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Research Article

Ecological Studies of Yasuj Bashar River with reference to water quality in 2015-2016

Afsaneh Pezhhan[1], P. Manikya Reddy[2],

Soheila Rezaei[3]and Amin Hossaini Motlagh[4*](corresponding)

[1]Ph.D Student in Env.Health,
Yasuj University of Medical Sciences,Yasuj,Iran
[2]Department of Environmental science,
Osmania University, Hyderabad-500007".India
3Social Determinants of Health Research Center,
YasujUniversity of Medical Sciences, Yasuj ،Iran
4Assistant professor, Ph.D in Env.Health Clinical Research Development Unit,
Yasuj University of Medical Sciences,Yasuj,Iran
Corresponding Authors: Amin HossainiMotlaghAssistant professor,
Ph.D in Env.Health Clinical Research Development UnitBeheshti Hospital,
Yasuj University of Medical Sciences,Yasuj,IranE-mail: aminhomo@yahoo.com

ABSTRACT

The present study deals with the Ecological Studies of Yasuj Bashar River with reference to water quality in 2015-2016. For this purpose chemical and biological parameters were collected and analyzed. The samples were analyzed on the same day in the laboratory for different physico-chemical parameters following the standard methods and phycological.Three stations were selected within the River. The River provides a wide scope of identification of algal diversity existing in the River. The River is an important source of water for agriculture and it is essential to assess the quality of water. Both physico - chemical and phycological aspects are used to assess the quality of water and degree of pollution.Five different groups of algae were recorded in the River i.e. The phytoplankton is dominated by Bacillariophyceae followed by Chlorophyceae,Euglenophyceae, Cyanophyceae and Zygnematophyceae. The species *Chlorella, Closterium, Closteridium,Oedogonium,Anacystis,Fragilaria,Cymbella,Nitzschia, Cyclotella, Synedra, Navicula, Trachelomonas, Phacus, Euglena and*Spirogyra were dominant, and they can be used as good indicators of water quality and pollution.

Keywords: River, Ecology, Algae, Physico-chemical parameters, Water Quality.

INTRODUCTION

Rivers are dynamical systems that are shaped by their discharge, the life cycle of plants and animals, and the occurrence of floods depend on the size and time of different currents (18).In the study of current water (rivers), biologic studies are of particular importance and are a complement to physical and chemical studies that can provide a reasonable and reasonable result of the studied ecosystem (3)**.**Assessing the water quality of a river can be the first and perhaps most important step in the implementation of a proper quality management to eliminate the pollution problem, as it clarifies the individual's view of the process and how the pollution changes at any time, place, and circumstances (1).Knowing the qualitative state of surface water provides the possibility to use methods in different ways to minimize damage to this source. Different techniques for measuring the surface water quality in the world have been studied. The study and identification of

phytoplankton as a biochemical agent is one of the new methods in the world, especially Iran (19).

MATERIAL AND METHODS

Three sampling stations were selected from the Bashar River. Station I is situated where on the upstream of the river and before the interruption of the wastewater treatment plant with river water. Station II is the wastewater of the wastewater treatment plant before entering the river; station III is located after the interruption of waste water with the water river. Water samples from the surface were collected at all the sampling stations at monthly intervals for a period of one year. The samples were analyzed on the same day in the laboratory for different physic -chemical parameters following the standard methods (APHA 1995). For phytoplankton 1 liter of water samples were collected from three different stations of the River and were kept in the sedimentation column after adding 2-3 ml of 4% formaldehyde solution. The material was used for frequency measurements and identification of species. For frequency measurement of different species of algae at each station, the drop method of Pearsal et al., (1946) was followed.

RESULTS AND DISCUSSIONS

In BasharRiver the water was alkaline with an average pH of 7.48. Bicarbonates were present in an average range of 207.93–291.38 mg/l. Chlorides ranged from 7.49–11.02 mg/l. Dissolved oxygen was present in an average range of 2.70– 3.20 mg/l. Nitrates were ranged from 7.68 – 12.06 mg/l. Total hardness ranged from 186.11-206.44 mg/l. Ca and Mg were in the range of 48.86–73.02 mg/l and 13.59–21.64 mg/l respectively. Sulphates ranged from 13.91-37.30 mg/l. Phosphates were recorded in the range of 1.83 - 4.13 mg/l.Mainly five groups of planktonic algae were recorded in the River. They are Bacillariophyceae, Chlorophyceae, Euglenophyceae, Cyanophyceae andZygnematophyceae. At all the station Bacillariophyceae was dominant and occupied the first position. Chlorophyceae occupied the second position at all the stations. At station II, III Euglenophyceaeand at station I Zygnematophyceae occupied the third position. In the present river Bacillariophyceae was chiefly represented, while station I exhibited much higher percentage of Diatoms as compared to other stations.

