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Phytoplankton and Macrophytic Floral Studies in Kamalapur Reserviour of Karimnagar District of Telangana, India

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A B S T R A C T

Plankton communities are broadly classified into two basic categories such as phytoplankton and zooplankton. The integration and interaction of different physical, chemical and geo-morphological characteristics of any water body; Biological assessment is a useful alternative in assessing those systems. It is occupied nearly 700 acres and its downstream water utilisation area nearly 2000 acres. Every month collection by early morning 7 am to 11 am and evening 5 pm to 6 pm during research period from June 2013 to May 2015. Macrophytes of study area are 91 species belonging to Monocots, Dicots, Pteridophytes. The algae are totally 56 species of belonging to genera fewer than 4 Classes Bacillariophyceae, Chlorophyceae, Cyanophyceae, Euglenophyceae. Near saturation levels, coinciding with short-term blooms in dry periods and in October indicate dominant photosynthetic activity over respiration. Importantly, though pigments of photosynthesis content in October-November bloom was double to that found during the January-February bloom, the oxygen was clearly under saturated during the former period.

Introduction

Plankton occurs in all natural water as well as in artificial impoundments like ponds, tanks, reservoirs, irrigation cannels and rivers. The plankton study is a very useful tool for the assessment of water quality is any type of water body and also contributes to an understanding of the basic nature and general economy of the water body of river. Telesh (2004). Plankton communities are broadly classified into two basic categories such as phytoplankton and zooplankton. The phytoplankton organisms are exclusively of plant origin and are thus autotrophy belonging to the first trophic level and being the primary producer from the lowest trophic level in the food chain of freshwater

ecosystem and play a key role in fish culture. These are minute microscopic plants, passively floating in water often multiply rapidly and give a turbidity to the water. Phytoplankton which includes blue-green algae, green algae, diatoms, desmids, euglenoids etc. are important among aquatic flora. They are ecologically significant (important) as they form the basic link in the food chain of all aquatic animals, Misra *et.al.* (2001).

Physico-chemical parameters of any water body though, provide a good indication about the Water chemistry and quality, that alone does not reflect the clear picture of the ecological condition of the water body due to lack of proper integration with ecological factors (Karr *et al*., 2000). Since a biotic community is the outcome of the integration and interaction of different physical, chemical and geo-morphological characteristics of any water body, biological assessment is a useful alternative in assessing those systems (Stevenson and Pan, 1999).They are mainly responsible for net as well as the gross primary productivity of the system and are the source of base level energy in food webs maintaining in the water bodies.Habitat quality specificity of the different members of phytoplankton is seen to be reflected in their distribution and occurrence in relation to the quality of water where do they live (Bhatt, *et al*., 1999; Saha *et al*., 2000). The pond also showed an interesting observation during pre monsoon and monsoon seasons. Higher densities of during these seasons may be attributed for mixing of pond water and mobilisation of nutrients due to rain and surface runoff water that dictates towards the pond. Algal analysis thus showed that water quality of the pond has reached at threshold level and therefore, it need some corrective measures to maintain the water chemistry of the pond to save that historical site heritage from further deterioration.

