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STUDIES ON THE PHYTOPLANKTON COMPOSITION IN ADIRAMPATTINAM MANGROVE REGION, TAMIL NADU, INDIA

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ABSTRACT

In the present study area total number of 88 species of phytoplankton was recorded in the Adirampattinam mangrove water (Station I) and Adirampattinam coastal water (Station II) at different stations during the study period. The percentage composition of each group of phytoplankton in Mangrove water (Station I) was in the decreasing order Bacillariophyceae 29% > Phyrophyceae 23% > Chlorophyceae 19% > Cyanophyceae 16% > Euglenophyceae 8% > Cryophyceae 5%. The percentage composition of each group of phytoplanktans in coastal water (St. II) in the decreasing order Bacillariophyceae 29% > Phyrophyceae 23%> Chlorophyceae 21% > Cyanophyceae 15% > Euglenophyceae 8% > Cryophyceae 4%. Overall average percentage composition at each group of phytoplanktans in both stations (Station I and Station II) in the decreasing order is Bacillariophyceae 29% > Phyrophyceae 23%> Chlorophyceae 20%> Cyanophyceae 16% > Euglenophyceae 8% > and Cryophyceae 4%. Phytoplankton percentage composition exhibited high values in Coastal water (St.II) and low in mangrove water (St. I), because more intensity of light is prevailed during the seasons.

INTRODUCTION

Phytoplankton is the basic structure of the marine environment. The marine food web originates from phytoplankton and their organisms plays vital a role in marine ecology. The name 'phytoplankton' refers to plant component of plankton. Phytoplankton production contributes about 95% of total production in the marine environment. Phytoplankton composition influences various processes such as nutrients recycling grazing, particles, sinking and food webs. The success or failure of pelagic fishery is dependent upon the availability of plankton (Padamavathi and Goswami, 1996) without phytoplankton study of productivity, density and abundance of marine life would be impossible. Phytoplankton consists of major division Diatoms and Dinoflagellates, Growth and distribution of diatoms in more inflected by hydrobiology. Diatoms may dominate phytoplankton community only under condition of high nutrient concentration and optimum nutrient ratio due to growth composition. Each species having its own shape and size and some forms exhibit a tremendous designs and ornamentation such as spines flagella *etc*. Which are considered as more productive environment and these autotrophic organisms fix significant fractions of the organic carbon to support the ecosystem functioning, phytoplankton serve as a food for a many marine organisms like zooplankton, Molluscs forms, Crustaceans and small fishes in turn these animals serve food for other large animals (Mathivanan, 2007 Sridhar *et al.*, 2006).

The majority of carbon in the marine ecosystem is fixed by phytoplankton in the coastal waters. Phytoplankton consisting of autotrophic prokaryotes and eukaryotes are responsible for most carbon fixation in marine system (Sundaramanickam, 2004). It consists about 95% of total production in the marine environment. Phytoplankton can be used as bio indicators, since they reflect even the subtle changes taking place in their immediate environment by changing their species composition, biomass, community structure, chlorophyll pigment control and productivity. The reproduction and larval development of many species of fish are closely linked to phytoplankton diversity and primary productivity which is important for assessing the fisheries yield *i.e* how much can be harvested on the sustainable basic (Sundermanickam, 2004).

Prabhahar *et al.* (2011) observed the ecology and distribution of phytoplankton biomass in Kadalur coastal zone, Tamil Nadu, and also extensively studied the seasonal and tidal variation of phytoplankton's in the Vellar estuary and also found that the salinity plays a major role in determining the species composition,

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succession and density of phytoplankton and reported the phytoplankton distribution in coastal back water. High phytoplankton standing crop and chlorophyll 'a' concentrations accompanied by low species diversity at the Visakhapatnam harbour waters indicated serve eutrophication as against near normal condition in the open sea. Patterson and Ayyakkannu, (1991) reported that the growth and fluctuation of the phytoplanktonic community of Coleroon estuary associated with various hydrographical parameters and nutrients and observed that the species diversity was maximum and minimum during premonsoon and post monsoon season respectively. (De *et al.*, 1994) assessed phytoplankton community structure and species diversity in the Hugli estuary. (Satpathy and Nair 1996) reported the occurrence of *Asterionella glaciates* diatom bloom and its impact on physico-chemical characteristics in the coastal waters of Kalpakkam. Panigraphy *et al.* (2001) elucidated the level of organic pollution of Maipura estuary through algal pollution indices together with various physico-chemical parameters.

