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EFFECT OF SOME INSECTICIDES ON THE COTTON LEAF WORM *Spodoptera littoralis* (Boisd.) AND ITS ASSOCIATED PREDATOR (*Coccinella septempunctata* L) ON TOMATO PLANTS

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ABSTRACT

In 2005 and 2006 tomato season, two experiments were conducted to study the effect of using five insecticides applied on cotton leaf-worm *Spodoptera littoralis* (Boisd) and its predator *Coccinella septempunctata* L.in tomato fields. Five pesticides Profenofos (Celeian 72%Ec), Diflubenzaron (Diflurait 25%WP), Methomyl (Mitholait 20%SL), Chlorpyriphos-methyl (Birodan 50%EC) and Fentrothyon (Adoya Fentro 50% EC) were tested. Weekly counts of numbers second and fourth instar larvae on cotton leaf-worm and its predator were conducted in each plot. Results showed that during season 2005 the insecticide mitholait was the most potent chemical on the fourth instar larvae (85.5%R), but it was the least on the second instar larvae (60.7%R).

Diflurait gave highly reduction on the second instar larvae (78.9%R). During season 2006, the results showed also, the insecticide mitholait was still the most effective one on the fourth instar larvae (78.8% R) and the least effective one on the second instar larvae (70.6% R), while the insecticide celeian gave the high effect on the second instar larvae (80.2% R). During two seasons, the insecticide diflurait was the least effective one and did not detrimental effects on the predator (70.9 and 71.4% R) respectively. This proves that combination of mitholait plus the diflurait may fit well into IPM programs.

Keywords: insecticides, cotton leaf-worm, predator.

INTRODUCTION

Cotton is still the most important agricultural crop in Egypt. It is always attacked by several pests, among them the cotton leaf-worm *S. littoralis* (Boisd.) it is a polyphagous insect, attacking a large number of host plants. The larval stage is the major enemy of several field crops, vegetables. Synthetic pesticides have been used for many years to control this pest. However, considerable problems arose from the continued application of these insecticides including the development of resistance by insects and the pollution of the environment.

Furthermore, several authors have discussed the effect of different types of insecticides, rates and methods of application on the number of predators in cotton fields in Egypt (Hafez, 1960 & 1972, Ibrahim 1962, Hassanein & Khalil 1968, Ibrahim & Fayad 1980, Fayad & Ibrahim 1981). Adult and larval stages of predators to Coccinellidae play an important role in regulating pest population (Ibrahim & Fayad and Sarhan 1979, Ibrahim, 1983 and Kamal, 1951**)**.

Different species of coccinellid predators such as *Coccinella septempunctata* L. (F. Coccinellidae) which is considered as one of the biological control of the cotton leaf-worm (eggs and small larval) (Alfieri, 1976 and Wiesmann, 1955).

The present study throws light on the effect of some new insecticides of cotton leaf-worm and its predator.

MATERIALS AND METHODS

The present field experiments were carried out in khorishid region, Alexandria, during 2005 and 2006 seasons. Tomato plants (variety peto-68) were planted in June of both seasons, in an area of one feddan. All cultural practices and fertilizers were followed as commonly practiced. In all cases, the high volume spraying method by use of knapsack sprayers was used at the rate of 400 L. of diluted spray/feddan. Also the experimental design was the randomized plot design, marking 4 replicates for each treatment as well as the untreated control. The results were based on counts on both leaf surfaces of living insects per sample of 10 leaves for each replicates, making one count before spraying and 3 counts at 3,5 and 7 day intervals after spraying on the second and fourth instar larvae of cotton leaf worm spodoptera L. and its associated predator insect *C. septempunctata* L (adult). Percentages of reduction of infestation were calculated according to the equation of **Henderson and Tilton (1955)**: (arcsin transformation was done)

% Reduction of in festation = 100 [1-(ta/tb) x (cb/ca)].

where::

Ta = Post-treatment counts.

Tb = Pre- treatment counts.

Cb = Untreated counts before treatment.

Ca = Untreated counts after treatment.

L.S.D. statical analysis was employed to test the significance of differences between treatments **(Snedecor, 1982)**.

