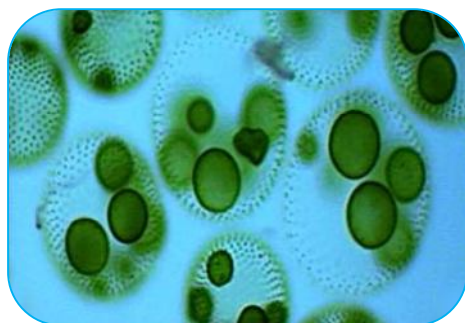




ISSN: 2249-894X
 IMPACT FACTOR : 5.7631 (UIF)
 UGC APPROVED JOURNAL NO. 48514
 VOLUME - 8 | ISSUE - 8 | MAY - 2019



“THE STUDY OF SOME PHYSICO-CHEMICAL PARAMETERS AND ITS EFFECT ON CHLOROPHYCEAN ALGAL FORMS”

Girish C. Kamble¹, H. J. Petkar² and K.D. Jadhav³

¹ Department of Botany, SRRL Science College, Morshi, Dist-Amravati, Maharashtra, India.

² Centre for Information and Languages Engineering, Mahatma Gandhi Aantarrashtriya Hindi Vishwavidyalaya, Wardha, India.

³ P.G. Department of Botany, Govt. Vidarbha Institute of Science and Humanities, Amravati.

ABSTRACT:

The physicochemical parameters and environmental factors and chlorophycean algal forms of the seasonal fresh water

stream located 9 km away from Morshi taluka in Vidarbha region of Maharashtra were studied during July to December 2016. A total 18 algal forms belonging to Chlorophyceae were recorded. Some physicochemical parameters of stream and environmental factors were observed. The correlation between physico-chemical parameter, environmental factors and aquatic chlorophycean algal flora has been evaluated qualitatively.

KEYWORDS : Environmental factor, Physico-chemical Parameter, Chlorophycean form, Hydrobiology.

INTRODUCTION:

The physicochemical parameter and environmental factors play important role individually while the final effect is a cumulative result of the interaction between these factors. Aquatic flora and phytoplanktons are sensitive to these environmental factors and physicochemical parameters which, in turn, lead to change in the algal flora in a habitat (Thirugnanamoorthy and Selvaraju, 2009). Morshi is one of the taluka in vidarbha region of Maharashtra. It is

located at 78° 00' 11" East longitude and 21° 20' 08" North latitude with maximum temperature around 42.2° C and minimum temperature around 15° C during the present study. The phytoplanktons are basically associated with the aquatic ecosystems therefore, there is correlation between phytoplanktonic flora and aquatic environ (Dutta et al., 1954). The aquatic algal flora is influenced by the interaction of physico-chemical, environmental factors. The present work has been carried out relative to eco-environmental factors and algal flora in one of the seasonal fresh water streams just 9 km away from the Morshi taluka. The agricultural farm land are present on both side of water

stream.

MATERIAL AND METHOD

Monthly samplings were assessed during the period of present study. Water sample and algal material were collected in every month from 4-5 sampling spot of the stream. The algal collections were preserved in 4% formalin and brought to the laboratory for temporary slide preparation and microscopic observation. The temporary slides of the monthly algal collection mounted with glycerine were prepared and observed under microscope for the camera lucida diagram and identification of the algal forms (Forest, 1954; Philipose,

1967;Chadha and Pandey,1977;Ramnathan, 1964;Tiffany, 1930;Randhawa,1959;Prasad and Mehrotra,1977;Prescott,1966;Saxena and Venkatswarlu,1968; Bruhl and Biswas,1926; Migula,1907). The Physico-chemical factors and environmental factors of the sample such as pH, nitrate, hardness, turbidity, temperature etc. were analysed by following the standard method and depicted in the Table 1 and Table. 2 (APHA,1971; Kodarkar,1992).

CHLOROPHYCEAN ALGAL FORMS -SYSTEMATIC ENUMERATION

Division-Chlorophyta

Class- Chlorophyceae

Order- Volvocales

Family- Chlamydomonaceae

Genus- *Chlamydomonas* Ehr.

- 1) *Chlamydomonas ehrenbergii* Gorosh

Order – Chlorococcales

Family- Oocystaceae

Genus- *Chlorella* Beyerinck

- 1) *Chlorella pyrenoidosa* Chick

Family- Scenedesmaceae

Genus- *Scenedesmus* Meyen

- 1) *Scenedesmus bijugatus* var. *bicellularis* (Chodat) com. nov. Philipose
- 2) *Scenedesmus quadricauda* var. *quadrispina* (Chodat) G. M. Smith
- 3) *Scenedesmus monomorphosus* Chadha et. Pandey

Order- Ulotrichales

Family-Ulotrichaceae

Genus- *Ulothrix* Kuetz

- 1) *Ulothrix tenuissima* Kuetz
- 2) *Ulothrix aequalis* Kuetz

Order- Oedogoniales

Family- Oedogoniaceae

Genus- *Oedogonium* Link

- 1) *Oedogonium globosum* Nordst
- 2) *Oedogonium rugulosum* Nordstedt ex. Hirn

Order- Conjugales

Family- Zygnemaceae

Genus- *Spirogyra* Link.