Considerable work has been done in India about systematic survey, distribution, periodicity and ecology of algae in different habitats (Das *et al*., 2009,Adhikary *et al*.2010,Das *et al*.,2010, Bhakta *et al*.,2010, Das and Adhikary, 2012a,b&c and Kumaraswamy *et al*.2013). Recently Mahajan (2005), Gupta and Anuj Bhadauriya 2007, Roy Zacharias and Joy (2007), Maya Subramoni, 2007, Kavitha and Rajini Balasingh (2007). Latha and Ramachandra Mohan (2010),, Ramadosu and Sivakumar (2010) and Chinnaiah *et al*.,(2011) studied on various fresh water bodies and described about physico-chemical characteristics along with algal population studies. Sreelatha and. Rajalakshmi (2005) studied dynamics of chlorophyceae in river Goutami, Godavari, Yanam, U.T. of Pondicherry; Aijaz *et.al.* (2009) studied phytoplankton of Wulor Lake (Ramsarsite), Jammu and Kashmir, India. In India the ecological aspects are focus of investigation in a few rivers such as Adyar, Chacko (1954, Coovum, Iyengar and Venkataraman (1951), Hoogly, Roy (1955), Ganga, Lakshminarayan (1965), Moosi Venkateswaralu (1969), Gomati Prasad and Saxena (1980), Vishwamitri, Nandan and Patel (1983; 1984 and 1986) and Godavari, Rajyalakshmi and Premswarup (1975), Yamuna Chakraborthy *et.al.* (1977). Hence, the present study was undertaken to know the influence of physic-chemical parameters of water on algal populations and their seasonal changes of Kamalapur reservoir. Heterotrophic organisms consume organic carbon to support their metabolic activities.

Study Area

Kamalapur is belong to district Karimnagar, Telanagana state. It is one of the rural areas of this district bordered with East Warangal district, South Elkathurhy mandal, North the Jammikunta, and West Huzurabad mandal.

It is occupied nearly 700 acres and its downstream water utilisation area nearly 2000 acres. Its borders with reservoir west Uppal village south Deshraj pally north and east itself. Downstream water combines with near ponds i.e.Vangapally and other small aquatic bodies.

Materials and Methods

The water samples were collected in polythene containers from four stations of reservoir every month early morning 7 am to 11 am and evening 5 pm to 6 pm during research period from June 2013 to May 2015. A liter of water sample from sampling stations was collected for the qualitative and quantitative estimation of phytoplankton study. Samples were subjected to use for further investigation by standard methods. Phytoplankton were identified according to Fritsch (1975*)*, and standard Manuals and published papers, Sreenivasa *et.al.* (1973), Santhanam *et.al.* (1987) and Tomas (1995).

The water samples collected from the lake in bottles were brought to the laboratory for analysis as per the standard methods described by APHA (1985) and Trivedy and Goel(1986). Four sampling sites were identified almost equidistant on the shore of the reservoir to its north, east, west and south. After that the overlying water from the bottle was decanted and the final volume was adjusted in between 10 to 15m1. The latter method was usually used to compare whether there was any demerit of using the other method. No significant difference was observed. After collection the phytoplankton material was transferred to glass preserved permanently in Transeau's solution (Distilled water 60m1 or 6 parts**;** Absolute alcohol 30m1 or 3 parts**;** Formaldehyde 10 ml or 1 part**.** To each l00 ml of the above solution 5m1 of glycerine was added to prevent the materials from becoming brittle (Transeau, 1951).

Results and Discussion

An extensive study was made to find out the occurrence and abundance of algae population in different study sites (FOUR) of Kamalapur, Karimnagar District, Telangana, India. Totally 56 species of algae belonging to genera fewer than 4 Classes viz., were recorded during the study period as shown in Table: no.(2). The distribution of these algal forms might be indicating the lower nitrogen status in all studied areas. Present study documented a remarkable biodiversity in species composition. Was the dominant genus of Cyanophyceae of studied area, Blue green algae are one of the major components of the nitrogen fixing biomass in ponds. Finally, it might be concluded that the documentation on Cyanobacteria may enhance the understanding.

The results of study area in different aspects like species composition Bacillariophyceae, Chlorophyceae, Cyanophyceae, Euglenophyceae i.e.4, 31,17,4.Generic composition 4,22,14,3.species wise and class wise percentage are Chlorophyceae I,93.5,II 77.41,III,100, IV,79.99. Bacillariophyceae I, 25, II, 75, 100, IV 75. Cyanophyceae, I94.11, II, 64.70, III, 88.25 IV, 82.35. Euglenophyceae I100, II, 100, III 50, IV 50. Species dominance based on their appearance from collected areas, Bacillariophyceae in Site I, 0, II, 25, III25, IV 0. Chlorophyceae I, 16.12 II, 32.25 III, 35.48 IV, 16.12. Cyanophyceae I, 29.41 II, 11.76 III, 11.76 IV, 5.6. Euglenophyceae I, 25% only.

