Research Journal of Recent Sciences _____ ISSN 2277-2502
Vol. **6(1),** 25-27, January **(2017)** *Res. J. Recent Sci.*

Short Communication

Seasonal variation of Epifloral communities with respect to nutrient load in sediment of Tapi at Utran, Surat, India

Patel Khushboo[1]* and Kapila Manoj[2]
[1]J.N.M. Patel Science College, Bharthana, Surat, Gujarat, India
[2]Department of Aquatic Biology, VNSGU, Surat, Gujarat, India
khushboopatel167@gmail.com

Available online at: www.isca.in, www.isca.me
Received 3rd November 2016, revised 25th December 2016, accepted 31st December 2016

Abstract

This study was aimed to observe the Epifloral communities with respect to nutrient load (Nitrite, Nitrate, and Phosphate) seasonally. This study was carried out for one year from March - 2015 to February - 2016. Sediment samples were collected from Utran, Surat which is located near the Gas based power station on the bank of Tapi River. Sediment samples were collected monthly in morning hours. Samples were analysed for nitrate, nitrite and phosphate. During the study period, four families of epifloral communities were found i.e. Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae with reference to seasonal nutrient load. Nutrient load was high in summer and showed the higher growth of Cyanophycaeae. In monsoon when nutrient load was less Chlorophyacae was observed highest.

Keywords: Epiflora, Nutrient load, Sediment, Tapi, Utran.

Introduction

Tapi River is important freshwater source for the Surat city. Utran is located near Gas based power station on the bank of Tapi river on Latitude 21° 13' 34.254" N and Longitude 72°51'57.08"E. It is a freshwater zone of Tapi River where all the domestic and industrial wastes are dumped. Epifloral communities are unicellular eukaryotic algae and cyanobacteria that grow within the upper several millimetres of illuminated sediment, typically appearing only as brownish or greenish shading[1]. They are primary producers for the sediment ecosystem. They are sensitive to the environment in which they live and any alteration in them leads to change in the plankton communities in terms of tolerance, abundance, diversity and dominance in the habitat[2]. The importance of benthic algal photosynthesis to aquatic food webs is often underappreciated[3]. They can grow on the surface of the sediment which is directly exposed to the sunlight. Point sources of nutrients may result in increased benthic algal productivity with little increase in benthic algal biomass because of rapid transfer of organic matter to grazers[4]. Epifloral communities play an important role for monitoring the environmental pollution. Zoo benthos are dependent on epifloral communities for nutrition. Present study is an attempt to investigate the seasonal variation of epifloral communities with respect to nutrient load in sediment of Tapi at Utran.

Methodology

To fulfill the objectives and aims of the study, monthly collection (March 2015 to February 2016) was taken from selected site in the morning time. The sediment samples were collected as described by Nybakken[5]. Samples were collected by using 30 cm long acrylic core of 7.5 cm diameter which was pushed into mudflats up to 5cm and the sediments were scooped out per m^2 area. At each sample spot, samples were collected, pooled and stored in polythene bag. Sediment sample was dried and preserved for selected chemical parameters. Epiflora had been collected by carefully scooping the superficial layer with the help of glass slide and preserved in 4 % formalin solution.

Table-1: Methods for analysis of sediment

Parameter	Method	Source
Nitrate	Cadmium Reduction Method	IS 3025 (P – 34) 1988
Nitrite	Spectrophotometric Method	IS 3025 (P – 34) 1988
Phosphate	Stannous Chloride Method	APHA 21st edition - 4500 (pp 4-151)

Results and discussion

During the summer period (March 2015 to June 2015) nitrite, nitrate and phosphate were estimated higher than other seasons. Among them phosphate was more than nitrite and nitrate. Cyanophyceae group was observed more than the Chlorophyceae, Bacillariophyceae and Euglenophyceae. They are gradually decreased in monsoon and winter season. In summer season nutrient load was higher so epifloral communities were found higher than other two seasons. Generally, the higher concentration of nutrients is responsible for the more growth of blue green algae. According to

Philipose[6] natural factors like alkalinity nitrate and phosphate are responsible for the growth of Cyanophyceae. Maximum value of pH and nitrate supports the growth of Cyanophyceae[7].

