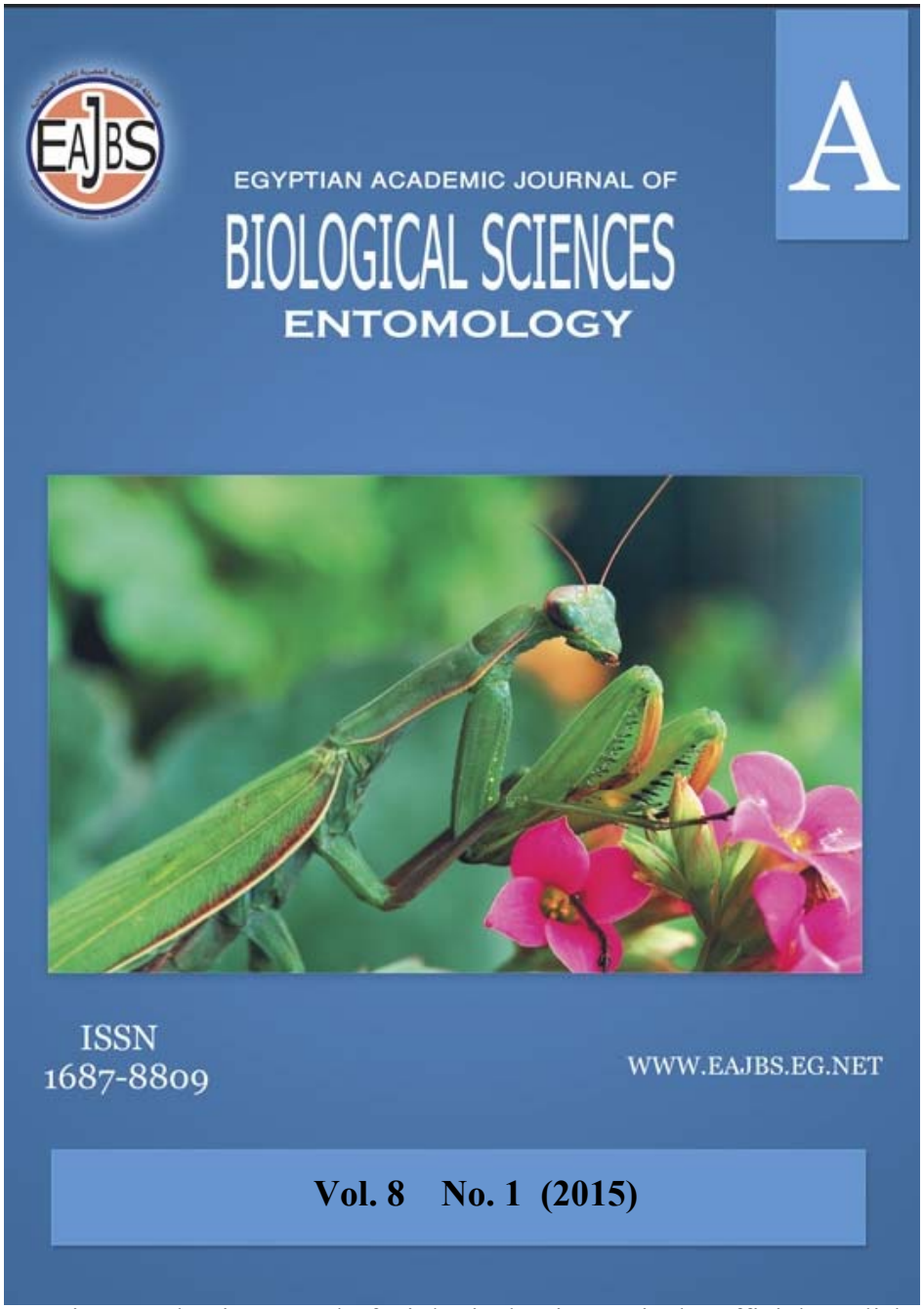


Egyptian Academic Journal of Biological Sciences is the official English language journal of the Egyptian Society for Biological Sciences, Department of Entomology, Faculty of Sciences Ain Shams University.

Entomology Journal publishes original research papers and reviews from any entomological discipline or from directly allied fields in ecology, behavioral biology, physiology, biochemistry, development, genetics, systematics, morphology, evolution, control of insects, arachnids, and general entomology.

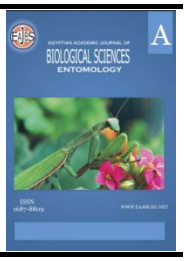
www.eajbs.eg.net

Citation: *Egypt. Acad. J. Biolog. Sci. (A. Entomology) Vol.8 (1)pp.79-87 (2015)*

Egypt. Acad. J. Biolog. Sci., 8(1): 79-87 (2015)

Egyptian Academic Journal of Biological Sciences
A. Entomology

ISSN 1687-8809
www.eajbs.eg.net



Side effects of certain common insecticides used in cotton fields on the egg parasitoid, *Trichogramma evanescens* west. (Trichogrammatidae: hymenoptera)

Essam M. Mohamed
Cotton Pesticides Bioassay Dept., Plant Protection Res. Institute, ARC.

