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EFFECT OF RELEASING TIME OF *TRICHOGRAMMA EVANESCENS* WESTWOOD FOR CONTROLLING *PECTINOPHORA GOSSYPIELLA* (SAUND.) AND *EARIAS INSULANA* (BOISD.) IN BENI-SUEF GOVERNORATE, EGYPT.

BY

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ABSTRACT

Field experiments were conducted at Naser city, Beni – Suef Governorate, to determine the effect of releasing time of *T. evanescens* in suppressing the population of pink bollworm, *P. gossypiella* and Spiny bollworm, *E. insulana* during the two seasons 2006 and 2007. The best release time of *T. evanescens* for controlling these pests were with 1st fruiting branch and 1st flower. The average seasonal % reduction was 87.64 and 85.32 % for pink bollworm, while, it were 78.13 and 72.99 % for spiny bollworm. The release time of *T. evanescens* with 1% and 3 % green boll infestation was the least effective. The average seasonal % reduction was 63.65 and 47.8 % for pink bollworm and it were 51.48 and 33.6 % for spiny bollworm, respectively.(Ministry program is 83.05 and 76.0 % for pink and spiny bollworm, respectively).

INTRODUCTION

Cotton is a crop of great economic importance in Egypt. This plant is susceptible to infestation by several insect pests. Low yield of cotton is mainly related to damage in bolls caused by the pink bollworm, *P. gossypiella* and the spiny bollworm, *E. insulana* which attacked the fruiting portions, squares, flowers and green bolls reducing both quantity and quality of the harvested lint and seeds during the late season. The main way for controlling these pests is still by using chemical insecticides. There are many problems which have appeared with repeated use of insecticides including hazards to man and his animals by environmental pollution and also the appearance of resistant strains of insect pests to insecticides (Metwally *et al.*, 1980and Nassef & Watson 1999). Mass – production and release of trichogramma egg parasitiods is regarded as a promising approach to reduce egg hatching and subsequent crop damage by cotton bollworms. (Abd El – Hafez *et al.*, 2002; Shalaby *et al.*, 2002; Abd El – Hafez 2004 and Mohamed, 2004). Recently, the Minstry of Agriculture established 18 laboratories at different Governorates for producing the parasitoid *Trichograma* with the aim of controlling cotton bollworms and several lepidopteran pests on vegetables and other crops. The present study aims to evaluate four releasing times of the egg parasitiods to choose the proper timing for releasing of the egg parasitiod, *T. evanescens* for controlling the cotton bollworms.

MATERIALS AND METHODS

1- Rearing technique.

T. evanescens Westood was reared on the grain moth, *Sitotroga cerealla* Oliv. eggs in the laboratory, Naser city, Beni- suef Governorate. The egg parasitoids were released as mature pupa into the field using a release card that protects them from predators. The release card was prepared in the laboratory. This card contains three strips of paper 1 x 1 cm that contain about 300-350 parasitoid pupae /a strip at three different stages of development 1, 2 and 3 days before

emergence. Cards were hanging manually before the sunset on the plant at about 50 cm above the ground. Twenty – two cotton plants / fed. were selected to serve as release points. The distance between these points was 14 meter and started 7 meter from the edges of the field.

2- Field experiments

The field experiments were carried out at Beni –suef Governorate in an area of about 3 fed. cultivated with the cotton varity Giza 80 . The experiments were conducted during two successive agricultural seasons 2006 and 2007. The area was divided into 6 plots and one treatment was used as a control. Each plot was divided into two replicates. Four releasing times of, *T. evanescens* were evaluated to choose the proper release time as compared to the Ministry program as follows.

Releasing time	Releasing rate/ fed. / 10days
With 1st fruiting branch	22 card
with 1st flower	22 card
With 1% infestation	22 card
With 3% infestation	22 card
Recommended Ministry Program (RMP)	different rates *
Untreated (check)	---

* RMP: Including 1st spray: Dursban 48% EC 1000 cm^3, 2nd spray Sumialpha 5% EC 600 cm^3 and the 3rd spray was Spintor 24 % SC 50 cm^3.

3- Estimation of the crop losses.

Reduction yield of cotton due to pink and spiny bollworms damage was determined at the end of each cotton season. The economic loss percentages of bolls were determined according to Hosny *et al.*, 1967:

$$\text{Yield loss \%} = \frac{\text{Total potential yield} - \text{Obtained yield}}{\text{Total potential yield}} \times 100$$

$$\frac{(A+B+C+D) - (A+2/3B1+1/3B2)}{A+B+C+Dd} \times 100$$

Where:

Total potential yield = A+B+C+D

Obtained yield = A+ 2/3B1 +1/3 B2

Where:

A= completely opened bolls.

B = partially opened bolls.

C= Green infested bolls.

D= Dried infested bolls.

