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Impact of Haematological Parameters of *Labeo rohita* (HAMILTON, 1882) Exposed to Pesticide of Profenofos

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ABSTRACT

Fungicide is serious adulterants of the aquatic environment because of their environmental persistence and ability to be accumulated by aquatic organisms. *Labeo rohita* was exposed to low, medium and high concentrations of Profenofos for 15 and 45 days. After 15 and 45 days of exposure red blood cell (RBC) and and Hb content decreased when compared to the control. The number of white blood cells (WBC) increased in Profenofos treated fish.

Key words: *Labeo rohita, Profenofos, RBC, WBC, Hb, PCV, MCV, MCH..*

Introduction

Pollution issue is presently experienced wherever the globe, with an ascent in make, urbanization, excess utilization of agrochemicals like pesticides, herbicides, fungicides and so forth To, improve yield of horticultural product. Among the different sorts of pesticides, organophosphates have gotten one of the for most part used classes of pesticides. The effects of acquaintance of aquatic environment with these pesticides are difficult to review considering their short consistent in water area due to low dissolvability and fast degradation. Henceforth, observing of these insect sprays is significant (Revathi *et al.*, 2020).

Aquatic biological systems that go through rural regions have high likelihood of being sullied by spillover and ground water filtering by an assortment of synthetic compounds. Profoundly successful pesticides are utilized colossally, which on entering the oceanic climate acquire different changes living being by adjusting the development rate, healthy benefit, standard of conduct, and so forth A significant region of the planet food is being provided from fish source, so it is fundamental to get the strength of fishes (Tripathi *et al.,* 2002; Ramesh and Saravanan, 2008). In India as much as 70% of the chemical formulations employed in agricultural practices are believed to affect non-target organisms and to find their way to fresh water bodies, ultimately polluting them (Bhatnagar *et al.,* 1992).

Pesticide is broadly used in present day agribusiness to help with the creation of excellent food. Be that as it may, a few pesticides can possibly cause genuine wellbeing and climate harm. Rehashed openness to sub-deadly portions of certain pesticides can cause physiological and social changes in fish that diminish populations, like deserting of homes and broods, diminished resistance to infection and expanded inability to keep away from hunters (Veeraiah, 2012)

Profenofos (Fig. 1) is regularly utilized in India for pest control in mango, banana, cotton and pine-

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apple agriculture (Das *et al.,* 2006; Reddy and Rao, 2008; Kavitha and Rao, 2009). It is one of the most regularly utilized broadspectrum organophosphate insect poisons of cotton fields (Tejada *et al.,* 1999). This is additionally an all around the world utilized pesticide for the control of different caterpillars, white fly and vermin on cotton and vegetable harvests in Egypt (British Crop Protection Council, 1991; Farrag and Shalby, 2007), Australia (Kumar and Chapman, 2001), Japan (Gotoh *et al.,* 2001), Korea (Min and Cha, 2000), Finland (Abass *et al.,* 2007), and China (Hong-Yan *et al.,* 2001). Profenofos is accounted for to be exceptionally poisonous to some amphibian living beings (Shaw, 1995).

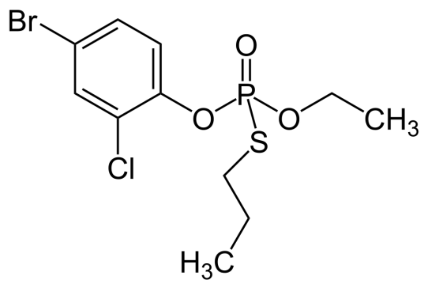

Fig. 1. Chemical Structure of Profenofos

Fish mimic to circumstance of water quality and contamination since they existed at the most reduced degree of natural way of life of oceanic bodies. They can get and hold synthetic substances like weighty metals and pesticides through agreeable peculiarities so toxin in their current circumstance can be recognized. Fish devour more prominent measure of green growth, phytoplankton and diverse sea-going plant tainted with pesticide, which thus lead these synthetics to bit by bit collect in tissues and organs of fish. Digestion can direct little measure of these synthetic substances while staying one get bio-collected in the organs and organs arrangement of fish. Hematological and serological boundaries are critical for estimation of pathophysiological state of fish. These boundaries widely utilized as marks of contamination or stress brought about by impurities on the grounds that hematological profile show the inner body circumstance before any unmistakable sickness recognizable proof (Ali and Rani, 2009; Tahir *et al.,* 2021).

