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Diversity of Phytoplankton from Inland Waters of Selected Districts in Tamil Nadu: A Review

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ABSTRACT

Wetlands are one of the important ecosystems, home to both aquatic and terrestrial organisms and have a well-supported food web. Phytoplankton, one the primary producers, acts as a food source for most of the aquatic organisms are present abundantly in the aquatic ecosystems. They are the largest carbon sink and generate about half the atmospheric oxygen. They are also a very good biological indicator of water quality. The primary productivity of the phytoplankton increases when the nutrient input into the water increases, due to increase in diversity and is considered a notable ecological parameter in the aquatic ecosystems. This review documents the phytoplankton species diversity in the inland waters of Tamil Nadu State. Based on the available information, a total of 578 species of phytoplankton were recorded across the inland waters of Tamil Nadu which includes 185 species of Cyanophyceae, 185 species of Chlorophyceae, 171 species of Bacillariophyceae, 32 species of Euglenophyceae, 4 species of Dinophyceae and 1 species of Chrysophyceae. This baseline analysis will help in understanding the diversity of phytoplankton and will pave a way for upcoming researchers, conservationists and scientists for future studies.

Keywords: Wetlands, Aquatic Ecosystem, Phytology, Microbiology, Species diversity, Taxonomy

INTRODUCTION

Wetlands are the transitional lands between aquatic and terrestrial ecosystem where the water table is usually at or near the surface, or the land is covered by shallow water permanently or seasonally (Cowardin 1979, Grobicki et al. 2016). As per the Ramsar Convention, in India, natural water bodies such as lakes, rivers, mangroves, coastal lagoons and peatland; and man-made wetlands such as ponds, reservoirs, salt pans, sewage farms, canals, farm ponds, gravel pits, irrigated field and sacred groves are all classified as wetlands (Bassi et al. 2014). A wetland must contain the following characteristics: (1) hydrology that results in damp or flooded soils (2) soils dominated by anaerobic processes, and (3) biota suited to survive in flooded, anaerobic environments, particularly rooted vascular plants (Cherry 2011). They are habitat for both terrestrial and aquatic biotas which include birds, fishes, amphibians, insects, plants and mammals (Mazumdar 2017). It is also shown to play a pivotal role in groundwater recharge, water holding capacity, minimize erosion, reduction of the destructiveness of severe floods and filter the pollution (Cherry 2011). Soils of wetlands have 200 times more carbon than that of vegetation and it's estimated that about 830 Tg/yr of carbon is been sequestrated by wetlands (Bassi et al. 2014, Mitsch et al. 2013). Wetlands have also been dubbed a "biological supermarket" due to the long food chain and diverse biodiversity that they sustain (Vijayan et al. 2006). The wetlands have very well food web support. They maintain characteristic plant communities and energy flow (NRC 1995). Based on the study by Salim Ali Centre for Ornithology and Natural History (SACON) (2006), wetland area of Tamil Nadu state is 1.24% of the total geographical area in 1991. As per National Wetland Atlas 2011 by Space Applications Centre of Indian Space Research Organization, by using GIS at a scale of 1: 50,000 it was found that the total

number of wetlands in Tamil Nadu was 24684. Furthermore, 18294 tiny wetlands (2.25 ha) have been found. A total of 884240 ha of wetlands in the state, of which 761867 ha is inland wetlands and 122373 ha is coastal wetlands. Including the wetlands which are less than 2.25 ha, the total wetland area of Tamil Nadu is 902534 ha (Moorthy et al. 2013). There are 1,175 inland waters which covers an area of 1,615.12 km^2 in the whole state (ENVIS 2011).

Phytoplankton is unicellular microscopic floating plants, which has a size of <1 ìm to 500 ìm (Manickam et al. 2020). This phytoplankton is an autotrophic organism and is usually found in aquatic ecosystems serving as the base for the easiest food source for most aquatic organisms like zooplankton, tiny fishes and crustaceans (Jyoti et al. 2018, Rajagopal et al. 2010, Manickam et al. 2020). The phytoplankton is majorly classified into four classes namely Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae (Manthri Kumar Rajesh et al. 2014). The population of phytoplankton is higher in the photic zone of freshwater lakes, ponds, canals and reservoirs and they optimize their home in the upper strata using numerous mechanisms like using gas vacuoles to controlling buoyancy, migrate from one place to another using flagella and metabolic process (Manickam et al. 2020, Uthirasamy et al. 2020). They play a very vital role in controlling the carbon level in the atmosphere and generate about half the atmospheric oxygen. Through the process of photosynthesis, they intake the atmospheric carbon and gives out the oxygen to the environment and water which helps in maintaining the global carbon level (Ilangovan et al. 2014, Manickam et al. 2017, Anbalagan and Sivakami 2019, Manickam et al. 2020). When there is an increase in the nutrient input to the freshwater ecosystem, the primary productivity of the phytoplankton gets enhanced and therefore their diversity is considered as a notable ecological parameter in the aquatic ecosystem (Szel¹g-Wasielewska 2005, Borics et al. 2021). Phytoplankton is a very good biological indicator to understand the water quality and they also respond to other physiological indicators like pH, oxygen, salinity, temperature, light and toxic chemicals (Dilip et al. 2017, Manickam et al. 2020, Krevs et al. 2010). There is little or no phytoplankton baseline data for inland water catchment areas in Tamil Nadu. As a result, it was thought that a study of phytoplankton taxa in inland water catchment areas of Tamil Nadu would be beneficial. This review is the first serious effort in gathering the baseline information of phytoplankton species diversity in inland waters which include ponds, lakes, reservoirs and canals of selected districts in Tamil Nadu, based on the previous research articles. This paper will act as a database to exhibit the phytoplankton diversity in the inland waters of the Tamil Nadu state.

PHYTOPLANKTON DIVERSITY OF INLAND WATERS IN TAMIL NADU

In five different ponds namely Dabeerkulam, Mariyamman Kovil, Padithurai, Pulavarnatham, Sivalingam temple in Tanjore District, 39 species belonging to 20 genera of cyanobacteria were recorded and it was found that the family Oscillatoriaceae were most common and dominating in the study area (Muthukumar et al. 2007). Rajagopal et al. 2010 performed his study of phytoplankton in two different ponds in the Sattur area and recorded 50 species and the class Chlorophyceae was dominated over the other classes by contributed 48% of total phytoplankton diversity in their study area. It was also found that certain member of the species in the class of Chlorophyceae and Cyanophyceae are tolerant to organic pollution and resist the stress caused by pollutants in the Sattur area. Isabella et al. (2015) performed their study in Kadamba and Arumugamangalam pond in Thoothukudi district and reported 130 species of phytoplankton from which 48 species where from Cyanophyceae, 33 species from Bacillariophyceae, 32 species from Chlorophyceae, 7 species from Euglenophyceae, 4 species from Dinophyceae and 1 species from Chrysophyceae. It was found that the quality of the physicochemical parameters and phytoplankton population were interrelated with each other. In the Parthasarathy Temple tank, Chennai, it was found that the species from the Chlorophyta class were dominant among the 67 species of phytoplankton, reported by Sankaran and Thiruneelakandan 2015. A total of 14 genera of phytoplankton were recorded in the Ganaprekasam

Temple pond of Chidambaram by Thiruganamoorthy et al. (2009). Thirty five species of phytoplankton were identified by Elayaraj and Selvaraju (2014) in Thachan pond.

