IMPACT OF DIMETHOATE ON PROTEIN CONTENT IN THE FRESHWATER FISH PUNTIUS TICTO (HAM)

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INTRODUCTION
Modern agricultural pesticides result in indiscriminate use of various agrochemicals, which usually enter into the aquatic environment and adversely affect the non target organisms. Pesticides in water cause damage to biotic life especially to fish. Fishes are very sensitive to a wide variety of toxicants in water. Various species of fish show uptake and accumulation of many contaminants or toxicants such as pesticides, polychlorinated biphenyls and heavy metals. Among these, pesticides have been found to be highly toxic not only to fishes but also to fish food organisms. Pesticides produce many physiological and biochemical changes in the freshwater fauna by influencing the activities of several enzymes and metabolites (Koundinya and Ramamurthy, 1978). It has also been reported that acute and chronic toxicities of pesticides caused biochemical alterations in organs (Rojik et al., 1983; Szabu and Nemcsok, 1992; Balint et al., 1995; Das et al., 1999; Rawat et al., 2002).

The alterations in biochemical contents in different tissues of fish due to toxic effects of different heavy metals and pesticides have been reported by many workers, some of them are Grant and Mehde (1973); Verma et al., (1983); Kamble (1983); Gupta et al. (1987); Khan et al. (1992); James and Sampath (1995); Das et al. (1999), Choudhary and Gaur (2001) Khare and Singh (2002). Extensive work has been done on the toxic effects of pesticides on protein, carbohydrate and lipid contents of fishes, but very little work have been done on biochemical changes in P. ticto. Therefore the present work has been an attempt to assess the extent of alteration in protein content in P. ticto under dimethoate toxicity.

MATERIALS AND METHODS
The freshwater fish P. ticto were collected from the freshwater sources around Aurangabad city. Fishes were acclimatized in aged, dechlorinated and well aerated water for two weeks. During acclimatization they were fed on alternate days with pieces of live earthworms. The LC 50 values are determined by following the guidelines given on committee of toxicity tests with aquatic organisms (Anon, 1975). The LC 50 values are calculated by Probit Analysis Method Finney (1971).

The acclimatized fishes were exposed to lethal concentration (5.012 ppm) for 96h and two sublethal concentrations (2.506 and 1.253 ppm) for 60 days. Simultaneously a control group of healthy fishes were maintained under identical conditions. The fishes were sacrificed immediately at the end of exposure period and different tissues viz. gill, liver, gonads, brain, kidney, intestine and muscles were processed for the biochemical estimations. Protein content was estimated by Follin phenol reagent method (Lowry et al., 1951).

RESULTS AND DISCUSSION
Acute exposure (5.012 ppm) resulted in significant decrease in the level of protein in testis, ovary and brain and least decrease in intestine, liver and gills; whereas increased protein level was observed in kidney. The two
sublethal exposure (2.506 and 1.253 ppm) results show that there is decrease in the level of protein content in ovary, brain, intestine, muscles, gills and liver. Whereas in tests protein level increases at 1.253 ppm and decreases in 2.506 ppm exposure.

Sublethal exposure result when compared, we find, the protein level increases with decrease in the pesticide concentration i.e. increased protein level in ovary, tests, intestine, gills, brain and liver, whereas decreased amount of protein in muscles and kidney were observed at low concentration (1.253 ppm).

Decrease in protein content after exposure to dimethoate may be attributed to the improvement of protein synthesis and or increase in the rate of its degradation to amino acids which may be fed to TCA cycle through aminotransferases probably to cope up with high energy demands in order to meet the stress condition. The decrease in protein content suggests an increase in proteolytic activity and possible utilization of its products for metabolic purpose. Depletion of protein as a result of toxicity stress has already been reported by a number of workers (Swami et al., 1983; Borah and Yadav, 1995; Rao and Ramneshwari, 2000; Choudhary and Gaur, 2001 and Shinde et al., 2002). Yogana et al., (1981) reported decrease in protein content of muscles after DDT treatment in the fish Clarias batrachus. Saxena et al., (1989) observed decreased level of protein in gonads of Channa punctatus after fenitrothion and carbofuran exposure. Reddy et al., (1991) observed decreased level of protein in brain, liver and muscles of fenvalerate exposed fish Cyprinus carpio. Singh and Bhati (1994) reported progressive decrease in the protein content with increase in exposure time in liver of Channa punctatus under 2, 4-D stress. Similar results were observed during present investigation. The changes in protein content may be due to damage caused to hepatic tissue and increased proteolysis. Ghousia and Vijayaraghavan (1995) reported decrease in protein content of dimethoate intoxicated fish (Clarias batrachus) indicated physiological adaptability of the fish to compensate for pesticide stress. To overcome the stress the animals require high energy, this energy demand might have led to the stimulation of protein catabolism. Rajyashree (1996) also observed decline in protein level in liver, muscles, gills and brain during carbamide exposure of Labeo rohita. Das et al., (1999) observed marked decrease in the protein content of various tissues like kidney and muscles and slight increase in the protein content of brain and gills in cypermethrin treated fish, Channa punctata. Susan et al., (1999) have also reported a significant decrease in protein content under sublethal concentrations of pyrethroid fenvalerate in the gills of Catla catla.

The fall in protein level during dimethoate exposure may be due to increased catabolism (Ghousia and Vijayaraghavan, 1995) and decreased anabolism of proteins (Khare and Singh, 2002). The reducing trend of protein content may be attributed to metabolic utilization of ketoacids to gluconeogenesis pathway for the synthesis of glucose or for the maintenance of osmotic and ionic regulations Schmidt (1975). The alteration in protein value in liver may also be related to some structural changes in the liver, the arrangement of hepatic cords leading to the alterations of liver metabolism. Decrease in protein content could possibly be due to protein breakdown and suggests decrease in protein is due to damage of hepatic tissue and an intensive proteolysis., this was also suggested by Rao and Rao (1984), Radhaiah et al., (1987) and Hilmy et al., (1985). Thus, a decrease in the protein content during exposure to dimethoate naturally affects the nutritive value of fish.

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