

Studies on histopathological effects of an agro-chemical Ekalux EC-25 in the Chironomus larvae

Md. Noor Alam^a*

**University Department of Zoology, Vinoba Bhave University, Hazaribag-825301, Jharkhand, India

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Abstract :Histopathological changes in the tissue of a midge, Chironomus larva under sublethal exposure to an organophosphate insecticide Ekalux EC25 has been studied in the present endeavour. The histopathological lesions were observed in the integument, gut wall, anal gills, various internal structures located in the haemocoel and the tracheal structures, thus showing highly toxic nature of the pesticide.

Keywords: Histopathological, Ekalux, Chironomus larva

INTRODUCTION

Ponds, swamps and derelict pools of water generally abound with aquatic insects, their larvae and oligochaetes which are well known to flowrish rapidly in the presence of urban wastes, sewage and their abundance oftenly indicates containment of organic pollutant in water (Srivastava, 1962; Singh and Harrison, 1984). However, the pesticidal and industrial pollution studies give a reverse impression. Like other aquatic biota, these, on exposure to such a media, can not sustain the stress and even get perished when the tolerance liit is crossed. From the review of literature it appears that little information is available on the histopathological effects of the pesticides in the tissues of the larvae of aquatic insects, though several reportings have been made about the degree of toxicity of the pesticides on aquatic insects and their larvae and also with respect to the chemical control of the harmful insects (Konar, 1970; Gopalkrishna et al, 1981; Konar and Ghosh 1981; Alam, 1992).

In the present investigation histopathological alterations in the tissues of a midge, Chironomus larva

E-mail : nooralam197@gmail.com

has been demonstrated on giving them exposure to sublethal concentration of an organo-phosphate pesticide Ekalux EC25 and significance of the main findings explained.

MATERIALS AND METHODS

Specimens of Chironomus were collected from derelict ponds near university campus and brought to the laboratory in polythene bags alongwith mod with least disturbance. They were allowed acclimatization for minimum 48 hours with provision of food contained in the mud. Grown up healthy specimens were chosen from the stock and transferred to a media in the flat glass container containing pre-determined sublethal concentrations of the pesticide, Ekalux as per earlier reported by Alam (1987). The specimens were allowed exposure in the toxic media for maximum 48 hours. After this stretch of time, those specimens which reflected sign of distress, were picked up, given a dip in the plain water and then transferred to Bouin's fixative for 24 hurs. The microtomised sections were stained with haemotoxylin-Eosin and selected slides from the lot of several sections were microphotographed for histopathological observations.

RESULTS AND DISCUSSION

Intoxication of the specimens of Chironomus to the

^{*}Correspondent author :

Phone : 09852568275

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sublethal concentration of the pesticide, Ekalux, for 48 hours brought impairment in tissues in varying degree. The main sites of such disorder were the integument (epidermis), gut wall, anal gills, various internal structures and tracheal structures. The cuticle which formed the outermost covering of the epidermis, appeared to have lost continuity at several sites and the cellular components of the integument in several positions seemed to have lost entities.

Such setback had also occurred in the sensory cells, unicellular glands and nevertheless, in the blood vessels which were situated at the base of the integument (Fig.1). In view of the fact that the epidermis of the Chironomus and other insect larvae were concerned in the gas exchange physiology and, thus, participated in the purification of blood (Walshe, 1950), the incumbent setback in the gaseous exchange phenomenon by the exposed specimens of this redworm is quite understandable. The disorganized condition of the anal gill structures in the specimens of Chironomus was additional feature of the same sequence (fig.2). In view of the reporting by Ewer (1941), Walshe (1950), on the functional role of the anal gills and also the ecological background of the larval form of the aquatic insects including the red worm, the present occurrence of histopathological lesions in the tissues of the Chironomus is highly significant.

The damages inflicted in the tissues were so acute that likelihood stood for direct threat to the survivalist of the exposed specimens. Fishery scientists, because of the above known fatal effects, have made use of several kinds of several kinds of chemicals including pesticides to con troll the harmful aquatic insects and their larvae so as to keep the fish fries in the nursery tanks in safe condition and avoid the space and food competition by eradicating population of unwanted organisms. Thus, Konar (1964), Srivastava and Konar(1966), Shirgur and Kewal Ramani (1967), Shukla and Ramamurthi (1981) have given valuable information on control of aquatic insects.

Spectacular signs of damages were visible also in the alimentary tract of the exposed specimens of Chironomus (Fig.3). The loss of continuity in the intima of the fore and hind-gut, the disorganized condition of the mucosa, and, nevertheless, depleted level of the cytoplasm contents including enzymatic granules in the epithelial cells of the mucosa were the main findings in the digestive organs. Earlier also Konar(1975), Konar and Ghosh (1981), Alam and Shafi (1999), have reported damaging effects in the tissues of the aquatic insects. The present findings of the digestive organs clearly indicated gross setback in the potentiality of the exposed red worm to carry on the role of digestion and absorption of the food substances.

In view of the above mentioned findings in the Chironomus, after exposure to sublethal concentration of ekalux, the highly toxic nature of this pesticide gets certified and its use is recommended for controlling population of undesirable aquatic insects and their larvae in nursery ponds but very cautiously and in specific doses.



Fig.1: Phtomicrograph of the section of whole body of Chironomus larva showing damage in Gut (G), Integument (I) and Fat cell (FC) under chronic exposure to Ekalux. H.E.x100 Noor Alam.: Studies on histopathological effects of an agro-chemical Ekalux EC-25 in the Chironomus larvae.



Fig.2: Showing damages in anal gill (AG) and integument (IT) exposed sublethally to Ekalux.



Fig.3: Showing rupture of gut wall (G) and breakage in internal lining of the gut on exposure to sublethal concentration of Ekalux. HE x 100

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