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# Toxicological effects of leather dyes on total leukocyte count of fresh water teleost, *Cirrhinus mrigala* (Ham)

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**Abstract**
The experiment were conducted on fresh water fish *Cirrhinus mrigala* (Ham.) in the Dept. of zoology Agra college Agra to check out the effect of two leather dyes Bismarck brown and Acid leather brown on Total leucocyte count with three conc. From both the dyes as 0.6 mg/l, 0.7 mg/l and 0.7 mg/l for Bismarck brown and 8 mg/l, 9 mg/l and 10 mg/l for Acid leather brown at different time intervals (24 hrs, 48 hrs, 96 hrs and 1 week), however the effect was more with Acid leather brown exposure than Bismarck brown. The increasing trend in TLC on exposure to Bismarck brown and acid leather brown at different time intervals and at all three concentrations has been observed. The sub-lethal exposure of Bismarck brown and Acid leather brown results into significant increase in the TLC. Intoxication of Bismarck brown and acid leather brown induces leukocytosis in which TLC increases. Leukocytosis in some cases may be due to protective reaction in which leukocyte protects the body when foreign substances (in present study fungicide invade the body. The increase in number of leukocyte may also be found in leukemia. The aim of the study is to aware the people to protect the fish fauna from leather dye effect. The study is to aware people to check the pollution related to leather industries.

**Keywords:** Leather dyes, toxicity, TLC, *Cirrhinus mrigala*.

## Introduction

Industrialization, urbanization and other developmental activities had led to determination of environment Salunk et al. 1982 and such heavy metals toxicants have shown to enter and accumulate in aquatic fauna and flora causing several changes (Berman and Lal, 1994). Further it is also essential to evaluate toxic effects of heavy metals on fishes, since they form very important members of food chain of the ecosystem.. Fishes are the sensitive to contaminations of water and pollutants may significantly damage certain hematological and biochemical processes when they enter organs of these animals Nemesok et al. 1987, the release and accumulation of dyes in suspension solution form in inland waters from tanneries, textile, paper and other industries produce tremendous chemico-azo stress on aquatic organism including fishes and some time results in their mass mortality. The river Kalu in Mumbai receives highly acidic and untreated wastes from Amer dye and chemical company, etc. Dye effluents of the Gwalior Rayon factory at Mavoor at Baypore have created a pollutional hazard in the river Chaliyar at Calcutta, Kerala, the ministry of Environment and Forest, Govt- of India, have identified 17 most polluting industries, of which dye and dye intermediates is one of them. Recently, the Govt. of our country have imposed to closer of number of tanneries situated at or near Kanpur in U.P. due to continuous discharge on highly poisonous effluents containing leather dyes in the rivers.Acute toxicity of hue textile, carpet leather and paper mill dyes have been worked out by various authors. The toxicity of the dyes fall in the category of moderately toxicity with some even nontoxic at the suggestive level of 100 trig/ 1 to fish.

## Materials and Methods

Total leucocytes were counted by using improved Standard Neubauer Haemocytometer (Dacie and Lewis, 1968). All the apparatus were cleaned with sodium citrate and then dried. The sample blood was aspirated in the WBCs pipette up to 0.5 mark and then diluted by WBCs diluting fluid (Turk's fluid) up to mark 11.0. The blood was thoroughly mixed with diluting fluid by shaking well. The counting chamber was covered with a cover slip and charged with the diluted blood after discarding first few drops. When the WBCs had settled down, the counting chamber was examined under the high magnification of a research microscope. The

cells were counted in four squares each containing sixteen smaller squares.

*Calculation*

$$\text{Total no. of WBCs/mm}^3 \text{ of blood} = \frac{\text{Total no. of WBCs counted X dilution X 10}}{\text{No. of small squares in which counting has been done}}$$

**Results and Discussion**

Fishes were treated with two leather dyes with different conc. At different time intervals as in (table 1 fig. A and 2 fig. B); After Bismarck Brown Treatment, the value of total leucocyte count was 2.33±0.52 109/L in control set after 0, 6 mg/l while as the value of total leucocyte count was 2.39±0.09, 2.45±0.07, 2.75±0.01 and 2.92±0.03 109/L after 24hrs, 48hrs, 96hrs and 1 week treatment, the increase was significant after 24hrs, 48hrs, 96hrs and 1 week treatment. The value of total leucocyte count was 2.31±0.42 109/L in control set after 0.7 mg/l while as the value of total leucocyte count was 2.38±0.09, 2.48±0.08, 2.78±0.03 and 2.98±0.03 109/L after 24hrs, 48hrs, 96hrs and 1 week treatment, the increase was significant after 24hrs, 48hrs, 96hrs and 1 week treatment. The value of total leucocyte count was 2.23±0.52 109/L in control set 0.8 mg/l while as the value of total leucocyte count was 2.44±0.06, 2.53±0.05, 2.80±0.02 and 3.02±0.02 109/L after 24hrs, 48hrs, 96hrs and 1 week treatment, the increase was significant after 24hrs, 48hrs, 96hrs and 1 week treatment respectively.

