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ABSTRACT

Helicoverpa armigera (Hubner) of the lepidopteran family is a serious pest of many important crops and claims a major share in crop losses every year. Annual losses due to Helicoverpa in pigeonpea and chickpea are estimated at US $ 310 and 330 millions respectively (ICRISAT, 2000) and over US $ 2 billion annually in Semi-Arid tropics (SAT) (Sharma, 2001).

Use of chemical means to control H. armigera attack has had a limited success and is being threatened by concerns like development of insect resistance, attack on non target organisms and possible environmental and health hazards. Bacillus thuringiensis (Bt) endotoxin genes have been successfully expressed in several crops to impart resistance against herbivorous insects however insects develop resistance to Bt endotoxin.

Development of transgenic plants using genes of protease inhibitors (PIs), amylase inhibitors (AIs), (Schuler et al, 1998; Jouanin et al, 1998) and lectins of plant origin is an approach which needs to be exploited for development of insect resistance plants.

All host plants of Helicoverpa such as pigeon pea and chickpea do posses protease inhibitors as a tool for defense against Helicoverpa. In chickpea, it is found that insect proteinases degrade the trypsin inhibitors of chickpea.

With recent approach, utilization of non-host plant PIs and AIs for insect resistance in plants have good promises (Schuler et al, 1998; Jouanin et al, 1998, Harsulkar et al, 1999) even then, wild relatives remain the first choice because wild relatives of crop plants
continue to survive in wild even today in spite of pests and diseases and thus we can tap resistance genes in wild relatives. Wild relatives of crop plants have showed resistance to *Helicoverpa armigera* in pigeonpea (Verulkar et al, 1997) and chickpea (Rai et al, 2003, Sharma et al, 2003a). In this scenario, it becomes important to screen wild relative of host plants to find out candidates (both compatible and non-compatible) which can be used to confer resistance to host plants.

In present study two important host plants pigeonpea and chickpea and their wild relatives have been screened for presence of Trypsin inhibitors (TIs), Chymotrypsin inhibitors (CTIs) and *Helicoverpa* gut proteinase inhibitors (HGPI) using spectrophotometric assay method and Electrophoretic analysis. Protease inhibitors present in plant tissues of 5 cultivars and 27 accessions of wild relatives of pigeonpea and chickpea were extracted in water and used for spectrophotometric assay and electrophoretic analysis followed by visualization using X ray film (Pichare and Kachole, 1994). In further study *Helicoverpa armigera* larvae were fed on synthetic diet containing seed powders of wild relatives of pigeonpea to see the effect of PIs on growth and development of larvae.

The present study demonstrated that PIs from wild relatives of pigeonpea are more effective in inhibiting proteinases and larval growth of *Helicoverpa armigera* when compared with PIs from cultivars of pigeonpea. From the results we have got, it is evident that PIs from wild relatives of host plants, especially pigeonpea have the capacity to inhibit gut digestive proteinases of *Helicoverpa armigera*. Amongst the wild relatives studied, species which showed higher activities against *Helicoverpa* gut proteinases viz. *C. alabicans* and *C. scarabaeoides* are from gene pool 2 and easily crossable with *Cajanus cajan*. While *C. platycarpus* is from gene pool 3 which is crossable with *Cajanus cajan* with some difficulty. The results obtained clearly demonstrate the usefulness and potential of the wild relatives of host plants against *H. armigera*, which can be exploited, to develop hybrids using conventional breeding for compatible wild relatives and using embryo rescue techniques for non compatible wild relatives of host plants.

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