The reason that *Labeo rohita* was picked is on the grounds that it is one of the three significant carp types of the Indian subcontinent along with *Catla catla* and *Cirrhinus mrigala*. Additionally, it is one of the most seriously refined fish species in South Asia in light of its fast development, high return and extraordinary worthiness by shoppers, coming in at #18 on the overall rundown of most cultivated species by amount. *Labeo rohita* is a section feeder, an omnivorous fish that records for 1.84 million tons of new water hydroponics delivered fish in 2016 (**Cai** *et al.,* 2017). Therefore, a good knowledge of dietary effects on the growth of the fish is important (Bakhtiyar *et al.,* 2018; Kumar *et al.,* 2019), in addition to an understanding of any effects of any synthetic additives or contaminants (Tabassum *et al.,* 2020).

In the present study is a haematology study of red blood corpuscle estimation, total white blood corpuscle estimation, PCV, haemoglobin content and mean of corpuscle heamoglobin in the fresh water fish in *Labeo rohita* Exposed Profenofos.

Materials and Methods

Procurement and Rearing of Experimental Animal

Healthy *Labeo rohita* having mean weight 13-16 gm and length 10 – 14 cm were collected from PSP fish farm, at Puthur and acclimatized to laboratory conditions (29 ± 1°C). The fish were fed daily on oil-less groundnut cake. The unused food was renewed after 2 hours and water was changed daily. Prior to experimentation the fish were acclimatized to experimental tanks for at least one week.

Pesticide

Organophosphorus insecticide profenofos purchased from local agro chemist shop was used for the present study.

Experimental Design

A total of 40 fishes (10 fishes per aquarium) were separated as four groups. The following experimental groups were conducted in the freshwater fish *Labeo rohita* for the period of 45 days. Sub lethal doses preferred on previous references.

Group 1 *Labeo rohita*, without any pesticide exposure (control)

Group 2 *Labeo rohita*, on exposure to 0.50 ppb Profenofos for a period of 15 and 45 days

Group 3 *Labeo rohita*, on exposure to 1.00 ppb Profenofos for a period of 15 and 45 days

Group 4 *Labeo rohita*, on exposure to 1.50 ppb Profenofos for a period of 15 and 45 days

Collection of blood

Blood samples were collected from the control and experimental fishes with the help of 24 gauge needle and stored in heparinized glass tube. The haematological parameters viz., total Red Blood Cells (RBC), White Blood Cells (WBC), Haemoglobin (Hb), Haematocrit (Ht) or PCV, Mean Cell Haemoglobin (MCH) and Mean Cell Haemoglobin Concentration (MCHC) were determined by adopting the method of Dacie and Lewis (1984).

Statistical Analysis

The data obtained were analyzed by applying analysis of variance DMRT one way ANOVA to test the level of significance (Duncan, 1957).

Results

The changes in haematological parameters of the fish *Labeo rohita* exposxed to acute toxicity of Profenofos 15 days exposure and 45 days exposure are presented in Table 1 & 2. *Labeo rohita* exposed to Profenofos show abnormal behavior changes like fast swimming, hypersensitivity, profuse secretion of mucous, jerky movement, lose of equilibrium, skin on dorsal side etc., indicated the high toxicity of Profenofos.

Discussion

Profenofos is a non-fundamental organophosphorus bug spray and acaricide with contact and stomach activity. It is broadly utilized for controlling bugs, especially Lepidoptera. Fish are principally being utilized as bio-marks of poison impacts for the appraisal of the nature of sea-going climate since fishes are extremely touchy to changes in their current circumstance and assume an imperative part in assessing the planned risks arranged by contamination in the amphibian climate because of new synthetic substances (Rajesh and Pilo, 2009; Lakra and Nagpure, 2009; Nataraj *et al.,* 2017).

Hematology is among one of the most key method in evaluating the hazard effects of pollutants on aquatic organisms, because blood variables respond to low doses of pollutants (Ghayyur *et al.,* 2020). A reduction in the haematological values, indicated anemia in the pesticide exposed fish may due to erythropoiesis, haemosynthesis or due to an increase in the rate of erythrocyte destruction in haematopoietic organs (Jenkins *et al.,* 2003). In the present study, the decrease in the RBC count during the acute treatment might have resulted from sever anemic state or haemolysis power of toxicant (profenofos).