- 1) *Spirogyra hyaline* Cleve

Family- Desmidiaceae

Genus- *Cosmarium* Corda

- 1) *Cosmarium subtumidum* Nordst
- 2) *Cosmarium subtumidum* var. *Klebesii* Gutw
- 3) *Cosmarium tenuu* Arch.
- 4) *Cosmarium leave* Rabenhorst
- 5) *Cosmarium pseudogranatum* Nordst
- 6) *Cosmarium norvegicum* Stroem
- 7) *Cosmarium portianum* Arch.

8) *Cosmarium subcrenatum* Hantzsch.**RESULT AND DISCUSSION**

The 18 Chlorophycean algal forms were observed in the present investigation. Chlorophyceae was represented by *Cosmarium*, *Scenedesmus*, *Oedogonium*, *Ulothrix Spirogyra*, *Chlorella Chlamydomonas*. The alkaline water and high pH has been reported as the favourable factor for abundance growth of chlorophycean forms (Gonzalves and Joshi, 1964; Gahotri *et al.*, 1980; Thirugnanamoorthy and Selvaraju, 2009). The present study revealed the conformity with the previous observation. The environmental factors have a profound effect upon the determination of population of algal forms in water body (Ganpati, 1960). The abundance in Chlorophycean flora has been reported in summer season (Whiteford and Schumcher, 1963).

The temperature plays a very important impact on algal growth (Nazneen, 1980). The high nutrient content in aquatic habitat causes a favourable effect with respect to the presence of phytoplanktons (Ferguson and Harper, 1982). The more chloride content is also a favourable component towards more growth of algal forms (Verma and Shukla, 1979; Kamble, 2015).

The present investigation represented that the range of temperature, high chloride content, pH range 7.4-8.4 and alkalinity collectively favoured towards the luxuriant growth of algal flora and phytoplankton (Kamble 2015; Kamble and Tayde, 2001). The high temperature is a favourable factor for the more desmid population in the aquatic habitat (Venkateshwarlu, 1983). The turbidity has been reported to have a considerable effect on algal growth (Barhate and Kamble, 2007). The present study revealed the agreement with previous study. The pH ranged between 5-8.5 has been reported as favourable for algal growth (Umavathi *et al.*, 2007). According to Elayaraj and Selvaraju (2014) high nitrate concentration could result in algal blooms in water body. The important source of nitrate in water body may be attributed to the agricultural use of fertilizers in adjacent agricultural land. It has been reported that there is a correlation between physicochemical parameters and phytoplankton density (Elayaraj and Selvaraju, 2014). In the present study, algal bloom was observed during September to December 2016. The present observation revealed the conformity with previous study.

CONCLUSION

The various physicochemical parameters such as high pH, nitrate, chloride, turbidity, hardness were found to be associated with the abundance growth of chlorophycean algal form. The more nutrient concentration in aquatic environment favoured luxuriant growth of algal flora in present study. The genus *Cosmarium*, *Scenedesmus*, *Ulothrix* and *Spirogyra* were abundantly present in the water body. The environmental factors revealed also the favourable impact upon the luxuriant growth of the chlorophycean members.

REFERENCES

- [1] A. P. H. A. (1971), Standard methods for the examination of water and waste water (13th Edn.) Amer. Pub. Health Assoc., New York.
- [2] Barhate, V. P. and Kamble, G. C. (2007), The study of environmental effects on the aquatic Cyanophycean forms of Nirguda River, Urban Planning and Environment Strategies and Challenges (Ed. L. Vyas), Macmillan India Ltd., pp 300-302.
- [3] Bruhl, P. and Biswas, K. (1926), Algae of Loktak Lake., *Mem. Asia Soc. Bengal* 8(5), pp 257-315.
- [4] Chadha Asha and Pandey, D. C., (1977), Addition To Algal Flora Of Allahabad-I Genus *Scenedesmus*, *Phycos.* 16(1 and 2), pp. 69-75.
- [5] Dutta, N., Malhotra, J.C. and Bose, B.B. (1954). Hydrobiology and Seasonal fluctuations of the phytoplankton in the Hooghly estuary in IPFC. Proc. 35-47.
- [6] Elayaraj, B. and Selvaraju, M. (2014), Studies on some Physico-chemical Parameters of Cyanophycean Members and Correlation Coefficient of Eutrophic ponds in Chidambaram, Tamil Nadu, India *International Letters of Natural Sciences* 16, pp 145-156.

