

Diversity of Rotifers in Mohabala Lake of Bhadrawati, District Chandrapur, (M.S.), India.

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ABSTRACT

The Mohabala lake is principal fresh water body located within Bhadrawati tahsil in Chandrapur District of Maharashtra state. Mohabala lake is near about 25 Km North of Chandrapur and 125 Km South East from Nagpur. It is situated at about 211 m above the mean sea level. A study of rotifer was undertaken during 2013 to 2015, two year to assess the types of rotifer present in this water body.

This water body is utilized by local residents for cloth washing and open defecation. Siltation is also responsible for pollution of water. Rotifers are the connecting link between primary producers and consumers in aquatic ecosystems. Rotifers are residing in inland water bodies and their diversity refers to varieties of species within their community. During the present study 25 species of rotifers were found at all sampling sites of lake.

Key words – Mohabala lake, Rotifer, Diversity.

INTRODUCTION

Rotifers are important component of an aquatic ecosystem and considered as microscopic soft bodied freshwater invertebrates. They play a significant role in an aquatic food chain. According to Hulyal and Kaliwal (2008) freshwater rotifers play an important role in the conversion of plant origin food to animal food and serve as prey to other smaller predatory fauna.

Rotifers are also called 'wheeled animals' mostly aquatic organisms that get their name from the corona: a rotating, wheel-like structure that is covered with cilia at their anterior end. They exhibit a wide range of feeding habits, they are filter feeders that will eat dead material, planktonic food particles such as algae, bacteria detritus and other microscopic living organisms that's why they are very important components of aquatic food webs. They are widely distributed in inland water bodies, such as in lakes, rivers and ponds. Due to fast reproductive rates and dispersal capabilities they can quickly colonize new habitats and often numerically dominate these communities.

MATERIAL AND METHODS

The water samples were collected from the three sites of lake such as site A, site B and site C. The samples were collected in the morning hours between 8.30 to 10.30 a.m. 50 lt. of water sample was filtrated through the plankton net made of bolting silk number 25 with mesh size 64 lime. The collected samples were allowed to settle down by adding Lugol's iodine. Sedimentation requires 24 hrs after which supernatant was removed and

concentrate was made up to 50 ml depending the number of plankton and preserved in 5% formalin for further studies.

For the quantitative study, the concentrated sample was shaken and one drop of sample was taken on a clear micro slide with the help of a standard dropper, the whole drop was carefully covered with the cover glass and observed. Plankton identification up to genera and whenever possible up to species level was classified according to keys given by Edmonson (1959), Adoni (1985) and APHA (1985) and standard analysis was undertaken as per Zar (2005).

Quantitative study of plankton was done by Sedgwick – Rafter Cell method.

Sedgwick–Rafter Cell method

The Sedgwick Rafter Cell is a special kind of slide similar to the Haemocytometer. The cell has a 50mm x 20 mm x 10 mm rectangular cavity that holds 1 ml sample. The cell is moved in horizontal directions on the stage of an inverted microscope and planktonic species encountered in the field are enumerated. A number of replicate samples are enumerated to calculate plankton / lit.

$$\text{Plankton (Units /lit.)} = n \times c / v$$

Where, n = number of plankton in 1 ml.

c = volume of concentrate.

v = volume of sample in lit.

RESULT AND DISCUSSION

According to Sharma (2010) dominance of protozoan and rotifers communities indicates the water quality deterioration and onset of eutrophication at alarming rate. Rotifers population is very useful in indicating water quality particularly in pollution studies. Plankton particularly rotifers have long been identified as indicators of water quality Arora, (1966). Rotifers are considered bioindicator of water quality. Rotifers play a very important role in the trophic level of freshwater impoundments and serve as living capsule of nutrition (Suresh Kumar, *et.al.*, 1999). The abundance of rotifers in an aquatic system indicates the water body is also rich in phytoplankton, debris element and bacteria and few predators. Rotifers, especially *Brachionus*, constitute an important link in the food chain of inland waters. They are considered preferred food for many fish larvae reported by Guerguess (1993).

