



Effect of different chickpea cultivars on parasitization of *Helicoverpa armigera* (Hübner) by *Campoletis chlorideae* Uchida

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ABSTRACT: The extent of natural parasitism of *Helicoverpa armigera* (Hübner) by *Campoletis chlorideae* Uchida on different chickpea cultivars was studied at different locations in Jalandhar district of Punjab. The parasitoid population varied from 0.02–1.50 cocoons per metre row length and the larval population ranged between 0.86–14.50 larvae per metre row length. The maximum numbers of cocoons were recorded on PBG 5 (0.88) followed by L 550 (0.74). The *H. armigera* population was also high on PBG 5 (9.38 larvae / m row length) followed by L 550 (6.75 larvae/ m row length).

KEY WORDS: *Campoletis chlorideae*, cocoons, *Helicoverpa armigera*, larval parasitization

Chickpea is an important *rabi* pulse crop in India. In Punjab, it occupies an area of 7.8 thousand hectares with an average productivity of 7.3 thousand tonnes (Anonymous, 2003). However, pod borer *Helicoverpa armigera* (Hübner) has become a major constraint in its productivity. A reduction in yield ranging from 40–50 per cent has been reported and it may cause even total loss of the crop (Rai *et al.*, 2003). Biocontrol is one of the major components of Integrated Pest Management (IPM), which seeks to maximize the contribution of naturally occurring parasitoids, predators and pathogens towards the reduction of pest population.

In India, about 77 parasitoids have been reported on different crops (Achan *et al.*, 1968; Romeis and Shanower, 1996). But unlike other

cropping systems, chickpea harbours very few natural enemies. Among these *Campoletis chlorideae* Uchida is the most promising, parasitizing 10–80 per cent of host larvae on chickpea in different parts of the country (Singh *et al.*, 1991; Patnaik *et al.*, 1994). Since *Trichogramma* spp. do not work in chickpea, so the role-played by *C. chlorideae* in nature needs exploration, for which estimation of field parasitization in order to quantify the natural mortality of the pest by this parasitoid is of great significance. The host plants provide cues, which orient parasitoids towards them. The differences of host plants also affect the performance of some parasitoids (Ballal *et al.*, 1987). So the present studies were undertaken to see natural parasitism of *H. armigera* by *C. chlorideae* in different chickpea cultivars.

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The experiment was conducted at farmer's fields at five locations *viz.*, Pattar Kalan, Kohala, Musapur, Meerpur maari and Uggi in Jalandhar district of Punjab. Five cultivars of chickpea *viz.*, two *kabuli* (L 550 and BG 1053) and three local types (PBG 1, PBG 5 and PDG 4) were sown in an area of 500 sq. m. under each cultivar during *rabi* 2002-2003. All normal cultivation practices were followed but no insecticide was sprayed. The plots were further sub-divided into three replicates. The larval population and number of cocoons of parasitoid per metre row length were recorded at ten spots in each replication on all the varieties at weekly interval. The observations were recorded starting from the 1st week of December 2002 till last week of April 2003. The cocoons were collected and reared till the emergence of parasitoid adult. The results obtained were pooled location wise and variety wise and subjected to analysis of variance.

The maximum larval population (9.39 larvae/m) was recorded on PBG5, which was significantly

higher than the other varieties (Table 1). However, both the *kabuli* type varieties L550 and BG 1053 were on par. The least infestation was recorded on PDG 4 (3.28 larvae/m row length), which was significantly better than the other varieties. From location to location, there was a significant difference in *H. armigera* population on chickpea varieties. The maximum larval population (10.58) was recorded at village Pattar Kalan, which was significantly higher than all the other locations. The lowest pest incidence (2.07 larvae/m) was recorded at village Uggi.

