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# Effect of an insecticide "Ekalux" on the Haematology of the Freshwater fish, "Labeorohita"

K. Vijaya kumar[1], S. Binu kumari[2]*, And M.Mohan kumar[3]
[1,2,3] *PG and Research Department of Zoology, Kongunadu Arts and Science College, Coimbatore-641029,Tamil Nadu, India*

***Abstract:*** *In developing countries, an extensive use of insecticides to meet with increased agricultural needs is inevitable and the indiscriminate use and misuse of insecticides results in acute poisoning of the biosystems. The sublethal toxicity of the insecticide Ekalux on the fingerlings of Labeo rohita was evaluated to determine its effect on the haematological values. The acute and sublethal toxicity of the insecticide "Ekalux" on the fingerlings of Labeo rohita was evaluated to determine its effect on the haematological values. The fish was exposed to varying levels of the toxicant concentrations using static bioassay to determine the median lethal concentration. The $LC_{50}$ value is 0.095 ml.The fish was exposed to different hours (24, 48, 72 and 96hrs) in sublethal concentration 0.095 ml and parameters like RBC,WBC,Hb,MCV,MCH,MCHC,PCV has been analysed. All haematological parameters except WBC were found to be decreased from control and the WBC was increased in all exposure periods.The values were statistically analyzed and most values were found to be significant at 5% level.*

***Keywords:*** *haematological, insecticide, toxicity, sublethal.*

## I. Introduction

Insecticides are one of the major classes of toxic substances used in india for management of pest in agricultural lands and control of insect vectors of human disease. The runoff from treated areas enters the river and aquaculture ponds that are supplied by rivers. Such rivers and the adjacent aquaculture ponds are likely to be contaminated by pesticide [1]. Pesticide and herbicides at high concentration are known to reduce the survival, growth and reproduction of fish. Haematological parameters are used as an index to detect physiological changes and to assess structural and functional status of health during stress conditions in a number of fish species [2].

## II. Materials And Methods

Fishes were maintained in a large tank and acclimatized to laboratory conditions for 21 days.Water was changed daily to maintain the oxygen content and to remove the excreta of fishes.Fishes were maintained at room temperature and fed with ad libitum daily at least one hour prior to the replacement of the tank water.Feeding was stopped one day prior to the experiment in order to keep the animal more or less in the same state of metabolic requirement. The herbicide Ekalux has been used for the study. Ekalux is a broad spectrum organophosphate insecticide which is effecting in controlling cardamom thrips, yellow stem borer of paddy, mealy bug, brown plant hopper, green leaf hopper, corn root worms, Cockroaches, grubs, fleas, beetels, flies, termites, fire ants and lice. Ekalux primarily as a contact poison with some action as a stomach poison.

Batches of 10 healthy fishes were exposed to different concentrations of Ekalux to calculate the $LC_{50}$ value.One more set of fishes are maintained as control in tap water.To find the wide range of concentration 10 to 50 ml of Ekalux were chosen and the number of dead or affected fish in each set up was counted at regular intervals upto 24 hours. The level of the dissolved oxygen, pH, alkalinity and hardness were monitored and maintained constant.The tanks were continuously aerated with electrically operated aerator.Appropriate narrow range of concentration 1-5 ml was used to find the median lethal concentration using a minimum of 6 fishes for each concentration and the mortality was recorded for every 24 hours upto 72 hours. It was found as 0.95 ml for 72 hours.For this stock solution various sub lethal concentrations were prepared for bioassay study. Four groups of fishes were exposed to 0.095 ml (sub lethal concentration of 72 hours $LC_{50}$ value)concentration of the Encounter for 24, 48 and 72 hours respectively.Another group was maintained as control at the end of each exposure period. The blood was collected from gills using syringe and anticoagulants (ammonium oxalate, EDTA) were added and the haematological parameters such as Hb,RBC,WBC,MCV,MCH,MCHC and PCV were analyzed. The haemoglobin content was estimated by acid hematin method [3]. Total RBC count and WBC count were counted using an improved Neubaurhaemocytometer [4].The mean corpuscular volume was calculated by using values of PCV% and the red blood cell counts expressed in μm-3 [5]. The mean corpuscular haemoglobin content was calculated by using the value of haemoglobin content and the red blood cell counts and expressed in pg [5].The percentage of mean corpuscular haemoglobin concentration was calculated by using

the values of haemoglobin content and the PCV% [5]. The PCV percentage was calculated employing standard method and formulae [6].