During the present study rotifer was found the most dominant group among all the zooplanktons. Taxonomic dominance of rotifers was observed by several researchers like Nogueira (2001), Sampaio, *et. al.*, (2002) and Kudari *et.al.*, (2005). Govind (1969) observed rotifers as dominant group in his study from Tungabhadra reservoir. Many workers like Moitra and Bhaumik (1968), Chaube (1991), Jayabhaye and Madalpure (2006) and Sharma and Capoor (2010) founded that the rotifera as the most abundant species in their studies on different water bodies of India. Similar reports were document by Gaurvi, *et. al.*, (2003). They have reported that during summer rotifers are dominant.

Taxonomic dominance of rotifers was observed by researchers, Sampaio, *et. al.*, (2002), Neves, *et. al.*, (2003). Bhagat, *et. al.*, (2010) recorded 29 species belong to rotifer in Ambadi irrigation dam District Akola. Shashikant R. Sitre and Mahendra G. Thakare (2013) recorded that the most abundant species are represented by rotifer in Balaji Temple Tank of Chimur City of Chandrapur District (M.S.), Hemlata Verma, *et.al.*, (2013) recorded that the rotifers were the most abundant throughout the study period in Futera pond, Damoh District (M.P.), Gunwant P. Gadekar (2014) recorded the maximum species richness was observed in group rotifer in Pangdi lake of Gondia, Dist. Gondia (M.S.) and Gajanan Sontakke and Satish Mokashe (2014) recorded rotifer was dominant with 11 species in Dekhu reservoir from Aurangabad (M.S.).

In the present investigation rotifer is represented by 25 species at all the sampling sites of ponds. It showed little species diversity as per sampling sites at the respective ponds. In site A, rotifer are represented by 24 species in 2013-14 and 23 species in 2014-15. In site B, rotifer is represented by 25 species in 2013-14 and 21 species in 2014-15 and in site C, rotifer are

represented by 29 species in 2013-14 and 26 species in 2014-15.

Isaiarasu, *et.al.*, (1995) collected 11 species of rotifer in ponds of Sivakashi, Tamilnadu. Kamble and Meshram (2005) observed 5 species of rotifer in Khatijapur tank of Achalpur, Amraoti (M.S.), Pawar and Pulle (2005) founded 28 species of rotifera in Petwadaj dam of Nanded (M.S.), Sahoo, S. and Jameson, J.D. (2006) observed twenty five species of rotifer in a fish pond in Thothukudi, Tamilnadu. Jayabhaye and Madalpure (2006) recorded 14 species of rotifer in Parola dam of Hingoli (M.S.), Sakhre and Joshi (2006) have recorded 8 species of rotifers in Yeldari reservoir. Sharma, *et.al.*, (2007) observed twenty eight species of rotifer in and around Udaipur city, Rajasthan. Chargan, *et.al.*, (2008) observed 7 species of rotifer in freshwater wetlands in Yeotmal district of (M.S.), Balakrishna, D. *et.al.*, (2013) recorded the four major groups 10 species of rotifers in Dharmasagar lake is located in village and mandal of Dharmasagar of Warangal district, Andhra Pradesh. Balakrishna, D. *et.al.*, (2013) rotifer form a significant component of the zooplanktons in Dharmasagar lake of Dharmasagar of Warangal district, Andhra Pradesh. M. Jeelani and H. Kaur (2014) recorded 27 species of rotifer in Dal Lake, Kashmir. Shashikant R. Sitre (2014) recorded nine species of rotifer in Naik Lake of Nagpur City (M.S.) and Gajanan Sontakke and Satish Mokashe (2014) recorded 11 species of rotifers in Dekhu reservoir from Aurangabad, Maharashtra.

