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Diversity of planktonic algae of selected freshwater ponds of Mahe, U T of Puducherry, India

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Abstract

A study was conducted to document the diversity of planktonic algae of selected fresh water ponds of Mahe region. Seven ponds from Mahe, Chalakkara, Chembra, Pandakkal and Palloor regions were studied extensively. The present study yielded a total 78 species of algae belonging to 7 classes. Class Chlorophyceae dominated in all the seven sites. The diversity of Cyanophyceae and Bacillariophyceae was comparatively less which indicated that most of the ponds were not polluted.

Keywords: Diversity, planktonic algae, freshwater ponds, Mahe

Introduction

Fresh water algae constitute a very diverse group of organisms visible mostly with the aid of a microscope. They have a wide range of size from less than one micrometer to several centimeters. Algae are important primary producers in both fresh water and marine systems. In many lakes and rivers they generate biomass which is the foundation of inverse food chains. Although algae have beneficial impacts on aquatic ecosystems they can also have adverse effects; produce 'blooms' that, on decomposition, deoxygenate the water causing fish death and other ecological problems. It is important to be aware of these impacts and to monitor waters for the presence of these potentially harmful organisms. Algal flora constitutes about 1.6 % of the total biodiversity. They are represented by about 1800 genera and 21000 species. The algae are one of the least known and less documented groups of lower plants (Easa, 2004). Since indigenous fresh water systems are the hotspots of diverse and rare algal components, the studies of local aquatic systems like ponds, pools, rivers etc. are of very much relevance.

Mahe, Union Territory of Puducherry comprises an area of 9 sq. km. situated on the West Coast of the Indian Peninsula part of Biodiversity rich Western Ghats. It is Located between 11^0 42' and 11^0 43' Northern Latitude and 75^0 31' and 75 ^{0}33' Eastern Longitude, between Vatakara and Thalassery in Kerala State. The total population, as per 2011 census is 41934 and the population density is 4659 persons / sq. km.

A review of the literature on phycological studies of Mahe region showed that only scanty information is available. It is confined to the studies on algae associated with the rhizosphere of Funaria hygrometrica and Cyathodium cavernarum by Girish Kumar et al. (2010). Pradeep kumar et al., (2010) made a preliminary study on the planktonic algae of wetland habitats. Gopinathan and Sivadasan (2012) have studied the microalgae of Mahe estuary. Girishkumar et al. (2014) reported the Diversity of planktonic algae of selected temple ponds of Mahe. In order to elaborate the database on the diversity of planktonic algae of fresh water systems of Mahe region the present study was undertaken.

Materials and Methods

Field trips were carried out in three seasons in the year 2016-17. During the field work seven ponds from different parts of Mahe were selected for the present study. Some of the selected ponds were temple ponds and others just 'tharavad' ponds. The selected ponds were Sree Venugopalalayam temple pond (Mahe proper), Puthalam temple pond (Mahe proper), Vazhayil tharavad pond (Chalakkara), Subramanya temple pond (Chembra), Pandokooloth

tharavad pond (Pandakkal), Koyyoden Koroth temple pond (Palloor) and Avaroth temple pond (Palloor). Morphometric features of the selected ponds were studied by visual observations. Collection of algal sample was done following standard procedure. Specific mesh net of size 10 micron was used for separating the algal components. The algal components were filtered from the water surface. A sterilized container of one liter volume was used and 30 collections full of surface water from different locations of the ponds were filtered through the mesh which was placed over a sieve. The algal sediment collected over the mesh was immediately transferred to the sterilized sample bottle by using a funnel and sealed along with the pond water. Temperature of atmosphere and the pond water was observed using standard thermometer. Collected algal samples were stored in refrigerator. The bottled algal samples were centrifuged at 6000 rpm in a centrifuge and the upper filtrate was discarded. The sediment was collected with the help of a dispenser and mounted in Glycerin. The photographs were taken and the dimension of the algae was measured using micrometer. The whole process was repeated thrice for accurate results. Algal species were identified with the help of Turner (1892), Prescott (1978), Cramer (1984), Krishnamurthy (2000), Bellinger et al. (2010), John J. & Francis (2013) etc.

