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Use of the Egg Parasitoid *Trichogramma evanescens* West. For Controlling the Rib Miner, *Scrobipalpa ocellatella* Boyd in Sugar Beet in Egypt (Lepidoptera:Gelechiidae)

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ABSTRACT

Seven releases of the egg parasitoid *Trichogramma evanescens* West. were applied each season in sugar beet in Fayoum governorate for controlling the rib miner moth, *Scrobipalpa ocellatella* Boyd at rates of ca. 12 000 parasitoid/feddan during the occurrence of the 1st and 3rd generations at 10 day intervals. The early three releases in December against the first generation of the pest successfully suppressed the infestation reaching reduction rates of 66, 93 and 94% in season 2002/2003 and 78, 94 and 92% in season 2003/2004, respectively. The late 4 releases in March against the third generation reached reduction rates of 75, 83, 92 and 97% in the first season and 57, 90, 96 and 96% in the second season, respectively.

Key Words: Egg parasitoid, *Trichogramma evanescens*, sugar beet moth, *Scrobipalpa ocellatella*, biological control.

INTRODUCTION

The gelechiid rib miner, *Scrobipalpa ocellatella* Boyd was recorded in Egypt by Willcocks (1922) among the Egyptian insect fauna. As sugar beet was introduced in Egypt, Hammad, (1968) recorded it as a common pest on the crop. Ten years later, it became a destructive pest for sugar beet allover the production areas causing high economic damage (Hammad *et al.*, 1968; Mahmoud *et al.*, 1973; Akil, 1974; Iskander, 1982; Hosny *et al.*, 1983; Guirgis, 1985; Mesbah *et al.*, 1985; Youssif, 1986; Abo-Saied, 1987; and El-Zoghby, 1999). Chemical insecticides are usually used to control the sugar beet pests (Abelentseva and Kreminiskaya, 1986; Kasza, 1996; and Sabluk *et al.*, 2002). El-Husseini *et al.* (2004) stated that the intensive use of chemical pesticides in sugar beet suppressed the role played by the natural enemies in the agroecosystem, of which importance was previously mentioned by Tron (1985). IPM programs in sugar beet minimize the use of pesticides to encourage the role played by natural enemies, where chemical insecticides could be applied into soil as granule formulations instead of spraying (Torn, 1985); or as seed dressing for protection of sugar beet seedlings (Bracic *et al.* 2000 and Fedorinko, 2002).

The egg parasitoid *Trichogramma evanescens* West.was recorded among the natural enemies found in sugar beet fields (Torn, 1985). The present study deals with releasing this native egg parasitoid currently used against different lepidopterous insect pests in Egypt for controlling the beet rib miner, *S. ocellatella* in seasons 2002/03 and 2003/04 in Fayoum governorate.

MATERIALS AND METHODS

T. evanescens was reared on eggs of the grain moth, *Sitotroga cerealella* Zeller according to the method described by Li (1986). Produced releasing cards included about 3000 parasitized eggs/card. Each card contains 3-age groups, each of about 1000 parasitized eggs, allowing adult emergence of *Trichogramma* along a period of one-week post card installation in the sugar beet field. The releasing card was placed at the plant heart and by 10m distances, *i.e.* 40 card/feddan/release (= 120 000 *Trichgramma* adults). Three releases were carried out in December and another four in March in seasons 2002/03 and 2003/04 in Fayoum governorate. The control field (2 feddans) located 800 meters far from the experimental field (5 feddans). The parasitoid release started by the presence of the first instar larvae on the plants.

The reduction among larval population in the experimental field was calculated with the formula of Hendreson and Tilton (1955):

$$100\ (1 - \frac{Ta \times Cb}{Tb \times Ca})$$

Where Ta = number of larvae after release; Tb = number of larvae before release; Ca = number of larvae in the control after release; and Cb = number of larvae in the control before release.