In site A, during 2013-2014, 24 species of rotifer were recorded among which *Brachionus bidentata* (89 no./lit) was dominant followed by *Filinia opoliensis* (62 no./lit), *Brachionus forticula* (42 no./lit), *Horaella brehmi* (42 no./lit), *Polyarthra vulgaris* (37 no./lit), *Trichocerca rattus* (32 no./lit), *Brachionus calyciflorus* (31 no./lit), *Branchionus quadridentatus* (31 no./lit), *Branchionus caudatus* (29 no./lit), *Keratella valga* (27 no./lit), *Trichocerca tigris* (27 no./lit), *Brachionus formadivergens* (23 no./lit), *Brachionus plicatilis* (22 no./lit), *Brachionus angularis* (20 no./lit), *Cephalodella gibba* (19 no./lit), *Lepadella ovalis* (18 no./lit), *Platyias quadricornis* (18 no./lit), *Lecane luna* (16 no./lit), *Asplanebnopus myrmeleo* (15 no./lit), *Esophora anthadis* (15 no./lit), *Philodina roseota* (14 no./lit), *Asplanchna intermedia* (13 no./lit), *Keratella tropica* (11 no./lit) and *Testidinella macroneta* (11 no./lit).

In site A, during year 2014-15, 23 species of rotifer were recorded among which *Brachionus formadivergens* (57 no./lit) was dominant followed by *Brachionus falcatus* (47 no./lit), *Asplanchna intermedia* (45 no./lit), *Brachionus forticula* (43 no./lit), *Monostyla bulla* (41 no./lit), *Platyias quadricornis* (38 no./lit), *Branchionus caudatus* (37 no./lit), *Horaella brehmi* (36 no./lit), *Brachionus*

plicatilis (34 no./lit), *Lepadella ovalis* (33 no./lit), *Lecane Luna* (29 no./lit), *Cephalodella gibba* (28 no./lit), *Esophora anthadis* (28 no./lit), *Philodina roseola* (26 no./lit), *Rotaria neptunia* (26 no./lit), *Trichocerca tigris* (24 no./lit), *Brachionus angularis* (24 no./lit), *Testudinella macroneta* (23 no./lit), *Trichocerca rattus* (19 no./lit), *Keratella tropica* (17 no./lit), *Keratella valga* (14 no./lit), *Brachionus quadridentatus* (13 no./lit) and *Tripleuchlaris plicata* (10 no./lit).

In site B, during 2013-14, 25 species of rotifer were recorded among *Brachionus bidentata* (103 no./lit) was dominant followed by *Brachionus furficula* (64 no./lit), *Brachionus caudatus* (61 no./lit), *Filinia opolensis* (59 no./lit), *Brachionus formadivergens* (51 no./lit), *Esophora anthadis* (49 no./lit), *Polyarthra vulgaris* (47 no./lit), *Brachionus plicatilis* (46 no./lit), *Brachionus falcatus* (4 no./lit), *Brachionus calyciflorus* (37 no./lit), *Brachionus quadridentatus* (36 no./lit), *Cephalodella gibba* (36 no./lit), *Keratella valga* (35 no./lit), *Brachionus angularis* (35 no./lit), *Platyias quadricornis* (34 no./lit), *Philodina roseola* (28 no./lit), *Keratella tropica* (27 no./lit), *Lepadella ovalis* (27 no./lit), *Asplanchna intermedia* (23 no./lit), *Trichocerca tigris* (19 no./lit), *Tripleuchlaris plicata* (17 no./lit), *Rotaria neptunia* (15 no./lit), *Monostyla bulla* (13 no./lit) and *Testudinella macroneta* (12 no./lit).

In site B, during 2014-15, 21 species of rotifera were recorded 21 among which *Cephalodella gibba* (80 no./lit) was dominant followed by *Brachionus falcatus* (66 no./lit), *Brachionus forficula* (61 no./lit), *Brachionus bidentata* (60 no./lit), *Polyarthra vulgaris* (57 no./lit), *Brachionus plicatilis* (51 no./lit), *Filinia longiseta* (54 no./lit), *Horaella brehmi* (54 no./lit), *Lepadella ovalis* (54 no./lit), *Asplanchna intermedia* (49 no./lit), *Esophora anthadis* (47 no./lit), *Testudinella macroneta* (47 no./lit), *Philodina roseola* (43 no./lit), *Platyias quadricornis* (43 no./lit), *Brachionus angularis* (42 no./lit), *Lecane luna* (35 no./lit), *Tripleuchlaris plicata* (34 no./lit), *Brachionus quadridentatus* (33 no./lit), *Asplanchna myrmeleo* (32 no./lit), *Keratella tropica* (31 no./lit) and *Trichocerca tigris* (31 no./lit).