ARTICLE INFO

Article History
Received: 5/4/2015
Accepted: 15/5/2015

Keywords:
Theridion jordanense
Theridiidae
Biological aspects
Feeding behavior
Spodoptera littoralis
Food consumption
Egypt

ABSTRACT

Studies on the toxicity of some common insecticides used in cotton fields against *Trichogramma evanescens* were carried out under laboratory and field conditions following the guidelines recommended by International Organization for Biological Control (IOBC). Field Recommended Concentrations (FRCs) of five insecticides viz., Dursban 48 %, Sumi-alpha 5 %, Cascade 10 % Spinotor 24 % and Agerin were tested against immature stages of the egg parasitoid under laboratory conditions.

Concerning the insecticide effects on the development of immature stages inside host eggs, results revealed only Sumi-alpha, Dursban and Spintor were categorized as "class 3 – moderately harmful ($80 \leq E \leq 99\%$), while, Agerin and Cascade 10 % were categorized as class 1 – harmless ($E < 30\%$) to all.

In the experiment free-choice and non-choice trails were conducted to evaluate the acceptance of the female wasps to the less toxic insecticides. It is evident from the results presented with free-choice and non-choices of treated eggs females of *T. evanescens* significantly reduced the parasitism and adult emergences of eggs treated with Dursban, Sumi-alpha, and Spintor, while, in the case of Agerin and Cascade 10 % were considerably safe.

Under field conditions, after spraying directly, despite the statistically significant differences among the treatments, only Sumi-alpha and Dursban were categorized as "class 3 – moderately harmful ($80 \leq E \leq 99\%$). While, Cascade 10 % was categorized as class 2 – slightly harmful ($30 \leq E \leq 79\%$), Agerin was categorized as class 1 – harmless ($E < 30\%$), according to the IOBC ranking.

After five days from spraying, Spintor was the most effective treatments followed by Dursban and Sumi-alpha on reducing the percentages of parasitism of the egg parasitoids of *T. evanescens*. Only Spintor and Dursban were categorized as "class 2 = slightly harmful ($30 \leq E \leq 79$ %), while, Agerin , Cascade and sumi-alpha were categorized as class 1 – harmless ($E < 30\%$), according to the IOBC ranking

Among the tested insecticides, the harmless ones should be chosen in a program of integrated pest management (IPM) since it allows the use of pesticides without harm to the biological control agent *T. evanescens*. On the other hand, the moderately harmful pesticides should be excluded or replaced by another product with less impact whenever it is possible.

INTRODUCTION

Cotton is the most important fiber crop all over the world. In Egypt, cotton is a very important crop that is cultivated mainly for fibers in industry and seeds for oil which is of great value.

The use of pesticides to control the cotton pests in Egypt has a great effect on natural enemies and may drastically reduce or eliminate the naturally occurring entomophagous, causing the outbreak of one or more pests. So, the use of selective pesticides is an important strategy within pest management programs.

Trichogramma species are polyphagous egg parasitoid that the most widely used in the world because they are easy to mass rear and kill major crop pests inside their egg stage before cause feeding damage (Ulrichs and Mewis, 2004). Releases of Trichogramma are successfully used on large scale on corn, cotton, sugarcane, fruit tree and vegetable crops in more than 50 countries (Desneux *et al*., 2007).

One major purpose of Integrated Pest Management (IPM) strategies is to unify the safe and sustainable use of chemical and biological control methods. Therefore, the side-effects of pesticides on biocontrol agents should be carefully evaluated for induction in IPM programs (Stark *et al*., 2007).

Trichogramma evanescens is an important parasitoid species of lepidopterous pests in Egypt and it is therefore, imperative to assess its compatibility with chemical control for induction in integrated pest management programs. Thus, the objective of this study was to evaluate the effect of five recommended insecticides, commonly used for control cotton pests associated with local crops on the development, survival and parasitic efficiency of the egg parasitoid, *T. evanescens* in order to gather information that will help decision making as to which pesticides to use in pest management programs and determine the Persistency of these insecticides.

MATERIALS AND METHODS

The experiments were carried out in the Trichogramma Laboratory, Naser City, Beni- suef Governorate, Plant Protection Institute.

The tested insecticides.

Spintor 24 SC (**Spinosad**): The spinosyns obtained from a culture of the actinomycete *Saccharopolyspora spinosa* containing a naturally occurring mixture of spinosyn A ($C_{41}H_{65}NO_{10}$) and spinosyn D ($C_{42}H_{67}NO_{10}$). The insecticide was introduced by Dow Agro Sciences for control lepidopterous pests in cotton under the trade name (Tracer). The rate of application was 50 cm^3 / fed.

Dursban insecticide (Chlorypyrifos) 48% E.C: The chemical name is *O,O*-diethyl *O*-3,5,6-trichloro-2-pyridyl phosphorothioate. The rate of application was 1000 cm^3 / fed.

