



Studies on Algal Flora of Pool Water of Supataal and Devtaal of Jabalpur City

KEYWORDS

Eutrophic, Oligotrophic, Bloom, Pollution, Cyanophages

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ABSTRACT *The studies of algae of pools water were done for two consecutive seasons. The algal samples were collected in the month of May (summer) and in December (winter) from both the sites. The water samples were analyzed for its temperature, pH and dissolved oxygen. The diverse algal forms recorded are presented in the paper.*

INTRODUCTION:

Water constitutes the main part of our environment. It contains a number of impurities in varying amounts. The sources of contaminants are natural as well as synthetic. The rainwater when moves on the ground carry silt and organic impurities. Waterborne domestic and industrial waste is called sewage. It contains organic and inorganic materials in soluble and suspended form. It is a rich source of many inorganic nutrients like sulphur, nitrogen, phosphorus and potassium. Excessive presence of nitrogen and phosphorus proliferates the growth of aquatic algae results in the formation of algae blooms (Hem, 1992). Decomposition of algae like Anabaena, Microcystis, imparts bad odour and toxins to the water. In polluted water a characteristic algal flora come up and they serve as the indicator of the quality of water (Philipose, 1972). Algae also interfere with water treatment process. Toxins secreted by Gymnodinium and Pyrodinium kill many kinds of fishes. Algal blooms lead to oxygen deficiency to the other aquatic forms.

Devtaal and Supataal forms the important water systems for Jabalpur city for recreational activities. Both taals are situated about a kilometre distance from each other. Studies were carried to conserve the constant deterioration of water quality as algae has special significance in pollution studies. Wastewater, fertilizers and livestock farming are the major source of nitrate in groundwater (Hem, 1992). The main factors which appear to determine the development of planktonic population are light, temperature and nutrient concentration. Jabalpur city is well known as 'City of Taal' and many of these water bodies are in loss due to loss of conservation and maintenance. Due to lack of awareness human interference with these water bodies causing serious threat to health and water system. The DO values of water were suitable for potability and aquaculture (Shastri and Pendse, 2001).

MATERIALS AND METHODS:

The water samples were collected randomly from the selected sites of Devtaal and Supataal during morning hours of the day. One-litre plastic bottles were used for water sample collections. Samples were analyzed for algal forms and pH, temperature, dissolved oxygen. Algae were separated from the water sample through filtration. Filtered water was used for the physico-chemical character study of water samples and concentrated samples were preserved in 4 percent Formalin for detailed study of algal flora. The water was examined within 12 hours when brought to the laboratory. pH was recorded with pH meter, temperature was recorded on the sampling site with thermometer. Dissolved oxygen was determined through titrimetric method (APHA, 1995).

Direct microscopic examination of algae was performed after thorough washing. Micrographs of the sampled algae were taken. Taxonomic characterization of algae was done through

standard monographs available in literatures (Smith 1950, Desikachary 1959). Purification of algal samples was done through plating method. The medium used for cultivation of algal cells was Basal Bold's medium (Starr and Zeikus, 1973)

RESULTS :

The analyzed results of water quality for pH, temperature and DO is presented in Table 1

Table 1

PARAMETERS	DEVTAAL			SUPATAAL		
	W	S	MEAN	W	S	MEAN
pH	8.5	9	13	7.2	8.0	11.2
Temperature(°C)	24	35	41.5	25	36	43
DO(mg/l)	8.2	7.5	11.9	4.2	6.0	7.2
transparency	low	low	-----	high	low	-----

The algal flora recorded is presented in Table 2:-

Algae	DEVTAAL		SUPATAAL	
	W	S	W	S
Bacillariophyceae				
Pinnularia	+	+	-	+
Fragilaria	+	-	-	+
Navicula	+	+	+	+
Chlorophyceae				
Chara	+	-	-	-
Codium	-	-	+	+
Oedogonium	+	-	+	-
Cladophora	-	-	+	-
Scenedesmus	+	-	-	-
Spirogyra	-	-	+	+
Cyanophyceae				
Microcystis	-	-	+	-
Lyngbya	-	-	+	-
Scytonema	-	-	+	+
Anabaena	-	-	+	-
Nostoc	-	-	-	-
Chroococcus	-	+	+	+
Gloeocapsa	-	+	+	+
Gloeotricha	-	+	+	+
Aphanotheca	+	-	+	-
Synechococcus	+	+	-	-
Oscillatoria	+	+	+	+

W = Winter Season, S = Summer Season, + Present, - Not Found

DISCUSSION:

The water temperature of the pool ranged between 24°C to 35°C showing a uniform pattern of variation as both the study sites were located in the same area. The pH varied from 7.2 to 8.0 in Supataal whereas it ranged from 8.5 to 9.0 in Devtaal. The higher range of the pH indicates higher productivity of water. Rao (1953) pointed out that pH has a direct relationship with the density of blue-green algae. The temperature effect on pH is very less as observed by Dhawan (1970). Arise in temperature of water leads to speeding up of chemical reaction as observed by Shelat et al. (2005).

