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Original Research Paper

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STUDY OF POLLUTION INDEX AND POLLUTION TOLERANT ALGAL GENERA OF CERTAIN WASTE WATER HABITATS

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ABSTRACT

In present study for rating the water pollution, Palmer's pollution index (1969) was followed.. Algal samples were collected for the period of two years i.e. from Jun 2015 to May 2017 by selecting four different waste water habitats. Pollution tolerant genera of algae were found at all selected waste water habitats. The pollution tolerant algal genera belonging to four class of algae i.e. Chlorophyceae, Bacillariophyceae, Euglenophyceae and Cyanophyceae were recorded. A total of 28 pollution tolerant genera of algae were recorded. Collected algal samples were identified with the help of standard literature.

KEYWORDS : Palmer's pollution index (1969), Pollution tolerant algal genera, Waste water .

INTROUCTION

Water is one of the significant natural resources of earth. It is also known as universal solvent as it dissolves more substances than any other liquid. Water containing one or more of various types of impurities may be said to be polluted. The sources of water pollution are domestic waste water, agricultural run-off and industrial effluents. These pollutants pollutes water and adversely affect aquatic environment. Algae being primary producers and biological entity responds to these changes. The effects are seen as decline in algal growth or stimulation of growth of certain type of tolerant algal forms. Algae are reliable indicators of water pollution. In present research work, Palmer's pollution index of algal genera is taken into account for evaluation of water quality of selected waste water habitats. Various research workers supported the view of Palmer like Hajdu (1976), Vanlandingam (1976), Nandan and Patel (1983), Jose and Kumar (2011) and Sawdekar (2018).

MATERIALS AND METHODS

The research work was carried out to study pollution index and pollution tolerant algal genera of certain waste water habitats, four sites have been selected. These sites are:

i) S1 - Domestic waste water: This site is located in Aurangabad city. Domestic waste water released in Kham river.

ii) S2 – Dairy waste water: This site is located near Aurangabad city known as Mahanand dairy.

iii) S3 – Sugar industry waste water: This site is located in Partur tehsil of Jalna district. The site is known as Maa Bageshwari sugar factory.

iv) S4 - Oil industry waste water: This site is located in Selu tehsil area of Parbhani district.The site is known as Mahesh oil industry.

The experimental work was carried out for two consecutive years i.e. from June 2015 to May 2017. The pollution tolerant algal genera and species were recorded at each site of waste water habitat. Twenty most frequent occurring genera were taken into account. The pollution index factor was assigned to each genus. The index factor of the algae present were then totaled. For rating pollution of water, observations according to Palmer (1969) were made.

RESULTS AND DISCUSSION

During present investigations pollution tolerant genera of algae belonging to Chlorophyceae, Bacillariophyceae, Euglenophyceae and Cyanophyceae were recorded. A total of 28 pollution tolerant genera of algae were recorded. These are *Ulothrix*, *Stigeoclonium*, *Chlorococcum*, *Chlorella*, *Ankistrodesmus*, *Coelastrum*, *Crucigenia*, *Scenedesmus*, *Spirogyra*, *Closterium*, *Cosmarium*, *Selenastrum*, *Fragilaria*, *Navicula*, *Pinnularia*, *Cymbella*, *Nitzschia*, *Gomphonema*, *Euglena*, *Phacus*, *Trachelomonas*, *Lepocinclis*, *Microcystis*, *Aphanocapsa*, *Spirulina*, *Oscillatoria*, *Phormidium* and *Lyngbya*.Highest number of pollution tolerant algal genera (24) were recorded at S1 while lowest number of genera (14) were recorded at S4 (Table 1). The pollution tolerant algal genera which were recorded at all selected waste water habitats are *Chlorococcum*, *Chlorella*, *Scenedesmus*, *Pinnularia*, *Nitzschia*, *Euglena*, *Microcystis*, *Oscillatoria*, *Phormidium* and *Lyngbya*.

For assessment of selected waste water habitats, Palmer's pollution index was followed. The result are shown in Table 2. Out of 20 most frequent occurring pollution tolerant algal genera recorded during present study 16, 12, 11 and 10 algal genera were present at S1, S2, S3 and S4 respectively. The total score of S1 was 32, S2 was 38, S3 was 24 and S4 was 25, indicative of confirmed high organic pollution. The level of organic pollution is in the range of S1>S2>S4>S3. Pollution index study of selected waste water habitats indicate that all sites are organically polluted.

