Research Paper :

Role of oxidyzing enzymes in host plant resistance to cotton mealybugs (*Phenococcus solenopsis*)

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SUMMARY

A laboratory investigation was conducted to find out the role of oxidizing 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 were undertaken for estimation of oxidizing enzymes like superoxide dismutase, polyphenol oxidase, polyphenol peroxidase and catalase from different cotton cultivars. CAHH-231 (pigmented hybrid) recorded higher activity of polyphenol oxidase (0.95 unit mg protein^{-1} min^{-1}) and polyphenol peroxidase (0.87 unit mg protein^{-1} min^{-1}). Catalase activity was found higher in susceptible cultivars. PKV Rajat showed highest SOD activity 2.84 unit mg^{-1} followed by Bunny-Bt. Polyphenol oxidase, polyphenol peroxidase and catalase activity was found higher in Bunny-Bt and CAHH-231 (Pigmented hybrid) which are susceptible to the sucking pests. 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.

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Cotton is known as "white gold" or "king of fibre" plays a prominent role in Indian economy. In cotton, insect pest is the major limiting factor for increasing the productivity of crop. Bollworms are suppressed by inserting Bt gene in to cotton plants, but for the sucking pest there is no such control measure developed till date. Recently in India, the cotton crop in Punjab, Rajasthan, Maharashtra and Gujarat 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).

In current decade, the trend of increased build up of various mealy bug species in crop plants is observed, which might be due to certain abiotic changes in climate and environment. This pest showed very detrimental effects on yield of the crop. Chemicals recommended for its management have also shown some adverse effect. Hence, it is necessary to search for the alternative like host plant resistance. During the last few years mealy bugs, which were considered to be the minor pests in many crops have acquired the status of the major pest causing damage to important agronomic crops.

Today's trend in insect control is to decrease the use of conventional insecticides not only because of the cost but also to minimize environmental pollution and to the further development of pesticide resistance. The ability of plant to withstand the attack of insect pests is due to certain biochemical characteristics which exert unfavourable effects on the insects.

Plants challenged by insects respond through changes in the composition and physical properties of the cell wall as well as the biosynthesis of secondary metabolites (Hopkins and Huner, 2004). Herbivory by the phloem feeding three corned alfalfa hopper caused increase in the activities of several oxidative enzymes including lipoxygenases, peroxidases, ascorbate oxidase and polyphenol oxidase studied by Felton *et al.* (1994). Also,