Senthilkumar et al. (2008) recorded a total of 159 species of phytoplankton of which 74 species are Bacillariophyceae, 43 species are Chlorophyceae, 38 species are Cyanophyceae and 5 species are Euglenophyceae in Veeranam lake. In this study, maximum diversity of phytoplankton was observed during the post-monsoon season compared to other areas. Vijayakumar and Subramaniyan (2013) recorded 46 species belonging to 12 genera of cyanobacteria in Samuthiram Lake and it was found that *Oscillatoria laete-virens* and *Phormidium corium* were found during all the months of the study. Ilangovan et al. (2014) observed monthly variations in species composition, species diversity and population diversity of phytoplankton in three study sites namely Ukkadam Lake, Kuruchi Lake, Singanallur Lake. A total of 25 species were recorded in the three sites. More abundance of phytoplankton was found in Kuruchi Lake in December 2012 and less in March 2013. Manickam et al. (2019) recorded 50 species from Sulur Lake and 36 species from Ukkadam Lake. The maximum diversity of phytoplankton was observed in the summer season and minimum in monsoon in both the sampling sites during their study period and *Microcystis* was the dominant species in the class of Cyanophyceae. It was also found that the population density was higher in Ukkadam Lake and lower in Sulur Lake and the author recommended that this sampling site can be used for fish and prawn culture.

In a study conducted in two stations in the Cauvery River, Tanjore District, Alakkudi station I recorded 53 species and Rettipalayam station II recorded 60 species (Babu et al 2014). It was found that the productivity of phytoplankton is high during the month of June and low during the month of December. In another study conducted in Cauvery River, a total of 60 species belongings to 21 genera were documented (Venkatachalapathy and Karthikeyan 2015).

A total of 136 species of phytoplankton belonging to 60 genera were reported in 3 study stations at the Vellar river basin and it was found that more pollutant tolerant genera have been recorded, where the area was more polluted during their study period (Aranganathan and Sivakumar 2019). Kangasabapathi and Rajan 2010 noted 23 genera during their month wise survey on phytoplankton in Irrukkangudi reservoir in Viruthunagar district. Anbalagan and Sivakami (2019) reported 28 species of phytoplankton belonging to 5 different classes in Mayanur Dam. It was found that the class of Cyanophyceae was dominated in February and Chlorophyceae and Euglenophyceae were abundant in May. A total of 33 species of Cyanophyceae were recorded by Kensa (2017) with maximum number of species occurring in the crop panicle growth stage during the monsoon season in Chunkankadai paddy wetlands. This shows the importance of Cyanobacteria in soil conditioning and as a soil bioindicator.

A total of 69 species of phytoplankton were identified in canal water at Rangampalayan belonging to 4 classes (Chitra et al. 2020) and Chlorophyceae was one of the most dominant family and Bacillariophyceae was the least dominant family during their study period. The study concluded that rich growth of Chlorophyceae indicates the purity of water at the site.

SPECIES COMPOSITION IN INLAND WATERS OF TAMIL NADU

From the extended literature survey it is evident that, totally 578 species of phytoplankton is documented which comprises of 185 species of Cyanophyceae belonging to 25 families, 185 species of Chlorophyceae belonging to 43 families, 171 species of Bacillariophyceae belonging to 33 families, 32 species of Euglenophyceae belonging to 4 families, 4 species of Dinophyceae belonging to 2 families and 1 species of Chrysophyceae belonging to 1 family (Fig. 1, Table 1). The Phytoplankton diversity analyses were performed in 37 various inland waters in Tamil Nadu (Table 2).

CONCLUSION

In this study, we emphasized phytoplankton diversity, particularly in selected inland water catchment areas of Tamil Nadu, and reported 578 phytoplankton species based on 22 research articles performed in

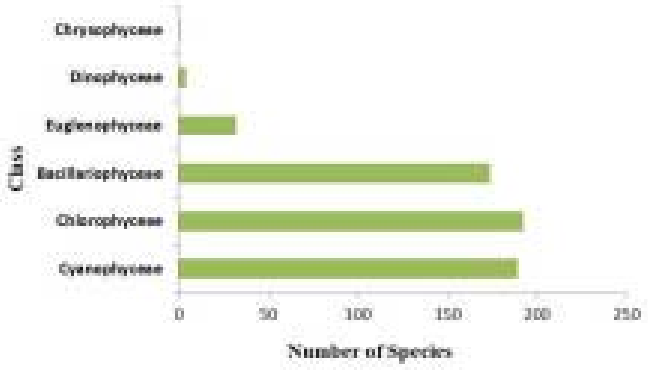

Figure 1. The number of taxa collected among the classes of phytoplankton

37 inland water locations in 11 Tamil Nadu districts (Table 2). According to the published literature, Cyanophyceae and Chlorophyceae were found to be the most common in inland waters of Tamil Nadu, accounting for 32%, followed by Bacillariophyceae (29%), Euglenophyceae species (5.5 %), Dinophyceae, and Chrysophyceae (less than 1%). The freshwater phytoplankton is the most diverse and ubiquitous organisms on earth. The phyptoplankton as the primary producer benefits in numerous environmental functions and various ecosystem services based upon the recycling of nutrients. Based on this review, the physical,

