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STUDIES ON THE EFFECT OF CARPET INDUSTRY EFFLUENTS ON WETLAND FLORA OF MIRZAPUR

AMOD KUMAR SINGH[1a], RUPESH KUMAR SINGH[b] , VANADA YADAV[c] AND NEELKANTH MISHRA[d]

[abc]Department of Chemistry, A.B.R.P.G. College, Anpara , Sonebhadra, U.P., India
[d]Department of Botany, A.B.R.P.G. College, Anpara , Sonebhadra, U.P., India

ABSTRACT

Keeping in view the study goals of the Mirzapur wetland soil under the influence of carpet industries effluents and wastes we studied the biotic compounds were and phytoplankton for distribution and occurrence. The phyutoplankton density organism (O/L) was highest in the least polluted site-c in all season and least in the most polluted site-A.

KEYWORDS : Wetland, Carpet, Phytoplankton, Site

Increases in population coupled with unplanned and industrialization have seriously destroyed the soil and water bodies to the extent that many of them are unfit for use and are getting extinct by silting , dumping of solid wastes and eutrophication water bodies situated in populated urban environs receive contaminated water from surface drainage. Eutrophication of water bodies in also intensified due to washing of clothes, use of soaps in bathing and excessive input of organic wastes.

The quality of water after use gets degraded in most cases and is let out as effluents. This has resulted into scarcity of unpolluted water. Wastes disposal in water bodies cause undesirable effect on the wetland soil ecosystem and hydrological cycle. Due to exploitation, water is becoming scarce day by day (Ganpati and Chacko, 1951). The physico- chemical properties of effluents from industries and sewage have been studied by (Brower 1985).

Wetlands soil in Mirzapur experience periodical submergence and exposure, erosion, siltation grazing, sera ping, discharge of domestic wastes and effluents. Washing and distribution of natural herbaceous vegetation. Normally a good vegetation cover is ideal to check soil and nutrient erosion. However all around the wetland soil there are a dense human and cattle population and therefore the level of biotic disturbances in also high.

The import of domestic wastes, soil and water , run off from surrounding uplands and excreta of grazing animals add to the eutrophication process. Herbaceous species on these sloping landscapes effectively reduce nutrient loss. (Ambasht et.al., 1984).

MATERIALS AND METHODS

Study Site

Studies on a wetland soil at Mirzapur situated about 50 km. west of Varanasi. It is hub of a big centre of several thousand cottage industries of woolen carpets which through export earn about rupees 2200 million worth of foreign exchange per year.

Three sites were selected for studies. Site-A is a part of Vindhya plateau, specially Lalganj and Marihan, which receives heavy discharged of different processing units of carpet industry. It is heavily polluted and the wetland has luxuriant growth of *Typha* and *Echhornia*. Site-B is moderately polluted and is located in southern bank of Ganga while site-C is on the other side on north bank of Ganga and is relatively less polluted.

The wetland soil is being polluted by discharged of untreated industrial effluents, sewage and municipal wastes, kitchen and other house hold wastes carried by drains, surface run off oil, metal scrapes, semi burn coal and ash.

Dyes and detergents used by carpet industries waste wood and waste find their ways through surface run off, sewage and drain in to the wetland and these are the major sources of pollution. The surface run off also plays a very important role for the enrichment of nutrients.

Climate

Tthe climate of the study area is typical mansoonic , characterized by long days of hot and dry summer, warm and moist rainy and short day of cold and dry winter seasons. Relative humidity is high in the rainy and low in the

[1]**Corresponding author**

summer and winter season. The average mean maximum relative humidity during the study period was 70.75% in August and 77.75% in September. Minimum mean relative humidity was 17.98 in April.

Biotic Components

The following species were the common plants.

1. *Typha, cyperus, sagittaria* were found in the emergent zone. *Typha angustifolia* is dominant.
2. *Eichornia*, *Azolla*, *Utricularia* and *Wolfia* were found in the free floating species. *Azolla Pinnata* is the dominant species and covered about 70% of this zone.
3. Algal species recoerded during study period belonging to the classes of chlorophyta, Bacillariophyta and cyanophyta.

Water analysis

Analysis of effluents was carried by selecting appropriate Methods (Recommended in the book 'standard method for examination of water and waste water, APHA, 1985)**.**

Phytoplankton sampling and measurements

Phytoplankton samples were collected at monthly intervals between 8 AM to 10 AM on sampling day from all three investigation sites.

The content of the specimen tube were transferred to another specimen tube. Filtered and concentrated samples were preserved in 4% formalin for subsequent analysis. Plankton density was calculated by micro transect methods described by Edmondson, 1974.

