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Seasonal Variation of Hyto Lankton in Tungabhadra River near Harihar-Karnataka

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Abstract: The present study deals with the study of the seasonal changes in phytoplankton population in Tungabhadra river from Harihar, Karnataka. From the selected 3 stations of Tungabhadra river water samples were collected at monthly intervals. Qualitative and quantitative analysis of phytoplankton were carried out during the year 2003-2004. About 71 species of phytoplankton were found comprising Chlorophyceae 35.47%, Bacilleriophyceae 18.11%, Cyanophyceae 37.48% and Euglenophyceae 8.93%. The peak of the phytoplankton population was observed during summer.

Key words: Phytoplankton, seasonal variation, Tungabhadra river, summer, poopulation, India

INTRODUCTION

Phytoplankton constitute the very basis of nutritional cycle of an aquatic ecosystem. Phytoplanktons play a key role in a fresh water ecosystem as primary producers and constitute the major fraction of food energy transferred to the second trophic level (herbivores). It becomes quite essential to study the trends of seasonal variation in phytoplankton community.

Phytoplanktons are plants inhibiting almost all kinds of habitats. Majorities of them inhabits water bodies and are sensitive to pollution. They quickly respond to environmental changes. This aspect led several workers to use algae as biological indicators of water quality (Sreenivasan, 1963, 1964; Munawar, 1974; Hegdae, 1989; Patil, 1960; Sharma and Sharma, 1992). Phytoplanktons of fresh water rivers have been studied extensively in India Mishra and Saksena (1993), Somasekar (1988) and Trivedy and Khatavkar (1996) various phytoplankton groups prefer to exist in various kinds of water. However, no particular group there may be certain species which resist pollution while others may be very sensitive, Pearsall (1930, 1932) have attempted to pin point that water containing chlorophyceae are different from diatoms and member of myxophyceae. The density of phytoplankton has been reported to be affected by the quality of water (Bilgrami and Munshi, 1985).

The present investigation have been undertaken to study the seasonal changes in phytoplankton population in Tungabhadra river during December 2003 to November 2004 near Harihar town, Davangere District., Karnataka. For convenient three sampling stations S1-S3 from the river were selected.

MATERIALS AND METHODS

The water samples for phytoplankton analysis were collected from the river for a period of 12 months starting from December 2003 to November 2004. Quantitative determination were carried out refering the algal samples were presented by Trivedy and Goel (1984). A qualitative and quantitative study of 4 groups of algae was made, the pollution tolerant genera and species were recorded at 3 stations of river according to Palmer and Rao (1992) and APHA (1995).

RESULTS

The total number of phytoplankton and monthly average phytoplankton number per mL were shown in the Table 1. While seasonal variation and percentage composition of plankton components has been shown in Table 2 and 3. It was noted that the total number of phytoplankton at station S1 from 2513-5602 mL^{-1} and at station S3 2343-5999 mL^{-1} during the year 2003-2004.

Chlorophyceae: Chlorophyceae was encountered as the 2nd most significant group of phytoplankton with a contribution of 35.47% (Table 2) to the total annual

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Table 1: Mothly variatios in phytoplakto count mL^{-1} (2003-2004)

Components	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Total
Statio S1													
Chlorophyceae	1686	2547	1384	1086	1868	1865	1210	1384	1068	765	1684	1456	18003
Bacillariophyceae	496	794	276	545	1658	725	754	674	920	654	986	898	9380
Cyanophyceae	2656	1975	1686	3164	778	1465	1664	2086	1346	674	1056	1356	19906
Uglenophyceae	210	286	318	186	648	176	214	318	218	420	546	486	4026
Total	5048	5602	3664	4981	4952	4231	3842	4462	3552	2513	4272	4196	51315
Statio S2													
Chlorophyceae	1751	2471	1456	1815	1756	1686	1218	1456	954	656	1594	1386	18199
Bacillariophyceae	371	818	315	818	1464	814	664	764	418	758	875	866	8945
Cyanophyceae	2546	2156	1784	945	878	1345	1756	4151	1315	356	1246	1264	19742
Uglenophyceae	315	194	421	274	735	194	203	471	148	458	674	765	4852
Total	4983	5639	3976	3852	4833	4039	3841	6842	2835	2228	4389	4281	51738
Statio S3													
Chlorophyceae	1698	2498	1398	1718	1818	1756	1198	1399	995	698	1644	1298	18118
Bacillariophyceae	396	798	310	756	1545	718	685	738	816	664	1015	975	9416
Cyanophyceae	2565	2015	1696	1064	718	1394	1698	3464	1295	465	1186	1196	18756
Uglenophyceae	298	256	307	218	545	188	225	398	236	516	756	856	4799
Total	4957	5567	3711	3756	4626	4056	3806	5999	3342	2343	4601	4325	51089

Table 2: Percentage of phytoplankton

Groups	No. of geera	Percent
Chlorophyceae	25	35.47
Bacillariophyceae	13	18.11
Cyanophyceae	27	37.48
Uglenophyceae	6	8.93

Table 3: Seasoal variatios of phytoplakto groups of the river Tuga Bhadra

Seasons	Chlorophyceae	Bacillariophyceae	Cyaophyceae	Eugleophyceae	Total
Summer	21508	6693	24252	3283	55736
Winter	18614	11203	21397	4315	55529
Rainy	14198	9845	12755	6079	42877

population. It exhibited maximum density during January, April and December and least in September (Fig. 1). The group includes *Pediastrum dup ex* sp., *Spirogyra* sp., *U othrix* sp., *Cosmarium* sp., *Scenedesmus* sp., *Costerium anceo atum* sp., *Desmidium grevie ei* sp.