Fenvalerate 5% E.C (Sumi- alpha): A synthetic pyrethroid. Its chemical name is: Cyano (3-phenoxyphenyl) methyl 4-chloro-α-(1-methylethyl) benzeneacetate. The rate of application was 600 cm^3 / fed.

Agerin: Biological insecticides from *B. thuringiensis* var kurstaki sub sp aegypti, 4.6 % B.t (32.000 IU / mg) Under licence from ; Agriculture Genetic Engineering Research Institute (Agerin). The rate of application was 500 gm / fed.

Flufenoxuron (Cascade) 10 % E.C. The rate of application was 200 cm^3 / fed.

The host and parasitoids:

Both *Sitotroga cerealla* eggs and *T. evanescens* were obtained from the mass rearing unit the Trichogramma Laboratory, Naser City, Beni- suef Governorate, Plant Protection Institute.

Laboratory tests

The effect of dipping insecticides on parasitized *Sitotroga cerealella* eggs was studied at different stages of immature *T. evanescens* development. Five randomly egg cards were selected, each having 50 - 80 eggs, were dipped into recommended field concentration of each treatment for three second. The exposed eggs were divided

into four groups; the 1st group was treated one days after parasitism (egg stage) ; 2nd group was treated three days after parasitism (larval stage); 3rd group treated seven days after parasitism (pupal stage), While the 4th group treated with water only for each group after parasitism to serve as a control.

Dipped egg cards were dried at ambient room temperature, each egg card was then placed in a small plastic Petri dish (1.5 cm). the Petri dishes were incubated at 25 ± 2º C and 60 ± 5 % R. H. in an incubator and was maintained until all parasitoids had emerged. Under the environmental conditions mentioned above, adults generally emerged 10 days after initial parasitism. A final assessment of emergence was made 15 days after initial parasitism in order to check mortality during the immature development. Thus, parasitized eggs (indicated by shiny black appearance of egg chorion) were visually inspected for emergence holes, and those with partially chewed exit holes with dead adults remaining inside were categorized as partially emerged.

Free Choice and Non – choice to wasps femals.

Free-choice and non-choice trails were conducted to evaluate the acceptance of the wasps female to the less toxic insecticides.

In the non-choice experiment, fresh *S. cerealella* eggs (less than 24 h old) were glued onto cartoon cards, each contained 50-100 eggs treated with the recommended field concentration of each tested insecticides. Treated eggs were placed separately for each tested insecticides in plastic Jars (1 Liter) and exposed to newly emerged *T. evanescens* adult wasps. Fresh eggs treated with water only used as a control.

In the choice experiment, *T. evanescens* adult wasps exposed to fresh *S. cerealella* eggs treated with the recommended field concentration of each tested insecticides, all treated cards placed in one plastic Jars (1 Liter) sealed with Para film.

After the parasitized eggs for Free-choice and non-choice trails turned black each treated egg card was transferred to separate tube sealed with Para film to determine the numbers of parasitized eggs, number of exit hall and merged wasps resulted from each treated eggs with the tested insecticides. Treated and untreated eggs replicated five times.

Field experiments

The field experiments were carried out at Beni-suef Governorate, Naser city in an area one feddan cultivated with the cotton Varity Giza 80. The experiments were conducted during two successive agriculture seasons 2013 and 2014. The area was divided into 3 blocks, each block divided into 6 plots. The insecticide treatments were sprayed using a solo motor at the rate of recommended dose. The egg parasitoids were released as mature pupa into the field using a release card that protects them from predators and unfavorable weather. The release card prepared in the laboratory, this card contains one strip of paper 1x 1 cm that contains parasitoid pupa about 300-350. Cards were hanging manually before the sunset the plant at about 50 cm above the ground. Two cards / plot were applied. Three Cards contains one strip of paper that contains fresh *S. cerealella* eggs (less than 24 h old) were used / plot as a host. After sparing the insecticides, the Trichogramma cards were released after 0, 3, 5 days. The release cards were collected and transferred into the laboratory after two days to estimate the percentage of parasitism under field condition.

The effect of the insecticides was calculated by the formula: E (%) = (1- Vt / Vc) 100, where E is the effect of the pesticide on the biological control agent being measured as the reduction of parasitism viability (Adult Emergence in this case) compared to the untreated, Vt is the parasitism viability observed on each pesticide treatment and Vc is the parasitism viability observed on the control (untreated) (Manzoni *et al.*, 2007). Parasitism was determined by counting the number of

parasitized eggs per card under stereomicroscope. The reduction in parasitism (RP) was determined for each insecticide by the equation RP (%) = (1-f/t) x 100 where f = average number of parasitized eggs in the insecticide treatment and t = average number of parasitized eggs in the control treatment. The value E and RP calculated for each pesticide treatment were classified according to the International Organization of Biological Control (IOBC) where: class 1-harmless (E < 30%), class 2-slightly harmful (30 ≤ E ≤ 79%), class 3-moderately harmful (80 ≤ E ≤ 99%) and class 4-harmful (E >99%). (Sterk *et al*., 1999).

