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Limnoligical Studies of Vijay Sagar lake in Mahoba District with the special reference to planktons.

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Abstract- The Limnological analysis in relation to plankton of Vijay Sagar lake was studied. The lake varies considerably in Physico-chemical and biological parameters at four sampling stations. The lake water was found to be alkaline with pH ranging 7.98 to 8.18 ppm. The average concentration of different dissolved nutrients and occurrence of Phytoplankton and Zooplankton discussed in the paper.

Key words : Physico-chemical, Phytoplankton, Zooplankton. Vijay Sagar lake Nutrients.

Introduction : Water has the unique property. It can dissolve various substances and carry huge variety of chemicals in the form of suspension, without any change in their chemical nature. The water is also a good medium for aquaculture, besides it is very essential for living beings for their survival, but if the water is contaminated it becomes undesirable.

The characteristics of aquatic system depends on quality of physical and chemical factors. These factors affect directly to the biota of water, the presence of some factors in high level cause pollution which are discussed in the concerned factors. The biological enventory presents reliable picture of water quality besides. Soil condition also have direct impact on the above quality.

Vijay Sagar lake acquires an area of about 450 acres in monsoom period. Its latitude 25_0 6' - 26_0 7'N. longitude 67_0 17' - 80_0 5' E and is located in Mahoba district. Regarding 06 Kilometer from mahoba city on Banda-Mahoba highway and located in south-west of Uttar Pradesh and comes in Mahoba district at Chitrakoot dham Banda Commisonary.

The quality of lake water was studied at four different sampling stations Viz- A_1, A_2, A_3 and A_4 to find out the characteristics of water in reference of abiotic and biotic factors along with soil chemical conditions.

Methodology: Limnological studies of Vijay Sagar lake was done having in consideration various abiotic and biotic factors for which the parameters were taken viz-turbidity, pH, total alkalinity (Carbonates and Bicarbonate) Co_2 D.O. chloride Ammonical nitrogen, Phosphate, etc.

The above parameters were examined physically and chemical analysis during the study period December, 2002 to November, 2003 the physiography and directions of the lake was also studied.

Water samples were analysed at monthly intervals from four sampling stations for physical, chemical and biological parameters. The physical and chemical factors investigated were water temperatue and turbidity by using thermometer and turbidity meter respectively. Dissolved oxygen by winkler's method. Co_2 phosphate ammonical nitrogen and total alkalinity by neutralized phenolphthalein indicator methods respectively, as suggested by A.P.H.A. (1985), Jhingran (1987 & 1992) and Welch (1952). For quantitative and qualitative studies of phytoplankton and zooplanktons samples were concentrated by sedimentation, preserved in 4% formalin after filtering 100 liters of sample through 2 bolting silk net and examined under Sedgwick Rafter cell and forms were identified upto genera level according to Needham and Needham (1972) and Edmondson (1956). Phytoplankton and Zooplankton was expressed as units per ml. with the aid of the formula [n = a,b/l).

Results and Discussion :- The pattern of seasonal atomospheric temperature and water temperature fluctuations impact positively with the changes in solar radiations. Maximum water temperature observed in station No.-A_4 and minimum station No.-A_1, Which shows positive impact on the primary production of lake.

Some seasonal fluctuation in turbidity was recorded in the lake, maximum value observed in station No.- A_2 and low value is station No.- A_3. Turbidity showed positive co-relation with total alkalinity and negative relation with phytoplankton production and vice-versa.

Physico-chemical parameters of Vijay Sagar lake
Period 2017-2018.

S.No.	Parameters	Stations A_1	Stations A_2	Stations A_3	Stations A_4
1	Water Temperature	26.00	32.00	31.90	32.90
2	Turbidity	32.60	35.00	28.13	31.13
3	pH	7.98	8.06	8.02	8.18
4	Carbonate	12.30	13.40	12.40	11.20
5	Bicarbonates	163.13	163.40	159.80	160.20
6	Total Alkalinity	176.30	172.40	171.15	160.95
7	Ammonical Nitrogen	0.43	0.52	0.39	0.50
8	Dissolved oxygen	5.75	5.95	6.39	5.80
9	Co_2	13.72	13.90	13.59	13.80
10	Phosphate	0.40	0.47	0.39	0.45

All value in ppm. except temperature in degree contrigrade and turbidity in NTU.

