RESEARCH ARTICLE

Sub-lethal effects of methyl parathion on protein content of different tissues of *Channa gachua*

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ABSTRACT

Methyl parathion has a broad range of toxicity to many insect pests and has several agricultural applications. The present paper deals with the study of protein content of digestive tract and gills of *Channa gachua* induced by methyl parathion. Bromophenol blue test performed with methyl parathion exposure showed a gradual decrease in protein content with an increase in concentration and duration of toxicant level but in stomach columnar epithelium did not show any such response for different doses and duration. In intestine columnar epithelium, sub mucosa and circular muscles, protein remains unaffected. In the gills reduction of protein content was observed except in blood capillaries and central column.

Keywords : *Channa gachua*, Bromophenol blue, central column, Gills.

INTRODUCTION

All over world the pesticide usage has been increased significantly during the past two decades coinciding with changes in farming practices and increasingly exhaustive agriculture. Contamination of water by pesticides, either directly or indirectly, can lead to fish kills, reduced fish productivity, or high concentrations of undesirable chemicals in edible fish tissue which can affect the health of humans consuming these fish. Residual amounts of pesticides and their metabolites have been found in drinking water and food, increasing concern for the possible intimidation to human health posed by exposure to these chemicals. Contamination of surface waters has been well recognized worldwide and constitutes a major concern at local, regional, national, and global levels. (Cerejeira *et al*., 2003: Spalding *et al*., 2003)

MATERIALS AND METHODS

The pesticide selected was methyl parathion of varying concentration of 2.0 ppm, 4.0 ppm & 6.0 ppm respectively. The live specimens were

collected from lake of Jabalpur. The fishes were taken out after 10 and 20 days of treatment. Gill, stomach and intestine were collected after pesticide exposure. Then the pieces of gill were kept into the Jenkin's fluid for 72 hours for decalcification. And stomach and intestine were fixed in neutral formalin (Baker 1958) at 12 hours. Then stained with mercuric bromophenol blue (Mazia *et al*., 1953) for general protein. Stained sections examined under compound microscope and microphotographs taken were ever necessary.

Observation of the histochemical studies entirely depends upon the intensity of the color chemical constituent and not the amount of the substances present in the sections.

RESULTS AND DISCUSSION

Gill: In 2.0 ppm and 4.0 ppm parathion intoxication for 10 and 20 days there was no remarkable change in protein content in comparison to control gill , except after 4.0 ppm 20 days intoxication were protein contain slightly reduce in whole of the gill. In 6.0 ppm parathion exposure after 20 days further reduction in protein content was observed, except in blood capillaries, central column and pilaster cells. Fig. 1, 2 and 3.

Stomach: In control stomach Bromophenol blue test showed strong positive reaction in tunica propia, submucosa and circular muscles while columnar epithelial cells , logitudinal muscles and serosa exhibited positive reaction. Reduction of protein content was observed in the stomach of Methyl parathion treated fish for both the duration but this decrease is not showm in case of columnar epithelial cells. Fig. 4 and 5.

Intestine: Bromophenol blue test for the general protein in the intestine of the Methyl parathion intoxicated fish revealed that there was a steady decrease in protein content in different layers of the intestine with the increase of concentration and duration. But in columnar epithelium, submucosa and circular muscle, the protein remained unaffected in different doses and duration of the parathion. Fig 6 and 7.

Very little attention has been paid towards histochimical studies of the different organs of teleost fishes. Few workers reported histochemical changes in different organs of fishes after different pesticides and heavy metal treatment. Some of them are listed here, who are Spicer 1960, Mehrotra and Khanna (1969), Medeiros *et al*., (1970), Shaw (1974) , Rai (1993), Hundet (1997); Tiwari (1998). Viswaranjan *et al*., (1988) studied the effect of tannic acid on the protein in the tissues of Oreochromis mossambicus. They notice that tannic acid exposure enhance the protein content in liver, gill and muscle. Surprisingly at the heighest concentration the fish could not increase, its gill protein beyond the level observed in the fishes reared in 75 ppm medium.

