

## COMPARISON BETWEEN THE EFFICACY OF *Trichogramma evanescens* RELEASES AND THE INSECTICIDES TREATMENTS ON BOLLWORMS AND WHITEFLY IN RELATION TO THEIR PREDATORS IN COTTON FIELDS

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### ABSTRACT

Field trials were conducted at Margha district, Sohag Governorate to evaluate the egg parasitoid, *Trichogramma evanescens*. (West) release for control both pink bollworm, *Pectinophora gossypiella* (Sound.) and Spiny bollworm, *E. insulana* in the cotton fields during the two successive seasons of 2006 and 2007. Generally, the egg releases showed higher reduction in the infestations caused by pink bollworm, than the spiny bollworm either in flowers or green boll stages. On the other hand, the numbers of pink bollworm moths as well as the infestation rates caused by both pink and spiny bollworm larvae were higher in the insecticidal plots than the egg parasitoid release plots during the flowering stage infestation rates caused by *Earias insulana* (Boisd) larvae were higher in the *Trichogramma* plots than the insecticides plots during bolls stage. Plots received seven *Trichogramma* release exhibited lower numbers of insecticidal application as compared with the insecticidal plots. Moreover, higher numbers of predators were noticed in the *Trichogramma* plots in comparable with the plots treated with insecticidal treatments. Also, the numbers of whit fly nymphs were very high in the plots treated with insecticides as compared with those in insecticide treatments.

### INTRODUCTION

Pink bollworm, *Pectinophora gossypiella* (Saund.) and Spiny bollworm, *Earias insulana* (Boisd) are polyphagous insects attacking a large different host plants. The larval stage is considered the major enemy of several field crops. Synthetic recommended insecticides had been used for many years to control these pests. However, considerable problems arose from the continued application of these insecticides including the development of resistance by the insects and the pollution of the replace conventional pesticides by using biological control agents. One of these agents being the use of *Trichogramma evanescens* (west). For bollworms control in the cotton fields.

The utilization of bio-agents has been seen to increase natural enemies activity represents 65% of the mortality factors. The difference of pest suppression, Kogan (1998). against pest complex in cotton fields. Among certain natural enemies that are unable to mass-production is the egg parasitoid *Trichogramma spp.* It parasitized successfully eggs of the cotton bollworms and drastically reduces their damage (Guhan, and Arora 1987, Hassan and Guo 1991, Asifulla et al. 1998, Dunny et al. 1998 and Mesbah et al. (2003).

There fore, the present study was conducted to evaluate the effect of *Trichogramma evanescens* (West) for controlling both pink bollworm, *P. gossypiella* and *E. insulana* in the cotton fields. Also, to assess the predators number represented in the *Trichogramma* plots and whit fly, *Bemesia tabaci* numbers as comparable with the insecticidal treatments.

## **MATERIALS AND METHODS**

Experimental trails were conducted at Maragha District, Sohag Governorate for two successive seasons, i.e 2006 and 2007. An area of four feddans cultivated through out the second week of February with the recommended cotton variety *Giza 91* was selected annually for experimentation. Experimental plots received regular cultural practices.

The experimental plot was divided into two categories, two feddans for each. First one for *T.evanescens*, where it received two released at flowering growth stage and seven released at bolling stage. Second one for insecticidal treatments, where it received three insecticidal applications started mid June depending upon either the trap catches or the recommended infestation threshold level of 3%.

*Trichogramma* release dates were:

June, 1, 11, 21 and July, 2, 12, 22 and first August 2006 while as these dates in cotton season of 2007 were: June, 4, 14, 24 July 5, 15, 25 and August, 5

The parasitoid used for released was obtained from the massrearing Lab. at Shandaweel Research Station, Plant Protection Research Institute, Agricultural Research Center.

The insecticides used in both seasons were: Summi Alfa (Senvalerate). 5% EC, 400 ml/feddan, Telition (Prophenofos) 72% EC, 750 cm / feddan, Bulldock (Beta cyfluthrin), 12.5% S.C, 150 cm/ fed. and Pestban (Chloropyrifos 48% E.C, litter / feddan.

Insecticides were applied at 15-21 days intervals. Date of insecticidal treatments were:

July, 3, 18, and August 9 in 2006 cotton season where as in the season of 2007 these dates were July 5, 21 and August, 11.