B1= 2/3 partially opened bolls

B2= 1/3 partially opened bolls

RESULTS AND DISCUSSION

Data presented in Table 1 and Fig. 1 show the releasing time of *T. evanescens* for controlling the pink bollworm, *P. gossypilla* and spiny bollworm, *E. insulana* to choose the best proper releasing time .

The first releasing time was with first fruiting branch. The average seasonal percentage reduction of *P. gossypilla* was 87.64, but it was 78.13 for *E . isulana* as a compared to 83.05 and 76.00 for pink and spiny bollworms for the Ministry program, respectively. The second releasing time was with the first flower. The average seasonal percentage reductions for pink and spiny bollworms were 85.32 and 72.99 respectively. The third and fourth releasing times were with 1 and 3% green bolls infestation. The average seasonal percentage reductions were 63.65 and 47.8 % for pink bollworm, but, it were 51.48 and 33.60 for spiny bollworm, respectively, as a compared with 83.03 and 76.0 for the Ministry program.

Table (1): Effect of releasing time of *T. evanescens* on suppressing infestation with *P. gossypiella* and *E. insulana* separately at Beni –suef Governorate, Naser city during 2006 and 2007 seasons.

Releasing time	Releasing rate/ fed.	Av. % of reduction at indicated months after releasing			** Av. Seasonal % reduction
		July	August	Septem.	
P. gossypiella					
With 1st fruiting branch	22 card	88.85	85.85	88.23	87.64 a
with 1st flower	22 card	76.35	89.44	90.17	85.32 a
With 1% infestation	22 card	66.77	69.97	54.21	63.65 b
With 3% infestation	22 card	29.06	63.09	51.25	47.80 c
Ministry program	different rates #	70.83	89.95	88.37	83.05 a
Untreated (check)	----	0.00	0.00	0.00	0.00
F value					11.16
L.S.D at 5% level					16.71
E. insulana					
With 1st fruiting branch	22 card	83.33	74.09	76.96	78.13 a
with 1st flower	22 card	66.67	85.09	67.21	72.99 a
With 1% infestation	22 card	60.42	48.49	45.53	51.48 b
With 3% infestation	22 card	37.50	38.33	24.96	33.60 c
Ministry program(RMP)	different rates #	70.83	77.59	79.58	76.00 a
Untreated (check)	----	0.00	0.00	0.00	0.00
F value					20.17
L.S.D at 5% level					11.66

** Av. % reduction in infestation calculated according to Abbott formula (1925)

** The values marked with the same letter are not significantly different according to the value to the L. S. D. test at 5% level.

RMP: Including 1st spray: Dursban 48% EC 1000 cm^3, 2nd spray Sumialpha 5% EC 600 cm^3 and the 3rd spray was Spintor 24 % SC 50 cm^3 / feddan.

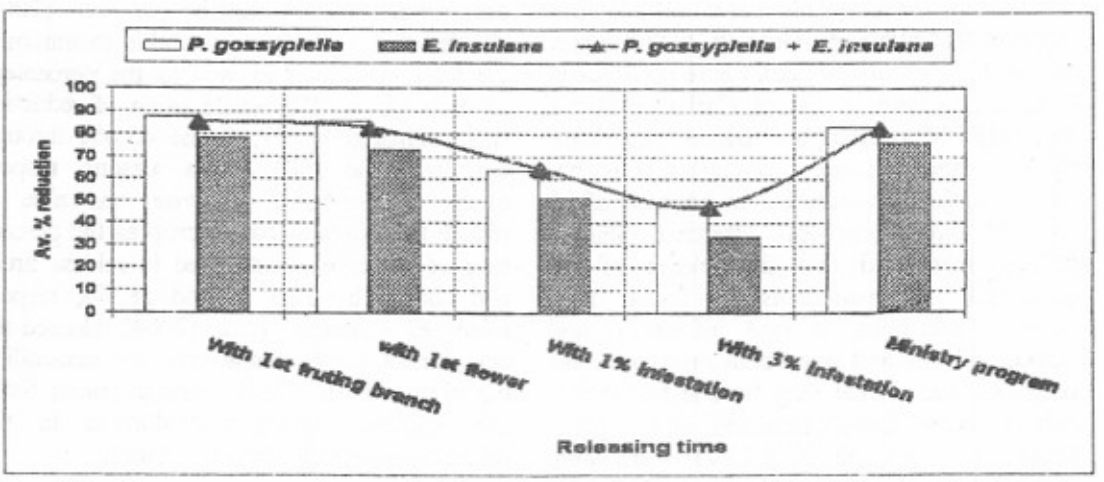

Fig. (1): Average percentage reduction of cotton bollworms with different releasing time of *T. evanescens*.