The pH range was found to vary from station No. A_1 to station No.- A_4 , the water of lake was found alkaline from A_1 to A_4 . the water of lake was found alkaline from A_1 to A_4 . It is directly related with total alkalinity.

The Carbonate of water ranged between 11.20 at A_4 station and 13.40 at A_2 station. The higher value of Carbonate due to high photosynthetic activities which directly effect Zooplanktons.

The Bicarbonate varied between 159.80 at Station A_3 and 163.40 at Station A_2. Low value mainly due to the presence of Co_2 which inhibit the change of carbonate into bicarbonate.

Total alkalinity ranged between 160.95 station A_4 and 176.30 at station A_1 . It is produced by anions mainly carbonates bicarbonate and Hydroxyl ions. It is found positively Co-relationship with productivity of water and pH.

The Ammonical nitrogen concentration varied between 0.39 at A_3 station and 0.52 at A_2 station. It is found positively co-related with phosphate which increase the growth of phytoplankton. Higher value appeared due to high temperature and increased ammonification.

D.O. (Dissolved oxygen) value varying from 5.75 station A_1 to 6.39 at station A_3. Concentration of D.O. showed a direct relationship to phytoplankton density. The highest value observed during winter season due to low temperature and much water quality whereas lowest value recorded in summer season. It is one of the most important parameter in water quality assessment.

The low range of Co_2 concentration is observed at station A_3 and highest range observed 13.90 at station A_2. The low concentration of Co_2 is due to higher rate of photosynthesis and enough amount of sun light energy was reach in surface water for the consume of phytoplankton and another aquatic biota. Higher concentration of Co_2 was observed due to decomposition of organic matter and animal excreta.

Phosphate content recorded between 0.39 at Station A_3 and 0.47 at Station A_2. It is one of the primary nutrients responsible for biological productivity, the maximum concentration was observed in mansoon season due to agricultural run-off and sewage causes eutrophication and minimum concentration was noticed due to lack of discharge. It is the limiting factors.

Phytoplankton observed in the present study belongs to11 genera of the groups chlorophyceae, cynophyceae and Bacillariophyceae. The qualitative and quantitative fluctuations in phytoplankton population depend upon its ecosystem. It was observed that the density of phytoplankton touched peak level in two occasions. The first peak level which was comparatively higher was recorded in April and second peak was found in October and November.

Annual variations of Phytoplankon

Period 2017-2018

S.No.	Name	Stations A_1	Stations A_2	Stations A_3	Stations A_4
1	Ulothrix	28	39	16	8
2	Spirogyra	6	8	04	0
3	Zygnema	18	15	11	04
4	Pediastrum	27	26	38	19
5	Navicula	38	32	40	13
6	Synedra	44	40	52	19
7	Nitzschia	27	33	40	30
8	Microcystis	150	122	141	117
9	Oscillatoria	8	26	24	25
10	Nostoc	10	21	18	14
11	Anabaena	9	12	8	04

The phytoplankton observed between 04 to 150 org./lit. at different sampling stations. The highest concentration of phytoplankton estimated during summer and pre-winter season due to decomposition of organic materials like phosphate and nitrogen which cause eutrophic condition in lake water. These are directly related to ammonical nitrogen and phosphate.

Zooplanktonic community of Vijay Sagar lake consisted of Rotifers, cladocerans, copepods, protozoans. The population of Zooplankton in maximum number was recorded months of May-June and minimum number of Zooplankton was recorded in the month of July to August.

Annual variations of Zooplankton
Period 2017-2018

S.No.	Name	Stations A_1	Stations A_2	Stations A_3	Stations A_4
1	Euglena	15	29	24	36
2	Arcella	02	04	02	03
3	Euglypha	06	06	03	02
4	Brachionus	16	14	18	11
5	Keretella	02	00	03	00
6	Cyclops	10	04	07	04
7	Mesocyclops	04	06	04	02
8	Daphnia	15	17	05	04
9	Alonella	06	12	07	06
10	Ceriodaphnia	14	17	06	03

The Zooplankton population observed between 02 to 36 org./lit. in different sampling stations. The maximum range of Zooplankton are found in summer season due to high temperature which stimulate reproduction and development of Zooplankton. Lowest quantity of Zooplankton recorded in rainy season for to dilution of water they are highly influenced with phosphate, ammonical nitrogen and temperature.

The limnological feature of the Vijay Sagar lake indicates the better yield of fish. Favorable growth of plankton is suitable for fish production.

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