Phytoplankton's are of immense value as food and plays an important role in the natural purification of polluted water. Phytoplankton constitutes the very basic of nutrient cycle of aquatic ecosystem. They play a key role in maintaining proper equilibrium between abiotic and biotic components of an aquatic ecosystem and they have been regarded as the chief primary producers of the natural ecosystem. Their density has been reported to be effected by the quality of water (Srivastava and Singh, 1995) the physico chemical characteristics of water can enhance or inhibit the growth of plankton, due to the presence of a complex mixture of nutrients and toxicants in the effluent. These changes may favour or impede primary production and secondary production of the biota. Anyhow, it may promote transference of pollution tolerant species to reduce biodiversity and stability.

MATERIALS AND METHODS

Phytoplankton samples was collected at monthly intervals from the waters of the study area by towing a plankton net (0.35 ↘m mouth diameter) made up of bolting silk (No. 30, mesh size 48 for phytoplankton for half an hour. These samples were preserved in 4% neutralized formalin and used for qualitative analysis. For the quantitative analysis of phytoplankton, the settling method described by Sukhanova (1978) was adopted. Numerical plankton analysis was carried out using utermohl's inverted plankton microscope. Phytoplanktons were identified by adopting the standard procedures given by APHA, (2000). For the sake of convenience, the phytoplankton were assigned to some major groups *viz*. Phyrophyceae, (Dianoflagellates) Cryrophyceae (Silicoflagellates) Bacillarophyceae (Diatoms) Chlorophyceae (Green Algae) EuglenoPhyceae,Cyanophyceae(Blue) .

RESULTS

A total number of 88 species of Phytoplankton were recorded in Adirampattinam Mangrove waters and Adirampattinam Coastal water at different stations during the study period (Table.1). Of these *Ceratium breve, C. extensum, C. furca, C. macroceros, C. mononceras, C. triops, Dinophysis caudate, D. hastate, Noctiluca scintillans, Noctiluca sp, Peridinium conicum, P. excentrium, Prorocentrum micans, P. depressum, P. venustrum, P. oceanicum, P. pentagonum, P. striata, Pyrocrystis fusiformis, Chroomonas acuta, Cryptomonas ovate, Distephanes acanthicus, D. speculum, Amphora Coffeaeformis, A. ovalis, Bacilaria parillifer, B. paradoxa, B. varians, Campylodiscus indicus, Chaetoceros orientalis, Coscinodiscus gigas, C. centralis, C. subtilis, C. radiates, C. thori, Ditylum sol, Grammatophora marina, Guinardia flaccid, Navicula amphibian, N. cincta, N. radiosa, N. rostellata, N. Mutica, Nitzschia acuta, Odentella heteroceros, O. Sinensis, Pleurosigma sps, Skeletonema costatum, Botrycoccus sp, Chladophora crispate, Chlamydomionas sp, Chlorella Vulaaris, Chlorococcium sp, Closterium sp., Edogonium sp, Eudorina morum, Eudorina sp., Micractinum radiates, Oocystis sp., Pediastrum duplex, P. simplex, Spirogyra sp., Ulothrix sp., Uronema sp., Volvox sp., Euglena geniculatea, E. viridius, E. spirogyra, E. viridis, Phacus acuminatus, P. longicauda, P. pleuronectes, P. triqueter, Anabena sp, Aphanocapsa koordersi, A. Montana, Arthrospira sp, Gomphosphaeria sp, Lynagbya sp., Microcystis flosaquae, Nostoc pruniforme, Oscillatoria limosa, Oscillatoria sp, Pseudo anabaena sp, Spirulina sp and Trichodesmium erythraeum.*

