

**EVALUATION THE RELEASE OF *Trichogramma evanescens* WEST. FOR CONTROLLING *Pectinophora gossypiella* (SAUND.) AND *Earias insulana* (BOISD.) IN COTTON FIELDS AT MANZALA DISTRICT, DAKHLIA GOVERNORATE**

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**ABSTRACT**

Field experiments were carried out at Manzala district, Dakahlia Governorate during two successively seasons (2008 and 2009) to evaluate the release of egg parasitoid *Trichogramma evanescens* West. For controlling pink bollworm *Pectinophora gossypiella* (Saund) and Spiny bollworm *Earias insulana* (Boisd) in cotton field. The results showed that the average percentages of infestation by pink and spiny bollworms throughout the whole 2008 season were 2.9% and 5.4% in *Trichogramma* release area and insecticides treated area respectively. In the second season of study the average percentages of infestation by pink and spiny bollworms throughout the whole season were 2.3% and 5.3% in *Trichogramma* release area and insecticides treated area respectively. The results revealed that, the average percentages reduction of infestation by the two insect pest were 53.91% in 2008 season and 56.88% in 2009 season. These percentages reduction were achieved due to *T. evanescens* release. The present results revealed that *T. evanescens* is a good tool for controlling pink and spiny bollworms in cotton fields.

**INTRODUCTION**

Cotton (*Gossypium baradense* L.) is still the main cash crop in Egypt. Annually, it is cultivated in approximately 750 thousand feddans. Cotton plants are able to infestation by different insect pests during the cotton growing season causing a serious damage to the yield quality and quantity. In early and late season, the Egyptian cotton leafworm, *Spodoptera littoralis* (Boisd.) is one of the most widespread and injurious insect pests to cotton in the middle east. Using of chemicals is still having an important role in controlling insect pests. However, several problems appeared as result of extensive use of pesticides. The widespread of synthetic pesticides since 1945 helped in increasing agriculture production and decreasing the incidence of endemic and epidemic diseases. However, the massive application of pesticides, resulted in building up pest resistance to these poisons, and also resulted in adverse effectiveness on the environment. The adverse effects include acute and chronic hazards to human and non target organisms, pollution and upsetting the natural balance. In recent years, a total area of over 32 million ha of agriculture and forestry in the world has been treated annually with *Trichogramma* for controlling insect pest. In the worldwide use of *Trichogramma*, the former USSR ranked first, followed by China and Mexico. Extensive utilization of this parasitoid was developed on corn, rice, sugarcane, cotton, vegetables and pines. The most important pests controlled by

*Trichogramma* were corn borers, sugar-cane borers and cotton bollworm Li, (1992). Several authors have determined the population densities of related predators in cotton fields and studied their role in regulating the population of cotton pests in Egypt Abdel-Salam, (1995). The recent widespread application of pesticides for control of the cotton pests has in many cases had effects on the population densities of natural enemies in this country leading to considerable agricultural problems in situation of cotton pests. Several investigators studied the role of *Trichogramma* spp. in controlling different insect pests infesting the cotton crops in different parts of the world ( Ables *et al.*, 1979 ; Joes *et al.*, 1979 ; Ables *et al.*, 1980 ; Luttrell *et al.*, 1980 Ridgway *et al.*, 1981 ; ; King *et al.*, 1985 ; Pak 1988 ; Li 1994 ; Suh *et al.*, 1998 ; Charles *et al.*, 2000 ; Suh *et al.*, 2000 and Nadeem *et al* 2009 )

Therefore, the aim of the current investigation to evaluate the release of *T. evanescens* for controlling the pink and spiny bollworm in cotton crop.

## **MATERIALS AND METHODS**

Field experiments were conducted for controlling pink bollworm, *Pectinophora gossypiella* (Saund.) and spiny bollworm *Earias insulana* (Boisd.) by using egg parasitoids *Trichogramma evanescens* in one cotton field during two successively cotton seasons (2008 and 2009) at Manzala district, Dakahlia Governorate, Egypt. Ten releases were applied at six days intervals. The release times were made in the 12<sup>th</sup>, 18<sup>th</sup>, 24<sup>th</sup> ; 30<sup>th</sup> of July , 5<sup>th</sup>, 11<sup>th</sup>, 17<sup>th</sup>, 23<sup>th</sup> 29<sup>th</sup> of August and 4<sup>th</sup> of September during the two seasons of study, with a rate three cards/feddan (1000 parasitoids/each). The total number of cards were 30 cards/feddan (30000 parasitoids). One feddan was used for this investigation, and this area was divided into three equal plots that received two treatments and control (3 replicates per treatments) first was left free of any treatment as a control, the second plot received insecticides, and the third plot received release of *T. evanescens*, only for control *P. gossypiella* and *E. insulana*. Releasing the egg parasitoid was carried out on July 12<sup>th</sup> in both seasons at the rate of three cards/feddan, each cards produced 1000 individuals i.e. 30000 adults per feddan. Cotton seeds (Giza 86 varieties were sown on March 15<sup>th</sup> 2008 and 2009 seasons. All plots received the normal agricultural practices. where distances between these point was 14m and started 7m from the edges of the field. Cards were hand- placed at the early morning on a 0.5m above soil surface . The releasing cards were transported to the field in cooling box to avoid the adverse effect of hot weather during transportation. Control plot was sprayed by insecticides when infestation reached or exceeded the recommended economic threshold of bollworms in insecticides treatment. In Egypt this economic threshold was (3% of infested bolls or a catch of 8 moths/3 nights/trap) .When Inspection suggested recommended compounds such as IGR (Cascade), organophosphoric (Teleton) and pyrethroid compounds (Somi-Gold) were applied in sequence design. This resulted in four applications spaced 10-15 days in both the two seasons of study. The sequential sampling method was used to evaluate the infestation of green cotton bolls with pink and spiny bollworms. Therefore, one sample (100 green bolls) were

