

## Evaluating the Efficiency of *Trichogramma evanescense* on the Corn stem borer, *Sesamia cretica* Led. under field conditions

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### Abstract:

*In order to evaluate the efficiency of Trichogramma evanescense on the Corn stem borer, Sesamia cretica Led., field experiments were carried out at a private corn field under natural conditions at Baghdad\Abu Graib, during the season of 2016. Releases of Trichogramma were conducted at two rates, 5000 parasitoids\1000m<sup>2</sup> and 10000 parasitoids\1000m<sup>2</sup> every 10 days, besides the control treatment (without release), with 100 meters of the interval distance among the treatments.. Results showed that the percentage of plant infestation by Corn stem borer were ranged from 4% to 7% in the treatment of releasing of 5000 parasitoids, and 4-5% at the treatment of 10000 parasitoids, while it was ranged from 4 to 28% in the control treatment. Biological efficiency was 37.5% for the first release of 5000 parasitoids with significant difference from the treatment of 10000 parasitoids that was 50% (p=0.018), the efficiency at the last release*

was 75% for the treatment of 5000 parasitoids and 86 % for the treatment of 10000 parasitoids without significant difference between them ( $p=0.07$ ). The efficiency was increased significantly with the increasing of accumulation release from 37.5- 75% for the 5000 parasitoids treatment ,and 50- 86 % for treatment of 10000 parasitoids. According to these results and the negative correlation between the percentage of plant infestations and the increasing of accumulation release, it can be successfully used to control the Corn stem borer.

**Key words:** *Trichogramma evanescense* Corn stem borer, *Sesamia cretica*

## INTRODUCTION

Corn (*Zea mays* L.) is one of the most economic cereal crops. It ranks third in production following wheat and rice. Maize occupies a crucial place since it used for human and livestock's consumption and as a source of industrial raw material for the production of oil, alcohol and starch. This crop is subjected to sever attack by several insect pests causing considerable damage (Setamou *et al.*, 2000). The Corn stem borer *Sesamia cretica* Led., is considered one of the most important, as larvae bore in the stems of seedlings causing deterioration of plants in the seedling stage, so it's the major limiting factors to maize production in the world (Tende *et al.*, 2005) , ,This pest cause significant decline in corn yield annually by reducing the photosynthetic area of the leaves. Also, crop losses due to death of the growing point, early leaf senescence, reduced translocation, lodging and direct damage to ears. Secondary losses have been documented due to infections by bacterial and fungal pathogens via entry points created by the stem borers within the plant tissues (Wang and Yan, 2005).

Chemical control is the most common way to control these pests in many countries but due to destructive

environmental effect of chemical pesticides in last decade researches have tried to find alternative for synthetic pesticides. Between alternative options biological control agents as like as parasitoid wasps has proved as admissible alternative for chemical pesticides. The egg parasitoid, *Trichogramma* spp. (Hymenoptera: *Trichogrammatidae*), is used extensively around the world as a biological control agent against a wide range of agricultural pests including corn borers, sugarcane borers, and cotton bollworm (Godin & Boivin, 2000). *Trichogramma* is an egg parasitoid that kills the pest before it can cause any damage to the plant. Adults of eggs parasitoid lay their eggs inside pest eggs and the larvae of parasitoid feed inner material of pest eggs and decrease the larvae population (Ahmad, *etal.* 2012). Inundative releases of several *Trichogramma* spp. occurred with variable success. In south Germany release of *Trichogramma evanescense* to control European corn borer *Ostrinia nubilalis* Hub achieved 80.5% to 96.8% reduction in plant damage (Neuffer, . 1982). 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 objectives of this study were to evaluate the effectiveness of *T. evanescens* for the management the Corn stem borer in the field .

## **MATERIALS AND METHODS**

Field experiments were carried out at a private corn field under natural conditions at Baghdad \Abu Graib,, during the season of 2016. *Trichogramma evanescens* Westwood is reared on angoumois grain moth, *Sitotroga cerealella* eggs, at 25±1°C and

75±5% relative humidity. Eggs parasitized with *Trichogramma* were attached to cards of 4 x 2 cm. Releases of *Trichogramma* wasps was conducted at two rates , 5000 parasitoids\1000m<sup>2</sup>, 10000 parasitoids\1000m<sup>2</sup> every 10 days besides the control treatment (without release) with 100 meters of interval distance among the treatments. Cards of *T. evanescens* 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 corn stem borer was monitored on the basis of randomly selected sample from each treatment. Every 10 days in each plot 100 plants selected randomly and the number of infected plants counted and recorded, the efficacy was calculated by Henderson-Tilton's formula (Henderson-Tilton, 1955). The experiment was laid out in a randomized complete block design RCBD, The data obtained was statistically analyzed by using SPSS virgin 20.