During the Monsoon period (July 2015 to October 2015) nitrate, nitrite and phosphate were estimated lower than the summer and winter season which may be because of dilution due to flooded condition. Phosphate was reported higher than nitrite and nitrate. In Monsoon season nutrient load is low so epifloral communities were found less than other two seasons. Maximum Chlorophyceae density reported during winter according to Kulshrestha and Joshi[8]. But during study Chlorophyceae was observed more than the Bacillariophyceae, Cyanophyceae and Euglenophyceae in monsoon period.

Table-2: Seasonal variation of Epifloral communities

Season	Epifloral Communities			
	Bacillariophyceae	Chlorophyceae	Cyanophyceae	Euglenophyceae
Summer	++	+++	++++	+
Monsoon	+++	++++	++	+
Winter	++++	+++	++	+

Table-3: Seasonal variation of nutrient load

Seasons	Nutrient load		
	Nitrate (mg/kg) (Mean ± SD)	Nitrite (mg/kg) (Mean ± SD)	Phosphate (mg/kg) (Mean ± SD)
Summer	23.66 ± 4.30	1.35 ± 0.89	60.02 ± 10.80
Monsoon	16.99 ± 4.89	1.16 ± 0.60	46.60 ± 7.02
Winter	19.14 ± 11.42	1.23 ± 0.19	58.97 ± 10.89

Table-4: Showing maximum growth of Epifloral communities in respect to nutrients

Parameters	Epifloral communities		
	Cyanophyceae	Bacillariophyceae	Chlorophyceae
Nitrate (mg/kg)	23.66 ± 4.30	19.14 ± 11.42	16.99 ± 4.89
Nitrite (mg/kg)	1.35 ± 0.89	1.23 ± 0.19	1.16 ± 0.60
Phosphate (mg/kg)	60.02 ± 10.80	58.97 ± 10.89	46.60 ± 7.02

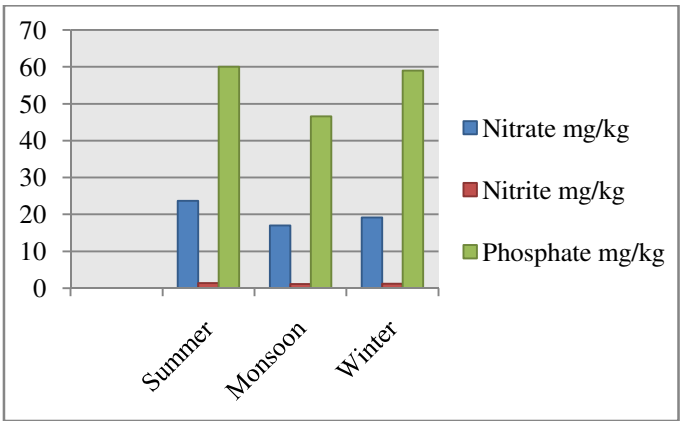

Figure-1: Showing seasonal comparison of nutrients.

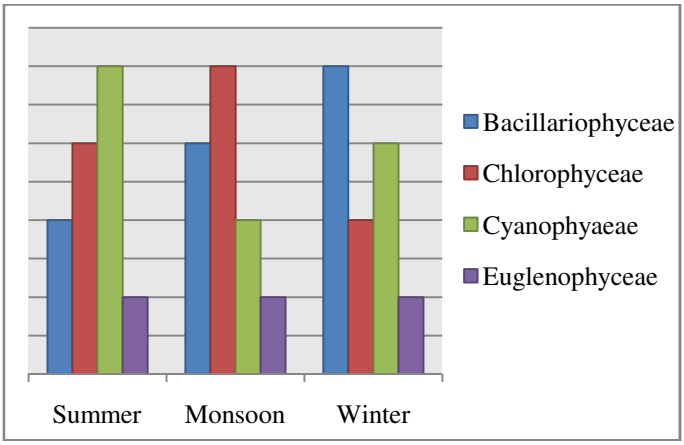

Figure-2: Showing seasonal comparison of Epiflora.

