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PERIPHYTIC FORMS ASSOCIATED WITH *TILAPLA MOSSAMBICA* AND *CYPRINUS CARPIO* VAR. COMMUNIS IN A TROPICAL POND

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ABSTRACT

Present study was conducted in a tropical pond on periphytic forms associated with two common freshwater fish species. Species belonging to Chlorophyceae, Bacillariophyceae, Cyanophyceae, Rotifers and Copepods were found attached to the abdominal, head and tail portion of *Tilapia mossambica*, while, species belonging to Bacillariophyceae and Copepods were found associated with *Cyprinus carpio* var. communis. However, present investigation reveals no true periphytic forms associated with the fish samples.

INTRODUCTION

Periphytic forms play a major role among the biological community in shallow lakes and small streams. Periphytic forms associated with substrate have been studied by many workers (Cattaneo & Kailff 1978, 1980).

The studies on periphyton in India were carried out in few numbers of freshwater ponds in Uttar Pradesh, Orissa, and West Bengal and in Kashmir (Kumar 1985, Wanganeo & Wanganeo 2003). Considering the paucity of information regarding the substrate selectivity of periphytic forms in the tropical pond in Bhopal, the present study was undertaken.

The present investigation was conducted on one of the flat-land pond of Bhopal. The pond is situated at BHEL (Bharat Heavy Electrical Limited) township at Bhopal. It lies within the geographical coordinates of 23°16' N latitude and 77°26' E longitude.

The lake harbours a number of fish species and in the present investigation two species that were analysed for periphytic forms were *Tilapia mossambica* and *Cyprinus carpio* var. communis.

MATERIALS AND METHODS

In the present study (February-May 2006), the samples were collected monthly from Sarangpani pond, a typical tropical pond. Two fish species, i.e., *Tilipia mossambica* and *Cyprinus carpio* var. communis were caught with the aid of a gill net and were transferred to a dissection tray. Periphytic forms were collected from three portions of their body, i.e., head, abdomen and tail by scratching a defined area (1cm^2). The scratched material was collected in a Petri plate containing 10 mL of distilled water and 5% of formalin for preservation. For qualitative analysis, the preserved material was observed under microscope for identifying phyto-periphytic and zoo-periphytic forms attached with the sample. For quantitative analysis 1mL of sample was taken in Sedgewick Rafter chamber for reading its entire contents. The results are expressed as numbers per cm^2.

The physico-chemical features of the pond were estimated following the methods given in APHA (1989) and Golterman et al. (1978).

RESULTS AND DISCUSSION

The samples were collected from the Sarangpani pond and analyzed to assess the variation in physico-chemical characteristics, and flora and fauna associated with different fish species found in this tropical water body during summer period. The physico-chemical features of the pond are summarised in Table 1.

The physico-chemical characteristics are of paramount importance for accessing the quality of water which may be influenced by various factors in an aquatic system. Table 1 sum up the monthly variation in both atmospheric and water temperature of Sarangpani pond. The maximum value was recorded in the month of May (38.5°C) and minimum (30°C) in the month of February. A close relationship between the atmospheric temperature and surface water temperature has been recorded in the present study. Such a phenomenon has been recorded under temperate climatic conditions (Qadri & Yousuf 1980, Wanganeo 1980) and also under tropical climatic condition (Bhatia et al. 1970). The chemical and biochemical reactions in an aquatic body take place at a particular pH which plays role in productivity of the pond. The pH recorded during the present study was always towards alkaline side and varied from 7.4 -7.6 units. The maximum value was found to be 7.6 in the month of April and minimum (7.4) in the month of March. The variation in pH may also be due to the input of sewage and agricultural wastes coming from the catchment area of the pond Gifford et al. (1996).

The maximum value of DO was found to be 8.0 mg/L in the month of May and the minimum (7.4 mg/L) in the month of February. DO in water depends upon temperature, concentration of dissolved salts, wave action, pollution load, photosynthetic activity and respiration rate by organisms (Reid 1961). During the present study, the average value of CO_2 was found to be 8.3 mg/L. The maximum value of 8.5 mg/L was found in the month of March while it was absent in the month of May. The quality of water is also affected by the change in alkalinity which depends upon the presence of carbonates, bicarbonates and hydroxides, which collectively shift the pH to the alkaline side. In the present study, phenolphthalein alkalinity (16 mg/L) was recorded only in the month of May. On the other hand total alkalinity recorded minimum (116 mg/L) in the month of May when CO_3 alkalinity was detected. A maximum value of total alkalinity 168 mg/L was detected in the month of March.

In the present study, the average value of chloride was found to be 50.74 mg/L. The maximum value of chloride (54.99 mg/L) was recorded in the month of May, and minimum (48.99 mg/L) in the month of February. The chloride values depict higher trophic status of the pond. During the study period, the average value of total hardness was 102.55 mg/L. The maximum value of 130 mg/L was found in the month of May, and minimum value of 92.6 mg/L in the month of February. Calcium hardness is an essential component of all organisms being an important cell wall constituent and regulates various physiological functions in animals too. It has a direct effect on pH and carbonate system. In the present study the average value of Ca-hardness was 67.42 mg/L; the maximum value of 69.3 mg/L was found in the month of February, and minimum (6.0 mg/L) in the month of May. The average value of magnesium hardness was 86.05 mg/L. The maximum value of 114.69 mg/L was found in the month of May, and minimum (75.43 mg/L) in the month of February.