RESULTS AND DISCUSSION

Season 2002/2003

Data presented in Table (1) and Fig.(1) showed that the first release (December, 1st) of the egg parasitoid *T. evanesceus* in season 2002/03 decreased the larval population of the beet rib miner *S. ocellatella* from 12 to 4 larvae /10 plants (66% reduction) among the larval population 10 days post release. The second release (December, 10th) kept the level of larval infestation at the same rate (4 larvae/10 plants) along the following 10 days. But comparing this level with that recorded in the control field (12 larvae/10 plants) for the same period; it was found that the 2nd release increased the reduction among larval population of the pest to 93%. The 3rd release (December, 20th) increased the reduction rate among the larvae by only 1% (94%), and slightly decreased along the next 2 months from 92 to 87% (Table 1). This might be related to the reproduction of *T. evanescens* on eggs of *S. ocellatella* in the area of release.

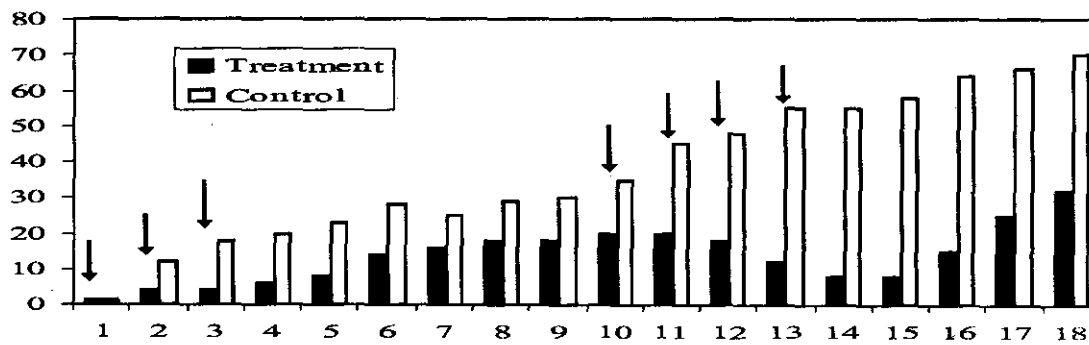
By the 1st of March 2003, a 4th release of the egg parasitoid took place, as larval population reached 20 larvae/10 plants in the treatment compared to 35 larvae/10 plants in the untreated control area (Table 1).

Ten days post release, the infestation level remained unchanged in the area of release (20 larvae/10 plants) but increased in the control field from 35 to 45 larvae/10 plants; thus a reduction value of 75% was recorded due to

Table (1): Numbers of *S.ocellatella* larvae/10 sugar beet plants in treated (after releasing of *T. evanescens*) and untreated experimental fields in *Fayoum governorate*, seasons 2002/03 and 2003/04.

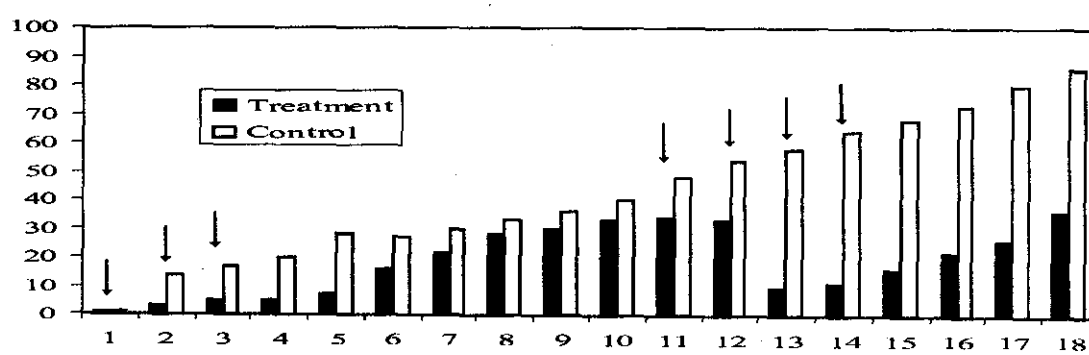
Season 2002/03				Season 2003/04			
Dates	Treatment	Control	Reduction %	Dates	Treatment	Control	Reduction %
1/12/02*	1	1		6/12/03*	1	1	
10/12*	4	12	66	16/12*	3	14	78
20/12*	4	18	93	26/12*	5	17	94
30/12	6	20	94	5/1/04	5	20	92
10/1/03	8	23	92	15/1	7	28	92
20/1	14	28	89	25/1	16	27	86
30/1	16	25	86	7/2	22	30	79
10/2	18	29	87	17/2	28	33	76
20/2	18	30	87	27/2	30	36	76
1/3*	20	35	87	7/38	33	40	76
10/3*	20	45	75	17/3*	34	48	42
20/3*	18	48	83	27/3*	33	54	57
30/3*	12	55	92	8/4*	10	58	90
10/4	8	55	97	18/4*	11	64	96
20/4	8	58	97	28/4	16	68	96
30/4	15	64	95	9/5	22	73	95
10/5	25	66	92	19/5	26	80	99
20/5	32	70	90	29/5	36	86	92