During the winter period (November 2015 to February 2016) nitrite, nitrate and phosphate were reported higher than the monsoon period. During this period also phosphate was reported higher than nitrite and nitrate. Maximum Bacillariophyceae group was observed compared to Chlorophyceae, Cyanophyceae and Euglenophyceae. Velecha and Bhatnagar[9], Tripathy and Pandey[10] reported same observation. Bacillariophyaceae were reported less in summer. Same result was reported by Munawar[11]. Nutrient load was found maximum in summer and minimum in monsoon. In monsoon there is more dilution of nutrients due to the rain. After the monsoon nutrient load is gradually increasing so high productivity occurs because sediment surface is directly exposed to the sunlight.

Euglenophyceae was remaining lesser than all communities in all seasons. Cyanophyceae were more when nutrient load was highest and when nutrient load was lowest Chlorophyceae group was observed highest.

Conclusion

In conclusion the present study revealed that the population of epifloral communities depend upon the nutrient load in aquatic system. According to result it is concluded that phosphate is

responsible for the better growth of Bacillariophyceae, Chlorophyceae, Cyanophyceae during winter, monsoon and summer period respectively. Generally Cynophyceae members are responsible for the eutrophication in river. It indicates the accumulation of polluted waste materials in aquatic system is taking place. We can reduce but can't discontinue the effluence source with the developing industries and all human activities. So Cynophyceae group are bad as well as good. Some species of this group like *Anabena sp.* and *Nostoc sp*. are enhancing the soil fertility by nitrogen fixing. As a food supplement and medicine *spirulina sp.* is known as a super food. While *Oscillatoria sp*. and *Anabena sp*. are used for the solar energy conversion by hydrogen production. So this quality of sediment is best for the culture of Cynophyceae communities. It may hold immense potential for the future and could be exploited for man's economy.

Acknowledgement

The authors are heartily thankful to the Department of Aquatic Biology, V.N.S.G.U. and J.N.M. Patel Science College for providing laboratory facilities and all staff members for their co-operation and support during this research work.

References

1. Rejil B.T. (2012). Microalgal vegetation in the selected mangrove ecosystems of kerala. *marine biology*, under the faculty of marine sciences.

2. K. Thirugnanamoorthy M.S. (2009). Phytoplankton Diversity in Relation to Physico-Chemical Parameters of Gnanaprekasam Temple Pond of Chidambaram in Tamilnadu, India. *Recent Research in Science and Technology,* 1(5).

3. Strayer D. and Likens G.E. (1986). An Energy Budget for the Zoobenthos of Mirror Lake, New Hampshire. *Ecology*, 67(2), 303–313. Https://doi.org/10.2307/1938574

4. R.J. Stevenson, M.L. Bothwell, R.L. Lowe, J.H. Thorp (1996). Algal ecology: Freshwater benthic ecosystem. New York, NY: Academic Press.

5. Nybakken J.W. (1988). Marine Biology: An ecological approach, second edition, Harper Collins Publisher, 73-74, 297-298, 338-350.

6. Philipose M.T. (1967). Chlorococcales, New Delhi ICAR.

7. Naik U.G., Bhosale S.H., Rathod J.L. and Bhat V.G. (2005). Diversity of phytoplanktonic groups in the river kali, west coast of India. Proceeding of Senior, Lecture University Grants Commission Haveri, 192-196

8. Kulshrestha S.K. and Joshi M. (1991). Periphyton community of lower lake of Bhopal in relation to sewage pollution. In Gopal Athana V. (Eds), Aquatic Science in India. Indian Association for Limnology and Oceanology, 65-75.

9. Valecha V. and Bhatnagar G.P. (1988). Seasonal changes of phytoplankton in relation to some physico-chemical factors in lower lake Bhopal. *Geobios*, 15, 170-173.

10. Tripathy A.K. and Pandey S.N. (1990). Water Pollution. Ashish Publishing House, 1, 326.

11. Munawar M. (1970). Limnological studies on fresh. Water ponds of Hyderabad India II. The biocoenose distribution of Cellular and colonial phytoplankton in polluted and unpolluted environments. Hydrobiodogia, 36/05428

12. Indian Standards B. (1988). IS 3025-34 (1988): Methods of sampling and test (physical and chemical) for water and wastewater, Part 34: Nitrogen.

13. APHA (1998). Standard method for the examination of water and waste water, (19th Ed). New York: American Public Health Association, Inc.