



Record of *Bracon hebetor* Say (Hymenoptera: Braconidae) on *Helicoverpa armigera* (Hübner) in chickpea

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ABSTRACT: Regular survey for the parasitoids of *Helicoverpa armigera* (Hübner) in chickpea ecosystem was conducted during post-winter months (March–April) in Kanpur (Uttar Pradesh, India) during 2006–2008 cropping seasons. Fourth and fifth instar larvae of *H. armigera* were found parasitized by *Bracon hebetor* Say (Hymenoptera: Braconidae). The per cent parasitization of *B. hebetor* on *H. armigera* larvae in chickpea ecosystem ranged from 0.24 to 1.59 under field conditions. This is the first record of *B. hebetor* from chickpea ecosystem. A study was also conducted on the effect of adult diets on the longevity of the parasitoid. Highest longevity of 34.7 days in case of female and 22.0 days in case of male was recorded when fed with 50% honey solution.

KEY WORDS: *Bracon hebetor*, *Helicoverpa armigera*, chickpea ecosystem.

Helicoverpa armigera (Hübner) is a major pest of chickpea and pigeonpea causing heavy losses every year. Its preference for high protein, reproductive and growing plant parts leads to serious losses in crop yield. In North India, during post-winter months, *i.e.*, March–April, *H. armigera* moths emerge from hibernating pupae and breed freely due to the absence of or almost negligible parasitism and favourable climatic conditions. This coincides with the fruiting stage of chickpea and pigeonpea, causing heavy losses. Regular survey for the parasitoids of *H. armigera* in chickpea fields of New Research Farm (NRF) of Indian Institute of Pulses Research (IIPR), Kanpur, was conducted during post winter months in 2006, 2007 and 2008 cropping season to collect the potential parasitoids. During 2006, *Bracon hebetor* Say (Hymenoptera: Braconidae), a gregarious ectoparasitoid was recorded on *H. armigera*. Hence, the survey was continued during post-winter months (March–April) of 2007 and 2008 in chickpea fields to record its natural parasitism on *H. armigera*.

Totally 822, 710 and 755 larvae of *H. armigera* were collected from chickpea fields of NRF of IIPR, Kanpur during 2006, 2007 and 2008 cropping seasons, respectively. These larvae were reared individually on semi-synthetic diet (Armes *et al.*, 1992) in plastic vials (10 x 2.5cm) and observed for the emergence of parasitoids, extent of parasitisation and the biology of parasitoids. The parasitoid was mass multiplied on the larvae of *H. armigera* (5th and 4th instars) in plastic jars (30 x 15cm). The mouth of the jar was covered with muslin cloth and fastened with rubber band. A cotton swab soaked in 50% honey solution was kept in the jar as the feed for the parasite. Chickpea

Pods were also provided for the larvae of *H. armigera*. To know the influence of diets on the longevity of adult parasitoid, seven adult diets (25% honey, 50% honey, 100% honey, 25% glucose, 25% sucrose, 25% jaggery and distilled water) were tested with three replications. In each replication, ten female and male parasitoids were used. Five ml of each treatment soaked in absorbent cotton was placed in the specimen tube (10 x 2.5cm) and the adult parasitoid was released. Feeding solutions were changed once in two days to obviate fermentation and its consequent detrimental effect on the insect.

The survey conducted during 2006–2008 showed the regular natural occurrence of *B. hebetor* on *H. armigera* during post-winter months (March–April). The per cent field parasitization of *B. hebetor* on *H. armigera* in chickpea ecosystem ranged from 0.24 to 1.59% (Table 1).

Observations on the biology of the parasitoid on field collected *H. armigera* indicated that *B. hebetor* females first paralyzed their host larvae by stinging and then laying variable numbers of eggs singly on the surface of paralyzed hosts. The paralyzed host larvae are then used as food sources for the developing wasp. This parasite prefers the fourth and fifth instar *H. armigera* larvae for egg laying. The eggs are laid on the body of the larvae of *H. armigera* within one hour after paralyzing. After completion of feeding, full grown larvae of the parasite pupate besides the body of the host. This gregarious ectoparasitoid formed 10–16 cocoons per *H. armigera* larva and completed its life cycle in 7–9 days. The sex ratio was found to be female-biased and mating occurred soon after emergence.

Table 1. Field parasitization of *B. hebetor* on *H. armigera* in chickpea ecosystem

Year (Months)	No. of larvae collected	No. of larvae parasitized	% parasitization	No. of parasitoids emerged
2006 (March -April)	822	2	0.24	4 female and 1 male
2007 (March -April)	710	3	0.42	7 female
2008 (March -April)	755	12	1.59	15 female and 9 male

Studies on the effect of adult nutrition indicated a significant increase in the longevity of the adult parasitoid with feeding. The highest longevity of 34.7 days and 22.0 days was recorded in case of females and males, respectively when fed with 50% honey solution (Table 2). However, under field conditions, water drops available in plenty may be sufficient for the survival of the adults for sufficient duration as in case of *Allorhogas pyralophagus* (Varma *et al.*, 1987).

Table 2. Effect of diets on the longevity of adult parasitoid

Adult diet	Longevity of <i>B. hebetor</i> (days)	
	Female	Male
100% honey	33.3 ^a	20.3 ^b
50% honey	34.7 ^a	22.0 ^a
25% honey	25.0 ^b	16.0 ^c
25% sucrose	23.3 ^b	19.3 ^b
25% glucose	15.7 ^c	12.7 ^d
25% jaggery	9.0 ^d	6.3 ^e
Distilled water	8.7 ^d	5.0 ^e
CD (P = 0.05)	2.45	1.67

Earlier *B. hebetor* was reported from India in cotton eco-system (Anonymous, 1974). It has been also reported from other countries in Asia, Africa and Europe from cotton (Singh *et al.*, 2002). Mandal and Mishra (2004) reported that *B. hebetor* is not effective in controlling *H. armigera* in chickpea in Orissa. But in the present study, regular occurrence of *B. hebetor* and natural parasitisation on *H. armigera* larvae were observed under Kanpur conditions and it is amenable for mass multiplication throughout the year. Hence, *B. hebetor* may be used as a potential biocontrol agent against *H. armigera* in different cropping systems.

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