In the present investigation, Bacillariophyceae found to be dominant group at all the station. Fragilaria were present in considerable number at all the station. The species identified at different stations and the total numbers of common species are given in (Table – 2). At station I the highest peaks were observed during June and the lowest numbers were found during May. At Station II the Bacillariophyceae members were present in very low numbers during summer.At stationIII the highest numbers of these algae were recorded during January (2015)-November(2016). The peaks were mainly due toCymbellaaffinis, C. girdle views, C.,*Nitzschiapalea and Ni. Acicularis*, Synedra ulna girdle view, S. ulna, S. tabulate, S. ulna girdle view and these species were present throughout the period of investigation.

Chlorophyceae was second represented by Chlorococcales, while station II much higher percentage of green algae as compared to other stations favour with low dissolved oxygen. There are many opinions regarding the distribution of this group. According to Seenayya (1971) high bicarbonate content was responsible for their presence. Iyengar (1933) and Philipose (1960) are of the opinion that the presence of nitrate and phosphates may be the other reason. Sampath Kumar (1977) has also emphasized the importance of temperature in the periodicity of Chlorococcales. The present study is in conformity with their findings. Since Chlorococcales developed abundantly in summer at stations I, II. Similar observations were made by Misra et al; (2009), Jawale et al; (2009), Dhande and Jawale (2009). In the present river where the *Chlorella,Eudorina,Pandorina andClosterium species* were very common throughout the year. Gonzalves and Joshi (1946)

and Venkateswarlu (1969C) have reported that high concentrations of dissolved oxygen are favourable for the development of Chlorococcales. Venkateswarlu (1969C) also pointed out that high concentrations of nitrites and low dissolved oxygen appear to be unfavourable for the development of these algae. This is also evident in the present study especially at station III where the dissolved oxygen was comparatively low and nitrites were more.

Blue–green algae occupy fourth place in their dominance at all the stations. Station II recorded high percentage of blue–greens than the other stations. Station III also recorded low concentration of dissolved oxygen. At station III, blue-greens attained maximum numbers in March - May and minimum during November andDecember. In general the high numbers were always during spring months, low members during winter months, when the temperatures were very low. From the data it is quite evident that the blue-greens attain maximum number during summer months when the water temperature and organic matter were high and minimum in winter months when the temperature and organic matter were low. Many investigators stressed the importance of temperature and organic matter in the periodicity of blue green algae (Venkateswarlu 1969 C, and Sampath Kumar, 1977). In Bashar River, water temperature and blue green algae showed a direct relationship in their monthly fluctuations. Manikya Reddy and Venkateswarlu (1987), PullaRedy (2004), Ananthaiah (2010),Bhakta et al; (2010),Navatha, K.,et all (2013),Manikeyareddy, P, et all (2013) and HossainiMotlagh. A (2013) have observed the luxuriant growth of blue greens in waters low in dissolved oxygen. Here the low dissolved oxygen concentrations were associated with high number of blue-greens.

WATER QUALITY

The average values of the important physico-chemical variables of the water bodies studied along with the standards stipulated by WHO (1971) and IEPA are given in the table -1. From the comparison, it is clear that the water in Bashar River can be termed ‘contaminated’.In the present investigation, both the physico-chemical and biological parameters have been taken into account for assessing the quality of water and pollution. Among the biological parameters the algal flora has been used as an important tool in river study. The species observed at all the stations belongs to polluted water organisms.

CONCLUSION

Both physico-chemical and phycological data analyzed in the Bashar river, indicate that the water is polluted and the quality of water is deteriorated. Hence, it cannot be used for different purposes, such as drinking, domestic, and recreation purposes.

