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EFFECT OF TRIAZOPHOS ON PROTEIN CONTENT IN THE FRESH WATER FISH *CYPRINUS CARPIO* (LINN.) AFTER ACUTE AND CHRONIC EXPOSURE

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Abstract: Organophosphate pesticides are largely used to control various agricultural pests. Triazophos is one of the organophosphate (OP) pesticides extensively used in agricultural practices throughout India. In the present study, the effect of Triazophos on protein contents was studied in gill, liver, muscle and kidney of common carp, *Cyprinus carpio.* The fish were exposed to 0.5 ppm (LC0) and 1 ppm (LC50) concentrations for 96hrs and 0.1 ppm($1/10^{th}$of LC50) and 0.05ppm($1/20^{th}$of LC50) concentrations for the period of 30 days. Statistical analysis was made by using probit analysis. Significant alterations in the protein content of fish tissue were observed. Protein content was found to be decreased in all the tissues after acute and chronic exposure to all test concentrations over control. Comparatively less depletion in protein content was observed at 0.5 ppm (LC0) and 0.05ppm ($1/20^{th}$of LC50) concentrations than1ppm and 0.1 ppm concentrations.
Keywords: Triazophos, *Cyprinus carpio*, protein, LC0, LC50.

Introduction

The present nutritional challenge has pointed out current Indian scenario about children malnutrition. Humankind gets proteins from meat, eggs and fish. Millions of Indian people depend on protein and other nutritional requirement from the fishery and fishery byproducts. Through green revolution, an increase in agricultural production has been observed but on the other hand use of pesticide also increased. However, extensive use of pesticides has caused a lot of pollution and threatened the health of non-target terrestrial and aquatic organisms. (Ghosh et al., 2006; Abdul et al.,2010). The pesticides used for various purposes reach aquatic sources, either directly or indirectly through runoff from agricultural fields, spray drifts, rain water, sewage and effluents from industries (Lutz et al., 1992).

Organophosphate pesticides are largely used to control pests because of their effectiveness and easy biodegradation. Triazophos (o,o-Diethyl-o-(1-phenyl-1H-1,2,4,-triazol-3yl) thiophosphate) is one of the organophosphate (op) pesticides extensively used in agricultural practices in India for the protection of rice, vegetable, cotton, sugarcane, soya

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bean etc. The fish considered as bioindicators of water quality, the effect of pesticides can be studied by analyzing its biochemical parameters. (Tilak et al., 2003; Venkatramana et al., 2006; Rohankar et al., 2012). The protein content of fish is used as biomarker under stress conditions (Pawar et al.,2010).

Considering the toxicity of Triazophos on fresh water fish *Cyprinus carpio*, the present attempt has been made to study the alterations in the protein content of the fish *C. carpio.*

Materials and Methods

The fish were collected from local sources and brought to the laboratory for acclimation. The fishes used for experimentation were having the average length of 6-9 cm and the weight about 10-14 grams. Triazophos 40% EC was used as toxicant for static bioassay test. A stock solution of toxicant was prepared (100 ppm). After 96 h acute toxicity test values of triazophos LC0 and LC50 to *Cyprinus carpio* was estimated by using static bioassay test. Water was renewed after every 24 hours to maintain the pesticide concentration. The total mortality in each concentration was recorded after 96 hrs of exposure. The data obtained was subjected to probit analysis method (Finney, 1971). After determining values, the fish were exposed to .5 ppm (LC0) and 1 ppm (LC50) concentration for 96 hours and to 0.1 ppm ($1/10^{th}$ of LC50) and 0.05 ppm ($1/20^{th}$ of LC50) concentrations for 30 days. Another group of fish was maintained as a control for acute and chronic test. The fishes were dissected immediately at the end of the exposure period and tissues like gill, liver, kidney and muscles were used for biochemical estimations. The protein content was estimated by lowry's et al (1951) by using follin phenol reagent.

Results and Discussion

Table 1: Effect of Triazophos on protein content (mg/100 mg wet tissue) after acute exposure (96 h) to *Cyprinus carpio*

Tissue	Control	LC0	% change over control	LC50	% change over control
Gill	8.81 ± 0.53	6.08 ± 0.55 ***	-30.98	4.97 ± 0.08 ***	-43.58
Liver	10.09 ± 0.30	7.19 ± 0.29 ***	28.74	6.52 ± 0.19 ***	-35.38
Muscle	11.90 ± 0.49	8.97 ± 0.15 ***	-24.62	7.58 ± 0.17 ***	-36.30
Kidney	7.98 ± 0.10	5.46 ± 0.23 ***	-31.57	4.25 ± 0.23 ***	-46.74

Values are mean ± S.D., *** indicates significant change $p<0.001$ (n = 3).

