

Short Communication

Behavioral responses of *Cyprinus carpio* to industrial effluents

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Abstract: Fish were collected from Nath Sagar, Paithan 50 kms away from Aurangabad and were brought to the laboratory and exposed to industrial effluent (tannery effluent). Behavioral changes and responses of the fish to the tannery effluent were observed. Control fish showed normal behaviour and swimming in contrast the effluent exposed fish showed abnormal swimming, loss of equilibrium, fading of colour, coughing and opercular movements.

Key words: *Cyprinus carpio*, Tannery effluent.

Introduction

The increasing luxurious needs of the human have not left any biosphere untouched. The danger is being seen at the doorstep while shifting million tones of solid waste materials from one place to another and converting them into degradable form of byproduct generated during the process is harmful to the living beings. Increasing demands, in over increasing population within limited natural source, has been the problem without solution. It shows an alternative to some extent, if the needs are minimized as the natural resources are limited.

Industrial development has contributed significantly in uplifting everyone's living standard upto present status, but at the same time, brought pollution danger. During analysis of liquid waste, it is reported that in many cases the toxicant level after treatment of toxic chemicals is in considerable amount, it may be due to lack of efforts and perfect technology.

Materials and Methods

Fish were collected from Nath Sagar, Paithan 50 kms away from Aurangabad. Fish were brought to the laboratory carefully to avoid any injury to the fish. Seven batches of ten fish weighing 280-300 grams were kept in a aquarium of 15 litre capacity to avoid overcrowding. Fish were exposed to the industrial effluent for 96 hrs. Effluent was added to the aquarium with different dilutions of the effluent (Table 1). While two batches of ten fish were kept in normal water to be used as control (Table 2).

Results and Discussion

Behavioral study gives direct response of the animals to the pollutant. Warner *et al.* (1966) commented that "The behavioral activities of an organism, represents the final integrated results of a diversified biochemical and physiological processes. Thus, a single behavioral parameter is generally more comprehensive than a physiological or biochemical parameter.

When *Cyprinus carpio* were introduced to the effluent added water, they get excited and were swimming rapidly with

random movements. While in control, fish were swimming with normal movement. Similar results were reported earlier by Anderson and Weber, (1975) when guppies were exposed to dieldrin. Similar excitement was also found with light movements and vibrations.

There were rapid opercular movements followed by excited swimming and coughing in *C. carpio* because of improper ventilation or inconvenience in breathing. Carlson (1982) stated that, coughing in fish is due to the interruption of normal ventilation cycles. Similar results of coughing and rapid opercular movements were also reported earlier by Haider (1964) and Holcombe *et al.* (1976) in rainbow trout exposed to lead. Carlson and Drummond (1978) stated that, such coughing response is a useful tool for evaluating the quality of industrial and municipal effluents. While in control fish the opercular movements were normal and it was clearly seen when compared with experimental fish. Coughing was not observed in control fish.

Quick expansion and contraction of opercular cavities serves the cleaning of debris accumulated on the gills. In *C. carpio*, the rate of movement of operculum is found increased with the increase in concentration of effluent. Similar results were also observed in *Coho salmon* treated with fenitrothion by Bull and Mc Inerney (1974).

A thick coat of mucus was observed all over the body of the fish, making the fish slimier. While in control the fish were also with normal mucus coat on their body. Similar results were noted by Carpenter (1924, 1927). Durve and Jain (1980) observed similar behavioral changes in *Rasbora daniconius* when treated with distillery effluent.

The fish were swimming with the belly upwards and in zig zag motion. There were also erratic and parallel movements observed in the fish, indicating the loss of equilibrium while in control the fish were swimming normally without loss of equilibrium. The fish regularly came to the surface of water. Also the gills of fish were affected indicating the pale red colour of the gills. Similar results were observed by Murthy and Ramarao

Table – 1: Fish exposed to different dilutions of tannery effluent.

No. of fish exposed	Concentration of effluent (%)	No. of fish dead	No. of survived fish	Percentage mortality
10	10	00	10	00
10	20	00	10	00
10	30	2	8	20%
10	40	3	7	30%
10	50	5	5	50%
10	60	6	4	60%
10	70	7	3	70%

Table – 2: Fish kept in normal water for control.

No. of fish exposed	Concentration of effluent (%)	No. of fish dead	No. of survived fish	Percentage mortality
10	00	00	10	00
10	00	00	10	00

(1983) when he exposed *Tilapia* to lindane. Similar results on behavioral changes were also observed by Konar and Ghosh (1982), and Peshine and Kurve (2000).

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