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Variation of zooplankton and their population density in Savitri River at Poladpur, dist- Raigad, Maharashtra state, India

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Abstract

Zooplankton is cosmopolitan in nature and they are found in all over the world in its habit all freshwater tropical wetlands. The present investigation deals with the study of monthly changes of diversity and density of Zooplankton community of the Savitri River at Poladpur dist –Raigad. The work was carried out for a period of one year during the month of may 2016 to April 2017. Zooplankton samples were collected the two separate place such as station ‘A’ and ‘B’. The qualitative and quantitative estimating and counting each and month wise evaluation of the zooplankton population throughout the study period. The present study revealed that Savitri river water which is the contaminated of sewage and various chemical industrial effluents. The highest population density of rotifers was recorded in annual cycle in year 2016- 2017.

Keywords: Zooplankton, pollution, Savitri River

Introduction

Zooplankton is a diverse group of heterotrophic organisms that consume phytoplankton, regenerate nutrients via their metabolism, and transfer energy to higher trophic levels. (Steinberg and Robert, 2009) ^[10]. Zooplankton is good ecological indicators due to their wide physiological tolerances among species due to their place in their aquatic food chains. Zooplankton are pelagic food webs, play a key role, mediating the transfer of energy produced by unicellular algae through photosynthesis to higher trophic levels (Harris *et al.*, 2000) ^[5]. Zooplankton function as both a sink and source for nutrients, by simultaneous incorporation of prey items into biomass and release of dissolved nutrients and zooplankton grazing and excretion can also have a large impact the amount of a of protein composition and other nutrients. (Wavle and Larsson, 1999) ^[14].

Due to their importance as food for fish, zooplanktons have been studied from various inland ecosystems of India, Zooplankton may also offer insight on productivity of other group of organisms.

Materials and Methods

The study area of Savitri River is originated in mahabaleshor region in hilly area of Maharashtra state. Samples were collected in polythene bag two sampling sites over period of Collections were done in month of May 2016 to April 2017. For qualitative analysis the samples were collected with the help of plankton net. Collected plankton was transferred to enamel tray zooplankton net was clearly washed so as to collect any sticking planktons. Zooplankton preserved in 4% formalin and observed in electron microscope. The collected samples counting and identification were done as per species diversity index was obtained by following Shannon were methodology (Nath, 1997) ^[7].

Zooplankton was sample were collected for weekly and analysis population density from the site following standard methods of Samples were collected and fixed in 5-6 % formalin and brought to the laboratory for zooplankton analysis and evaluate. By estimated standard methods by scientist. (Battish 1992) ^[1].

Discussion

Zooplankton community structure is an important indicator of ecosystem health and plays an important role in cascading trophic effects (Guevara *et.al.*, 2009) ^[4]. They occupy an intermediate position in the food web, and mediate the transfer of energy from lower to higher trophic level. (Waters TF (1977) ^[13]. It is the important link in the aquatic food chain and contributes significantly to secondary production in freshwater ecosystems (Sharma BK (1998) ^[8].

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The plankton study was reported br, Rotifera group was reported to be dominant among all other groups of Zooplankton. In tropical freshwater wetlands, dominance of rotifera group is a common characteristic; similar was reported from the studies. (Mwebaza-Nadwula, 2005) [6].

This present investigation revealed that the population density of Rotifera group reported from the study site vary in different seasons Rotifera density was followed by that of Cladocera and then that of Copepoda as similar as it was reported by Tyor *et. al.*, (2014) [12]. Zooplankton has short life span and

they respond more quickly to environment leads to change in plankton communication in terms of tolerance, abundance, diversity and dominance in the habitat. The industrial effluents from various industries in and around the loharmal downstream and sewage discharge at nangalwadi area affecting the water quality as a consequence; the zooplankton population of Savitri River has been affected in terms of abundance and diversity.

Observation Tables

Table 1: Population density status of Zooplankton at stations ‘A’ (Organism/ ml) from months of May 2016 to April 2017

Components	Annual fluctuation of Zooplankton in year 2016-17												Mean	Percentage (%) Contribution
	May	Jun	Jul	Aug.	Sept.	Octo.	Nov.	Dec.	Jan	Feb.	Mar.	Apr.		
1) Rotifers	25	23	29	27	17	10	13	20	23	11	38	10	20.5	37.73
2) Cladocera	09	17	12	13	19	22	21	14	20	13	12	11	15.25	28.06
3) Cladocera	22	20	28	20	16	17	19	18	13	20	17	13	18.58	34.19
Total	56	60	69	60	52	49	53	52	56	44	67	34	-	-

Table 1: Population density status of Zooplankton at stations ‘B’ (Organism/ ml) from months of May 2016 to April 2017.