Table 1. List of phytoplankton documented in inland waters of Tamil Nadu

S. NO	Class	Family	Genera	Species name
1	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena aequalis*
2	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena affinis*
3	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena ambigua*
4	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena aphanizomenoides*
5	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena bergii*
6	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena circinalis*
7	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena circularis*
8	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena constricta*
9	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena doliolum*
10	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena fertilissima*
11	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena laxa*
12	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena orientalis*
13	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena oryzae*
14	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena oscillarioides var gracilis*
15	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena spiroides*
16	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena torulosa*
17	Cyanophyceae	Nostocaceae	*Anabaena*	*Anabaena variabilis*
18	Cyanophyceae	Aphanizomenonaceae	*Aphanizomenon*	*Aphanizomenon flos-aquae*
19	Cyanophyceae	Merismopediaceae	*Aphanocapsa*	*Aphanocapsa banaresensis*
20	Cyanophyceae	Merismopediaceae	*Aphanocapsa*	*Aphanocapsa delicatissima*
21	Cyanophyceae	Merismopediaceae	*Aphanocapsa*	*Aphanocapsa grevillei*
22	Cyanophyceae	Merismopediaceae	*Aphanocapsa*	*Aphanocapsa koordersi*
23	Cyanophyceae	Merismopediaceae	*Aphanocapsa*	*Aphanocapsa litoralis*
24	Cyanophyceae	Merismopediaceae	*Aphanocapsa*	*Aphanocapsa montana*
25	Cyanophyceae	Merismopediaceae	*Aphanocapsa*	*Aphanocapsa pulchra*
26	Cyanophyceae	Aphanothecaceae	*Aphanothece*	*Aphanothece microscopica*
27	Cyanophyceae	Microcoleaceae	*Arthrospira*	*Arthrospira jenneri*
28	Cyanophyceae	Microcoleaceae	*Arthrospira*	*Arthrospira platensis*
29	Cyanophyceae	Nostocaceae	*Aulosira*	*Aulosira fertilissima*
30	Cyanophyceae	Calothricaceae	*Calothrix*	*Calothrix braunii*
31	Cyanophyceae	Calothricaceae	*Calothrix*	*Calothrix brevissima*
32	Cyanophyceae	Calothricaceae	*Calothrix*	*Calothrix fusca*
33	Cyanophyceae	Calothricaceae	*Calothrix*	*Calothrix marchica*
34	Cyanophyceae	Calothricaceae	*Calothrix*	*Calothrix simplex*
35	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus turgidus*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
36	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcococcus tenax*
37	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus cyanosarcina*
38	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus dispersus*
39	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus giganteus*
40	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus indicus*
41	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus macrococcus*
42	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus minor*
43	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus minutus*
44	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus prescottii*
45	Cyanophyceae	Chroococcaceae	*Chroococcus*	*Chroococcus varius*
46	Cyanophyceae	Coelosphaeriaceae	*Coelosphaerium*	*Coelosphaerium dubium*
47	Cyanophyceae	Coelosphaeriaceae	*Coelosphaerium*	*Coelosphaerium knetzingianum*
48	Cyanophyceae	Nostocaceae	*Cylindrospermum*	*Cylindrospermum majus*
49	Cyanophyceae	Chroococcaceae	*Dactylococcopsis*	*Dactylococcopsis acicularis*
50	Cyanophyceae	Dermocarpellaceae	*Dermocarpa*	*Dermocarpa leibleinae*
51	Cyanophyceae	Microcystaceae	*Gloeocapsa*	*Gloeocapsa minima*
52	Cyanophyceae	Microcystaceae	*Gloeocapsa*	*Gloeocapsa magma*
53	Cyanophyceae	Microcystaceae	*Gloeocapsa*	*Gloeocapsa nigrescens*
54	Cyanophyceae	Microcystaceae	*Gloeocapsa*	*Gloeocapsa punctata*
55	Cyanophyceae	Microcystaceae	*Gloeocapsa*	*Gloeocapsa rupestris*
56	Cyanophyceae	Microcystaceae	*Gloeocapsa*	*Gloeocapsa stegophila*
57	Cyanophyceae	Aphanothecaceae	*Gloeothece*	*Gloeothece rupestris*
58	Cyanophyceae	Aphanothecaceae	*Gloeothece*	*Gloeothece samoensis*
59	Cyanophyceae	Gloeotrichiaceae	*Gloeotrichia*	*Gloeotrichia echinulata*
60	Cyanophyceae	Gloeotrichiaceae	*Gloeotrichia*	*Gloeotrichia ghosei*
61	Cyanophyceae	Gloeotrichiaceae	*Gloeotrichia*	*Gloeotrichia natans*
62	Cyanophyceae	Gloeotrichiaceae	*Gloeotrichia*	*Gloeotrichia raciborskii*
63	Cyanophyceae	Gomphosphaeriaceae	*Gomphosphaeria*	*Gomphoshaeria aponina*
64	Cyanophyceae	Homoeotrichaceae	*Homoeothrix*	*Homoeothrix varians*
65	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya aestuarii*
66	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya allorgei*
67	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya borgerti*
68	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya ceylanica*
69	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya connectens*
70	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya lutea*
71	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya majuscula*
72	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya martensiana*
73	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya polysiphoniae*
74	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya semiplena*
75	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya shackletonii*
76	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya spirulinoides*
77	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya truncicola*
78	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngbya versicolor*
79	Cyanophyceae	Oscillatoriaceae	*Lyngbya*	*Lyngnya limnetica*
80	Cyanophyceae	Eukaryota (unassigned family)	*Marssoniella*	*Marssoniella elegans*
81	Cyanophyceae	Merismopediaceae	*Merismopedia*	*Merismopedia aeruginea*
82	Cyanophyceae	Merismopediaceae	*Merismopedia*	*Merismopedia duplex*
83	Cyanophyceae	Merismopediaceae	*Merismopedia*	*Merismopedia elegans*
84	Cyanophyceae	Merismopediaceae	*Merismopedia*	*Merismopedia glauca*
85	Cyanophyceae	Merismopediaceae	*Merismopedia*	*Merismopedia minima*
86	Cyanophyceae	Merismopediaceae	*Merismopedia*	*Merismopedia punctata*
87	Cyanophyceae	Merismopediaceae	*Merismopedia*	*Merismopedia tenuissima*
88	Cyanophyceae	Desmidiaceae	*Micrasterias*	*Micrasterias fimbriata*
89	Cyanophyceae	Rivulariaceae	*Microchaete*	*Microchaete calothrichoides*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
90	Cyanophyceae	Rivulariaceae	*Microchaete*	*Microchaete loktakensis*
91	Cyanophyceae	Microcoleaceae	*Microcoleus*	*Microcoleus acutissimus*
92	Cyanophyceae	Microcystaceae	*Microcystis*	*Microcystis aeruginosa*
93	Cyanophyceae	Microcystaceae	*Microcystis*	*Microcystis delicatissima*
94	Cyanophyceae	Microcystaceae	*Microcystis*	*Microcystis flos-aquae*
95	Cyanophyceae	Microcystaceae	*Microcystis*	*Microcystis viridis*
96	Cyanophyceae	Microcystaceae	*Microcystis*	*Microcystis wesenbergii*
97	Cyanophyceae	Hyellaceae	*Myxosarcina*	*Myxosarcina amethystina*
98	Cyanophyceae	Zygnemataceae	*Mougeotia*	*Mougeotia scalaris*
99	Cyanophyceae	Hyellaceae	*Myxosarcina*	*Myxosarcina concinna*
100	Cyanophyceae	Aphanizomenonaceae	*Nodularia*	*Nodularia spumigena*
101	Cyanophyceae	Nostocaceae	*Nostoc*	*Nostoc caeruleum*
102	Cyanophyceae	Nostocaceae	*Nostoc*	*Nostoc calcicola*
103	Cyanophyceae	Nostocaceae	*Nostoc*	*Nostoc carneum*
104	Cyanophyceae	Nostocaceae	*Nostoc*	*Nostoc linckia*
105	Cyanophyceae	Nostocaceae	*Nostoc*	*Nostoc muscorum*
106	Cyanophyceae	Nostocaceae	*Nostoc*	*Nostoc paludosum*
107	Cyanophyceae	Nostocaceae	*Nostoc*	*Nostoc pruniforme*
108	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria acuminata*
109	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria agardhii*
110	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria amphibia*
111	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria angusta*
112	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria animalis*
113	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria annae*
114	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria boryana*
115	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria brevis*
116	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria chalybea*
117	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria chlorina*
118	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria claricentrosa*
119	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria cortiana*
120	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria curviceps*
121	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria earlei*
122	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria foreaui*
123	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria formosa*
124	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria geminata*
125	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria insignis*
126	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria jasorvensis*
127	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria laetevirens*
128	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria limnetica*
129	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria limosa*
130	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria obscura*
131	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria obtusa*
132	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria okenii*