Randomized sampling technique was carried out, five samples (100 flowers for each) were inspected in the field every three days from April, 20 till May, 14. both experimental categories of *Trichogramma* and insecticides. Green boll samples (100 bolls / sample) were collected weekly from two experimental plots. Percentage of infestation with pink and spiny bollworms was estimated in the flower and green bolls at the same day of collection.

Population densities of *B. tabaci* nymphs and natural enemies i.e, *Coccinella undecimpunctata* L., *Chresoprllt carnea*, (Steph) *Orius abidipennis*, *Scymnus spp* and True spiders prevails in cotton fields were recorded from first of May till the end of August. Cotton plants in 100 hills were examined and the weekly number of both natural enemies and *B. tabaci* were recorded in all plots.

Obtained data were recorded and statically analyzed using ANOVA statical method. ( Co – stae )

## RESULTS AND DISCUSSION

Results of evaluating the efficiency of *Trichogramma* releases in comparative with recommended insecticides against the pink bollworm *P.gossypiella* (Table) and spiny bollworm, are summarized in Table (1) and (2).

Data presented in Table (1) clarified that efficacy of the different treatments as mentioned previously against pink and spiny bollworms infesting flowering stage. The obtained results indicated that *Trichogramma* was more effective in protecting the cotton flowers from Pink and Spiny bollworms attack in comparable with insecticidal treatments during two successive seasons of 2006 and 2007.

Data in Table (2) show the percentages of infestation with bollworms for ten successive inspections during the two seasons.

The mean percent of infestations with two pests through May in the area treated with *Trichogramma* were (0.55 and 0.40) in the two seasons as compared with (0.92 and 0.69) in the area treated with recommended insecticides during the two seasons of 2006 and 2007, respectively. On the other hand these means of the infestation percentages were 1.68 and 1.05 in the plots treated with *Trichogramma*, in contrast of 2.1 and 2.18 in insecticides area during the two successive seasons, respectively.

Generally the results indicated that the percent of infestations with Pink and Spiny bollworms in insecticides plots were two times; approximately than that in *Trichogramma* treatments during the whole season through the two successive seasons; i.e 2006 and 2007.

**Table (1): Percent infestation with bollworms in flowers in the insecticide and *Trichogramma* applications during cotton seasons of 2006 and 2007 in Sohag Governorate.**

Inspection		% Infestation											
		2006						2007					
No.	Date	Treatments						Treatments					
		Trichogramma			Insecticides			Trichogramma			Insecticides		
		P	S	T	P	S	T	P	S	T	P	S	T
1	April, 20	0.0	0.0	0.0	0.0	0.0	0.0	0.50	0.0	0.50	0.0	0.0	0.0
2	April, 23	0.0	0.3	0.3	0.4	0.2	0.6	0.2	0.2	0.40	0.2	0.0	0.2
3	April, 26	0.1	0.5	0.6	0.5	0.6	1.1	0.3	0.2	0.5	0.25	0.25	0.50
4	April, 29	0.7	0.6	1.3	0.4	0.6	2.00	0.0	0.4	0.4	0.86	0.69	1.55
<b>Mean</b>		0.2	0.35	0.55	0.33	0.33	0.66	0.25	0.2	0.45	0.33	0.24	0.39
5	May,2	0.6	0.9	1.5	0.7	0.9	1.6	0.4	0.7	1.1	0.6	0.4	1.00
6	May,5	1.0	0.9	1.9	1.4	0.9	2.3	0.9	0.6	1.5	0.7	0.8	1.50
7	May,8	0.9	1.0	1.9	1.5	1.0	2.5	0.40	0.25	0.65	1.0	0.93	19.50
9	May, 11	1.2	0.8	2.0	1.7	1.3	3.0	1.0	0.95	1.95	1.5	1.10	2.25
10	May,14	0.4	1.1	1.41	1.5	0.6	2.15	0.4	0.23	0.63	0.70	0.45	1.25
<b>Total</b>		4.1	4.8	8.71	7.0	4.7	11.55	4.10	2.73	6.63	4.50	3.680	7.30
<b>Mean</b>		.82	0.96	1.74	1.4	0.94	2.31	0.82	0.55	1.64	0.9	0.74	1.46

P = Pink bollworm.  
S = Spiny  
T= Summation P. & S.

