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HISTOPATHOLOGICAL LESIONS INDUCED BY METACID 50 IN THE FINGERLINGS OF A CARP - *Labeo rohita* Ham.

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ABSTRACT

Exposure of the larval (fingerling) specimens of *L. rohita* in sublethal concentration of Metacid exposed for 48 hours showed the occurrence of histopathological lesions in varying intensities in the gill tissues and internal organs like liver, kidney and intestinal tract. Dissolution of the intrahepatic tissues and epithelial cells of the gill lamellae exposing the gill septa at some sites, loss of the glycogen deposits in the hepatic cells, degenerated condition of the internal tissues, incompletely fragmentation of the haemopoietic tissues in the kidney, disintegration of the intestinal epithelia at several positions and depleted condition of the intestinal epithelial cells revealing loss of the enzymatic granules from the cytoplasm, were the main damaging effects of this insecticide. Obviously these alterations reflected adversities in the respiratory, general metabolic, renal, osmoregulatory and digestive activities of the larval form of *L. rohita*.

INTRODUCTION

Indiscriminate use of various insecticides and pesticides to boost up crop production has been found to be largely responsible for contamination of the aquatic systems and subsequent reduction in the population density of the biota, in general, and fish yield in particular (Edwards 1977, Konar 1977, Konar and Ghosh 1981). Recent records of investigations reveal that the synthetic pesticides are generally of more concern in affecting fish population as a result of their hazardous effects on the vital organs and blood (Eller 1971, Anees 1978, Verma et al. 1983, Singh 1992, Khilare 1993). However, little is known about the obnoxious nature of Metacid 50 (an organo-phosphate pesticide), particularly in respect to its potentiality to cause histopathological lesions in the piscian tissues.

The present investigation is an attempt to study the hazardous nature of this chemical in respect to damaging effects on the vital organs of the larval form (fingerling stage) of a major carp, *Labeo rohita* Ham.

MATERIAL AND METHODS

The larval specimens of *Labeo rohita* (3.0-3.5 cm in length) were procured from the Government Fish Farm, Doranda (Ranchi) and reared in the plastic pool of 420 liter capacity, containing chlorine-free water. They were allowed normal light and temperature and fed with the rice bran and the groundnut oil cake (1:1). Occasionally live planktons were also given as food.

The sublethal concentrations of Metacid 50 were estimated for this fish and 6.5 ppm represented LC_{25}/96 hr. Healthy disease-free specimens were given exposure to the sublethal concentration (LC_{25}/96 hr) of Metacid for maximum 96 hours. Provision of food in limited level

and oxygenation were allowed to the exposed specimens during experimentation. The specimens which reflected signs of distress were removed, cleaned in water and transferred to Bouin's and Rossman's fixatives for 4 hours, then dissected for the removal of gills, liver, kidney and intestinal tract. Small pieces of these organs in 0.3-0.5 cm size were transferred to fresh stock of the same fixatives for additional 30 hours for further processing for microtomy. The sections were stained with the haematoxylin-eosin, Heidenhain's Azan and McManus' PAS reagents.

OBSERVATIONS AND DISCUSSION

The exposure of the fingerlings in the sublethal concentration of Metacid for 24 hours led to the formation of histopathological lesions of varying intensities on the gill tissues and internal organs like liver, kidney and intestinal tract. The gill lamellae showed disarrayed condition with the development of inflammation particularly in some positions of the sides and tip region of the secondary lamellae. Nevertheless, there was dissolution of the epithelial cells at some positions so much so that the gill septa appeared without coverage of the epithelial lining (Fig. 1). Such alterations in the gill tissues of the adult teleosts after exposure to the polluted (pesticidal) media was observed earlier by Konar (1969), Reddy et al. (1977), Jauch (1979), Singh and Sahai (1984), Srivastava and Srivastava (1984). A common inference was drawn that acute setback occurred in the gaseous exchange capacity of the fishes.

Visualizationof the inflammatory condition or swelling in the gill epithelia of the larva of *L. rohita* is indicative of the fact that there was unusual enhancement in the rate of mitosis of the stimulated epithelial cells to give effect to bulged out or swollen condition. This natural device was seemingly aimed to cope with the abruptly raised demand of oxygen in the body. But since the trend of dissolving action gradually followed afterwards, the initial efforts with the increased gill surface area changed to reversed condition and the exposed specimens developed complications in the gaseous exchange norm.