Macrophytes of study area are 91 species belonging to Monocots, Dicots, Pterridophytes. Total genera are 68.Table no. (1) Macrophytes classification varies from literature one author to another. In present study we classify them as (EA) emergent anchored, (FF) free floating,

(RFL) rooted and floating, (SA) submerged and anchored. Table No. (4). Family and species wise results are shown in Table No. (3).

Community production and respiration vary with season (Kemp *et al*. 1992; Smith and Hollibaugh 1997), salinity (Swaney *et al*. 1999) and depth (Caffrey *et al*. 1998). Gomes *et al* (2000) observed increased phytoplankton biomass (92 mg m-2) during monsoon with reference to increased river runoff and wind driven coastal upwelling on the west coast of Bay of Bengal compared to other seasons, however, the primary productivity was low, suggesting light limitation due to intense cloud cover and high suspended load associated with higher river discharge. Phytoplankton appears to have rapidly consumed nutrients during post monsoon bloom. However, near saturation levels, coinciding with short-term blooms in dry periods and in October indicate dominant photosynthetic activity over respiration. Importantly, though pigments of photosynthesis content in October-November bloom was double to that found during the January-February bloom, the oxygen was clearly under saturated during the former period.

Table.1 Enumeration of Macrophytes of Kamalapur

Sl no	Scientific name	Family	Habit	SITES				Life form	IUCN Version 2015.3
				I	II	III	IV		
1	*Aerva laneta*	Amaranthaceae	H	P	A	A	P	EA	NE
2	*Aeschynomene aspera* L.	Fabaceae	Us	P	P	A	P	EA	LC
3	*A.diffusa* Wild	Fabaceae	Us	A	A	P	P	EA	NE
4	*Ageratum conyzoides* L.	Asteraceae	H	P	P	P	P	EA	NE
5	*Alysicarpus rugosus*	Fabaceae	Cr	P	P	P	P	EA	NE
6	*A. vaginalis* **(**L) DC	Fabaceae	Cr	P	A	P	P	EA	NE
7	*Ammania buccifera*	Lythraceae	H	P	P	P	P	EA	NE
8	*A.roxiburghi*	Lythraceae	H	P	P	P	P	EA	NE
9	*Alternanthera philoxeroides* (Mar) Grisep.	Amaranthaceae	Cr	P	P	P	P	EA	NE
10	*A. sessilis* (L.) R.Br.ex DC.	Amaranthaceae	Cr	P	P	P	P	SM	DD
11	*Aponogeton natans*	Aponogetonaceae	H	P	A	P	A	SA	NE
12	*Argemone mexicana* L.	Papaveraceae	H	P	A	P	P	EA	NE
13	*Aurundo donax* L.	Poaceae	H	P	P	P	P	EA	NE
14	*Azolla pinnata R.Br.*	Salviniceae	H	P	P	P	A	FF	LC
15	*Bergia capensis*	Elatinaceae	H	P	A	P	A	EA	NE
16	*Blumea axillaris*	Asteraceae	H	P	A	P	A	EA	NE
17	*Breniya retusa*	Euphorbiaceae	H	P	P	P	A	EA	NE
18	*Ceratophyllum demersum* L.	Ceratophyllaceae	H	P	P	P	P	SA	NE
19	*Chrozophora rottleri*	Euphorbiaceae	H	P	A	P	P	EA	LC
20	*Cleome chelidoni*	Capparaceae	H	P	A	P	P	EA	NE
21	*Coldenia procumbena*	Boraginaceae	Cr	P	P	P	P	EA	NE
22	*Commelina benghalensis* L.	Commelinaceae	H	P	P	P	P	SA	LC
23	*C. haskarhi*.**L**	Commelinaceae	H	P	P	P	P	SA	NE