Each transect represented a definite fraction of the areas under the cover slip, hence a definite volume of the

Table 1: Seasonal fluctuation in phytoplankton distribution at different sampling sites of Mirzapur wetland

Name of Genera	Site - A			Site - B			Site - C		
	W	S	R	W	S	R	W	S	R
1. Bacillariphyceae									
Gomphonema	-	-	-	+	+	-	+	+	-
Diatoma	-	-	-	-	-	-	+	+	-
Fragilaria	-	-	+	-	+	+	+	+	+
Navicula	-	-	-	-	+	-	-	+	+
Nitzchia	-	-	-	-	-	-	+	+	-
Pinularia	-	+	-	+	+	-	-	-	-
Total no. of Genera	**0**	**1**	**1**	**2**	**4**	**1**	**4**	**5**	**2**
2. Chlorophyceae									
Bulbocheate	-	-	-	-	+	-	-	-	-
Chara	+	+	+	+	+	+	-	-	-
Chlorella	+	+	+	-	-	-	-	-	-
Cladophora	+	+	-	+	+	-	+	+	-
Chlorococcum	-	-	-	+	-	+	-	-	+
Closterium	-	+	-	+	+	-	-	+	+
Cosmarium	-	-	-	-	-	-	-	+	+
Pediastrum	-	-	-	-	+	-	-	+	+
Scendesmus	+	-	-	+	-	-	-	-	-
Spirogyra	+	-	-	+	-	-	-	-	-
Ulothrix	-	-	-	+	-	-	-	+	-
Total no. of Genera	**5**	**4**	**2**	**7**	**5**	**2**	**6**	**5**	**4**
3. Cynophyceae									
Anabaena	-	-	-	-	-	-	+	+	+
Gloeocapsa	-	+	-	-	+	+	-	+	-
Microcystis	+	+	-	+	+	+	-	+	-
Nostoc	-	-	-	-	+	+	-	-	+
Oscillatoria	-	+	-	-	+	-	-	-	-
Stigonema	-	-	-	-	-	-	-	-	+
Spirulina	-	-	-	+	+	-	-	+	-
Total No. of Genera	**1**	**2**	**0**	**2**	**5**	**3**	**1**	**4**	**3**

W- Winter, S- Summer, R- Rainy

Table 2 : Monthly Variation in Phytoplankton Net Primary Productivity, Gross Primary Productivity (mgCm^3/hr) and Net Primary Productivity, Gross Primary Productivity Ratio.

Months	Site-A			Site-B			Site-C			Average NPP A+B+C+	Average GPP A+B+C+	Average NPP/GPP
	NPP	GPP	NPP/GPP	NPP	GPP	NPP/GPP	NPP	GPP	NPP/GPP			
January	96.7	132.8	0.73	125.4	161.4	0.77	148.4	182.3	0.81	123.5	158.8	0.78
February	98.9	138.0	0.71	130.2	153.6	0.85	156.2	208.3	0.74	128.4	166.6	0.77
March	99.7	134.8	0.74	136.4	183.7	0.74	164.0	210.9	0.78	133.4	176.5	0.76
April	104.9	127.6	0.82	138.0	187.5	0.74	177.0	237.0	0.75	140.0	184.0	0.76
May	104.1	125.0	0.83	141.0	192.5	0.73	182.3	226.5	0.80	142.5	181.3	0.79
June	109.2	136.0	0.80	141.6	193.6	0.73	184.9	244.5	0.75	145.2	181.3	0.76
July	80.7	111.9	0.72	114.0	153.6	0.74	127.6	171.8	0.74	107.4	145.8	0.74
August	78.1	114.5	0.68	111.9	138.0	0.81	125.0	161.4	0.77	105.0	138.0	0.76
September	65.1	93.7	0.69	106.7	125.0	0.85	122.4	148.4	0.82	98.0	122.4	0.80
October	83.7	114.5	0.73	110.5	138.8	0.79	132.8	187.5	0.74	109.0	146.9	0.74
November	85.9	98.9	0.86	122.4	148.4	0.85	138.0	187.5	0.73	115.4	144.9	0.79
December	88.9	122.8	0.72	128.8	169.2	0.76	141.0	153.6	0.92	119.6	155.2	0.77

sample. The number of plankton per drop was calculated as follows.

$$\text{No. of plankton per drop} = \frac{\text{area of cover slip}}{\text{area of transect}} \times \text{Average no. of plankton}$$

RESULTS AND DISCUSSION

The plankton density organism (O/L) was highest in the Least polluted site-C in all seasons and the least in the most polluted site-A. The peak of the phytoplankton number was observed in June at all three sites. Which was 2108 $0L^{-1}$ at site-C, 1956 $0L^{-1}$ at site-B and 1191 $0L^{-1}$ at site A. minimum value of phytoplankton number were recorded in Sept. at all the three sites. It was 119 OL^{-1} at site-A, 167 OL^{-1} at site-B and 204 OL^{-1} at site-C. The total no. of genera recorded of was 16 at site-A, 30 at site-B, 34 at site-C during study period. Maximum number of 35 genera recorded in summer followed by 28 in winter and 17 in rainy season. (Table-1).

The maximum rate of phytoplankton gross and net production followed same at all three sites. (Table-2).

- The maximum value of net productivity in the month of June. It was recorded at site-B and site-C.
- The minimum value of net productivity in the month of September. At site-B and site-C.
- The maximum value of gross production was recorded at site-C in the month of June.
- The maximum value of gross productivity recorded at site-A in the month of September.

Phytoplankton population was highest at site-C and lowest at site-A. It is interesting to find out that large number of algal species are found both in polluted as well as less polluted sites.

It was also been noted that the diversity and the quantity of the algal species decreases with the increases in the load of pollution at different sampling sites in the studied wetland productivity of phytoplankton was least at site-A as the pollution load was highest.

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