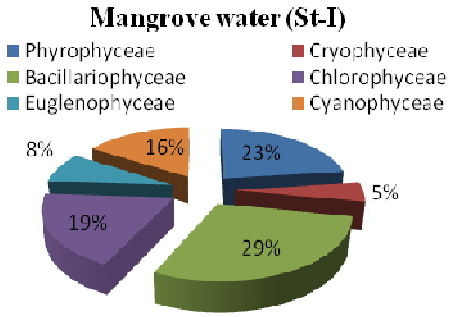

Fig.1 Percentage composition of different phytoplankton groups in Mangrove water (St -I) from July 2010 – June 2011

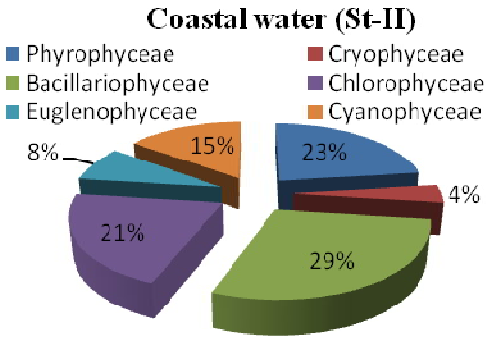

Fig.2 Percentage composition of different phytoplankton groups in Coastal water (St -II) from July 2010 – June 2011.

DISCUSSION

In Marine environment phytoplankton act as a primary producers using radiant energy phytoplankton species under goes spatio-temporal changes in their distribution due to the differential effects of changing physical,

Table 1 Check list of Phytoplankton groups in Adirampattinam Mangrove water and Adirampattinam Coastal water (St-I and St -II) at during the period July 2010 - June 2011