Presence of Euglenophyceae members is a direct evidence of organic pollution. During present study *Euglena*, *Phacus*, *Trachelomonas* and *Lepocinclis* were recorded. Hosmani and Bharti (1980) recorded *Euglena*, *Phacus*, *Trachelomonas* in organically polluted waters. Pandey (1985) reported abundance of euglenoids in sewage water. Divekar and Deshmukh (2006) observed abundance of *Euglena* and *Phacus* in domestic waste water.

The present study *Chlorella*, *Ankistrodesmus*, *Scenedesmus*, *Spirogyra*, *Fragilaria*, *Navicula*, *Nitzschia*, *Euglena*, *Microcystis*, *Spirulina*, *Oscillatoria*, *Phormidium* and *Lyngbya* were found abundant which is in conformity with earlier reports (Ganpati and Chaco 1950, Somashekar and Ramaswamy 1983, Pandey 1985, Nandan and Patel 1983, Barun et. al. 2009, Dubey et. al. 2011, and Subramaniyan et. al. 2012). Abundance of these algal genera indicate organic pollution of water (Palmer 1969, Hosmani and Bharati 1980, Jose and Kumar 2011 and Sawdekar 2018). This is supported by present study.

Table 1: Pollution tolerant genera of algae from four selected sites of waste water habitats (Palmer 1969).

Sr. No.	Genus	Group	S1	S2	S3	S4
01.	Ulothrix	G	+	-	+	-
02.	Stigeoclonium	G	-	-	+	-
03.	Chlorococcum	G	+	+	+	+
04.	Chlorella	G	+	+	+	+
05.	Ankistrodesmus	G	+	+	-	+

06.	Coelastrum	G	+	-	-	-
07.	Crucigenia	G	+	-	-	-
08.	Scenedesmus	G	+	+	+	+
09.	Spirogyra	G	+	-	-	-
10.	Closterium	G	-	-	-	+
11.	Cosmarium	G	-	+	-	-
12.	Selenastrum	G	+	-	+	-
13.	Fragilaria	D	+	-	+	-
14.	Navicula	D	+	+	-	+
15.	Pinnularia	D	+	+	+	+
16.	Cymbella	D	+	+	-	+
17.	Nitzschia	D	+	+	+	+
18.	Gomphonema	D	+	-	-	-
19.	Euglena	E	+	+	+	+
20.	Phacus	E	+	+	-	-
21.	Trachelomonas	E	-	-	+	-
22.	Lepocinclis	E	+	-	-	-
23.	Microcystis	B	+	+	+	+
24.	Aphanocapsa	B	+	+	+	-
25.	Spirulina	B	+	+	+	-
26.	Oscillatoria	B	+	+	+	+
27.	Phormidium	B	+	+	+	+
28.	Lyngbya	B	+	+	+	+

Table 2:Pollution Index of algal genera (Palmer 1969) at four selected sites of waste water habitats.

Sr.No.	Pollution tolerant genera	Pollution Index value	S1	S2	S3	S4
I	**CHLOROPHYCEAE**					
01.	*Stigeoclonium*	2	-	-	2	-
02.	Chlorella	3	3	3	3	3
03.	Ankistrodesmus	2	2	2	-	2
04.	Coelastrum	1	1	-	-	-
05.	Scenedesmus	4	4	4	4	4
06.	Spirogyra	1	1	-	-	-
07.	Closterium	1	-	-	-	1
08.	Cosmarium	1	-	1	-	-
II	**BACILLARIOPHYCEAE**					
01.	Fragilaria	1	1	-	1	-
02.	Navicula	3	3	3	-	3
03.	Gomphonema	1	1	-	-	-
III	**EUGLENOPHYCEAE**					
01.	Euglena	5	5	5	5	5
02.	phacus	2	2	2	-	-
03.	Trachelomonas	1	-	-	1	-
04.	Lepocinclis	1	1	-	-	-
IV	**CYANOPHYCEAE**					
01.	Microcystis	1	1	1	1	1
02.	Spirulina	1	1	1	1	-
03.	Oscillatoria	4	4	4	4	4
04.	Phormidium	1	1	1	1	1
05.	Lyngbya	1	1	1	1	1
	Total score	-	32	28	24	25

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