

## Short Communication

# Potential of parasitoid *Trichogramma chilonis* (Ishii) (Hymenoptera: Trichogrammatidae) against the sugarcane stem borer, *Chilo infuscatellus* (Lepidoptera; Pyralidae) under field conditions

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Accepted 8 December, 2011

The present experiment reports the role of egg parasitoid, *Trichogramma chilonis* (Ishii) (Hymenoptera; Trichogrammatidae) as a pest management tool for the control of sugarcane stem borer (*Chilo infuscatellus*) under natural field conditions. The prime focus of study was to find out the effectiveness of egg parasitoid as a primary tool after its field releases at different time intervals. The experiment was conducted at Rahim Yar Khan, Punjab during 2008 to 2009. The trails were laid out in randomized complete block designed with five treatments of field releases an interval of 10, 15 and 20 days. The intensity of damage showed that minimum infestation of 9.31% was recorded in treatment T<sub>1</sub> (72,000 *Trichogramma* cards followed by T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> with infestation percentage of 13.60, 17.07 and 19.44, respectively. The highest infestation was recorded at 25.95% in control treatment. The lowest infestation (16.57%) was observed after 10 days intervals of field releases followed by recording after 15 and 20 days interval with infestation of 17.14 and 17.52%.

**Key words:** *Trichogramma chilonis*, egg parasitoid, sugarcane, *Chilo infuscatellus*.

## INTRODUCTION

*Trichogramma chilonis* (Ishii) (Hymenoptera; Trichogrammatidae) is an important egg parasitoid of lepidopterous pests with effective control as against the sugarcane stem borers. It has been in use in sugarcane, corn, cotton, vegetables and fruits crops for the control of pests since 20 years. The *Trichogramma* has been considered as one of the most important parasitoid for more than 100 years and it was also reported that *T. chilonis* can be more effective when its parasitizing potential and searching ability is well adopted in the field (Smith, 1996). *Trichogramma* specie is most effective against the lepidopterous pest particularly for the sugarcane stem borers (Metcalf and Breniere, 1969; Nagarkatti and Nagaraja, 1977). The inundate releases of

bio-agent for the control of lepidopterous pests are being practiced in more than 32 million ha each year around the world (Hassan, 1993). The release of *T. chilonis* in China, Switzerland, Canada and former USSR reduced the damage up to 70 to 92% on sugarcane (Li 1994), while in Asia, it reduced the incidence of pests in sugarcane by early shoot borer (*Chilo infuscatellus*) from 43 to 82% (Bharati et al., 2002). Rafique et al. (2007) reported that *T. chilonis* give very good results against the sugarcane stalk borer. The application of *T. chilonis* at 60,000 eggs reduces the pest infestation at 83% against the *C. infuscatellus* (Table 1). Zia et al. (2007) reported that the application of *T. chilonis* against *C. infuscatellus* showed a negative correlation with an increase in number of eggs which indicated that it can successfully be used to control stem borer and it reduces the borer infestation at 2.74%.

Mustafa et al. (2006) studies that infestation of *C. infuscatellus* was reduced at 52.04% during 2000 and

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**Table 1.** Analysis of variance of pest infestation.

Source of variation	Degrees of freedom	Mean squares	F-value
Replication	2	1.502	4.14
Day	2	3.430	9.46**
Variety	4	352.925	973.36**
Day × variety	8	0.292	0.81 <sup>NS</sup>
Error	28	0.363	

\*\* = Highly significant ( $P < 0.01$ ).

**Table 2.** Borer's infestation after different time interval.

Treatment	Interval (days)			Mean
	10	15	20	
T <sub>1</sub>	8.90±0.18	9.61±0.67	9.41±0.26	9.31±0.24 A
T <sub>2</sub>	12.88±0.13	13.89±0.33	14.04±0.05	13.60±0.21 B
T <sub>3</sub>	16.79±0.10	17.13±0.54	17.27±0.40	17.07±0.21 C
T <sub>4</sub>	18.93±0.37	19.38±0.29	20.02±0.34	19.44±0.23 D
T <sub>5</sub> (Control)	25.35±0.55	25.66±0.32	26.86±0.55	25.95±0.34 E
Mean	16.57±1.49 A	17.14±1.45 B	17.52±1.57 C	

Means ± SE, sharing similar letter in a row or in a column are statistically non-significant ( $P > 0.05$ ).

60.03% during 2001. The damage ranged from 3.9 to 10.5% in treated and 9.6 to 18.6% in untreated plots. The internodes damaged reduction due to *Trichogramma* treated ranged from 28.6 to 59.7%. Shenmar et al. (2003) reported that *T. chilonis* was released at 50000 per acre for 10 days interval from July to October. In terms of borer infestation, the damaged was 52.04% during 2000 and 60.03% during 2001; so the aim of the present study is to find out the efficiency of *Trichogramma* with most suitable dose against the sugarcane stem borer.

