Heliothis Species infesting Chickpeas in Northern Syria

In the Mediterranean region chickpeas are known to be attacked commonly by leaf miners and pod borers. At ICARDA studies were made of the pod borer (*Heliothis*) species infesting chickpeas. Samples of the *Heliothis* larvae were collected from chickpea crops grown on the ICARDA farm at Tel Hadya and in farmers' fields around Aleppo during May 1980 and 1981. They were reared in the laboratory on natural food in individual containers to pupation. Thereafter they were periodically checked for 12 months for death, survival, or emergence.

The three *Heliothis* species, *H. armigera* (Hb), *H. viriplaca* (Hufn.), formerly *H. dipsacea*, and *H. peltigera* (Schiff), occur on chickpeas in the region (Table 1). Their relative abundance appears to vary with season and location. *H. viriplaca* was present in much greater numbers in 1981 than in 1980 and at Tel Hadya than on farmers' fields. *H. armigera* and *H. viriplaca* are polyphagous, feeding on a variety of crop and weed hosts.

Table 1. Emergence of *Heliothis* species adults from larvae collected at ICARDA from chickpeas during 1980 and 1981.

Species	Source of larvae[a]	Number of adults emerged			
		1980 collections		1981 collection	
		before 25.6.80	between 25.6.80 and 2.6.81	before 21.6.81	Total
H. armigera	T	10	0	6	16
	F	11	0	2	13
H. viriplaca	T	6	3	76	85
	F	1	2	5	8
H. peltigera	T	1	0	6	7
	F	0	0	2	2

[a]Based on 456 and 142 larvae samples during 1980 at Tel Hadya (T) and in farmers' fields (F) and on 449 and 38 larvae sampled during 1981.

It will be useful to study the role of different hosts that support *Heliothis* species in the region, to understand regional and seasonal fluctuations.

The study also revealed that, in *H. viriplaca*, the pupae were able to survive and emerge into adults after several months. This requires further study to determine the carry-over potential of the pest from season to season.

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The influence of Host-Plant Resistance in Chickpea on Parasitism of *Heliothis armigera* Hb Larvae

Several cultivars of chickpea with resistance to *Heliothis armigera* have recently been identified at ICRISAT. The influence of host-plant resistance on the parasitism of pest larvae was examined in a field trial of resistant (ICC-506) and susceptible (Annigeri) cultivars, at three plant densities (8.3, 16.7, and 33.3 plants/m^2) sown on the research farm at Patancheru in October 1981 with a plot size of 12 x 4 m and four replications. *H. armigera* larvae were periodically sampled during December 1981 and retained in individual vials in the laboratory to record the incidence of parasitism.

Pest populations increased with increasing plant density (Table 1), thus confirming earlier results. Parasitism of the pest larvae was generally low both overall and among survivors; but there was a lower incidence of parasitism in larvae from the "resistant" cultivar than in those from the "susceptible" type. The dominant parasitoids recovered from the *H. armigera* samples were the Hymenopteran *Campoletis chlorideae* Uchida (Fam: Ichneumonidae) and the Dipteran *Carcelia illota* Curran (Fam: Tachinidae).

The levels of parasitism were too low in this study to be important in the regulation of pest populations. However, these data, and earlier observations at ICRISAT of a greater incidence of parasitism of *Heliothis* larvae on more susceptible kabuli types than

Table 1. Influence of resistance to *Heliothis armigera* in chickpea on the larval parasitism of the pest, ICRISAT, 1981/82.

	Plant density per m²					
	8.3		16.7		33.3	
	S[a]	R[a]	S	R	S	R
No. of *H. armigera* larvae/m²	69	26	95	42	157	42
No. of larvae parasitized/m²	2.1	0.4	2.4	0.4	3.0	0.3
% larval parasitism (overall)	3.3	1.9	2.7	0.7	1.8	0.7
% larval parasitism (among survivors)	3.8	2.3	3.1	0.8	2.0	0.7

[a] S: Susceptible (Annigeri); R: Resistant (ICC-506)

on desi cultivars, indicate that host-plant resistance influences the incidence of larval parasitism. This could be important in situations where larval parasitism is high or can be artificially augmented.

Furthermore, it would be of interest to determine whether such an influence is due to a direct effect of the cultivar on the preference of the parasitoid or to an indirect effect of the resistance on the population density and quality of the *H. armigera* larvae. It may also be useful to study the responses of the individual parasitoids to host-crop varietal differences.

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Microbiology

Nitrate Reductase Activity in Chickpea: A Preliminary Investigation

To assist in gaining an insight into nitrate assimilation by chickpea it was proposed to use an in vivo assay for nitrate reductase activity (NRA). Preliminary experiments in regard to this assay are reported here.

Chickpea, inoculated with effective rhizobia, was grown in free-draining pots watered 2-3 times per week with solutions of KNO_3 containing 20, 80, 150, or 200 ppm N. The procedure was that proposed by Jaworski (1971)[1] for other plant tissue. Freshly harvested tissue (ca 200 mg fresh weight) was used. Leaf tissue was either whole or dissected by a single cut through each leaflet and by three or four cuts through the midrib. The tissue was suspended in 5 ml of a mixture of 0.1 M phosphate buffer 9 (pH = 7.5), 0.02 M KNO_3, 5% propanol, and 2 drops of chloramphenicol (0.5 mg/ml), in sealed jars incubated at 25°C in the dark for 60 min. NRA was measured by NO_2 production which was detected by treating 0.4 ml of the incubation mixture with 0.3 ml each of 1% sulfanilamide in 3 M HCl and 0.02% N-1-naphthyl-ethylenediamine hydrochloride, for 20 min. After appropriate dilution the absorption peak at 540 nm was measured.

Table 1. Effect of leaf treatment on leaf nitrate reductase activity (absorbance/g dried leaf[a]) of plants grown in a medium containing 200 ppm nitrate-N.

Leaf treatment	Leaf position[b]		
	A	B	C
Whole	1.42	1.56	1.75
Dissected	5.08	6.42	6.17
S.E.	1.210	1.793	1.541

[a] Each value is a mean of three leaves.

[b] A is the fifth leaf to emerge. B and C are younger.

Dissecting tissue, as opposed to whole leaves, increased activity 3.5- to 4-fold (Table 1). Activity was widely distributed in the plant, with the highest levels occurring in leaf and root tissue (Table 2). Activity in leaf, stem, and nodule tissue most clearly reflected nitrate level imposed. Activity in leaves declined with age.