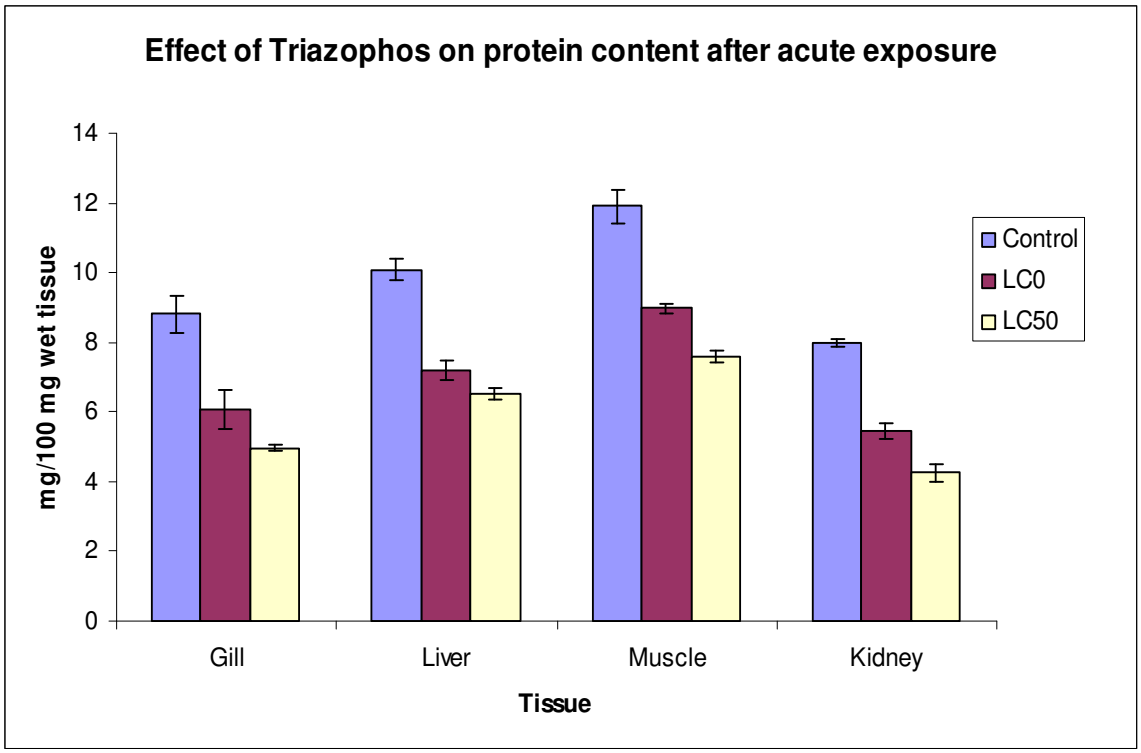
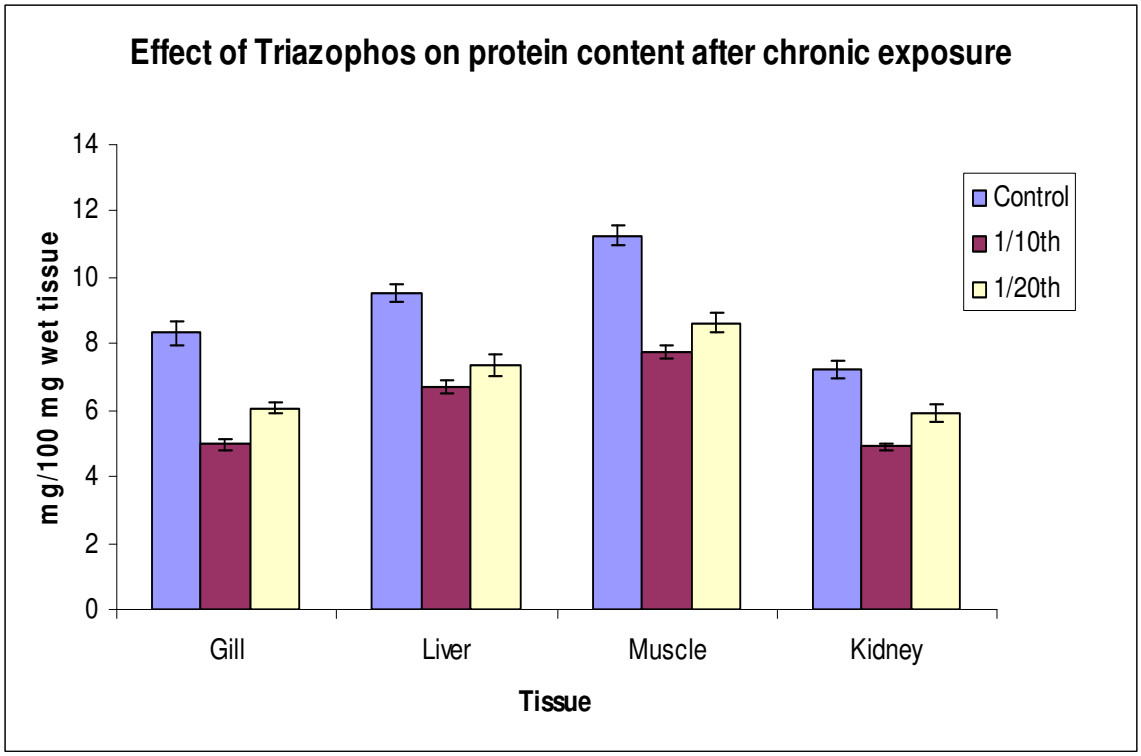