collected randomly from *Trichogramma* release area and control area and insecticides area. The percentages of infestation were recorded. Reduction infested bolls in *Trichogramma* release area was calculated according to the following equation:

$$\% \text{ Reduction} = \frac{C - T}{C} \times 100$$

Where C: the estimated parameter in control (insecticide treatments).

T: the same parameter in *Trichogramma* release area, and Abott formula (1925).

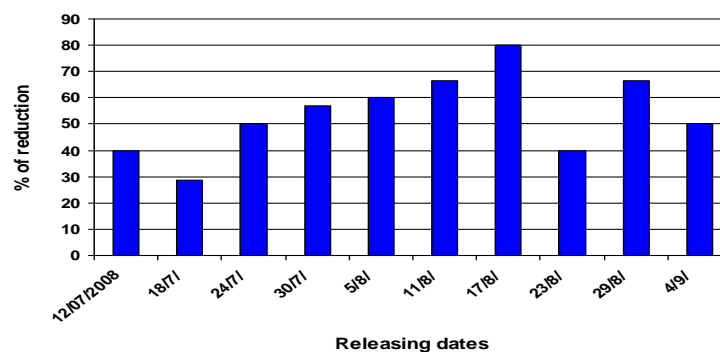
## RESULTS AND DISCUSSION

Data in (Table 1) showed the percentages Infestation of green cotton bolls with pink (PBW) and spiny (SBW) bollworms in *T. evanescens* release area comparing with insecticides treated area at Manzala district, Dakahlia Governorate during 2008 season. From this Table it can be noted that the percentages of infestation with PBW ranged between 1-4 % with an average of 1.9% in *Trichogramma* release area, while that were ranged between 3-4 % with an average of 3.4% in insecticides treated area (Table 1) . The percentages of infestation with SBW ranged between 0-3% with an average of 1.0 % in *Trichogramma* release area, while that were ranged between 1-3% with an average of 2.0 % in insecticides treated area. The average percentages of infestation by the PBW and SBW throughout the whole seasons 2.9% and 5.4% in *Trichogramma* release area and insecticides area respectively.

The illustrated data in Figure (1) showed that the percentages reduction of infestation by the two insects were ranged between 28.57- 80% with an average of 53.91%, this reduction was achieved due to *T. evanescens* release.

**Table (1): Percentages Infestation of green cotton bolls by pink (PBW) and spiny (SBW) bollworms in *T. evanescens* release area and percentages reduction comparing with insecticide treated area at Manzala district, Dakahlia Governorate during 2008 season.**

Release dates	Percentages Infestation						% Reduction
	Insecticides			<i>T. evanescens</i>			
	PBW	SBW	Total	PBW	SBW	Total	
12/7/2008	3	2	5	4	3	7	40
18 / 7	4	3	7	3	2	5	28.57
24 / 7	3	1	4	2	0.00	2	50
30 / 7	4	3	7	2	1	3	57.14
5 / 8	3	2	5	1	1	2	60
11 / 8	4	2	6	1	1	2	66.67
17 / 8	3	2	5	1	0	1	80
23 / 8	3	2	5	2	1	3	40
29 / 8	4	2	6	1	1	2	66.67
4 / 9	3	1	4	2	0	2	50
Average	3.4	2.0	5.4	1.9	1.0	2.9	53.91



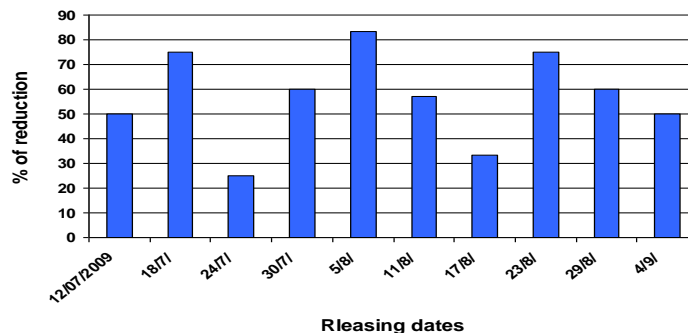
**Figure (1): Percentages reduction of PBW and SBW infestation in *Trichogramma* release area comparing with insecticides treatment area during 2008 seasons.**

