Studies on the behavioural responses of *Labeo rohita* (Ham.) against waste water released from SAIL Growth Works (SGW), Kulti, West Bengal, India

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Abstract *: The waste water released from SAIL Growth Works (SGW) Kulti, is a potent toxic pollutant, adversely affecting the fauna of aquatic ecosystem. . The fingerlings of Labeo rohita were exposed to SGW Kulti waste water from concentration of 10ml/lit to 100ml/lit in increasing array at an interval of 12 hrs. The fishes exhibited abnormal behavioural effects like irritability, frequent surfacing,mucous secretion etc. It is concluded that the SGW Kulti waste water or industrial effluent is toxic to the fingerlings of Labeo rohita and affect their physiology and behaviour. The present paper elaborates the behavioural responses of Labeo rohita to the polluted water.*

INTRODUCTION

The modern civilization needs industry. But the industrial waste has harmful effect on the aquatic fauna and aquatic ecosystem. Such industrial waste water is introduced into the aquatic body by overflow in the rainy season from the effluent drain or by improper disposal of the waste water. This toxic effect on aquatic fauna may extend to the human population through food chain. The aquatic ecosystem can also be contaminated by pesticide causing acute and chronic poisoning of fish and other organisms [4]. The damage to the vital organs of fish are done by pesticides [5, 6], and biochemical alterations in the exposed fishes are caused [7-9].

Labeo rohita is highly palatable fish and preferred for culture due to its high growth rate and taste. It is an Indian major carp and can be cultured in confined water with several other craps.

MATERIALS AND METHODS

Live fingerlings of Labeo rohita (Teleostei; Cypriniformes; Cyprini) were collected from local ponds during the month of August. They were brought to the laboratory carefully in plastic bags to avoid any injury and disinfected by giving a bath for two minutes in 0.05% KMnO4 Solution. Thereafter they were transferred to a large glass aquarium of 30 liter capacity for two weeks for acclimatization to laboratory conditions. During acclimatization fishes were fed daily with 'Tokya' baby pellet, containing fish meal, wheat flour, Vit. A,

C, D, E, B1, B2, B6, B12 and minerals etc. Dead fishes, whenever located were removed immediately to avoid fouling of the water.

After two weeks of acclimatization fingerlings were starved 24 hr. prior to exposing them to different concentration of SAIL Growth Works(SGW) Kulti waste water. Fishes of similar size (11 ± 1.0 cm) were stored out and separated into two groups of two fish each. Each group was placed in a glass jar containing 4 ltrs. of water. During assay no food was administered to fishes [1].

The experiment was conducted under natural photoperiod and temperature in the month of August and September. The temperature of the water was 28 ±2O C and pH 7.4 ± 0.6. During the experiment the first jar contained only fresh water but the second jar contained increasing concentration of diluted SGW Kulti waste water at regular interval of 12 hrs. In the second jar the respective concentration of the water was as follows : 10 ml/lit., 20 ml/ lit., 30 ml/lit., 40 ml/lit., 50 ml/lit., 100 ml/lit. The behavioural responses of the fishes were noticed at each concentration carefully. The behaviour of fishes in the first jar was also noticed at the same time intervals.

RESULTS

The Labeo rohita fingerlings exhibit a number of abnormalities in their behaviour when exposed to increasing concentration of theSAIL Growth Works(SGW) Kulti waste water (Table-1).

Concentration of waste water (ml/lit)	Behavioural changes of the fishes to the SGW Kulti, waste water
10ml/lit	• Irritability of the fishes noticed.
20ml/lit	• Fishes become almost static.
30ml/lit	• Random opercular movement noticed in the fishes.
40ml/lit	• Slight mucous secretion of fishes with increased irritability.
50ml/lit	• Frequent surfacing and mucous secretion .
100ml/lit	• Increased irritability of the fish with random opercular movement and mucous secretion continued.

Table-1 : Table showing the behavioural changes of experimental fishes exposed to the increasing concentration of SAIL Growth Works (SGW) Kulti, waste water at regular interval of 12 hrs.

Note: The fishes in the first jar showed normal behaviour and remain all alive after the completion of the experiment

DISCUSSION

The fish mortality due to industrial waste water exposure depends upon its sensitivity to the pollutants and its concentration. Different concentration of waste water also showed abnormal swimming behaviour in fishes. The

behavioural changes in fishes is due to change in its physiological process. The mucous secretion is shown to have direct relationship with concentration of pollutant in water [2]. Irritability and abnormal swimming are triggered by deficiency in nervous and muscular coordination which may be due to accumulation of acetylcholine in synaptic and neuromuscular junction [3]. The increased mucus secretion after the waste water exposure is probably an adaptive response to counter the irritating effect of the industrial waste water on the body surface and mucous membrane. Random opercular movement is due to lack of oxygen uptake by gills [10,11]. It is concluded that the carps are sensitive to industrial waste water. Further studies on toxicity of industrial effluents on the mortality and behaviour of fish in the laboratory and field conditions are required.

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