular plant diversity in two lakes of Haliyal taluk, Uttara Kannada reports totally 100 plant species in which lower plants and higher plants were differentiated. More species diversity is in Antrolli lake than Guttigere lake. Antrolli lake records 82 species out of 100 species and Guttigere lake records 48 species out of 100 species [7]. Phytoplanktons diversity of two lakes in Uttara Kannada reports diversity of phytoplanktons are high in summer and lower in rainy season. Guttigere lake and Antrolli lake records 9 species and 52 species respectively, among that only one species is common for both the lakes. A total of 60 species belonging to 32 families, Phacaceae is dominant family. More number of species recorded in Chlorophyta group and less in Dinoflagellate and Zygomematophyceae. The physicochemical parameters result shows the water is fit for drinking [6].

A good quality of water is essential for good quality of life and crucial for human survival, it leads to preventing diseases. Therefore, physicochemical parameters (Temperature, EC, TSS, TDS, Turbidity, pH, Alkalinity, Hardness, Cl, Nitrate, Sulfate, DO, COD and BOD) standards helps to understand the water quality. And also biological parameters such as phytoplanktons also effect on the water quality. The study's results revealed that the pond water in Bihar is slightly contaminated, highlighting the need for water quality monitoring and management to ensure public health and safety [20]. Algal work on the three effluent drains of Guwahati Oil Refinery, Assam reports 22 taxa of class Chlorophyceae, Bacillariophyceae, Euglenineae and Cyanophyceae. Along with qualitative analysis of water, Temperature, EC, Turbidity, BOD, Potassium, Phosphate and Nitrate were done. Overall the water quality parameter along with algal population indicated highly organically polluted status of the pond and need management interventions [9].

## MATERIAL METHODS

**Study Area:** The Mangesh lake (Fig. 01) is perennial freshwater body located in Dharwad District of Karnataka State. The lake is utilized as a source for drinking, cattle and Clothes washing by local people, for fishery by fishermen communities and agricultural purpose. Mangesh lake is situated about 35 km from Dharwad,  $15^{\circ}10'47.1''\text{N}$   $74^{\circ}57'01.7''\text{E}$ . The lake surrounded by farms for agricultural purpose, constructed canals for watering to farm. This lake mainly used for fisheries. And some anthropogenic activities like cloth washing, buffalo and vehicle washing are found in this lake.

**Collection of Samples:** Samples were collected in monthly with variant times for different parameters respectively, for the phytoplanktons were collected at morning hours (8-10 am), water sample was also collected at morning hours (10-11 am) and angiosperms were collected in two to three times in a month.

**Identification of phytoplankton:** An Introduction to Phytoplankton: Diversity and Ecology [19]. Training Manual on Phytoplankton Identification Taxonomy [14]. Phytoplankton identification and water quality monitoring along the fish-cage belt at Magat dam reservoir, Philippines [12]. Freshwater Algae Identification and Use as Bio indicators [11].

## Physio-chemical Parameters:

Physico-chemical Parameters were conducted minor tests for monthly and some major tests for two seasons with the following standard methods: Chemical Oxygen Demand [10]; Total Alkalinity Test [3]; Dissolved Oxygen test (Winkler method); Electrochemical Conductivity: This has been conducted in Shilpa Biologicals Pvt. Ltd.; Chloride Test (Mohr's test); Determination of Total Hardness by Volumetric EDTA Method [13]; Determination of Calcium by Volumetric Method [13]; Determination of Magnesium by Calculation Method [13]; Determination of Chlorophyll content in a given sample by UV spectrophotometric method [2].

## RESULTS

Limnological studies of Mangesh lake was started from January, 2024 to July, 2024. In this period three forms of work were done i.e., water analysis (Physicochemical parameters), phytoplankton diversity and angiosperm diversity.

Physicochemical parameters were conducted monthly once. That result follow as, Temperature recorded high in summer season of April month-  $30^{\circ}\text{C}$  and low in January month of winter season-  $25^{\circ}\text{C}$ . pH was little much variation with all months among that little high in May month of summer season records 8.6. TDS was recorded in decreasing order from month January to July, higher in winter season 827 ppm and lower in rainy season 439 ppm. Total alkalinity is depends upon the Carbonate and Hydrocarbonates, variation with different month, high amount of alkalinity recorded in January, April and July month - 40 mg/ml and lowest amount of alkalinity recorded in March month - 25 mg/ml. Dissolve Oxygen is variation with different season, high amount recorded in summer season of April month - 6 mg/ml and lower amount recorded in rainy season - 1.6 mg/ml. Result of chloride analysis

shows variation with different month the values in-between 10 - 18 mg/ml, the highest amount recorded in April month - 17.75 mg/ml. Chemical Oxygen Demand was variation with different season, highest amount recorded in summer season - 20 mg/ml, lowest in winter season - 10 mg/ml due to the seasonal variation (Table- 1).

Some major tests were conducted once in a different season i.e., Total hardness, Hardness, Calcium hardness, Magnesium hardness and Chlorophyll content of phytoplankton's. Total hardness is depends upon the Calcium and Magnesium amount present in the water, high amount of Hardness recorded in summer season - 224 mg/ml and low amount recorded in rainy season - 192 mg/ml. As it is Calcium hardness was recorded high in summer season - 210.1 mg/ml and lower in rainy season - 171.13 mg/ml. and the Magnesium hardness was recorded high in winter season - 6.31 mg/ml and lower in summer season - 3.41 mg/ml. Among that amount of Calcium is more than Magnesium in the all season of Total hardness analysis. The Chlorophyll content of phytoplankton's was conducted in two seasons (Summer and Winter) because of availability. The amount of Total Chlorophyll content high in summer season - 38.74 mg/ml. The amount of separated Chlorophyll 'a' content was high in summer season - 32.71 mg/ml and low in rainy season - 30.82 mg/ml and the Chlorophyll 'b' (Summer season - 5.97 mg/ml and Rainy season - 4.28 mg/ml) is always less than Chlorophyll 'a' (Table 2).

Soil and some parameters of water analysis was conducted at ICAR Science Centre, Dharwad, that reports, red color soil with 7.57 pH and has good nutrition content. The overall result concluded that good fertility of soil for plant growth in form and water is good for agriculture and drinking purpose (Table 3).

In this lake 57 taxa of phytoplanktons were recorded during the January to July month. The summer season is suitable for growing phytoplanktons due to high sunlight and also highest diversity of phytoplanktons were recorded (Table 4& Fig. 2-5). Total 57 taxa belongin to 7 classes, Bacillariophyta - 20, Chlorophyceae - 13, Cyanophyceae - 12, Euglenophyceae - 6, Zygnematophyceae - 3, Coscinodiscophyceae - 2 and Trebouxiophyceae - 1 respectively recorded. Among them Bacillariophyta records more number of species, because of high amount of DO, TDS, Phosphate leads to increase of diversity of Bacillariophyceae (Table 5).

The survey of Mangesh lake was conducted in two to three times in a month from January to July 2024 with three different seasons, angiosperm survey reports 83 species belonging to 34 families. And 43 are Native to India other than are alien species (Table 6 & Fig. 6-11).

Among them herbs were recorded in highest number - 39, shrubs - 26, climbers - 12 and trees - 6 respectively (Table 7). Top 8 families are Fabaceae, Asteraceae, Solanaceae, Convolvulaceae, Euphorbiaceae, Nictaginaceae, Acanthaceae and Boraginaceae among that Fabaceae were recorded 23 species (Table 8).

Mangesh lake water is used for agricultural purposes. As the pond is ephemeral soil is used for various purposes. Washing clothes, cattle's and vehicles is also regularly done in this pond. There is no protection fencing around it. Fishing is done during February to June when the water becomes less. Fishes include Katla, Kannadi, Miragal, Rahoo, Gaskarp, Murgod, Chillaipilli.