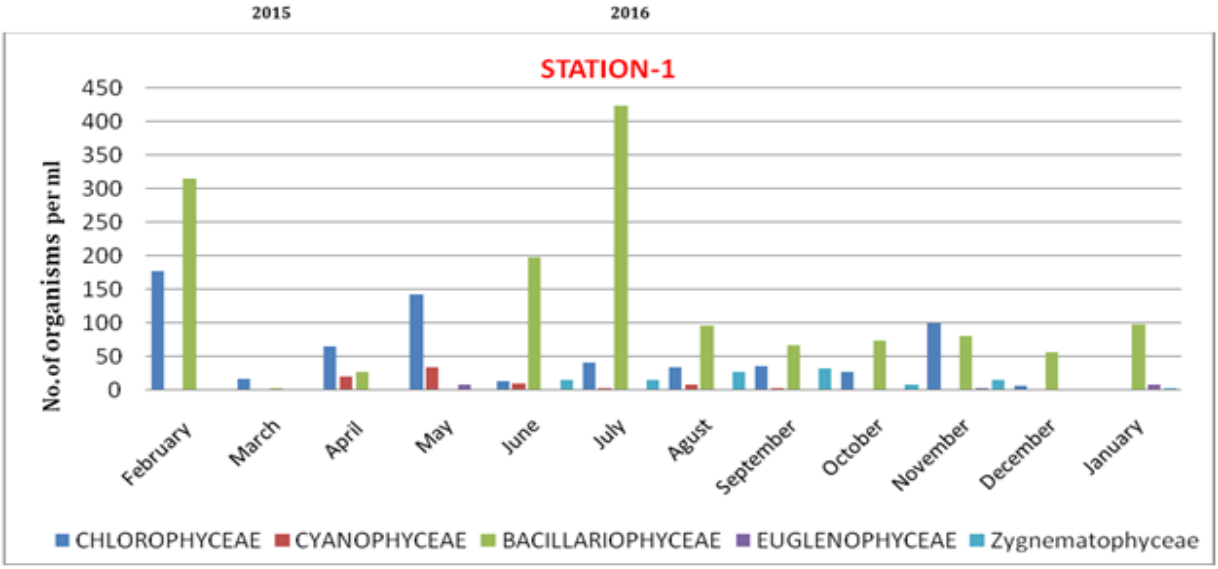
Table: 1 Comparison Of The Present Data With Who And Iepa Standards

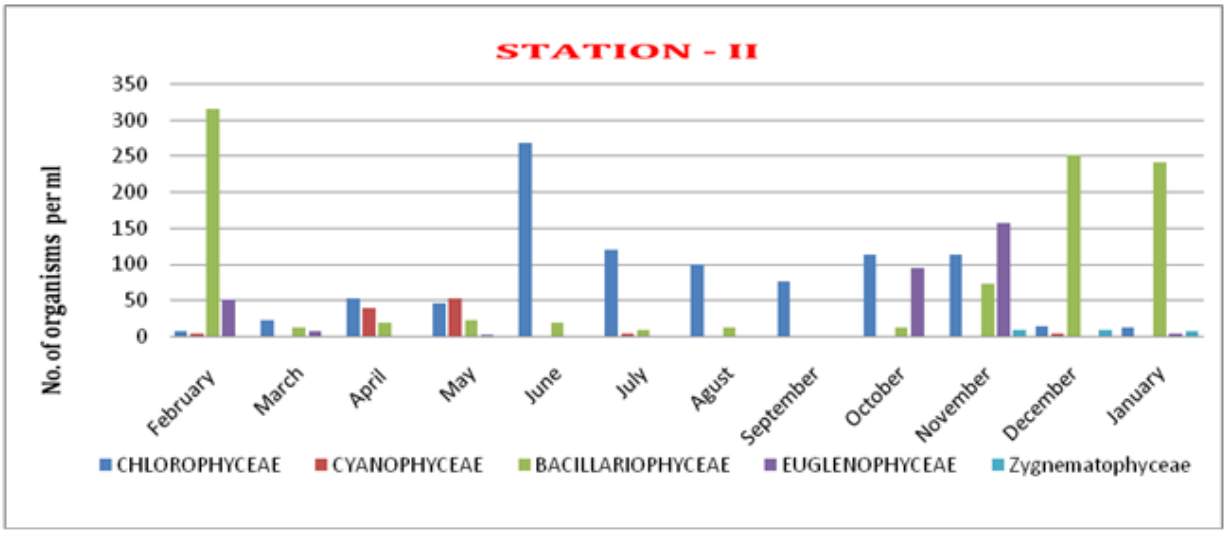
	Bashar River			STANDARDS	
Parameters	TA-1	TA-2	TA-3	IEPA	WHO 1971
pH	.45	.51	.49	6,5 - 9	6,5-8,5
CO_3-				,	,
HCO_3-	07.93	91.38	17.98	,	,
Cl	.88	1.02	.49	,	250 mg/l
D.O	.20	.06	.70	Min 5 mg/l	3 mg/l
Organic Mtter		04.33	78.00	,	,