After acid leather brown treatment, the value of total leucocyte count was 2.33±0.52 109/L in control set after 8 mg/l while as the value of total leucocyte count was 2.43±0.10, 2.48±0.07, 2.79±0.11 and 2.98±0.13 109/L after 24hrs, 48hrs, 96hrs and 1 week treatment, the increase was significant after 24hrs, 48hrs, 96hrs and 1 week treatment. The value of total leucocyte count was 2.31±0.42 109/L in control set after 9 mg/l while as the value of total leucocyte count was 2.42±0.08, 2.49±0.18, 2.68±0.04 and 2.88±0.09 109/L after 24hrs, 48hrs, 96hrs and 1 week treatment., crease was significant after 24hrs, 48hrs, 96hrs and 1 week treatment. he value of total leucocyte count was 2.23±0.52 109/L in control set after 10 mg/l while as the value of total leucocyte count was 2.42±0.01, 2.50±0.09, 2.59±0.11 and 2.99±0.10 109/L after 24hrs, 48hrs, 96hrs and 1 week treatment,te increase was significant after 24hrs, 48hrs, 96hrs and 1 week treatment respectively. In *Cirrhinus mrigala* (Ham.), increasing trend in TLC on exposure to bismarck brown and acid leather brown at different time intervals (24 hrs, 48 hrs, 96 hrs and 1 week) and at all three concentrations has been observed. However, the effect was more in acid leather brown exposure. The increase in the TLC was also reported by Garg et al 1989 *Heteropneustes fossilis* due to manganese poisoning, while Goswami and Dutta (1991) in *Heteropneustes fossilis* due to aldrin and fenvalerate intoxication; Saxena and Chauhan (1994) in *Heteropneustes fossilis* due to copper sulphate intoxication; Nath and Banerjee (1995) in *Heteropneustes fossilis* treated with devithion; Singh (1995) in *Channa punctatus* due to copper sulphate and potassium dichromate induced toxicity, Raizada and Rana (1998) in *Clarias batrachus*, Gupta and Gupta (2000) in *Heteropneustes fossilis*, Ananadkumar *et al*. (2001) in *Heteropneustes fossilis*, Kumar *et al*. (2006) in *Clarias batrachus,* Sanjib and Ashok (2006) in *Heteropneustes fossilis*. In the present study the sub-lethal exposure of Bismarck brown and acid leather brown results into significant increase in the TLC. Intoxication of Bismarck brown and acid leather brown induces leukocytosis in which TLC increases. Leukocytosis in some cases may be due to protective reaction in which leukocyte protects the body when foreign substances, in present study fungicide invade the body. Increase in number of leukocyte may also be found in leukemia. However, in contradiction, Singh and Shrivastava (1992) in *Heteropneustes fossilis* after propoxur intoxication.singh and Singh (2007) *Heteropneustes fossilis* with endosulfan.

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**Table 1: Total leukocyte count ($10^9$/L) in *Cirrhinus mrigala* (Ham.) after Bismarck brown treatment.**

| Conc. | Control (Mean±S.Em.) | 24 hrs (Mean±S.Em.) | 48 hrs (Mean±S.Em.) | 96 hrs (Mean±S.Em.) | 1 week (Mean±S.Em.) |
|---|---|---|---|---|---|
| 0.6mg/L | 2.33±0.52 | 2.39±0.09* | 2.45±0.07* | 2.75±0.01** | 2.92±0.03*** |
| 0.7mg/L | 2.31±0.42 | 2.38±0.09* | 2.48±0.08** | 2.78±0.03*** | 2.98±0.03*** |
| 0.8mg/L | 2.23±0.52 | 2.44±0.06** | 2.53±0.05*** | 2.80±0.02*** | 3.02±0.02**** |

* Non significant (P>0.05)
** Significant (P<0.05)
*** Highly significant (P<0.01)
**** Very highly significant (P<0.001)