**Table 1: Data showing the tests conducted regularly Mangesh Lake**

Physicochemical parameters	January	February	March	April	May	June	July
Date	29 <sup>th</sup> Jan	13 <sup>th</sup> Feb	18 <sup>th</sup> March	24 <sup>th</sup> April	24 <sup>th</sup> May	15 <sup>th</sup> June	8 <sup>th</sup> July
Temperature <sup>0</sup> C	25	28	30	35	31	26	27
pH	8.13	8.41	8.2	8.49	8.6	8.3	8.5
TDS in ppm	825	827	815	621	616	567	439
Total Alkalinity	40	30	25	40	35	30	40
CO <sub>3</sub> <sup>2-</sup> mg/ml	20	10	10	20	10	10	20
HCO <sub>3</sub> mg/ml	20	20	15	20	15	20	20
DO mg/ml	2	3.6	5.2	6	4.8	1.6	2.5
Chloride mg/ml	10.65	12.78	14.2	17.75	10.29	15.6	14.6
COD mg/ml	10	18	15	19	20	16	17

**Table 2: Data showing the two seasonal (Winter, Summer & Rain) observations**

Seasonal Parameters	Winter(Jan-Feb)	Summer(Mar-May)	Rainy(Jun-Jul)
Hardness mg/ml as CaCo <sub>3</sub>	210	224	192
Total Hardness in mg	210.12	224.17	192.06
Calcium mg/ml	73.74	84.1	68.53
Calcium Hardness mg/ml	184.1	210.1	171.13
Magnesium mg/ml	6.33	3.41	5.36
Magnesium Hardness mg/ml	6.31	3.41	5.09
Chlorophyll a mg/ml	-	32.76	30.82
Chlorophyll b mg/ml	-	5.97	4.28
Total chlorophyll content mg/ml	-	38.74	35.1
Total chlorophyll content in phytoplankton mg/ml	-	154.9	140.34

**Table 3: Soil and Water Analysis (Mangesh Lake) in ICAR Science Centre, Dharwad**

Soil Parameters	
Soil color	Red
pH	7.57
Electric conductivity (S/m)	0.11
Organic Carbon mg/ L	0.56
Mineralization Nitrogen	58.5
P <sub>2</sub> O <sub>5</sub> per acre	11.5
K <sub>2</sub> O per acre	169
Ca per 100gm	26
Mg per 100gm	11.5
Available Sulphur	18.6
Zn mg per Kg	0.81
Cu mg per Kg	0.46
Fe mg per Kg	5.81
Mn mg per Kg	6.12
Water	
pH	7.13
Electric conductivity(S/m)	0.15
Sodium carbonate mm/L	2.61

**Table 4: List of Phytoplankton's in Mangesh Lake**

Sl. No.	Scientific name	Class	Family
1	<i>Ankistrodesmus falcatus f. terrestris</i> Bristol	Chlorophyceae	Selenastraceae
2	<i>Asterionella</i> sp.	Bacillariophyceae	Tabellariaceae
3	<i>Asterococcus superbus</i> (Cienkowski) Scherffel	Chlorophyceae	Palmellopsidaceae
4	<i>Aulacoseira</i> sp.	Coscinodiscophyceae	Aulacoseiraceae
5	<i>Brachysira vitrea</i> (Grunow) R.Ross	Bacillariophyceae	Brachysiraceae
6	<i>Chlorella</i> sp.	Trebouxiophyceae	Chlorellaceae
7	<i>Coscinodiscus radiatus</i> Ehrenberg	Coscinodiscophyceae	Coscinodiscaceae
8	<i>Cymbella obtusa</i> W.Gregory	Bacillariophyceae	Cymbellaceae
9	<i>Desmodesmus flavescens</i> (Chodat)	Chlorophyceae	Scenedesmaceae
10	<i>Desmodesmus intermedius</i> (Chodat)	Chlorophyceae	Scenedesmaceae
11	<i>Desmodesmus maximus</i> (West & G.S.West)	Chlorophyceae	Scenedesmaceae
12	<i>Desmodesmus opoliensis</i> (P.G.Richter)	Chlorophyceae	Scenedesmaceae
13	<i>Euglena acus</i> (O.F.Müller) Ehrenberg	Euglenophyceae	Euglenaceae
14	<i>Eunotia bilunaris</i> (Ehrenberg) Schaarschmidt	Bacillariophyceae	Eunotiaceae
15	<i>Gomphonema lanceolatum</i> C.Agardh	Bacillariophyceae	Gomphonemataceae
16	<i>Microcystis aeruginosa</i> (Kutzing) Kutzing	Cyanophyceae	Microcystaceae
17	<i>Microcystis novacekii</i> (Komárek) Compère	Cyanophyceae	Microcystaceae
18	<i>Monoraphidium indicum</i> Hindák	Chlorophyceae	Selenastraceae
19	<i>Navicula germainii</i> J.H.Wallace	Bacillariophyceae	Naviculaceae
20	<i>Navicula pupula</i> Kutzing	Bacillariophyceae	Naviculaceae
21	<i>Navicula</i> sp.	Bacillariophyceae	Naviculaceae
22	<i>Navicula viridula</i> (Kützing) Ehrenberg	Bacillariophyceae	Naviculaceae
23	<i>Neidium affine</i> (Ehrenberg) Pfitzer	Bacillariophyceae	Neidiaceae
24	<i>Nitzschia bizertensis</i> B.Smida	Bacillariophyceae	Bacillariaceae

25	<i>Nitzschia frustulum</i> Kutzin Grunow	Bacillariophyceae	Bacillariaceae
26	<i>Nitzschia umbonata</i> (Ehrenberg) Lange-Bertalot	Bacillariophyceae	Bacillariaceae
27	<i>Nitzschia vasnaii</i> H.P.Gandhi	Bacillariophyceae	Bacillariaceae
28	<i>Nostoc</i> sp.	Cyanophyceae	Nostocaceae
29	<i>Oscillatoria brevis</i> Kutzin ex Gomont	Cyanophyceae	Oscillatoriaceae
30	<i>Oscillatoria formosa</i> Bory ex Gomont	Cyanophyceae	Oscillatoriaceae
31	<i>Oscillatoria ornata</i> Kutzin ex Gomont	Cyanophyceae	Oscillatoriaceae
32	<i>Oscillatoria princeps</i> Vaucher ex Gomont	Cyanophyceae	Oscillatoriaceae
33	<i>Oscillatoria</i> sp.	Cyanophyceae	Oscillatoriaceae
34	<i>Oscillatoria tenuis</i> C.Agardh ex Gomont	Cyanophyceae	Oscillatoriaceae
35	<i>Onychonema uncinatum</i> Wallich	Zygnematophyceae	Desmidiaeae
36	<i>Pediastrum tetras</i> (Ehrenberg) Ralfs	Chlorophyceae	Hydrodictyaceae
37	<i>Phacus caudatus</i> Hübner	Euglenophyceae	Phacaceae
38	<i>Phacus limnophilus</i> (Lemmermann) E.W.Linton	Euglenophyceae	Phacaceae
39	<i>Phacus mariae</i> Deflandre	Euglenophyceae	Phacaceae
40	<i>Phacus ovalis</i> Skvortsov	Euglenophyceae	Phacaceae
41	<i>Phacus pyrum</i> (Ehrenberg) W.Archer	Euglenophyceae	Phacaceae
42	<i>Phormidium</i> sp.	Cyanophyceae	Oscillatoriaceae
43	<i>Pinnularia interupta</i> W.Smith	Bacillariophyceae	Pinnulariaceae
44	<i>Pinnularia biceps</i> W.Gregory	Bacillariophyceae	Pinnulariaceae
45	<i>Pinnularia microstauron</i> (Ehrenberg) Cleve	Bacillariophyceae	Pinnulariaceae
46	<i>Planktothrix rubescens</i> (De Candolle ex Gomont) Anagnostidis & Komarek	Cyanophyceae	Microcoleaceae
47	<i>Pleurosigma</i> sp.	Bacillariophyceae	Plecurisigmataceae
48	<i>Pleurotaenium trabecula</i>	Zygnematophyceae	Desmidiaeae
49	<i>Rhizosolenia</i> sp.	Bacillariophyceae	Rhizosoleniaceae
50	<i>Scenedesmus longispina</i> Meyen, Syn	Chlorophyceae	Scenedesmaceae
51	<i>Scenedesmus</i> sp	Chlorophyceae	Sphaeropleales
52	<i>Spirulina</i> sp.	Cyanophyceae	Spirulinaceae
53	<i>Staurastrum punctulatum</i> Brébisson	Zygnematophyceae	Desmidiaeae
54	<i>Surirella splendida</i> (Ehrenberg) Ehrenberg	Bacillariophyceae	Surirellaceae
55	<i>Tetradesmus major</i> Gilbert Morgan Smith	Chlorophyceae	Scenedesmaceae
56	<i>Tetraedron</i> sp.	Chlorophyceae	Hydrodictyaceae
57	<i>Tetraedron trigonum f. gracile</i> (Reinsch) De Toni	Chlorophyceae	Hydrodictyaceae