Bloom forming plankton *Microcystis* was observed only in Supataal in winter season. Toxin producing cyanophycean *Anabaena* and *Lyngbya* were also reported in Supataal in winter season. Water of Devtaal contains no toxin producing forms, *Bacillariophyceae* were the dominant algal flora. Dissolved oxygen was found to be high in winter season and low in summer. This finding about dissolved oxygen is in conformity with George et al. (1966) and Saxena et al. (1966). The DO value of Supataal was minimum in winter (4.2mg/l) confirming the polluted nature of the water. In the present investigation, the DO concentration ranged from minimum 4.2mg/l to maximum 8.0 mg/l. The mean average values of DO of sampled stations showed a significant difference of 4.7mg/l. The temperature was not found to be correlated with DO. Ganapat (1940) and Nasar and Munshi (1974) reported that temperature is not always the chief controlling factor of oxygen content but algal blooms play an important role.

It is reported that slight change in physical or biotic environment can favour one species over another and alters the Phytoplankton quality of water bodies (Treshow, 1970).

Phytoplanktons population depends on cumulative effect of temperature, pH, DO, nitrate, phosphate and organic matter (Munawer, 1970). High concentrations of nitrate and phosphate in water favours the chlorophycean members and high sulphate is favoured by the cyanophycean members only (Philipose, 1959). Thus, excessive presence of *Microcystis* in Supataal indicates it as eutrophic water body. It was investigated that amount of sewage input was increased rapidly from summer to winter season. This water body contains organic contaminants in abundance producing foul smell due to decomposition of organic waste. It is not safe for recreational activities and for indigenous aquatic life. To the contrary, the nutrient status of Devtaal found to be oligotrophic, as it is reflected by the low abundance of algal flora. This water body contains aquatic plants in rich number, which maintain the dissolved oxygen of the water. It receives no sewage input; though detergents are continuously wash off into the water. The temples constructed along the banks protect the water body from direct sunlight throughout the day, which slows down the process of bloom formation. Water of Devtaal may contain Cyanophages, as number of Cyanophycean forms found to be low.

**REFERENCE**

- APHA (1995): Standard methods for examination of water wastewater. American Public Health Association, 19th edition. Inc, New York. pp.1760
- | Desikachary T. V. (1959): Cyanophyta. ICAR, New Delhi, India, pp. 686. | Dhawan R. M. (1970): Plankton and hydro biological factor at Kandla in the Gulf of Kutch during 1960-1963. Indian Journal of Fisheries, Vol-17, pp.122-131. | Ganpati S.V. (1940): The ecology of the temple tank containing a permanent bloom of *Microcystis aeruginosa* (Kutz) Henfr. J. Bombay Nat. Hist. Soc. 42:65-77. | George M. G., Qasim S.Z. and Siddiqui A. Q. (1966): A limnological Survey of the river Kali with special reference on fish mortality. Environmental Health, 8:262-269. | Hem J. D. (1992): Study and interpretation of the chemical characteristics of nature water. USGS Water supply paper 2254, 3rd ed., US Government Printing Office, Washington DC. | Khan A. and Khan A. A. (1985): Physicochemical condition of Sheikh Jheet at Aligath. Environment and Ecology, 3(2). | Munawer M. (1970): Limnological studies on freshwater ponds of Hyderabad. India. The Biocenose, Hydrobiol. 36(1):105-128. | Nasar S.A.K. and Datta Munsh J.S. (1974): Seasonal variations in the physico-chemical and biological properties of a tropical shallow pond. Jap. J. Ecol. 24:255-259. | Philipose M. T. (1959): Freshwater phytoplankton of inland fisheries. Proc. Symp. Algol., ICAR, New Delhi. pp. 272-291. | Philipose M. T. (1972): Notes on the ecology role and possible control of some common blue-green algal blooms in Indian freshwater fishponds. In International Symposium on Taxonomy and Biology of Blue-green Algae. Madras pp. 455-460. | Rao C.B. (1953): On the distribution of algae in a group of six small ponds. J. Ecol. 41(1):62-71. | Saxena K. L., Chakraborty R. N., Khan A. Q., Chattopadhyaya S. N. and Chandra H. (1966): Pollution studies of the river Ganga near Kanpur. Environmental Health, 8:270-285. | Shastri Y. and Pendse D. C. (2001): Hydrological studies of Dhikehra Reservoir. Journal of Environmental Biology, 22:67-70. | Shelat Y. A., Oza B. and Pandit B. R. (2005): Int. J. of Bioscience Reporter 3. Pp.266-269. | Smith G. M. (1950): Freshwater algae of the United States. 2nd edn. Mc Graw Hill Publication. New York. | Starr R.C. and Zeikus J.A. (1993): UTEX. The culture collection of algae at the University of Texas at Austin. J. Phycol suppl 29:1-106. | Treshow M. (1970): Environment and plant responses. Mc Graw Hill Inc, New York. The Journal of Indian Botanical Society, Vol.73. pp.109. |