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SEASONAL VARIATION OF PHYTOPLANKTON FROM TWO SELECTED BIOTOPES

Environmental Science

Satheesh Kumar, B Bala Sarada Institute for Science and Technological Research, Vellamcode, Chitharal – 629 151, Kanyakumari District, Tamil Nadu.

ABSTRACT

Oceans, estuaries and backwaters have been historically featured in national developments. Most of the cities and towns depend on them for port facilities, transportation, effluent disposals, recreation etc. Besides these the aquatic systems are valuable resources, which call for careful consideration to avoid thoughtless exploitation. In view of this there is an increasing interest in the study of the aquatic environment as distinct entity by itself. Regular monthly samplings were done from June 2020 to April 2022 from a marine and backwater habitats namely Vizhinjam and Veli sea of Thiruvananthapuram District, Kerala, India. Camera Lucida drawings are given. The identification of carried out with the help of authentic literature. At Station I the phytoplankton density was high when compare with station II. In both the station, lowest number of phytoplankton standing crop was recorded in November and December. The peak period of phytoplankton production was from June to August at both the stations. Thereafter there was a decline in the crop and the second peak lasted from April to May at both the Stations.

KEYWORDS

Aquatic Environment, Diversity, Phytoplankton, Camera Lucida.

INTRODUCTION

Ecological studies on the physico-chemical factors and composition of phytoplankton of 'sea' and 'estuaries' (other than India) have been carried out extensively (Lena, *et al*., 2021; Watson, *et al*., 1997). Similarly hydrography and phytoplankton characteristics of coastal and estuarine waters of India have also been investigated by several authors (Waga, *et al*., 2021; Jayaraman, 1951; George, 1952; Jayaraman and Seshappa, 1957). Seasonal distribution and behaviour of nutrients of Mulki estuary and bar built estuary was studied by Waga, *et al*., (2021); Vareethiah and Hanifa, (1997) and Rajesh *et al*., (2000). Similarly seasonal variations in the physico-chemical and biological characteristics of the eastern Arabian Sea were studied by Pillai *et al*., (2000). Many investigators working on phytoplankton and on the hydrography of the seas and estuaries in Kerala have provided a fairly good picture of the highly dynamic environmental conditions prevailing in these water bodies. The present study focused to explore algal diversity of Vizhinjam and Veli sea of Thiruvananthapuram District, Kerala, India.

MATERIAL AND METHODS

Regular monthly samplings were done from June 2020 to April 2022 from a marine and backwater habitats namely Vizhinjam and Veli sea of Thiruvananthapuram District, Kerala, India. Camera Lucida drawings are given in Fig.1. Phytoplankton samples were taken with the help of planktonic net of 30µm mesh size and were preserved in 2% formalin. Taxonomic identification was carried out by means of compound microscope (Olympus) and drawings were made at different magnifications using camera lucida. The identification of carried out with the help of authentic literatures.

RESULTS AND DISCUSSION

At Station I the phytoplankton density ranged from 507 cells/m3 at station II. In both the station, lowest number of phytoplankton standing crop was recorded in November and December. The peak period of phytoplankton production was from June to August at both the stations. Thereafter there was a decline in the crop and the second peak lasted from April to May at both the Stations.

The monthly occurrence of phytoplankton species (cells/ m^3) at two stations is listed in Table 1 & 2. A total of 54 genera of phytoplankton belonging to diatoms were recorded from the sites, among which, the dominant genera are described below. *Cyclotella striata* was the only species recorded in this genus and was very common and occurred during most part of the year at both the stations. *Biddulphia* was present at all the Stations in fairly conspicuous numbers. The different species of this genus recorded were *Biddulphia tridens*. *B. mobiliensis, B. pulchella, B. rhombus, B. sinensis and B. heteroceros.* Of these B. *mobiliensis* and *B. tridens* were the most dominant. In (Station I) the period of abundance was in May and January whereas in (Station II), the peak period of *B. mobiliensis* was in July. It should be mentioned that in the open sea the concentration of *B. tridens* was very low.

Triceratium was very common throughout the period of study. The species recorded were *Triceratium favus*, *T. reticulum* and *T. dubium.* Of these T. favus appeared almost all the months in (Station II) and highest number being recorded in March. *Chaetoceros* was common throughout the year and was represented by *Chaetoceros didymus, C. affinis, C. peruvianus, C. lorenzianus, C. compressus, C. denticulatum, C. decipiens, C.diversus, C. messanensis and C. curvisetus.* Of these *C. lorenzianus* can be considered as very common species, which was available almost throughout the year. In (Station I) the peak was in April and in (Station II) the period of maximum abundance was June and August.

Bacteriastrum varians and *B. delicatulum* were the two species recorded in the collection and *B. varians* appeared in noticeable numbers in October at the (Station I) whereas it was not distributed throughout the year in (Station II). *Asterionella* is represented by *Asterionella japonica* and was a very common species and occurred almost all the months of the year. Its maximum abundance was during monsoon period.