**Trichogramma* releasing dates



Time/ 10 days intervals (1=1/12/2002)

Fig (1): Numbers of *S.ocellatella* larvae/10 sugar beet plants in *Trichogramma* treated fields and in the control in Fayoum governerate, season 2002/03.The arrows indicate dates of treatments.



Time / 10 days intervals (1=6/12/2003)

Fig (2): Numbers of *S.ocellatella* larvae/10 sugar beet plants in *Trichogramma* treated fields and in the control in Fayoum governerate, season 2003/04.

the 4th release of *T. evanescens*. The 5th release (March, 10th) protected the plants from new infestation through parasitism on the newly laid eggs of *S. ocellatella* in the releasing area, while the existing larvae developed into pupae that produced the new adult moth individuals. A status that explains the decrease of larvae/10 plants in treated area opposed to a continuous increase in case of the control field as shown in Fig.(1). This release caused a slight decrease among larval population (83% reduction) recorded/10 plants; may be due to lack of the pest eggs at this period from one side and the development of larvae into pupae by the end of this 3rd generation of *S. ocellatella* on the other side.(El- Zoghby, 1999).

The 6th release (March, 20th) protected the sugar beet plants from new infestation where *T. evanescens* parasitized the newly laid eggs of the pest. Meanwhile, the larvae inside plants developed into pupae; thus their number decreased from 18 to 12 larvae/10 plants opposed to an increase in the control plants from 48 to 55 larvae/10 plants (Table 1 & Fig. 1) . The reduction rate caused by the 6th release of *Trichogramma* recorded 83%.

Ten days after the 7th and last *T. evanescens* release (March, 30th), the reduction rate increased from 92 to 97% due to the same reasons explained for the previous two releases. Accordingly, the four successive *T. evanescens* releases during March 2003 had increased the population of the egg parasitoid in the treated sugar beet field. Thus, the infestation with *S. ocellatella* remained under control by the *Trichogramma* during March & April (Fig. 1) and continued to the end of the season where it increased to 97% on April, 10th and 20th ; and decreased gradually to 95, 92 and 90% for the next three inspections at 10 day intervals (Table 1 and Fig.1).

Season 2003/04

The 1st *Trichogramma* releae (December, 6th) occurred one week later than in season 2002/03 (Table 1). Ten days post release, infestation level with *S. ocellatella* in the treated area recorded 3 larvae compared to 14 larvae/10 plants in the untreated control field. Thus, a reduction rate of 78% was achieved. The 2nd release (December, 16th) increased the reduction rate to 94% (Table 1) ten days post release. The 3rd release (December, 26th) recorded 92% reduction among larvae counted per 10 plants during the period of the 1st generation of *S. ocellatella* on sugar beet plants. No releases took place during January and February 2004. The 4th release (March, 17th) was associated with an infestation rate of 34 and 48 larvae /10 plants in both areas of the treatment and the control, respectively (Table 1). Ten days later, the calculated reduction rate recorded only 57% due to high infestation with the larvae (Fig. 2). But the 5th release (March, 27th) protected the sugar beet plants from new infestation (Table 1) that increased in the control field (from 48 to 54 larvae/10 plants) 10 days post release showing a reduction rate of 90%. The 6th release (April, 8th) and the 7th release (April, 18th) protected the sugar beet from the new infestation as well (Table 1 and Fig. 2) due to the same reasons explained for the 6th and 7th releases in season 2002/03, recording a reduction rate of 96% ten days post each release. The reproduction of *T.evanescens* on eggs of the pest at the treated sugar beet field continued during May 2004 till the end of the season recording successive reduction rates of 95, 99 and 92% among larvae of *S. ocellatella* (Table 1). As far, there is no available literature concerning the use of *T.evanescens* against *S. ocellatella* in sugar beet. Thus, the present results could be considered as a new approach in the biological control of this pest in sugar beet fields.

