

A Study on Protozoan Fauna in Kanwar Sen Lift Canal, Lunkaransar (Northern Rajasthan)

Ganpat Ram* and Deepti Srivastava**

* Research Scholar ** **Assistant Professor

Department of Zoology,
Govt. Dungar College, Bikaner

ABSTRACT

Indira Gandhi Canal, runs along the northern edge of Thar Desert. The Kanwar Sen lift canal is largest lift canal of Indira Gandhi Nahar Project. Protozoan fauna of Kanwar Sen lift canal is unique around the Thar desert. Protozoans are microscopic aquatic animals that are diverse and occur in almost all lakes and ponds besides rivers and canals. Protozoans play an important role in the aquatic food web as primary consumers. The present study was undertaken to observe the protozoan fauna in Kanwar Sen lift canal. The study was undertaken monthly for a period of 15 months (Jan, 2019 to March, 2020), covering all the three seasons and overlapping period of three months. Protozoans were represented by nine species belonging to three classes: Mastigophora (four species), Ciliata (four species) and Sarcodina (one species). The highest population density of protozoans was recorded during monsoon while during summer it was minimum. Among protozoans *Paramecium caudatum* was recorded maximum population density while, *Peranema trichophora* was recorded minimum population density. Different environmental conditions affect the density of protozoans.

Keywords: Protozoan fauna, Thar desert, Lift canal, Population density.

INTRODUCTION

Rajasthan is the largest state of India by area. Its geographical location between 23.3° to 30.12° north latitude and 69.30° to 78.17° east longitude north-western side of India. It is one of the arid states with an average rainfall of less than 100 cm annually. There are three main seasons winter (November to February), monsoon (July to October), and summer (March to June). The main source of the drinking water in Rajasthan at present is ground water, however most important source of surface water is Indira Gandhi Canal, which runs along the northern edge of Thar desert and supplies water for irrigation and drinking through its branches.

Kanwar Sen lift canal is a part of the seven-lift canal scheme of the Indira Gandhi Nahar Project. The Kanwar Sen lift canal provide irrigate water for Lunkaransar tehsil and drinking water for Bikaner city. Protozoan diversity of Kanwar Sen lift canal is unique around the Thar Desert.

Protozoa is a diverse group of minute unicellular organisms and is an important constituent of the zooplankton community of a water body. They generally act as a primary consumer and comprise an important link between primary producers (phytoplankton) and higher consumers in

aquatic food chain. Protozoan fauna in a canal is often different from the ponds, reservoirs and lakes.

The present study explored the diversity and density of protozoans in Kanwar Sen lift canal. The study was undertaken monthly for a period of 15 months (Jan, 2019 to March, 2020), covering all the three seasons and overlapping period of three months.

OBJECTIVES OF STUDY

- To assess the periodicity of occurrence of protozoans in Kanwar Sen lift canal.
- To study the protozoan diversity of Kanwar Sen lift canal.
- To assess the population density of protozoa in Kanwar Sen lift canal.

STUDY AREA

The Kanwar Sen lift canal mainly covers the area of Lunkaransar tehsil of the Bikaner district (27°22' to 28°01' north latitude and 71°54' to 74°22' east longitude). Bikaner is situated in the central area of the Thar Desert which represents the northwestern Rajasthan. Kanwar Sen lift canal starts from Birdhwal Head of the Indira Gandhi Canal. The water of the Beas and Sutlej rivers flows in the Kanwar Sen lift canal. Kanwar Sen lift canal is providing drinking water to Bikaner city and more than a hundred villages situated close to canal's area.

MATERIALS AND METHODS

The present study was carried out monthly for a period of 15 months (Jan, 2019 to March, 2020), covering all the three seasons and overlapping period of three months. Protozoans were collected from three study stations in the early morning of the day. Protozoans were collected with the help of plankton net made up of bolting silk (No.25, 0.3 mm size). From the net, collected sample was transferred to duly labelled plastic bottle. Formaldehyde was used to preserve the protozoan species and observed under the stereoscopic binocular microscope. Protozoans fauna were identified and results were expressed in No./l. Protozoans were identified by following respective keys like Edmondson (1966), Needham & Needham (1978) and Tonapi (1980).

RESULTS AND DISCUSSION

The protozoans were rich in the canal and represented by nine species belonging to three classes: Mastigophora, Ciliata and Sarcodina. Average population density of total protozoan was recorded 218.5/l. The highest population density (292.5/l) was recorded during monsoon while during summer it was minimum (178/l).

Class Mastigophora was represented by four species namely *Euglena acus*, *E. spirogyra*, *E. mass*, and *Peranema trichophora*. *Euglena acus*, *E. spirogyra* were found throughout the study period.

Average population density of Mastigophora was recorded 93.33/l. The highest population density of Mastigophora was (105/l) during monsoon and the lowest (80/l) in summer.

Class Ciliata was represented by four species namely *Paramecium caudatum*, *Paramecium bursaria*, *Vorticella campanula* and *Nassula omate*. *Paramecium caudatum* was found throughout the study period. The average population density of Ciliata was recorded as 98.94/l. During monsoon population density of Ciliata was maximum (152.5/l) and minimum in winter (68.33/l).