- [7] Ferguson, A. J. D. and Harper, D. M. (1982), Rutland water phytoplankton, the development of an asset or a nuisance, *Hydrobiologia*, 88, pp 117-133.
- [8] Forest, H.S.(1954), Handbook of Algae, The University of Tennessee Press, Knoxville.
- [9] Ganpati, S. V. (1960), Ecology of tropical water, Proc. Sm. Algology, ICAR, New Delhi, pp 204-218.
- [10] Gahotri, O.D., Chaturvedi, L.D., and Joshi, B.D. (1980). Ecological studies of sewage fed pond including seasonal fluctuation of its planktonic component. 5th All India Conference of Zoology Abstract L.4, p 152.
- [11] Gonzalves, E.A., and Joshi, D.B. (1964). The seasonal succession of the algae in tank of Bandra. *Journal of Bombay Natural History Society*, 46, 1544, 154-176.
- [12] Kamble, G. C. (2015), The Study of Eco-environmental Impact on Hydrobiological Algal forms of Nurguda River. *International Journal of Engineering and Applied Science*, 5 (10) ,pp 132-135.
- [13] Kamble, G. C. and Tayde, D.T. (2001), Studies of some physicochemical parameters and hydrobiological algal pollutants of water sources in Revasa, *Oriental Journal of Chemistry*, 17(3), pp 493-496.
- [14] Kodarkar, M. S. (1992), Methodology of water analysis, Indian Association of aquatic Biologists Publication No. 2, pp 1-50.
- [15] Migula, W.,(1907), Cryptogams Flora Von Deutsch Oesterreich Under Schweisim Anschulues an Thome's Flora Von Deuschalnd, Band II, Algen Teil1 Cyanophyta Diatomaceae, Chlorophyceae, p 918.
- [16] Nazneen, S. (1980), Influence of hydrobiological factors on the seasonal abundance of phytoplankton in Kinjhar lake, Pakistan, *Int. Rev. Ges. Hydrobiologia* 65 (2), pp 269-282.
- [17] Philipose, M. T.(1967), Chroococcales, I.C.A.R., New Delhi.
- [18] Prasad, B. N. and Mehrotra, R. K. (1977), Some Desmids new to Indian Flora *J. Ind. Bot. Soc.* 56, pp.343-350.
- [19] Prescott, G. W. (1966), Algae of Panama Canal and Its Tributaries.II. Conjugales., *Phycos.* 5, pp1-49.
- [20] Ramnathan, K. R.(1964), Ulotrichales, I.C.A.R., New Delhi.
- [21] Randhawa, M S.(1959), Zygnemaceae, I.C.A.R., New Delhi.
- [22] Saxena, M. R. and Venkatshwarlu, V. (1968), Desmids of Andhrapradesh. II from Dharmasagar Lake, Warangal., *J. Indian Bot. Soc.* 47(1&2) pp 23-45.
- [23] Tiffany, L. H. (1930), The Oodogoniaceae-A Monograph, Columbus Union.
- [24] Thirugnanamoorthy, K. and Selvaraju, M. (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), pp 235-238.
- [25] Umavathi S., Longakumar K. and Subhashini, (2007), Studies on the nutrient content of Sular pond in Coimbatore, Tamil Nadu, *Journal of ecology and environmental conservation*, 13(5), pp 501-504.
- [26] Venkateshwarlu, V. (1983), Ecology of Desmids I *Staturastrum tetracerum* Ralf., *Indian J. Botany*, 6(1), pp 68-73.
- [27] Verma, S. R. and Shukla, G.R. (1970), The physico-chemical condition of 'Kamla Nehru Tank' Muzaffernagar, U. P. in relation to biological productivity, *Environmental Health*, 12, pp 110-128.
- [28] Whiteford, L. A. and Schumacher, G. J. (1963), Communities of algae in North Carolina streams and their seasonal relation, *Hydrobiologia*, 22(1 and 2), pp 133-196.

Table 1. Physicochemical Parameter (in ppm).

Physicochemical Parameter	July	August	September	October	November	December
pH	7.4	7.7	7.9	8.2	8.2	8.4
Nitrate	0.39	0.42	0.42	0.45	0.38	0.38
Total hardness	219	220	204	200	198	198
Chloride	28	28	22	20	18	18
Turbidity	1.1	1.2	1.6	1.3	1.8	1.8

Table 2. Environmental Factor.

Sr. No	Month	Rainfall (in mm)	Temperature(in °C)	
			Maximum	minimum
1	July	427	36.7	22.5
2	August	475	36.5	22.2
3	September	382	36.4	21.2
4	October	192	36.2	21.2
5	November	110	32.1	20.9
6	December	12	32.1	15.8

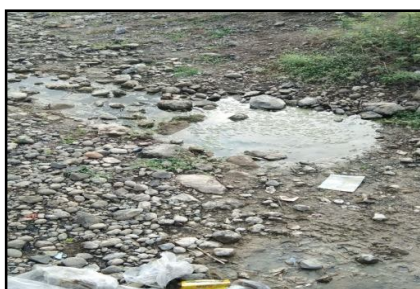


Plate1. Sample Collection Spot A



Plate2. Sample Collection Spot B



Plate 3. Sample Collection Spot C



Plate4. Abundance Algal Growth