133	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria ornata*
134	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria princeps*
135	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria proboscidea*
136	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria pseudogeminata*
137	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria redekei*
138	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria rubescens*
139	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria salina*
140	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria sancta*
141	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria splendida*
142	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria subbrevis*
143	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria subtilissima*
144	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria tenuis*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
145	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria terebriformis*
146	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria vizagapatensis*
147	Cyanophyceae	Oscillatoriaceae	*Oscillatoria*	*Oscillatoria willei*
148	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium ambiguum*
149	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium calcicola*
150	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium corium*
151	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium foveolarum*
152	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium fragile*
153	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium granulatum*
154	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium jadinianum*
155	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium lucidum*
156	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium molle*
157	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium mucicola*
158	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium mucosum*
159	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium pachydermaticum*
160	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium tenue*
161	Cyanophyceae	Oscillatoriaceae	*Phormidium*	*Phormidium uncinatum*
162	Cyanophyceae	Microcystaceae	*Polycystis*	*polycystis aeruginosa*
163	Cyanophyceae	Microcystaceae	*Polycystis*	*polycystis incerta*
164	Cyanophyceae	Pseudanabaenaceae	*Pseudanabaena*	*Pseudanabaena crassa*
165	Cyanophyceae	Scytonemataceae	*Scytonema*	*Scytonema coactile*
166	Cyanophyceae	Scytonemataceae	*Scytonema*	*Scytonema hofmanii*
167	Cyanophyceae	Scytonemataceae	*Scytonema*	*Scytonema simplex*
168	Cyanophyceae	Spirulinaceae	*Spirulina*	*Spirulina gigantea*
169	Cyanophyceae	Spirulinaceae	*Spirulina*	*Spirulina labyrinthiformis*
170	Cyanophyceae	Spirulinaceae	*Spirulina*	*Spirulina laxa*
171	Cyanophyceae	Spirulinaceae	*Spirulina*	*Spirulina major*
172	Cyanophyceae	Spirulinaceae	*Spirulina*	*Spirulina meneghiniana*
173	Cyanophyceae	Spirulinaceae	*Spirulina*	*Spirulina princeps*
174	Cyanophyceae	Spirulinaceae	*Spirulina*	*Spirulina subsalsa*
175	Cyanophyceae	Spirulinaceae	*Spirulina*	*Spirulina subtilissima*
176	Cyanophyceae	Stichosiphonaceae	*Stichosiphon*	*Stichosiphon regularis*
177	Cyanophyceae	Synechococcaceae	*Synechococcus*	*Synechococcus aeruginosus*
178	Cyanophyceae	Synechococcaceae	*Synechococcus*	*Synechococcus elongatus*
179	Cyanophyceae	Synechococcaceae	*Synechococcus*	*Synechococcus lividus*
180	Cyanophyceae	Merismopediaceae	*Synechocystis*	*Synechocystis aquatilis*
181	Cyanophyceae	Merismopediaceae	*Synechocystis*	*Synechocystis crassa*
182	Cyanophyceae	Merismopediaceae	*Synechocystis*	*Synechocystis pevalekii*
183	Cyanophyceae	Merismopediaceae	*Synechocystis*	*Synechocystis trididemni*
184	Cyanophyceae	Hydrodictyaceae	*Tetrapedia*	*Tetrapedia reinschiana*
185	Cyanophyceae	Tolypothrichaceae	*Tolypothrix*	*Tolypothrix byssoidea*
186	Chlorophyceae	Chlorellaceae	*Actinastrum*	*Actinastrum aciculare*
187	Chlorophyceae	Chlorellaceae	*Actinastrum*	*Actinastrum fluviatile*
188	Chlorophyceae	Desmidiaceae	*Actinotaenium*	*Actinotaenium cucurbitum*
189	Chlorophyceae	Merismopedioideae	*Agmenellum*	*Agmenellum thermale*
190	Chlorophyceae	Microcystaceae	*Anacystis*	*Anacystis Montana*
191	Chlorophyceae	Selenastraceae	*Ankistrodesmus*	*Ankistrodesmus bibraianus*
192	Chlorophyceae	Selenastraceae	*Ankistrodesmus*	*Ankistrodesmus falcatus*
193	Chlorophyceae	Selenastraceae	*Ankistrodesmus*	*Ankistrodesmus fusiformis*
194	Chlorophyceae	Selenastraceae	*Ankistrodesmus*	*Ankistrodesmus gracilis*
195	Chlorophyceae	Tetrasporaceae	*Askenasyella*	*Askenasyella chlamydopus*
196	Chlorophyceae	Botryococcaceae	*Botryococcus*	*Botryococcus braunii*
197	Chlorophyceae	Phacotaceae	*Cephalomonas*	*Cephalomonas granulata*
198	Chlorophyceae	Chareae	*Chara*	*Chara longifolia*
199	Chlorophyceae	Characiosiphonaceae	*Characiosiphon*	*Characiosiphon rivularis*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
200	Chlorophyceae	Characiaceae	*Characium*	*Characium gracilipes*
201	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas incerta*
202	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas fasciata*
203	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas globosa*
204	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas microsphaera*
205	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas orbicularis*
206	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas polypyrenoideum*
207	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas pseudopodia*
208	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas pseudopolypyrenoidea*
209	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas reinhardtii*
210	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas simplex*
211	Chlorophyceae	Chlamydomonadaceae	*Chlamydomonas*	*Chlamydomonas vacuolata*
212	Chlorophyceae	Chlorellaceae	*Chlorella*	*Chlorella botryoides*
213	Chlorophyceae	Chlorellaceae	*Chlorella*	*Chlorella ellipsoidea*
214	Chlorophyceae	Chlorellaceae	*Chlorella*	*Chlorella protothecoides*
215	Chlorophyceae	Chlorellaceae	*Chlorella*	*Chlorella pyrenoidosa*
216	Chlorophyceae	Chlorellaceae	*Chlorella*	*Chlorella vulgaris*
217	Chlorophyceae	Chlorococcaceae	*Chlorococcum*	*Chlorococcum humicola*
218	Chlorophyceae	Chlorosarcinaceae	*Chlorosarcina*	*Chlorosarcina consociata*
219	Chlorophyceae	Cladophoraceae	*Cladophora*	*Cladophora crispata*
220	Chlorophyceae	Cladophoraceae	*Cladophora*	*Cladophora glomerata*
221	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium acerosum*
222	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium archerianum*
223	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium aciculare*
224	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium cambricum*
225	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium crenulatum*
226	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium depressum*
227	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium dianae*
228	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium fontigenum*
229	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium lineatum*
230	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium navicula*
231	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium porrectum*
232	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium purvulum*
233	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium sphaericum*
234	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium strigosum*
235	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium striolatum*
236	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium tumidum*
237	Chlorophyceae	Closteriaceae	*Closterium*	*Closterium venus*
238	Chlorophyceae	Chroococcaceae	*Coccochloris*	*Coccochloris aeruginosa*
239	Chlorophyceae	Scenedesmaceae	*Coelastrum*	*Coelastrum astroideum*
240	Chlorophyceae	Scenedesmaceae	*Coelastrum*	*Coelastrum microporum*
241	Chlorophyceae	Radiococcaceae	*Coenocystis*	*Coenocystis planctonica*
242	Chlorophyceae	Coleochaetaceae	*Coleochaete*	*Coleochaete soluta*
243	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium bengalense*
244	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium botrytis*
245	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium contractum*
246	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium depressum*
247	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium granatum*
248	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium moniliforme*
249	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium pachydermum*
250	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium phaseolus*
251	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium quadrifarium*
252	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium subcostatum*
253	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium subtumindum*
254	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium tumidum*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
255	Chlorophyceae	Desmidiaceae	*Cosmarium*	*Cosmarium venustum*
256	Chlorophyceae	Trebouxiophyceae incertae sedis	*Crucigenia*	*Crucigenia neglecta*
257	Chlorophyceae	Trebouxiophyceae incertae sedis	*Crucigenia*	*Crucigenia tetrapedia*
258	Chlorophyceae	Chlorellaceae	*Dictyosphaerium*	*Dictyosphaerium granulatum*
259	Chlorophyceae	Chlorellaceae	*Dictyosphaerium*	*Dictyosphaerium pulchellum*
260	Chlorophyceae	Coelastroideae	*Dimorphococcus*	*Dimorphococcus lunatus*
261	Chlorophyceae	Chaetophoraceae	*Draparnaldia*	*Draparnaldia glomerata*
262	Chlorophyceae	Elakatotrichaceae	*Elakatothrix*	*Elakatothrix gelatinosa*
