



## **Studies on Rotifers Diversity with Reference to Physico-Chemical Parameters of Railway Station Pond At Gondia, Distt. Gondia, Maharashtra.**

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### **Abstract:**

Railway Station Pond was constructed in 1930 by the Railway Department to supply the water for steam engines and loco sheds. It is located in the heart of Gondia city and is surrounded on three sides by dense habitations and on one side by railway line, near the railway station. It has become highly polluted due to the receipt of untreated sewage, garbage and rubbish from railway station.

Seasonal changes in physico-chemical parameters such as water temperature,  $P^H$ , Dissolved Oxygen, Free Oxygen and inorganic contents were studied month wise from June 2006 to May 2007. Studies showed the seasonal fluctuations in water temperature ( $27^{\circ}C-36^{\circ}C$ ), Transparency (10.5-17 cm),  $P^H$  (7.1-8.4), Dissolved Oxygen (2.8-6 mg/l), Free Carbon Dioxide (2.7-12.5 mg/l), Total alkalinity (180-371mg/l) Chlorides (30.4-79.48 mg/l), Total Hardness ( 585-970 mg/l), Phosphate (4.70-10.2 mg/l), Nitrates (2.90-4.25 mg/l), Rotifers 2116 ind/lit. The study revealed that there is an indication of pollution in the pond due to anthropogenic activities, rapid encroachments of the area, domestic sewage; the pond water is being polluted. Hence preventive measures are required to avoid further deterioration of the pond water quality.

### **Keywords:**

Rotifers, Railway Station Pond, Physico-chemical parameters.

### **Introduction:**

Water is one of the most important compounds that profoundly influence the life. It is not only major component of environment but also the best solvent and a medium on which all organisms depend for their existence. A fresh water body, which fulfills a variety of human needs is full of value, only when if it is not abused and polluted.

The physico-chemical characteristics of pond water have direct impact on prevailing organisms as well as on human being using such water. The pond receives domestic waste water throughout the year as the domestic waste water channels of the surrounding area are diverted into the pond.

Rotifera is one of the group of zooplankton in the aquatic ecosystem. Rotifers occurs almost universally in freshwater habitat and make an important group of zooplankton community. They provide food for fishes in





fresh water ponds, lakes and play a major role in fish growth and their production. (Datta and Bandyopadhyay 1985) showed their relationship with tropic status of water bodies. (Arora 1966) worked on effects of temperature,  $p^H$  and dissolved oxygen concentration on rotifers. (Salaskar and Yeragi 2009) also studied rotifer density in relation to temperature,  $p^H$  and dissolved oxygen.

A physico-chemical analysis with reference to rotifers was undertaken in the present study. The investigation was carried out to study the pond ecosystem with seasonal changes in response to physico-chemical and biological factors during different seasonal of the year.

### **Material and methods:**

Railway Station Pond located at 21 27' and 39.18" N and 80 11' and 11.67" E and is about 1022 ft. above the mean sea level (MSL) with an area of 0.09 sq. km. Monthly water samples were collected and brought to the laboratory. Physical parameters were studied according to Welch (1948) and Lind (1974) and chemical parameters were studied by using APHA (1975).

The investigations on physico-chemical and biological parameters were carried out during June 2006 to May 2007. Monthly water samples were collected and brought to the laboratory for further analysis. Physico-chemical parameters like temperature, transparency (Welch, 1948),  $p^H$ , dissolved oxygen, free carbon dioxide, chloride, hardness and nutrients like phosphates and nitrates. (APHA, 1975). At the same time the plankton samples were collected by using standard nylon plankton net made by bolting silk no. 25 planktons were preserved in 4% and identified using (Edmondson 1959) and other standard manuals.

### **Result and discussion:**

During the present investigation the physical parameters such as temperature, transparency and chemical parameters namely  $p^H$ , dissolved oxygen, free carbon dioxide, chlorine, hardness, alkalinity, phosphate and nitrates. The density and diversity of rotifers were studied from June 2006 to May 2007. Table no. 1 shows the seasonal variations of various physico-chemical parameters of Railway Station pond during the study period.

Parameters like water temperature (34.4 °C), free carbon dioxide (10.13 mg/l), total alkalinity (336 mg/l), nitrates (4.02 mg/l) and phosphates (8.64 mg/l) were maximum during summer while transparency (15.63 cm),  $p^H$  (8.3), dissolved oxygen (5.4 mg/l) showed its peak in winter and total hardness (869.25 mg/l) and chloride (69.95 mg/l) were recorded maximum during monsoon season.

In the present study total 14 species of rotifera were recorded belonging to 6 genera. The most diversified genera was Brachionus represented by 7





species namely *B. calcyflorus*, *B. caudatus*, *B. rubens*, *B. durgae*, *B. falcatus*, *B. bidentata*, *B. angularis*. The genera which were *Filinia* species, *Asplanchna* species, *Trichocerca* species and *Lecane* species were recorded. The least dominant genera were represented by a single species of *Filinia* species, *Asplanchna*, *Trichocerca*, *Lecane* species. (Table no. 2).

During the study period total population of rotifera was recorded as 2116 ind/lit. Seasonal population, density of rotifers recorded its peak during summer (1126 ind/lit) while least during monsoon (357 ind/lit).

Rotifers are regarded as valuable bioindicator to depict the trophic status of water quality (Pejler, 1989). (Arora 1963) reported that species of *Brachionus* have a wide range of occurrence and are found from potable water to diluted sewage tanks. Seasonal rotifer biodiversity study of Railway Station pond showed the peak in density and diversity during summer indicating the influence of various physico-chemical factors such as temperature, free carbon dioxide total alkalinity and nutrients like nitrates and phosphates and rotifer population.

