ISSN 0976 – 3333

Available Online at www.ijpba.info

International Journal of Pharmaceutical & Biological Archives 2013; 4(1): 66- 69

ORIGINAL RESEARCH ARTICLE

Diversity and Seasonal Fluctuation of Phytoplankton of Pahuj Reservoir, Jhansi (U.P)

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Received 18 Oct 2012; Revised 22 Jan 2013; Accepted 01 Feb 2013

ABSTACT

Present investigation deals with the quantitative and qualitative information on seasonal variations of phytoplanktons on Pahuj reservoir in Jhansi (U.P). Phytoplankton which are present in natural water bodies respond to the ecological factors. Phytoplankton's play an important role as food for herbivorous animals (primary production) and acts as biological indicators of water quality in pollution studies. Hence the present study was carried out on Pahuj reservoir in Jhansi(U.P).During the study 15 species of Chlorophyceae,7 species belonging to family Bacilariophyceae,6 species of Myxophyceae and 1 species of Desmokontae were collected at different sites of Pahuj reservoir.

Key words: phytoplankton, Pahuj reservoir, Jhansi.

1. INTRODUCTION

Plankton comprises the word of drifting or weakly swimming aquatic being that are most minute in size and at the mercy of water movement. Phytoplankton are chlorophyll bearing organism and occupies the lowest level in food chain phyramids.Presence of about 39 genera is recorded in Pahuj reservoir.In order of abundance they can be represented as Myxophyceae>Chlorophyceae>Bacillariophyceae > Desmids.

Pahuj reservoir (23̊ -8¯ and 26̊ -30¯N) latitude and 78̊ -11¯ and 81̊ -3¯ longitude,is a multipurpose small and shallow(maximum 10meter depth)reservoir catering primarily to irrigation needs.It is a rain fed reservoir connected across the river Pahuj,a small tributary of river Yamuna,located near Jhansi city under Bundelkhand region which is predominantly a drought prone area with an average rainfall of 879 mm.

The plankton community is a heterogenous group of tiny plants and animals adapted to suspension in the sea and fresh waters.Their intrinsic movement, if any, are so feeble that they remain essentially at the mercy of water cuurent. According to Hensen (1887), plankton include all organic particles which float freely and involuntarily in the open water,independent of shores and bottom.Depending on their ability to carry out photosynthetic activity, plankton are divided into phytoplankton(plant plankters). Again, net planktons are those retained by a townet while nanoplankton will normally pass through.

2. METHODOLOGY

i) Collectoin and Estimation:

Plankton samples were collected by plankton nets, water samplers and collecting bottles. All categories of plankton were collected by nets except nanoplankton. Bolting silk is the best material for phytoplankton nets and number 25 standard grade may be used for making plankton nets. This has an aperture size of 0.064mm.Many types of water samplers and collecting were valuable for collecting plankters vertically as well as horizontally at a desired depth. But Mayer's water sampler was used for this purpose. This is the simplest type of sampler and consists of an ordiner glass bottle of wide mouth and known capacity (1-2 liter).Three rings are provided on the upper arm of the frame and a nylon rope tied to each. The middle ring is movable and by pulling the rope, the lid of the bottle can be opened. The plankton samples were further concentrated by sieving them through fine mesh or even through membrane. However for nanoplanktonic

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collection, the samples were centrifuged by centrifuge tubes of 10-30ml capacities for 10-20 minutes after which the supernatant water was removed.

Once the plankton samples were collected they were fixed (formalin with a concentration of 2 to 5% /methyl alcohol /legal's solution) and preserved at the earliest.

Area of sampling:

Pahuj reservoir has been selected for analysis of phytoplankton.Six sampling points were selected for this purpose from the six sites of the reservoir along the edge from the place of human activities.The outlets, inlets ,morphometric characteristics and aquatic weeds etc were consider during the selection of the sites.