24	*Croton banaplandium*	Euphorbiaceae	H	P	A	P	P	EA	NE
25	*Cyanotis bonblandianum*	Commelinaceae	H	P	A	P	P	SA	LC
26	*Cynodon dactylon* (L) Pers.	Poaceae	H	P	P	P	P	EA	NE
27	*Cyperus arenarius Retz*	Cyperaceae	H	P	P	P	P	SA	LC
28	*C. compressus* L.	Cyperaceae	H	P	A	P	P	EA	LC
29	*C. corymbosus* Rottb.	Cyperaceae	H	P	A	P	P	EA	LC
30	*C.difformis*	Cyperaceae	H	P	P	P	P	EA	LC
31	*C.*eragrostis	Cyperaceae	H	P	P	P	P	EA	LC
32	*C.exaltanus Retz*	Cyperaceae	H	A	P	A	P	EA	LC
33	*C. rotundus* L	Cyperaceae	H	P	A	P	A	EA	LC
34	*C.tenuispica Steud*	Cyperaceae	H	A	P	A	P	EA	LC
35	*Dentella repens* Forst.	Rubiaceae	H	P	A	P	P	EA	LC
36	*Desmodium triflorum* (L.) DC.	Fabaceae	Cr	P	P	P	P	EA	LC
37	*Digitaria sanguinalis*	Poaceae	H	P	P	P	P	EA	NE
38	*Eclipta alba*. (L.) L.	Asteraceae	H	P	P	P	P	EA	DD
39	*E. prostrata* (L.) L.	Asteraceae	H	P	P	P	P	EA	DD
40	*Eichhornia crassipes* (Mart.) S.L.	Pontederiaceae	H	P	A	A	P	FF	NE
41	*Fimbristylis argentia (Rottb.)Vahl*	Cyperaceae	H	P	P	P	A	EA	LC
42	*F.dichotoma(L) Vahl*	Cyperaceae	H	A	P	A	P	EA	LC
43	*F.miliacea*	Cyperaceae	H	A	P	A	P	EA	LC
44	*F.triflora*	Cyperaceae	H	A	P	P	P	EA	LC
45	*Glinnus lotoides*	Molluginaceae	Cr	P	P	P	P	EA	NE
46	*G.oppositifolia*	Molluginaceae	Cr	P	A	P	P		
47	*Grangea maderaspatana* (L.) Poir.	Asteraceae	H	A	P	A	P	SA	LC
48	*Heliotrophium curasavica*	Boraginaceae	H	P	P	P	P	EA	NE
49	*H.indica*	Boraginaceae	H	P	P	P	P	EA	NE
50	*H.zeylanica*	Boraginaceae	H	P	A	P	P	EA	NE
51	*Hydrilla verticillata* (L.f.) Royle.	Hydrocharitaceae	H	P	P	P	P	SA	LC
52	*Hygrophila sculli*.	Acanthaceae	H	P	A	P	A	SA	NE
53	*Hygroryza aristata* (Retz.) Nees.	Poaceae	H	P	P	P	P	RFL	NE
54	*Indigofera linnaie*	Fabaceae	Cr	A	P	P	P	EA	NE
55	*I. trita*	Fabaceae	Cr	P	A	A	P	EA	NE
56	*Ipomoea aquatica* Forssk.	Convolvulaceae	H	P	P	P	P	RFL	LC
57	*I. carnea* Jaeq.	Convolvulaceae	Sh	P	P	P	P	EA	NE
58	*Kyllinga monocephela* Roxb.	Cyperaceae	H	P	P	P	P	EA	NE
59	*Leersia hexandra* Sw.	Poaceae	H	P	A	P	P	EA	NE
60	*Lemna purpusilla* Torrey	Lemnaceae	H	P	P	P	P	FF	NE
61	*Leucas aspera* Link	Lamiaceae	H	P	A	P	A	EA	NE

