

Field evaluation of *Cotesia flavipes* Cameron (Hymenoptera: Braconidae) (Indonesian strain) against sugarcane stalk and internode borers

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ABSTRACT: Field trials were conducted on the releases of *Cotesia flavipes* Cameron (Indonesian strain) against sugarcane stalk (*Chilo auricilius* Dug.) and internode (*Chilo sacchariphagus indicus* Kapur) borers at IISR Farm, Lucknow for consecutive three crop seasons 1996-97 to 1998-99. The parasitoids were released in one block @ 2000 mated females/ ha / month split into four doses from July to October and the other block was treated as check. The results indicated reduction of 56.2, 69.6 and 43.1 per cent in stalk borer infestation in parasitoid released blocks as compared to check, in October during 1996- 97, 1997-98 and 1998-99, respectively. The results remained inconclusive in cases of internode borer due to low infestation.

KEY WORDS: *Chilo auricilius*, *Chilo sacchariphagus indicus*, *Cotesia flavipes*, parasitoid, field releases

Cotesia flavipes Cameron (Hymenoptera: Braconidae), an important gregarious larval endoparasitoid of different sugarcane borers, namely *Chilo infuscatellus* Snellen, *Chilo sacchariphagus indicus* Kapur, *Chilo tumidicostalis* Hmps. n., *Sesamia inferens* (Walker) and *Acigona steniellus* (Hmps. n.) is widely distributed in different cane growing regions in India (Gupta, 1954; Kalra and Srivastava, 1966; Borah and Arya, 1995). Indigenous *C. flavipes* has been found effective in reducing the infestation of *A. steniellus* (Bindra and Chand, 1973), *C. infuscatellus* and *C. auricilius* (Shenmar and Brar, 1996) under Punjab conditions in India. This parasitoid has also been successfully introduced against *Diatraea saccharalis* (F.) in Barbados (Alam *et al.*, 1971), Brazil (Macedo *et al.*, 1984), Texas (Fuchs *et al.*,

1979) and Thailand (Suasa-ard and Charernson, 1999). In the recent past the Indonesian strain has been imported to India through Project Directorate of Biological Control, Bangalore for evaluation against sugarcane borers. Laboratory evaluation of this strain has already been done (Tanwar and Varma, 1996). In the present study field evaluation of *C. flavipes* (Indonesian strain) was carried out at Indian Institute of Sugarcane Research farm against *C. auricilius* and *C. s. indicus*.

MATERIALS AND METHODS

Nucleus culture of *C. flavipes* (Indonesian strain) was received through the Project Directorate of Biological Control, Bangalore. Freshly emerged wasps were released into

transparent plastic jars (1.5 lit) fitted with brass mesh on the lid for ventilation and provided with cotton swab soaked in 50 per cent sucrose solution as adult food. Rearing of the parasitoid was carried out on laboratory bred larvae of stalk borer (Tanwar and Varma, 1996).

Block trials were conducted on the releases of laboratory reared *C. flavipes* @ 2000 mated females/ha/month split into four doses (500 each) from July to November for three consecutive years (1996-97 to 1998-99) against sugarcane stalk and internode borers. The releases of the parasitoids were made in one block of 54x60m size with CoLk 8102 planted in 1996-97 and 54x180m with CoS 91269 ratooned and CoLk 8102 ratooned in 1997-98 and 1998-99, respectively. Another block of the same size with same cultivars and agronomic practices was maintained in each year as a check (unreleased) at a distance of 200m. The observations on the progressive field infestation were recorded from 10 spots in each block (released and check) by counting 50 canes including healthy and infested canes from each spot in July (pre-release), October and January (at harvest). The observations at harvest were made by splitting the canes to record infestation, larval population and parasitisation of *C. auricilius* larvae. The results were subjected to 't' test for drawing the conclusion.

RESULTS AND DISCUSSION

The infestation of stalk borer in July, in general, remained low ranging from traces to