Statistical analyses:

Data obtained were subjected to the analysis of variance and the means were compared using the LSD test at P < 0.05.

RESULTS AND DISCUSSION

Effect of treatments on the immature stages of *T. evanescens*.

The results in (Table 1 and 2) showed varying degrees of toxicity for the common insecticides used in cotton fields against the different immature stages of *T. evanescens* inside host eggs. Sumi-alpha ranked first in terms of reducing adult emergence followed by Dursban and Spinster, when treated at egg stage. The percentages of adult emergence were (11.11, 12.5 & 18.75 %) and (22.22, 14.29 & 16.37%) on the F1 and F2 Generations, respectively. On the other hand, the average percentage of reduction in adult emergence were (87.42, 85.85 &78.77) and (75.35, 84.16 & 81.85) on the F1 and F2 Generations, respectively. Despite the statistically significant differences among the treatments, only Sumi-alpha and Dursban were categorized as "class 3-moderately harmful (80 ≤ E ≤ 99%), while, Agerin and Cascade 10 % were categorized as class 1-harmless (E < 30%), according to the IOBC ranking

Table 1: Effect of different insecticides on the adult emergence of *T. evanescens* when treated egg, larval and pupal stages under laboratory conditions.

Treatments	The first generation (G1) Parasitoid stages days old								
	1 days (eggs stage)			3 days (larval stage)			7 days (pupal stage)		
	* Adult emergence (%)	Reduction in adult emergence	** Class	* Adult emergence (%)	Reduction in adult emergence	** Class	* Adult emergence (%)	Reduction in adult emergence	** Class
Spintor 24 %	18.75 ± 6.9 d	78.77	2	15.00 ± 5.0 c	83.44	3	5.54 ± 3.6 e	94.22	3
Agerin	75.00 ± 2.2 b	15.09	1	51.32 ± 2.8 b	43.33	2	54.75 ± 4.8 b	42.85	2
Cascade10 %	62.12 ± 2.6 c	29.67	1	52.27 ± 1.3 b	42.28	2	44.57 ± 1.4 c	53.48	2
Dursban 48 %	12.50 ± 3.1 d	85.85	3	10.71 ± 3.5 c	88.17	3	3.90 ± 2.2 e	95.93	3
Sumi-alpha5%	11.11 ± 7.8 d	87.42	3	13.89 ± 9.2 c	84.66	3	16.51 ± 5.1 d	82.77	3
Untreated	88.33 ± 3.3 a	0.00		90.56 ± 2.9 a	0.00		95.80 ± 1.9 a	0.00	
L. S. D.	7.66			8.59			6.51		

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

** Class: 1, harmless (E<30%); 2, slightly harmful (30 % < E< 79 %) ; 3, Moderately harmful (80 % < E < 99 %) ; 4, harmful (E > 99 %).

Table 2: Effect of different insecticides on the adult emergence of *T. evanescens* when treated egg, larval and pupal stages under laboratory conditions.

Treatments	The second generation (G2) Parasitoid stages days old								
	1 days (eggs stage)			3 days (larval stage)			7 days (pupal stage)		
	Adult * emergence (%)	Reduction in adult emergence	** Class	Adult * emergence (%)	Reduction in adult emergence	** Class	Adult * emergence (%)	Reduction in adult emergence	** Class
Spintor 24 %	16.37 ± 4.1 c	81.85	3	10.42 ± 6.9 c	88.09	3	3.39 ± 6.4 d	96.45	3
Agerin	78.29 ± 5.1 a	13.17	1	71.05 ± 6.4 b	18.74	1	64.91 ± 0.4 b	32.07	2
Cascade10 %	65.15 ± 8.7 b	27.74	1	61.36 ± 2.5 b	29.82	1	45.31 ± 0.3 c	52.58	2
Dursban 48%	14.29 ± 9.2 c	84.16	3	8.93 ± 5.9 c	89.79	3	8.39 ± 3.2 d	91.22	3
Sumi-alpha5%	22.22 ± 8.6 c	75.35	3	13.89 ± 9.2 c	84.12	3	9.86 ± 7.7 d	89.68	3
Untreated	90.17 ± 3.4 a	0.00		87.43 ± 3.9 a	0.00		97.22 ± 2.5 a	0.00	
L. S. D.	13.96			10.35			7.02		

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

** Class: 1, harmless (E<30%); 2, slightly harmful (30 % < E< 79 %) ; 3, Moderately harmful (80 % < E < 99 %) ; 4, harmful (E > 99 %).

Free Choice and Non – choice

Data presented in Table 3 show that percent of parasitism and adult emergence percentage of *T. evanescens* exposed to *S. cerealella* eggs treated with insecticides in Free Choice and Non – choice**.**

Dursban, Sumi-alpha and Spintor caused a highly decrease in the percent of parasitism and adult emergence rate compared to the control. The recorded values for the percentage of parasitism were (15.68, 19.61 & 26.77) and (10.27, 32.58 & 30.36) for adult emergence as a compared with (94.45 & 89.84 %) in free choice, respectively. While, in case of Agerin and Cascade 10 %, the percentage of parasitism were (73.74 & 64.66 %) and (87.56 & 82.13) for adult emergence as a compared with (94.45 & 89, 84 %) in free choice, respectively.