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REFERENCES

Abelentseva, G.M, and T.I.Kreminskaya,1986. Phthalophos. Zashchita Rastenii Moskva,11:54.

Abo Saied, A.M.B., 1987. Studies on the insects of sugar beet in Kafr El-Sheikh governorate, Egypt. Ph.D.Thesis, Faculty of Agriculture, Tanta University, Egypt, 152 pp.

Akil, H.A.,1974. Studies on some insects infesting sugar beet in Egypt. M.Sc. Thesis, Faculty of Agriculture, Alexandria University, Egypt, 182 pp..

Barcic, J.I.; R. Dobrincic; V.Sarec and A. Kristek., 2000. Studies on insecticide seed dressing of sugar beet. Poljoprivredna Znanstvena Smotra, Agriculturae Conseptus Scientificus, 65(2):89-97.

El-Husseini, M. M.; A. Mesbah; Amal, A. El-Zoghby; Naglaa, A. M. Omar,; Shahira S. Marei ; Sahar, S. Ali,; E. A. Agamy; H.E Abou Bakr; M. S. Nada; T. Sherin; A. M. Ibrahim, and Hannah M. Kamal. 2004. Isolation, propagation and application of the entomopathogenic fungi in controlling the sugar beet insect pests in Egypt. The 1st Arab Conference for Achievements in Biological Control of Pests, April 5-7, 2004, Cairo, Egypt.

El-Zoghby, Amal A.,1999. Biological control of some sugar beet insects. Ph.D. Thesis, Faculty of Agriculture, Cairo University, Egypt, 164 pp.

Fedorinko, V. P., 2002. Reliable protection for sugar beet seedlings. Zashchita I Karantin Rastenii., 4:19.

Guirgis, G.Z.,1985. Studies on certain insects attacking sugar beet in western desert, Egypt. Ph.D. Thesis, Faculty of Agriculture, Menofya University, Egypt, 277 pp.

Hammad, S. M.; K. H. Youssif and M. A. Assem, 1968. The biology of the sugar beet moth, *Scrobipalpa ocellatella* Boyd . Bull. Soc. ent. Egypté, 52:49-51.

Henderson, C. F. and W. A. Tilton, 1955. Test with acaricides against the wheat mites. J. Econ. Entomol. 49:157-161.

Hosny, K.; S. I. El-Sherif; A. A. Gaber and H. A. Mesbah, 1983. The common harmful pests found on sugar beet plants in Alexandria region. Alex. Sci. Exch., vol.4.

Iskander, A. K. F., 1982. Studies on certain sugar beet insects. M.Sc. Thesis, Faculty of Agriculture, Alexandria University, 182 pp.

Kasza, I., 1996. Survey of the sugar beet moth within the production area of the Szolnok Sugar Factory, Hungarian. Novenyvedelem, 32(10):536-0357.

Li, L.Y. (1986) Mass production of natural Font (parasites and predators) of insect pests. Enemies of Insects 8, 52-62.

Mahmoud, A.; M. A. Assem; K. H. Youssef; A. A. Mahhour and G. A. I .El-Imam, 1973. Studies on the control of the main pests by using some recent insecticides .Abst. 4th Vegetable Research Conference, Cairo, September, 6th, 1973.

Mesbah, H. A.; H. K. El-Sherif and A. A. Gaber, 1985. The common sugar beet insect pests in Alexandria region. Ann. Agric. Sci., 23(1):365-372.

Sabluk, V.T.; V. P. Fedorinko and Y. A. Gres, 2002. A forecast of the development and spread of pests in Ukraine. Sakharanaya Svekla, 4:19-21.

Tron, N. M.,1985. The role of insect natural enemies in the protection of sugar beet. Sashchita Rastenii.6:17-18.

Willcocks, F. C., 1922. A survey of the more important and economic insects and mites of Egypt. Bull. Sult. Agric. Tech. Sec. No.1, Cairo, Egypt, 482 pp.

Youssif, F.C., 1986. Studies on some insects infesting sugar beet. M.Sc. Thesis, Faculty of Agriculture, Kafr El-Sheikh, Tanta University, 104 pp.