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EFFECT OF SEVIN ON INVERTASE ACTIVITY IN *LAEVICAULIS ALTE.*

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ABSTRACT
Pesticides are known for their strong attraction to biological tissues. Pesticides which are absorbed in to body are capable of reacting with a variety of binding sites and then disturbing the normal physiology of an organism leading to toxicity. To meet the increasing food demands, several types of pesticides are used for controlling various types of agricultural pests. As such many useful non-garget organisms also have the toxic effect of pesticide. Most of the pesticides interfere with the enzyme action and produce many physiological and biochemical changes in the bodies of non-target organisms.so in this study attempt have been made to investigate effect of sevin pesticide on digestive enzyme invertase in *laevicaulis alte.*

KEYWORDS: Biochemical, Enzymes, Non target- organism, Pesticides.

INTRODUCTION

Several workers have reported the effect of different pollutants on enzyme activity, little information is available regarding the effect of pesticides on digestive and metabolic enzymes of the gastropods. The present investigation was therefore, undertaken to study the alterations produced in the digestive enzymes invertase, protease and lipase metabolic enzyme, arginase in the gastropod, *L. alte* after treatment of endosulfan, sevin, cypermethrin and nuvacron Pesticides are known for their strong attraction to biological tissues. Pesticides which are absorbed into body are capable of reacting with a variety of binding sites and then disturbing the normal physiology of an organism leading to toxicity. Mackee and Wolf (1963), stated that the important poisoning of an enzyme system depends on its capacity to react with ligands. The living cells are the centers of majority of enzyme catalyzing reactions. When an energy imbalance occurs in the cell due to exposure to infective agents or toxic substances, enzymes leak through the membrane into circulating fluids. This causes their fluid level to be augmented above the normal level. It has been also argued that some of the cytoplasmic enzymes are leaked out of the tissues due to damaged cells. They are often released in fluids resulting in the decreased enzyme activities in tissues and corresponding increase in the fluids. The pollutants may cause injury to organism and the damaged tissues show dysfunction which results in quantitative altered enzyme activity. Thus, enzyme bioassay can provide diagnostic means to assess change or injury caused to organism due to exposure to pollutants. In clinical medicine, serum enzyme analysis has been used for decades to diagnose, both the site and extent of organ injury (Schmidt and Schmidt, 1976). The molluscs have surprising enzyme equipment. Indeed there seems to be no other group in the animal kingdom with such an array of digestive enzymes. Studies on the digestive enzymes of lamellibranches were first initiated by Younge (1926), in oyster. Mansour and Zaki (1946) and Zaki (1951), reported the presence of protease, peptidases and lipases from the stomach juice as well as digestive diverticula of Unio prasedens.

Mukherji and Kanungo (1954) reported the presence of invertase in the digestive gland of common Indian freshwater pelecypod, *Lamellidens* sps. But among the gastropods little work has been done on the physiology of digestion and digestive enzymes. Hence to study the change in enzymatic pathways is a potent approach to assess the toxicity of the pesticides. Therefore, by measuring the activity of some key enzymes it is possible to determine the physiological effects of the pesticides on the biological systems.

The studies pertaining to invertase activity in mollusc are very rare. The invertase activity was studied by Wigglesworth (1953), Saxena and Bhatnagar (1961), in various insects and Ghosh (1961) in land snail. Ravinder et al. (1989) studied the alterations in enzyme activity of fresh water catfish, *Clarias batrachus* after exposure to Decis. Recently a few workers studied effect of pesticides and heavy metals on invertase enzyme activity in mollusc (Jadhav, 1993; Bhamre, 1993; Masarrat, 1995; Deshmukh, 1995).

MATERIALS AND METHODS

Medium sized terrestrial snail *Laevicaulis alte* (8 to 10 cm in length and 2 to 3 cm in width) used in the present study were collected from Kalwan Taluka area. Freshly collected slugs were immediately brought to the laboratory and kept

in large glass containers. The slugs were cleaned to remove fouling biomass and mud. They were acclimatized to the laboratory conditions for four to five days. The air temperature was 31.25° ± 2.2173°. Since the animals are micro feeders, no special food was supplied during the experiment. To study the effect of pesticides sevin on the enzyme activity of gastropods, *L. alte* were exposed to lethal concentration (LC_{50} ppm of 96 hrs) for acute treatment. The active and acclimatized medium sized animals were divided into two group, one was maintained as control and other group was exposed for acute treatment of pesticides sevin up to 96 hours during pre-reproductive, reproductive and post-reproductive period. For digestive enzymes such as invertase the animals were dissected and the digestive gland was taken out, cleaned and homogenized in ice cold distilled water.

The invertase activities were estimated by the method of Noaelting and Benfold (1948). The reaction mixture was prepared by taking 0.5 ml substrate (2.1 %), 1.5 ml phosphate buffer (pH 7.5) and 0.5 ml tissue homogenate (10% w/v). The reaction mixture was incubated for 60 minutes at 37°C. The enzyme activity was terminated by adding 2 ml of 3, 5, dinitrosalicylic acid reagent, and heating the mixture in boiling water bath for 5 minutes. After cooling the optical density was recorded at 530 m. Starch and sucrose were used as substrates for amylase and invertase respectively. The difference between the unboiled and boiled homogenate tissue containing reaction mixtures indicated the enzyme activity. The activities of invertase were estimated by taking known amount of maltose and glucose respectively with the same procedure for calibration curves.