62	*Ludwigia adscandens* (L.) Hara	Onagraceae	H	P	P	P	P	RFL	NE
63	*L. parviflora* Roxb.	Onagraceae	H	P	A	P	A	EA	NE
64	*L. perennis* L.	Onagraceae	H	A	A	P	P	EA	NE
65	*Marsalia quadrifolia L.*	Marseliaceae	H	P	P	P	P	EA	NE
66	*Merrimia emariginum*	Convolvulaceae	Cr	P	A	P	A	EA	NE
67	*Murdania nudiflora*	Commelinaceae	H	P	P	P	A	SA	NE
68	*Najas indica* (Willd.) Cham.	Najadaceae	H	P	P	P	P	SA	LC
69	*N.minor*	Najadaceae	H	P	A	P	P	SA	LC
70	*Nymphaea alba* L.	Nymphaeaceae	H	P	P	P	A	RFL	LC
71	*N.nouchali* Burm.f.	Nymphaeaceae	H	P	P	P	P	RFL	LC
72	*Nymphoides cristata* (Roxb.)Kuntze	Nymphaeaceae	H	P	P	P	P	RFL	LC
73	*N.indica* (L.) Kuntze	Nymphaeaceae	H	P	P	P	P	RFL	LC
74	*Ottelia alismoides* (L.) Pers.	Hydrocharitaceae	H	P	P	P	P	SA	LC
75	*Phalaris aurundinosa*	Poaceae	H	P	A	P	A	SA	NE
76	*Phyla nodiflora* (L.) Greene	Verbenaceae	H	P	P	P	P	SA	LC
77	*Oxlis corniculata* L.	Oxalidaceae	H	P	A	P	P	SA	NE
78	*Panicum repens* L.	Poaceae	H	P	A	P	A	SA	LC
79	*Parthenium hysterophorus* L.	Asteraceae	H	P	P	P	P	EA	NE
80	*Pistia stratiotes* L.	Araceae	H	P	P	A	A	FF	NE
81	*Rorippa palustris*	Brassicaceae	H	P	P	P	P	EA	NE
82	*Polygonum plebium*L.	Polygonaceae	H	P	A	P	P	EA	NE
83	*Potomogeton crispus* L.	Potamogetonaceae	H	P	A	P	P	SA	NE
84	*P.pectinatus*	Potamogetonaceae	H	P	P	P	A	SA	NE
85	*Scirpus articulatus* L.	Cyperaceae	H	P	P	P	P	EA	NE
86	*Spheranthus indicus*	Asteraceae	Cr	P	A	P	A	EA	NE
87	*Trianthema portulacanthem*	Portulacaeae	H	P	P	P	P	EA	NE
88	*Typhaa aungstifolia*.	Typhaceae	H	P	P	P	A	EA	NE
89	*Urena lobata* L.	Malvaceae	H	P	A	P	A	EA	NE
90	*Valisnaria spiralis* Linn.	Hydrocharitaceae	H	P	P	P	P	SA	NE
91	*Xanthium indicm*	Asteraceae	H	P	P	P	P	EA	NE
Total			91	84	60	81	71		

H= herb,Cr=creeper,Sh=shrub,Us=under shrub. P=present,A=absent,
EA= emergent anchored, FF= free floating, RFL= rooted and floating, SA= submerged and anchored.
NE=not evaluated,LC=least concern,DD=data deficient