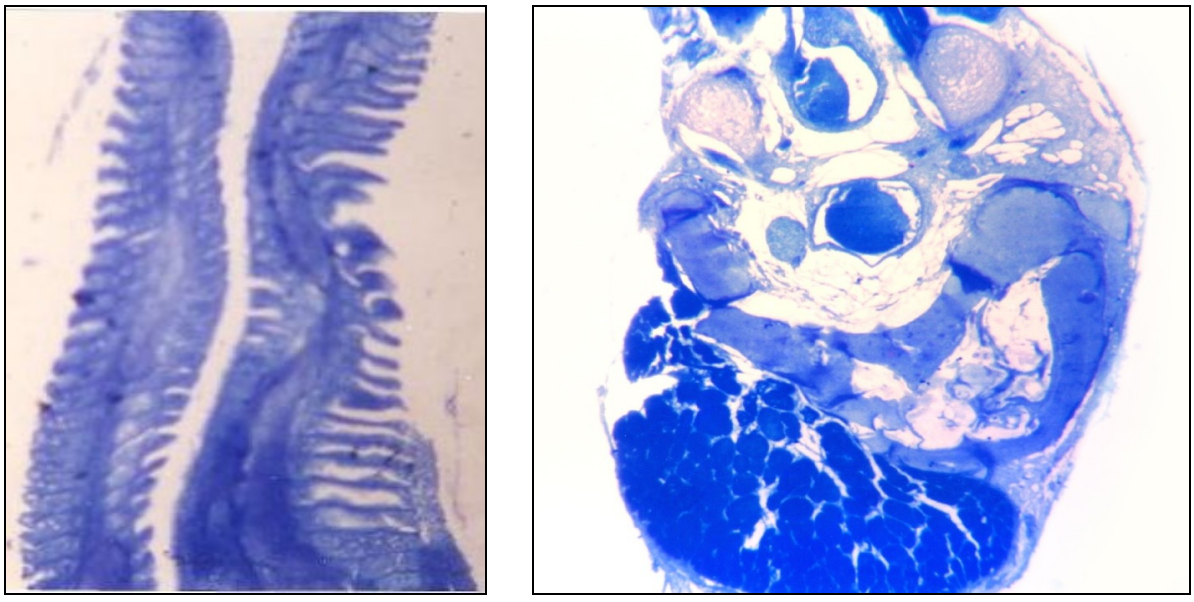

Fig 1 T.S. of gill of control *Channa gachua* (Bromophenol blue test)

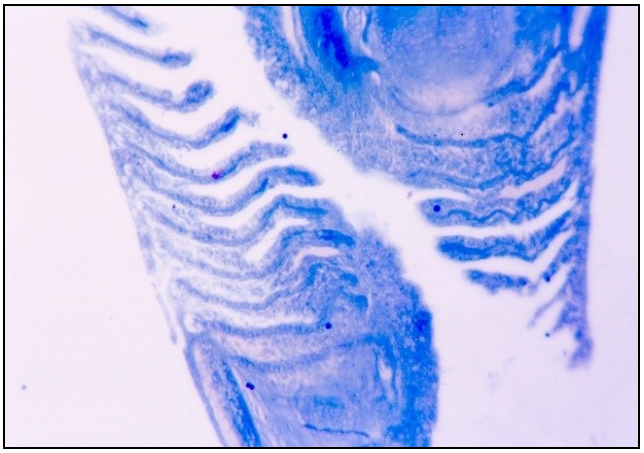

Fig.2:T.S. of gill lamellae of *Channa gachua* treated with 6.0 ppm parathion (Bromophenol blue test)