RESULTS

Invertase :

Changes in invertase activity of the digestive gland of slug *Laevicaulis alte* after acute pesticidal exposures were studied. After acute exposure to pesticides, the inhibition of enzyme activity was observed. It was observed that there is decrease in invertase from 12.93 % ($P < 0.01$) to 37.50 ($P < 0.001$) in pre-reproductive period. In reproductive period it was 20.9242% ($P < 0.01$) to 24.4518 % ($P < 0.001$) whereas in post-reproductive period it varies from 9.2432 % to 19.7913 % ($P < 0.01$) A constant depletion in invertase activity was observed after the stress of pesticides used.

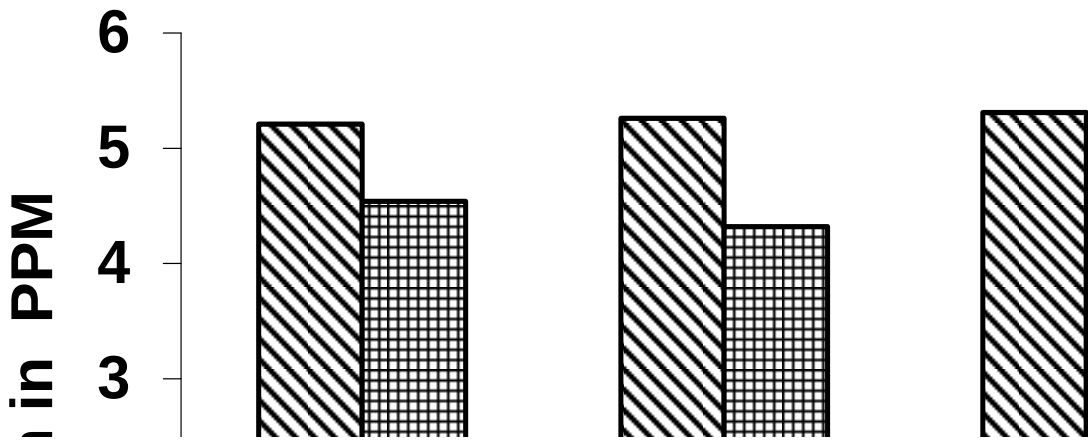

Figure 1. Changes in the invertase activity of *Laevicaulis alte* after cute pesticidal stress during Pre-reproductive period.

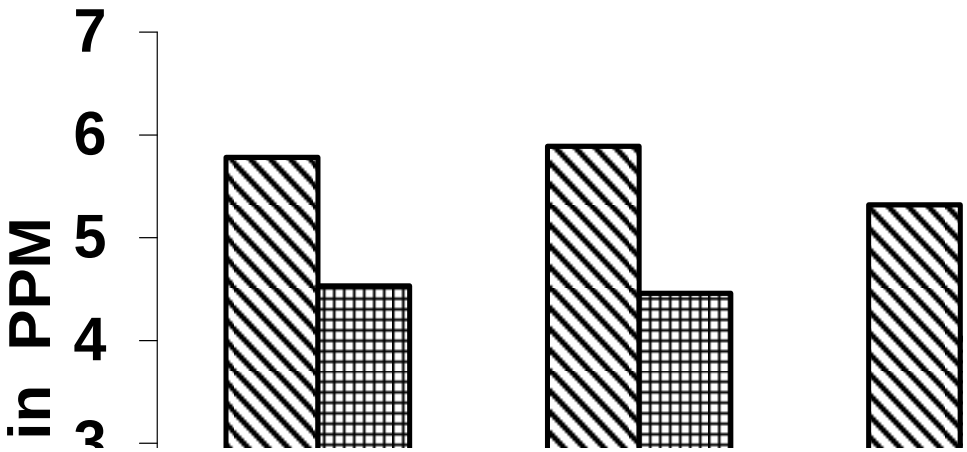

Figure 2. Changes in the invertase activity of Laevicaulis alte after cute pesticidal stress during reproductive period.

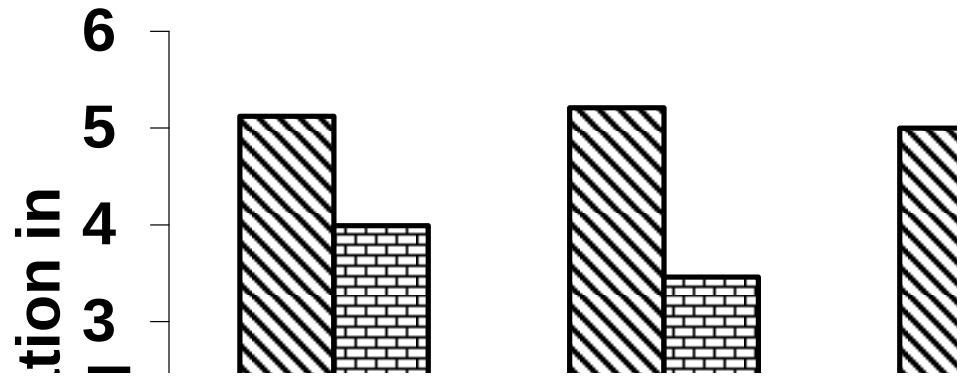

Figure 3. Changes in the invertase activity of Laevicaulis alte after cute pesticidal stress during Post-reproductive period.

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