263	Chlorophyceae	Desmidiaceae	*Euastrum*	*Euastrum ansatum*
264	Chlorophyceae	Desmidiaceae	*Euastrum*	*Euastrum bidentatum*
265	Chlorophyceae	Desmidiaceae	*Euastrum*	*Euastrum gessneri*
266	Chlorophyceae	Desmidiaceae	*Euastrum*	*Euastrum insulare*
267	Chlorophyceae	Desmidiaceae	*Euastrum*	*Euastrum spinulosum*
268	Chlorophyceae	Volvocaceae	*Eudorina*	*Eudorina cylindrica*
269	Chlorophyceae	Volvocaceae	*Eudorina*	*Eudorina elegans*
270	Chlorophyceae	Radiococcaceae	*Gloeocystis*	*Gloeocystis major*
271	Chlorophyceae	Neochloridaceae	*Golenkinia*	*Golenkinia paucispina*
272	Chlorophyceae	Neochloridaceae	*Golenkinia*	*Golenkinia radiata*
273	Chlorophyceae	Haematococcaceae	*Haematococcus*	*Haematococcus lacustris*
274	Chlorophyceae	Prasiolaceae	*Hormidium*	*Hormidium flaccidium*
275	Chlorophyceae	Desmidiaceae	*Hyalotheca*	*Hyalotheca dissilens*
276	Chlorophyceae	Hydrodictyaceae	*Hydrodictyon*	*Hydrodictyon reticulatum*
277	Chlorophyceae	Selenastraceae	*Kirchneriella*	*Kirchneriella controta*
278	Chlorophyceae	Selenastraceae	*Kirchneriella*	*Kirchneriella lunaris*
279	Chlorophyceae	Oocystaceae	*Lagerheimia*	*Lagerheimia quadriseta*
280	Chlorophyceae	Chlamydomonadaceae	*Lobomonas*	*Lobomonas ampla*
281	Chlorophyceae	Chlorellaceae	*Micractinium*	*Micractinium pusillum*
282	Chlorophyceae	Chlorellaceae	*Micractinium*	*Micractinium quadrisetum*
283	Chlorophyceae	Microsporaceae	*Microspora*	*Microspora aequabilis*
284	Chlorophyceae	Selenastraceae	*Monoraphidium*	*Monoraphidium capricornutum*
285	Chlorophyceae	Oocystaceae	*Nephrocytium*	*Nephrocytium agardhianum*
286	Chlorophyceae	Mesotaeniaceae	*Netrium*	*Netrium digitus*
287	Chlorophyceae	Characeae	*Nitella*	*Nitella opaca*
288	Chlorophyceae	Oedogoniaceae	*Oedogonium*	*Oedogonium nodulosum*
289	Chlorophyceae	Oocystaceae	*Oocystis*	*Oocystis borgei*
290	Chlorophyceae	Palmellaceae	*Palmella*	*Palmella miniata*
291	Chlorophyceae	Volvocaceae	*Pandorina*	*Pandorina morum*
292	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum duplex*
293	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum biradiatum*
294	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum boryanum*
295	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum duplex*
296	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum leonensis*
297	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum ovatum*
298	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum reticulatum*
299	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum simplex*
300	Chlorophyceae	Hydrodictyaceae	*Pediastrum*	*Pediastrum tetras*
301	Chlorophyceae	Pithophoraceae	*Pithophora*	*Pithophora oedogonia*
302	Chlorophyceae	Pithophoraceae	*Pithophora*	*Pithophora polymorpha*
303	Chlorophyceae	Desmidiaceae	*Pleurotaenium*	*Pleurotaenium ehrenbergii*
304	Chlorophyceae	Volvocaceae	*Pandorina*	*Pandorina morum*
305	Chlorophyceae	Cladophoraceae	*Rhizoclonium*	*Rhizoclonium crassipellitum*
306	Chlorophyceae	Cladophoraceae	*Rhizoclonium*	*Rhizoclonium fontinale*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
307	Chlorophyceae	Cladophoraceae	*Rhizoclonium*	*Rhizoclonium tortuosum*
308	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus abundans*
309	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus acuminatus*
310	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus acutus*
311	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus annatus*
312	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus arcuatus*
313	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus armatus*
314	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus bernardii*
315	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus bijuga*
316	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus bijugatus*
317	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus denticulatus*
318	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus dimorphus*
319	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus insignis*
320	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus javanensis*
321	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus denticulatus var. australis*
322	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus longus*
323	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus major*
324	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus maximus*
325	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus obliquus*
326	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus quadricauda*
327	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmus quadrispina*
328	Chlorophyceae	Scenedesmoideae	*Scenedesmus*	*Scenedesmusgraevenitzii*
329	Chlorophyceae	Schroederiaceae	*Schroederia*	*Schroederia planctonica*
330	Chlorophyceae	Schroederiaceae	*Schroederia*	*Schroederia setigera*
331	Chlorophyceae	Selenastraceae	*Selenastrum*	*Selenastrum bibraianum*
332	Chlorophyceae	Selenastraceae	*Selenastrum*	*Selenastrum gracile*
333	Chlorophyceae	Zygnemataceae	*Spirogyra*	*Spirogyra corrugata*
334	Chlorophyceae	Zygnemataceae	*Spirogyra*	*Spirogyra hyalina*
335	Chlorophyceae	Zygnemataceae	*Spirogyra*	*Spirogyra maxima*
336	Chlorophyceae	Zygnemataceae	*Spirogyra*	*Spirogyra parvispora*
337	Chlorophyceae	Zygnemataceae	*Spirogyra*	*Spirogyra quinine*
338	Chlorophyceae	Zygnemataceae	*Spirogyra*	*Spirogyra rhizobrachialis*
339	Chlorophyceae	Zygnemataceae	*Spirogyra*	*Spirogyra subsalsa*
340	Chlorophyceae	Zygnemataceae	*Spirogyra*	*Spirogyra varians*
341	Chlorophyceae	Mesotaeniaceae	*Spirotaenia*	*Spirotaenia condensata*
342	Chlorophyceae	Desmidiaceae	*Staurastrum*	*Staurastrum bieneanum*
343	Chlorophyceae	Desmidiaceae	*Staurastrum*	*Staurastrum columbetoides*
344	Chlorophyceae	Desmidiaceae	*Staurastrum*	*Staurastrum convolutum*
345	Chlorophyceae	Desmidiaceae	*Staurastrum*	*Staurastrum gepalai*
346	Chlorophyceae	Desmidiaceae	*Staurastrum*	*Staurastrum gracile*
347	Chlorophyceae	Desmidiaceae	*Staurastrum*	*Staurastrum hexaserum*
348	Chlorophyceae	Hydrodictyaceae	*Tetraedron*	*Tetraedron arthrodesmiforme*
349	Chlorophyceae	Hydrodictyaceae	*Tetraedron*	*Tetraedron minimum*
350	Chlorophyceae	Hydrodictyaceae	*Tetraedron*	*Tetraedron muticum*
351	Chlorophyceae	Hydrodictyaceae	*Tetraedron*	*Tetraedron regulare*
352	Chlorophyceae	Hydrodictyaceae	*Tetraedron*	*Tetraedron trigonum*
353	Chlorophyceae	Hydrodictyaceae	*Tetraedron*	*Tetraedron trilobulatum*
354	Chlorophyceae	Tetrasporaceae	*Tetraspora*	*Tetraspora lubrica*
355	Chlorophyceae	Scenedesmaceae	*Tetrastrum*	*Tetrastrum punctatum*
356	Chlorophyceae	Scenedesmaceae	*Tetrastrum*	*Tetrastrum staurogeniaeforme*
357	Chlorophyceae	Trebouxiaceae	*Trebouxia*	*Trebouxia humicola*
358	Chlorophyceae	Ulotrichaceae	*Ulothrix*	*Ulothrix lamellosa*
359	Chlorophyceae	Ulotrichaceae	*Ulothrix*	*Ulothrix variablis*
360	Chlorophyceae	Ulotrichaceae	*Ulothrix*	*Ulothrix zonata*
361	Chlorophyceae	Ulotrichaceae	*Ulothrix*	*Ulothrix aequalis*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
362	Chlorophyceae	Uronemataceae	*Uronema*	*Uronema acutum*
363	Chlorophyceae	Volvocaceae	*Volvox*	*Volvox aureus*
364	Chlorophyceae	Volvocaceae	*Volvox*	*Volvox globator*
365	Chlorophyceae	Volvocaceae	*Volvox*	*Volvox kugeln*
366	Chlorophyceae	Scenedesmoideae	*Westella*	*Westella botryoides*
367	Chlorophyceae	Zygnemataceae	*Zygnema*	*Zygnema caeruleum*
368	Chlorophyceae	Zygnemataceae	*Zygnema*	*Zygnema fanicum*
369	Chlorophyceae	Zygnemataceae	*Zygnema*	*Zygnema stellinum*
370	Chlorophyceae	Trebouxiophyceae	*Crucigenia*	*Crycigenia quadrata*
371	Bacillariophyceae	Acanthocerataceae	*Acanthoceras*	*Acanthoceras zachariasii*
372	Bacillariophyceae	Achnanthaceae	*Achnanthes*	*Achnanthes brevipes*
373	Bacillariophyceae	Achnanthaceae	*Achnanthes*	*Achnanthes hauckiana*
374	Bacillariophyceae	Achnanthaceae	*Achnanthes*	*Achnanthes inflata*
375	Bacillariophyceae	Achnanthidiaceae	*Achnanthidium*	*Achnanthidium binodis*
376	Bacillariophyceae	Achnanthidiaceae	*Achnanthidium*	*Achnanthidium minutissimum*
377	Bacillariophyceae	Eunotiaceae	*Actinella*	*Actinella punctata*
378	Bacillariophyceae	Catenulaceae	*Amphora*	*Amphora coffeaeformis*
379	Bacillariophyceae	Catenulaceae	*Amphora*	*Amphora holsatica*
380	Bacillariophyceae	Catenulaceae	*Amphora*	*Amphora libyca*
381	Bacillariophyceae	Catenulaceae	*Amphora*	*Amphora ovalis*
382	Bacillariophyceae	Anomoeoneidaceae	*Anomoeoneis*	*Anomoeneis serians*
383	Bacillariophyceae	Anomoeoneidaceae	*Anomoeoneis*	*Anomoeoneis sphaerophora*
384	Bacillariophyceae	Tabellariaceae	*Asterionella*	*Asterionella formosa*
385	Bacillariophyceae	Tabellariaceae	*Asterionella*	*Asterionella gracillima*
386	Bacillariophyceae	Bacillariaceae	*Bacillaria*	*Bacillaria paradoxa*
387	Bacillariophyceae	Naviculaceae	*Caloneis*	*Caloneis pulchra*
388	Bacillariophyceae	Naviculaceae	*Caloneis*	*Calonies silicula*
389	Bacillariophyceae	Chaetocerotaceae	*Chaetoceros*	*Chaetoceros orientalis*
390	Bacillariophyceae	Cocconeidaceae	*Cocconeis*	*Cocconeis cistula*
391	Bacillariophyceae	Cocconeidaceae	*Cocconeis*	*Cocconeis diminuta*
392	Bacillariophyceae	Cocconeidaceae	*Cocconeis*	*Cocconeis placentula*
393	Bacillariophyceae	Ulnariaceae	*Ctenophora*	*Ctenophora pulchella*
394	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella bodanica*
395	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella catenata*
396	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella comta*
397	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella girdie*
