EFFECTIVENESS OF *TRICHOGRAMMA CHILONIS* (ISHII) (HYMENOPTERA: TRICHOGRAMMATIDAE) AGAINST SUGARCANE STEM BORER (*CHILO INFUSCATELLUS* SNELLEN) (LEPIDOTERA: PYRALLIDAE)

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ABSTRACT

Trichogramma chilonis Ishii against sugarcane stem borer (*Chilo infuscatellus* Snellen) was evaluated in experimental plots of sugarcane in the field at Faisalabad, Pakistan. Among five treatments of *T. chilonis*, the treatment having 60,000 parasitized eggs per acre showed significant results causing 83% reduction in infestation of *C. infuscatellus* as compare to control having 30.67% infestation. Population of *C. infuscatellus* showed negative correlation with increase in number of parasitized eggs of *T. chilonis,* which indicates that it can be successfully used for the suppression of sugarcane stem borer.

Key words: Egg parasitoid; *Trichogramma chilonis*; biological control, *Chilo infuscatellus*

INTRODUCTION

Sugarcane (*Sacharum officinerum* L.) is an important cash crop of Pakistan, which contributes substantially to the national income. It accounts for 3.5 percent of value added in agriculture and 0.7 percent of GDP. Pakistan is the 4th largest sugarcane producing country in the world. Sugarcane crop provides raw cane to 76 sugar mills which plays an important role in the economy of the country. Sugar serves as food and as most widely traded commodity. Sugar production in our country mostly depends upon sugarcane crop, though a small quantity of sugar is also produced from sugar beet (Annonymous, 2006-07). The average yield of sugarcane in Pakistan is low as compared to the other sugarcane growing countries of the world. This may be due to many factors of which insect pest are the most important one. Insect pests are threat to sugarcane crop. Among these insect pests, about 103 insects are associated with Sugarcane (Kumarasinghe, 1999). Among these insect pests sugarcane borer are most damaging one. According to Aheer *et al.,* (1994), stem borer of sugar cane causes losses upto 36.51%.

Sugarcane borer has become a challenging pest of sugarcane crop, due to feeding inside the plant parts where sprays are difficult to approach and the extensive and injudicious use of insecticides not only create the health hazards problem and environmental pollution but also resistance problem in large number of insect pests (Mohyuddin *et al*., 1997; Soerjani, 1998). It has been reported that more than 500 pest species have developed resistance against insecticides (Georghion and Lagunes, 1991). Indiscriminate use of pesticides kill the natural enemies resulting in flare up of pest population (Hamburg and Guest, 1997; Yousaf, 1996).

To overcome resistance problem and also to meet the demand of international markete, for producing good quality agroproducts, now more stress is on organic farming. It is imperative to use biological control programme for sugarcane. The inundative releases of bioagents for control of lepidopterous pests are being practiced in more than 32 million hectares each year around the world (Hassan, 1993). *T. chilonis* releases in China, Switzerland, Canada and foremer USSR reduced the damage up to 70-92% on sugarcane, corn and cotton crops (Lily, 1994), while in Asia, releases of *T. Chilonis* remarkably reduced the incidence of cotton boll worm (*Helicoverpa armigera*) and sugarcane early shoot borer (*Chilo infuscatellus*) by 43 and 82%, respectively (Bhut *et al*., 2004; Bharati and Babu *et al*., 2002). In sugarcane *T. chilonis* reduces stalk borer incidence by 55-60% (Shenhmar *et al*. 2003).