Hematological study assume fundamental part in checking fish wellbeing, contamination burden, stress and illness. Subsequently, it is appropriate to concentrate on the effects of pollutants on fish. In the current review, the freshwater fish *Labeo rohita* under openness to different centralizations of organophosphate pesticide profenofos showed critical ad-

Table 1. 15 DAYS Profenofos Exposure to *Labeo rohita*

Groups	RBCmg g^{-1} wet weight	WBC mg g^{-1} wet weight	Hb mg g^{-1} wet weight	PCV mg g^{-1} wet weight	MCV mg g^{-1} wet weight	MCHmg g^{-1} wet weight	MCHC mg g^{-1} wet weight
Control	3.50 ±0.23	11.50 ± 1.05	10.80 ± 0.80	30.75 ±2.50	85.50 ± 4.23	30.70 ±2.50	35.70 ± 2.40
Low concetration	3.28 ± 0.22	12.20 ± 0.80	10.50 ± 0.70	28.20 ± 2.20	92.35 ± 6.25	31.26 ± 2.20	34.30 ± 2.20
Medium Conc.	3.15 ± 0.19	14.20 ± 1.10	10.30± 0.60	29.80 ± 2.25	94.25 ± 7.58	32.83 ± 2.40	33.80 ± 2.26
High Concentration	2.91 ± 0.20	15.70 ± 0.96	9.70 ± 0.60	28.23 2.15	100.57 ± 8.20	35.06 ± 2.65	32.79 ± 2.15

Table 2. 45 DAYS Profenofos Exposure to *Labeo rohita*

Groups	RBCmg g^{-1} wet weight	WBCmg g^{-1} wet weight	Hbmg g^{-1} wet weight	PCVmg g^{-1} wet weight	MCVmg g^{-1} wet weight	MCHmg g^{-1} wet weight	MCHCmg g^{-1} wet weight
Control	3.71 ±0.25	12.90 ± 1.20	11.25 ± 1.25	30.95 ±2.20	84.91 ± 6.25	30.40 ± 2.63	36.20 ± 2.30
Low concetration	3.13 ± 0.24	15.04 ± 1.40	10.40 ± 0.80	28.56 ± 2.19	92.17 ± 7.24	33.75 ± 2.70	35.90 ± 2.28
Medium Conc.	2.75 ± 0.21	18.30 ± 1.50	9.30 ± 0.70	26.88 ± 2.17	100.35 ± 8.05	35.06 ± 2.75	34.90 ± 2.20
High Concentration	2.15 ± 0.20	20.80 ± 1.50	8.20 ± 0.50	24.33 ± 24.05	100.71 ± 8.90	36.76 ± 2.80	33.80 ± 2.13

justment in the degree of different s blood parameters.

The expanded in WBC count can be relate with expansion in antiboby creation which helps in endurance and recuperation of the fish presented to sublethal convergence of pesticide (Joshi *et al.,* 2002). The current discoveries likewise show excessive touchiness of leucocytes for profenofos and these progressions might be because of immunological response to deliver antibodies to adapt up to stretch initiated by profenofos. In this way expansion in WBC include in the current review shows pressure state of the fish brought about by profenofos which may delivered hypoxia and gill harm.

Decrease in RBC and hemoglobin esteems in Labeo rohita presented to profenofos in this review is like the perceptions led by (Vijaya Kumar *et al.,* 2015). Decline in RBC count might be because of oxygen transport limit of the blood which might be because of the hindrance of erythropoiesis, hemosynthesis and expansion in danger of erythrocyte destruction in haemopietic organs. Low hemoglobin level as indicated by might diminish the capacity of fish to upgrade its action to satisfy infrequent needs. Diminished hemoglobin, RBC include and hematocrit esteems in *Clarias gariepinus* presented to Lead nitrate (Zenebehagos *et al.,* 2017).

Also, after chronic profenofos toxicity in eastern rainbow fish *Melanotaenia duboulayi* (Kumar and Chapman, 1998). They revealed that the reduction of RBCs count, Hb content and Hct value may be due to a harmful effect of pesticide on spleen, liver and anterior kidney (Sharafeldin *et al.,* 2015). Our results are supported by the similar investigations of (Hasan *et al.,* 2015) in *Ctenopharyngodon idella* exposed to Endosulfan during acute toxicity. The hematological adjustments in mean cell hemoglobin (MCH), mean cell volume (MCV), and mean cell hemoglobin concentration MCHC esteems additionally change in light of the fact that the computation of these boundaries rely upon RBCs, Hb and PCV esteems. The chose pesticides tried in this study had altogether expanded MCH and MCV esteems while diminished MCHC esteem. Comparable perceptions are accounted for in *O. mossambicus* openness to chlorpyrifos (Ghayyur *et al.,* 2019) and *C. carpio* presented to silver nanoparticles (Vali *et al.,* 2020; Ghayyur *et al.,* 2020). The expansion in MCV and MCH esteems on treatment with pesticides assigns that reduction in RBCs count might be come about because of annihilation of RBCs or their diminished amalgamation in bone marrow.

Conclusion

All in all, long season of the profenofos rotting arrived at 15 days in water and 45 days in fish tissues. This late disintegration might cause changes in fish which is clear in hematological unsettling influences. In this way, for human security forbid utilizing profenofos.

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