**Table (2): Percent infestation with bollworms in green bolls in the insecticide and Trichogramma applications during cotton seasons of 2006 and 2007 in Sohag Governorate.**

Inspection No.	Inspection Date	% Infestation													
		2006						2007							
		Trichogramma			Insecticides			Trichogramma			Insecticides				
		P	S	T	P	S	T	P	S	T	P	S	T		
1	24/5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	31/5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	7/6	0.0	0.0	0.0	0.10	0.22	0.32	0.0	0.0	0.0	0.07	0.0	0.07	0.0	0.07
4	14/6	0.60	0.20	0.80	0.47	0.01	0.48	0.0	0.1	0.1	0.23	0.0	0.23	0.0	0.23
5	21/6	0.0	0.4	0.40	0.36	0.0	0.36	0.0	0.6	0.6	0.40	0.0	0.40	0.0	0.40
6	28/6	0.0	0.89	0.89	0.94	0.0	0.94	0.0	0.1	1.0	0.95	0.08	0.51	0.08	0.51
7	7/7	0.0	0.20	0.20	0.89	0.0	0.89	0.0	0.0	0.0	0.25	0.04	0.29	0.04	0.29
8	14/7	0.0	0.6	0.60	1.53	0.0	1.53	0.0	0.0	0.0	0.50	0.0	0.50	0.0	0.50
9	21/7	0.0	0.0	0.0	0.10	1.90	2.00	0.3	0.4	0.7	0.89	0.0	0.89	0.0	0.89
10	28/7	0.3	0.2	0.5	-	-	-	0.0	0.4	0.4	2.2	0.0	2.20	0.0	2.20
<b>Total</b>		<b>0.9</b>	<b>2.29</b>	<b>3.39</b>	<b>4.29</b>	<b>2.13</b>	<b>6.52</b>	<b>0.3</b>	<b>2.5</b>	<b>2.8</b>	<b>5.49</b>	<b>0.12</b>	<b>5.61</b>	<b>0.12</b>	<b>5.61</b>
<b>Mean</b>		<b>0.09</b>	<b>0.25</b>	<b>0.34</b>	<b>0.43</b>	<b>0.22</b>	<b>0.65</b>	<b>0.03</b>	<b>0.25</b>	<b>0.28</b>	<b>0.55</b>	<b>0.01</b>	<b>0.56</b>	<b>0.01</b>	<b>0.56</b>

P= Pink boll worm.

S= Spiny boll worm.

T= Summation (Pink & Spiny boll worm)

Data represented in Table (2) show percentage of green boll infestations caused by pink and spiny bollworms as a result of using Trichogramma as compared with insecticidal applications during two successive cotton seasons of 2006 and 2007. It is obvious that the total percentages of the green bolls infestation with both bollworms were always significantly lower in the area treated with Trichogramma as compared with insecticide area, these results are in agreement with those of Khidr, et al 2003.

The percent infestations with pink bollworm *P.gossypiella* in Trichogramma area throughout the cotton season 2006 were zero except the two inspections numbers 5<sup>th</sup> 11, 06 and 03, respectively. On the other hand the percent infestations with pink boll worm in the same season in the insecticides area were positive in nine inspections and negative in two inspections only i.e. first and second inspection. Generally, the percent of infestations with pink bollworm in Trichogramma area were lower than those in insecticides area.

Concerning the data represented in Table (2) , it is noticed that the percent of infestations with spiny bollworm in Trichogramma area were higher than in the insecticides area. This indicated that Trichogramma had higher potency to protect the bolls against pink than the spiny bollworm.

Referring to the effectiveness the different treatments on the natural enemies. The obtained data presented in Table (3) clarified that the population density of the present predators recorded remarkable higher numbers in the plots treated with Trichogramma as compared with those in insecticidal treatments. The predatory numbers in the plots received the egg parasitoid, Trichogramma releases were more than two times as their numbers in the plots applied with recommended insecticides. It means the treatment with Trichogramma releases kept the predatory numbers to do its role in the integrated pest management program.