## III. Results And Discussion

The amount of RBC in the blood of the fishes exposed to 0.095 ml insecticide Ekalux for 24, 48, 72 and 96 hrs was found to contain 1.92, 1.81, 1.61, 1.40 x 106/mm$^3$and mean control was found to be 2.00 x 106/mm$^3$.The amount of WBC were found to be increased from the control. The values were 3.90, 5.00, 5.14, 5.33, 5.40 x 106/mm$^3$ in control 24, 48, 72 and 96hrs respectively. The level of haemoglobin in the fish, Labeo rohita on exposed to 24, 48, 72 and 96hrs was found to contain 2.60, 2.48, 2.21, 2.00 gm% and mean control was found to be 3.00gm %. The value of MCV in fishes exposed to 0.095 ml Ekalux for 24,48,72 and 96 hrs was found to contain 22.00,19.50, 16.20, 15.10 µm$^3$ and mean control was found to be 23.50 µm$^3$. The amount of MCH in the blood of the fishes exposed to 0.095 ml Ekalux was recorded as 16.20, 15.15, 13.20, 12.00 and the control was found to be 17.00 Pg.The amount of MCHC recorded as 15.7, 13.10, 11.26, 9.07, 6.50 gm/dL in control 24,48,72 and 96hrs exposures respectively.The amount of PCV in the blood of the fishes exposed to 0.095 ml Ekalux for 24,48,72 and 96hrs was found to contain 9.20, 8.32, 7.50,and 7.00% and mean control was found to be 10.00 %.

**Table**

**Effect of Ekalux on haematological parameters in blood of the fish Labeo rohita.**

| Parameters | Exposure concentration 0.11ppm | Exposure Periods | | | | |
|---|---|---|---|---|---|---|
| | | Control | 24 hrs | 48 hrs | 72 hrs | 96 hrs |
| **RBC (106/mm3)** | Mean±SD % | 2.00±0.056$^a$ | 1.92±0.1$^{ab}$ 4.00↓ | 1.81±0.08$^{ab}$ 9.5↓ | 1.61±0.07$^b$ 5.33↓ | 1.40±0.06$^b$ 5.40↓ |
| **WBC (106/mm3)** | Mean±SD % | 3.90±0.11$^d$ | 5.00±0.12$^c$ 28.21↑ | 5.14±0.1$^b$31.79↑ | 5.33±0.08$^b$ 36.67↑ | 5.40±0.04$^a$ 38.46↑ |
| **Haemoglobin (gm %)** | Mean±SD % | 3.00±0.10$^a$ | 2.60±0.05$^b$ 13.33↓ | 2.48±0.09$^b$ 17.33↓ | 2.21±0.07$^d$ 26.33↓ | 2.00±0.03$^c$ 33.33↓ |
| **MCV (µm3)** | Mean±SD % | 23.50±0.09$^a$ | 22.00±0.10$^b$ 6.38↓ | 19.50±0.07$^c$ 17.02↓ | 16.20±0.09$^d$ 31.06↓ | 15.10±0.12$^e$ 35.74↓ |
| **MCH (pg)** | Mean±SD % | 17±0.10$^a$ | 16.20±0.08$^b$ 4.71↓ | 15.15±0.13$^c$ 10.88↓ | 13.20±0.07$^d$ 22.35↓ | 12.00±0.08$^e$ 29.41↓ |
| **MCHC (g/dL)** | Mean±SD % | 15.7±1.82$^a$ | 13.10±1.54$^b$ 16.56↓ | 11.26±0.97c 28.28↓ | 9.07±1.39d 42.23↓ | 6.50±0.95$^e$ 58.60↓ |
| **PCV (%)** | Mean±SD % | 10.00±0.10$^a$ | 9.20±0.$^{12b}$ 8.00↓ | 8.32±0.11$^c$ 16.8↓ | 7.50±0.13$^c$ 25.00↓ | 7.00±0.09$^d$ 30.00↓ |

Results are mean (±SD) of 5 observations
% = Parenthesis denotes percentage increase/decrease over control.
In a column,means followed by a common letter or not significant at 1% level by using DMRT.

Decrease in RBC may be due to oxygen carrying capacity of the blood which may be due to the inhibition of erythropoiesis, haemosynthesis and increase in the rate of erythrocyte destruction in haemopietic organs. Low haemoglobin level according to [7] might decrease the ability of fish to enhance its activity in order to meet occasional demands. The significant increase in total leucocyte count might be due to immunological reaction to produce more antibiotics to cope with the stress induced by these toxicants [8].The significant reduction of Hb could be indication of severe anemia caused by destruction of erythrocytes [9]. The low value of PCV in fish exposed to stress was attributed to a reduction in red blood cell volume caused by osmotic changes [10].

## IV. Conclusion

The haematological parameters except WBC were found to be decreased from control and the WBC has increased in all exposure periods.From the above investigation it can be inferred that the aquatic animals are affected by the Ekalux.So we should create awareness among people to use biocides instead of insecticides and herbicides.

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