398	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella hyalodiscus*
399	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella meneghiniana*
400	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella quadrata*
401	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella radiosa*
402	Bacillariophyceae	Stephanodiscaceae	*Cyclotella*	*Cyclotella stelligera*
403	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella affinis*
404	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella alpina*
405	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella aspera*
406	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella cymbiformis*
407	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella gracilis*
408	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella lanceolata*
409	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella leptoceros*
410	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella naviculiformis*
411	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella sumatrensis*
412	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella tumida*
413	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella tumidula*
414	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella turgida*
415	Bacillariophyceae	Cymbellaceae	*Cymbella*	*Cymbella ventricosa*
416	Bacillariophyceae	Tabellariaceae	*Diatoma*	*Diatoma moniliformis*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
417	Bacillariophyceae	Tabellariaceae	*Diatoma*	*Diatoma vulgaris*
418	Bacillariophyceae	Diploneidaceae	*Diploneis*	*Diploneis interrupta*
419	Bacillariophyceae	Diploneidaceae	*Diploneis*	*Diploneis ovalis*
420	Bacillariophyceae	Diploneidaceae	*Diploneis*	*Diploneis subovalis*
421	Bacillariophyceae	Rhopalodiaceae	*Epithemia*	*Epithemia sorex*
422	Bacillariophyceae	Eunotiaceae	*Eunotia*	*Eunotia curvata*
423	Bacillariophyceae	Eunotiaceae	*Eunotia*	*Eunotia fallax*
424	Bacillariophyceae	Eunotiaceae	*Eunotia*	*Eunotia monodon*
425	Bacillariophyceae	Eunotiaceae	*Eunotia*	*Eunotia pectinalis*
426	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria arcus*
427	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria brevistriata*
428	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria capucina*
429	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria construens*
430	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria crotonensis*
431	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria fonticola*
432	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria intermedia*
433	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria oceanica*
434	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria ratonensis*
435	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria Vaucheriae*
436	Bacillariophyceae	Fragilariaceae	*Fragilaria*	*Fragilaria Virescens*
437	Bacillariophyceae	Amphipleuraceae	*Frustulia*	*Frustulia rhomboides*
438	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema acuminatum*
439	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema affine*
440	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema clavatum*
441	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema constrictum*
442	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema gracile*
443	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema herculeana*
444	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema intricatum*
445	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema lanceolatum*
446	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema olivaceum*
447	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema parvulum*
448	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema tenellum*
449	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema truncatum*
450	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema undulatum*
451	Bacillariophyceae	Gomphonemataceae	*Gomphonema*	*Gomphonema vibrio*
452	Bacillariophyceae	Gymnodiniaceae	*Gymnodinium*	*Gymnodinium uberrinum*
453	Bacillariophyceae	Naviculaceae	*Gyrosigma*	*Gyrosigma balticum*
454	Bacillariophyceae	Naviculaceae	*Gyrosigma*	*Gyrosigma acuminatum*
455	Bacillariophyceae	Naviculaceae	*Gyrosigma*	*Gyrosigma distortum*
456	Bacillariophyceae	Naviculaceae	*Gyrosigma*	*Gyrosigma spencerii*
457	Bacillariophyceae	Mastogloiaceae	*Mastogloia*	*Mastogloia apiculata*
458	Bacillariophyceae	Mastogloiaceae	*Mastogloia*	*Mastogloia braunii*
459	Bacillariophyceae	Mastogloiaceae	*Mastogloia*	*Mastogloia dolosa*
460	Bacillariophyceae	Mastogloiaceae	*Mastogloia*	*Mastogloia elliptica*
461	Bacillariophyceae	Mastogloiaceae	*Mastogloia*	*Mastogloia exigua*
462	Bacillariophyceae	Mastogloiaceae	*Mastogloia*	*Mastogloia smithii*
463	Bacillariophyceae	Melosiraceae	*Melosira*	*Melosira granulata*
464	Bacillariophyceae	Melosiraceae	*Melosira*	*Melosira moniliformis*
465	Bacillariophyceae	Melosiraceae	*Melosira*	*Melosira varians*
466	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula acicularis*
467	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula capitatoradiata*
468	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula cincta*
469	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula cryptocephala*
470	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula cuspidata*
471	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula gracilis*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
472	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula gregaria*
473	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula hasta*
474	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula lacustris*
475	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula laterostrata*
476	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula linearis*
477	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula membranacea*
478	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula microcephala*
479	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula mutica*
480	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula palea*
481	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula peregrina*
482	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula producta*
483	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula pseudofonticola*
484	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula pycmae*
485	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula radiosa*
486	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula recta*
487	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula rectangularis*
488	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula rhynchocephala*
489	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula rostellata*
490	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula sigma*
491	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula subrynchocephala*
492	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula symmetrica*
493	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula thermalis*
494	Bacillariophyceae	Naviculaceae	*Navicula*	*Navicula viridula*
495	Bacillariophyceae	Neidiaceae	*Neidium*	*Neidium iridis*
496	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzchia closterium*
497	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzchia cuspidata*
498	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzchia obtusa*
499	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia acicularis*
500	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia amphibia*
501	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia bilobata*
502	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia brebissonii*
503	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia dissipata*
504	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia palea*
505	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia plana*
506	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia sigmoidea*
507	Bacillariophyceae	Bacillariaceae	*Nitzschia*	*Nitzschia vitrea*
508	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*Pinnularia abaujensis*
509	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*Pinnularia acrosphaeria*
510	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*Pinnularia borealis*
511	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*Pinnularia brauniana*
512	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*Pinnularia fasciata*
513	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*Pinnularia gibba*
514	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*Pinnularia interrupta*
515	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*pinnularia major*
516	Bacillariophyceae	Pinnulariaceae	*Pinnularia*	*Pinnularia viridis*
517	Bacillariophyceae	Pleurosigmataceae	*Pleurosigma*	*Pleurosigma delicatulum*
518	Bacillariophyceae	Pleurosigmataceae	*Pleurosigma*	*Pleurosigma salinarum*
519	Bacillariophyceae	Eupodiscaceae	*Pleurosira*	*Pleurosira indica*
520	Bacillariophyceae	Rhizosoleniaceae	*Rhizosolenia*	*Rhizosolenia longiseta*
521	Bacillariophyceae	Rhoicospheniaceae	*Rhoicosphenia*	*Rhoicosphaenia abbreviata*
522	Bacillariophyceae	Achnanthidiaceae	*Rossithidium*	*Rossithidium lineare*
523	Bacillariophyceae	Skeletonemataceae	*Skeletonema*	*Sceletonema costatum*
524	Bacillariophyceae	Staurosiraceae	*Stauroforma*	*Stauroforma exiguiformis*
525	Bacillariophyceae	Stauroneidaceae	*Stauroneis*	*Stauroneis anceps*
526	Bacillariophyceae	Stauroneidaceae	*Stauroneis*	*Stauroneis kriegeri*