It is evident from the results presented with non-choices of treated eggs females of *T. evanescens* significantly reduced the parasitism of eggs treated with Dursban, Sumi-alpha, and Spintor. The recorded values for the percentage of parasitism were (9.49, 14.61 & 21.03) for compared to high percentage of parasitism (91.08%) in the untreated. Similar trend was recorded for the adult emergence in non-choice tests (Table 3).

Table 3: Percentage of parasitism and adult emergence of *T. evanescens* exposed to *S. cerealella* eggs treated with insecticides in Free Choice and Non – choice**.**

Treatments	Free choice		Non-choice	
	Parasitism %	Emergence %	Parasitism %	Emergence %
Spintor 24 %	26.77 + 3.54 d	30.36 + 7.83 b	21.03 + 3.57 d	24.25 + 5.31 b
Agerin	73.74 + 0.84 b	87.56 + 4.23 a	80.35 + 1.79 b	83.95 + 4.67 a
Cascade10 %	64.66 + 3.28 c	82.13 + 8.86 a	73.23 + 2.07 c	80.07 + 7.8 a
Dursban 48%	15.68 + 2.44 e	10.27 + 11.7 c	9.49 + 1.36 f	6.25 + 10.83 c
Sumi-alpha 5 %	19.61 + 1.76 e	32.58 + 3.31 b	14.61 + 4.48 e	13.33 + 8.75 c
Untreated	94.45 + 2.93 a	89.84 + 2.94 a	91.08 + 1.55 a	90.21 + 3.07 a
L. S. D. at 5 %	4.33	13.51	4.21	11.01

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

** Class: 1, harmless (E<30%); 2, slightly harmful (30 % < E< 79 %); 3, moderately harmful (80 % < E < 99 %) ; 4, harmful (E > 99 %)

Results agreed with Sattar *et al.* (2011) who studied the toxicity of some new insecticides against *Trichogramma chilonis.* Results regarding the harmful effects of the insecticides on the different life stages of *T. evanescens* revealed that Spinosad was the most selective of all the tested insecticides for the development of immature stages inside host eggs. Indoxacarb was also recorded as "slightly harmful" to all, also, Charles *et al.*(2000), reported that spinosad and prophenofos were the most toxic compounds to *T. exiguum* adults, followed by lambda cyhalothrin, cypermethrin, and thiodicarb.

Insecticidal effects on *T. evanescens* Parasitoids under field condition:

Data presented in Table 4 and illustrated in Fig (1) show that Initial and latent effect of the tested insecticides against the egg parasitoids, *T. evanescens* on cotton fields after 0, 3 and 5days treatments. Varying degrees of toxicity for the insecticides used against the egg parasitoids *T. evanescens* inside host of *S. cerealella* eggs. After spraying directly, Sumi-alpha ranked first in terms of reducing the percentages of parasitism followed by Dursban and Spinster. The average percentages of parasitism were (1.6, 2.95 and 6.91) for compared to high percentage of parasitism (34.73 %) in the untreated.

Despite the statistically significant differences among the treatments, only Sumi-alpha and Dursban were categorized as "class 3 – moderately harmful ($80 \leq E \leq 99\%$). While, Cascade 10 % was categorized as class 2 – slightly harmful ($30 \leq E \leq 79\%$), Agerin was categorized as class 1 – harmless ($E < 30\%$), according to the IOBC ranking

After three days from spraying, Dursban was the most effective treatments followed by Spintor and Sumi-alpha on reducing the percentages of parasitism and adult emergence of the egg parasitoids of *T. evanescens*. The average percentages of parasitism were (4.34, 7.4 and 11.64) for compared to high percentage of parasitism (28.56 %) in the untreated.

Table 4: Average initial and latent effect of the tested insecticides against the egg parasitoids, *T. evanescens* on cotton fields during 2013 and 2014 seasons.

Treatments	Av. Initial and latent effect after days								
	0			3			5		
	Av. % Parasitism *	% reduction	Class **	Av. % Parasitism	% reduction	Class	Av. % Parasitism	% reduction	Class
Spintor 24 %	6.91 + 0.7 d	80.09	3	7.40 + 2.5 d	74.09	2	18.93 + 1.2 ce	39.40	2
Agerin	28.41 + 1.7 b	18.18	1	23.98 + 2.4 a	16.06	1	26.99 + 1.1 b	13.63	1
Cascade10 %	17.97 + 3.3 c	48.25	2	21.02 + 1.3 b	26.43	1	28.21 + 2.6 a	9.71	1
Dursban 48%	2.95 + 0.7 de	91.50	3	4.34 + 1.3 e	84.79	3	20.38 + 2.2 c	34.78	2
Sumi-alpha 5%	1.60 + 0.2 e	95.38	3	11.64 + 2.7 c	59.25	2	21.88 + 3.5 c	29.99	1
Untreated	34.73 + 2.3 a	0.00		28.56 + 4.2 a	0.00		31.25 + 0.9 a	0.00	
L. S. D.	4.46			4.38			3.11		

