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Impact of Toxic Sediment on Behavior of *Tilapia Mossambica* and *Channa Punctatus*

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Abstract:- In this study we procured toxic sediment from Amlakhadi water channel in Bhuj where paper, dye and textile industries were dumping their toxic wastes. We took Tilapia mossambica and Channa punctatus to test the toxicity of the sediment in the lab to find the NOEC for their behavior.

I. AIM OF EXPERIMENT

The aim of experiment was to observe behavioral change in fishes due to exposure to toxic waste for species of fish i.e. *Tilapia mossambica* and *Channa punctatus*

A. Feeding

Diet, based on the fish protein requirement, was prepared. The fish were fed @ 5-10% of body weight once a day, in the morning. The feeding rate was adjusted as per requirement.

B. Sediment

The sediment was collected from Amlakhari channel in Bhuj , Gujarat . Organic contents in terms of organic carbons and organic matter, as well as nutrient load in terms of nitrogen and phosphates and heavy metals of the composite sediment, are presented in Table 1.

C. Survival of Test Organisms at Toxic Sediment

- *Acute Toxicity*

The value of LC_{50} of sediment to *Tilapia mossambica* was 12.5 gm/l, while the values of LC_0 & LC_{100} were 6.5 & 25.0 gm/l respectively. Similarly LC_{50} value of *Channa punctatus* was 25.5 gm/l, while values of LC_0 & LC_{100} were 50.0 & 12 gm/l respectively

- *Selection of Sub Lethal Doses*

The three sub lethal doses for both the fishes i.e. *Tilapia mossambica* & *Channa punctatus* were taken as different fractions of their LC_{50} test values i.e. 12.5 & 25.5 gm/l respectively.

The three sub lethal doses selected for Tilapia mossambica were 0.8, 0.5 & 0.3 gm/l and the three sub lethal doses taken for Channa punctatus were 1.2, 0.8 & 0.5gm/1.

Nutrient & Organic Load	
Organic carbon (%)	2.72
Organic matter (%)	4.7
Total Nitrogen (mg/100 gm)	245
Total Phosphorus (mg/100 gm)	49.5
Heavy Metal Concentration (in mg / 100 gm)	
Cadmium	6.0
Chromium	7.18
Copper	58.27
Lead	6.19
Iron	2763.5
Manganese	47.4
Zinc	109.75

Table 1:- Nutrient, Organic Load and Heavy Metal Concentrations in Composite Sediments from Amlakhadi water Channel

II. RESULTS

Behavioral Monitoring was conducted daily throughout the 30-day exposure period. The general behaviour, swimming, crowding or seclusion, skin coloration and external appearance of fish were monitored. Fishes were then fed and their feeding habits were observed until either the food had been consumed or 5 minutes had passed. If food had not been consumed within 5 minutes, the aquarium was checked periodically over the next 2 hours to see if the food had been consumed, and left-over food was then removed. Certain behavioral parameters, as described by McKim *et al.* (1987), were selected for the studies. (Table 2&3).

III. DISCUSSION

Barring colour changing to dark at the highest concentrations of Toxic Sediment for both the fishes *Tilapia mossambica* and *Channa punctatus*, there was no visible alternation of external appearance due to exposure to all the three concentrations of toxic sediment . Changes in behaviours, such as, late response after tapping the aquarium was observed at the highest exposure concentration of the toxic sediment for both the fishes.

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Parameters	Exposure Concentrations in gm/l			
	Control	0.3 gm/l	0.5 gm/l	0.8 gm/l
Behaviour	Chasing	Chasing	Chasing	Chasing
Feed Consumption	Within 10-15 minutes	Within 10-15 minutes	Within 10-15 minutes	Within 10-15 Minutes
Movements	Normal	Normal	Normal	Lethargic towards the end of Experimental period (i.e. from day 20th onwards).
Coloration	Normal	Normal	Normal	Dark coloration (day 20 onwards)
Tapping Response	Normal	Normal	Normal	Late Response

Table 2:- Behavioral Responses of *Tilapia mossambica* Exposed to Toxic Sediments at Different Concentrations.

Parameters	Exposure Concentrations in gm/l			
	Control	0.5 gm/l	0.8 gm/l	1.2 gm/l
Behaviour	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive
Feed Consumption	Within 10-15 minutes	Within 10-15 minutes	Within 10-15 minutes	Within 10-15 Minutes
Movements	Normal	Normal	Normal	Lethargic towards the end of Experimental period (i.e. from day 20th onwards).
Coloration	Normal	Normal	Normal	Dark coloration (day 20 onwards)
Tapping Response	Normal	Normal	Normal	Late Response

Table 3:- Behavioral Responses of *Channa punctatus* Exposed to Toxic Sediments at Different Concentrations

IV. CONCLUSION

There was no visible alteration of external appearances due to exposure to all the concentrations of toxic sediment except dark coloration at the highest concentration of the toxic sediment for both the fishes viz., Tilapia mossambica and Channa punctatus. Delayed response was observed at the highest exposure concentrations of the toxic sediment for both the species from 20 days onward of the 30 day experiment.

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