Table 5: Phytoplankton Classes from Mangesh Lake

Class	No. of species
Bacillariophyta	20
Chlorophyceae	13
Cyanophyceae	12
Euglenophyceae	6
Zygnematophyceae	3
Coscinodiscophyceae	2
Trebouxiophyceae	1
<b>Total</b>	<b>57</b>

Table 6: List of plant species collected from Mangesh Lake

Sl no.	Scientific name	Family	Common name	Vernacular name	Flowering season	Nativity to India
1	<i>Aeschynomene indica</i> L.	Fabaceae	indian joint vetc	Budda pea	Jun-July	+
2	<i>Albizia lebbeck</i> (L) Benth	Fabaceae	Indian siris	Baage	Sep-Nov	+
3	<i>Alternanthera ficoidea</i> (L.) P.Beauv.	Amaranthaceae	Snow carpet	Kusal	Mar-May	-
4	<i>Ampelocissus latifolia</i> (Roxb)	Vitaceae	Jungle grave vine	jungle aangoor	Jun-July	+
5	<i>Amranthus viridis</i> L.	Amranthaceae	Green amaranth	Jungali chulayi	Jan-August	-
6	<i>Azadirachta indica</i> A Juss.	Meliaceae	Indian Lilac	Kahi bevu	Jan-Apr	+
7	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Punarnava	Gadahpurna	Jan-July	+
8	<i>Boerhavia erecta</i> L.	Nyctaginaceae	Erect spiderling	Erecta Tar vine	Jan-July	-
9	<i>Brassica juncea</i> (L.) Czern	Brassicaceae	Leaf Musturd	Indian Musturd	May-Jun	-
10	<i>Brugmansia</i> sp.	Solanaceae	Angel trumpets	Madulam	Jan-Aug	-
11	<i>Butea monosperma</i> (Lam.) Kuntze	Fabaceae	Flame of the forest	Dhak palash	Jan-Apr	+
12	<i>Caesalpinia pulcherrima</i> (L.) Sw.	Fabaceae	peacock flower	Radhasura	Jan-Dec	-
13	<i>Calotropis gigantea</i> (L.) W.T.Aiton	Apocynaceae	Crown flower	Madar	Jan-Dec	+
14	<i>Canna indica</i> L.	Cannaceae	Indian Shoot	Samudra bale	Apr-May	-
15	<i>Canthium coramandlicm</i> (Burm.f.) Alston	Rubiaceae	Karemullu	Wild jassamine	Jan-July	+
16	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Balloon vine	Agniballi	May-Jun	+
17	<i>Carex canescens</i> L.	Cyperaceae	Curta Gooden	white sedge	Jun-July	-
18	<i>Caussonis trifolia</i> (L.) Mabb.& J.Wen	Vitaceae	Three leaved wild vine	Fox grapes	May-Jun	+
19	<i>Chromolena odoreta</i> (L.) R.M.King&H.Rob.	Asteraceae	Siam weed	Aeroplane plant	Jan-July	-
20	<i>Clotoria tenera</i> L.	Fabaceae	Butterfly Pea	Blue pea	Apr-May	-
21	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Scarlet gourd	Tindora	Feb-May	+
22	<i>Commelinia benghalensis</i> L.	Commelinaceae	Benghal dayflower	Kena	Jun-July	+
23	<i>Cyprus rotundus</i> L.	Cyperaceae	Nut Grass	Badra mushti	Jan-Dec	+
24	<i>Datura metel</i> L.	Solanaceae	Thorn apple	Kala Dhatura	May-Jun	-
25	<i>Dentella repens</i> Var.repens.	Rubiaceae	Creeping Lickstoop	sheem	Jan-July	+
26	<i>Dicliptera foetida</i> (Forssk.) Blatt.	Acanthaceae	stinking foldwing	stinking foldwing	Jan-Apr	+
27	<i>Digitaria ciliaris</i> (Retz.) Koeler	Poaceae	Summer grass	Hairy crabgrass	Apr-July	+
28	<i>Digitaria ciliaris</i> (Retz.) Koeler	Poaceae	Deccan grass	Jungle rice	Jun-July	-
29	<i>Duranta erecta</i> L.	Verbinaceae	Pigeon berry	Neelakantha	Apr-May	-