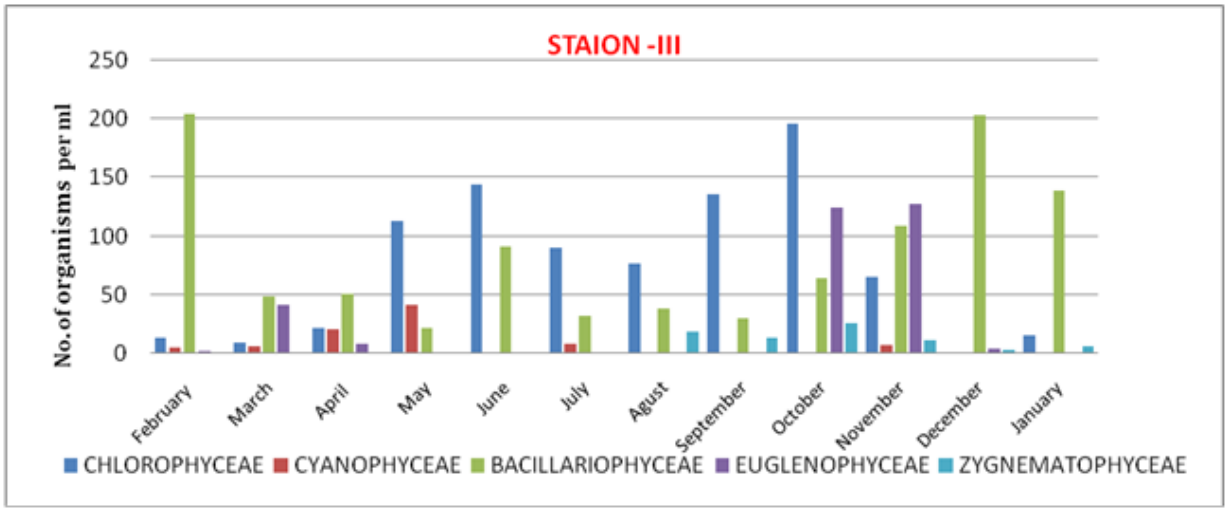
Total Hardness	91.44	06.44	86.11	300 mg/l	300 mg/l
Ca_{2+}	4.06	3.02	8.86	200 mg/l	75 mg/l
Mg_{2+}	3.59	1.64	5.30	150 mg/l	30 mg/l
PO_4^{3-}	.83	.13	.97	,	,
BOD_5	.02	.06	.03	5	
NO_3	.68	2.06	.79	45	,
SO_4^{2-}	6.94	7.30	3.91	250	150 mg/l
NO2				0.05	
K				10	

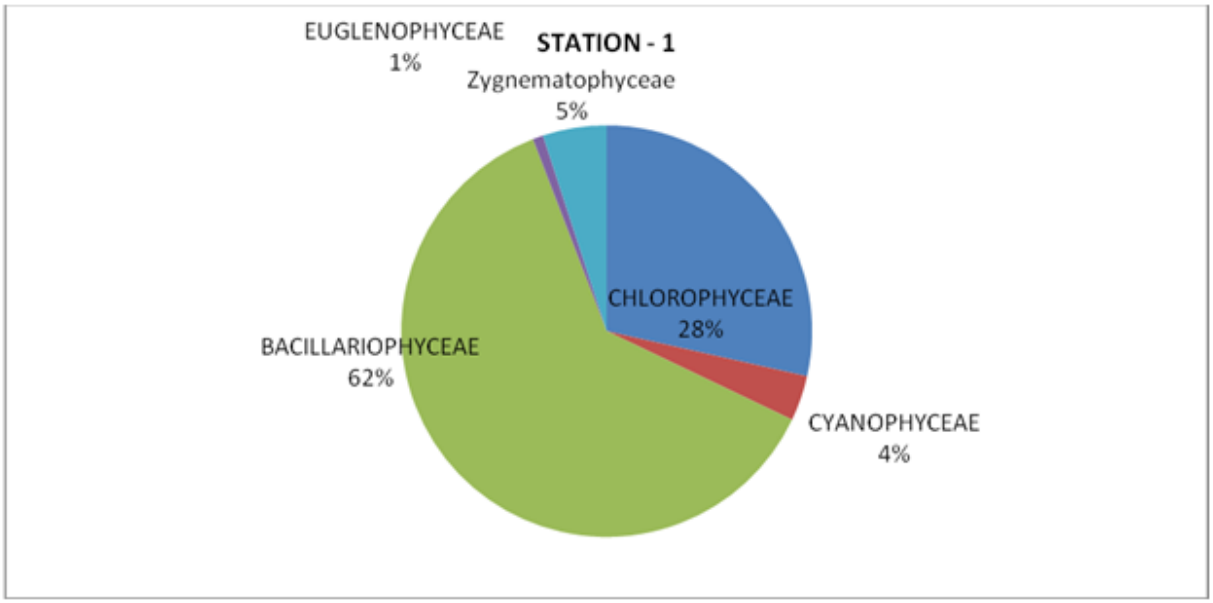
Table: 2 Common Algal Species in Bashar River