Sampling period:

The sampling was done in the first week of every month (March- Sept) in early hours of the day i.e. around 9:00 to 11: a.m. ii)

Estimation of volume of water sieved through plankton Net:

This was achieved by following methods under as:

1.A mug of known volume (1 to 2 liter) was used to collect subsurface water. Collected water was sieved through the net and the concentrated plankton was collected from the tub fixed at the bottom of the net.

2. In case of vertical hand, the following steps were taken and each step was followed with great care

a) Took reading for the depth of the sites chosen to take a vertical haul. b).give allowance (i.e. subtract) for the length of the net and collecting bucket.

3. Pull the net surface wards at the rate of 0.3m/sec (approx)

4. Transfer the sample from the collecting bucket to graduated cylinder.Add 1ml of formalin to every 20ml of plankton and water.

5. Allow the plankton concentrate finally as ml/cubic meter in the following manner

$$\frac{\text{Settled plankton volume (ml)}}{\text{Area of the net mouth (sq.m) x length of haul (meters)}}$$

iii) **Quantitative Estimation of total plankton:**

1.**Setting volume:** Allowed sufficient time (24 hour or more) for the plankton to settle in graduated cylinders and recorded its volume.

2. **Displacement volume**:

a) Recorded the volume of whole plankton sample water with plankters.

b) Filtered off the plankton and determined the volume of the plankton free water.

3. **Displacement weight:** This is expressed on the basis of above by assuming that the specific gravity of plankton is unity.

iv) **Quantitative Estimation of plankters:**

Plankton was estimated with the simple "drop method". An ordinary 4ml dropper was taken and some of its narrow tip was broken so that the diameter of the dropper mouth increased sufficiently for releasing easily the bigger phytoplankton. The concentrated samples were first mixed thoroughly and immediately. Some samples were sucked in the dropper and quickly 2-3 drops were taken on the slide for observation .No of drops forming 1ml for observation was taken into consideration. The following formula was used.

$N = abc/L$

Where; N=No.of organisms /liter

a=Average no. of individuals in one drop

b= No. of drops forming 1ml

c=Volume of concentrated plankton

L=Orginal water sample(in litetr) sieved

3. RESULTS AND DISCUSSION

During the present study Phytoplankton showed a high degree of seasonality within and between the groups.In Pahuj reservoir Jhansi a total of twenty one species or phytoplankton belonging to Bacilarophyceae,Chlorophyceae,Myxophyceae and Desmokontae were identified.Out of the 15 species belonged to chlorophyceae,7 species belonged to Bacilarophyceae,6 species belonged to Myxophyceae and1 species beloged to Desmokontae.The species rich class Chlorophyceae was represented by 15 species i.e. Zygnema,Volves,Protocus, Zygnema insinge, Actinastrum gracillimum, Pendorina, Coelastrum chodati, Tetraspora, Pltydorina caudate, Selenastrum, Crucigenia, errerella bornhemiensis, Pluedorena californica, Staurastrum and Eudorina. Class Bacilarophyceae being sub dominant was represented by 7 species including Fragilaria, Coscinodiscus rothii, Surirella, Chaetoceroseimei,Diatoms, Navicutta and Synedra.Class Myxophyceae encompassing 6 species i.e, Microcystis, Anabaena, Nostoc, Pandorina, Oscillatoria and Spirulina (**Table 1**).

There are marked seasonal differences in the quantitative and qualitative composition of phytoplankton communities at each site.In terms of total numbers for each species in all algal groups,the heighest,maximum count were recorded at site 1 and lowest at site 4.

Data obtained in the present study also point to the importance of the small reservoirs hydrology for

structuring the phytoplankton community. However, the effect of grazing, one of the main factors shaping phytoplankton structure was not tackled in this study.

Pahuj reservoir was found rich in diversity and density with respect to phytoplankton.But a clear seasonal fluctuation was observed in distribution of various groups of phytoplankton.