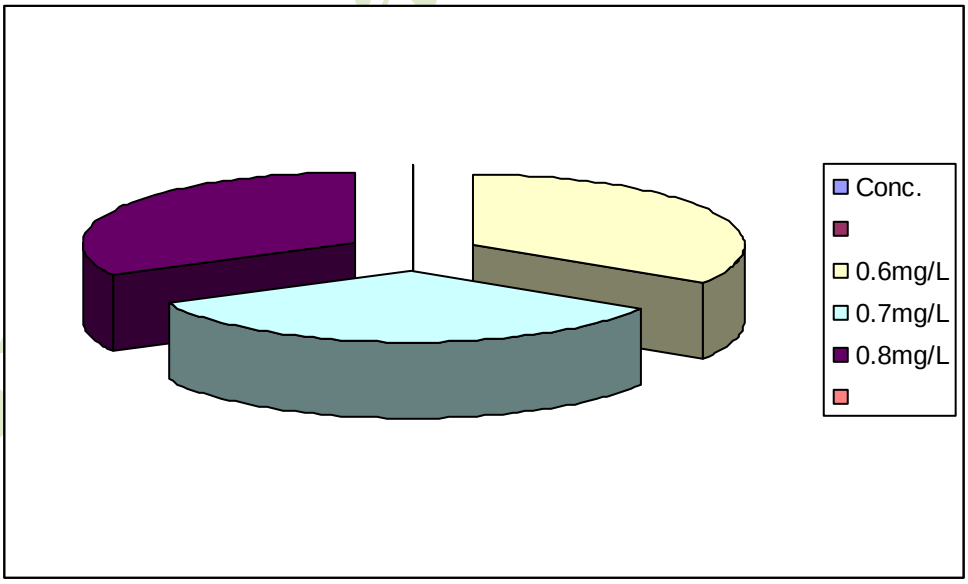


**Fig. A**

**Table 2: Total leukocyte count ($10^9$/L) in *Cirrhinus mrigala* (Ham.) after acid leather brown treatment.**

| Conc. | Control (Mean±S.Em.) | 24 hrs (Mean±S.Em.) | 48 hrs (Mean±S.Em.) | 96 hrs (Mean±S.Em.) | 1 week (Mean±S.Em.) |
|---|---|---|---|---|---|
| 8mg/L | 2.33±0.52 | 2.43±0.10* | 2.48±0.07* | 2.79±0.11** | 2.98±0.13*** |
| 9mg/L | 2.31±0.42 | 2.42±0.08* | 2.49±0.18** | 2.68±0.04*** | 2.88±0.09*** |
| 10mg/L | 2.23±0.52 | 2.42±0.01** | 2.50±0.09*** | 2.59±0.11*** | 2.99±0.10**** |

* Non significant (P>0.05)
** Significant (P<0.05)
*** Highly significant (P<0.01)
**** Very highly significant (P<0.001)

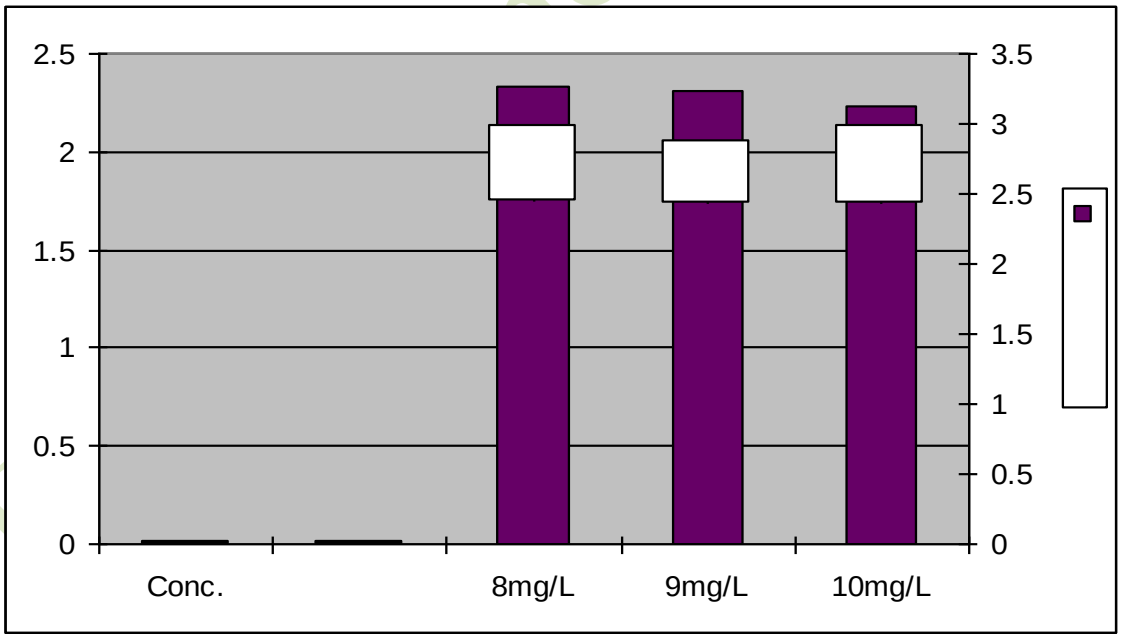


**Fig B**

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