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# HISTOLOGICAL CHANGES IN THE DIGESTIVE SYSTEM OF THE FILARIAL VECTOR, *CULEX QUINQUEFASCIATUS* (*SAY*) EXPOSED TO LEAF AND SEED EXTRACT OF *ABRUS PRECATORIUS*

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Histological studies were carried out in larvae of *Culex quinquefasciatus* treated with petroleum ether extracts of *Abrus precatorius* leaf and seed and a comparison was made with that of control. Detectable changes were in the midgut of treated larvae, thining of epithelium, absence of striated borders of epithelial cells and peritrophic membrane surrounding the gut contents.

**Key words :** Peritrophic membrane , epithelium, gut content

## INTRODUCTION

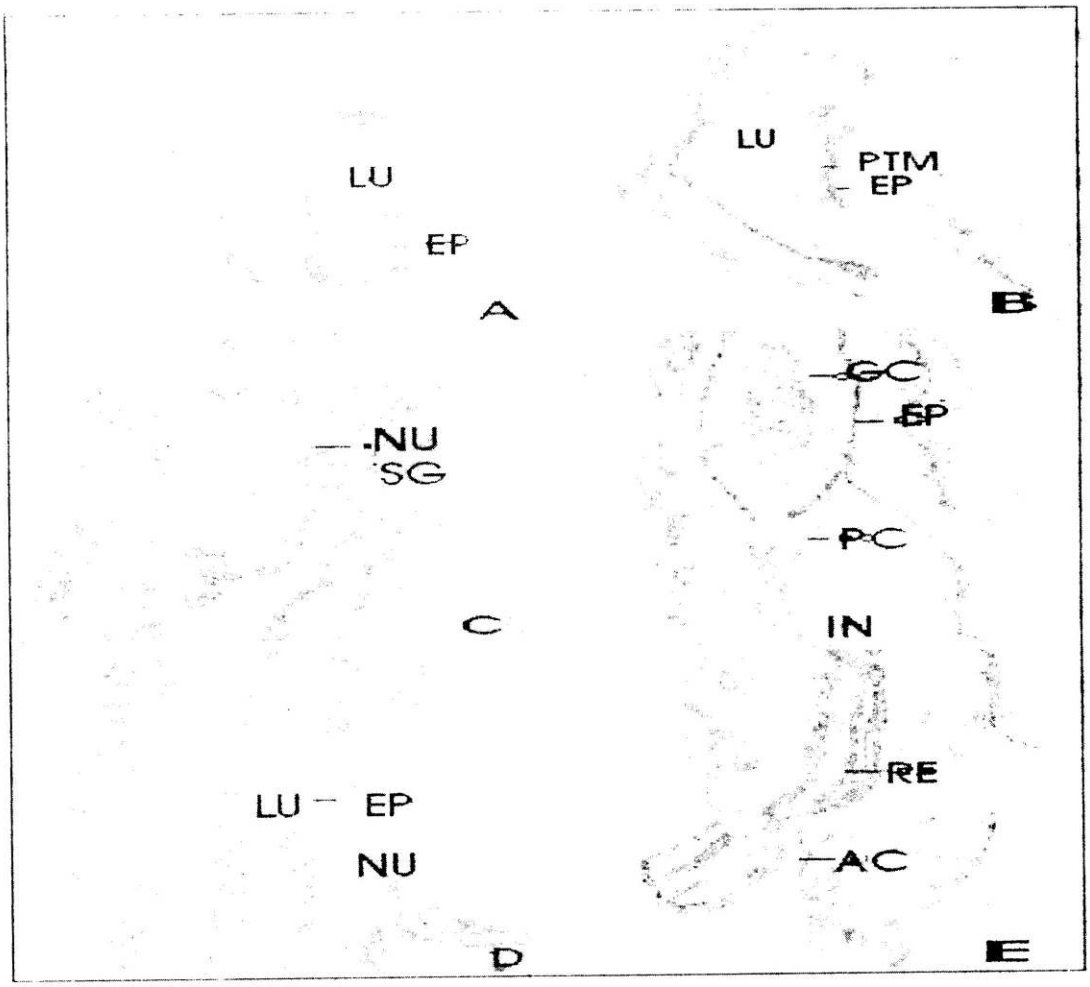
Vector control is facing a threat due to the emergence of resistance in vector mosquitoes to conventional synthetic insecticides warranting either counter measure or development of newer insecticides (Chandre *et al.*, 1998). Botanical insecticides may serve as suitable alternative to synthetic insecticides in future as they are safe, easily degradable and are readily available in many areas of the world. Though several plants from different families have been reported to have mosquitocidal activity, only a very few botanicals have moved from the laboratory to field use, like neem based insecticides, which might be due to the light and heat instability of phytochemicals compared to synthetic insecticides (Green *et al.*, 1991).