The data on number of cocoons presented in Table 2 revealed that the maximum numbers of parasitoid cocoons were recorded on variety PBG5 (0.88 cocoons/m) followed by L550 (0.74) and PDG4 (0.72). However, statistically all the varieties were on par. Whereas, at different locations the parasitoid population was significantly different. A maximum number of cocoons (1.15/m row length) were recorded at village Pattar Kalan

Table 1. Larval population of *H. armigera* on different chickpea cultivars at different locations of district Jalandhar (Punjab) during *rabi* 2002-2003

Sl. No.	Location	Mean number of larvae / metre row length* of chickpea plants in different varieties					Mean of varieties
		L 550	BG 1053	PBG 1	PBG 5	PDG 4	
1	Pattar Kalan	13.77 (3.82)	9.77 (3.27)	9.33 (3.19)	14.00 (3.86)	6.00 (2.64)	10.58 (3.36)
2	Kohala	4.83 (2.40)	5.42 (2.53)	4.33 (2.31)	9.62 (3.26)	3.22 (2.05)	5.49 (2.51)
3	Musapur	7.62 (2.93)	7.86 (2.97)	5.83 (2.61)	14.50 (3.93)	3.28 (2.07)	7.82 (2.90)
4	Meerpur maari	5.22 (2.48)	6.77 (2.77)	3.35 (2.07)	7.94 (2.99)	2.45 (1.85)	5.15 (2.43)
5	Uggi	2.33 (1.80)	3.75 (2.17)	2.00 (1.72)	0.86 (1.36)	1.44 (1.56)	2.07 (1.72)
Mean of locations		6.75 (2.69)	6.72 (2.75)	4.97 (2.38)	9.39 (3.08)	3.28 (2.03)	

CD (P=0.05)

Variety = 0.17

Location = 0.17

Figures in parentheses are square root transformations.

Table 2. Cocoon population of *C. chloridae* on different chickpea cultivars at different locations of District Jalandhar (Punjab) during rabi 2002-2003

Sl. No.	Location	Mean number of cocoons / metre row length of chickpea plants in different varieties					Mean of varieties
		L550	BG 1053	PBG 1	PBG 5	PDG 4	
1	Pattar Kalan	1.15 (1.58)	1.11 (1.44)	0.84 (1.35)	1.12 (1.45)	1.16 (1.47)	1.15 (1.46)
2	Kohala	0.47 (1.21)	0.33 (1.15)	0.67 (1.29)	1.04 (1.43)	0.73 (1.31)	0.65 (1.28)
3	Musapur	0.82 (1.35)	0.88 (1.37)	0.61 (1.26)	1.18 (1.47)	0.90 (1.37)	0.88 (1.36)
4	Meerpur maari	0.57 (1.25)	0.61 (1.27)	0.55 (1.24)	0.98 (1.41)	0.80 (1.34)	0.70 (1.30)
5	Uggi	0.33 (1.15)	0.12 (1.05)	0.44 (1.20)	0.08 (1.04)	0.02 (1.01)	0.20 (1.09)
Mean of locations		0.74 (1.31)	0.61 (1.26)	0.62 (1.27)	0.88 (1.36)	0.72 (1.30)	

CD (p=0.05)

Variety = NS

Location = 0.07

* Mean of 3 replications

Figures in parentheses are square root transformations.

that was significantly higher than that of the other locations. It was followed by village Musapur where 0.88 cocoons were recorded. The least parasitization was recorded at Village Uggi.

It is evident from the above observations that the varieties which harboured more pest population also attracted a large number of parasitoids as in case of above mentioned varieties except PDG 4 which harboured least larval population but the rate of parasitization was quite high as compared to other varieties. So this can be concluded that *C. chloridae* plays an important role in suppressing *H. armigera* population in chickpea. As the incidence of pest increases the parasitoid activity also increases. However, varietal differences were observed with respect to population of *H. armigera* and *C. chloridae*. So detailed investigations are needed to identify role of chemicals in different varieties, which act as attractants/ repellents to parasitoids. This information would help us to use

and develop the crop varieties, which would be more favourable for natural enemies.

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