Thalassiothrix frauenfeldii was the only representative species of this genus and occurred throughout the year in the habitat. In (Station I) it occurred in varying numbers during all the months of the year and exhibited a striking abundance in August whereas in (Station II) this species was present in the samples almost during all the months but was dominant in the month of August. *Thalassionema nitzschioides* was the only species recorded from this genus. It was common throughout the year in the open sea. *Nitzschia* was represented by *Nitzschia seriata, N. closterium, N. longissima and N. sigma.* Of this *N. seriata* was very common and was present in the samples almost all seasons in (Station II) but was dominant in the month of June.

Among the phytoplankton elements met are species belonging to the genera *Melosira, Stephanopyxis, Leptocylindrus, Skeletonema, Planktoniella, Lauderia, Coscinodiscus, Actinoptptychus, Bellarochea, Streptotheca, Eucampia, Hemialus, Rhizosolenia, Ditylum, Guinardia, Fragilaria, Stauroneis, Diploneis, Pleurosigma, Amphiprora and Bacillaria.* As these occur in very small numbers and infrequently, they have all been combined here and their fluctuation is shown in Table 2.

Table 1. Monthly Average Of Marine Phytoplankton (CELL COUNT/ FILAMENT/m^3) At Vizhinjam Station - I

Family	Species Name	Monsoon				Post monsoon				Premonsoon			
		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Stephanodiscaceae	Cyclotella striata	174											
Biddulphiaceae	Biddulphia tridens			300									
	Biddulphia mobiliensis										72	299	
	Biddulphia pulchella					36					254		
	Biddulphia rhombus			296	40		203	12					245
	Biddulphia sinensis	103	219	194	5	36			129	291	145		

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	Biddulphia heteroceros	120	85			109				97		38	
	Triceratium favus		113			109				97		38	
	Triceratium reticulam											284	
	Streptotheca tamensis					36							
	Eucampia zodiacus				55		36	36	64	32	255		295
	Triceratium dubium								32				
Chaetocera ceae	Chaetoceros didymus							12					
	Chaetoceros affinis										34	243	89
	Chaetoceros peruvianus												
	Chaetoceros lorenzianus	262	277	284		288	12				191	154	300
	Chaetoceros compressus	52											
	Chaetoceros denticulatum		57										88
	Chaetoceros decipiens	52	142					30	162	32	142	77	88
	Chaetoceros diversus										142		
	Chaetoceros messanensis	52							65				
	Chaetoceros curvisetus					73	12	12	32	65	118	245	
Chaetocerot aceae	Bacteriastrum varians										36	150	
	Bacteriastrum delicatulum			129							36	150	
Diatomacea e	Asterionella japonica	51											
Thalassione mataceae	Thalassiothrix frauenfeldii	67		223	102	191		24		126	73	284	294
	Thalassionem a nitzschioides											8	
Nitzschiace ae	Nitzschia seriata	103	84	129							36		
	Nitzschia closterium			65									
	Nitzschia longissima	52	57										
	Nitzschia sigma								32		71	77	
Microcysta ceae	Microcystis aeruginosa											8	
Oscillatoria ceae	Arthrospira platensis	103	84	129							36		
	Spirulina major			65									
	Spirulina subsala	52	57										
	Oscillatoria princeps								32		71	77	
	Oscillatoria curviceps			194									
	Oscillatoria annae	41		199	55	36	24					190	300
	Oscillatoria obscura											77	
Nostocacea e	Anabaenopsis arnoldii		28			36							88
Micractinia ceae	Micractinium pusillum		170		162	267		191	97	146	284	88	
Hydrodicty aceae	Pediastrum tetras											38	
	Pediastrum ovatum											77	
	Pediastrum duplex var. genuinum		11								109		44
	Pediastrum duplex var. coronatum		28										
	Pediastrum duplex var. reticulatum										71		
	Tetradon trigonum		57										
Selenastrac eae	Ankistrodesm us falcatus			65									
	Actinastrum hantzschii	52			20					64			84
Scenedesm aceae	Scenedesmus obliqus		109	147							100	253	156
	Scenedesmus quadricauda										36	122	88
	Scenedesmus acuminatus	154	125	165	36	55	155	42	42	124	126	139	106
	Scenedesmus armatus						12	12					
Melosiracea e	Melosira sulcata									36			
Thalssiosira ceae	Cyclotella meneghiniana										142	77	44