The present study was designed to evaluate the relative efficacy of different doses of egg parasitoid *T. chilonis* Ishii against sugarcane *C. infuscatellus.*

MATERIALS AND METHODS

The research was conducted at Chak No.109 G.B. near Jarhanwala road, district Faisalabad during 2006. A variety of sugarcane HSF-240 was sown in Randomized Complete Block Design (RCBD) with five treatments viz.,

T_1 (30,000 parasitized eggs/acre)
T_2 (40,000 parasitized eggs /acre)
T_3 (50,000 parasitized eggs/acre)
T_4 (60,000 parasitized eggs/acre)
T_5 (control)

Each treatment was replicated thrice. Predetermined numbers of parasitized eggs were released by installing *T. chilonis* cards on fortnight basis, in each replication of biological control plot. These cards were attached on ventral side of sugarcane leaves to avoid the direct exposure of sunlight to the parasitized eggs. Infestation of sugarcane stem borer was monitored fortnightly on the basis of randomly selected sample from each treatment, which consisted of 25 plants from each replication. From these selected samples, damaged plants by *C. infuscatellus* were counted and percent infestation was calculated.
% infestation = (Damaged tillers / Total tillers) x 100, while percentage reduction of sugarcane stem borers by using *T. chilonis* was determined by the formula: (damaged tillers in control plot-damaged tillers in treated plot/total damaged tillers in control plot) x100. First installation of card with parasitized eggs at a farm oriented doses was done on 15 July, 2006 and the last installation of cards was done on 15 October, 2006. To evaluate the performance of *T. chilonis*, mean infestation of sugarcane stem borer under study was compared in biological control plots and the control plot.

The data obtained was analyzed statistically by using analysis of variance according to the procedure given by Steel *et al*. (1997). Then TUCKEY HSD test at 5% probability was used for the comparison of means of significant results.

RESULTS AND DISCUSSION

The reduction in percentage infestation of *C. infuscatellus* ranged from 41.74 to 49% when 30,000 *Trichogramma* parasitized eggs were applied and 51.61 to 67.39 % when 40,000 parasitized eggs were applied, 64.52 to 78.72% when 50,000 parasitized eggs were applied where as maximum reduction percentage of sugar cane stem borer was observed i.e. 77.4% when 60,000 *Trichogramma* parasitized eggs per acre were applied, in the sugar cane field.

The result exhibited that maximum infestation of stem borer present in the field was on 30-9-2005 and 15-10-2005 when 30,000 eggs were released i.e. 20% followed by 16.33% and 15.66% on 15.9.2005 and 31.8.2005 respectively, the minimum infestation was observed on 30-9-2005 and 15-10-2005 when 60,000 parasitized eggs per acre were applied in sugarcane field i.e. 5.67% followed by 7 and 6 % on 15.9.2005 and 31.8.2005 respectively.

The data clearly showed that when the population of *T. chilonis* increased in the field due to successive releases the infestation of *C. infuscatellus* decreased in plots where 50,000 and 60,000 parasitized eggs were installed, where as in plots where 30,000 and 40,000 parasitized eggs were installed, infestation increased gradually. The maximum reduction percentage i.e. 83.38% was observed on 30-9-2005 when 60,000 parasitized eggs were installed and minimum reduction percentage was 49% when 30000 parasitized eggs were installed. The data clearly depicted that population of *T. chilonis* is directly proportional to the reduction percentage of *C. infuscatellus*. When the population of *T. chilonis* was low infestation of *C. infuscatellus* remained high but as the concentration of *T. chilonis* parasitized eggs increased gradually the population of *C. infuscatellus* also decreased and reduction percentage increased that indicated the effectiveness of stem borer. The findings of Selvaraj *et al*. (1994), Bharati *et al*. (2002), Shenhmar *et al*. (2003), Soula *et al*. (2003) and Bhat *et al*. (2004) are confirmatory to my findings.

The present findings can not be compared with those of Tanwar and Bajpai (1993), Halimie *et al*. (1994), Saikia and Roy (1998), Rajendran(1999), Rachappa and Naik (2000), Saroj and Jaipal (2000), Tanwar *et al*. (2003), Rao and Babu (2004), Sallam and Allsopp (2005), because of difference in environmental factors and also because they tested different parameters than those included in the present studies.

