Entomology

Search for Chickpeas less Susceptible to Heliothis

Heliothis spp. are generally the most damaging pests of chickpeas, particularly in the tropics. On other crops *Heliothis* spp. attacks start at the flower bud stage but chickpea is unusual in that it attracts this pest right from the seedling stage. In the Old World, *H. armigera* is the major pest but this is replaced by *H. zea* and *H. virescens* in the Americas.

We do not expect to find chickpeas that are immune to such polyphagous pests, but we have initiated a search for materials that have less susceptibility and greater tolerance to *Heliothis* attacks. Our initial attempts to screen chickpea germplasm in nethouses were not fruitful, because plant growth was etiolated, and the moths preferred to lay eggs on the netting rather than on the plants. However, as there were heavy attacks of *H. armigera* on chickpeas in the ICRISAT Center fields in the last four seasons, we could test our germplasm in open field screening, with the natural infestations augmented by laboratory-bred *Heliothis* when required.

The major problem with open field screening using natural pest infestations is, of course, the variability of the attack, both spatial and temporal. We found that with adequate replication and by ensuring that each trial contained germplasm of a very narrow maturity range it was possible to reduce the confusion caused by escapes, and to detect appreciable differences in susceptibility and tolerance consistent over three seasons.

Of over 11 000 germplasm and breeders' lines tested by us, the kabuli types were generally more susceptible to *Heliothis* spp. than the desi. We have selected lines that are markedly less and more susceptible to *H. armigera* attack, and our breeders have taken these into their crossing program. We hope that a study of the progenies of these will throw light on the heritability of such differences.

We are also attempting to identify the mechanisms responsible for the differences in susceptibility. The acid exudate that forms droplets on the plants has for long been considered to play a role in the relative resistance to pests, and we are studying this exudate in cooperation with Max Planck Institute for Biochemistry in Munich.

In 1980 we will offer small quantities of seeds to those interested in testing for susceptibility to *Heliothis* attacks in their own locations.

- S.S. Lateef and W. Reed (ICRISAT).

Plant Density and Pest Damage in Chickpea

Poor plant stands have often been considered as one of the major limitations to yield in farmers' chickpea fields. A density of 33 plants/m^2 is generally recommended, but our surveys of farmers' fields in India show a mean density of about half that recommendation. Experiments by ICRISAT physiologists indicated that some cultivars are plastic in that their yield per unit area differs little over densities ranging from 8 to 100 plants per square meter when protected by pesticides. As our surveys also showed that more than 80 percent of chickpea farmers in India use no pesticides, we decided to investigate the effect of differing plant densities on pest populations in pesticide-free plots, and to compare these with the situation in treated plots.

During the 1977-78 rabi season, in an unsprayed trial at Hyderabad, with plant densities of 3, 8, and 33 plants/m^2, the populations of *Heliothis armigera* larvae per unit area at the closest spacing were about four times as great as those at the widest spacing. Grain yields were considerably reduced in the closest-spaced plots.

During the 1978-79 rabi season, we tested four plant densities, consisting of 4, 8, 33 and 67 plants/m^2, with three different cultivars in two trials, one pesticide-free and the other protected with endosulfan sprays. A summary of the data from these trials is shown in the Table.

This year there were again far more *H. armigera* larvae in the closer-spaced unsprayed plots. There appeared to be little advantage in plant densities greater than 8 plants/m^2, even under protected conditions.

We intend to collaborate with physiologists and breeders in further studies of the pest, spacing, and cultivar interactions both at Hyderabad, and at Hissar in northern India. Such interactions could be very important in determining the need for different elements of pest management. Fourfold differences in pest populations per unit area, as a result of differing plant densities, will have marked effects on our