Five insecticide were tested at the rates indicated in **Table (1)**.

Table (1) treatment used of some insecticides on tomato plants.

Trade marke	**Common name**	**Rate/faddan (L.)**	**Producing Company**
Celeian 72% EC	Profenofos	750 cc/f	KZ Company
Diflurait 25%WP	Diflubenzaron	70 gm/100 L	Misr Agr. Developmen
Mitholait 20% SL	Methomyl	1.25 L/f.	Misr Agr. Development
Birodan 50% EC	Chlorpyriphos-methyl	1 lit/f.	The National company for Agochemical production.
Adoya fentro 50% EC	Fentrothyon	250 cc/100 L	Adoya Company.

RESULTS AND DISCU SSION

A- Effect of insecticides on second instar larvae:

The averages of percentages reduction of infestation during both seasons are given in Tables (2 & 3). In the first season (2005), it could

concluded that there were significant differences between all the tested insecticides and untreated control (L.S.D. = 0.504 at 5% level of significance). These differences were evident in the highly percentage of reduction for treatment. Diflurait treatment gave the highest percentage of reduction (78.9%), followed by Birodan (76.7%), Celeian (71.8%) and Adoyafentro (71.4%) with no significant differences among Diflurait, Mitholait and Birodan compounds. On the other hand, the least percentage of reduction was obtained in Metholait treated plots. Results gave an average percentage of (60.7%).

Table (2): Efficiency of some insecticides in controlling *Spodoptera littoralis* (Bosid) on tomato plants during season (2005).

Treatments	2ed instar larvae					4th instar larvae				
	24 h. pre-treatment	Number of 2ed larvae and (%R) at indicated days post-treatment				24h pre-treatment	Number of 4th larvae and (%R) at indicated days post treatment			
		3 days	5 days	7 days	Average %reduction		3 days	5 days	7 days	Average %reduction
Celeian 72% EC	212	21 (91.1)	90 (64.8)	124 (59.6)	(71.8)	216	26 (90.1)	68 (65.0)	85 (51.1)	(68.7)
Diflurait 25% WP	410	79 (82.7)	82 (83.4)	175 (70.6)	(78.9)	384	35 (92.5)	112 (67.6)	151 (51.1)	(70.4)
Mitholait 20%SL	357	36 (90.9)	190 (55.8)	334 (35.5)	(60.7)	418	37 (92.7)	41 (89.1)	85 (74.7)	(85.5)
Birodan 50% EC	255	19 (95.3)	65 (78.8)	240 (56.1)	(76.7)	432	78 (85.1)	129 (66.8)	138 (60.3)	(70.7)
A doyafentro 50% EC	309	26 (92.4)	141 (62.1)	180 (59.8)	(71.4)	283	84 (75.5)	92 (63.9)	101 (55.6)	(65.0)
Untreated	200	222 (…)	240 (…)	290 (…)	(…)	520	629 (…)	468 (…)	418 (…)	(…)

L.S.D. (Pest) 0.05 level = 0.504
L.S.D. (Time) 0.05 level = 0.619
Total number 0f 2 ed & 4th instar larvae on 40 leaves

Table (3): Efficiency of some insecticides in controlling *Spodoptera littoralis* (Bosid) on tomato plants during season (2006).

Treatments	2ed instar larvae					4th instar larvae				
	24 h. pre-treatment	Number of 2ed larvae and (%R) at indicated days post-treatment				24h pre-treatment	Number of 4th larvae and (%R) at indicated days post treatment			
		3 days	5 days	7 days	Average %reduction		3 days	5 days	7 days	Average %reduction
Celeian 72% EC	178	12 (92.8)	28 (85.5)	87 (62.4)	(80.2)	109	9 (89.8))	35 (57.7)	28 (58.3)	(68.6)
Diflurait 25% WP	218	20 (90.2)	73 (69.1)	127 (55.2)	(71.5)	79	6 (90.6)	17 (71.7)	23 (52.7))	(71.7)
Mitholait 20%SL	232	22 (89.9)	78 (68.9)	142 (52.9)	(70.6)	86	5 (92.8)	11 (83.2)	21 (60.3)	(78.8)
Birodan 50% EC	185	15 (91.4)	53 (73.5)	112 (53.3)	(72.7)	103	6 (92.8)	25 (68.1)	30 (52.7)	(71.2)
A doyafentro 50% EC	238	26 (88.3)	56 (78.3)	131 (57.6)	(74.7)	63	6 (88.2)	20 (58.2)	18 (53.6)	(66.7)
Untreated	244	229 (…)	264 (…)	317 (…)	(…)	104	84 (…)	79 (…)	64 (…)	(…)

