



Volume: 2; Issue: 1; January-2016; pp 212-218. ISSN: 2454-5422

IMPACT OF PAPER AND PULP MILL EFFLUENT IN CAUVERY RIVER WATER

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Abstract

The nutritive and medicinal value of the fish has been recognized from time immemorial. The realization of the importance of the fish as food has initiated the development of fisheries. This is because fisheries form one of the important biotic resources of man. However, fisheries of our inland waters have been greatly depleted in a last few years on account of pollution of natural waters. The pollutants are easily made access into the body of the fish through the gills. As a result, the biochemical composition which determines the nutritive value of the fish is affected by the water pollutants.

Key words: *Cattla cattla*, Total Proteins, Total free amino acids, Triacylglycerol.

Introduction

Industries are the major pollutants in all environmental sources. High levels of pollutants in river water systems causes to increase in biological oxygen demand (BOD), chemical oxygen demand (COD) total dissolved solids, total suspended solids, toxic metals such as Cd, Cr, Ni and such water unsuitable for drinking, irrigation and aquatic life, Industrial waste waters range from biodegradable wastes such as those from human sewage and other manmade activities. Many studies has to done on physicochemical parameters of various industrial effluents and its mixing point in the river, pond and other water resources. The physicochemical characteristics affect the

aquatic organisms directly (or) indirectly through the physiological of the organisms (or) biochemical aspects or its metabolisms. The present work has been planned to evaluate the nutritive value of the fresh water fish *Cattla cattla* under the treatment of paper and pulp mill effluent.

The main objectives of the study

1. Collection of paper and pulp mill effluent from sesasayee paper and Boards Ltd.
2. Collection of test animal from local breeding places. *C. cattla*.
3. Rearing of test animal in lab condition.
4. Study of physicochemical characteristics of the industrial effluent.
5. Study of Biochemical Constituents in the muscle of effluent treated as well as control animal.
 - Total Proteins
 - Total free amino acids.
 - Triacylglycerol.

Materials and Methods

The composite paper and pulp mill effluent collected from the seshasayee paper pulp mill in pallipalayam near Erode and the fish *Cattla cattla* collected from local breeding places. Selection and maintenance of test animal, Selection of effluent and diluents water, Determination of various biochemical parameters, Total free amino acids, Total proteins, Glycogen content, Estimation of cholesterol and Estimation of triacylglycerol.

Result

In the control fish, various experimental aspects were carried out at their muscle of the fish. Therefore periods corresponding to the muscle of control fish (day 10, 20, and 30) were taken into consideration for the treated individuals.

The data presented in Table clearly indicates that the effluent stress on the total protein content was dose and of muscle on 10th, 20th and 30th day exposure test animal. The reduction of total

protein content was dose and duration dependant. The percent reduction was ranging from -0.14 to -3.37 on 10th day, -1.88 to -12.88 on 20th day and -5.38 to -28.25 on 30th day exposure.

Table: 1 Total protein content in the muscle of paper and pulp mill effluent treated fish *Cattla cattla*. (Each value is the mean \pm SD of 5 observations)

Concentration of the Effluent	Duration of exposure (days)		
	10	20	30
Control	22.250 \pm 0.302	22.270 \pm 0.314	22.300 \pm 0.316
2.0	22.220 \pm 0.60 (-0.14)	21.850 \pm 0.290 (-1.88)	21.100 \pm 0.313 (-5.38)
4.0	22.200 \pm 0.050 (-0.22)	21.050 \pm 0.270 (-5.47)	21.00 \pm 0.290 (-5.82)
6.0	21.950 \pm 0.040 (-1.34)	20.500 \pm 0.230 (-7.94)	20.00 \pm 0.260 (-10.31)
8.0	21.730 \pm 0.060 (-2.33)	19.300 \pm 0.190 (-13.33)	17.500 \pm 0.190 (-21.52)
10.0	21.500 \pm 0.070 (-3.37)	19.400 \pm 0.153 (-12.88)	16.00 \pm 0.140 (-28.25)

The results recorded in Table 2 give an account of total free amino acid content in the muscle of the control and paper and pulp mill effluent treated fish of *Cattla cattla*. The concentration of total free amino acid in the muscle of the control fish on day 10, 20 and 30 was found in increasing trend (4.40 \pm 0.20 mg /100 mg, 4.43 \pm 0.25mg /100 mg and 4.95 \pm 0.70 mg /100mg).

Table: 2 Total free amino acid content in the muscle of paper and pulp mill effluent treated fish *Cattla cattla*. (Each value is the mean \pm SD of 5 observations)

Concentration of the effluent	Duration of exposure (days)		
	10	20	30
Control	4.40 \pm 0.20	4.43 \pm 0.25	4.95 \pm 0.70
2.0	4.34 \pm 0.15 (-1.36)	4.39 \pm 0.23 (-0.90)	4.89 \pm 0.69 (-1.21)
4.0	4.27 \pm 0.09 (-2.95)	4.33 \pm 0.19 (-2.25)	4.78 \pm 0.58 (-3.43)
6.0	4.19 \pm 0.04 (-4.77)	3.37 \pm 0.15 (-23.92)	3.90 \pm 0.53 (-21.21)
8.0	3.950 \pm 0.02 (-10.22)	3.29 \pm 0.13 (-25.73)	2.87 \pm 0.49 (-42.02)
10.0	3.690 \pm 0.01 (-16.13)	2.70 \pm 0.09 (-39.05)	1.60 \pm 0.38 (-67.67)

Table: 3 Triacylglycerol (mg/100g) in the muscle of paper and pulp mill effluent treated fish *Cattla cattla*. (Each value is the mean \pm SD of 5 observations)

Concentration of the effluent	Duration of exposure (days)		
	10	20	30
Control	3.43 \pm 0.30	3.50 \pm 0.31	4.10 \pm 0.89
2.0	3.39 \pm 0.27 (-1.16)	3.30 \pm 0.29 (-5.71)	3.10 \pm 0.78 (-0.48)
4.0	3.25 \pm 0.23 (-5.24)	3.28 \pm 0.25 (-6.28)	3.00 \pm 0.69 (-0.97)
6.0	3.29 \pm 0.20 (-4.08)	2.90 \pm 0.22 (-17.14)	2.80 \pm 0.54 (-1.70)
8.0	2.90 \pm 0.18 (-15.45)	2.87 \pm 0.19 (-18)	2.70 \pm 0.49 (-3.65)
10.0	2.60 \pm 0.16 (-24.19)	2.40 \pm 0.15 (-31.42)	2.59 \pm 0.37 (-12.43)

Discussion

In effluent-treated fishes, the total free amino acids and proteins are found to reduce and this could be attributed to the utilization of free amino acids and proteins in various catabolic

reactions. Similar observations have also been made in many species of fishes under the stress of various industrial effluents (Raveender Kumar 1997). Thus the present study clearly revealed that the paper and pulp mill effluent inflicts stress on *Cattla cattla* and causes alterations in both biological and chemical parameters of the fish with an overall decrement in the growth of the body.

The results obtained that present investigation clearly indicated that various concentrations of the paper and pulp mill effluent have exerted intensive on the nutritional value of the fish. The findings of the present investigation also coincide with the observation of Thilagavathi and Uthara (1990). The paper and pulp mill effluent causes reduction of various biochemical constituents in the muscle. The free amino acids are found to serve as supplementary energy source under emergency and the proteins as the energy source (Umminger, 1970). The decreased quantity of Triacylglycerides suggests an increase in the breakdown of lipids to meet extra energy demands have noticed that the triglycerides are highly utilized.

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