Statistical analysis of data indicated that there are no significant differences between the Minstry program and the releasing time of *T. evanescens* with 1st fruiting branch and the 1st flower, while, there are significant differences between the releasing times (1 and 3 % infestations) and others releasing times of *T. evanescens*

Regarding to Table 2 the average seasonal percentage reduction of the two pests, the best proper time of *T. evanescens* were with the the first fruiting branch,where the average seasonal percentage reduction was 85.39 as a compared with 82.58 for the Ministry program, while the releasing time of *T. evanescens* with 3 % green bolls infestation was the least effective, where the average seasonal percentage reductions was 47.6. Statistically, there is no significant difference between the Ministry program and the release of *T. evanescens* with the first fruiting branch and first flower.

Table (2): Effect of releasing time of *T. evanescens* on suppressing infestation with *P. gossypiella* and *E. insulana* together at Beni –suef Governorate, Naser city during 2006 and 2007 seasons.

Releasing time	Releasing rate/ fed.	Av. % of reduction at indicated months after releasing			**Av. Seasonal % reduction
		July	August	Septem.	
P. gossypiella + *E. insulana*					
With 1st fruiting branch	22 card	87.72	83.48	84.97	85.39 a
with 1st flower	22 card	74.23	90.51	83.41	82.72 a
With 1% infestation	22 card	75.38	67.22	51.71	64.77 b
With 3% infestation	22 card	41.87	57.02	43.90	47.60 c
Ministry program	different rates #	79.56	82.34	85.83	82.58 a
Untreated (check)	---	0.00	0.00	0.00	0.00
F value					12.97
L.S.D at 5% level					12.92

** Av. % reduction in infestation calculated according to Abbott formula (1925)

** The values marked with the same letter are not significantly different according to the value to the L. S. D. test at 5% level.

RMP: Including 1st spray: Dursban 48% EC 1000 cm^3, 2nd spray Sumialpha 5% EC 600 cm^3 and the 3rd spray was Spintor 24 % SC 50 cm^3 / feddan.

In this respect, Tuhan *et al.* (1987) They reported that although releasing 20,000 newly emerged *T. brasiliense* adult / acre per week in combination with sprays of Carbaryl, Dimethoate and Monocrotophos reduced significantly the damage caused to cotton bolls but release at the same rate but at intervals of 15 and 30 days were less effective. Shawer (2000), mentioned that the release of the parasitoid, *T. evanescens* in cotton field induced reductions in boll infestation and number of pink and spiny bollworm larvae for only two weeks, that may be due to the fact that one wave release technique of this parasitoid is not enough to achieve a desirable control in cotton fields. Nazir *et al.* (1996) reported that the parasitoid, *T. chilonis* was more effective in controlling *P. gossypiella* than in controlling *Earias sp.* Abd El – Hafez *et al.* (2001) mentioned that the parasitization of *T. evanescens* and *T. bactrae* on eggs of *P. gossypiella*, were the most preferred by both parasitoids. Also, Shalaby *et al.* (2002) showed that *T. bactrae* was able to minimize the total infestation as well as the percentage of crop losses. The whole mean of reduction was estimated by 57.58 and 65.6% through out 2000 and 2001 cotton seasons, respectively. Moreover, *T. bactrae* was able to reduce the losses in cotton crop as the percentage of losses was estimated in release areas and control by 12.3 % and 58.9%, respectively. El – Heneidy *et al.* (2004) released the egg parasitoid, *T. evanescens for* controlling the pink and spiny bollworms in cotton fields that showed significant reduction in the percentages of bollworms infestation.

Estimation of the crop losses.

The % economic losses in cotton yields were estimated during 2006 and 2007 seasons. Data in Table 3 and Fig. 2 show the % economic losses in cotton yields and average actual yield. The least economic

losses were obtained with the Ministry program, the release of egg parasitoids with the first fruiting branch and first flower, where it were 8.2. 10.1 and 9.3 as a compared with 29.4 for control. On the other hand, the average actual yields were 8.9, 8.3 and 8.1 kentar / fed. as compared with 3.95 kentar / fed.) for control, respectively.

Table (3): Effect of releasing time of *T. evanescens* on the average % of economic losses and the average actual yield.

Releasing time	No. of com. open bolls	No. of bolls 2/3 opened	No. of bolls 1/3 opened	No. of green infested bolls	No. of dried infested bolls	% economic losses**	average actual yield**
With 1st fruiting branch	1351	50	60	74	30	10.1 a	8.30 a
with 1st flower	1150	32	56	47	29	9.3 a	8.10 a
With 1% infestation	1021	69	98	56	36	14.2 b	6.16 b
With 3% infestation	790	104	57	87	120	24.1 c	5.37 c
Ministry program	1224	44	52	24	39	8.2 a	8.90 a
Untreated (check)	785	134	154	130	109	29.4 c	3.95 d
F value						115.9	8.23
L.S.D at 5% level						2.47	2.02
at 1% level						3.37	2.75

** The values marked with the same letter are not significantly different according to the value to the L. S. D. test at 5% level.