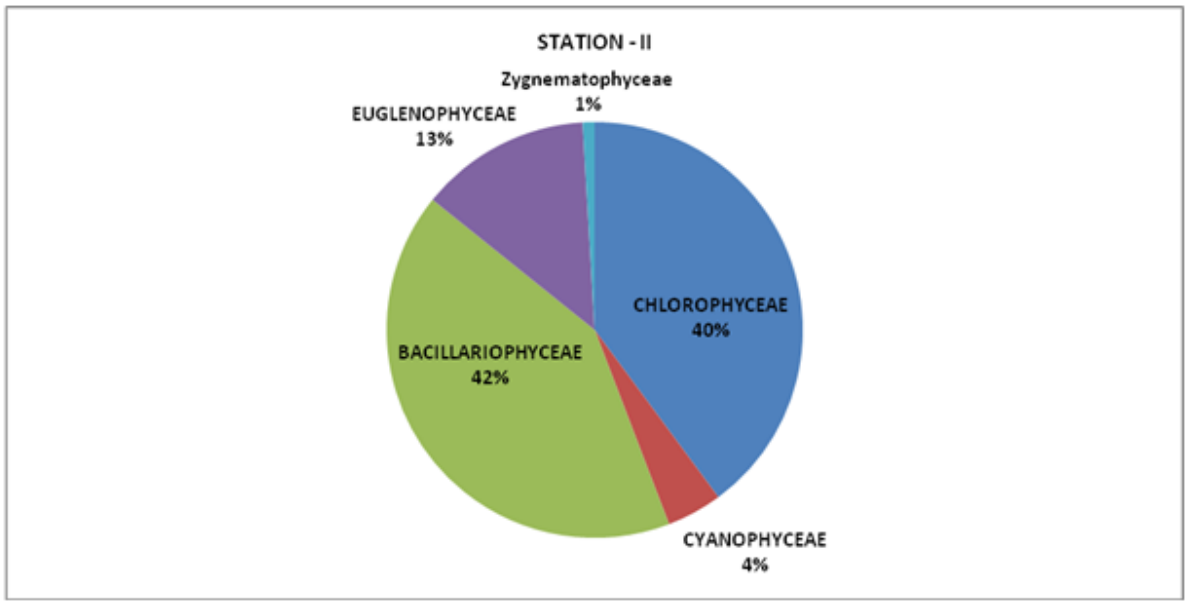
BACILLARIOPHYCEAE	*Cyclotellameneghiniana, Nitzschiapalea and Ni. Acicularis,* Navicullar*hynchocephala,* Cymbellaaffinis , C. girdle views, C. affinis , Gomphonemasphaerophorum , ,Synedra ulna girdle view, S. ulna, S. tabulate, , S. ulna girdle view
CHLOROPHYCEAE	*Chlorella vulgaris, Crucigeniatetrapedia,* Scenedesmusobliquas ,*Scenedesmusarmatus, S. dimorphus, Coelastrumcambricum, Coelastrummicroporum* ,Dictyosphaeriumpulchella، Oocystiscrassa ، Gonium sp. ،Oedogonium sp. ,Ulothrix sp., Stigeoclonium sp.
EUGLENOPHYCEAE	*Phacuslongicauda.,* Euglena polymorpha, *E. proxima, Trachelomonaswoycickii, T. pulcherrima,* Lepocinclisovuam,
CYANOPHYCEAE	*Microcystisaeruginosa , Chroococcusturgidus, OscillatoriaSubbrevis ,Spirulina major , Arthrospiraplatensis,* Anacystis, Spirulina, Oscillatoria, Microcystis, Gomphosphaeria, Agmenellum
ZYGNEMATOPHYCEAE	Spirogyra, Cosmarium, Desmidium