The data on the occurrence of periphytic forms on various body parts of the two fishes are given in Table 2. In the month of February the fish analysed was *Tilipia mossambica.* Periphytic forms associated with *Tilapia mossambica* on its abdomen recorded the taxa belonging to Chlorophyceae and Bacillariophyceae alone. Out of Chlorophyceae, species belonging to *Scenedesmus* recorded maximum numbers. Two species belonging to Bacillariophyceae were also found associated with

Table 1: Monthly fluctuations in some chemical parameters of Sarangpani pond during February 2006 to May 2006.

Parameter	Units	Feb.	March	April	May	Mean	Standard Deviation
pH	-	7.5	7.4	7.5	7.6	7.5	0.08
DO	mg/L	7.6	7.4	8.0	8.0	7.75	0.298
Free CO_2	mg/L	8.0	8.5	8.5	-	6.25	6.290
Phenolphthalein alkalinity	mg/L	-	-	-	16	4	-
Total alkalinity	mg/L	162	168	164	116	152.2	24.46
Chloride	mg/L	48.99	49.66	49.33	54.99	50.74	24.46
Total hardness	mg/L	94.0	92.6	93.6	130	102.55	18.3
Ca-hardness	mg/L	69.3	68.7	68.7	63.0	67.42	2.96
Mg-hardness	mg/L	77.16	75.45	76.9	114.69	86.05	19.1

Table 2: Average number of periphyton associated with *Tilapia mossambica* and *Cyprinus carpio* var. communis.

Taxa	*Tilapia mossambica* Abdomen	*Cyprinus carpio* var. communis Abdomen
Chlorophyceae		
Scenedesmus armatus	27	-
Scenedesmus quadricauda	18	-
Bacillariophyceae		
Cyclotella	13	-
Diatoma	5	-
Rotifers		
Branchionus calyciflorus	15	-
Trichocerca	6	-
Copepode		
Nauplius larvae	5	-
	Head	**Head**
Chlorophyceae		
Scenedesmus armatus	1	-
Bacillariophyceae		
Cyclotella	15	-
	Tail	**Tail**
Chlorophyceae		
Scenedesmus armatus	16	-
Scenedesmus quadricauda	10	-
Stigeoclonium	1	-
Bacillariophyceae		
Cyclotella	8	2
Diatoma	18	-
Cyanophyceae		
Microcystis	14	-
Copepods		
Nauplius larvae	-	2
Cyclops	5	-

Tilapia mossambica. The average numbers of periphytic forms associated with abdomen portion were 27 individuals of *Scenedesmus armatus,* 18 individuals of *Scenedesmus quadricauda,* 13 individuals of *Cyclotella* and 5 individuals of *Diatoma.*

On the head portion of *Tilapia mossambica, Scenedesmus armatus* and *Cyclotella* species were

found adhered. *Cyclotella* belonging to Bacillariophyceae recorded maximum numbers in comparison to *Scenedesmus armatus* belonging to Chlorophyceae. The average number of individuals present on head portion were 1 *Scenedesmus armatus* and 15 *Cyclotella*.

On the tail portion of *Tilapia mossambica*, species belonging to Chlorophyceae, Bacillariophyceae and Cyanophyceae were found adhered to it. Three species of Chlorophyceae and one species of Bacillariophyceae and one species of Cyanophyceae was found on the tail portion of the fish. The average number of periphytic forms associated with the tail portion were 16 individuals of *Scenedesmus armatus*, 10 individuals of *Scenedesmus quadricauda*, 1 individual of *Stigeoclonium*, 8 individuals of *Cyclotella*, 18 individuals of *Diatoma* and 14 individuals of *Microcystis*. Species belonging to Cyanophyceae were not recorded from the abdomen and the head portion of the fish *Tilapia mossambica.*

Out of zoo-periphytic forms, species belonging to Rotifers and Copepods were found attached on the abdomen and the tail portion alone. The average number of zoo-periphytic forms associated with abdomen portion of *Tilapia mossambica* were 5 species of *Nauplius* larvae, 15 species of *Branchionus calyciflorus,* 6 species of *Trichocerca,* and on the tail portion were 5 species of *Nauplius* larvae.

On the other hand *Cyprinus carpio* recorded comparatively less forms of attached or adhered periphytic forms. Species belonging to Bacillariophyceae alone and the species belonging to Copepods were found adhered to the tail portion of the fish. The average numbers of species present on tail portion were 2 species of *Cyclotella* and 2 species of *Cyclops.*

Present investigation reveals no true periphytic forms associated with the fish samples analysed. Reason for the absence of true periphytic forms on the fish is on account of high fishing rate. However, due to high influx of nutrients from the catchment area the possibility of catching disease is more, suggesting adherence of phyto and zooperiphytic forms.

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