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Seasonal Variations of Phytoplanktons and Zooplanktons in Beehar River, Rewa (M.P.)

KEYWORDS: Phytoplanktons, Zooplanktons and seasonal variation.

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ABSTRACT *Studies on phytoplankton and zooplankton in Beehar river were conducted at 5 stations. 32 identified species of phytoplankton belongs to 6 groups (viz, Chlorophyceae, Bacillariophyceae, Cynophyceae, Euglenophyceae, Crysophyceae and Dinophyceae) and 20 identified species of zooplankton belongs to 4 groups (viz, Protozoa, Rotifer, Cladocera and Copepoda). Chlorophyceae and Rotifera were found as the dominant group in present study. All constituents of phytoplankton groups were found in their primary peaks during summer seasons but the winter months, represented the period of second abundance.*

INTRODUCTION

The water quality strongly influenced distribution and biodiversity of plankton which are critically linked to the changes in ambient environment. The species present either become tolerant to rigorous chemical malice or loss the very presence which, in turn, affects the entire ecological niche (Sharma, 2010; Ahmed et al., 2010 and Habeeba et al., 2012).

Detection and enumeration of indicator organism are of primary important for the monitoring of sanitary and microbiological quality of water. The bacterial growth also regulated by physico-chemical quality of water.

MATERIAL AND METHODS

Study was carried out at Beeher River in Rewa district (M.P.), India. Beehar River is one of the most important river of Rewa district (M.P.) and located in eastern border of Madhya Pradesh and lies at latitude of 24-32' North and longitude of 81-18' East.

Samples were collected regularly at monthly intervals by using plankton net and preserved in 5% formalin during Jan.2010 to Dec.2011for phytoplankton and zooplankton following the standard method (APHA,1999). The planktonic counting was done by using a Sedgwick rafter counting cell. The average number of plankton in per liter of water was calculated. Planktonic samples were collected separately from fixed from five sampling sites ($S_{1,}$ $S_{2,}$ $S_{3,}$ S_4 and $S_{5)}$ of the river to study the seasonal variations. Identification and analysis of phytoplankton and zooplankton were made following the methods recommended by Ward and Whipple (1959), Needham and Needham (1962), Holome and McIntyre (1971) and Pennak (1978).

RESULTS AND DISCUSSION

The total plankton counts of phytoplankton and zooplankton during two years (Jan. 2010 to Dec. 2011) exhibited marked variation in different seasons. The average plankton counts indicated annual variation. A higher concentration (1630 plan./l.) was found during first year than second year (1569 plan./l.). The predominance of phytoplankton shown over zooplanktons has also been reported by Pankaj et al. (2009). Almost during all the periods, phytoplanktons were found dominating over zooplankton. Bimodal pattern of phytoplankton and zooplankton production occurring in the present study was found similar to those reported by Pankaj et al. (2009).

In total 32 species of phytoplankton have been recorded of these 16 to Chlorophyceae, 6 to Bacillariophyceae, 5 to Cyanophyceae, 3 to Euglenophyceae, one to Chrysophyceae and Dinophyceae.During present study the total number of phytoplankton was recorded as 516 plan/l in winter season, 359 plan./l in summer and 255 plan./l in monsoon season 2010 and respectively 521plan./l in winter season, 466 plan./l in summer season and 202 plan./l in monsoon season 2011.

Result shows that during present study, S1 and S5 stations were more polluted in comparison to other station. The presence of Navicula, Nitzschia, Euglena and Oscillatoria sp. indicates that the water is polluted which may be due to presence of organic matter (Venkateswarlu, 1981).

In present study the Chlorophyceae was recorded highest in winter and lowest in monsoon season. Among Bacilliorophyceae the highest count was recorded in summer while lowest in monsoon season. The Cyanophyceae was recorded highest in winter and lowest in summer and monsoon season. Khanna and Singh (2000) reported high values of plankton during Jan. to March; according to him increase in turbidity reduces the plankton production. According to Khanna (1993) the planktons were maximum in the month of winter probably due to low temperature, high content of dissolved oxygen, low velocity and transparency of water and other suitable conditions. He has also stated that water current is the chief factor influencing the plankton of stream. During the study period maximum phytoplankton found in winter season both years.

There was positive co-relation of planktons with pH, alkalinity, hardness and negative co-relation with depth, turbidity, and nitrate in water was due to presence of higher percentage of plankton. The nitrogen and phosphorus are the most important nutrient in the regulation of phytoplankton growth.

Zooplanktons are the integral part of lotic community and contribute significantly to biological productivity of ecosystems. The abundance of some zooplanktons as intermediate in aquatic food web is supposed to be an inductor of gradual eutrophication of the system. These organisms are good experimental tool for eco-toxicological studies to de-

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termine the ecological health of the system. Seasonal variations profoundly affected zooplanktons population in Beehar water, which is very high during the summer and low in the monsoon.

In total 20 species of zooplankton were identified which belong to 4 groups of animals viz. Rotifera, Protozoa, Copepoda, and Cladocera. Among them, Rotifera is represented by 8 species, Protozoa 4 species, Copepoda 3 species, and Cladocera 5 species. Rotifera, Protozoa and Cladocera form the main bulk of zooplankton in Beehar River.

