ORIGINAL RESEARCH PAPER
Volume-6 | Issue-12 | December-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 93.98
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

SEASONAL VARIATION AND ANALYSIS OF PLANKTON DIVERSITY IN GHODHAVI LAKE RURAL AREA OF AHMEDABAD.

Zoology

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ABSTRACT

Godhavi is a village in Sanand taluka in Ahmadabad district, Gujarat State. Godhavi lake is located at the northern side of the village. It is also known as Jambu talav. Rain water enters from the surroundings into the talav and water from the Narmada River also enters into the talav through canal.

The plankton were collected, counted and were identified by using the method suggested by APHA, (1995) Prescott, (1970) and W. T. Edmondson, (1959). The planktons were counted by using Sedgwick Rafter counting cell. During investigation period phytoplankton like *Ankistrodesmus sp., Merismopedia sp., Navicula sp., Nitzschia sp, Euglena sp.* and zooplankton such as *Strombidium sp., Ceriodaphnia sp., Tropocyclops sp.* and *Brachionus sp.* were recorded as a dominant genera in Godhavi pond. The study was carried out monthly but was tabulated seasonally by using statistical method. From the listed data the quality of water was concluded.

KEYWORDS

Godhavi lake, Plankton, Ahmedabad.

INTRODUCTION

Godhavi lake is located at the northern side of the village. It is also known as Jambu talav. It is natural talav in which the cattle used to drink and bath, local people are engaged in washing clothes and discharge soap water into the talav. The area of Godhavi pond is 56970 m^2, peripheral area is **985.13 m.** and depth is **20 feet.** Its exact location is **230 01' 36.98" N** Latitude and **720 24' 36.51" E** Longitude, and **129 feet** above sea level.

Analyses for biological parameter were carried out by using the method suggested by APHA (1985); Kumar and Ravindranath (1998) and Trivedy and Goel (1984) Prescott, (1970) and W. T. Edmondson, (1959).

MATERIALS AND METHODS:

The standard method suggested in APHA, Battish, (1992), Edmondson, (1959), and Prescott (1970) used for collection and counting and identification of phytoplankton and zooplankton. Plankton were counted by using Sedgwick Rafter counting cell. Plankton net number 25 of mesh size 20 µm was used for collecting samples. 50 liters of water was measured in a graduated bucket and filtered through the net and concentrated in a 100 ml bottle. Samples were collected as close to the water surface as possible in the morning hours. The samples were labeled with the date, time, study area and the volume measured and pasted on the containers. Plankton is preserved by using 4% formalin. The sample was allowed to settle for 24-48 hours and was further concentrated to approximately 30 ml by decanting. Sedgwick Rafter counting cell is used to count the plankton. A trinocular compound microscope is used to count the plankton with different eyepieces such as 10X and 40X. Formula to convert unit/ml of plankton into unit/liter is

$$n = \frac{(a \times 1000)\, c}{l}$$

Where,
n = Number of plankton / liter of water.
a = Average no. of plankton in one small counting chamber of S-R cell.
c = ml of plankton concentrate.
l = Volume of original water filtered in liter.

RESULTS AND DISCUSSION:

Plankton has long been used as indicator of water quality. Because of their short life spans, plankton responds quickly to environmental changes. They flourish both in highly eutrophic waters while a few others are very sensitive to organic and/or chemical wastes. Some species have also been associated with noxious blooms sometimes creating offensive tastes and odours or toxic conditions. Because of their short life cycles plankton responds quickly to environmental changes, and hence the standing crop and species composition indicate the quality of the water mass in which they are found.

During study period it is observed that the total phytoplankton 95/ml is more in summer season and basillariophyceae is dominant while total zooplankton 34/ml is more in summer season and copepod is dominant. The total plankton count/ml. is minimum in monsoon season (89/ml) and maximum in summer season 129/ml (Table no 1 and 2).

In Godhavi pond 37 plankton species were recorded out of which 10 species of Chlorophyceae, 4 species of Cyanophyceae, 10 species of Basilariophyceae, 3 species of Euglenophyceae, 3 species of Ciliata, 1 species of Rotifera, 2 species of Cledocera and 4 species of Copepoda (Table no. 1and 2).