L.S.D. (Pest) 0.05 level = 3.222
L.S.D. (Time) 0.05 level = 4.652

Total number of 2 ed & 4th instar larvae on 40 leaves

Also, there are significant differences among three time (L.S.D. = 0.619 at 5% level). In 2006 season, statistical analysis also indicated significant different between the tested chemicals and untreated control. Celeian treatment gave the highest percentage of reduction were (80.2%).

Moderate percentage reduction were obtained by Adoyafentra (74.7%), Birodan (72.7%), Diflurait (71.5%) and Mitholait (70.6%) without significant differences between Celeian and Birodan compounds

(L.S.D. = 3.222 at 5% level of significance). Also, there are significant differences among three time

(L.S.D. = 4.652 at 5% level of significance).

B- Effect of insecticides on fourth instar larvae:

The results of these tests are given in **Tables (2 & 3)** During the first season (2005), statistical analysis indicated highly significant differences between the treatment and untreated ((L.S.D. = 0.504 at 5% level of significance).

Mitholait showed the highest percentages of reduction which reached (85.5%).

Birodan and Diflurait came next and showed almost similar percentages reduction (70.7%, 70.4%, respectively). Celeian showed a moderate effect (68.7% reduction), and Adoyfentro showed the lowest effect (65.0% reduction).

In the experiment of 2006, analysis of variance showed high significant differences among insecticides ((L.S.D. = 3.222 at 5% level of significance).

Mitholait gave the highest mean percentage of reduction (78.8%) compared with 66.7% for Adoyafentro. Diflurait and Birodan came next gave almost similar percentages reduction (71.7% and 71.2%, respectively). These results with those of the first season (2005).

Mitholait seemed to be the most promising insecticide for the control of cotton leaf-worm followed by Birodan and Diflourait, while Celeian and Adayfentro were less effective.

C- Effect of insecticides on insect predator:

The results are given in **Table (4).** Analysis of variance during first season (2005) revealed not significant differences among the treatments on C. *septempunctata* L

(L.S.D. = 15.045 at 5% level). Plots treated with Birodan gave the best control (90.3% reduction). Celeian (85.4%) and Adoyafentro (78,1%) came next in that respect. Moderat percentage reduction were obtain by Mitholait (75.7%), while Diflurait gave the least control (70.9% reduction).

In the experiment of 2006 season, statistical analysis indicated not significant differences among the insecticidal treatments ((L.S.D. = 10.798 at 5% level of significance).

Birodan was the most effective (90.9% reduction), compared with 87.9% for Celeian and 80.7% for Adoyafentro and 84.6% for Mitholail. On the other hand, Diflurait showed the least percentages of reduction (71.4%).

Table (4): Efficiency of some insecticides on associated predator* insect with *Spodoptera Littoralis* on tomato plants.

Treatments	2005 season					2006 season				
	24 h. pre-treatment	** Number of predator and (%R) at indicated days post-treatment				24h pre-treatment	** Number of predator (%R) at indicated days post treatment			
		3 days	5 days	7 days	Average %reduction		3 days	5 days	7 days	Average %reduction
Celeian 72% EC	6	2 (70.8)	1 (85.4)	0 (100)	(85.4)	4	1 (78.6)	1 (85.0)	0 (100)	(87.9)
Diflurait 25% WP	2	1 (56.3))	1 (56.3)	0 (100)	(70.9)	3	3 (14.3)	0 (100)	0 (100)	(71.4)
Mitholait 20% SL	6	3 (56.3)	2 (70.8)	0 (100)	(75.7)	5	2 (65.7)	1 (88.0)	0 (100)	(84.6)
Birodan 50% EC	3	1 (70.8)	0 (100)	0 (100)	(90.3)	7	2 (75.5)	2 (97.1)	0 (100)	(90.9)
A day afentro 50% EC	4	2 (56.3)	1 (78.1)	0 (100)	(78.1)	4	2 (57.1)	1 (85.0)	0 (100)	(80.7)
Untreated	7	8 (…)	8 (…)	10 (…)	(…)	6	7 (…)	10 (…)	10 (…)	(…)