TABLE 2. MONTHLY AVERAGE OF MARINE PHYTOPLANKTON (CELL COUNT/ FILAMENT/m3) AT VIZHINJAM STATION - II

Family	Species Name	Monsoon				Post monsoon				Premonsoon			
		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Stephano discaceae	Cyclotella striata			171									
Biddulph iaceae	Biddulphia tridens										69	82	90
	Biddulphia mobiliensis					28					105		
	Biddulphia pulchella	98		199	55		28				73		42
	Biddulphia rhombus		165	47	18	69		12	50	25			
	Biddulphia sinensis	99	65	182			14						169
Chaetoce raceae	Biddulphia heteroceros					57					69		42
	Triceratium favus	99											
	Triceratium reticulam											109	
	Streptotheca tamensis	99											
	Eucampia zodiacus							32	58		72	25	42
	Triceratium dubium									28	83		
	Chaetoceros didymus							8					
	Chaetoceros affinis										126		58
	Chaetoceros peruvianus	95	88	67		96	24				43	37	46
	Chaetoceros lorenzianus						14						
	Chaetoceros compressus		32					8					24
	Chaetoceros denticulatum		32			28		20	113	58	141	63	127
	Chaetoceros decipiens		32										
	Chaetoceros diversus		32								69		
	Chaetoceros messanensis	99											
	Chaetoceros curvisetus	198											
Chaetoce rotaceae	Bacteriastrum varians	99											
	Bacteriastrum delicatulum					113		8	141		172	218	
Diatomac eae	Asterionella japonica									28	165		
Thalassio nemataceae	Thalassiothrix frauenfeldii		65		20		127				34	75	
	Thalassionema nitzschioides	189	56	165	29	124	13		145	166	69	36	155
Nitzschia ceae	Nitzschia seriata		32									36	109
	Nitzschia closterium											12	
	Nitzschia longissima	97											
	Nitzschia sigma			150					131		69		
Microcys taceae	Microcystis aeruginosa	154	65									72	
Oscillato riaceae	Arthrospira platensis	93	65	70	55							82	130
	Spirulina major									28	34		
	Spirulina subsala			97						84		104	
	Oscillatoria princeps		32		63	136	14		113				
	Oscillatoria curviceps					125		103			69		
	Oscillatoria annae								28				
	Oscillatoria obscura		97										42

Nostocaceae	Anabaenopsis arnoldii		32								34		
Micractiniaceae	Micractinium pusillum			55									
Hydrodictyaceae	Pediastrum tetras			94									42
	Pediastrum ovatum	99											
	Pediastrum duplex var. genuinum	157											
	Pediastrum duplex var. coronatum		153	75							69	210	105
	Pediastrum duplex var. reticulatum	94	149	156	84	98			28		103	36	97
	Tetradon trigonum		124	209		142	155		209	41	197	255	104
Selenastraceae	Ankistrodesmus falcatus	198											
	Actinastrum hantzschii									28			
Scenedesmaceae	Scenedesmus obliqus		32										
	Scenedesmus quadricauda											55	42
	Scenedesmus acuminatus	195		32			169	14	48				42
	Scenedesmus armatus	300	129	185	162	57	108		240	141		100	59
Melosiraceae	Melosira sulcata								26				
Thalssiosiraceae	Cyclotella meneghiniana									28			85

REFERENCES

1. Alan, M. Watson. and Margaret, M. Hanson. Near Infrared Spectroscopy of G29.96-0.02: The first spectral classification of the ionizing star of an ultracompact H II Region. The Astrophysical Journal, 1997, Vol.490: 2.
2. George, P. and Irvine, D. H. The reaction between metmyoglobin and hydrogen peroxide. Biochemical Journal, 1952, 52 (3): 511-517.
3. Jayaraman, R. Observations on the chemistry of the waters of the Bay of Bengal off Madras city during 1948-1949. Indian Academy of Sciences, 1951, Vol.33: 92-99.
4. Jayaraman, R. and Seshappa, G. Phosphorus cycle in the sea with particular reference to tropical inshore waters. Indian Academy of Sciences, 1957, Vol.46: 110-125.
5. Lena, A. Schallenberg., John, K Pearman., Carolyn, W Burns. and Susanna, A Wood. Spatial abundance and distribution of picocyanobacterial communities in two contrasting lakes revealed using environmental DNA metabarcoding. FEMS Microbiol Ecology, 2021, 18; 97(7): fiab075, doi: 10.1093.
6. Pillai, V.N., Pillai, V.K., Gopinathan, C.P. and Nandakumar, A. Seasonal variations in the physic-chemical and biological characteristics of the eastern Arabian sea. Journal of Marine Biological Association of India, 2000, 42 (1and2):1-20.
7. Rajesh, K.M., Gangadhara, Gowda., Mridula, R., Mendon and Hariharan V. Distribution of benthic diatoms in brackishwater ponds along the Nethravathi estuary. South west coast of India. Journal of Marine Biological Association of India, 2000, 42(1and2):32 - 38.
8. Vareethiah, K. and Hanifa, M.A. Quantitative indices of. Phytoplankton in a bar-built estuary. Journal of Marine Biological Association of India, 1997, 39: 1-2.
9. Waga, H., Eicken, H., Hirawake, T. and Fukamachi, Y. Variability in spring phytoplankton blooms associated with ice retreat timing in the Pacific Arctic from 2003-2019. Journal pone, 0261418. 16; 2021, 16(12), doi: 10.1371.