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Fig.1. Mean infestation of sugarcane stem borer on different dates of observation at predetermined doses

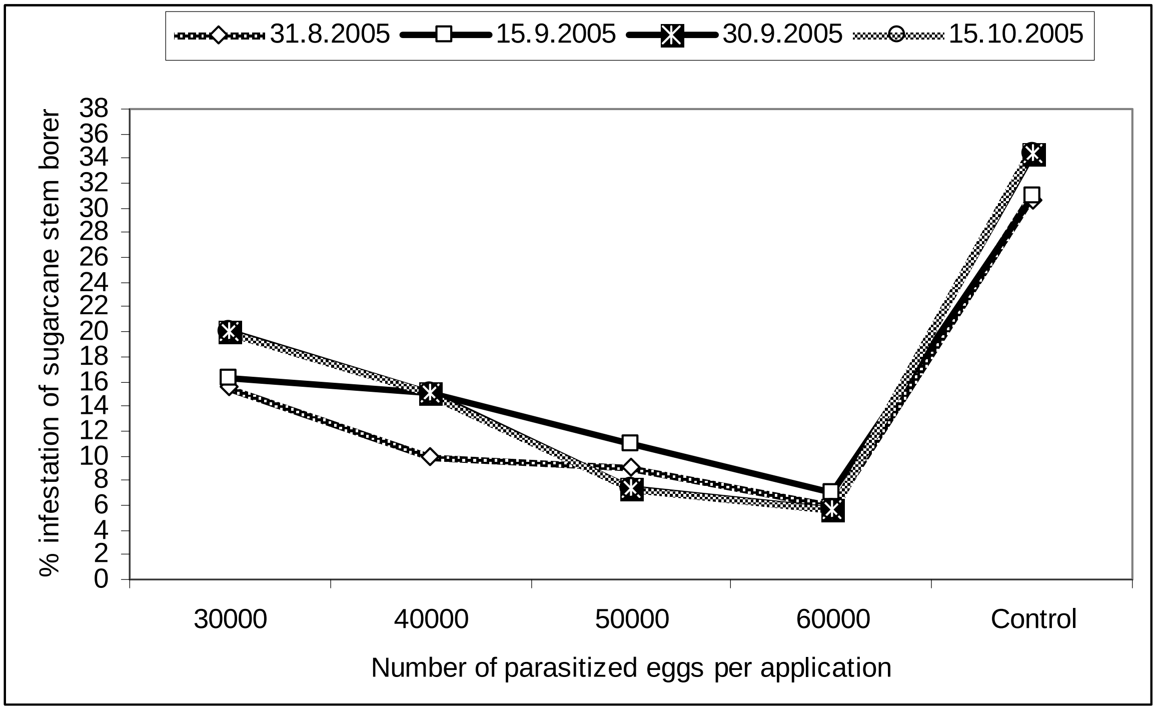

Fig.2. % reduction in infestation of sugarcane stem borer on different dates of observation at predetermined doses

