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Research Article

Effect of an insecticide Chlorantraniliprole on some biochemical characteristics of fish *Labeo rohita*

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Abstract

The toxic effect of the insecticide Chlorantraniliprole on oxygen consumption and some biochemical characteristics (total protein, carbohydrate and cholesterol in liver, muscle, kidney and gills) of the *Labeo rohita* fish were estimated. The data shows that the rate of oxygen consumption was declined during all the exposure periods. Similarly, the biochemical parameters were found to be decreased in all the insecticide treated tissues with control.

Keywords: Chlorantraniliprole, total protein, carbohydrate, cholesterol, *Labeo rohita* and Toxicity.

Introduction

Fish is highly nutritious easily digestible and much sought after food. Nutritional value of fish depends on their biochemical composition, which is affected by water pollution (Prado *et al.,* 2009). Fish accumulate xenobiotic compounds, especially those with poor water solubility from water or food. Pesticides are considered as a source of pollution to aquatic environment. It includes large variety of chemical nature and biological activity grouped together only on the basis that are used to destroy or eliminate the pests (Kamel *et al.,* 2007). Pesticides are seep into ecosystem and food chain to affect the non target species. Any change in behavior and physiology of fishes indicate the deterioration of water quality. Pesticides are usually entered into the body of fish through gills and liver. Therefore in the present study an attempt has been made to investigate the effect of anthranilamide insecticide on the oxygen consumption and some biochemical parameters in the blood of edible fish *Labeo rohita.*

Materials and Method

Chlorantraniliprole 18.5% W/W SC is an anthranilamide insecticide. The fresh water fish *Labeo rohita* were collected from Aliyar dam Coimbatore, Tamilnadu. The period of acclimatization lasted for 2 weeks. Batches of 10 healthy fishes were exposed to different concentration of insecticide Chlorantraniliprole to calculate the median lethal concentration (LC_{50}) value using probit analysis method (Finney, 1971). The fishes were exposed to sublethal concentration ($20\mu gL^{-1}$) of Chlorantraniliprole for 24, 48, 72 and 96 hrs respectively. Another group was maintained as control. At the end of each exposure period fishes were sacrificed and tissues such as liver, gill, muscle and kidney were dissected and removed. The tissues (10mg) were homogenized in 80% methanol centrifuged at 3500rpm for 15 minutes and the clear supernatant was studied for the analysis of total protein, carbohydrate and cholesterol (Lowry *et al.,* 1951; Hedge and Hortifreiter, 1962; Richmond, 1973). Changes in the

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Table – 1. Carbohydrates content (mg g $^{-1}$) in tissues of *Labeo rohita* exposed to 20µgL^{-1} of Chlorantraniliprole.

Exposure	Tissues	Liver	Kidney	Gill
24h	Control	4.21±0.04	2.56±0.05	2.02±0.03
	Chlorantraniliprole	3.05±0.03	1.64±0.10	1.32±0.05
	ANOVA	***	***	**
48h	Control	4.44±0.09	2.57±0.08	1.98±0.02
	Chlorantraniliprole	3.02±0.10	1.87±0.06	2.26±0.04
	ANOVA	***	***	*
72h	Control	4.61±0.08	2.50±0.10	2.00±0.04
	Chlorantraniliprole	2.38±0.13	1.67±0.12	1.34±0.02
	ANOVA	***	**	*
96h	Control	4.75±0.17	2.51±0.12	1.96±0.03
	Chlorantraniliprole	2.65±0.15	1.70±0.09	1.29±0.03
	ANOVA	***	**	*

Means ± SD (n=4), Results of one-way ANOVA indicate; *: p<0.05; **: p<0.01; ***: p<0.001; NS = Non significant

Table - 2: Cholesterol content (mg g $^{-1}$) in tissues of *Labeo rohita* exposed to 20µgL^{-1} of Chlorantraniliprole

