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Short Communication

Seasonal variation of cladocera in a perennial pond, Ambajogai (Maharashtra), India

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Abstract

A systematic investigation on seasonal variations of cladocera in Udayan Sarovar, a perennial pond near Swami Ramanand Teerth Mahavidyalaya at Ambajogai (Maharashtra, India) was carried out for a period of one year from June 2018 to May 2019. A total of 9 species of cladocera were identified. The cladoceran diversity fluctuated seasonally and the maximum number of 240 organisms L^{-1} was recorded during month of April and minimum number of 22 organisms L^{-1} during the month of September.

Keywords: Cladoceran diversity; zooplankton; seasonal variations; perennial pond; Maharashtra

1 | INTRODUCTION

Cladocera, commonly known as 'water fleas', are planktonic crustaceans ranging in size from 0.2 to 5.00 mm and belong to the class Branchiopoda. Globally about 4000 species of cladocera have been described (Covich and Tharp 1991). About 187 species of freshwater cladocera have been reported from India (Raghunathan and Kumar 2003). A range of studies on cladocera have been conducted from different ponds of India (e.g. Biswas 1966, 1971; Nayar 1971; Michael and Sharma 1988; Raghunathan 1989; Sharma and Sharma 1991; Gupta 2002; Raghunathan and Suresh 2002; Raghunathan and Kumar 2003; Sharma *et al.* 2005; Siraj *et al.* 2007; Chanderkiran 2008; Sharma and Chanderkiran 2011; Sharma and Kotwal 2011; Sharma *et al.* 2012). However, sufficient investigations have not been done on the cladoceran diversity of freshwater bodies in Maharashtra, India. Considering the lack of knowledge of cladoceran diversity of this region, a systematic investigation on seasonal variations on cladoceran diversity from Udayan Sarovar, a perennial pond of Ambajogai, Maharashtra was carried out for one year.

2 | METHODOLOGY

With aim to investigate the seasonal diversity of the cladocerans, a perennial pond near Swami Ramanand Teerth Mahavidyalaya at Ambajogai (18043'37.6860"N, 76022'51.9168"E; at an elevation of 633 m above sea level) in Indian state of Maharashtra was surveyed monthly between June 2018 and May 2019. Approximately 50 litres of water was filtered through plankton net of standard bolting cloth number 25 (0.03 – 0.04 µ mesh size). The filtrate was taken in plastic vials and preserved in 5% formaldehyde solution. These fixed samples were brought to the laboratory for taxonomical studies (Ward and Whip-

ple 1959; Edmondson and Winberg 1971; Pennak 1978). Drop count method of Trivedy and Goel (1992) was followed for enumeration of cladocerans and expressed as organisms per litre.

3 | RESULTS AND DISCUSSION

Recorded cladocerans were represented by nine species including *Diaphanosoma sarsi*, *D. excisum*, *Ceriodaphnia cornuta*, *Moina micrura*, *Macrothrix spinosa*, *Alona rectangular*, *A. nana*, *Indialona ganapati* and *Daphnia pulex* (Table 1). The cladoceran diversity fluctuated seasonally and the maximum number of 240 organisms L^{-1} was recorded during month of April and minimum number of 22 organisms L^{-1} during the month of September (Figure 1).

Ceriodaphnia cornuta and *Alona nana* were absent for three months in 2018 *i.e.* July, August and September. *Diaphanosoma sarsi* and *A. rectangular* were absent in August and September, while *Macrothrix spinosa* was not seen in September. The cladocerans such as *Diaphanosoma excisum*, *Moina micrura*, *Indialona ganapati* and *Daphnia pulex* were present throughout the study period. All the cladoceran species showed minima in monsoon and maxima in summer. The decline in cladoceran population during monsoon coincided with the inflow of allochthonus nutrients, along with surface run off (Mishra *et al.* 2010). Besides, cladocerans produce resting eggs in autumn or winter months of the year which hatch from February onwards (Dokulil *et al.* 1990) culminating in peak population during summer. Sarmila Sree and Shameem (2017) and Chalak and Sakhare (2018) also reported higher cladoceran density in summer and lower in monsoon.

TABLE 1 Species composition of cladocera during year 2018–19.

Species	Cladocera density (organisms L^{-1}) in different months											
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Diaphanosoma sarsi	02	04	00	00	08	10	08	06	19	30	42	17
Diaphanosoma excisum	06	06	01	08	10	10	14	10	17	24	38	20
Ceriodaphnia cornuta	03	00	00	00	12	14	10	14	22	16	35	15
Moina micrura	10	10	05	04	08	10	12	10	12	20	30	24
Macrothrix spinosa	10	05	07	00	07	10	10	19	20	24	28	25
Alona rectangular	05	02	00	00	05	05	05	08	15	18	18	20
Alona nana	08	00	00	00	05	05	05	08	08	10	12	14
Indialona ganapati	07	09	07	05	08	08	12	10	12	15	12	16
Daphnia pulex	10	10	12	05	18	15	15	15	20	20	25	30
Total	61	46	32	22	81	87	91	100	145	177	240	181

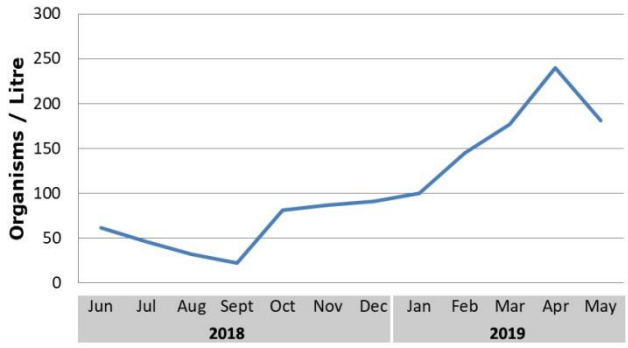

FIGURE 1 Seasonal variation of claocera in the study pond.

Hutchinson (1967) pointed out that water temperature increases the development of cladocera while Patalas (1972) stated that temperature is the primary factor influencing the zooplankton abundance. Quadri and Yousuf (1980) also recorded the significance of temperature in occurrence and the distribution of cladocera in Kashmir lake. The present investigation corroborate with the findings of Hutchinson (1967).

The overall view of the present investigation reveals good diversity of cladocera with maxima and minima in the month of April and September respectively. This investigation will be useful to monitor the health (water quality) and wealth (fish population) of this pond in near future.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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