**Table (3): Weekly numbers of predators per 100 hills of Trichogramma area as compared with insecticides area through cotton seasons 2006 and 2007.**

Data of count	Total numbers of predator					
	Insecticide area			Trichogramma area		
	2006	2007	Mean	2006	2007	Mean
<b>May,1</b>	11	8	9.5	20	12	16.0
8	15	12	13.5	47	58	52.5
15	20	49	34.5	22	69	45.5
23	40	39	39.5	60	87	73.5
30	80	60	70.0	89	60	74.5
<b>Mean</b>	<b>33.2</b>	<b>39.6</b>	<b>33.4</b>	<b>47.6</b>	<b>57.2</b>	<b>52.4</b>
<b>June,4</b>	82	55	68.5	117	130	123.5
11	70	86	78.0	189	207	198.0
18	101	71	86.0	160	195	177.5
25	55	112	88.5	200	250	225.0
<b>Mean</b>	<b>79.5</b>	<b>81.0</b>	<b>80.25</b>	<b>174.0</b>	<b>195.5</b>	<b>181</b>
<b>July,2</b>	55	77	66.0	230	160	195.0
9	17	52	34.5	190	154	172.0
16	36	45	40.5	160	76	118.0
23	15	107	61.0	103	56	79.5
30	12	16	14.0	45	52	48.5
<b>Mean</b>	<b>27.0</b>	<b>59.4</b>	<b>43.0</b>	<b>145.6</b>	<b>99.6</b>	<b>122.6</b>
<b>Total</b>	<b>609.0</b>	<b>789.0</b>	<b>704.0</b>	<b>1639</b>	<b>1557</b>	<b>1362.2</b>
<b>General mean</b>	<b>43.50</b>	<b>56.34</b>	<b>50.3</b>	<b>117.07</b>	<b>111.2</b>	<b>97.3</b>

Table (4) shows that generally, the numbers of *B. tabaci* nymphs in Trichogramma area are very low as compared with those in insecticides area this due to the use of Trichogramma has not effect on natural enemies which play positive role on *B. tabaci* control

Data present in Table (4) clear that the numbers of *B. tabaci* nymphs in insecticides application are two ones those in trichogramma applications. Also data in this table show that the lowest mean of *Bemisia tabaci* in Trichogramma area is 12 in the first week of August while this number is 61 in the first third of August in insecticide area.

**Table (4): Efficiency of Applications with trichogramma on mean numbers of white fly *Bemisia tabaci* as compared with insecticide applications during two seasons 2006 and 2007.**

Investigate No	Investigation date	Account of B.T	
		Tricho. Area	Insect. Are.
1	July, 10	60	61
2	July, 17	83	91
3	July, 24	50	83
4	July, 31	28	112
5	August, 7	12	73
6	August, 14	16	61
<b>Total</b>		<b>249</b>	<b>481</b>
<b>Mean/ Wean</b>		<b>41.5</b>	<b>80.17</b>

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### مقارنة بين تأثير إطلاق طفيل التريكوجراما والمعاملة بالمبيدات على ديدان اللوز (القرنفلية والشوكية) والذبابة البيضاء وعلاقة ذلك بالمفترسات المتواجدة في حقول القطن

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أجريت هذه التجارب بهدف دراسة تأثير إطلاق طفيل التريكوجراما على مكافحة دودتي اللوز القرنفلية والشوكية والذبابة البيضاء بمحافظة سوهاج خلال موسمي قطن ٢٠٠٦، ٢٠٠٧ وذلك بالمقارنة بالمبيدات الموصى بها من قبل وزارة الزراعة. وتم دراسة هذا التأثير على كل من:

- الإصابة بديدان اللوز (القرنفلية والشوكية) في الأزهار واللوز الأخضر.
- تعداد الأعداء الحيوية في منطقتي المعاملة.
- أعداد الذبابة البيضاء في المساحة المعاملة التريكوجراما والمبيدات

أوضحت النتائج المتحصل عليها أن تأثير الطفيل على نسب الإصابة بدودة اللوز القرنفلية أكثر من تأثيره على نظيرتها في الشوكية كما أوضحت النتائج أن الأعداء الحيوية في منطقة المعاملة بالتريكوجراما كانت أضعاف مثلتها في منطقة المعاملة بالمبيدات. وأظهرت النتائج أيضا أن أعداد الذبابة البيضاء في منطقة المعاملة بالمبيدات كانت أكثر منها في منطقة المعاملة التريكوجراما ويعزى ذلك إلى زيادة الأعداء الحيوية في منطقة المعاملة التريكوجراما عنها في منطقة المعاملة بالمبيدات.