30	<i>Eclipta prostrata</i> (L.)L.	Asteraceae	False Daisy	Bhringraj	May-Jun	-
31	<i>Erigeron bonariensis</i> L.	Asteraceae	Flax-leaf fleabane	Asthma weed	Jan-July	-
32	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Snake weed	Asthma weed	Jan-Jun	-
33	<i>Euphorbia pulcherrima</i> Willd.ex Klotzsch	Euphorbiaceae	Poinsettia	Lalpata	May-Jun	-
34	<i>Euploca strigosa</i> (Willd.) Diane & Hilger	Boraginaceae	Bristly Heliotropes	Choti santri	May-Jun	+
35	<i>Euploca ovalifolia</i> (Forssk.) Diane& Hilger	Boraginaceae	Salt heliotrope		Apr-May	+
36	<i>Ficus benghalensis</i> L.	Moraceae	Banyan tree	Aalada mara	Mar-Dec	+
37	<i>Gomphrena serrata</i> L.	Amaranthaceae	Globe amaranth		Jan-July	-
38	<i>Grangea maderaspatana</i> (L.)Poir.	Asteraceae	Madras carpet	Namuti	Apr-May	+
39	<i>Heliotropium indicum</i> L.	Boraginaceae	Heliophytum	Hathajori	Mar-May	-
40	<i>Hygrophilla auriculata</i> (schumach.) Heine	Acanthaceae	Swamp weed	Kokilaksha	Jan-Aug	+
41	<i>Hyptis sauvolones</i> (L.) Poit.	Lamiaceae	American mint	Vilaiti Tulsi	Mar-July	-
42	<i>Indigofera tinctoria</i> L	Fabaceae	Indigo		Jul-Aug	+
43	<i>Ipomea cairica</i>	Convolvulaceae	messina creeper		May-July	+
44	<i>Ipomea meyeri</i> (Spreng.) G.Don	Convolvulaceae	Meyer's morning glory		Feb-May	-
45	<i>Ipomea obscura</i> (L.) Ker Gawl.	Convolvulaceae	Wild petunia	White morning glorry	Mar-Aug	+
46	<i>Ipomea triloba</i> Thunb.	Convolvulaceae	Morning glory	Little bell	May-Jun	-
47	<i>Ipomoea sagittifolia</i> Burm.f.	Convolvulaceae	Morning glorry	Bankaalmi	Mar-Jun	+
48	<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	Bellyache bush	Ratanjot	May-Jun	-
49	<i>Lantana camera</i> L.	Verbinaceae	Lantana	Raimuniya	Feb-Nov	-
50	<i>Magnifera indica</i> L.	Anardiaceae	Mango	Mavin mara	Feb-May	
51	<i>Martynia annua</i> L.	Martyniaceae	Cat's claw	Biralo -nangri	Jun-July	-
52	<i>Mimosa pudica</i> L.	Fabaceae	Touch me not	Chuimui	Mar-Nov	-
53	<i>Mirabilis jalpa</i> L.	Nyctaginaceae	Four O 'clock plant	Madhyana mallige	Apr-July	-
54	<i>Momordica charantia</i> L.	Cucurbitaceae	Bitter Gourd	Karela	Jan-Dec	+
55	<i>Momordica</i> sp.	Cucurbitaceae			May-Jun	+
56	<i>Muntingia calabura</i> L.	Muntingiaceae	singapur cherry	Gasgase hannu	May-Aug	-
57	<i>Phyla nodiflora</i> (L.) Greene	Verbinaceae	capeweed carpet	Nelahippli	Apr-May	+
58	<i>Phyllanthus reticulatus</i> Poir.	Phyllanthaceae	Black honey shrub		Jan-April	+
59	<i>Physalis minima</i> L.	Solanaceae	Bladder cherry	Rasbhari	Apr-Aug	-
60	<i>Plumbago zeylanica</i>	Plumbaginaceae	Wild leadwort	chitrak	Jan-Apr	+
61	<i>Polygonum plebeium</i> R.Br.	Polygonaceae	Knotweed	Machechi	Jun-July	+
62	<i>Ricinus communis</i> L.	Euphorbiaceae	Castor oil plant	Castor bean	May-Jun	-
63	<i>Ruelia tuberosa</i> L.	Acanthaceae	Meadow weed	Jurbula gadda	Mar-May	-
64	<i>Scoparia dulcis</i> L	Plantaginaceae	Goat weed	Mithi Patti	May-Jun	-
65	<i>Senecio</i> sp.	Asteraceae			Apr-Jun	+
66	<i>Senna occidentalis</i> L	Fabaceae	Coffe senna		Feb-Jun	-
67	<i>Senna</i> sp.	Fabaceae			Feb-Jun	+
68	<i>Senna uniflora</i> (Mill.) H.S.Irwin&Barneby	Fabaceae	One leaf senna	One leaf senna	Jan-Aug	-
69	<i>Sesamum indicum</i> L.	Pedaliaceae	Gingelly	Til	Mar-Jun	+
70	<i>Sida acuta</i> Burm.f.	Malvaceae	wireweed,	Boriala	Jun-July	+
71	<i>Sida rhombifolia</i> L.	Malvaceae	jelly leaf	jelly leaf	Jun-July	+
72	<i>Solanum nigrum</i> L.	Solanaceae	black nightshade	Mokoi	May-Jun	+
73	<i>Solanum torvum</i> Sw.	Solanaceae	Devil's fig	Sundekkai	May-Jun	-
74	<i>Synedrella nudiflora</i> (L.)Gaertn.	Asteraceae	Cindrella weed	pig grass	Jan-July	+
75	<i>Stylosanthes fruticosa</i> (Retz.) Alston	Fabaceae	African stylo	Pencil flower	Mar-Jun	-
76	<i>Syzygium jambos</i>	Myrtaceae	Jambos		Feb-Apr	-
77	<i>Tamarindus indica</i> L.	Fabaceae	Tamarind	Assam jawa	Jan-Apr	-
78	<i>Telosma pallida</i> (Roxb.) Craib	Apocynaceae	Surkilla	Telosma Vine	Jun-July	+
79	<i>Trianthemum portulacastrum</i> L.	Aizoaceae	Black pigweed	Pasale oppu	May-June	+
80	<i>Tridax procumbens</i> L.	Asteraceae	Coat buttons	Gubbusanner	Jan-Dec	+
81	<i>Vigna unguiculata</i> (L.) Walp.	Fabaceae	Cow peas	Lobiaya	Jan-Dec	-
82	<i>Volkameria inermis</i> L.	Lamiaceae	Seashore Tubeflower	Glory bower	Apr-May	+
83	<i>Ziziphus oenopolia</i> (L.) Mill.	Rhamnaceae	Jackle jujube	Makai	Jun-July	+

Table 7: Habit Wise distribution of Plants from Mangesh Lake

Tree	6
Shrub	26
Herbs	39
Climbers	12
Total	83

Table 8: Dominant families of Angiosperms in Mangesh Lake

Family	Number of species
Fabaceae	13
Asteraceae	7
Solanaceae	5
Convolvulaceae	5
Euphorbiaceae	4
Nictaginaceae	3
Acanthaceae	3
Boraginaceae	3