Table.2 Phytoplnkton Distribution

S.No	Algal species	Class	Site I	Site II	Site III	Site IV	Total
1	*Fragillaria brevistriata Grun*	Bacillariophyceae	-	*	*	-	**2**
2	*Navicula cuspidate Kuetz.*	Bacillariophyceae	-	*	*	*	**3**
3	*Pinnularia gibba Ehr.*	Bacillariophyceae	-	-	*	*	**2**
4	*Synedra ulna (Nitz)*	Bacillariophyceae	*	**	**	*	**4**
5	*Ankistrodesmus falcatus (Corda) Ralfs*	Chlorophyceae	*	*	*	*	**4**
6	*Anthodesmus curuvatus*	Chlorophyceae	-	-	*	*	**2**
7	*Chara vulgaris*	Chlorophyceae	*	*	*	*	**4**
8	*Chlamydomonas globosa Snow.*	Chlorophyceae	*	*	*	-	**2**
9	*Chlorella ellipsoidea Gerneck*	Chlorophyceae	-	-	*	-	**1**
10	*C. vulgaris Beyernick*	Chlorophyceae	*	-	*	-	**2**
11	*Closterium acerosum (Schrank) Ehr.*	Chlorophyceae	*	*	*	*	**3**
12	*C.tumidum*	Chlorophyceae	*	*	*	-	**2**
13	*Cladophora glomerata*	Chlorophyceae	*	*	*	*	**3**
14	*Cosmarium botrytis Menegh*	Chlorophyceae	*	**	**	*	**4**
15	*C.auriculata*	Chlorophyceae	*	*	*	*	**4**
16	*C.granatum*	Chlorophyceae	*	-	*	-	**2**
17	*Microspora sp*	Chlorophyceae	*	*	*	-	**3**
18	*Nitella sp*	Chlorophyceae	*	**	**	*	**4**
19	*Oedogonium borisianum*	Chlorophyceae	**	**	**	**	**4**
20	*O.sp*	Chlorophyceae	*	**	*	*	**4**
21	*Oocystis gigas*	Chlorophyceae	**	*	**	**	**4**
22	*Pandorina morum Bory*	Chlorophyceae	*	**	*	*	**4**
23	*Pediastrum biradiatum Presc*	Chlorophyceae	*	*	*	*	**3**
24	*P.duplex*	Chlorophyceae	*	**	**	*	**4**
25	*P.simplex*	Chlorophyceae	*	*	**	*	**4**
26	*Pithophora varia*	Chlorophyceae	*	**	**	**	**4**
27	*Rhizoclonium hieroglypicum*	Chlorophyceae	*	*	*	*	**4**
28	*Scenidesmus dendiculatum*	Chlorophyceae	*	**	**	**	**4**
29	*S.quadracauda*	Chlorophyceae	*	**	**	*	**4**
30	*S.dimorphosus*	Chlorophyceae	**	-	*	*	**3**

31	*Spirogyra formosa*	Chlorophyceae	**	**	**	*	**4**
32	*Staurastrum pinnatum*	Chlorophyceae	*	-	*	*	**3**
33	*Tetraedron quadratum*	Chlorophyceae	*	*	*	*	**4**
34	*Ulothrix sp*	Chlorophyceae	*	-	*	*	**3**
35	*Zygnema czurde*	Chlorophyceae	**	*	**	**	**4**
36	*Anabaena constricta*	Cyanophyceae	*	*	**	*	**4**
37	*A. iyengarii*	Cyanophyceae	*	*	*	*	**4**
38	*Anabaenopsis sp*	Cyanophyceae	**	*	*	**	**4**
39	*Apanocapsa litorates*	Cyanophyceae	*	*	*	-	**3**
40	*Arthrospira platensis (Nordst*	Cyanophyceae	*	-	*	*	**3**
41	*Chroococus dispenses*	Cyanophyceae	*	*	*	*	**4**
42	*C.turgidus*	Cyanophyceae	*	-	*	-	**2**
43	*Coeolophaeriumdubium*	Cyanophyceae	*	-	*	*	**2**
44	*Gleocapsa sp.*	Cyanophyceae	*	*	-	*	**3**
45	*Microcystis erusinosa*	Cyanophyceae	**	-	-	*	**2**
46	*Nostoc commune*	Cyanophyceae	**	*	**	*	**4**
47	*Oscillatoria tenuis*	Cyanophyceae	**	*	*	*	**4**
48	*O.rubesenes*	Cyanophyceae	-	-	*	*	**2**
49	*Lyngbya ceylanica*	Cyanophyceae	*	**	**	*	**4**
50	*Phormidium tennue*	Cyanophyceae	*	*	*	-	**3**
51	*Spirulina major (Kütz) Gomont*	Cyanophyceae	*	-	*	*	**3**
52	*Synechococcus aponina*	Cyanophyceae	**	**	*	*	**4**
53	*Euglena cadata*	Euglenophyceae	*	*	-	*	**3**
54	*Phacus acuminatus*	Euglenophyceae	*	*	*	-	**3**
55	*P.longicauda*	Euglenophyceae	*	*	*	-	**3**
56	*Lepocinclis fusiformis*	Euglenophyceae	**	*	-	*	**3**
		Total	**50**	**42**	**52**	**44**	