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

** Class: 1, harmless (E<30%); 2, slightly harmful (30 % < E< 79 %); 3, moderately harmful (80 % < E < 99 %); 4, harmful (E > 99 %)

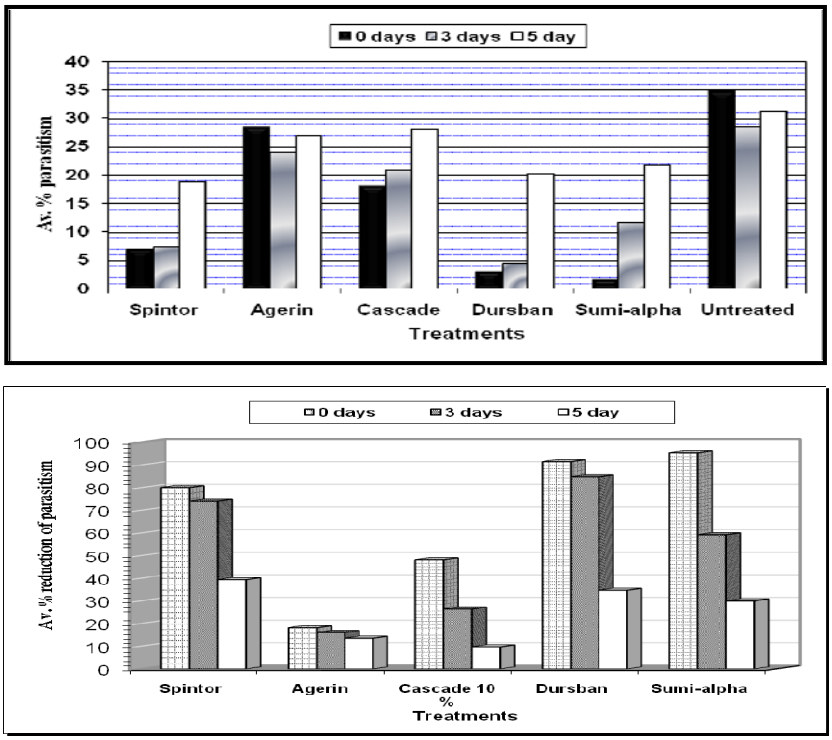


Fig. 1: Average initial and latent effect of the tested insecticides against the egg parasitoids, *T. evanescens* on cotton fields during 2013 and

After five days from spraying, Spintor was the most effective treatments followed by Dursban and Sumi-alpha on reducing the percentages of parasitism of the egg parasitoids of *T. evanescens*. The average percentages of parasitism were (18.93, 20.38 and 21.88) for compared to high percentage of parasitism (31.25 %) in the untreated.

Despite the statistically significant differences among the treatments, only Spintor and Dursban were categorized as "class 2 = slightly harmful (30 ≤ E ≤79 %), while, Agerin, Cascade 1o % and suni-alpha were categorized as class 1 – harmless (E < 30%), according to the IOBC ranking

Similar results found by Vianna *et al.* (2009) who studied the effect of nine insecticides used in tomato production on adults of two populations of *Trichogramma pretiosum* Riley. They reported that *Bacillus thuringiensis*, lufenuron and triflumuron had the lowest negative effects on parasitism; however, abamectin and pyrethroids (betacyflurin 50 and esfenvalerate) insecticides reduced parasitism rates. *T. pretiosum* emerged from *A. kuehniella* eggs treated with esfenvalerate were not able to parasitize untreated eggs of this host. Shoeb (2005) studied the effect of insecticides on *T. evanescens* and found that profenofos and the natural oil, K-Z, were harmful to the immature stages of the parasitoid while the bio-insecticide, Protecto (*Bacillus thuringiensis*.) had the least deleterious effect. Kawamura *et al.* (2001) Chares *et al.* (2000) and Suh *et al*. (2000), reported that spinosad and prophenofos were the most toxic compounds to *T. exiguum* adults, followed by lambda cyhalothrin, cypermethrin, and thiodicarb.

It is evident from the results regarding the tested insecticides, the harmless ones should be chosen in a program of integrated pest management (IPM**)** since it allows the use of pesticides without harm to the biological control agent *T. evanescens*. On the other hand, the moderately harmful pesticides should be excluded or replaced by another product with less impact whenever it is possible and determined the releasing time of *T. evanescens* on cotton fields after spraying the common insecticides.

Concerning the insecticide effects on larval stage of the parasitoid appeared more vulnerable to the insecticides as compared to the egg stage significantly lower adult emergence was observed in case of Sumi-alpha, Dursban and Spinoter as compared to control. The percentages of adult emergence were (16.51, 3.6 & 5. 54 %) and (9.86, 8.39 & 3.39 %) on the F1 and F2 Generations, respectively. and was therefore, categorized as "moderately harmful" (Class 3), while, Agerin and Cascade 10 % were categorized as class 2 – slightly harmful ($30 \leq E \leq 79$ %) for G1 but was class 1 – harmless ($E < 30\%$) for G2, according to the IOBC ranking.