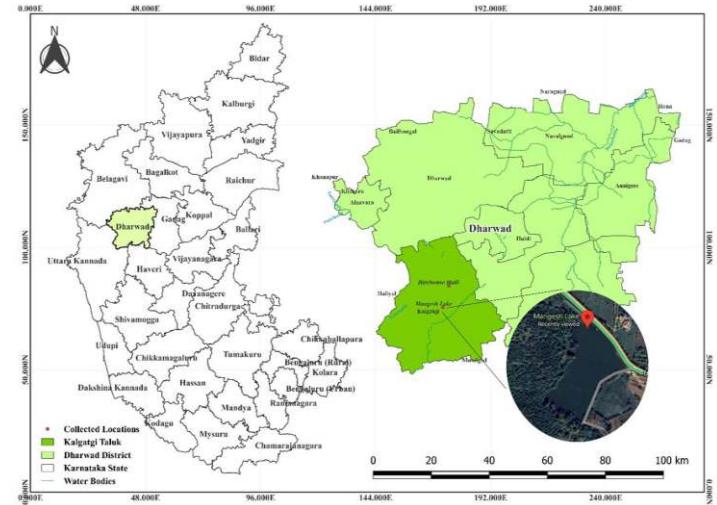
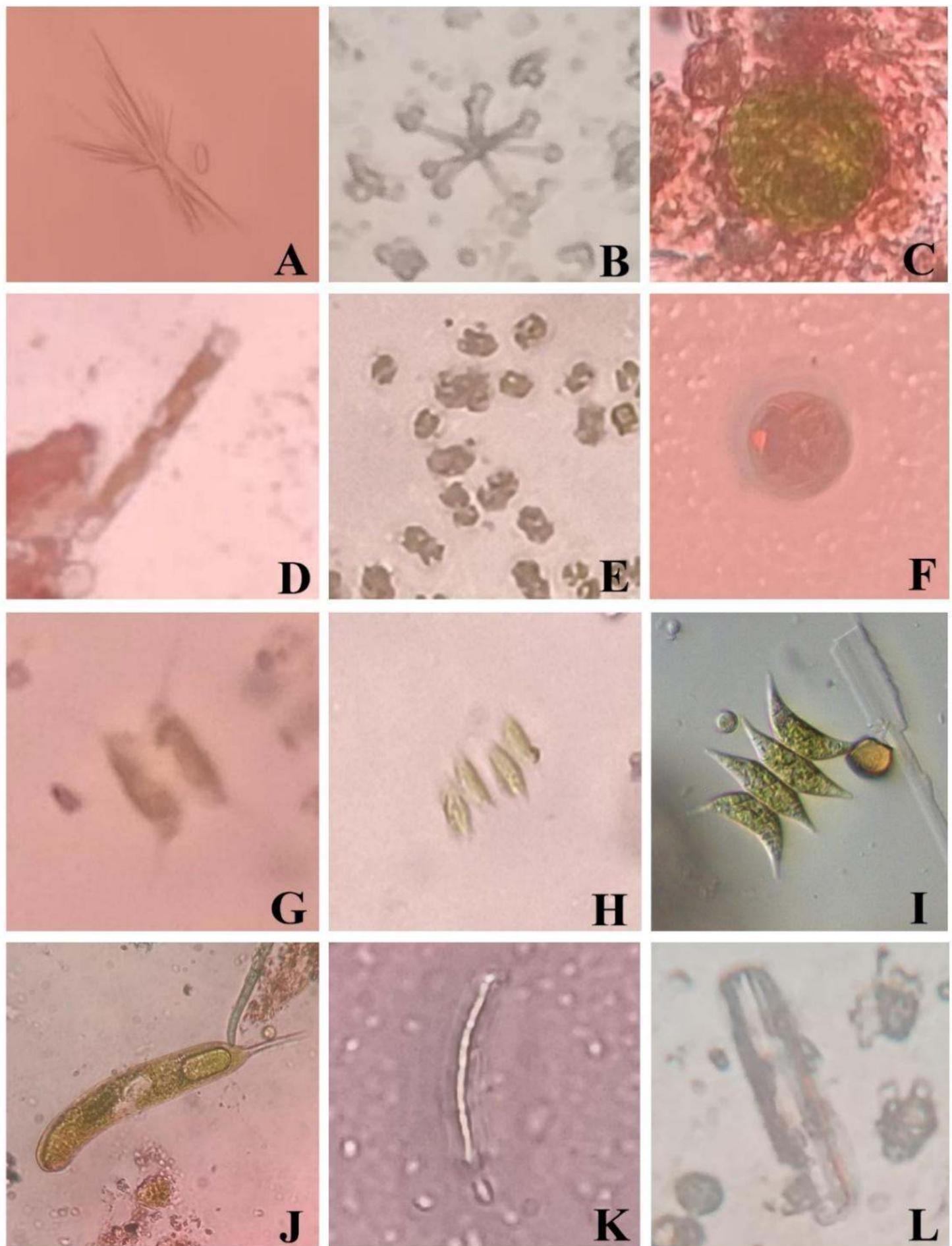
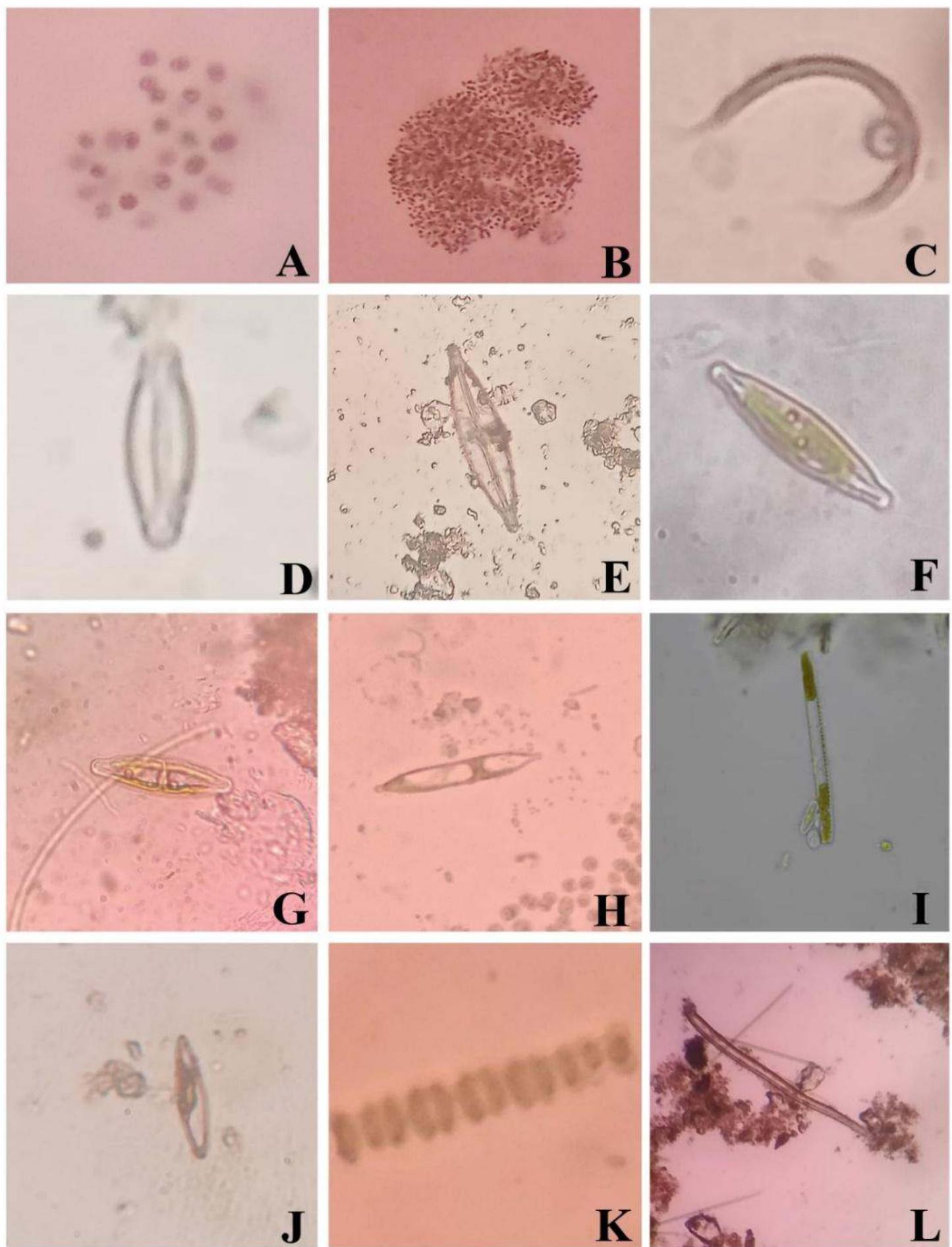


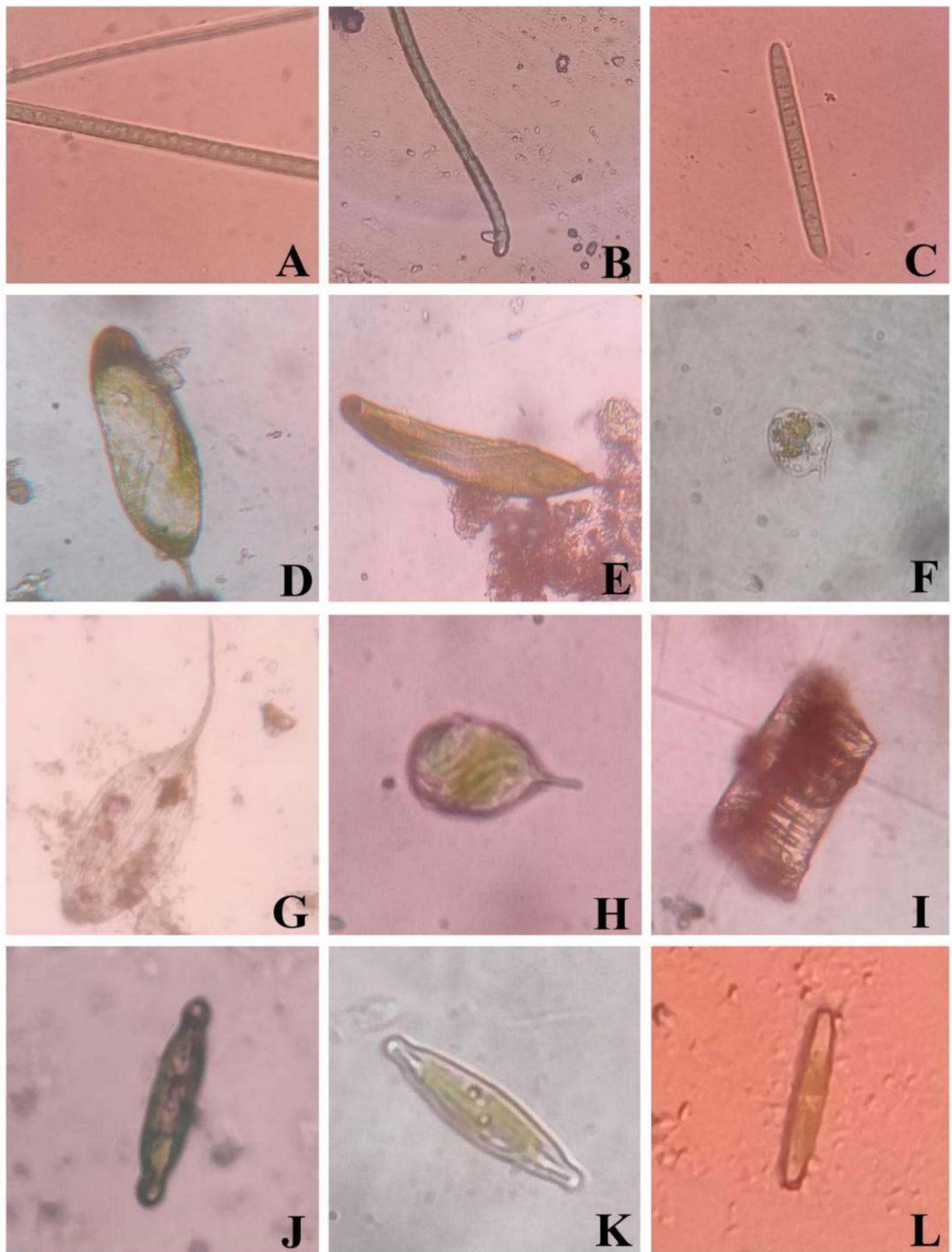
Figure 1: Map of Study Area showing Mangesh Lake