Table.3 Families Wise and Species Wise

S. No	Family	Species No.	Monospecies families
1	Cyperaceae	14	Acanthaceae Araceae
2	Asteraceae	8	Brassicaceae
3	Fabaceae	7	Capparaceae Ceratophyllaceae
4	Poaceae	7	Elatinaceae
5	Boraginaceae	4	Lamiaceae, Lemnaceae
67	Commilinaceae	4	Malvaceae Marseliaceae
8	Nymphaceae	4	Oxalidaceae
9	Amaranthaceae	3	Papavaraceae Polygonaceae
10	Convolvulaceae	3	Pontederiacea Portulacaeae
11	Euphorbiaceae	3	Rubiaceae
12	Hydrocharitaceae	3	Salviniceae
13	Onagraceae	3	Typhaceae
14	Lythraceae	2	Verbenaceae
15	Molluginaceae	2	
16	Najadaceae	2	
17	Potamogetanaceae	2	

Table.4 Macrophytes Morphological, Life forms, IUCN Categories

S.No	Morphological form	IUCN categories	Life form	Site wise distribution
1	H-76	LC-32	EA-59	I-84
2	Cr-12	DD-04	FF-04	II-60
3	Us-02	NE-55	RFL-07	III-81
4	Sh-01	----	SA-21	IV-71

H=Herb, Cr=creeper, Us=under shrub, Sh=shrub.LC=least concern, DD=data deficient, NE=not evaluated. EA=emergent anchored, FF=free floating, RFL=rooted and floating, SA=submerged and anchored

Macrophytes: Plate No.1

A) ***Phyla nodiflora*** (L.) Greene

B) ***Heliotrophium curasavica***

C) ***Coldenia procumbena***

D) ***Najas indica*** (Willd.) Cham

E) ***Fimbristylis argentia***

F) ***Hydrilla***

G) ***Dentella repens*** Forst

H) ***Glinnus lotoides***

Macrophytes: plate.2

I) ***G.oppositifolia***

J) ***Cyperus arenarius*** Retz

K) ***Scirpus articulatus*** L.

L) ***Ceratophyllum demersum*** L

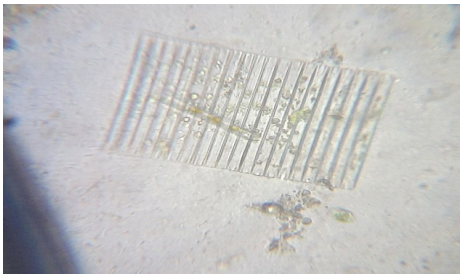
M) ***Nitella*** sp

N) ***Hydrilla verticillata*** (L.f.) Royle.

