

## Role of detoxifying enzymes in host plant resistance to cotton mealybugs (*Phenococcus solenopsis* Tinsley)

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A laboratory investigation was conducted to find out role of detoxifying enzymes in defense mechanism of cotton cultivars against mealybugs in Insect Biotechnology Laboratory of Department of Agricultural Entomology, Dr. PDKV, Akola during 2008-09. Quantitative and qualitative studies undertaken for estimation of detoxifying enzymes like Glutathione S-transferases and esterases. GST activity was found higher in resistant variety, PKV Hy-2, followed by AKH-3614-10 (Hirsutum pigmented). The highest esterase activity was found to be present in Bunny-Bt (187.14 nM mg protein<sup>-1</sup> min<sup>-1</sup>) than other cotton cultivars. PKV Hy-2 showed very lowest esterase activity (76.97 nM mg protein<sup>-1</sup> min<sup>-1</sup>). Glutathione-s-transferase and esterase bands were not detected in the susceptible CAHH-231 (Pigmented hybrid) variety. Three GST isozymes were observed in AKA-8, whereas, CAHH-231 (Pigmented hybrid) did not show any isozyme. The study will be helpful in understanding the biochemical basis of mealy bug resistance in cotton. The outcome of the present investigation will act as stepping stone to develop mealy bug resistant cotton variety.

**Key words :** Cotton, Detoxifying enzymes, Esterases, GST, Host plant resistance, *Phenococcus solenopsis*

### INTRODUCTION

Cotton is an important fibre crop. It is natural gift known for its fibre since time immemorial. It provides 65 per cent raw material to textile industry and contributed one third of total foreign exchange earning of India (Mayee and Rao, 2002). But in recent years mealy bug is becoming one of the major sucking pest of cotton. They suck a large amount of sap from leaves and stems with the help of piercing and sucking mouthparts, depriving plants of essential nutrients. In view of the large infestation of this pest and the huge losses caused by them, this pest must be kept below ETL. Various studies have been done to identify the biochemical basis of sucking pest resistant in host plant.

Though there is huge area under cotton but yield and production is very low. Various factors are responsible for this low productivity in Maharashtra. Among these losses caused by insect pest is major one. In India, 160 species of insect pests have been recorded to damage cotton crop (Agrawal *et al.*, 1979). In Maharashtra, including Vidarbha region about 25 insect pests have been recorded to attack cotton crop regularly (Thakare *et al.*, 1983). Amongst them the sucking pests *i.e.* Aphid (*Aphis gossypii*), Jassid (*Amrasca biguttula biguttula*), thrips (*Thrips tabaci*) and cotton bollworm are major one.

But in recent years mealy bug is becoming one of the major sucking pests of cotton. Mealy bug (*Phenacoccus solenopsis*) belongs to order Hemiptera, sub-order-Homoptera and family-Pseudococcidae, are cottony in appearance, small oval, soft bodied sucking insects. Adult mealy bugs are found on leaves, stems and roots and are covered with white mealy wax which makes them difficult to eradicate. They form colonies on stems and leaves developing into dense, waxy, white masses. They suck a large amount of sap from leaves and stems with the help of piercing and sucking mouthparts, depriving plants of essential nutrients. The excess sap is excreted as honeydew which attracts ants and develops sooty mould inhibiting the plants ability to manufacture food. Serious attack results in retarded growth and late opening of bolls affecting the yield badly. Recently in India the cotton crop in Punjab, Rajasthan, Maharashtra and Gujrat is being seriously infested with mealy bug. During 2005, the sudden appearance of the pest in cotton in Multan, Sanghar, Mirpurkhas and Tando Allahyar of Pakistan destroyed the entire crop within a few days (Tanwar *et al.*, 2007).

### MATERIALS AND METHODS

The shoot tips of different cotton cultivars *viz.*, PKV-

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