Table 1 contd..

S. NO	Class	Family	Genera	Species name
527	Bacillariophyceae	Stauroneidaceae	*Stauroneis*	*Stauroneis parvula var. Prominula*
528	Bacillariophyceae	Stephanodiscaceae	*Stephanodiscus*	*Stephanodiscus alpinus*
529	Bacillariophyceae	Stephanodiscaceae	*Stephanodiscus*	*Stephanodiscus neostraea*
530	Bacillariophyceae	Surirellaceae	*Surirella*	*Surirella robusta*
531	Bacillariophyceae	Surirellaceae	*Surirella*	*Surirella brebissonii*
532	Bacillariophyceae	Surirellaceae	*Surirella*	*Surirella elegans*
533	Bacillariophyceae	Surirellaceae	*Surirella*	*Surirella linearis*
534	Bacillariophyceae	Surirellaceae	*Surirella*	*Surirella splendida*
535	Bacillariophyceae	Surirellaceae	*Surirella*	*Surirella tenera*
536	Bacillariophyceae	Fragilariaceae	*Synedra*	*Synedra capitata*
537	Bacillariophyceae	Fragilariaceae	*Synedra*	*Synedra rumpens*
538	Bacillariophyceae	Fragilariaceae	*Synedra*	*Synedra ulna*
539	Bacillariophyceae	Tabellariaceae	*Tabellaria*	*Tabellaria fenestrata*
540	Bacillariophyceae	Tabellariaceae	*Tabellaria*	*Tabellaria flocculosa*
541	Bacillariophyceae	Tabellariaceae	*Tabellaria*	*Tabellaria quadrisepta*
542	Bacillariophyceae	Thalassiosiraceae	*Thalassiosira*	*Thalassiosira marginata*
543	Euglenophyceae	Eugleninae	*Euglena*	*Euglena acus*
544	Euglenophyceae	Eugleninae	*Euglena*	*Euglena caudata*
545	Euglenophyceae	Eugleninae	*Euglena*	*Euglena convoluta*
546	Euglenophyceae	Eugleninae	*Euglena*	*Euglena deses f. intermedia*
547	Euglenophyceae	Eugleninae	*Euglena*	*Euglena elastica*
548	Euglenophyceae	Eugleninae	*Euglena*	*Euglena fundoversata*
549	Euglenophyceae	Eugleninae	*Euglena*	*Euglena gracilis*
550	Euglenophyceae	Eugleninae	*Euglena*	*Euglena limnophila*
551	Euglenophyceae	Eugleninae	*Euglena*	*Euglena obtuso-caudata*
552	Euglenophyceae	Eugleninae	*Euglena*	*Euglena oxyuris*
553	Euglenophyceae	Eugleninae	*Euglena*	*Euglena polymorpha*
554	Euglenophyceae	Eugleninae	*Euglena*	*Euglena proxima*
555	Euglenophyceae	Eugleninae	*Euglena*	*Euglena repulsans*
556	Euglenophyceae	Eugleninae	*Euglena*	*Euglena spirogyra*
557	Euglenophyceae	Eugleninae	*Euglena*	*Euglena Van goori*
558	Euglenophyceae	Eugleninae	*Euglena*	*Euglena viridis*
559	Euglenophyceae	Phacidae	*Lepocinclis*	*Lepocinclis ovum*
560	Euglenophyceae	Phacidae	*Phacus*	*Phacus acuminatus*
561	Euglenophyceae	Phacidae	*Phacus*	*Phacus agilis*
562	Euglenophyceae	Phacidae	*Phacus*	*Phacus elegans*
563	Euglenophyceae	Phacidae	*Phacus*	*Phacus indicus*
564	Euglenophyceae	Phacidae	*Phacus*	*Phacus longicauda*
565	Euglenophyceae	Phacidae	*Phacus*	*Phacus orbicularis*
566	Euglenophyceae	Phacidae	*Phacus*	*Phacus pleuronectes*
567	Euglenophyceae	Phacidae	*Phacus*	*Phacus pseudoswirenko*
568	Euglenophyceae	Phacidae	*Phacus*	*Phacus suecicus*
569	Euglenophyceae	Phacidae	*Phacus*	*Phacus tortus*
570	Euglenophyceae	Synuraceae	*Synura*	*Synura uvella*
571	Euglenophyceae	Euglenidae	*Trachelomonas*	*Tracbelomonas volvocina*
572	Euglenophyceae	Euglenidae	*Trachelomonas*	*Trachelomonas hispida*
573	Euglenophyceae	Eugleninae	*Euglena*	*Euglena minuta*
574	Dinophyceae	Ceratiaceae	*Ceratium*	*Ceratium hirundinella*
575	Dinophyceae	Ceratiaceae	*Ceratium*	*Ceratium lunula*
576	Dinophyceae	Ceratiaceae	*Ceratium*	*Ceratium symmetricum*
577	Dinophyceae	Gymnodiniaceae	*Gymnodinium*	*Gymnodinium palustre*
578	Chrysophyceae	Dinobryaceae	*Dinobryon*	*Dinobryon sociale*