In seven days old parasitized eggs (pupal stage) , maximum *T. evanescens* adult emergence (95.8 & 97. 22%) was observed in untreated check followed by Agerin (54.75 & 64.91 %) and Cascade 10% (44.57 & 45.31 %) 0n the F1 and F2 Generations, respectively, while, minimum adult emergence was observed in Tricho-cards treated with Dursban (3.9 & 8.39 %), Sumi-alpha (16.51 & 9.86 %) and Spintor (5.54 & 3.39%) for F1 and F2 Generations, respectively. Only Sumi-alpha, Dursban and Spintor were categorized as "class 3 – moderately harmful ($80 \leq E \leq 99\%$), while, Agerin and Cascade 10 % were categorized as class 2 – slightly harmful ($30 \leq E \leq 79\%$), according to the IOBC ranking. These results are agree with Brunner *et al*. (2001) observed that these kinds of products could be successfully integrated into biological control programs in conjunction with small parasitoids. Williams *et al.* (2003) reported that Hymenopteran parasitoids are significantly more susceptible to spinosad than predatory insects. Vianna *et al.* (2009) recorded a higher parasitism rate of *T. pretiosum* for lufenuron treated host eggs, also, Ksentini *et al.* (2010) Trichogramma immature stages and adults received the recommended field dose of insecticides'. thuringiensis was proven to be slightly harmful towards.

REFERENCE

Brunner, J.F. (2001): Effect of pesticides on *Colpoclypeus florus* Hymenoptera: Eulophidae) and *Trichogramma platneri* (Hymenoptera: Trichogrammatidae), parasitoids of leafrollers in Washington. J. Econ. Entomol ., Maryland, 94(5): 1075-1084

Charles, P. C.; Orr d, B. and Van, D. J. W. (2000): Effect of insecticides on *Trichogramma exiguum* (Trichogrammatidae: Hymenoptera) preimaginal development and adult survival. J. Econ. Entomol,. 93(3): 577-583.

Desneux, N.; A. Decourtye and J.M. Delpuech (2007): The sublethal effects of pesticides on beneficial arthropods. Annul. Rev. Ent, 52: 81–106.

Kawamura, S.; Y. Takada and Tanaka, T. J. (2001): Effects of various insecticides on the development of the egg parasitoid *Trichogramma dendrolimi* (Hymenoptera: Trichogrammatidae). J. Econ. Entomol.; 94(6): 1340-1345.

Ksentini, T ; J , Ardak and Najiba Z. E. (2010): *Bacillus thuringiensis*, deltamethrin and spinosad side-effects on three Trichogramma Species. Bulletin of Insectology 63 (1): 31-37.

Manzoni, C.G., Grutzmacher, A.D., Giolo, F.P., Harter, W. Da. R., Castilhos, R.V. And Paschoal, M.D. F. (2007): Side-effects of pesticides used in integrated production of apples to parasitoids of *Trichogramma pretiosum* Riley and *Trichogramma atopovirilia* Oatman & Platner (Hymenoptera: Trichogrammatidae). BioAssay, 2: 1-11.

Moscardini, V. F.; A.P. Moura,; G. A. Carvalho, Lasmar, O. (2008): Efeitoresidual de inseticidas sintéticos sobre *Trichogramma pretiosum* Riley (Hym., Trichogrammatidae) em diferentes gerações. Revista Acta Scientiarum 30(2): 177-182.

Sattar, S. F. ; A. R. Saljoqi ; M. Arif ; H. Sattar and Aved I. Q. (2011): Toxicity of Some New Insecticides against *Trichogramma chilonis* (Hymenoptera: Trichogrammatidae) Under Laboratory and Extended Laboratory Conditions. Pakistan J. Zool., 43(6): 1117-1125.

Shoeb, Mona A. (2005): Comparativeness of chemical, natural and bacterial insecticides on some biological aspects of the egg parasitoid *Trichogramma evanescens* (West.) J. Agric. Sci. Mansoura Univ., 30(8): 4821-4826.

Stark, J.D.; R. Vargas and Banks, J.E. (2007): Incorporating ecologically relevant measures of pesticide effect for estimating the compatibility of pesticides and biocontrol agents. J. Econ. Ent., 100: 1027 – 1032.

Sterk, G.; S.A. Hassan, Baillod, M. ; Bakker, F. ; Bigler, F. ; Blumel, S.; Bogenschutz, H.; Boller, E.; Bromand, B.; Brun, J. ; Calis, J.N.M.; Pelseneer, J.C.; Duso, C.; Garrido, A.; Grove, A. ; Heimbach, U. and Vogt. H. (1999): Results of the seventh joint pesticide testing program carried out by the IOBC/WPRS-Working Group 'Pesticides and Beneficial Organisms. BioControl , 44 : 99–117

Suh C. P.C. ; B. Orrd and Van Duyn J. W. (2000): Effect of insecticides on *Trichogramma exiguum* (Trichogrammatidae: Hymenoptera) preimaginal development and adult survival. J. of Econ. Entomol. , 93: 577-583.