The pink and spiny bollworms considered as the serious pests of cotton, causing losses in yield and quality of lint and seeds. Jayaswal and Saini (1982) in India, stated that the pink bollworm *P. gossypilla* is the most destructive insect pest of cotton . It causes 70-90% damage to green bolls.Butter *et al.* (1990) determined the economic threshold level of bollworms, *P.gossypiella*, *E. insulana* and *H. armigera* infestation by 4% of infested fruiting bodies on cotton plants. Mansour 2004 found that the rate of damage caused by the cotton bollworms, *P.gossypiella* and *E. insulana* was 29.0, 28.38, 26.25 and 20.63 in treatments by *B.t*, *T. evanescens*, *T. evanescens* with *B.t* and chemical insecticides in 2001 season.

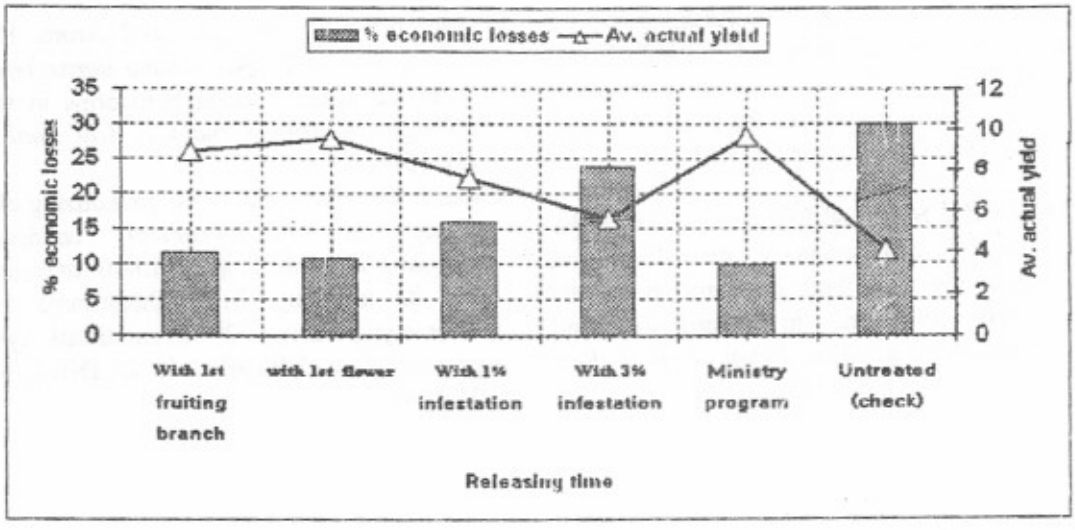

Fig. (2): Effect of releasing time of *T. evanescens* on the average % of economic losses and the average actual yield .

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تأثير وقت إطلاق طفيل البيض *TRICHOGRAMMA EVANESCENS* WESTWOOD لمكافحة ديدان اللوز القرنفلية والشوكية في حقول القطن. محافظة بني سويف .

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أجريت تجارب حقلية في مدينة ناصر – محافظة بني سويف لاختيار التوقيت المناسب لإطلاق طفيل البيض *T. evanescens* لمكافحة دودة اللوز القرنفلية *P.gossypiella* و دودة اللوز الشوكية *E. insulana* في حقول القطن المصرية خلال موسمي ٢٠٠٦ ، ٢٠٠٧ . حيث تم إطلاق الطفيل بمعدل ٢٢ كارت للفدان مع أول فرع ثمري – مع أول زهرة – مع نسبة إصابة لوز أخضر ١% ، ٣% مقارنة ببرنامج وزارة الزراعة لهذين الموسمين .

ومن النتائج تبين أن أفضل وقت لإطلاق طفيل البيض مع أول فرع ثمري وأول زهرة حيث كان متوسط نسبة الخلط لدودة اللوز القرنفلية ٨٧,٦٤ % ، ٨٥,٣٢% وكانت بالنسبة لدودة اللوز الشوكية ٧٨,١٣% ، ٧٢,٩٩% . أما بالنسبة لإطلاق الطفيل مع نسبة إصابة اللوز الأخضر بـ ١% أو ٣% كانت أقل تأثيرا حيث كان متوسط نسبة الخفض ٦٣,٦٥% ، ٤٧,٨% بالنسبة لدودة اللوز القرنفلية بينما كانت ٥١,٤٨% ، ٣٣,٦% بالنسبة لدودة اللوز الشوكية .

فمن النتائج السابقة يتضح أنه لابد من إطلاق طفيل البيض *T. evanescens* مع أول فرع ثمري أو مع أول زهرة لنبات القطن حيث أعطت أفضل النتائج في مكافحة ديدان اللوز.