AIM AND SCOPE
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Everyone knows what life is, and can distinguish living matter from dead. Yet, when a definition of life is sought, the phrases encountered are as many and varied as the attitudes and inclinations of the scientists and philosophers who have grappled with the most fundamental problems. To the zoologist the characteristic of life is the ability to feed, grow and reproduce, while a biochemist might be inclined to refer to the particular types of biochemical compounds such as proteins which are associated with living matter. Such a protein which is an enzyme is carboxylesterase with overlapping properties. Although these enzymes are not directly involved in any pathway of intermediary metabolism, they have been implicated in the regulation of juvenile hormone titres, metabolism of lipids, detoxification of xenobiotics digestion and reproduction. These enzymes have broad substrate specificities and broad distribution in the tissues of most organisms. With regard to the acyl residue, short chain esters are cleaved at the highest rate, the optimal length being 3 to 6 carbon atoms. Besides aliphatic amides, thioesters are also substrates of these enzymes. Esterases are the enzymes which have the property of breaking the ester bond or the insecticide molecule. This then becomes an acid and an alcohol metabolite, both essentially non toxic. These enzymes are present in insects but act slowly and with difficulty. On the other hand they are very active in warm blooded animals and act very rapidly.

A large number of xenobiotics to which insects are exposed are esters such as the phosphoric acid esters and carbamate esters while certain other foreign compounds also contain ester or amide groups. In general, the titre of the enzymes metabolizing these xenobiotics is low except among some resistant strains.
A dominant agricultural pest *H. armigera* causes serious damage to cotton and other crops like pigeonpea, chickpea, sunflower, safflower, maize, groundnut and a wide variety of vegetables in India (Fig 1). Because of its wide host range and nature of damage, it has attained the status of national pest causing enormous crop losses.

In recent years the management of *H. armigera* has become increasingly difficult due to the development of resistance to various groups of insecticides particularly pyrethroids and cyclodines. This is because of the increased levels of detoxifying enzymes e.g. esterases, monooxygenases, GSTs, Acetylcholinesterases and proteases.

Several mechanisms of insecticide resistance have been identified in *H. armigera* populations in various parts of the world. Resistance is often based upon increased enzymatic detoxication of an insecticide or reduced sensitivity of target enzyme to inhibition by the insecticide (Brown, 1987).

The purpose of this work was to study the current status and dynamics of pyrethroid resistance in *H. armigera* in Akola region and to investigate the metabolic mechanisms underlying this resistance by purification, biochemical characterization and knowing properties of carboxylesterase from midgut of *H. armigera*. In Indian *H. armigera* population, mechanisms have not been studied exhaustively, hence it is vital to know this esterase on biochemical and molecular level which is responsible for insecticide resistance. The knowledge and behaviour of this enzyme is of great importance far outside the confines of the biochemical laboratories in pesticide and insecticide industries, agriculture and genetics where it can be exploit for the benefit of human beings.
In insect, the glutathione S-transferase provide an important defense mechanism against plant allelochemicals as well as insecticides. An increase in the titre of enzyme appears to be responsible for resistance to certain organophosphate and chlorinated hydrocarbon insecticides. This enzyme family has been implicated as one of the major mechanisms neutralizing the toxic effects of insecticides.

Therefore, this study was undertaken to know the probable biochemical importance of carboxylesterases for resistance in *H. armigera* with the following objectives.

1) Bioassay of different insecticides in *H.armigera*.

2) To estimate carboxylesterase and glutathione S-transferase levels from different tissues and instars of *H.armigera*.

3) To purify and characterise carboxylesterase from midgut of *H.armigera* by column chromatography and electrophoresis.

4) To study properties of carboxylesterase from midgut of *H.armigera*. 