. No.	PHYTOPLANKTON SPECIES	Stations: Mangrove water S - I	Stations: Coastal water S – II
	PYROPHYCEAE (Dinoflagellates)		
1	*Ceratium extensum*	+	+
2	*Ceratium furca*	+	+
3	*Ceratium triops*	-	+
4	*Ceratium fusus*	+	+
5	*Ceratium breve*	+	+
6	*Ceratium manoceras*	+	+
7	*Ceratium macroceros*	+	+
8	*Dinophysis caudate*	+	+
9	*Dinophysis hastate*	-	+
10	*Protoperidinum depressum*	+	+
11	*Protoperidium striata*	+	-
12	*Noctiluca sp.*	+	+
13	*Noctiluca scintillans*	+	+
14	*Protoperidinum venustrum*	-	+
15	*Protoperidium oceanicum*	+	+
16	*Protoperidium pentagon*	-	+
17	*Protocentrum micans*	+	+
18	*Peridinium conicum*	+	+
19	*Peridinium excentrium*	+	+
20	*Pyrocrystis fusiformis*	-	-
	CRYROPHYCEAE (Sillico flagellate)		
1	*Chroomonas acuta*	+	+
2	*Cryptomonas ovate*	+	-
3	*Distephanus Speculum*	-	+
4	*Distephanes acanthicus*	+	+
	BACILLARIOPHYCEAE (Diatoms)		
1	*Chaetoceros orientalis*	+	+
2	*Bacillaria paradoxa*	+	+
3	*Bacillaria varians*	+	+
4	*Bacilaria parillifer*	-	-
5	*Campylodiscus indicus*	+	+
6	*Ditylum sol*	+	+
7	*Skeletonema costatum*	-	+
8	*Amphora coffeaeformis*	+	+
9	*Coscinodiscus thori*	+	+
10	*Coscinodiscus subtilis*	+	+
11	*Coscinodiscus radiates*	+	+
12	*Coscinodiscus gigas*	+	+
13	*Coscinodiscus centralis*	+	+
14	*Odentella heterocera*	-	+
15	*Odentella sinensis*	+	+
16	*Grammatophora marina*	+	+
17	*Guinardia flaccid*	+	-
18	*Nitzschia acuta*	-	+
19	*Nitzschia amphibian*	+	+
20	*Pleurosigma sp.*	+	+
21	*Navicula cincta*	-	+
22	*Navicula rostellata*	+	+
23	*Navicula radiosa*	-	+
24	*Navicula mutica*	+	-
25	*Amphora ovalis*	-	+
	CHLOROPHYCEAE (Green Algae)		
1	*Spirogyra sp.*	-	+
2	*Eudorina sp.*	+	+
3	*Closterium sp.*	+	+
4	*Pediastrum duplex*	+	+
5	*Pediastrum simplex*	+	+
6	*Chlorella Vulgaris*	-	+
7	*Ulothrix sp.*	+	+
8	*Cladophora crispate*	+	-
9	*Odogonium sp.*	-	+
10	*Uronema sp.*	+	+
11	*Volvox sp.*	+	+
12	*Chlorococcum sp.*	+	+
13	*Chlamydomonas sp.*	-	+
15	*Oocystis sp.*	+	+
16	*Micractinium radiate*	+	-
17	*Eudorina morum*	-	+
	EUGLENOPHYCEAE		
1	*Phacus triqueter*	+	+
2	*Euglena geniculate*	-	+
3	*Euglene viridis sps.*	+	-
4	*Euglene spirogyra*	+	+
5	*Euglena viridius*	-	+
6	*Phacus acuminatus*	+	+
7	*Phacus longicauda*	+	+
8	*Phacus pleuronectes*	-	+
	CYANOPHYCEAE (Blue)		
1	*Anabaena sp.*	+	+
2	*Trichodesmium erythracum*	-	+
3	*Oscillatoria*	+	+
4	*Oscillatoria limosa*	+	+
5	*Spirulina sp.*	-	+
6	*Lynagbya sp.*	+	-
7	*Pseudo anabaena*	-	+
8	*Spirullina sp.*	+	+
9	*Microcystis flosaquae*	-	+
10	*Arthospira sp.*	+	-
11	*Aphanocapsa koordersi*	+	+
12	*Aphanocapsia Montana*	+	+
13	*Gomphosphaeria sp.*	-	-
14	*Nostoc pruniforme*	+	+

+ = present , - = absent

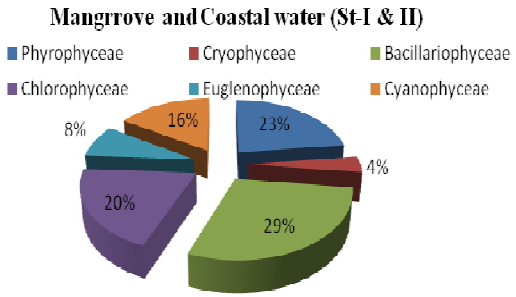

Fig. 3 Average percentage composition of different phytoplankton groups in Mangrove water and Coastal water (St-I and St -II) from July 2010 – June 2011

Chemical and biological facts on individual species, Moreover productivity of the estuarine and marine ecosystem is largely determined by their phytoplankton population (Gandhiyappan 1999). It is clearly understood that the percentage composition of species at coastal water (station II) was more than mangrove water (station I) with maximum in summer and minimum in Monsoon season in which Baccillariophycea and Cryophycea was high value. In mangrove water (station I) the percentage composition was low similar observation were also made by (Layyuapan, 2000). The maximal phytoplankton population density during the summer could be attributed to the increased salinity, pH, temperature, dissolved oxygen and more intensity of light prevailed during the season. (Sandergaard, 1979). Suggested that the seasonal distribution of phytoplankton is influenced by the availability of inorganic nitrogen and phosphorus. Blue green algae all predominant during low photoperiod and the green algae are predominant during high photoperiod and carbon dioxide concentration (Prescott, 1969).

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