Results and Discussion

In the present study seven ponds (Table- 1) were subjected to the study of diversity of planktonic algae.

Table – 1. List of ponds studied

Sl.No.	Short Name	Name of Pond	Location
1	S1	Venugopalalayam Temple Pond	Mahe
2	S2	Puthalam Temple Pond	Mahe
3	S3	Vazhayil Tharavad Pond	Chalakkara
4	S4	Subramanya Temple Pond	Chembra
5	S5	Pandokooloth Tharavad Pond	Pandakkal
6	S6	Koroth Temple Pond	Palloor
7	S7	Avaroth Temple Pond	Palloor

The analysis of water sample from the selected ponds showed the presence of 78 algal species. (Table- 2). Of the 78 species of algae, 50 belonged to Chlorophyceae, 15 to Bacillariophyceae, 9 to Cyanophyceae. The Chrysophyceae, Cryptophyceae, Dinophyceae and Euglinineae were represented by one species each. The dominant class was Chlorophyceae and similarly Chlorophyceae and Bacilliariophyceae were common in all the seven sites.

The analysis of water sample from the selected ponds showed the presence of the following algal forms.

Table – 2. List of Algal species identified

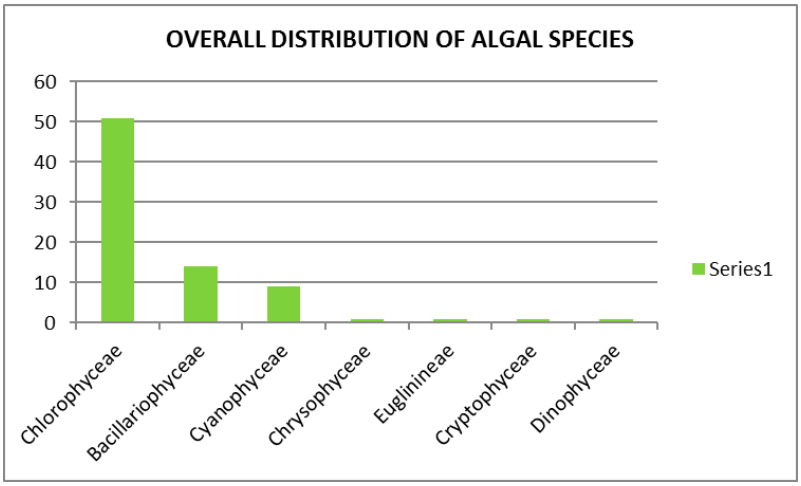
Sl no	Scientific name	Class	S_1	S_2	S_3	S_4	S_5	S_6	S_7
1	*Ankistrodesmus falcatus*	Chlorophyceae	-	-	+	-	-	-	-
2	*Aphanocapsa biformis*	Cyanophyceae	-	-	-	-	-	+	-
3	*Aphanocapsa pulchra*	Cyanophyceae	-	-	-	+	-	-	-
4	*Aphanothece stagnina*	Cyanophyceae	-	-	-	+	-	-	-
5	*Arthrodesmus menoides*	Chlorophyceae	-	-	-	-	-	-	+
6	*Asterionella formosa*	Chlorophyceae	+	-	-	-	-	-	+
7	*Bacillaria paradoxa*	Bacillariophyceae	-	-	-	-	+	-	-
8	*Botryococcus braunii*	Chlorophyceae	-	-	-	+	-	+	-