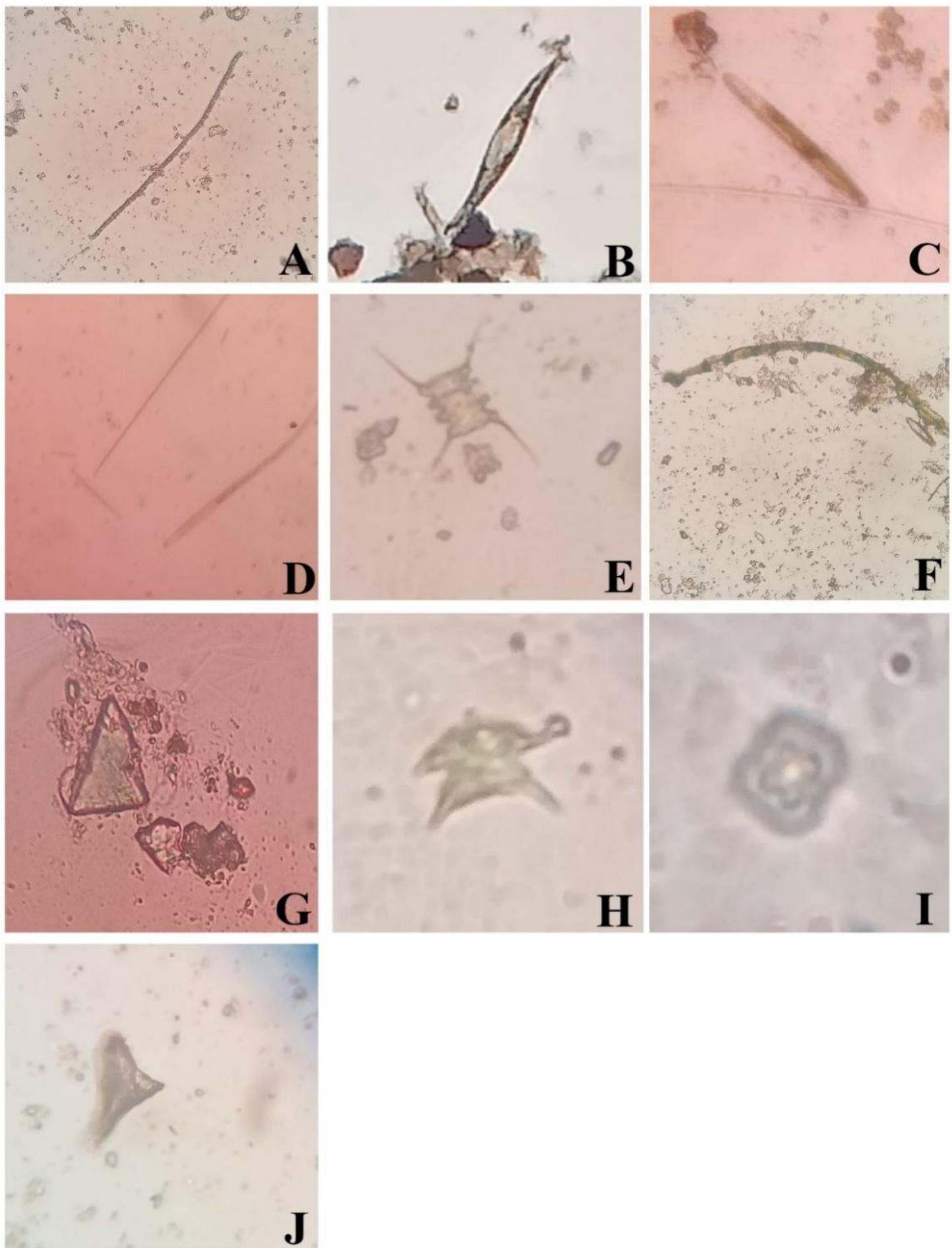
**Figure 2:** A. *Ankistrodesmus falcatus*; B. *Asterionella* sp.; C. *Asterococcus superbus*; D. *Aulacoseira* sp.; E. *Chlorella* sp.; F. *Coscinodiscus radiatus*; G. *Desmodesmus flavescentis*; H. *Desmodesmus intermedius*; I. *Desmodesmus maximus*; J. *Euglena acus*; K. *Eunotia bilunaris*; L. *Gomphonema lanceolatum*.



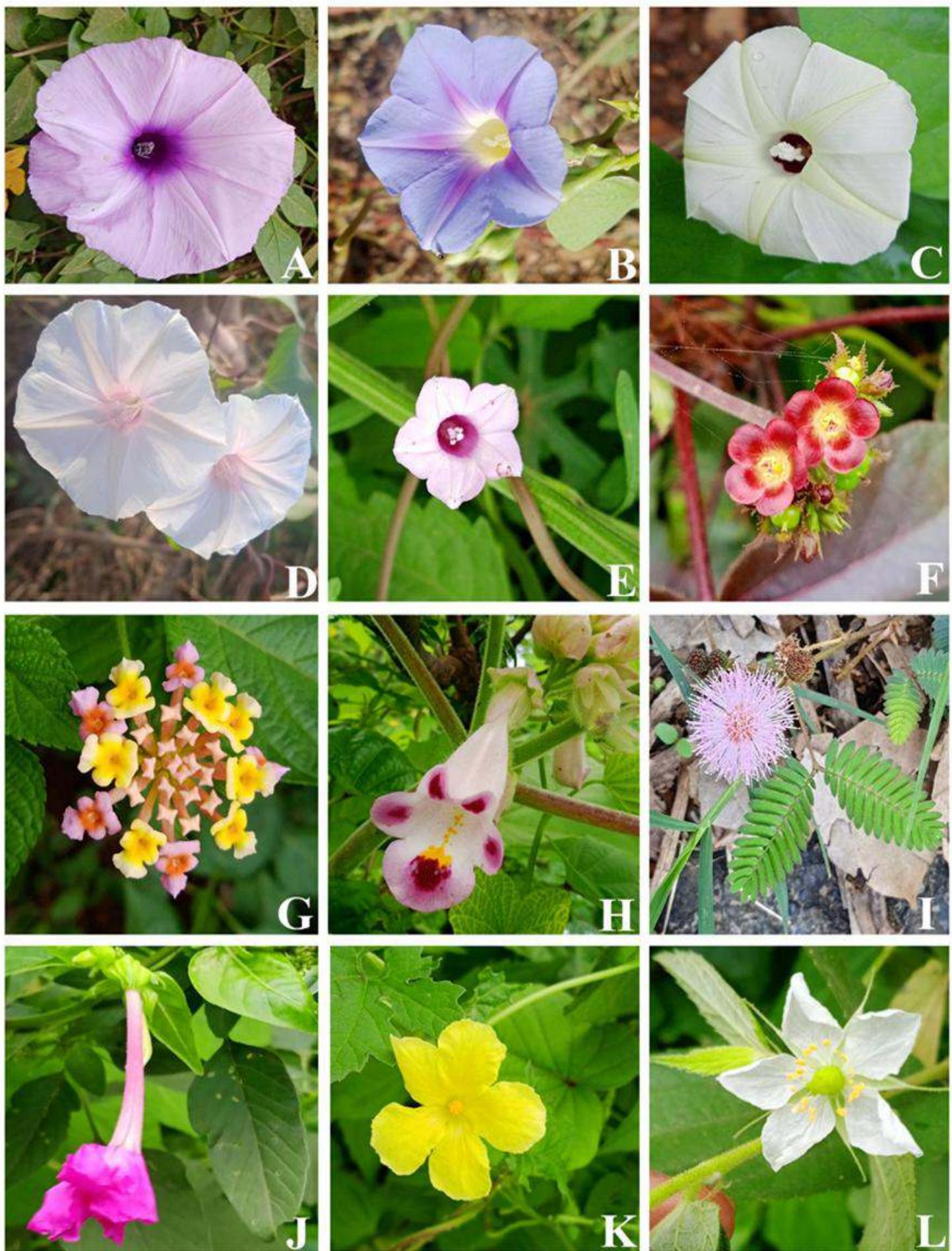
**Figure 3:** A. *Microcystis aeruginosa*; B. *Microcystis novacekii*; C. *Monoraphidium indicum*; D. *Navicula germainii*; E. *Navicula* sp.; F. *Neidium affine*; G. *Nitzschia bizertensis*; H. *Nitzschia frustulum*; I. *Nitzschia umbonata*; J. *Nitzschia vasnaii*; K. *Oscillatoria brevis*; L. *Oscillatoria formosa*.



