**Row spacing**

Disease development and spread was faster when interrow spacing was 30 cm instead of 45 cm, but the final severity was the same in both cases. Sowing on a flat surface proved better than on ridges.

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# Entomology

## Preliminary Observations on *Heliothis* and Other Insect Pests on Chickpea in Syria

In 1978 and 1979, during visits to ICARDA at Aleppo, Syria in May, we observed that many of the *Heliothis* larvae feeding on chickpea were atypical in their appearance and feeding habit of *H. armigera*. In India, the larvae of *H. armigera* are commonly found feeding on the developing seeds in the green pods but with only the head and anterior portion of the body inside the pod. After the larva has finished feeding, it leaves a typical damage symptom of a single neat round hole in the pod wall, with much of the seed(s) consumed and with no frass in the pod. At ICARDA, however, many of the *Heliothis* larvae on chickpea were found to be feeding completely inside the pods. The damaged pods often contained frass and some showed both entrance and exit holes. In some cases much of the pod wall had been consumed, such damage being more typical of that caused by *Plusia spp* in northern India.

The *Heliothis* moths in ICARDA collection had been reared from larvae collected from chickpea, and appeared to be a mixture of *H. peltigera*, *H. viriplaca*, and *H. armigera*, with the last named species being in the minority. In other local collections the forewings of many of the moths labelled as *H. armigera* closely resembled *H. peltigera* in pattern and coloration.

In May 1980, one of us (S. Sithanantham) paid an extended visit to ICARDA, with the objective of helping to disentangle the *Heliothis* species complex and to assist with assessments of yield loss caused by the leaf miner, *Liriomyza cicerina*, which is very common in most of the mediterranean chickpea-growing areas. The preliminary results from this visit again indicate that there is a mixture of *Heliothis* species on chickpea, both in the ICARDA farm and in the Syrian farmers' fields. The first emergents from the collected larvae were moths typical of *H. viriplaca* and *H. armigera*. We await emergence data from the main bulk of the larvae, which had pupated but not emerged until Dr. Sithanantham's departure.

In the earlier visits it was noticed that the *Heliothis* attacks were sporadic but generally more extensive and damaging further south. In 1979, some fields in Jordan were recorded as being particularly heavily attacked, with 40% and more of the pods damaged. During the 1980 visit, a survey of Syrian farmers' fields revealed a generally light *Heliothis* infestation but with rather more damage to the south of Damascus. However, this year the crop was much later than usual and a damaging buildup of the pest was still possible after these surveys had been completed.

Leaf miner was common in every field visited in all three years. During a visit to Turkey in 1979 the leaf miner was seen to be common in all chickpea fields, even in those still in the seedling stage. In 1980, the incidence of leaf miner was recorded in insecticide trials and in germplasm blocks. There were indications of cycles of fly abundance and the winter-sown crop was generally less severely attacked than the spring sown. Earlier observations that larger leaflet types were more susceptible were confirmed. Many of the larvae and pupae that were collected were parasitized.

The only other insect pests commonly noticed during these visits were aphids, both *Aphis craccivora* and *Acyrthosiphon pisum*. In general, the aphid attacks did not appear to be damaging but in some fields there was a noticeable incidence of stunt disease which was probably vectored by the aphids.

During our visits we received cooperation and hospitality from the food legume scientists at ICARDA, particularly from Miss Oreib and other members of the legume entomology unit. A joint report on the season's chickpea entomology research will be produced when the final data are analysed. We also gratefully acknowledge the guidance and advice provided by Prof. G. Hariri of Aleppo University.

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