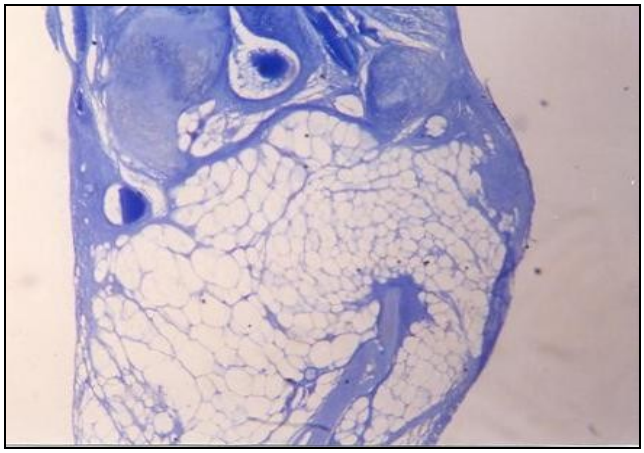

Fig. 3: T.S. of gill arch of *Channa gachua* treated with 6.0 ppm parathion (Bromophenol blue test)

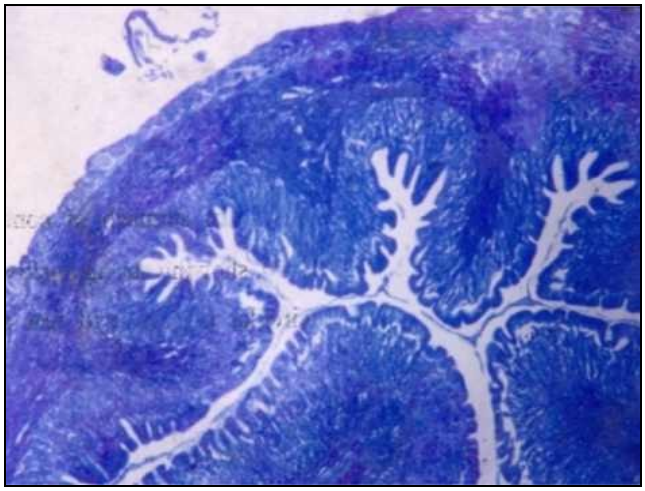

Fig 4 T.S. of stomach of control *Channa gachua* treated with (Bromophenol blue test)

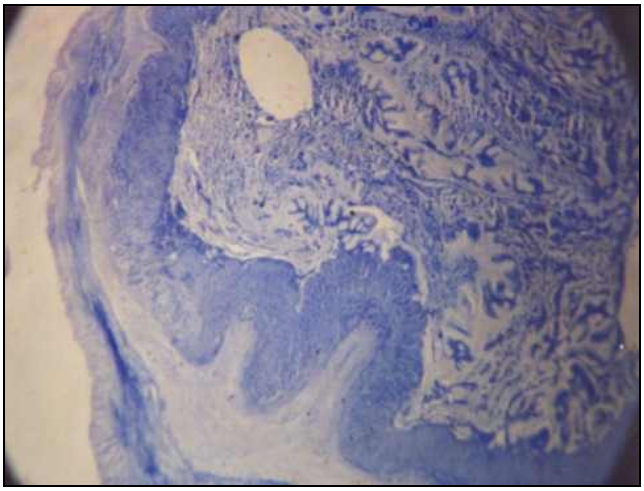

Fig. 5 T.S. of stomach of *Channa gachua* (6.0 ppm parathion (Bromophenol blue test)