Ulrichs, C. and Mewis I. (2004): Evaluation of the efficacy of *Trichogramma evanescens* Westwood (Hym., Trichogrammatidae) inundative releases for the control of *Maruca vitrata* F. (Lep., Pyralidae). J. of Applied Entomology 128: 426-431.

Vianna, U. R.; D. Pratissoli; Zanuncio, J.C.; Lima E. R., Brunner J. Pereira F. F. and Serrão J. E. (2009): Insecticide toxicity to *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae) females and effect on descendant generation. Ecotoxicology (London, England) 18(2):180-186.

Williams T. and V. J. Vinuelae (2003): Is the naturally derived insecticide spinosad® compatible with insect natural enemies. Biocontrol sci. and Technology, 13: 459-475.

ARABIC SUMMERY

التأثيرات الجانبية لبعض المبيدات الشائعة الاستخدام في حقول القطن على طفيل البيض *Trichogramma evanescens* West.

عصام محمد محمد

قسم بحوث اختبار مبيدات آفات القطن –معهد بحوث وقاية النباتات – مركز البحوث الزراعية- الجيزة- مصر

تم إجراء دراسات معملية وحقلية لدراسة تأثير بعض المبيدات الشائعة الاستخدام لمكافحة آفات القطن مثل دوسبان ٤٨ % و سومي ألفا ٥ % و منظم النمو الحشري كاسكيد ١٠ % والمبيد الحيوي سبينوساد ٢٤ % والمبيد البكتيري اجرين على الأطوار المختلفة لطفيل البيض *Trichogramma evanescens* في هذه الدراسة تم معاملة بيض العائل المعملي (بيض فراشة الحبوب) المتطفل عليه *T. evanescens* بعد ١ و ٣ و ٧ يوم عقب التطفل عندما يكون الطفيل في أطوار البيض واليرقات والعذراء بالتركيزات الحقلية للمبيدات الشائعة الاستخدام في حقول القطن.

أوضحت النتائج أن المبيد الفوسفورى درسبان وسومي ألفا و سبينوساد كانت من اشد المبيدات سمية على الأطوار المختلفة للطفيل خلال جيلين متتاليين حيث كانت درجة السمية تراوحت ما بين (30 % < E < 79 %) Slightly harmful و (80 % < E < 99 %) Moderately harmful .بينما منظم النمو الحشري كاسكيد والمبيد الحيوي اجرين كانا اقل سمية في الجيلين حيث تراوحت ما بين (;(E< 30%) harmless و (30 % < E< 79 %) slightly harmful) في كل أطوار الطفيل.

ومن ناحية أخرى تم دراسة مدى كفاءة وقدرة أنثى الطفيل في تمييز سمية بيض العائل المعامل بالجرعة الحقلية للمبيدات المستخدمة تحت ظروف الاختيار والتقييد حيث أوضحت النتائج أن النسبة المئوية للتطفل وخروج الحشرات الكاملة كانت أعلى ما يكون في الكنترول (٩٤,٤٥ و ٨٩,٨٤ %) يليها المبيد الحيوي اجرين ومنظم النمو الحشري كاسكيد (٧٣,٧٤ و ٨٧,٥٦) و (٦٤,٦٦ و١٣ ,٨٢ %) على التوالي. أجريت تجربة حقلية لدراسة تأثير هذه المبيدات على طفيل الترايكوجراما تحت الظروف الحقلية وتقييم النسبة المئوية للتطفل بعد معاملة هذه المبيدات مباشرة وثلاثة أيام بعد الرش و خمسة أيام بعد الرش أوضحت النتائج أن المبيد الفوسفورى درسبان وسومي ألفا و سبينوساد كانت من اشد المبيدات سمية على الأطوار المختلفة للطفيل حيث كانت درجة السمية تراوحت ما بين (30 % < E < 79 %) Slightly harmful و (80 % < E < 99 %) Moderately harmful.

بينما كانت اعلي درجة السمية للمبيد الفوسفورى دوسبان و سبينوساد بعد ٣ يوم و ٥ يوم من الرش حيث تراوحت درجة السمية مابين (30 % < E < 79 %) Slightly harmful و (80 % < E < 99 %) Moderately harmful بينما كانت درجة السمية لمبيد سومي ألفا و الأجرين و كاسكيد بعد ٥يوم من الرش (E< 30%) harmless .

من هذه النتائج يتضح انه يمكن استخدام المبيد الحيوي اجرين و منظم النمو الحشري كاسكيد في حقول القطن المعاملة بطفيل الترايكوجراما ولا ينصح باستخدام المبيد الفوسفورى دوسبان و المبيد الحيوي سبينوساد . كما يمكن ا طلاق الطفيل بعد معاملة حقول القطن بمبيد سومى ألفا بعد ٥يوم من المعاملة على الأقل.