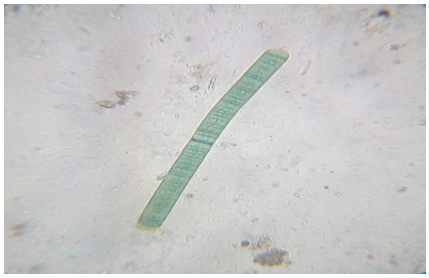
O) ***Cyperus corymbosus***

P) ***Cleome chelidoni***

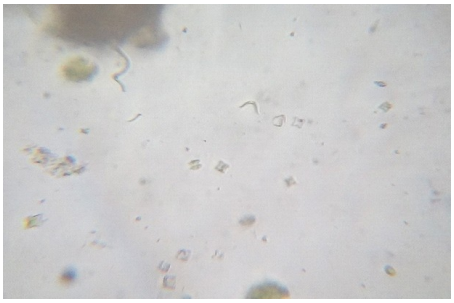
Plate.3 Phytoplankton



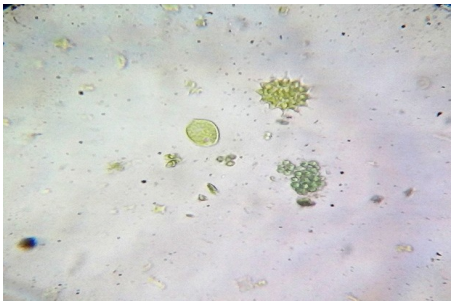
i) *Fragillaria brevistriata* Grun



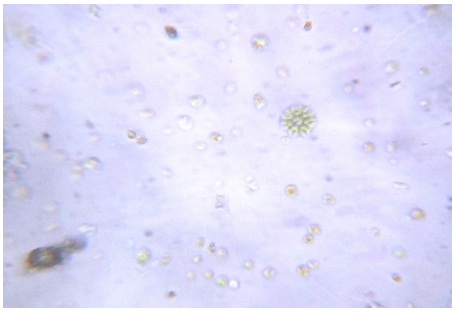
ii) Oscillatoria tenuis



iii) *Ankistrodesmus falcatus* (Corda) Ralfs



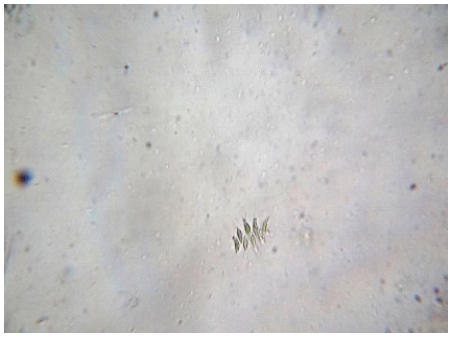
iv) *Phacus acuminatus* & Pediastrum sp



v) P.simplex

vi) *Cosmarium botrytis*

vii) *Scenidesmus dimorphosus*



viii) *S.quadracauda*

Seasonal appearance of the prominent phytoplankton's of Kamalapur has also been studied in which the two most prominent blue green algae *Nostoc*, *Lyngbya*

m two important diatoms, *Pinnularia, Navicula* and green-alga *Spirogyra*, *Pithiphora,* during the year 2013-2015. Of the two most prominent Cyanophyceae members *Lyngbya* was found to be dominant in March minimum in January. *Nostoc* has been shown to be dominant in February lowest in October. The Bacillariophyceae members were observed more dominantly in the month of March and the lowest in the month of September, maximum in March, with minimum in September. The green algae, *Pithiphora* was the only genus observed most dominantly in July least in the month of October under study. During the observation period between June 20013 – May 2015, the seasonal variation of all the members of Cyanophyceae, Bacillariophyceae and Chlorophyceae were found in almost all the seasons and in every month of 2013-2015. The phytoplankton populations of the reservoir varied with the seasonal variations and the maximum phytoplankton production coincided with the optimum water depth.

In conclusion, the macrophytic population decides the fish species composition and species richness. The water quality also decides by macrophytes documented by several authours earlier. As like this phytoplankton population also determines the zooplankton species. Bacillariophyceae algae are considered for water quality and organic pollution status by Palmer (1969). But due to anthropogenic activities causes even back ward area water resources also contaminated by organic pollution. The studied fresh water ecosystem was in good condition in the sense of organic pollution.

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