Components	Annual fluctuation of Zooplankton in year 2016-17												Mean	Percentage (%) Contribution
	May	Jun	Jul	Aug.	Sept.	Octo.	Nov.	Dec.	Jan	Feb.	Mar.	Apr.		
1) Rotifers	30	35	25	25	57	38	43	40	53	61	58	40	42.08	60.50
2) Cladocera	08	09	15	13	14	11	07	05	15	13	12	11	10.25	15.42
3) Cladocera	12	20	10	15	14	17	19	13	13	09	12	13	13.91	20.99
Total	50	64	50	53	73	66	69	58	81	83	82	64	-	-

Results

During the present study of Zooplankton were recorded from the three groups viz, Cladocera, Copepoda and Rotifera. Station I (Savitri Dam) Species encounter at station I and their month wise distribution were presented in table 1 .A total no of species were recorded from this station, of which 12 species belongs to rotifer, 5 species belongs to cladocera and 3 species of copepoda. The maximum population density 69 was observed in July and minimum April in 34. The annual mean percentage composition of different groups of zooplankton shows the rotifer contribute 37.73 %, copepod 34.19 % and cladocera 28.06 % showing on Table-1.

Station II (Loharmal Downstream) : A total 22 species encounter from this station of which 13 to rotifera, 4 belongs to cladocera , 2 belongs to copepoda the monthly variation of various zooplankton species during the present study were shown in table 2 total zooplankton population The maximum population density 81was observed in January and minimum may in 50. The annual mean percentage composition of different groups of zooplankton shows the rotifer contribute 60.50 %, copepod 20.99 % and cladocera 15.42 % showing on Table-2.

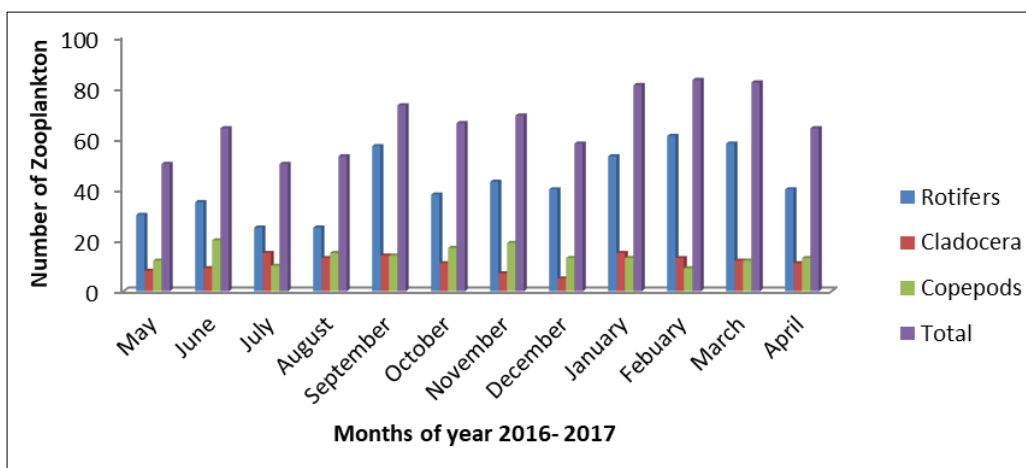


Fig 1: Graph Showing Population density status of Zooplankton in Savitri River at station ‘A’ from month of May 2016 to April 2017.

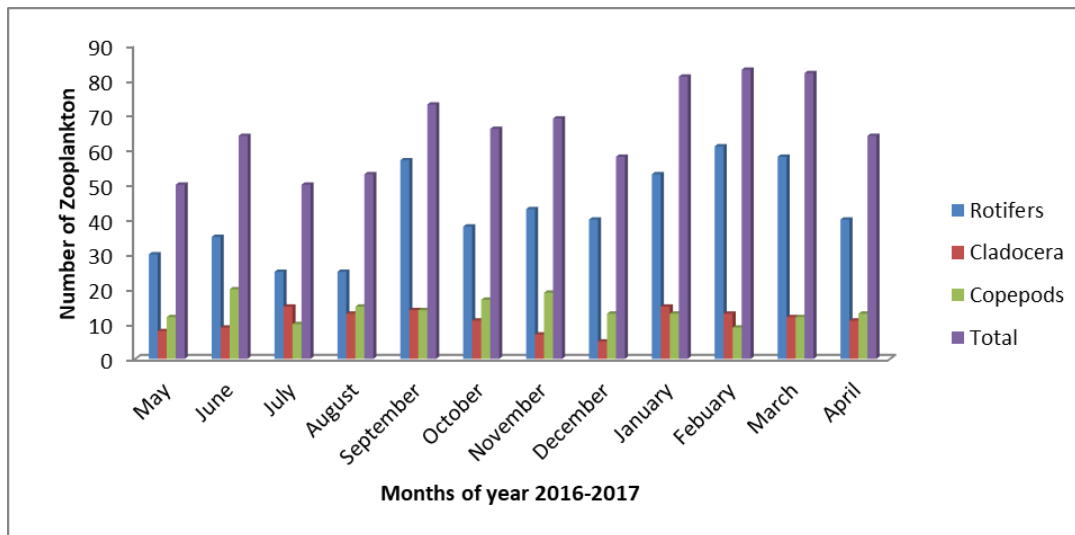


Fig 2: Graph showing population density status of zooplankton in Savitri river at station 'B' from month of May 2016 to April 2017.

Conclusion

The present study on diversity Zooplankton which is dominated by Rotifera throughout the study period which reveals that the wetland is very much suitable for aquaculture as Zooplankton particularly rotifer are known to be the best food for the fish larvae for aquaculture. Its population density increase in the saprozoic aquatic animals as well as waste faecal matter of domestic animals. Zooplankton highly influenced by the discharge from different industrial effluents.

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