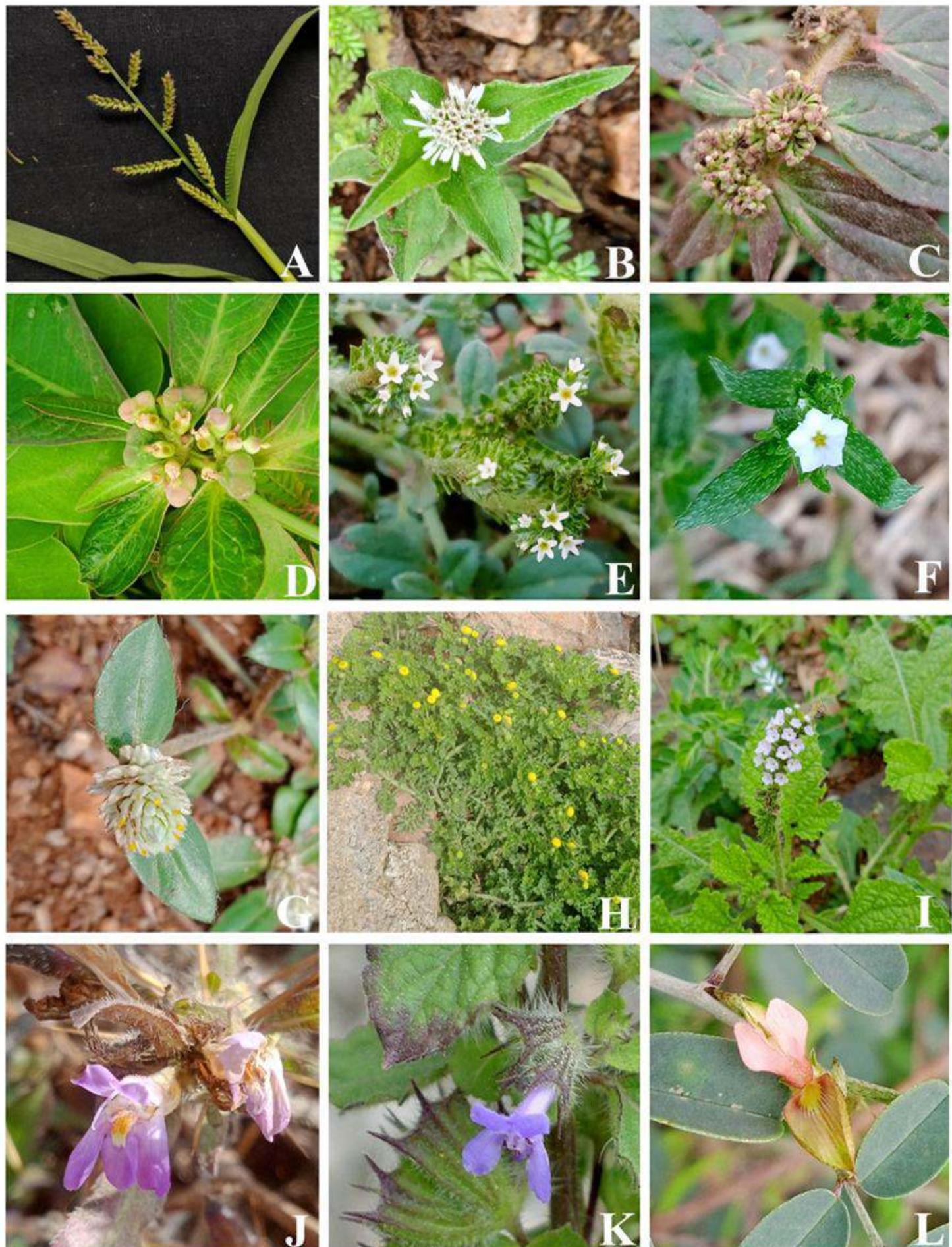
**Figure 4:** A. *Oscillatoria ornata*; B. *Oscillatoria* sp.; C. *Onychonema uncinatum*; D. *Phacus caudatus*; E. *Phacus limnophilus*; F. *Phacus mariae*; G. *Phacus ovalis*; H. *Phacus pyrum*; I. *Phormidium* sp.; J. *Pinnularia interupta*; K. *Pinnularia biceps*; L. *Pinnularia microstauron*.



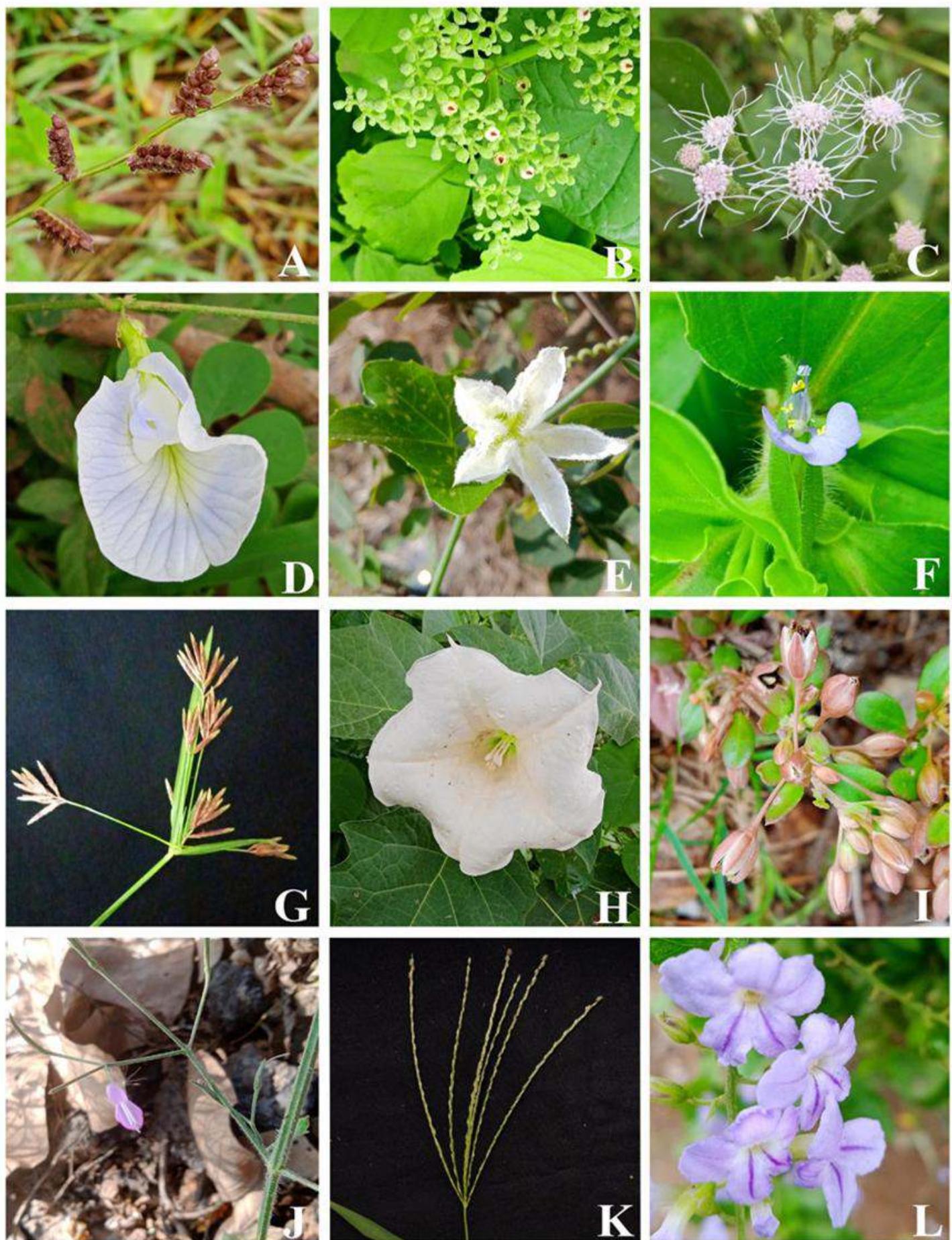
**Figure 5:** **A.** *Planktothrix rubescens*; **B.** *Pleurosigma* sp.; **C.** *Pleurotaenium trabecula*; **D.** *Rhizosolenia* sp.; **E.** *Scenedesmus* sp.; **F.** *Spirulina* sp.; **G.** *Staurastrum punctulatum*; **H.** *Tetradesmus major*; **I.** *Tetraedron* sp.; **J.** *Tetraedron trigonum*.