Histological and histochemical studies of cuticle, epidermal cells, fat cells and midgut epithelium of fourth instar larvae of *C. pipiens* and *C. quinquefasciatus* showed necrotic changes after exposure to 0.05 and 0.10 ppm. The peritrophic matrix is a chitin containing acellular sheath that surrounds the blood meal and separates the food bolus from the midgut epithelium (Villalon *et al.*, 2003).

## MATERIALS AND METHODS

Fresh leaves and seeds were collected, washed in water and air dried under shade. Dried leaves were powdered using an electric pulverizer. Fine powder was obtained by sieving a 10 g of each of the leaf powder or the seed powder and was weighed using an electronic balance. These were made into packets using zerohaze filter paper. These powders were subjected to extraction with 500 ml of the solvents for 8 h using a Soxhlet apparatus. Petroleum ether (60-80$^0$C) extraction was followed by chloroform extraction and ethanol extraction so that the powders were subjected to extraction with solvents of increasing polarity. The leaf and seed extracts thus obtained were concentrated by distillation and dried by evaporation in a water bath at 40$^0$C. The residue thus obtained was stored in tightly closed glass vials in the refrigerator for further use.

Microscopic examination of control and experimental larval tissues were made to study thegroup were for histological changes in the digestive system. The experimental




**Figs.** A-E.: Section showing the effect of leaf and seed extracts of *A. precatorius* on the digestive system of *C.quinquefasciatus*; **A.** L.S. of anterior midgut of control larva x 25; **B.** L.S. of Posterior midgut of control larva x 25. **C.** Enlarged view of salivary gland of larva treated with petroleum ether extract of leaf x 25.; **D.** Enlarged view of anterior midgut of larva treated with petroleum ether extract of leaf x 25; **E.** Enlarged view of posterior midgut, pyloric chamber and intestine of larva treated with petroleum ether extract of seed x 25. [Abbreviations. SG : Salivary gland; NU : Nucleus; LU : Lumen; EP : Epithelium; PTM : Peritropic membram; GC : Gut contents; RE : Rectum; AC : Anal canal; IN : Intestine; PC : Pyloric chamber]

group consisted of larvae treated with petroleum ether extract of leaf and seed of *A. precatorius*. The two extracts were chosen based on their efficacy and also for the sake of homogeneity, The larvae were exposed to median lethal concentration ($LC_{50}$) of the two extracts for 24 h. For microscopic examination the entire larva was fixed in Bouin's fluid and processed for microtome sectioning following petrifies double embedding method. The sections were cut using Weswax rotary microtome and stained with Heidenhein's haematoxylin and eosin. Photographs were taken using a research trinocular microscope.

## RESULTS AND DISCUSSION

In the control larva, two regions of the midgut are clearly seen (Fig. A).The anterior region is thick tubular and of uniform thickness. It dilates into a flask shaped posterior region or stomach . In the posterior midgut the borders of epithelial cells lining the lumen are distinctly stained. A non- cellular peritrophic membrane surrounds the gut contents and separates the contents from the epithelium (Fig. B). Among the three solvents used, petroleum ether extract was found to be the most effective one. In the larva treated with petroleum ether extract of leaf, the anterior midgut appears as a long, narrow tube. The wall is very thin, having a thin layer of circular muscles (Figs. C & D). In petroleum ether extract of seed extract, the posterior midgut encloses the gut contents which appears as a brownish mass. There is no peritrophic membrane surrounding the gut contents (Fig. D).

Histological changes revealed that detectable changes were observed in the midgut of treated larvae. The changes include thinning of the epithelium, absence of striated border of epithelial cells and absence of peritrophic membrane surrounding the gut contents. Similar report was made by Mittal & Navpret (1988). Villalon *et al.* (2003) described the peritrophic matrix as a chitin containing a cellular sheath that surrounds and separates the food bolus from the midgut epithelium. Zhuang & Linser (1999) reported the presence of two types of epithelial cells and cuboidal cells in the midgut of the *Ades aegypti*. Minjas & Saradha,(1986) extracted the plant products using suitable solvents possess larvicidal effects against the fourth instar larvae of *Culex quinquefasciatus* and produced tissue damage.

***Remarks*** : From the study it is concluded that leaf and seed extracts of *A .precatorius* exhibited strong toxic effect on larva of *C. quinquefasciatus* .Hence, the plant could suggested as one of the agents in the integrated management of mosquito population.

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