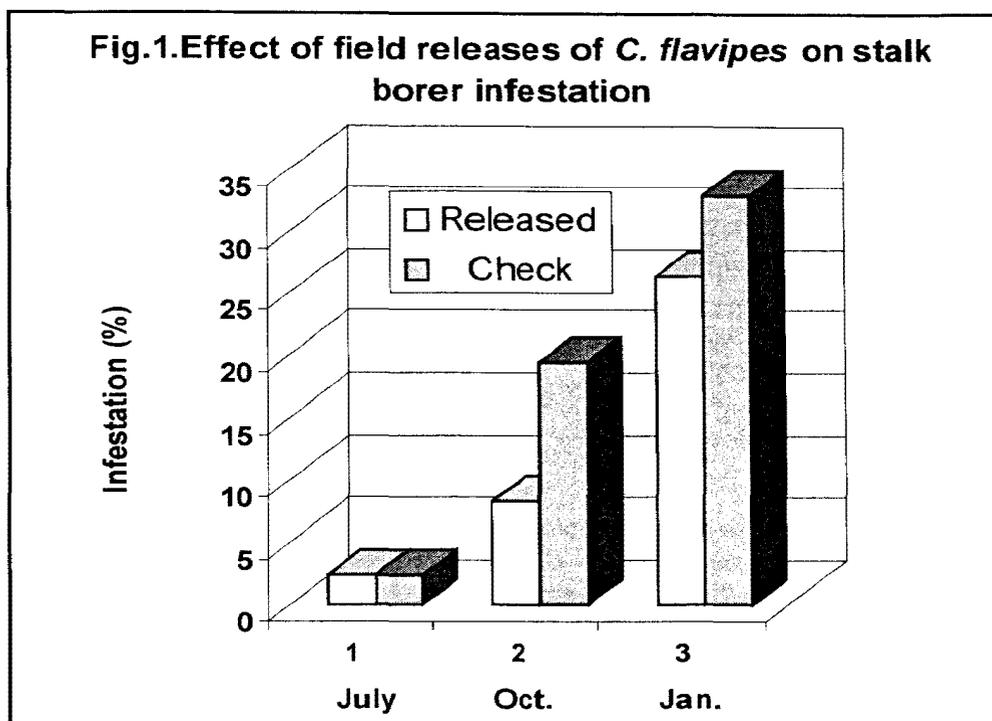
5.1 per cent in both released and check blocks (Table 1). The observation recorded in October indicated lower infestation of stalk borer in the parasitoid released blocks as compared to check. The differences were statistically significant in 1997-98 and 1998-99. Under the Punjab conditions, the field releases of indigenous *C. flavipes* @ 800 adults/ha had been found effective against *C. infuscatellus*, *C. auricilius* and *A. steniellus*. However, the Indonesian strain was ineffective against borer complex (Shenhmar and Brar, 1996).

While observing the effectiveness of the released parasitoid on progressive stalk borer infestation (Table 1, Fig 1) it was found that in October the released block indicated a reduction of 56.2, 69.6 and 43.1 per cent in stalk borer infestation as compared to check during 1996-97, 1997-98 and 1998-99, respectively. However, in January per cent reduction in the infestation of stalk borer in released block was lower than October (52.9 and 28.9 in 1996-97 and 1997-98, respectively). No reduction in stalk borer infestation was noticed in 1998-99. It is due to fact that from July to October the released parasitoid remained more active in the field for its parasitisation and multiplication which resulted in a reduction in the infestation of stalk borer in parasitoid released block. Beyond October, the prevailing low temperature, appeared to be non-conducive for its mating (Al-Maliky and Al-Izzi, 1990) and field parasitisation.

Table 1. Effect of field releases of *C. flavipes* (Indonesian strain) on the infestation of stalk borer

Period of observation	Cane bases per cent infestation of stalk borer (Mean \pm SEM)					
	1996-97		1997-98		1998-99	
	Released	Check	Released	Check	Released	Check
July	Traces	Traces	2.0	3.0	5.09 \pm 5.49	3.76 \pm 1.74
October	3.38 \pm 1.38	7.7 \pm 1.38	8.56 \pm 1.72	28.15 \pm 2.89*	12.78 \pm 10.9	22.45 \pm 3.46*
January	17.47 \pm 4.93	37.15 \pm 4.25*	25.5 \pm 3.37	35.9 \pm 4.28	35.9 \pm 21.8	25.8 \pm 6.89

(* Significant at P=0.05)



Observations recorded during harvest on larval population and parasitization of stalk borer indicated low population and higher parasitization of stalk borer larvae in parasitoid released block as compared to check. However, the difference was non-significant ($P= 0.05$). During

1997-98 and 1998-99 the larval population in general remained low, therefore, no reduction in larval population could be observed. The parasitization was also very low (0 to 2.19 %) during 1997-98 and 1998-99 in parasitoid released as well as check blocks (Table 2).

Table 2. Effect of field releases of *C. flavipes* population and parasitization of stalk borer larvae

Parameters	Cropping season					
	1996-97		1997-98		1998-99	
	Released	Check	Released	Check	Released	Check
Stalk borer larvae ± SEM/100cane	8.55±2.30	27.3±8.08	9.98±1.89	10.59±2.29	9.81±3.19	5.71±1.79
Parasitisation (%)	5.0 ± 4.99	3.55±2.28	2.19±1.51	NP	NP	NP

(NP - no parasitization)

Table 3. Effect of field releases of *C. flavipes* on the infestation of internode borer

Period of observation	Cane bases per cent infestation of internode borer (Mean± SEM)					
	1996-97		1997-98		1998-99	
	Released	Check	Released	Check	Released	Check
July	0.83± 0.51	0.38± 0.38	2.0	2.0		0.8± 1.40
October	0.72± 0.44	0.70± 0.42	0.39± 0.83	0.98± 1.67	1.53± 1.51	1.32± 1.52
January	7.43± 2.42	4.86± 2.08	4.18± 3.25	2.27± 1.76	5.81± 3.34	4.20± 1.73

It is evident from the above observations that the field releases of laboratory reared *C. flavipes* @ 2000 mated females/ha/ month split into four doses (500 each) from July to October is effective against stalk borer. In case of internode borer, the infestation remained low (0.38 to 7.43 %) in parasitoid released and check blocks during 1996-97 to 1998-99, therefore, no conclusion could be drawn on its effectiveness against internode borer (Table 3). Easwaramoorthy *et al.* (1998) found that augmentative releases of indigenous population of *C. flavipes* in tropical India had no impact on the activity of *C. s. indicus* and limited releases of the Indonesian population produced inconclusive results.

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