Bacillariophyceae: It accounted for a contribution of 18.11% (Table 2) to the total annual phytoplankton population. Its maximum density was noticed during April, October and August and least in February (Fig. 1). This group includes *Cymbea* sp., *Nitschia* sp., *Meosires* sp., *Pinnuaria* sp., *Synendra* sp. and *Fragiaria* sp.

Cyaophyceae: It was the most significant group of phytoplankton having and contribution of 37.48% (Table 2) to the total population. It exhibited maximum density during July, March and December and least in September and April (Fig. 1). This group includes *Yngbaea* sp., *Nostoc* sp., *Anabaena* sp., *Phormodium* sp., *Osci atoria* sp. and *Microcystis* sp.

Eugleophyceae: It contributes 8.93% to the total annual phytoplankton production and was represented by *Eugena spirogyra* sp., *Eugena minuta* sp., *Phagus* sp. and *Tracheomonas* sp.

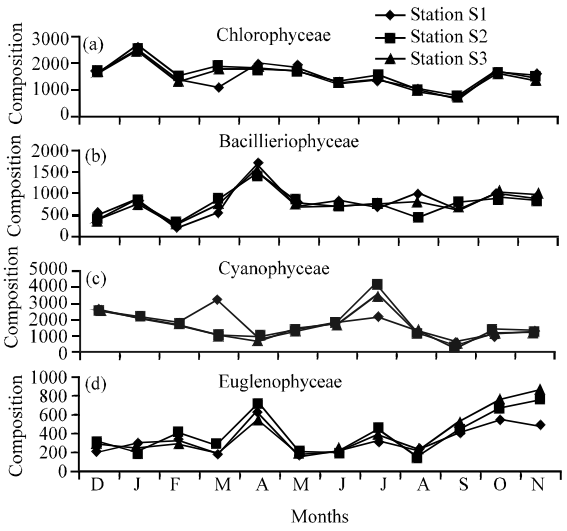

Fig. 1: Monthly variations in the average total count of all phytoplankton population

DISCUSSION

In water body, there usually occurs seasonal qualitative and quantitative fluctuations in the planktonic population in temperate and tropical climate. The reports of some workers suggest that the maximum development of phytoplankton occur during summer and minimum in winter (Philipose, 1960; Kumar and Dutta, 1991; Anjana and Kanhera., 1980). While Kumar estimated that the density of phytoplankton is greater during summer, post monsoon and winter and is lowest in monsoon. In the present investigation also peak of the phytoplankton was observed during summer followed by winter (Table 3 and Fig. 2). Saha and Choudhary (1985) obtained the maximum density of phytoplankton during July and minimum during January.

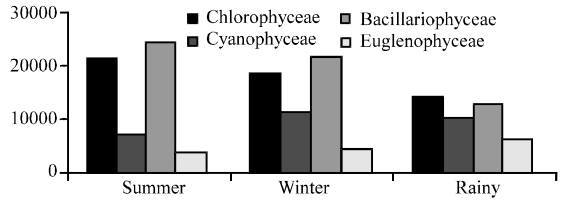

Fig. 2: Seasonal variation of phytoplankton

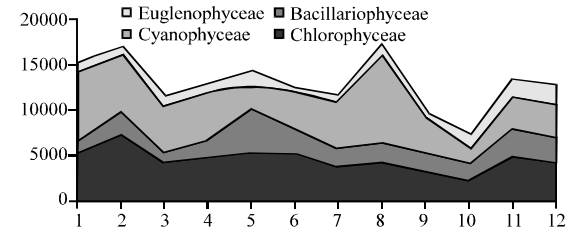

Fig. 3: Monthwise distribution of phytoplankton

In this study, the peak of phytoplankton was observed during July, May and December while lowest peak was found in September followed February and June (Table 1 and Fig. 2). Sreenivasan (1964) have observed that the peaks of phytoplankton occurred at different period in different years. In present study, the population of green algae and blue green algae were abundant as compared to other groups of algae, cyanophyceae was dominant in summer season as compared to other seasonal. In overall, the phytoplankton of algal flora was greater in summer season as compared to the other seasons as agreed with observation of Singh (1960), Nazneen (1980) and Nandan and Patel (1984). Margalef (1968) suggested that phytoplankton population in fertile water is more diverse
than those in infertile water.

The study revealed dominance of cyanophytes followed by chlorophytes, bacillariophytes and euglenophytes. Similar finding was also reported by Padhi (1995) in a polluted pond. Low phytoplankton density recorded during rainy season may possibility be due to dilution by the rainy water coupled with other unfavorable environmental conditions (Fig. 3). The percentage of chlorophyceae was observed greater as compared to 4 groups of algae (Table 2 and Fig. 3) similarly total population of green algae was greater at all 3 stations as compared to those of other groups. Uglenoids were more or less uniform in population. Its percentage was very less as compared to other groups.

CONCLUSION

It may be concluded that the density of phytoplankton is dependent on different abiotic factors either directly are indirectly.

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