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Histological alteration in the digestive gland and mantle of terrestrial snail *Achatina fulica* (Bowdich) exposed to Lambdacyhalothrin

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ABSTRACT

Lambda cyhalothrin were tested as molluscicides to observe morphological as well as histopathological alternation against the land snail *Achatina fulica* (Bowdich). At various concentration snails were exposed to (10 ppm, 20 ppm, 30 ppm, 40 ppm) for 96 hours. At 40 ppm snail becomes lethargic, shell become brittle and pale yellow and the organism secreted copious amount of mucus and further this snail were dissected and observed the histopathological changes in the digestive gland and mantle. Histopathological changes were observed in digestive gland and mantle which show it become dark blackish in color and shrinked and also the basement membrane get damaged along with scattered digestive and calcium cell. This suggests that this chemical does not kill the *Achatina* immediately but can be use as a molluscicides for controlling the pest.

Key words: *Achatina fulica, Digestive gland, Mantle, Foot, Lambda cyhalothrin.*

Introduction

The Phylum mollusks stands second to phylum Arthropods in terms of number of individuals and number of species (Russel-Hunter, 1979) and probably occupy third position in animal group after arthropods and vertebrates (South, 1992) and forming a major part of the world Fauna. Terrestrial snail is destructive agricultural pest and plays an important role in spreading and transmitting various diseases to cultivated plants and accidental to human also (Godan, 1983; Raut *et al.,* 2002). As digestive gland plays an essential role in intra as well as extracellular digestion as they encounter toxic material either by contact or during feeding (Regoli *et al.,* 2006). Similarly, the Mantle play important role in respiration as well as shell formation and protect the internal organs. The purpose of the present studies is to check the biological activity of Lambda cyhalothrin on adult snails and to assess the histopathological studies of digestive gland and mantle of *Achatina fulica* (Bowdich).

Materials and Methods

Tested Animal

Adult's healthy active snail *Achatina fulica* (Bowdich) were collected from infested field of grapes and agricultural crops either early in the morning or late in the evening as it was a favorable period for their growth and development and reproduction.

Tested Chemicals

Lambda cyhalothrin is a synthetic pyrethroids insec-

ticides used worldwide in agriculture, and home pest control. In the present study we used these chemicals as molluscicides to control the *Achatina fulica*.

Result

The Treated snails which were exposed to 40ppm were selected and further histomorphic or histopathological changes were observed.

Histomorphology of normal digestive gland.

The digestive gland cells were abundant in number and consists of simple columnar cells and whereas calcium cells are less in number, situated around the periphery of epithelial layer.

Histomorphology of treated digestive gland

The digestive gland become dull, greenish blackish in color and shrinked. The Transverse section of the digestive gland show basement membrane were ruptured. The calcium and digestive cell scattered from their normal position. The number of digestive cells becomes less in number and become degenerate and show large number of accumulations of dark granules due to which shape of lumen become irregular with increased or decreased empty space.

C) Histomorphology of Normal Mantle of *Achatina fulica* (Bowdich)

Mantle cavity is mainly occupied by the Nervous system and Anterior position of the gut. Mantle is very well bounded by mantle epithelial layer called outer Mantle epithelium and Inner Mantle epithelium. Mucocytes cell were present in order to secrete the mucus.

Histomorphology of treated Mantle of *Achatina fulica* (Bowdich)

The outer and inner membrane of ruptures at various places and create a gap in between the adjacent cell as shown in the plate. The loose connective tissue also damage scattered into fragments. The normal shape of Mucocytes was change in all cells and increased in number to secrete copious amount of mucus.

Discussion

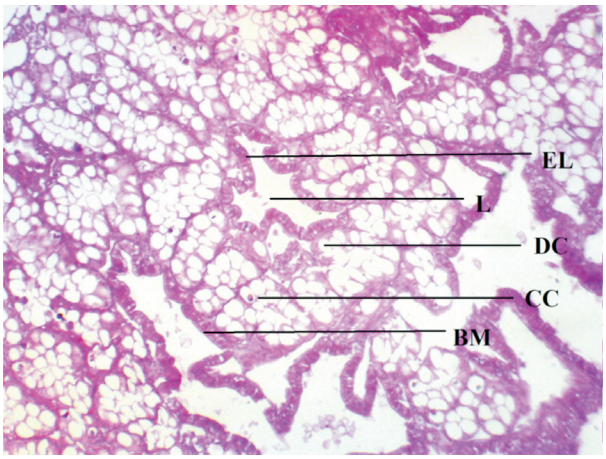
The present study shows that the lambda cyhalothrin shows molluscicides effects on the snail at 40 ppm at 96 hrs of exposure. At 40 ppm snails become lethargic, sluggish, And Immovable and secretes more amount of mucus, the shell become pale yellow and brittle and snail stop feeding. This lambda cyhalothrin brought the histopathological alternation in the digestive gland and mantle. As these organs play an important role in digestion and shell formation.

