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SHORT COMMUNICATION

Analysis of Zooplankton Diversity of a Sasta Oxbow Lake at Paroo Block, Muzaffarpur Bihar India

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ABSTRACT
Zooplanktons are known as good bio-indicator of changes in water quality because it is strongly affected by many changes in physical and chemical conditions of waters as well as the surrounding environmental conditions. Zooplankton diversity and physico-chemical parameters of Sasta oxbow lake was studies for period of one year from October 2022 to September 2023. During the study period a total of 26 species belonging to 4 groups of zooplankton were recorded, in which Rotifera was represented by highest number of 16 species, Cladocera by 7 species, Copepoda by 2 species and ostracoda by only 1 species showing lowest percentage of presence. Presence of highest percentage of Cladocera again depicts the better condition of the water body and can be used for aquaculture programme. Zooplankton community when correlated with physical chemical parameters indicated that dissolved oxygen and free carbon-dioxide are significantly inversely correlated with the occurrence of zooplanktons.
Keywords :- *Zooplankton, Cladocera, Sasta-oxbow lake. Aquaculture*

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INTRODUCTION

Zooplankton are microscopic free swimming in aquatic systems which are represented by wide array of taxonomic groups protozoa, Rotifera, Cladocera and copepoda. Plankton is the natural food of many species of fishes, especially zooplankton constitute important food item of many omnivorous and carnivorous fishes. Zooplankton provides the necessary amount of protein for the rapid growth. The zooplankton are often an important link in the transformation of energy from producers to consumers due to their large density drifting nature, high group or species diversity and different tolerance to the stress [1-3].

Zooplankton diversity is one of the most important ecological parameters as these are the intermediate link between phytoplankton and fish. It plays a key role in cycling of organic materials in an aquatic ecosystem [6]. The distribution of zooplankton is related with complex of factors such as changes of climate conditions, physical and chemical parameters and vegetation cover of the water body of Sasta oxbow lake. They play an integral role and may serve as bioindicators and a reliable tool for determining the status of water pollution. Thus, zooplankton association richness, abundance, seasonal variation and diversity can be used in the assessment of water quality and for pisciculture management practices [16, 12, 14].

Hence the investigation was conducted to assess the zooplankton community quantitatively and qualitatively along with their correlation with physical chemical parameters to get a better understanding of the structure and function of this important aquatic ecosystem that is Sasta oxbow lake.

MATERIAL AND METHODS

Analysis of Physico-Chemical Parameters: For analysis physico-chemical parameters of water, monthly sampling ware done from October 2022 to September 2023. Water samples were collected from the study site and analysis of parameters like air temperature, water temperature, pH, Dissolved Oxygen (DO), Free Carbon dioxide (FCO_2) Total Alkalinity (TA) were done on the spot [1].

Analysis of Zooplankton samples: The plankton samples were collected by filtering 20 litres of water through the standard plankton net (25 mesh bolting silk). Collected samples were transferred in a small vial from net properly. For the quantitative studies samples were fixed and preserved immediately after collection by adding slowly 2-5% buffered formalin. To retain the colour of the preserved plankton samples were stored in the dark and added 1 ml of saturated cupric sulfate solution per liter. The preserved samples were stored in the laboratory for further analysis with proper labelling in the body of the sample vial.

Qualitative analysis of zooplankton: The plankton sample was taken on the cavity slide and then examined under compound microscope. Zooplankton were identified following standard literature [3-10].

Quantitative analysis of zooplankton: For zooplankton counting the S-R cell is most common device. Before filling the S-R cell with sample, the cover slip was placed diagonally across the cell and then 1 ml of the samples was poured using pipette in the S-R cell. The S-R cell is then allowed to stand for 10-15 minutes. Then randomly 40 squares were selected and then zooplankton present in those was counted. Zooplankton density was counted. Zooplankton density was calculated following APHA [1].

RESULTS

The data on the physico-chemical parameters of Sasta-oxbow during the study period of October 2022 to September 2023 was depicted in Table 1. Assessment of different physico-chemical parameters of the study site reveals the remarkable variations in air and water temperature, water temperature ranges from 18°C to 29°C air temperature during the study ranges from 18 °C° to 34 °C. The pH value recorded ranges from 6 to 7. The Dissolved Oxygen value ranges from 6.5 to 8 Free Carbon dioxide ranges from 0.2 to 1 and total alkalinity value ranges from lowest 22 to highest of 50. The water quality assessment shows moderate value of all the parameters tested during the study. Figure 1 depicts the seasonal variations of the water quality parameters of the study site.