Exposure	Tissues	Liver	Kidney	Gill
24h	Control	13.08±0.12	9.94±0.13	2.11±0.05
	Chlorantraniliprole	11.14±0.15	955±0.11	2.01±01
	ANOVA	***	NS	*
48h	Control	1310±0.11	9.96±0.15	2.09±0.03
	Chlorantraniliprole	9.92±0.10	9.21±0.10	1.88±0.01
	ANOVA	***	*	***
72h	Control	13.09±0.12	9.96±0.15	2.10±0.03
	Chlorantraniliprole	9.71±0.12	8.72±0.08	1.64±0.05
	ANOVA	***	*	***
96h	Control	13.11±0.15	9.95±0.11	2.10±0.03
	Chlorantraniliprole	9.54±0.10	8.51±0.09	1.43±0.01
	ANOVA	***	**	***

Means ± SD (n=4), Results of one-way ANOVA indicate; *: p<0.05; **: p<0.01; ***: p<0.001; NS = Non significant

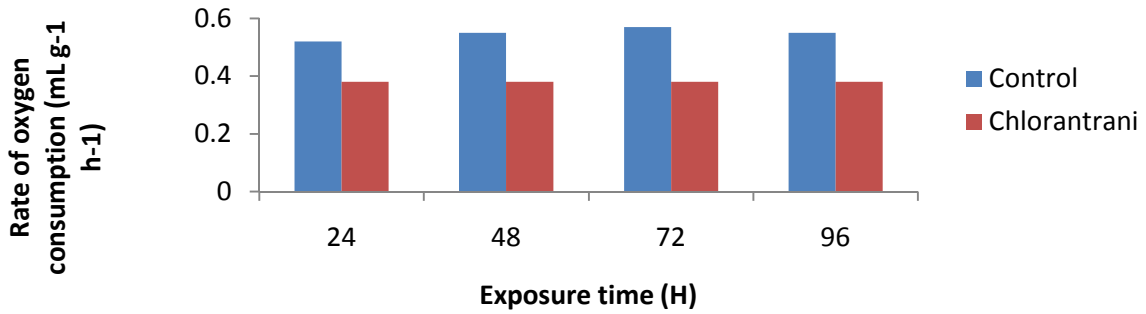

Fig. – 1. The rate of oxygen consumption of *Labeo rohita* fish 20µg L^{-1} of Chlorantraniliprole at different times of exposure

Table – 3. Protein content (mg g $^{-1}$) in tissues of *Labeo rohita* exposed to 20µgL^{-1} of Chlorantraniliprole

Exposure	Tissues	Liver	Kidney	Gill
24h	Control	5.68±0.06	5.10±0.03	4.78±0.11
	Chlorantraniliprole	3.90±0.05	4.50±0.05	5.82±0.55
	ANOVA	***	**	**
48h	Control	4.55±0.11	5.21±0.05	5.82±0.03
	Chlorantraniliprole	2.55±0.09	3.36±0.08	4.36±0.13
	ANOVA	***	**	**
72h	Control	4.54±0.11	4.88±0.06	5.80±0.03
	Chlorantraniliprole	1.90±0.09	2.98±0.05	3.49±0.13
	ANOVA	***	***	**
96h	Control	4.54±0.11	4.38±0.06	5.76±0.03
	Chlorantraniliprole	0.96±0.09	1.66±0.05	3.25±0.13
	ANOVA	***	**	***

Results of one-way ANOVA indicate; *: p<0.05; **: p<0.01; ***: p<0.001; NS = Non significant

rate of oxygen consumption of fishes were evaluated at different exposure periods by Winkler's method (Welsh and Smith, 1960).

Result and Discussion

The date shows that the rate oxygen consumption was declined during all the exposure periods (Fig.1). Proteins are important organic substances. The result of the present study showed significant decrease in protein content in the tissues studied (Anand Kumar *et al.,* 1988). Carbohydrate is an essential component of living cells. The result of present study showed significant decrease in carbohydrate content in tissues studied. Cholestrol is an important normal body constituent used in the structure of cell membrane. The result of the present study showed significant decrease in cholesterol content in the studied tissues of *Labeo rohita* (Table, 1 - 3). The decrease in cholesterol contents in all tissues were focus to be increased with hours of exposure.

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