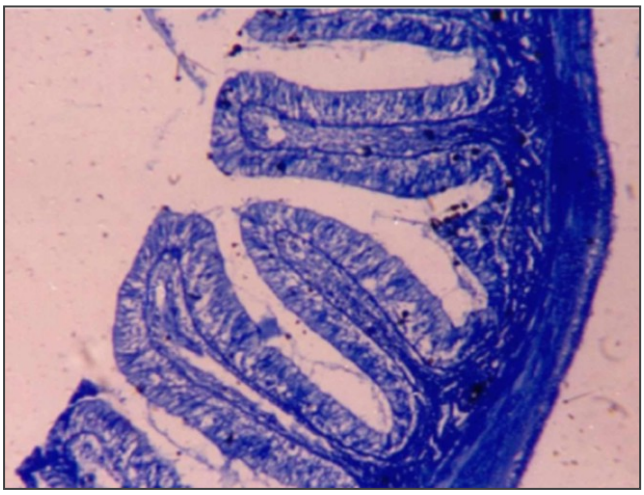

Fig. 6 T.S. of intestine of control *Channa gachua* with (Bromophenol blue test)

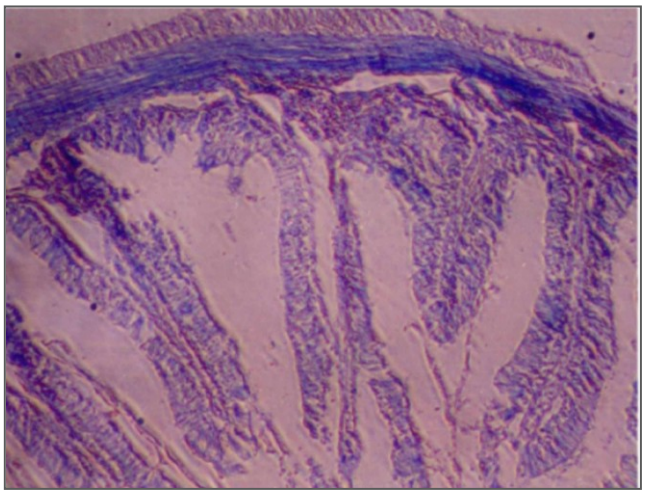

Fig. 7 T.S. of intestine of *Channa gachua* treated 6.0 ppm parathion (Bromophenol blue test)