In site C, during 2013-14, 29 species of rotifer were recorded among which *Filinia opliensis* (48 no./lit) was dominant followed by *Brachionus bidentatus* (37 no./lit), *Rotaria neptunia* (36 no./lit), *Horaella brehmi* (35 no./lit), *Lepadella ovalis* (34 no./lit), *Esophora anthadis* (33 no./lit), *Brachionus quadridentatus* (32 no./lit), *Lecane luna* (31 no./lit), *Brachionus caudatus* (29 no./lit), *Brachionus formadivergens* (27 no./lit), *Cephalodella gibba* (27 no./lit), *Monostyla bulla* (27 no./lit), *Philodina roseola* (26 no./lit), *Brachionus forficula* (25 no./lit), *Brachionus calyciflorus* (24 no./lit), *Brachionus havanaesis* (24

no./lit), *Keratella valga* (24 no./lit), *Brachionus falcatus* (23 no./lit), *Platyias quadricornis* (23 no./lit), *Keratella tropica* (22 no./lit), *Testudinella macroneta* (22 no./lit), *Asplanchna intermedia* (20 no./lit), *Brachionus plicatilis* (20 no./lit), *Polyarthra vulgaris* (18 no./lit), *Asplanchna myrmeleo* (14 no./lit), *Trichocerca tigris* (12 no./lit), *Brachionus angularis* (11 no./lit), *Tripleuchlaris plicata* (9 no./lit) and *Trichocerca rattus* (7 no./lit).

In site C, during 2014-15, 26 species of rotifer were recorded among which *Cephalodella gibba* (90 no./lit) was dominant followed by *Lecane luna* (73 no./lit), *Horaella brehmi* (62 no./lit), *Polyarthra vulgaris* (62 no./lit), *Brachionus calyciflorus* (59 no./lit), *Brachionus plicatilis* (57 no./lit), *Esophora anthadis* (56 no./lit), *Filinia opliensis* (55 no./lit), *Lepadella ovalis* (54 no./lit), *Trichocerca tigris* (53 no./lit), *Brachionus quadridentatus* (51 no./lit), *Keratella tropica* (50 no./lit), *Asplanchna intermedia* (49 no./lit), *Brachionus falcatus* (48 no./lit), *Platyias quadricornis* (47 no./lit), *Testudinella macroneta* (46 no./lit), *Brachionus forficula* (45 no./lit), *Brachionus angularis* (43 no./lit), *Brachionus bidentata* (41 no./lit), *Keratella valga* (41 no./lit), *Trichocerca rattus* (39 no./lit), *Tripleuchlaris plicata* (28 no./lit), *Asplanchna myrmeleo* (16 no./lit), *Monostyla bulla* (16 no./lit), *Philodina roseola* (12 no./lit) and *Rotaria neptunia* (11 no./lit).

Charjan, *et.al.*, (2008) stated that presence of *Brachionus sp.* is a definite indicator of the eutrophic nature of lake. The higher diversity of a *Brachionus sp.* in the zooplankton community indicates that most of the ponds are polluted by the organic pollution mostly contributed by the domestic sewage. Isaiarasu *et.al.*, (1995) and Malathi, *et.al.*, (1999) recorded several species of *Brachionus* are from highly polluted in Hussainsagar lake of Hyderabad. Ahmad, U. *et.al.*, (2011) recorded 11 genera belonging to rotifers i.e. *Brachionus calyciflorus*, *Brachionus bidentata*, *Brachionus angularis*, *Brachionus plicatilis*, *Asplanchna peridontata*, *Keratella*, *Notholca*, *Monostyla*, *Rotaria* and *Filinia longiseta*. Gadekar, G.P. (2014) recorded among the rotifera *Brachionus terminalis*, *Brachionus angularis*, *Brachionus falcatus*, *Cephalodella gibba*, *Keratella tropica*, *Lecane sp.* were the dominant species in Railway Pond, Gondia. Plankton particularly rotifers have long been known for indicators of water quality stated by Arora, (1966).

