TOXIC EFFECTS OF SELECTED PESTICIDES ON *CHANNA PUNCTATUS* (BLOCH) MAINTAINED IN AQUARIA: A STUDY BASED ON BIOCHEMICAL PROFILES

SYNOPSIS

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BY

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SYNOPSIS

Although pesticides produce good many results in the control of pests, their harmful effects on the non-target animals cannot be ruled out. Organophosphate pesticides though less persistent in the environment leave residues in water and mud even several days after their spray in the adjacent crop field. This poses a constant threat to the non-target organism especially to the fishes. The air breathing fishes are the worst sufferers of this situation. Hence, organophosphates may also cause health risk to mankind through food chain. These pesticides are powerful neurotoxic chemicals. These chemicals are also cytotoxic, mutagenic, teratogenic and carcinogenic. In view of importance of organophosphate contamination on freshwater ecosystem and public health and hygiene an attempt was done to evaluate precisely the toxic effects of two organophosphate pesticides, dimecron and quinalphos (most widely used in crop field and tea plantation respectively) on fish which are of great economic importance to man.

Experimentally acute toxicity determined through biochemical investigations in liver, muscle and kidney of fresh water teleost, *Channa punctatus* was done with dimecron and quinalphos exposure. The dimecron and quinalphos were added @1.8 mg/l, 0.36 mg/l and @ 2.5 mg/l, @ 0.50 mg/l respectively to the medium (tap water) of aquaria. About 25-30 acclimatized fish were introduced in each aquarium. Simultaneously, an aquarium was set up for the study of control animals. A minimum of five fish was sacrificed each time from treated as well as control aquaria. All the experiments were repeated three times for each biochemical estimation. The analysis was performed at 10, 20 and 30 days of exposure.

Both dimecron and quinalphos have been found to cause injury in different organs although the degree of injury vary in different organs. The apparent loss of body weight, organ weight and loss in total protein, DNA and RNA content in all the exposed groups were noticed. It was also dose dependent. On the gel electrophoretic protein band profiles of the experimental and control fish, a critical analysis of the band comparison revealed that certain bands present in control fish were found to be missing and a few unknown protein bands originated, more number of bands were missing with addition of a few new protein fractions in higher dose exposed group.

It may be inferred from this studies that some of the genes involved in the synthesis were switched off resulting in the disappearance of some of the proteins. The appearance of some new proteins may be due to the switching on of some genes. Stress proteins are a group of proteins whose synthesis is induced by a wide variety of physical conditions and chemical agents: heavy metals, xenobiotics, oxidative stress, anoxia, salinity stress, teratogens, and hepatocarcinogens. Some of these proteins are believed to play a role in protecting the cell from damage that can result from environmental perturbations. Others are involved in the regulation of various genes. Stress results in a dramatic redirection of metabolism; a suite of stress proteins is rapidly synthesized and production of cellular proteins is repressed.

In the present study the changes in protein sub-fractions and concomitant changes in DNA and RNA contents would not only confirm the protein loss (due to dimecron and quinalphos exposure) in a more powerful and precise manner, but would again strongly support the cellular protective response against organophosphate toxicity through possible expression of certain genes encoding stress proteins though characterization of those proteins need to be studied.

The changes in the enzymatic activities are also very significant. Increased acid phosphatase, alkaline phosphatase, lipid peroxidation, Cytochrome P450 and concomitant decrease in glutathione level indicate that both dimecron and quinalphos are cytotoxic and also caused oxidative stress. The toxic effect on different tissues has been reflected in the loss of body weight and gain in organ weight along with concomitant behavioral changes of fishes. In conclusion, it can be stated that dimecron and quinalphos are highly toxic chemicals.

The outcome of this present study is that even at sub lethal concentrations, pesticides have deleterious effect on fish, affecting the value of the fish. Therefore it may be suggested that necessary care may be taken to avoid contamination of fresh water bodies while spraying pesticides in adjacent crop field.

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