Table 2: Effect of Triazophos on protein content (mg/100 mg wet tissue) after chronic exposure (30 Days) to *Cyprinus carpio*

Tissue	Control	1/10th	% change over control	1/20th	% change over control
Gill	8.33 ± 0.36	4.96 ± 0.14 ***	-40.45	6.07 ± 0.18 ***	-27.13
Liver	9.51 ± 0.26	6.69 ± 0.18 ***	-29.65	7.36 ± 0.33 ***	-22.60
Muscle	11.27 ± 0.29	7.76 ± 0.18 ***	-31.14	8.63 ± 0.30 ***	-23.42
Kidney	7.23 ± 0.28	4.92 ± 0.10 ***	-31.95	5.91 ± 0.26 ***	-18.25

Values are mean ± S.D., *** indicates significant change $p<0.001$ (n = 3)



Results and discussion

The total protein content in various organs of control group of *Cyprinus carpio* observed after acute and chronic exposure was in the order of muscle > liver > gill > kidney. In the present study, protein content in all target tissues was decreased after acute (96hrs.) and chronic exposure (30 days). Results obtained are presented in table 1 and 2, and in figure 1 and 2. Comparatively, less depletion in protein content was observed at 0.5 ppm than 1 ppm after acute exposure. In the case of chronic exposure, comparatively less depletion in protein content was observed at 0.05 ppm concentration than 0.1 ppm concentration. The decrease in protein content varies from tissue to tissue. Present trend finds in good agreement with other researchers (Dixit et al., 2005; Rekha rani et al., 2008; Pawar et.,2010).

In the present investigation, protein showed a highly significant decrease ($p<0.001$) in all tissues at acute and chronic level exposure. Maximum decrease (-31.57% and -30.98%) in protein content was observed in kidney and gill while minimum decrease in protein content was observed in liver (21.60%) after acute exposure (0.5 ppm), Similarly maximum decrease in protein content (-46.74% and -43.58%) was observed in kidney and gill respectively while minimum decrease in protein content was observed in liver (-35.38%) after acute exposure (1 ppm). In chronic exposure protein, content was significantly decreased ($p<0.001$) in all tissues at 0.1 ppm and 0.05 ppm concentrations respectively. Maximum decrease (40.44%) in

protein content was observed in gill, while a minimum decrease was observed in liver (29.64%) at 0.1 ppm concentration.

Depletion of protein content in various tissues might be possible due to metabolic stress caused by Triazophos intoxication which could lead to the insufficient synthesis of protein and its use to cope up metabolic stress (Muley et al., 2007). Pesticidal stress resulted in a decrease in protein content, which may be due to various catabolic reactions. In present study protein content has been reduced may be due to metabolic utilization of keto acids for synthesis of glucose for glucogenesis and for ionic and osmotic regulations (Schmidt, 1975; Vutukuru, 2005; Chezian et al., 2010). In the present study decrease in protein content in *Cyprinus carpio* was observed after acute and chronic exposure of Triazophos. A similar trend has been observed by Remia et al (2008) in *Tilapia mossambica* exposed to monocrotophos and *Labeo rohita* exposed to Fenvalerate and Endosulfan by Suneetha (2011).

Conclusion

From the present findings, it is clear that an organophosphate pesticide Triazophos is moderately toxic to fish *Cyprinus carpio*. It causes alterations in the protein of vital organs like gill, liver, kidney and muscle. Depletion in protein content directly affects fish productivity.

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