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Impact of Cattle Shed Effluent on Certain Biochemical Parameters of the Freshwater Prawn *Caridina weberi*

[1]P. Thenmozhi, [2]P. Ronald Ross and [2]K. Balakrishnan

[1]Department of Zoology, St. Joseph's College, Cuddalore, India
[2]Department of Zoology, Annamalai University, Annamalai Nagar-608 002, India

Abstract: Domestic sewage consists of discharges of dirty water from cattle shed, bathrooms, lavatories and kitchens. It is a complex mixture of mineral and organic matters in many forms, including large and small particles of solid matter, substances in solution, in suspensions and in colloidal and pseudocolloidal dispersion. The freshwater prawn, *Caridina weberi* was exposed to various concentrations of cattle shed effluent to determine LC_{50} value for 96 hrs. The LC_{50} value for 96 hrs was 13.0%. The sublethal concentration for the above LC_{50} value was taken as 6.5% and the prawns were exposed for 96 hrs in the above concentration. The biochemical study was carried out. The values of carbohydrate, protein and lipid were recorded as 4.18%, 48.33% and 1.54% respectively in the control animals whereas the above values decreased to 3.77%, 35% and 1.30% in the animals exposed to sublethal concentration of cattle shed effluent. The results are discussed in detail.

Key words: Sewage · Macrophytes · Mortality rate · Carapace

INTRODUCTION

Sewage is a liquid waste of community. It is primarily of used up water with hardly 0.1% of solids made up of inorganic and organic matter. Faeces, urine, and grits are also present in this very dilute aqueous mixture which makes a cloudy appearance and slightly odorous when fresh. The sewage of non-industrial towns consists of purely domestic wastes. Domestic sewage consists of discharges of dirty water from cattle shed, bath-rooms, lavatories and kitchen. Apart from organic and inorganic matter it also contains living matter especially bacteria, viruses and protozoa.

Fresh sewage is slightly turbid but it becomes darker as it gets stale or septic. It contains a little dissolved oxygen and sometimes small amount of nitrite and nitrate, especially after rain. Fresh sewage is slightly alkaline but during oxidation there would be a decrease in alkalinity. Stable sewage gives off nausating odours of hydrogen sulphide and other gases. It usually has no dissolved oxygen. When sewage becomes septic bubbles of gases can be seen breaking on the surface.

The Carideans exhibit a generalized shrimp-like body plan and a remarkable degree of specialized variations in behaviour. The carideans occupy a variety of habitats such as pelagic, benthic, epibenthic, brackish and marine. The Atyid shrimps are mostly distributed in the vegetated littoral habitat and submerged macrophyte beds of both lentic and lotic water. They feed upon debris of epiphytic macroflora on the leaves of submerged macrophytes and filter particulate matter out of the passing water. The major breeding season of tropical Atyids occur during the following rainy season.

MATERIALS AND METHDOS

Effluent samples were taken from cattle shed and diluted with water. Acute studies were conducted in logarithmic series of concentrations of the cattle waste. Then 3 mm carapace length individuals were exposed to each concentration (LC_{50}). By graphical interpolation and log dose, profit regression line, the medium survival time (LC_{50}) was derived by plotting the data on the semilog proper with percentage mortality on arithmetic scale and on logarithmic scale. Ten individuals were exposed to each concentration. The mortality rate of individuals at different concentrations at different time were measured. After the exposure, the animals were dried and preserved. The preserved dry shrimps were ground with a mortar and pestle and the powdered tissue was stored in polythene bags for the biochemical estimation of carbohydrate, protein and lipid. The estimations of carbohydrate, protein and lipid for both control and test animals were carried out as per the standard methods of [1, 2] and [3], respectively.

Corresponding Author: P. Thenmozhi,Department of Zoology, St. Joseph's College, Cuddalore, India

Table 1: Changes in the carbohydrate, protein and lipid level in the muscle tissue of *C. weberi* exposed to cattle shed effluent

Sample	Carbohydrate (%)	Protein (%)	Lipid (%)
Control	4.18	48.33	1.54
6.5%	3.77	35.00	1.29
0.65%	3.82	40.00	1.34
0.065%	4.04	43.33	1.43

RESULTS AND DISCUSSION

There was a decrease in the chemical composition of carbohydrate, protein and lipid in the test animal as shown in the Table 1.

The decrease in the level of carbohydrate was 4.18% in the control to 3.77% in 6.5% concentration, 3.82% in 0.65% concentration and 4.04% in 0.065% concentration. The decrease of protein was 35% in 6.5% concentration from the control which had a protein content of 48.33%. In the concentration of 0.65% of cattle shed effluent it was 40% and 43.33% in the concentration of 0.065%. The lipid content was 1.54% in the control which decreased to 1.29% in the 6.5% concentration and 1.34% in the 0.65% of cattle shed effluent. In the concentration of 0.065% the lipid content was 1.43%.

DISCUSSION

When investigations were made for the effects of cattle shed effluent on the biochemical composition of the tissue it was noticed that the carbohydrate, protein and lipid contents of the muscle showed a decrease with the increase in the concentration. Decrease in carbohydrates is probably due to glycogenolysis and utilization of glucose to meet increased metabolic cost as suggested by [4]. In the case of protein, the decrease was drastic in the higher concentration. Fall in protein content in tissues under stress of pollutants may be due to altered enzyme activities [5]. Stress induced alteration in the lipid content of the muscle tissues of fish was observed by [6]. Similar results were recorded in *Cyprinus carpio* by [7].

It was clear that the carbohydrate protein and lipid content decreased when exposed to higher concentrations because of their utilization to meet the energy requirement during the stress caused by “Cattle shed effluent”.

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