The digestive gland shows histological alternation in basement membrane of digestive tubule with external lumen. The number of digestive cell and calcium cell were reduced and show large number of dark granules which is similar with Sharaf (2013) where Methiocarb and Chlorpyrifos tested against land snail *Helicella vestslis*. This finding is also coincided with Boucenna *et al.,* (2015) where the heavy metals brought the alternation in epithelial layer and appear more empty space from cytoplasm in the digestive cell and exudation in lumen. Vijay *et al.,* (2014) observed after exposure of Paraquat in 96 hrs which brought necrosis in the digestive cell and atrophy in the connective tissue of fresh water snail *Lymnea luteola*. Hamlets *et al.* (2012) examine whole tubule found in that it was scattered in basement membrane created a large space in the adjacent cell along with fragmentation of digestive and calcium cells. This finding ran parallel with Randwan *et al.,* (2008) and Hamed *et al.*, (2007) and also with the present study. This chemical irritates the cells, due to which the snail secretes mucus, which is the first reaction in mollusks and this may be due to the chemical which is ingested by the snail. These chemicals break the cuticular layer and form a gap in between them. The columnar cell becomes shrink.

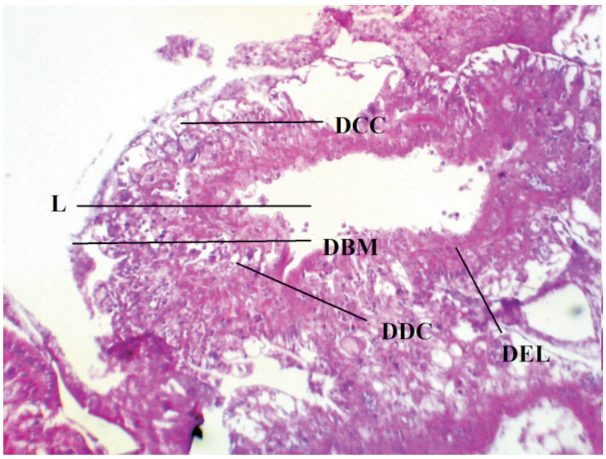
The mantle is important part of the body which get easily affected with chemicals. Epithelial cell is modified cell which secrets mucus that play an important role in crawling movement of *Achatina fulica.* The mantle plays an important role in respiration as well as shell synthesis and mucus secretion in the mollusks. The outer membrane and inner membrane get damage; a visible gap is seen in the adjacent cell and show nuclear pyknosis in outer mantle epithelium. Arrangement of muscle fiber where change connective tissue become loosed. The number of mucocytes increased in number just to dilute the chemicals which is ingested by the snail.

The present investigation revealed that the lambda cyhalothrin use as molluscicides in managing the *Achatina fulica* from this area because this chemical not directly kill the snail immediately but make them motionless, lethargic, dehydrated which led to death brought the histomorphological

Histological plates normal as well as treated with lambda cyhalothrin



T.S. Passing through the digestive gland of *Achatina fulica* (10X)
BM- Basement membrane, EL- Epithelial layer, L- Lumen, CC- Calcium cell, DC- Digestive cell.



T.S. Passing through the digestive gland of *Achatina fulica* (10X).
DBM- Damage Basement membrane, DEL- Damage epithelial Layer, L- Lumen, DDC- Damage Digestive cell, DCC- Damage Calcium cell.

changes in the digestive gland and mantle.

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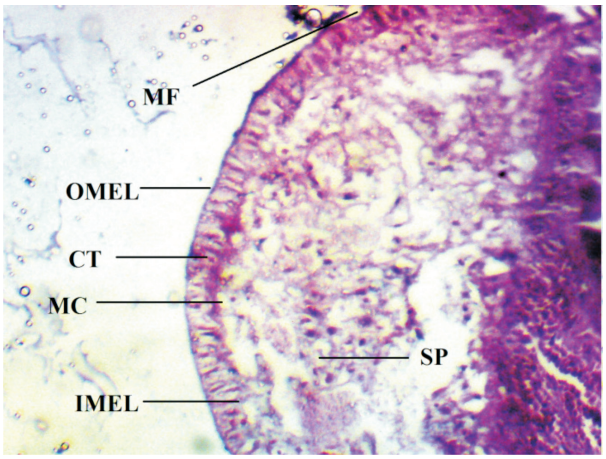
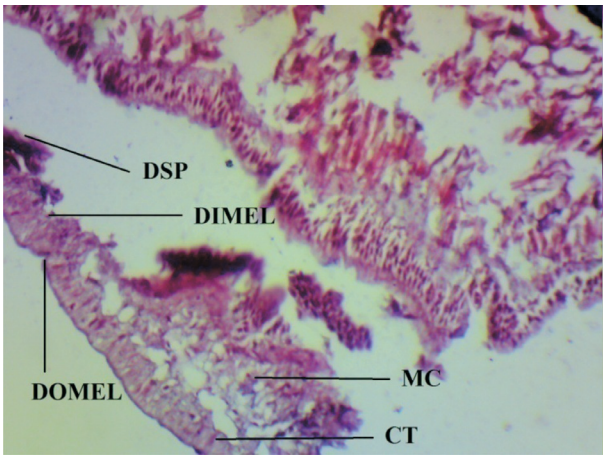


T.S. Passing through the mantle of *Achatina fulica* (10X).
MF- Mantle fold, OMEL- outer mantle epithelial layer, IMEL- Inner mantle epithelial layer, CT- Connective tissue, SP- Space, MC- Mucocytes



T.S. Passing through the mantle of *Achatina fulica* (10X).
DOMEL-Damage outer mantle epithelial layer, DIMEL-Damage Inner mantle epithelial layer, CT- Connective tissue, DSP- Damage Space, MC- Mucocytes.

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