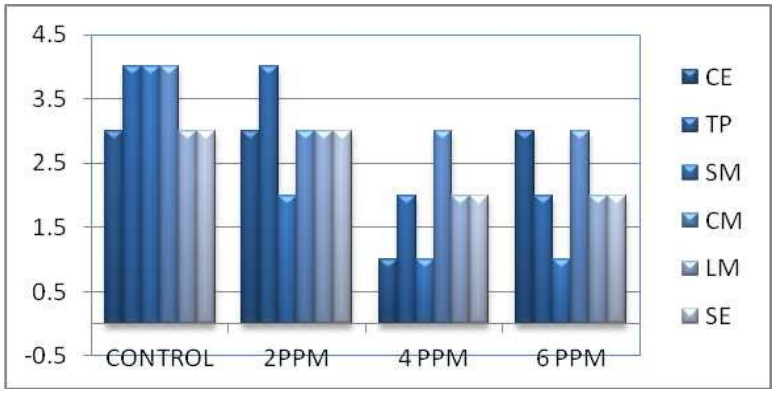

Fig. 8: Bromophenol blue test parathion (stomach)10 Days

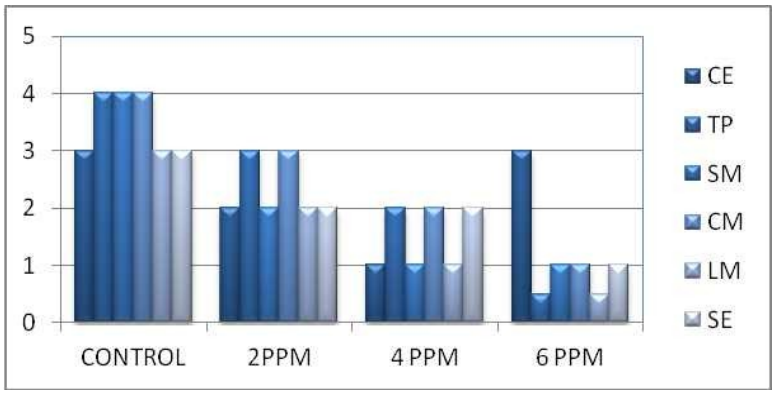

Fig. 9: Bromophenol blue test parathion (stomach)20 Days

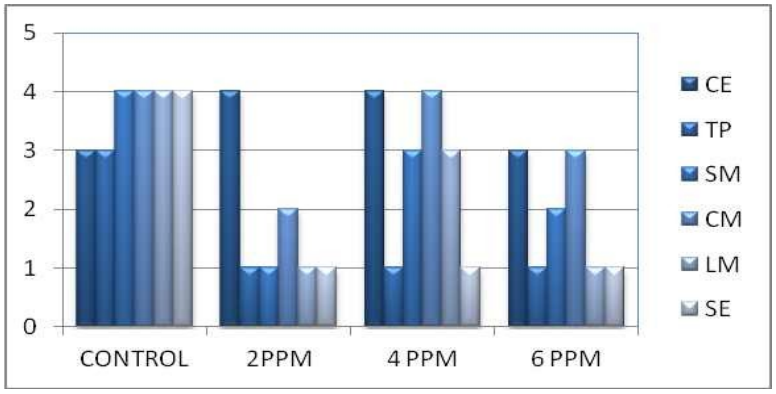

Fig. 10: Bromophenol blue test parathion (Intestine)10 Days

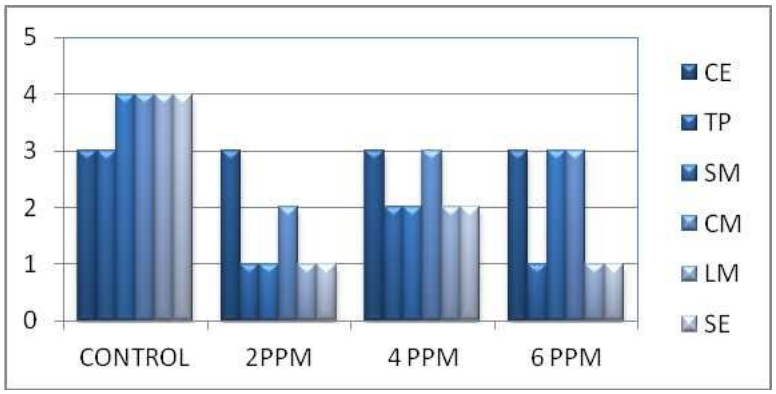

Fig. 11: Bromophenol blue test parathion (Intestine)20 Days

In the present study a remarkable decrease was observed in protein content with higher concentration of methyl parathion in the gill of *channa gachua*. Present findings are supported by the work of Pugazhvendan *et al*. (2009) in Ophiocephalus punctatus exposed to malathion. They observed gradual decrease of protein from various days of exposure may be due to the influence of exogenous factors like toxic enviornment. Shrivastava & Singh (2004) reported that the decrease level of protein in Heteropneustes fossilis to sub lethal concentration of carbaryl. Lakshmanan *et al*. (2013). In their study, when O. mossambicus is treated with sub lethel doses of Dichlorvos for all the exposure period, it shows a significant decrease in protein content.

Histochemical effects of pesticides on the stomach and intestine have been studied by several workers like Kaur *et al*., (1997) Gupta and Singh (1982) Khillare and Wagh (1986) and Hundet (1997). After methyl parathion intoxication a remarkable decrease was observed in protein content. The study indicates a gradual depletion in protein content with the increase in concentration and duration of toxciant. Najmi (1986) observed histochemcially the digestive tract of Clarius betrachus after endosulfan intoxication. She noted reduction in the amount of protein in different layers of digestive tract . More or less similar finding observed by Rajan (1990) , Rai (1993), and Hundet (1997). But an increase in liver protein content in lorsban treated groups was recorded throughout the experimental periods (Azza *et al*., 2011).

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