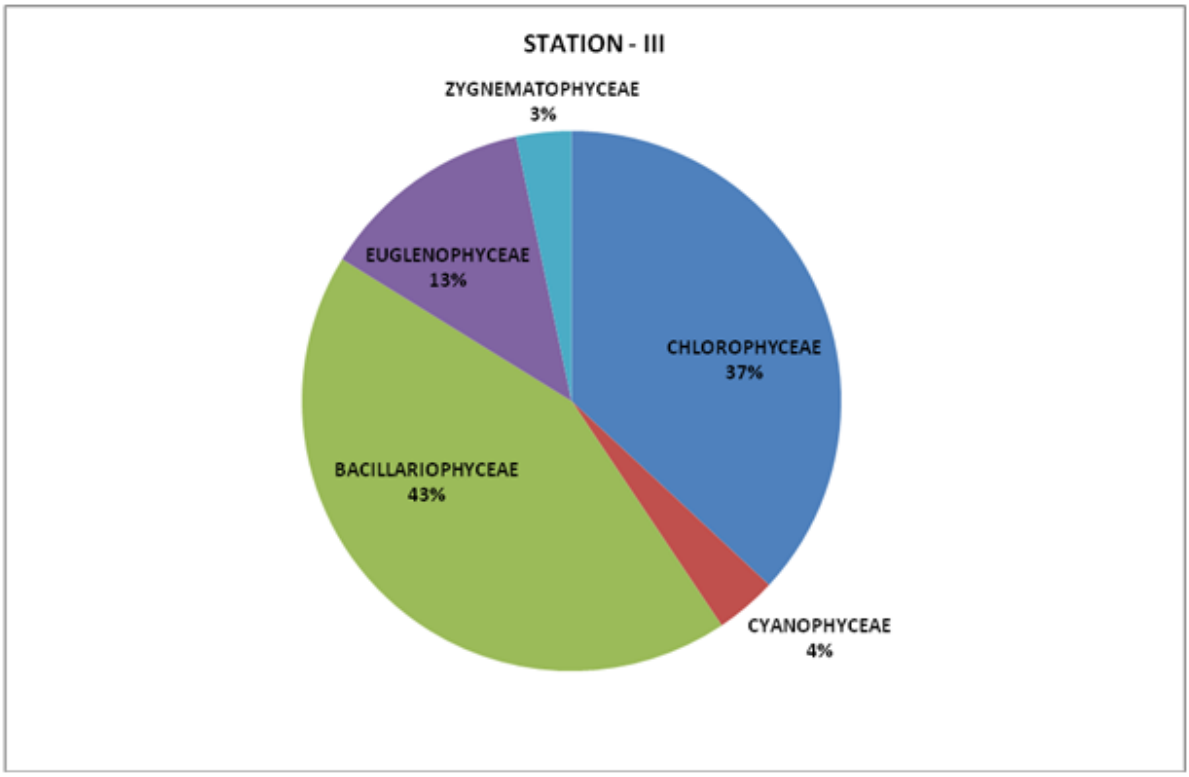



STATION - II
No. of organisms per ml
350
300
250
200
150
100
50
0
February
March
April
May
June
July
Agust
September
October
November
December
January
CHLOROPHYCEAE
CYANOPHYCEAE
BACILLARIOPHYCEAE
EUGLENOPHYCEAE
Zygnematophyceae


STAION -III
No. of organisms per ml
250
200
150
100
50
0
February
March
April
May
June
July
Agust
September
October
November
December
January
CHLOROPHYCEAE
CYANOPHYCEAE
BACILLARIOPHYCEAE
EUGLENOPHYCEAE
ZYGNEMATOPHYCEAE


STATION - 1
EUGLENOPHYCEAE
1%
Zygnematophyceae
5%
CHLOROPHYCEAE
28%
CYANOPHYCEAE
4%
BACILLARIOPHYCEAE
62%





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