In the present investigation dominance of rotifer as a group as well as *Brachionus sp.* in site A, B and C indicates eutrophic nature of the Mohabala lake. During present investigation, rotifers were maximum during the winter season in site B and site C and minimum during the monsoon season in site A of the lake. Rotifers consume more nutrients rapidly to build up their population (Saboor and Altaf, 1995). Kedar, (2007) observed

maximum rotifer during the March and minimum during July. Nirmal Kumar, J.I. *et.al.*, (2011) recorded maximum population of rotifers during the summer and minimum during the monsoon of Varasda wetland system. Goswami, A.P. and Mankodi, P.C. (2012) recorded rotifers were higher in winter in fresh water reservoir Nyari –II Rajkot district, Gujarat. M.R. Abdar (2013) reported maximum density of rotifer is recorded during post monsoon months and minimum during rainy season. Jaiswal, D.P. *et.al.*, (2014) reported maximum population density of rotifers was observed during summer season while minimum during monsoon season in a freshwater Rangavali Dam of Navapur of Dist- Nandurbar. Gunwant P. Gadekar (2014) in his study stated that the

population density of rotifers was maximum in winter, in December month and minimum in monsoon, in June month in Pangdi Lake of Gondia, Dist. Gondia, (M.S.) and Shashikant R. Sitre (2014) founded Rotifers were minimum in monsoon in Naik Lake of Nagpur City (M.S.).

In the present investigation, maximum rotifer during the winter is probably due to availability of suitable food and favorable temperature, more entry of domestic sewage and minimum density in monsoon season which could be due to dilution of water resulting in fewer nutrients or could be due to reduction of transparency and dissolved oxygen. Similar observations also found by Goswami, A.P. and Mankodi, P.C. (2012).

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Table No. 1: Seasonal variation of rotifers in Mohabala lake at site-A during year 2013-14

S.N.	Parameters	Monsoon	Winter	Summer	Total
1	Rotifera	14.25 ± 3.49	91.25 ± 36.50	60.50 ± 29.87	55.33 ± 14.26

Table No. 2: Seasonal variation of rotifers in Mohabala lake at site-A during year 2014-15

S.N.	Parameters	Monsoon	Winter	Summer	Total
1	Rotifera	9.50 ± 6.38	94.25 ± 11.17	69.75 ± 26.28	57.83 ± 8.48

Table No. 3: Seasonal variation of rotifers in Mohabala lake at site-B during year 2013-14

S.N.	Parameters	Monsoon	Winter	Summer	Total
1	Rotifera	23.75 ± 4.82	133.50 ± 42.50	77.50 ± 50.40	78.25 ± 19.89

Table No. 4: Seasonal variation of rotifers in Mohabala lake at site-B during year 2014-15

S.N.	Parameters	Monsoon	Winter	Summer	Total
1	Rotifera	23.25 ± 14.75	142.75 ± 26.42	85.00 ± 38.36	83.67 ± 9.64

Table No. 5: Seasonal variation of rotifers in Mohabala lake at site-C during year 2013-14

S.N.	Parameters	Monsoon	Winter	Summer	Total
1	Rotifera	22.75 ± 14.11	112.75 ± 19.27	44.50 ± 30.52	60.00 ± 6.85

Table No. 6: Seasonal variation of rotifers in Mohabala lake at site-C during year 2014-15

S.N.	Parameters	Monsoon	Winter	Summer	Total
1	Rotifera	32.00 ± 29.92	169.50 ± 23.76	99.50 ± 37.67	100.33 ± 5.69