Table (2) shows the percentages infestation of green cotton bolls with the two insect pests (PBW) and (SBW) bollworms in *T. evanescens* release area comparing by insecticides treated area during 2009 season. The results in this Table showed that the percentages of infestation by PBW ranged between 1-3% with an average of 1.6% in *Trichogramma* release area while that were ranged between 2-5% with an average of 3.5% in insecticides treated area (Table 2). The percentages of infestation with SBW ranged between 0-2% with an average of 0.7% in *Trichogramma* release area, while that were ranged between 1-2% with an average of 1.8% in insecticides treated area. The average of percentages infestation by the PBW and SBW throughout the whole season 2.3% and 5.3% in *Trichogramma* release and insecticides treated area respectively.

**Table (2): Percentages Infestation of green cotton bolls with pink (PBW) and spiny (SBW) bollworms in *T. evanescens* release area and percentages reduction comparing with insecticide treated area at Manzala district, Dakahlia Governorate during 2009 season.**

Date	Infestation%						% Reduction (+/-)
	Insecticides			<i>T. evanescens</i>			
	PBW	SBW	Total	PBW	SBW	Total	
12/7/2009	4	2	6	3	0	3	50
18 / 7	3	1	4	1	0	1	75
24 / 7	2	2	4	2	1	3	25
30 / 7	3	2	5	1	1	2	60
5 / 8	4	2	6	1	0	1	83.33
11 / 8	5	2	7	2	1	3	57.14
17 / 8	4	2	6	2	2	4	33.33
23 / 8	3	1	4	1	0	1	75
29 / 8	3	2	5	1	1	2	60
4 / 9	4	2	6	2	1	3	50
Average	3.5	1.8	5.3	1.6	0.7	2.3	56.88

Figure(2) shows that the percentages reduction of infestation by the two bollworms, it can be noted that, the percentage reduction ranged between 25-83.33% with an average of 56.88%, these reduction were achieved due to *T. evanescens* release. The present investigation revealed that *T. evanescens* is able to be used as biological control agent against *P. gossypiella* and *E. insulana* in cotton fields.



**Figure (2): Percentages reduction of PBW and SBW infestation in *Trichogramma* release area comparing with insecticides treatment during 2009 seasons.**

Similar results are reported by many investigators at different parts of the world, Tuhan *et al.* (1987) released *Trichogramma brasiliense* in India at area of 20000 newly emerged adults per acre per week in combination with sprays of Carbaryl, dimethoate and monocrotophos in cotton fields. They found that these treatments significantly, reduced the damage caused to cotton by *E. insulana* and *P. gossypiella*. In China, Chao *et al.* (1996) released *T. flavum* in Nanpi County, to control cotton bollworms (Nuctuidae) and found that the release of this parasitoids less costly than chemical sprays. Moreover, Cheema *et al.* (2004) stated that *T. chilonis* destroyed eggs of lepidopteron moths biologically in different genotypes of cotton crop in Pakistan, they suggested that it can be added as cotton insect pest management tool. In Egypt, previous studies showed that the local or imported species of *Trichogramma* were able to maintain pink and spiny bollworms densities below the economic level of infestation in most dissected boll samples (Abd El-Hafez and Nada 2000; Abd El-Hafez *et al.* (2002); Shalaby *et al.* (2002) and Abd El-Hafez *et al.* (2006).

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### تقييم إطلاق طفيل التريكوجراما لمكافحة دودة اللوز القرنفلية و الشوكية في حقول القطن في منطقة المنزلة - محافظة الدقهلية

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أجريت دراسات حقلية في منطقة المنزلة محافظة الدقهلية خلال عامين متتاليين 2008 - 2009 لتقييم إطلاق طفيل التريكوجراما *Trichogramma evanescens* West. في مقاومة دودة اللوز القرنفلية *Pictinophora gossypiella* (Sound) و دودة اللوز الشوكية (*Earias insulana* (Boisd.) . و أوضحت النتائج أن متوسط النسبة المئوية للإصابة بدودة اللوز القرنفلية خلال موسم 2008 كانت 2.9% و 5.4% في المساحة التي تم فيها إطلاق التريكوجراما و المنطقة التي تم فيها المعاملة بالمبيدات على التوالي. أما في الموسم الثاني من الدراسة فكانت هذه النسبة 2.4% و 5.3% في منطقة إطلاق التريكوجراما و المعاملة بالمبيدات على التوالي و أظهرت النتائج أيضا أن نسبة الخفض في الإصابة بهاتين الحشرتين 53.91% في الموسم الأول و 56.88% في الموسم الثاني من الدراسة و هذا يرجع لإطلاق التريكوجراما و تؤكد النتائج فعالية الطفيل التريكوجراما في مكافحة دودة اللوز القرنفلية و الشوكية في حقول القطن.

قام بتحكيم البحث

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