9	*Botryococcus protuberans*	Chlorophyceae	-	-	-	-	-	+	-
10	*Chlamydomonas coccifera*	Chlorophyceae	-	-	-	+	-	-	-
11	*Chlorella vulgaris*	Chlorophyceae	-	+	+	-	-	-	-
12	*Chlorococcum humicola*	Chlorophyceae	-	-	+	-	-	-	-
13	*Closterium idiosporum*	Chlorophyceae	-	-	-	-	-	+	-
14	*Closterium lunula*	Chlorophyceae	-	-	-	-	-	+	-
15	*Closterium setaceum*	Chlorophyceae	-	-	-	-	-	-	+
16	*Closterium subcorticum*	Chlorophyceae	-	-	-	-	-	+	-
17	*Colonies silicula*	Bacillariophyceae	-	-	+	-	-	-	-
18	*Coscinodiscus sublineatus*	Bacillariophyceae	-	-	-	-	-	-	+
19	*Cosmarium cucurbita*	Chlorophyceae	-	-	-	-	+	-	-
20	*Cosmarium geminatum*	Chlorophyceae	-	-	-	-	+	-	-
21	*Cosmarium lundelii*	Chlorophyceae	-	-	-	-	+	-	-
22	*Cosmarium margaritatum*	Chlorophyceae	-	-	-	-	+	-	-
23	*Cosmarium quadrum*	Chlorophyceae	-	+	-	-	+	-	-
24	*Cylindrocystis crassa*	Chlorophyceae	-	-	+	-	+	-	-
25	*Cymbella affinis*	Bacillariophyceae	-	-	+	-	-	-	-
26	*Dictyosphaerium ehrenbergianum*	Chlorophyceae	-	-	-	-	-	-	+
27	*Diploneis elliptica*	Bacillariophyceae	+	-	-	-	-	-	-
28	*Docidium parvum*	Chlorophyceae	-	-	+	-	-	-	-
29	*Euastrum incavatum*	Chlorophyceae	-	-	+	-	+	-	-
30	*Eudorina elegans*	Chlorophyceae	-	-	+	-	-	-	-
31	*Eunotia camelus*	Bacillariophyceae	-	-	-	-	+	-	-
32	*Fragilaria virescens*	Bacillariophyceae	+	-	-	-	-	-	-
33	*Frustulia frenguelli*	Bacillariophyceae	-	+	-	-	-	-	-
34	*Glenodinium cinctum*	Dinophyceae	-	-	-	-	+	-	-
35	*Hormidium flaccidum*	Chlorophyceae	-	+	-	-	-	-	-
36	*Hydrodictyon reticulatum*	Chlorophyceae	+	-	-	-	-	-	-

37	*Kirchneriella lunaris*	Chlorophyceae	-	-	-	-	-	-	+
38	*Lyngbya majuscule*	Cyanophyceae	-	-	+	-	+	-	-
39	*Mastogloia smithii*	Bacillariophyceae	-	-	-	+	-	-	-
40	*Melosira varians*	Bacillariophyceae	-	-	-	-	+	-	-
41	*Micrasterias mahabuleshwarensis*	Chlorophyceae	-	-	-	-	+	-	-
42	*Micrasterias radians*	Chlorophyceae	-	-	-	-	+	-	-
43	*Microcystis lamelliformis*	Cyanophyceae	-	-	+	-	+	+	-
44	*Mougeotia parvula*	Chlorophyceae	+	-	-	-	-	-	-
45	*Navicula cari*	Bacillariophyceae	-	-	-	+	-	-	-
46	*Navicula reinhardtii*	Bacillariophyceae	-	+	-	-	-	-	-
47	*Oedogonium globosum*	Chlorophyceae	-	+	+	-	-	-	-
48	*Oocystis coronata var. elegans*	Chlorophyceae	-	-	-	-	+	-	-
49	*Oscillatoria princeps*	Cyanophyceae	-	-	+	-	-	-	-
50	*Pandorina morum*	Chlorophyceae	-	-	-	+	-	-	-
51	*Pandorina morum var. major*	Chlorophyceae	-	+	-	-	-	-	-
52	*Pediastrum duplex*	Chlorophyceae	-	+	-	-	-	+	+
53	*Penium cylindrus*	Chlorophyceae	-	-	+	-	-	-	-
54	*Phacus stokesii*	Euglinineae	-	+	-	-	-	-	-
55	*Pinnularia acrosphaeria*	Bacillariophyceae	-	-	-	-	+	-	-
56	*Pleurotaenum ovatum var. intermius*	Chlorophyceae	-	-	-	-	+	-	-
57	*Rhizosolenia hebetata*	Bacillariophyceae	-	-	-	-	-	+	-
58	*Rhodomonas baltica*	Cryptophyceae	-	+	-	-	-	-	-
59	*Scenedesmus bijuga*	Chlorophyceae	-	+	-	-	-	-	-
60	*Scenedesmus bijuga var alternans*	Chlorophyceae	-	-	-	+	-	-	-
61	*Scenedesmus denticulatus*	Chlorophyceae	-	+	+	-	-	-	-
62	*Scenedesmus muzzanensis*	Chlorophyceae	-	+	-	-	-	-	-
63	*Scenedesmus perforatus*	Chlorophyceae	-	-	+	-	-	-	-
64	*Scenedesmus quadricauda*	Chlorophyceae	-	-	-	+	-	-	+