In the study site, Sasta-oxbow Lake, a total of 26 species belonging to 4 groups of Zooplankton were recorded during the study period. Of these, a total of 7 species of zooplankton belonged to Cladocera group, 2 species belonged to Copepoda group, 16 species belonged to Rotifera group and only 1 species belonged to Ostracoda group. The group Cladocera was represented by 7 species belonging to 7 different genera viz, *Diaphanosoma excisum, Chydorus* sp., *Alonella* sp., *Ceriodaphnia cornuta, Bosminopsis deitersi, Macrothrix* sp., Alona sp. The group Copepoda was represented by 2 species belonging to 2 different genera was recorded which are Mesocylops sp and *Neodiaptomus shamakeri*. The Rotifera group shows highest diversity of species assessed,

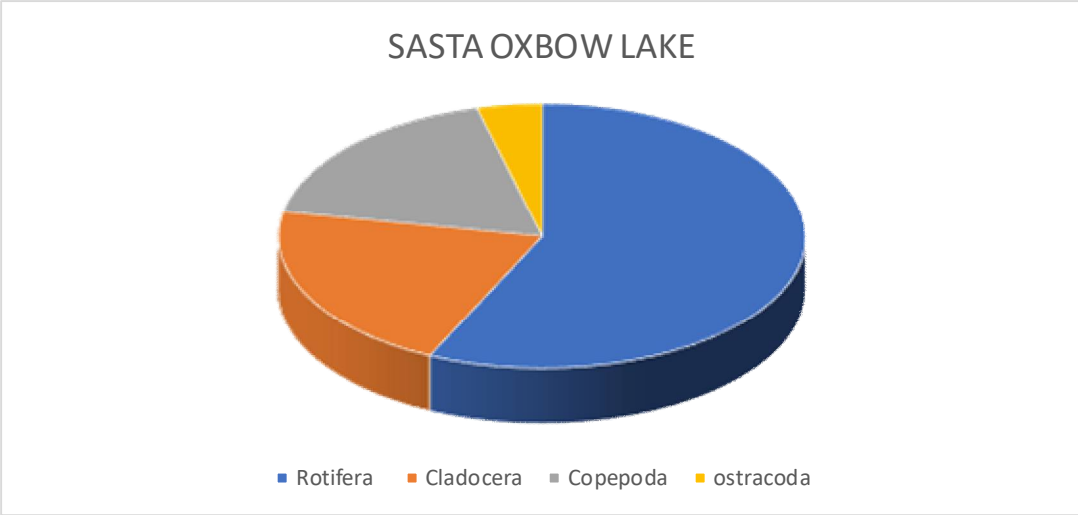
During the study 16 species belonging to 10 different genera were recorded. The genus Brachious was represented by 6 species (*B. quadridentatus quadridentatus, B. quadridentatus, B.angularis, B. calyciflorus, B.patulus, B.patulus patulus*). Filinia was followed by 1 species (Filinia.sp) The genus lecane was represented by 2 species (*L.sinuate , L. curvicornis curvicornis*)

The quantitative variation in zooplankton groups in Sasta oxbow lake during the study period of October 2022 September 2023 was depicted in table 1. Group wise percentage contribution of different zooplankton groups are shown in figure 1.

Table 1. Assessment of Physico-chemical parameters of water of Sasta oxbow lake during the study period of October 2022 to September 2023

Parameters	Mean ± SD
Air Temperature	24.5±5.1
Water temperature	24.1±3.5
pH	6.6±0.5
Total alkalinity	35.5±9
Dissolved oxygen	7.5±0.5
Free CO2	0.5±0.4

Figure 1. Percentage contribution of zooplankton groups in Sasta oxbow lake during the study period of October 2022 to September 2023



DISCUSSION

Sasta-oxbow lakes are the natural reservoir of different type fishes and its physiochemical parameter which are known to affect its biotic component in various ways. Physico-Chemical parameters are the important constituent of aquatic system as they reflect the water quality of aquatic ecosystem. Water temperature varied in accordance with the air temperature and it ranged from 18 °C (December) to 29°C(May), pH of water remained moderate throughout the study period and ranged lower value of 6 in December, January and ranged highest value of 7 in month of April, May. The Dissolved oxygen level varies between 6.5to 8. Which is moderately high and reveals that Sasta-oxbow lake is not in immediate threat of eutrophication. In the present study zooplankton was comprised of Rotifera (10 genera), Cladocera(7 genera), Copepoda (2 genera), Ostracoda(1 genera). In present work Rotifera constituent the most dominating group contributing 57% to the total zooplankton population followed by Cladocera contributing 21%, Copepoda18%and Ostracoda 4% Present investigation reveals high value of species richness reflecting the suitability of the wetland for the dominant species. The relationship between the zooplankton and investigated physical-chemical parameters was established using Pearson correlation analysis. Air temperature shows significant positive correlation with all other physico-chemical parameters and zooplankton occurrence whereas dissolved oxygen and free carbon dioxide showed significant inverse correlation with occurrence of zooplankton. Many of the investigated parameter did not however show significant correlation with the community structure of zooplankton [11-14]. This is probably because many environmental factors affect zooplankton only at extreme levels and will not be important in all freshwaters.

CONCLUSION

Higher value of species diversity of site depicts favorable condition in terms of physical chemical conditions. Although zooplankton exists under a wide range of environmental conditions, yet many species are limited by dissolve oxygen, temperature and other physico-chemical factors. Different species of zooplankton showed their abundance according to the favourable conditions. In the present investigation the study site was characterized by a greater diversity of zooplankton taxa during the dry season. The Moderate level of physico-chemical parameters that are tested shown that Sasta oxbow lake is suitable for aquaculture.

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