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HYDROBIOLOGICAL STUDIES IN AN INDUSTRIALLY POLLUTED POND IN FAISALABAD

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Nine genera (*Synedra, Navicula, Nitzschia, Cymbella, Euglena, Phacus, Schizogonium, Oscillatoria* and *Spirulina* of algae and seventeen genera (*Paramecium, Brachionus, Keratella, Daphnia, Moina, Chydorus, Cyclocypris, Eucypris, Corixa, Micronecta, Psychoda, Chironomus, Culex, Eristalis, Ephydra, Aeschna* and *Tubifex*) of aquatic fanua were recorded in an industrially polluted pond in Faisalabad. All these showed wide range of tolerance for soft to brackish waters, while the diatoms, cladocerans, ostracods and rotifers were found to tolerate also chemically polluted water. The presence of the larvae of the genera *Eristalis, Ephydra, Psychoda* and *Chironomus* and *Tubifex* worm indicated low oxygen content of the pond.

INTRODUCTION

The mixing of industrial wastes in a water body seriously affects the quality and quantity of aquatic life in it. In Pakistan, the disposal of industrial affluents into a pond, water channel, lake or canal is a common thing. In most cases, pools and ponds have been formed due to the accumulation of such water in low lying places.

Very limited work seems to have been undertaken in Pakistan on the hydrobiology af chemically polluted water bodies. Ali *et al.* (1975) studied the orgnisms found in industrially polluted waters of a pond near Hilal Tanneries in Gujrat and of waste water channels associated with some industries located at Kala Shah Kaku at Lahore - Sheikhupura Road. During their hydrobiological studies at Nowshera in 1976, the same authors recorded 15, 30 and 22 genera of algae and 8, 18 and 14 genera of aquatic fauna from the waste water bodies formed by the effluents of Associated Ferozesons Laboratories and Adamjee Paper Mills, respectively.

Most of the factories and mills in Faisalabad drain out their effluents into open space. Some pools and ponds have been formed in the adjoining areas by the polluted waters. The dissolved chemical pollutants in such water bodies have spoiled the quality of sub-soil water and sometimes made it unfit for domestic and agricultural purposes. No work has so far been done on the hydrobiology of such chemically polluted pools and ponds in the city. The present work aimed at studying the type of aquatic life in an industrially polluted pond situated on agricultural land adjacent to a thickly populated area in the city

MATERIALS AND METHODS

The pond was formed by the accumulation of waste water of Premier Cotton Mill, located on the south-west of the mill near mohalla Nazimabad. The pond was nearly triangular in shape. Its base was about 68 meters long. The other two sides measured 45 and 48 meters. The deepest point in the centre of the pond was approximately 1.2 meters. The flora and fauna of the pond were collected with the help af a plankton net of 200 µm mesh. The net was gently moved throughout the pond approximately 1-2 meters inside from its banks. The collections were made on monthly basis from September, 1984, through August, 1985. For the fixation of plankton, Acid Lugol's solution (Edmondson, 1966) was used. The microscopy on live material was done by making a ring of about half an inch diameter on the centre of the slide with the help of methyl cellulose suspension.

RESULTS AND DISCUSSION

The drainage of industrial wastes into the pond deteriorated the quality of its water. As a result a limited variety of planktons could survive. Only nine genera of phytoplanktonic algae were found to be present in the pond. Of these four genera, namely *Synedra*, *Navicula*/ *Nitzschia* and *Cymbella* were of diatoms, two genera viz. *Euglena* and *Phacus* were of Euglenophyceae, one genus *Schizogonium* was of green-algae and two genera (*Oscillatoria* and *Spirulina*) were of blue-green algae (Table 1). No blooming or dense growth of any the recorded algae was observed to take place in the pond during the study period. The zooplanktons that could be recorded in the pond comprised of one protozoan genus, *Paramecium*; two rotifer genera (*Brachionus* and *Keratella*; three cladoceran genera (*Daphnia*, *Moina* and *Chydorus*) and two ostracod genera viz., *Cyclocypris Eucypris* (Table 2). Ward and Whipple (1959) reported that diatoms, cladoce-

rans, ostracods and rotifers could tolerate a wide range of waters varying from soft to brackish. The presence of these organisms in the industrially polluted pond indicated that these organisms were also able to withstand pollution of water by industrial wastes as found in this study.