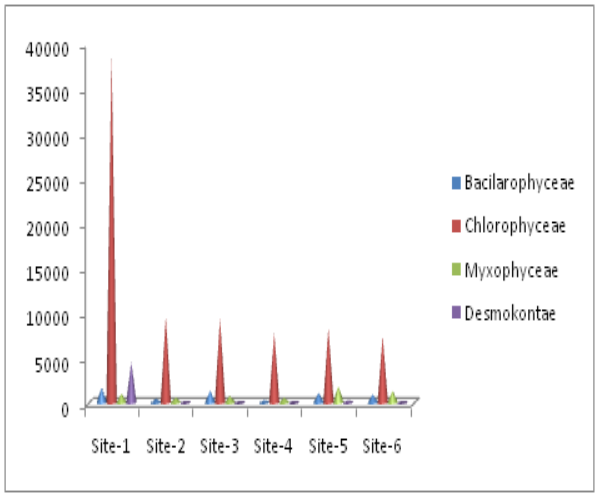
Table 1: Showing the No. of phytoplankton (unit/litre) at different sites of Pahuj reservoir

Family	Site-1	Site-2	Site-3	Site-4	Site-5	Site-6
BACILAROPHYCEAE						
Diatom species	X	X	X	22	X	20
Fragilaria species	26	X	X	X	28	X
Coscinodiscus rothii species	1612	330	1214	254	1024	876
Surirella species	X	X	98	X	X	X
Chaetoceroseimei species	X	X	33	X	X	X
Naviculla species	X	25	33	X	28	X
Synedra species	X	76	X	X	X	34
Total	1638	431	1378	276	1080	930
CHLOROPHYCEAE						
Zygnema species	38037	7709	6069	5406	6758	5624
Zygnema insinge species	X	532	820	X	X	X
Volvex species	53	380	820	547	625	354
Protococus species	323	507	1050	1024	857	564
Actinastrum gracillimum sps.	X	X	33	X	X	X
Pandorina species	215	X	X	547	X	654
Coelastrum chodati species	X	25	98	X	X	X
Tetraspora species	53	177	X	254	X	58
Pltydorina caudate species	53	101	X	X	X	X
Selenastrum species	X	25	65	X	X	X
Crucigenia species	X	101	X	X	X	58
Errerella bornhemiensis sps.	X	X	197	X	X	X
Pluedorena californica sps.	X	25	33	X	X	X
Staurastrum species	X	X	33	X	X	X
Eudorina species	X	X	164	X	58	104
Total	38734	9582	9382	7778	8298	7416
MYXOPHYCEAE						
Microcystis species	618	254	262	254	1024	204
Anabaena species	134	X	X	X	854	X
Nostoc species	X	127	X	X	X	547
Pandorina species	X	25	328	X	X	X
Oscillatoria species	X	127	131	254	X	X
Spirulina species	X	X	164	X	58	104
Total	1006	587	754	566	1902	1313
DESMOKONTAE						
Ceratium hirundinellum sps.	4486	127	33	08	254	84
Total No.of Phytoplankton	45867	10727	11547	8620	11534	9743

Table 2: showing group wise total number of phytoplankton forms (unit/litre) at six stations in Pahuj reservoir , Jhansi

Group	Site-1	Site-2	Site-3	Site-4	Site-5	Site-6
Bacilarophyceae	1638	431	1378	276	1080	930
Chlorophyceae	38734	9582	9382	7778	8298	7416
Myxophyceae	1006	587	754	566	1902	1313
Desmokontae	4486	127	33	08	254	84

Fig 1: showing seasonal fluctuation of phytoplankton in Pahuj reservoir



3. CONCLUSION

In conclusion the present study expressed that the diversity of phytoplankton and presence of these maintain and increase the productivity of Pahuj reservoir. Highly productivity culture of fish and maintain ecological balance. Further the data generated are essential so that this information may be used as the assessment creator for conservation and effective utilization of water bodies.

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