Seasonal variation of diatoms recorded maximum in summer and minimum during winter and monsoon season. Pahwa and Mehrotra, (1966) also observed similar trends in the water body, which has been further supported by Rao, (1979) and Sengar and Sharma, (1982).

A number of factors prejudiced the distribution of diatoms in water body, such as change in water temperature, Aykulu, (1978), Saad and Abbas, (1985) and Descy *et. al*., (1987), Aykulu, (1978) observed that the temperature and current discharge resulted in phytoplankton distribution and the maximum of water current associated with reduced water retention time and rainfall. In the water body temperature regulated the plankton development and water current formed the most important controlling factor.

Dhembare, (2011) stated that to monitor the aquatic ecosystems and integrity of water the zooplankton has been used recently as bioindicators. This study showed that community size of zooplankton was the highest in rainy while the lowest density in winter. Among the zooplankton rotifer forming dominant group followed by cladocera and copepoda. Sukumaran and Das, (2002) studied plankton abundance in relation to physico-chemical features of Manchribele reservoir in Bangalore, India and reported high chloride content and optimal temperature was favor for zooplankton in different seasons. In the studied groups of zooplankton rotifer was largest group and cladocera was second larger group followed by copepoda. Similar ranking was noticed in the present study.

Singh *et al.* (2002) reported that higher rotifer population occur during summer and winter might be dominant due to hypertropical condition of the pond at high temperature and low level of water. The dominance of rotifers was reported in winter Kulshreshtra and Joshi, (1999). Chandraseker, (1996) showed that the water temperature, turbidity and transparency and dissolved oxygen were favor for rotifer population. In rainy rotifers were lower might be due to neutral pH. At the alkalinity, pH and temperature above 29^0 C the rotifers disappears Dhanapathi, (1995). The differences in seasonal density might be the nutrition and biotic interactions Pawar and Pulle, (2005). Similar result was noticed in the present study. Presence of phytoplankton can

adversely affect water quality. Most of them are also indicative of the potential problems likely to be affected on the water supply system. The diversity in the physico- chemical factors was responsible for the diversity in the phytoplankton production, Marykensa, (2011). The diversity and density of zooplankton depends upon the nutrient condition of water body, abiotic factors, DO, food chain, soil-water chemistry and web with life cycle Dhembare, (2011).

CONCLUSIONS:

Therefore from the above study it is concluded that the total phytoplankton 95/ml. is more in summer season and basillariophyceae is dominant while total zooplankton 34/ml. is more in summer season and copepod is dominant. The total plankton count/ml. is minimum in monsoon season 89/ml. and maximum in summer season 129/ml. This was proved by the above result as the amounts of cyanophyceae algae and rotifera were found in Godavi pond, which are indicator of pollution.

During study period it is observed that Godavi lake is natural lake, in which the cattle used to drink and bath, rain water enter from the surroundings into the lake. One portion of the pond is covered by local people who are engaged in washing clothes and discharge soap water into the pond, local people immerse worship material in pond water. People from the surrounding area discharge their waste and domestic sewage directly into its water. These are some reasons of water pollution.