In the present investigation nutrients such as nitrates and phosphates were recorded higher during summer season which may results into the increased rotifer population during the same season while lower population recorded during winter and monsoon season. Rotifers utilize these nutrients more rapidly to build up their population (Saboor and Altaf, 1995) Jorge et al (2009) reported highest density and diversity of Rotifers during summer months in Valle de Bravo reservoir, Mexico, due to increase in temperature. Similar results were also observed by (Kedar et al 2007) in Yedshi lake of Maharashtra.

Lower values of rotifer population density and diversity were observed during the monsoon season which might be due to dilution of water, less nutrients or depletion of factors such as transparency, dissolved oxygen.  $P^H$ , (Chandrashekhar, 1996; Kumar, 2001), (Jeelani et al., 2005) in Dal Lake, Kashmir (India). (Yadav et al., 2003) noticed high density as well as diversity of rotifers both in summer and winter in Fatehpur Sikri Pond, Agra (U.P)

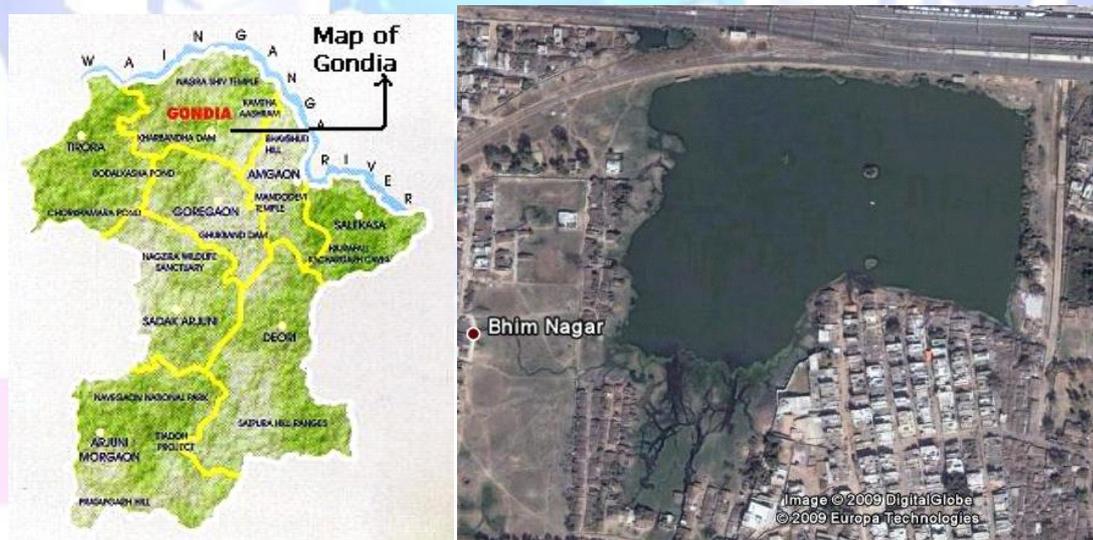
The present study showed the *Brachionus* formed the dominant and diversified genus among the rotifers through the study period. (Sunkad 2004) and (Pawar and Pulley 2005) also observed the dominance of *Brachionus* in Rakaskoppa reservoir of Belgaum, North Karnataka, India and Pethwadaj dam of Nanded District (M.S.). (Dhanapathi 2000) reported on the distribution of various *Brachionus* species from different parts of India.



**Table 1:** Annual range, Seasonal variations in Physico-chemical Parameters of Railway Station Pond during 2006-2007.

Parameters	Range	Monsoon	Winter	Summer
Water Temperature ( ° C)	27-36	31.4 ± 1.966	27.9± 0.544	34.4±1.556
Transparency (cm)	10.5-17	12.25± 0.901	15.63 ± 1.192	11.25 ± 0.559
PH	7.1-8.4	7.5 ± 0.339	8.3 ± 0.111	7.42 ± 0.227
Dissolved oxygen (mg/l)	2.8-6	4.03 ± 0.576	5.4 ± 0.651	3.55 ± 0.763
Free Carbon dioxide (mg/l)	2.7-12.5	7.78 ± 2.002	3.78 ± 0.869	10.13 ± 2.128
Total Alkalinity (mg/l)	180-371	258.2 ± 56.8	240± 19.039	336 ± 25.95
Total Hardness (mg/l)	585-970	869.2 ± 97.9	825 ± 39.408	657 ± 53.033
Chloride (mg/l)	30.4-79.5	69.95 ± 8.87	55.76 ± 9.983	34.22 ± 3.364
Nitrate (mg/l)	2.90-4.25	3.9 ± 2.094	3.09 ± 0.128	4.02 ± 0.228
Phosphate (mg/l)	4.70-10.2	7.55 ± 1.433	5.18 ± 0.415	8.64 ± 1.16

**Graph 1:-** Seasonal Biodiversity of Rotifers in Railway Station Pond during 2006-2007



**Figur 1:** Map showing Railway Station pond in Gondia District and satellite view of Railway Station pond.

### Conclusion:

Having a glimpse of observations on physico-chemical parameters, such as temperature, transparency, PH, dissolved oxygen, free carbon dioxide; total alkalinity, total hardness, nitrates and phosphates have the direct impact on occurrence, density and diversity of rotifers in Railway Station pond. Occurrence



of these bioindicator species at higher rate indicates the mesosaprobic nature of this pond.

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