Class Sarcodina is represented only by one species namely *Amoeba proteus*. *Amoeba proteus* was observed throughout the sampling period. The average population density of sarcodina was recorded as 25.33/l. The highest population density of Sarcodina was (35/l) during monsoon and the lowest (21.67/l) in winter.

Among protozoans *Paramecium caudatum* was recorded maximum population density while, *Peranema trichophora* was recorded minimum population density.

Srivastava (2009) recorded 10 species of protozoans in desert waters. These belonged to Mastigophora (three species), Ciliata (seven species) while no Sarcodina was noted in desert waters. Similar findings have also been reported by Sharma *et al.* (2008). They reported seven species of phylum Protozoa belonging to mastigophores, ciliates and one sacrodines. Sharma (2013) recorded 39 species of protozoans in desert pond ecosystems around Bikaner. Saxena (2008) reported 41 species of protozoans from the wet lands of the Indian desert region. His records were based on the survey of over 200 bodies of water in the region over a period of about three decades, besides those published by Mahajan (1963, 1965, 1977a). Mahajan (1969, 1971, 1977b) alone contributed immensely to the protozoan fauna of Rajasthan and listed 82 species. Sharma (2017) reported 10 protozoan species in Sirhind feeder canal, Hanumangarh. Ruksana & Srivastava (2015) also recorded 13 species of protozoans in desert region Churu.

CONCLUSION

The present study revealed that the water of Kanwar Sen lift canal is fairly suitable for animal life. Protozoan fauna was found throughout the year. Monsoon season is the best growth period for protozoans. This study provides valuable understanding of the ecological significance on the protozoa diversity in Kanwar Sen lift canal. Protozoa dynamic can contribute to effective canal management strategies.

Table 1. Diversity and population density of protozoan fauna at Kanwar Sen lift canal (Northern Rajasthan) during January, 2019 to March, 2020. Values are expressed as No./l

Protozoan Species	Months (2019-2020)															
	Jan.19	Feb.19	Mar.19	Apr.19	May.19	Jun.19	Jul.19	Aug.19	Sep.19	Oct.19	Nov.19	Dec.19	Jan.20	Feb.20	Mar.20	Average
Class Mastigophora																
<i>Euglena spirogyra</i>	20	30	20	30	20	30	50	30	20	30	20	20	20	30	20	26.00
<i>Euglena mass</i>	20	20	30	30	NIL	NIL	30	20	30	20	30	20	30	30	20	25.38
<i>Euglena acus</i>	30	20	40	20	30	20	10	20	20	30	20	30	20	30	20	24.00
<i>Peranema trichophora</i>	20	20	30	20	NIL	NIL	30	30	20	30	20	20	30	20	20	23.84
Total Mastigophores	90	90	120	100	50	50	120	100	90	110	90	90	100	110	80	92.66
Class Ciliata																
<i>Paramecium caudatum</i>	50	50	20	40	30	20	60	80	50	80	20	20	40	40	20	41.33
<i>Paramecium bursaria</i>	NIL	NIL	NIL	10	NIL	30	10	40	60	40	30	10	NIL	10	10	25.00
<i>Vorticella campanula</i>	NIL	NIL	20	30	40	20	30	30	20	30	20	30	NIL	10	20	25.00
<i>Nassula omate</i>	20	10	30	10	20	NIL	10	20	30	20	10	10	10	20	10	16.42
Total Ciliates	70	60	70	90	90	70	110	170	160	170	80	70	50	80	60	93.33
Class Sarcodina																
<i>Amoeba proteus</i>	30	20	30	10	20	20	30	30	40	40	20	30	10	20	30	25.33
Total Sarcodines	30	20	30	10	20	20	30	30	40	40	20	30	10	20	30	25.33
Total Protozoans	190	170	220	200	160	140	260	300	290	320	190	190	160	210	170	211.33

Table 2. Seasonal and annual means of population density of protozoans at Kanwar Sen lift canal, Lunkaransar (Northern Rajasthan) during January, 2019 to Mar, 2020. Values are expressed as No./l

Protozoan Species	Summer (March to June)	Monsoon (July to Oct.)	Winter (Nov. to Feb.)	Annual average
Class Mastigophora				
<i>Euglena spirogyra</i>	24.00	32.50	23.33	26.61
<i>Euglena mass</i>	26.67	25.00	25.00	25.56
<i>Euglena acus</i>	26.00	20.00	25.00	23.67
<i>Peranema trichophora</i>	23.33	27.50	21.67	24.17
Total Mastigophores	80.00	105.00	95.00	93.33
Class Ciliata				
<i>Paramecium caudatum</i>	26.00	67.50	36.67	43.39
<i>Paramecium bursaria</i>	16.67	37.50	16.67	23.61
<i>Vorticella campanula</i>	26.00	27.50	20.00	24.50
<i>Nassula omate</i>	17.50	20.00	13.33	16.94
Total Ciliates	76.00	152.50	68.33	98.94
Class Sarcodina				
<i>Amoeba proteus</i>	22.00	35.00	21.67	26.22
Total Sarcodines	22.00	35.00	21.67	26.22
Total Protozoans	178.00	292.50	185.00	218.50

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