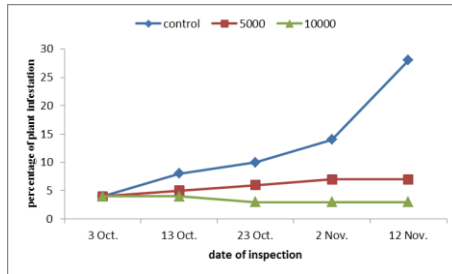
## RESULTS

Results in fig. 1 illustrate that the percentage of plant infestation by Corn borer *Sesamia cretica* were ranged from 4% to 7% in the treatment of releasing 5000 parasitoids, and it was 4-5% at treatment of 10000 parasitoids, while it was ranged from 4 to 28% in the control treatment. Biological efficacy of *T. evanescens* (fig.2) was 37.5% for the first release of 5000 parasitoids with significant difference from the treatment of release 10000 parasitoids that its biological efficacy was 50% (p=0.018), the biological efficiency at the last release was 75% for the treatment of 5000 parasitoids and 86 % for the treatment of 10000 parasitoids without significant difference between them (p=0.07. The efficiency was increased significantly with increasing of accumulation release (fig 3), it was 37.5, 40, 50 and 75% for the 5000 parasitoids treatment ,and it was 50, 60, 71and 86 % for the treatment of 10000

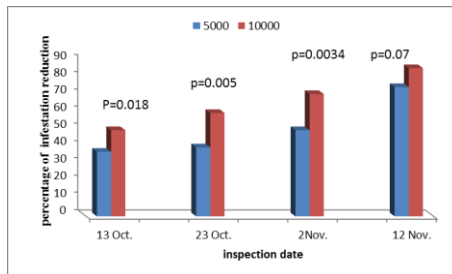
parasitoids. Negative correlation was noticed between the percentage of plant infestations and an increase of parasitoids number which indicated that it can be successfully used to control the Corn stem borer.

In south Germany release of *Trichogramma evanescense* to control European corn borer *Ostrinia nubilalis* Hub achieved 80.5% to 96.8% reduction in plant damage (Neuffer, . 1982). 10 000 individuals of *T. evanescens* were released on 1000 m<sup>2</sup> (100 000 individuals per hectare), plants damaged by the European corn borer *Ostrinia nubilalis* Hub decreased by 38.9%(Tancik,and Cagáň,2004). In Slovakia in 1987 biological efficiency of *Trichogramma evanescens* according to the attacked plants was 24.2% (Bírová, 1990). In Serbia in 1989-1991, biological efficiency amounted to 14.3 to 36.1 for *Trichogramma evanescens* and to 36.6 to 41.2% for *T. maidis* (Tancik et al., 1994). 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 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 highest efficiency of 76.0-84.9% was denoted in Germany with two releasing of 75 000 individuals of *Trichogramma evanescens* after the beginning of egg hatching (Hassan, Guo, 1991). The time of the first application is very important (Bigler, 1986, Hassan et al., 1986). Bigler (1986) made the first application in the beginning of oviposition. The first application is recommended in the beginning of the pest flight into the light traps, the second 7-10 days later on (Hassan et al., 1986), in our study the release programme was conducted

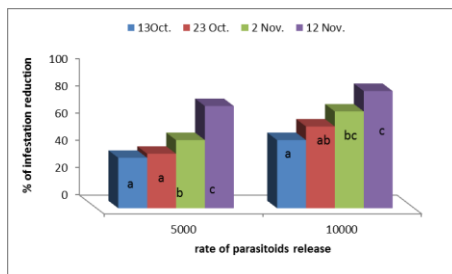
every 10 days from the first week of seedling growth. According to results of this the study and the negative correlation between the plant infestations and an increase of accumulation release, can be successfully used this parasitoid to control the Corn stem borer.



**Fig. 1** Percentage of plant infestation by *Sesamia cretica* under different releasing rates of *Trichogramma evanescens* .



**Fig. 2** Efficacy of different releasing rates of *Trichogramma evanescens* against *Sesamia cretica*



**Fig. 3** Efficacy of accumulation releasing rate of *Trichogramma evanescens* against *Sesamia cretica*

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