Table 2. Details of Phytoplankton reports from Tamil Nadu

S. No	Author	Year	No. of Species	No. of Sites	Name of the Sites	District
1	Chinnasamy et al.	2007	34	5	Dabeerkulam, Mariyamman Kovil, Padithurai, Pulavarnatham, Sivalingam temple	Thanjavur
2	Senthilkumar and Sivakumar	2008	159	1	Veeranam Lake	Cuddalore
3	Thirugnanamoorthy and Selvaraju	2009	8	1	Gnanaprekasam Temple Pond, Chidambaram	Cuddalore
4	Kanagasabapathi and Rajan	2010	4	1	Irukkangudi Reservior	Viruthunagar
5	Rajagopal et al.	2010	50	2	Chinnapperkovil pond, Nallanchettipatti pond, Sattur Area	Viruthunagar
6	Manickam et al.	2012	22	5	Parambikulam-Aliyar Irrigational Canal (Kulanaickenpatti canal, Seelakkampatti canal, Poosaripatti canal, Kongalnagaram canal, Pethappampatti canal)	Coimbatore
7	Vijayakumar and Subramaniyan	2013	45	1	Samuthiram lake	Thanjavur
8	Manthri Kumar Rajesh et al.	2014	31	2	Thamiraparani River & Man-made reservior	Thirunelveli
9	Babu et al.	2014	88	1	Cauvery River	Thanjavur
10	Elayaraj and Selvaraju	2014	32	1	Thachan Pond, Chidambaram	Cuddalore
11	Ilangovan et al.	2014	25	3	Ukkadam Lake, Kuruchi Lake and Singanallur Lake	Coimbatore
12	R.Periyanayagi	2015	35	1	Veeranam Lake	Cuddalore
13	Venkatachalapathy and Karthikeyan	2015	60	1	Cauvery River from Mettur Dam to Bhavani town	Erode
14	Isabella et al.	2015	85	2	Kadamba pond and Arumugamangalam pond	Thoothukudi
15	Sankaran and Thiruneelagandan	2015	34	1	Parthasarathy temple tank	Chennai
16	Pandiammal et al.	2017	7	1	Thiruvottiyur temple pond	Chennai
17	Kensa	2017	16	1	Chunkankadai Paddy Wetlands	Kanyakumari
18	Anbalagan and Sivakami	2019	28	1	Mayanur Dam	Karur
19	Aranganathan and Sivakumar	2019	133	3	Vellar River (Bhuvanagiri, Sethiyathoppu, Kumarakudi)	Cuddalore
20	Manickam et al.	2020	50	2	Sulur Lake, Ukkadam Lake	Coimbatore
21	Uthirasamy et al.	2020	42	1	Cauvery River at Pallipalayam	Erode
22	Chitra et al.	2020	66	1	Canalwater at Rangampalayam	Erode

chemical and biological qualities of inland waters is been ensured by the phytoplanktons. From this study it is evident that the phytoplankton acts as a tremendous producer and consumer of biological importance in inland waters. Phytoplankton is a basement for the food chain and this holds the entire earth's food chain stable. It is necessary to document the information about the phytoplankton species season wise to understand and protect the water quality of freshwater lakes, ponds, canals, rivers as well as coastal ecosystems.

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designed the review and participated in the manuscript preparation.

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