Table No. 1.: Seasonal variation of phytoplankton in Godhavi Lake

PHYTOPLANKTON COMPOSITION		SAMPLING SEASON		
CLASS	GENERA	SUMMER MEAN	MONSOON MEAN	WINTER MEAN
CHLOROPHYCEAE				
	Ankistrodesmus Sp.	11	10	12
	Closteriopsis Sp.	1	1	1
	Coelastrum Sp.	2	2	0
	Cosmarium Sp.	0	0	1
	Crucigenia sp.	0	1	0
	Gonium sp.	1	0	0
	Mugeotia sp.	1	1	1
	Pediastrum sp.	3	3	0
	Scenedesmus Sp.	8	3	2
	Tetraedron Sp.	5	0	2
TOTAL		**32**	**21**	**19**
CYANOPHYCEAE				
	Anabaena Sp.	0	2	1
	Merismopedia Sp.	8	6	1
	Oscillatoria Sp.	3	1	4
	Spirulina Sp.	0	1	1
TOTAL		**11**	**10**	**7**
BACILLARIOPHYCEAE				
	Cyclotella sp.	7	3	0
	Cylindrotheca sp.	1	0	3
	Cymbella Sp.	6	5	10
	Gomphonema Sp.	1	1	0
	Navicula Sp.	20	15	16
	Nitzschia sp.	10	14	21
	Synedra sp.	3	7	8
TOTAL		**48**	**45**	**58**
EUGLENOPHYCEAE				
	Euglena Sp.	3	4	3
	Phacus sp.	1	1	0
TOTAL		**4**	**5**	**3**
TOTAL PHYTOPLANKTON COUNT / ML		**95**	**81**	**87**
TOTAL PHYTOPLANKTON COUNT / L		57000	48600	52800

Table No. 2.: Seasonal variation of zooplankton in Godhavi Lake

ZOOPLANKTON COMPOSITION		SAMPLING SEASON		
GROUP	GENERA	SUMMER MEAN	MONSOON MEAN	WINTER MEAN
CILIATA				
	Pleuronema sp.	1	0	0
	Strombidium Sp.	3	1	3
TOTAL		**4**	**1**	**3**
CLADOCERA				
	Ceriodaphnia sp.	4	2	5
	Moina sp.	3	0	1
TOTAL		**7**	**2**	**6**
COPEPODA				
	Cyclops sp.	5	0	3
	Diaptomus sp.	4	1	2
	Eucyclops sp.	3	1	2
	Tropocyclops sp.	8	2	8
TOTAL		**20**	**4**	**15**
ROTIFERA				
	Brachionus Sp.	3	1	1
TOTAL		**3**	**1**	**1**
TOTAL ZOOPLANKTON COUNT / ML.		**34**	**8**	**25**
TOTAL ZOOPLANKTON COUNT / L		20400	4800	15000
TOTAL PLANKTON COUNT / ML.		**129**	**89**	**112**
TOTAL PLANKTON COUNT / L.		77400	53400	67200

Plate I Phytoplankton species

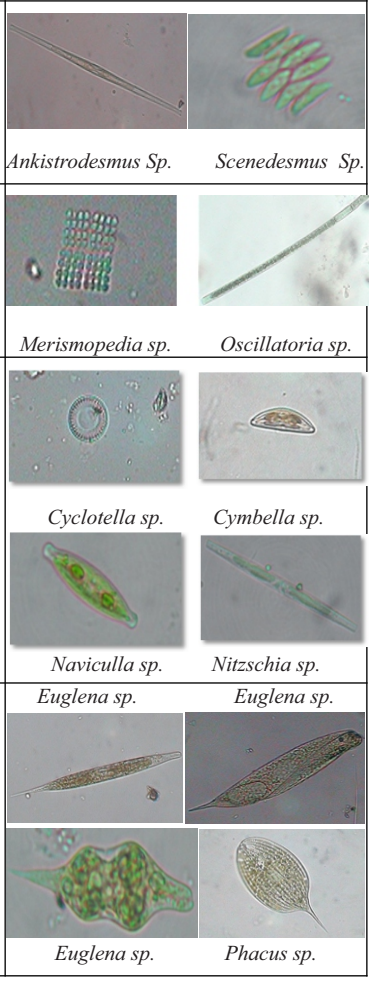
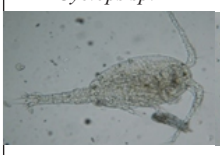


Plate II Zooplankton species

CILIATA	 *Pleuronema sp.*	 *Strombidium Sp.*
CLADOCERA	 *Ceriodaphnia sp.*	 *Moina sp.*
COPEPODA	 *Cyclops sp.*	 *Diaptomus sp.*
	 *Eucyclops sp.*	 *Tropocyclops sp.*
ROTIFERA	 *Brachionus Sp.*	 *Brachionus Sp.*
	 *Brachionus Sp.*	 *Brachionus Sp.*

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