Table 1: *Seasonal variations in the genera of phytoplankton in the pond between September, 1984 to August, 1985*

Phytoplankon	S e p.	O c t.	N o v.	D e c.	J a n.	F e b.	M a r.	A p r.	M a y.	J u n.	J u l.	A u g.
A. *Chrysophysea* (Diatoms)												
Synedra sp.	—	*	*	*	—	*	—	—	—	—	—	—
Navicula sp.	—	*	*	*	*	*	*	*	—	—	—	—
Nitzschia sp.	—	—	*	*	*	*	*	—	—	—	—	—
Cymbella sp.	—	—	*	—	*	*	—	—	—	—	—	—
B. *Euglenophyceae*												
Euglena sp.	*	*	*	*	*	—	—	*	*	*	*	*
Phacus sp.	—	—	—	—	*	—	—	*	—	*	*	*
C. *Chlorophyceae* (Green-algae)												
Schizogonuim sp.	—	*	*	*	—	—	—	—	—	—	—	—
D. *Cyanophyceae* (Blue-green algae)												
Oscillatoria sp.	*	*	—	*	—	*	*	*	*	—	—	*
Spirulina sp.	*	*	—	*	—	*	*	*	*	*	—	*

*Found in the sample; -not found in the sample.

The nekton fauna of the pond included two aquatic hemipterous insects of the genera *Corixa* and *Micronecta*, aquatic larvae of five insect genera viz. *Psychoda*, *Chironomus*, *Culex*, *Eristalis* and *Ephydra*, and nymph of a dragon fly genus *Aeschna* (Table 3). According to Hegner and Engelman (1968), the saprophagus larvae of dipterous insects of the genera *Eristalis*, *Ephydra* and

Psychoda were mostly found in shallow water with low oxygen content. The existence of the as well as *Chironomus* larvae in the present pond indicated the poor oxygenation state of its water which resulted from mixing of effluents from the nearby mill. Dolezil (1972) found that *Eristalis* larva had a long flexible respiratory process which was capable of being extended serveral time the length of its body. This adaptation of the larva enabled it to survive in the pond under low oxygenated condition.

Table 2. *Seasonal variations in the genera of zooplankton in the pond between September, 1984 to August, 1985*

Zooplankton	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
A. *Protozoan*												
Paramecium sp.	*	*	—	*	—	—	*	—	*	—	*	—
B. *Rotifers*												
Brachionus sp.	—	*	—	*	*	—	*	—	*	—	—	*
Keratella sp.	—	*	*	—	—	*	—	*	—	—	—	*
C. *Cladocerans*												
Daphnia sp.	—	—	—	—	—	—	*	*	*	—	*	—
Moina sp.	—	—	—	—	—	*	—	—	*	—	—	*
Chydorus sp.	—	*	*	—	*	—	*	*	—	—	—	—
D. *Ostracods*												
Cyclocypris sp.	—	—	*	*	*	*	—	*	—	—	*	*
Eucypris sp.	—	*	*	*	—	*	—	*	—	*	*	—

*Found in the sample; -not found in the sample.

Ali *et al.* (1975, 1976) reported that the presence of the larvae of *Psychoda*, *Ephydra* and to some extent those of *Culex* in a pond hinted at the chemical pollution of its water. The occurrence of these larvae in the present pond confirmed the finding of these workers. The mud of the pond was black and consisted mainly of silt, which also reflected the chemically polluted state of the water. It was found to be inhabited by the red coloured annelids of the genus *Tubifex* during September, 1984 and then from March through August, 1985 (Table 3). Coexistence of the Chironomid larvae and *Tubifex* worms in the pond during certain months (May, June, July and September) showed still poor oxygen content of its water.

Table 3. *Seasonal variations in the genera of aquatic fauna in the pond between September, 1984 to August, 1985*

Aquatic Fauna	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.
A. *Nekton*												
Corixa sp.	—	*	—	—	—	*	—	*	*	—	*	—
Micronecta sp.	*	—	*	*	*	—	*	*	*	—	*	—
B. *Larvae of Insects*												
Psychoda sp.	*	—	—	—	—	—	*	*	*	*	—	—
Chironomus sp.	*	—	—	*	—	—	—	—	*	*	*	—
Culex sp.	*	—	—	—	—	*	*	*	*	—	—	*
Eristalis sp.	—	—	—	—	—	—	—	*	*	*	*	*
Ephydra sp.	*	—	—	—	—	—	*	—	—	*	*	*
C. *Dragonfly nymph*												
Aeschna sp.	—	—	—	—	*	—	*	*	*	—	*	*
D. *Bottom worm*												
Tubifex sp.	*	—	—	—	—	—	*	*	*	*	*	*

*Found in the sample; -not found in the sample.

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