In the liver of the exposed specimen, the most common feature of the lesion was the loss of compactness in the hepatic cells as a result of dissolution of the tissues between hepatocytes. In some positions adjacent to the blood vessels, signs of disintegration of the hepatic cells were also discernible. PAS technique of histochemical preparations showed considerable loss of glycogen deposits in the hepatic cells (Fig. 2). Such alterations in the liver mass of the adult fishes were earlier reported by Eller (1971), Sastri and Sharma (1978), Verma et al. (1983), Kulshreshtha and Arora (1984) and Singh and Sahai (1984).

Damaging effects were also noticed in the kidney mass of the larva, which was yet in undeveloped form. The effects were generally limited to the degenerated condition of the inter-renal tissues, and incompletely fragmented condition of the haemopoietic tissues (Fig. 3). Considerable impact of these alterations in the exposed specimens was evident in consideration to earlier findings by Dubalae and Shah (1984), Kulshrestha and Arora (1984) on exposed adult fishes. The damage in the intestinal epithelia was limited to disintegration of the epithelial lining in some positions and depleted condition of the epithelial cells revealing loss of enzymatic granules from their cytoplasm (Fig. 3). All these alterations resulted into setback to the digestive and absorptive capacity of the intestinal tract.

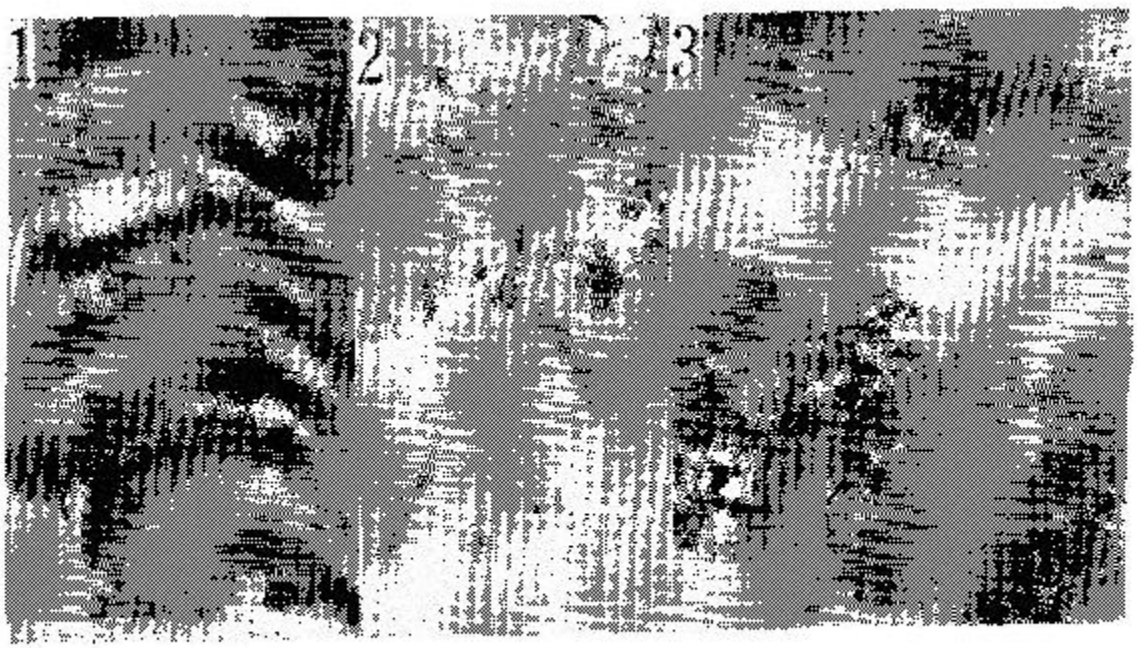

Fig. 1. Damage of gill septa (X 150 H&E)

Fig. 2 Loss of glycogen deposits in hepatic cells (PAS preparation : x 150 H&E)

Fig. 3 Fragmented haemopoietic tissue (x 150 H&E).

Earlier, Srivastava and Srivastava (1982), Alam (1988) reported almost similar impact of the polluted media in the larval specimens of fishes. Since Metacid 50 in as low as 6.5 ppm concentration was effective enough to cause damage to tissues of the larva of *L. rohita*, maximum care is warrented to keep the nursery tank in fully safe condition with respect to contamination by pollutants.

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