**Figure 6:** A. *Ipomea cairica*; B. *Ipomea meyeri*; C. *Ipomea obscura*; D. *Ipomea sagittifolia*; E. *Ipomea triloba*; F. *Jatropha gossypiifolia*; G. *Lantana camera*; H. *Martynia annua*; I. *Mimosa pudica*; J. *Mirabilis jalapa*; K. *Momordica charantia*; L. *Muntingia calabura*.



**Figure 7:** A. *Echinocola colon*; B. *Eclipta prostata*; C. *Euphorbia hirta*; D. *Euphorbia pulcherrima*; E. *Euploca ovalifolia*; F. *Euploca strigosa*; G. *Gomphrena serrata*; H. *Grangea maderaspatana*; I. *Heliotropium indicum*; J. *Hygrophilla auriculata*; K. *Hyptis sauvolones*; L. *Indigofera tinctoria*.



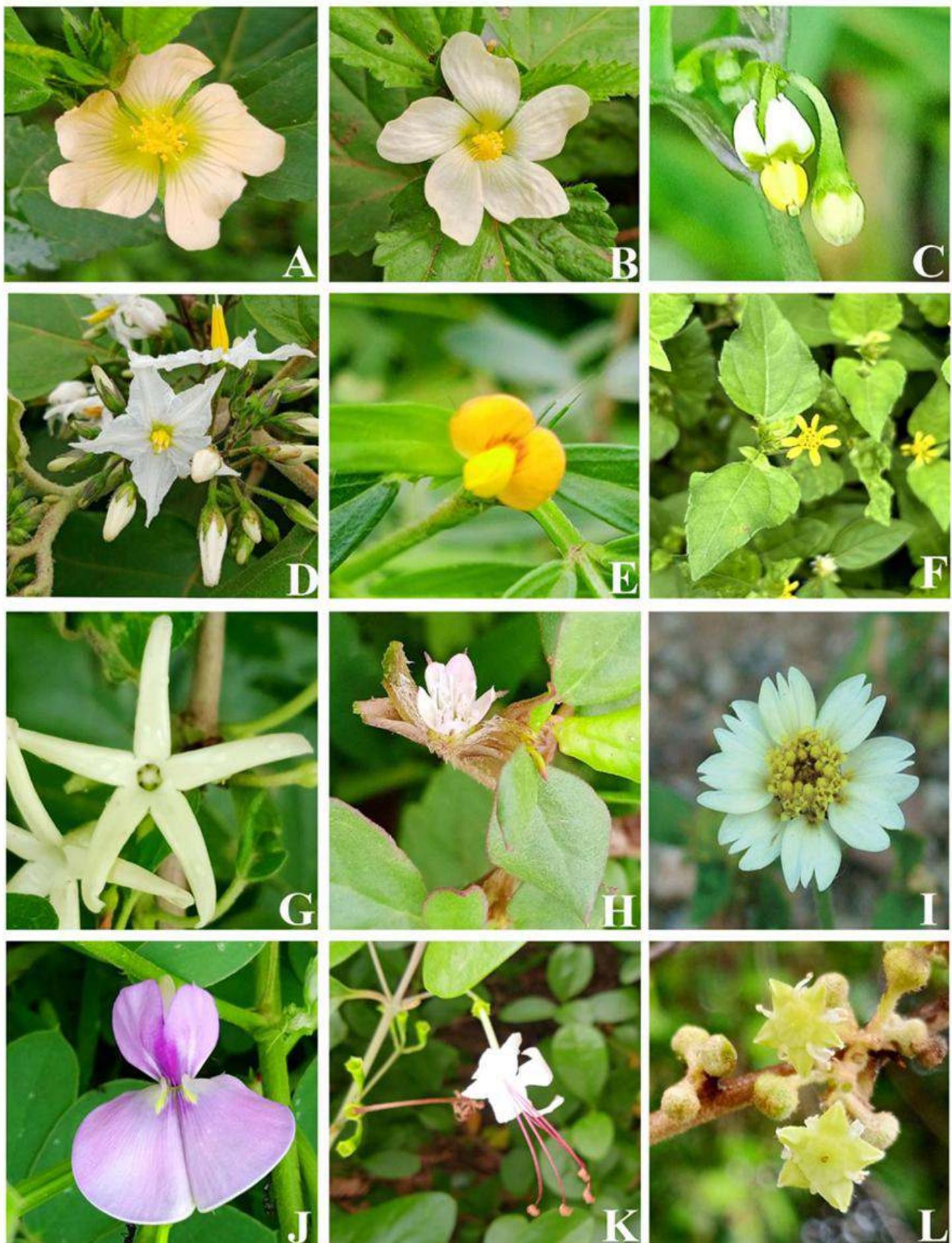
**Figure 8:** A. *Carex canescens*; B. *Causonis trifolia*; C. *Chromolaena odoreta*; D. *Clitoria tenera*; E. *Coccinia grandis*; F. *Commelina benghalensis*; G. *Cyperus rotundus*; H. *Datura metel*; I. *Dentella repens*; J. *Dicliptera foetida*; K. *Digitaria ciliaris*; L. *Duranta erecta*.



**Figure 9:** A. *Aeschynomene indica*; B. *Alternanthera ficoidea*; C. *Ampelocissus latifolia*; D. *Amaranthus viridis*; E. *Boerhavia diffusa*; F. *Boerhavia erecta*; G. *Brugmansia suaveolens*; H. *Butea monosperma*; I. *Calotropis gigantea*; J. *Canna indica*; K. *Canthium coramandlicum*; L. *Cardiospermum halicacabum*.



**Figure 10:** A. *Parthenium hysterophorus*; B. *Phyla nodiflora*; C. *Phyllanthus reticulatus*; D. *Physalis minima*; E. *Plumbago zeylanica*; F. *Polygonum plebeium*; G. *Ricinus communis*; H. *Ruelia tuberosa*; I. *Scoparia dulcis*; J. *Senna occidentalis*; K. *Senna uniflora*; L. *Sesamum indicum*.



**Figure 11:** A. *Sida rhombifolia*; B. *Sida acuta*; C. *Solanum nigrum*; D. *Solanum torvum*; E. *Stylosanthes fruticosa*; F. *Synedrella nudiflora*; G. *Telosma pallida*; H. *Trianthema portulacastrum*; I. *Ziziphus procumbens*; J. *Vigna unguiculata*; K. *Volkameria inermis*; L. *Ziziphus oenopolia*.

**CONCLUSION:**

The water is fit for agricultural needs and also good for drinking. Soil from the lake is dig out for various uses during the summer season. Washing clothes, washing buffelos and vehicles is also regularly done in this lake. There is does not have fencing around it but walking around the lake by people near villages. Fishing is done during February to June when water becomes less. Fishes include Katla, Kannadi, Miragal, Rahoo, Gaskarp, Murgod, Chillapilli. Soil of lake (Red) is good for plants to grow. Further the work need to be continued and investigated for useful purposes. This work is helpful for Agriculture department, farmers, students and the forest department for their future investigations and need to conserve the lakes.

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