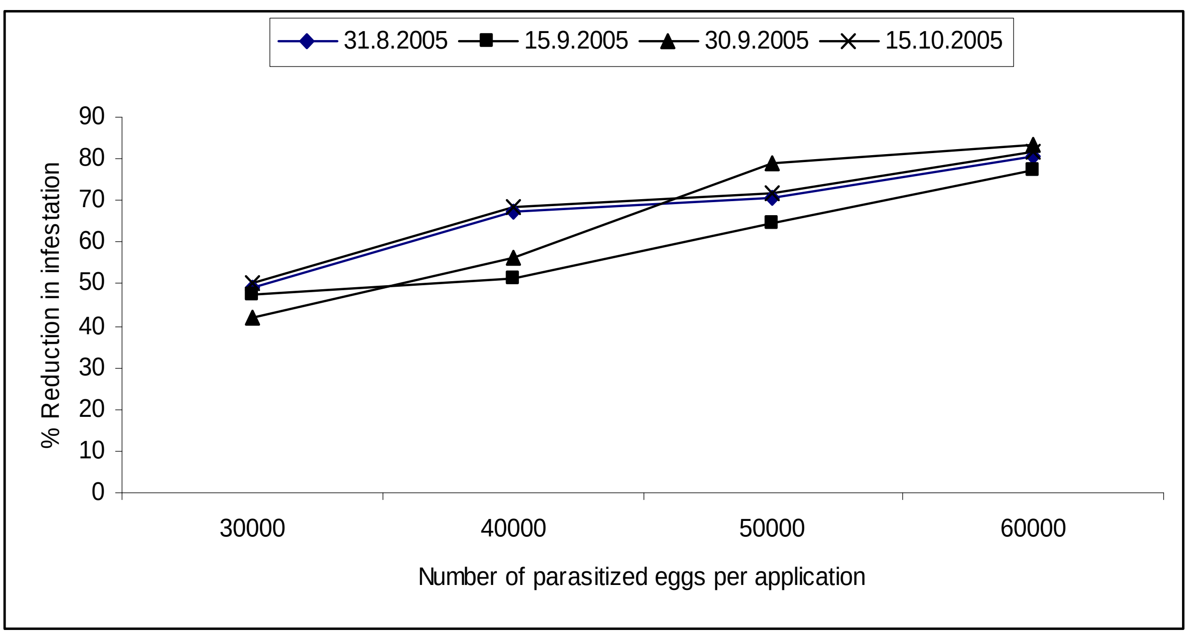

Fig. 3. Average % infestation of sugarcane stem borer through out the experimental period

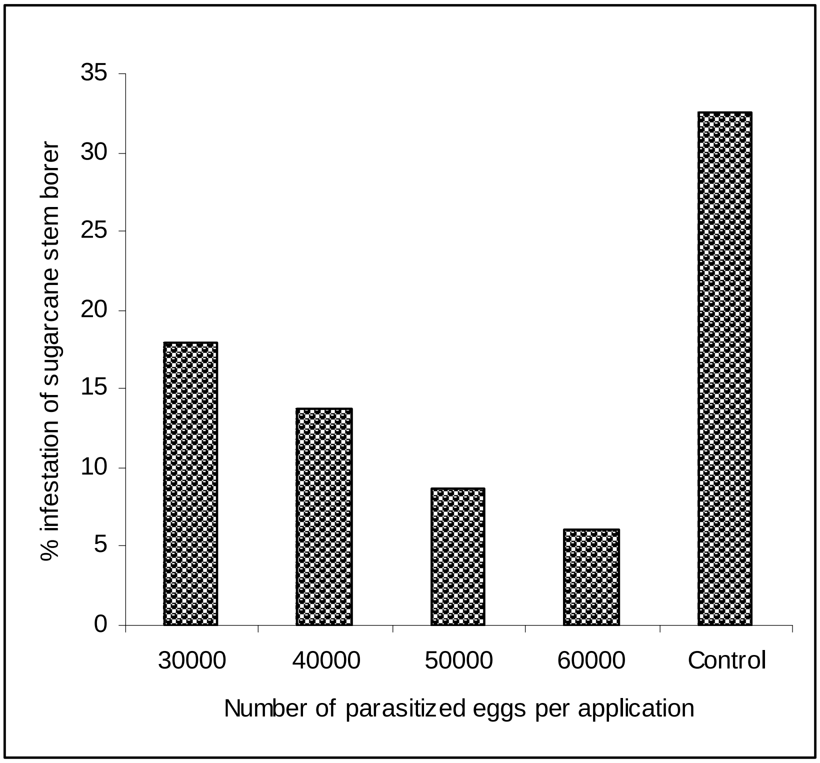

Fig.4. Average % reduction in infestation of sugarcane stem borer through out the experimental period