## MATERIALS AND METHODS

Present field trial was conducted in sugar cane crop under natural conditions at Akramabad Distt, Rahim Yar Khan. Homogeneous sets of a standard commercial sugarcane variety US-718 was planted by maintaining rows at a distance of 2.5 feet R × R and 1 foot P × P distance between set to set. The experiment was laid out in a randomized complete block design RCBD and replicated thrice with a plot size of 5 × 10 m<sup>2</sup> with five treatments in each block. Standard agronomic practices as irrigations, fertilizers, hoeing were adopted through out the crop period as per crop requirements. Releases of *Trichogramma* were made according to treatments having number of parasitoids population as by into the 72,000, 60,000, 48,000, 40,000 and untreated control as indicated by T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, respectively (Table 2). Parasitoids of *Trichogramma* were taken from the insectary at Department of Agri. Entomology, University of Agriculture Faisalabad; reared and releases were made accordingly into field site. Prepared parasitized cards of *T. chilonis* were released into each treatment by installing them on ventral surface of the leaves in order to avoid the direct exposure of the sunlight. Infestation of the sugarcane stem borer was

monitored on the basis of randomly selected sample from each treatment.

Each treatment consisted of five tillers of each experiment and the number of damaged plants by *C. infuscatellus* as well as the percentage of its infestation was calculated as follows:

$$\text{Infestation (\%)} = \frac{\text{Number of damaged tillers}}{\text{Total tillers}} \times 100$$

The percent reduction in the stem borer after the releases of *T. chilonis* was determined by the following formula:

$$\text{Reduction (\%)} = \frac{\text{Damaged tillers in control plot} - \text{damaged tillers in treated plot}}{\text{Total tillers in control plot}} \times 100$$

The effectiveness of the biological control agent of *T. chilonis* was evaluated by means of the sugarcane stem borer infestation and compared with that of the control treatment plot. The data obtained was statistically analyzed by using Tukey HSD test (Mstate Package).

## RESULTS AND DISCUSSION

The results revealed a significant difference among all the treatments ( $P < 0.01$ ). The lowest infestation (9.31%) was recorded in the treatment where releases of *T. chilonis* were made with 72000, 60000, 48000 and 40,000 parasitoids egg of *Trichogramma* with infestation percentage of 13.60, 17.07 and 19.44, respectively. The lowest infestation was recorded in

control treatment (25.95%). Among the time interval, the lowest infestation (16.57%) was observed after 10 days followed by 15 and 20 days interval with 17.14 and 17.52%, respectively. The present findings are partially compared with the results reported by Rafique et al. (2007) and Zia et al. (2007) who stated that when 60000 eggs of *Trichogramma* per acre were released causing 83% reduction of *C. infuscatellus* and showed significant results and also reported that population of *C. infuscatellus* showed a negative correlation with an increase in number of eggs which indicated that it can be successfully used to control stem borer. Our present findings are agreed to those of Muhammad and Muhyuddin (1987) who reported that by the use of *Trichogramma*, favorably affect natural enemies of sugarcane stem borer *C. infuscatellus*. Similarly, Ashraf et al. (1993) and Mustafa et al. (2006) reported that by using *Trichogramma*, infestation was reduced from 52.04 to 60.03% during 2000 to 2001 and damage ranged from 3.9 to 10.5% in treated area and 9.6 to 18.6% in untreated plots.

The internodes damaged reduced due to releases of *Trichogramma*, infestation ranged from 28.6 to 59.7%. The present findings are also in line to those of Rajendran and Hanifa (1996), Shenhmar et al. (2003) and Nadeem and Hamed (2011) who reported that *Trichogramma* is very effective against the sugarcane borers. The present results are in line with the results reported by Nadeem et al. (2008) and Nadeem et al. (2009) who stated that the temperature for *T. chilonis* at 20, 25, 28, 31, 35 and 40°C in the incubators. The biological parameters such as parasitism (95.6%), emergence (98.0%), developmental period (7.3 days) and adult longevity (9.0) days were very favorable at 28°C. It was also reported that 40°C and low 20°C temperature did not support the development period while temperature at 28°C was most favorable for the rearing of *T. chilonis*.

## ACKNOWLEDGEMENTS

The authors are thankful to Mr. Abdul Ghaffar, Ex. Director General, Agriculture extension for his co-operation, suggestion and provision of facilities to conduct the present research trial.

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