65	*Scytonema rivulare*	Cyanophyceae	-	-	-	+	-	-	+
66	*Selenastrum bibraianum*	Chlorophyceae	-	-	-	-	-	-	+
67	*Spirotaenia condensate*	Chlorophyceae	-	-	+	-	-	-	-
68	*Spirulina princeps*	Cyanophyceae	-	+	-	-	-	-	-
69	*Staurastrum anatinoides*	Chlorophyceae	-	-	-	-	-	-	+
70	*Staurastrum dentatum*	Chlorophyceae	-	-	-	-	-	-	+
71	*Staurastrum gladiosum*	Chlorophyceae	-	-	-	-	-	-	+
72	*Staurastrum perundulatum*	Chlorophyceae	-	-	-	-	-	-	+
73	*Staurastrum sexangulare*	Chlorophyceae	-	-	-	-	-	-	+
74	*Synechocystis pevalekii*	Cyanophyceae	-	-	-	-	-	+	-
75	*Synedra acus*	Bacillariophyceae	+	-	-	-	-	-	-
76	*Synura sphagnicola*	Chrysophyceae	+	-	-	-	-	-	-
77	*Ulothrix zonata*	Chlorophyceae	+	-	-	-	-	-	-
78	*Zygnema pectinatum*	Chlorophyceae	+	-	-	-	-	-	-

Maximum number of algal species was found in Pandokooloth tharavad pond (Pandakkal) where the number was 18, which was followed by Vazhayil tharavad pond (Chalakkara) showing the presence of 17 members, followed by Avaroth temple pond (Palloor) showing the presence of 15 algal members, which was then followed by Puthalam temple pond (Mahe) where the number of algal members was 14. Puthalam pond was followed by Subramanya temple pond (Chembra) and Koroth temple pond (Palloor) showing the presence of 10 algal species each. Sree venugopalalayam temple pond showed the least number of algal members where the number was only 9. The diversity of species in Cyanophyceae and Bacillariophyceae was less in number and hence most of the ponds were not polluted. Based on the present study it can be stated that the diversity of fresh water algae is fairly rich in fresh water ponds of Mahe. The study sites except one (Pandokooloth tharavad pond) are fairly managed. Venugopalalayam pond was showing heavy blooming of Hydrodictyon which disappeared within a time of one week. Some of the ponds are used by the public for taking bath and washing clothes. This may directly affect the natural growth and survival of algal species. The proper maintenance of these ponds will help in ground water recharge and also will act as repository of fresh water algae. The present study will help to enrich the knowledge on the diversity of Planktonic Algae of fresh water ponds of Mahe region



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