L.S.D. (Pest) 0.05 level = 15.045 **L.S.D. (Pest) 0.05 level = 10.798**
L.S.D. (Time) 0.05 level = 19.566 **L.S.D. (Time) 0.05 level = 21.702**
*** Predator = adult and larvae**
**** Total no. of predator on 40 leaves**
Coccinella Septempunctatal. (F. Coccinellidae)

Conclusion:

In general, the results of the present study reveal that Mitholait was the most effective against fourth larvae (4th larvae) cotton leaf-worm, while it gave the least control against second larvae (2ed larvae) cotton leaf-worm.

Birodan gave highly reduction against predators Coccinella which conceder as natural enemies in regulating some insect pest and for the biological control of cotton leaf-worm, Kamal 1951 and Ibrahim 1983). These insecticides could be useful only in cases of highly or moderate infestation.

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تأثير بعض مبيدات الآفات علي دودة ورق القطن والمفترس المرتبط بها (أبو العيد سبع نقط) علي نباتات الطماطم

ايفلين جودة ابراهيم
معهد بحوث وقاية النباتات - مركز البحوث الزراعية- الصبحية-الإسكندرية

أجريت التجربة الحقلية علي نباتات الطماطم المنزرعة في العروة النيلية (علي مدي موسمي ٢٠٠٥، ٢٠٠٦م) بغرض تقدير تأثيرات المبيدات التالية (سيليان ٧٢% Ec ، ديفلوريت ٢٥% WP، ميثوليت ٢٠% SL، بيرودان٥٠% EC، وادويافنترو ٥٠% EC) علي دودة ورق القطن (العمر الثاني والعمر الرابع) وكذلك المفترس أبو العيد ذو سبع نقط المتواجد علي تلك النباتات.

أظهرت النتائج أن المبيدات لها تأثير عالي علي كل من العمر الثاني والرابع بنفس الكفاءة (لا يوجد فروق معنوية بين الأعمار، ولكن أظهرت النتائج أن مبيد (ديفلوريت) أعطي انخفاض أكثر من كل المبيدات (٧٨,٩) علي العمر الثاني بينما مبيد (الميثوليت) سبب انخفاض أكثر من كل المبيدات (٨٥,٥) علي العمر الرابع وذلك خلال الموسم الزراعي ٢٠٠٥.

كما وضح من نتائج في موسم ٢٠٠٦أن فعالية المبيدات عالية أيضا بعد ٣ أيام من الرش فقد أحدث كل من المبيدان سيليان وبيرودان انخفاض (٩٢,٨، ٩١,٤% علي التوالي) علي العمر الثاني بينما أحدث كل من المبيدان الميثوليت والبيرودان نفس الانخفاض٩٢,٨% علي العمر الرابع وبالنسبة للتأثير علي المفترس أبو العيد أظهرت المعاملات تأثيرات سلبية علي المفترس حيث أعطي انخفاض ١٠٠% بعد ٧ أيام لكل المبيدات في الموسمين ويعتبر هذا المفترس هام في المكافحة البيولوجية لدودة ورق القطن.

ومن نتائج الموسمين ٢٠٠٥م، ٢٠٠٦م كان مبيد (ديفلوريت) أقل تأثيرا علي اعداد المفترس (أبو العيد) حيث كان معدل الإنخفاض (٧٠,٩، ٧١,٤%) علي التوالي-لذلك ينصح بالخلط بينه وبين مبيد الميثوليت بنسب معينة وهذا قد يحقق نجاح في برنامج المكافحة المتكاملة.