Species distribution of Rotifera was also found to be maximum during summer season. Some species such as Brachionus and Filiniaonly developed during summer. Hutchinson (1967) reported the Filinia as warm water species. Bilgrami and Datta Munshi (1985) have also been reported all these summer dominant species.

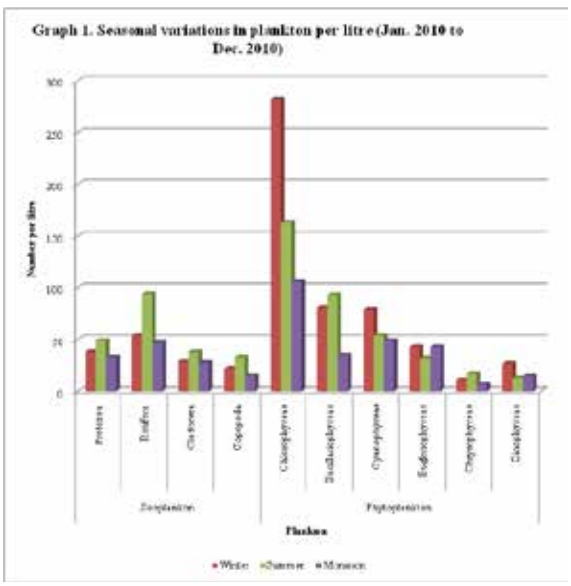
Brachionus and Keratella constitute the dominant genera in most of the river of the World. Ray et al. (1966) also reported the dominance of above species from Ganga and Yamuna. Bilgrami and Datta Munshi (1985) also reported the above species as most dominant forms in Ganges. In present study also both species showed their dominance.

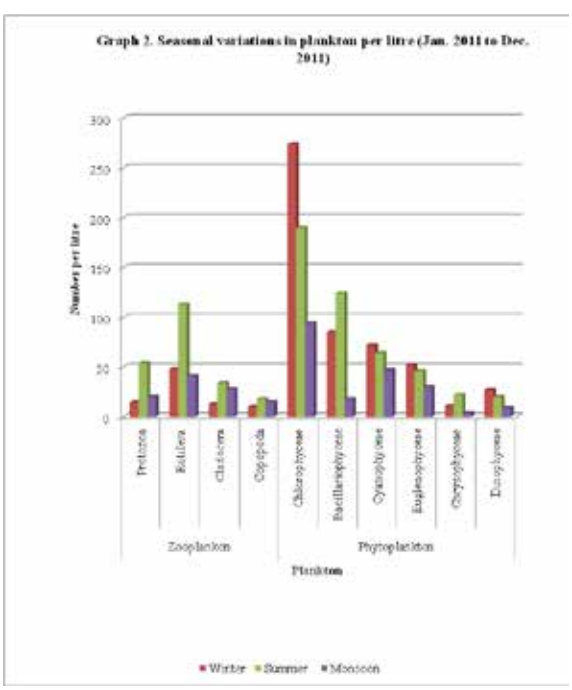
Rotifers are globally known as indicators of water quality since long time by a number of workers such as Thunmark (1945), Donner (1978) and Sladecek (1983). Sharma (1992) has listed a number of Rotifera from eutrophic alkaline water such as Brachionus sp., Keratella, Asplanchna, Filinia,. Most of these species have been observed in abundance in Beehar river indicating eutrophic nature of water.

The principal microplanktonic groups, copepods and cladocerans are widely distributed in India. Very little information is available on the cladocerans of Indian rivers. During present study genera of cladocerans were recorded in Beehar River. Moina sp. Ceriodaphnia and Daphnia dominated among cladocerans quantitatively. Verma et al. (1984) reported Moina brachiata as moderately sensitive to pollution. Kulshreshtha et al. (1989 a, b) reported Daphnia and Ceriodaphnia as indicator of eutrophication in the river Kshipra at Ujjain.

In present investigation copepods were represented by 3 species. Among them Nauplii and Cyclops showed their dominance. Verma et al. (1984) reported the Cyclops and nauplii to be sensitive to pollution and increase with an increase in nutrients. Kulshrestha et al. (1992) reported that copepods were directly related to nitrogen and phosphorus and showed tolerance to different physico-chemical characteristics in river Chambal receiving industrial effluents. Verma et al. (1984) observed that ostracods generally decrease with an increase in pollution. During present study the number of ostracods formed a minor zooplankton component.

Water temperature does not seen to be the only controlling factor for zooplankton abundance during summer, since a number of workers have reported dominance of zooplankton during winter. Chakraborty et al. (1959), Bilgrami and Datta Munshi (1985) reported the dominance of zooplankton during winter. Bilgrami and Datta Munshi (1985) also observed the dominance of Cladocera during summer and Rotifera during winter. Shrivastava (1989) reported the dominance of rotifers during summer in upstream of Ganga River at Allahabad. Our findings support the observation of Shrivastava (1989). Shrivastava (1989) reported that nutrients and water temperature are the most important factors, while Bilgrami and Datta Munshi (1985) concluded that increased zooplankton diversity during summer was due to higher photosynthetic activity and nutrient concentration. Sampath et al. (1979) reported summer zooplankton increase in Cauvery due to increased total alkalinity and total hardness. Patrick (1972) reported that water temperature and flow of river water are the most significant factors for controlling the zooplankton density. During present study, the dominance of zooplankton was recorded during summer season both years.





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