

## ASSESSMENT THE EFFICIENCY OF CERTAIN DIFFERENT INSECTICIDES AGAINST BOTH SPINY AND PINK BOLLWORMS ON COTTON CROP

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### ABSTRACT

Three sprays of certain different insecticides were carried out to evaluate their efficiency against both pink bollworm *Pectinophora gossypiella* (Saund.) and the spiny bollworm *Earias insulana* (Boisd.) infesting cotton plants under field conditions during 2000 and 2001 seasons. Tested insecticides were received from three chemical groups, 4 pyrethroids, 2 organophosphates and one carbamate. The two organophosphates insecticides had the same active ingredient but differ in their formulations. Tested pyrethroids were the most effective which induce the highest %reduction in bollworms larvae population during two seasons, followed by carbamates then organophosphorus insecticides except Dursban (OP) was active than carbamate during 2000 season. Results indicated that, overall mean percent of reduction in population density of bollworms during 2001 was more compared to that of 2000 season for all treatments. The percent reduction ranged between 42.98 to 77.78% and 59.20 to 83.00% for Bestan (OP) and Fenethrin (Pyreth.) during 2000 and 2001 seasons, respectively. Data indicated that also two treatments with the same active ingredient of organophosphorus, Dursban induced higher reduction in bollworms populations than with Bestan.

### INTRODUCTION

The cotton bollworms, *Pectinophora gossypiella* (Saund.) and the spiny bollworm *Earias insulana* Boisd. are major pests attacking cotton in Egypt (Saad *et al.*, 1974; Guirguis *et al.*, 1976 and Kassem and Zeid, 1987). Such pests causes sever loss of cotton yield in quantity and quality. Chemical control of this pest is still adopted as one of the major techniques for combating this serious cotton pest in Egypt. The intensive and unwise use of chemical pesticides induced many problems among them is resistance of pests to the applied pesticides. Chemical control program aimed mainly to achieve a high pesticidal effect to cotton pests. The ministry of Agriculture recommends a chemical control program to combat the pest. The efficiency of chemical control depends on the toxic action of the applied insecticides together with the suitable time of application. The efficiency of insecticides against cotton pests has been reported as a function of rotation system of the insecticides used (El-Nawawy *et al.*, 1979, Watson *et al.*, 1986 and Mustafa *et al.*, 1989).

The efficiency of different spraying programmes and their sequence against cotton bollworms have been studied by many investigators such as Kassem *et al.*, (1981), Watson *et al.* (1981a) and Abo El-Ghar *et al.* (1989). Moreover, the success of cotton bollworm control programme relies of use

pesticides belonging to different groups in certain sequence (Watson *et al.*, 1986), timing of application and interval of spraying (El-Feel *et al.*, 1991).

The present investigation aimed to evaluate the efficiency of certain insecticides belonging to different chemical groups on cotton bollworms *Pectinophora gossypiella* (Saund) and *Earias insulana* (Boisd.) to select the most effective chemicals.

## **MATERIALS AND METHODS**

Seven insecticides belongs to different 3 chemical groups were used in the present study.

### **A. Synthetic pyrethroids insecticides:**

- 1- Fenthrin (Fenpropathrin) 30% EC at rate of 500 ml/fed. (RS)  $\alpha$  cyano-3-phenoxybenzyl-2,2,3,3-tetramethyl-cyclopropanecarboxylate.
- 2- Actamethrin (cypermethrin) 10% EC at rate of 600 ml/fed. (RS)  $-\alpha$  cyano-3 phenoxybenzyl-3-(2,2-dichlorovinyl)-2,2-dimethyl cyclopropane carboxylate.
- 3- Super alfa (Alphacy permethrin): It is a racemete comprising (s)- $\alpha$ -cyano-3-phenoxybenzyl (1R, 3R)-3-(2,2-dichlorovinyl)-2,2-dimethyl cyclopropane carboxylate and (R)- $\alpha$ -cyano-3-phenoxybenzyl (1S, 3S)-3-(2,2-dichlorovinyl) 2,2-dimethyl cyclopropane carboxylate. EC 10% 250 cm/fed.
- 4- Catron (lambdacyhalothrin) 2.5% EC at rate of 750 ml/fed. a 1: 1 mixture of (S)- $\alpha$  cyano-3-phenoxybenzyl (Z)-(1R) cis-3-(2-chloro-3,3,3-trifluoropropenyl)-2,2 dimethyl-cyclopropane-carboxylate and (R)  $\alpha$  cyano-3-phenoxybenzyl (z)-(1S)-cis-3-(2-chloro 3,3,3-trifluoropropenyl) 2,2-dimethylcyclopropane-carboxylate.

### **Organophosphate insecticides:**

1. Dursban (chlorpyrifos) 48% EC at rate of 1 litre/fed 0,0-diethyl o-(3,5,6-trichloro 2-pyridyl phosphorothioate.
2. Bestan (chlorpyrifos) 48% EC at rate of litre/fed. 0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl) phosphorothioate.

### **Carbamate insecticides:**

Pyrothane: 75% W.P. at rate of 300 gm/fed.

### **Field assessment:**

The experiments were conducted during the cotton growing seasons of 2000 and 2001 at Sakha Agricultural Research Station, Kafr El-Sheikh Governorate. The experimental area was divided into plots of 1/24 of a feddan for each and cultivated with Giza 86 cotton variety. The treatments were arranged in complete randomized blocks design. Four replicates were used for each treatment including the control. The tested insecticides were sprayed three times using a low-volume spraying (model CP)<sup>3</sup>, in water dilutions at 300 litre/feddan. The spray programme was started on August 8<sup>th</sup>, season 2000 and July 31<sup>st</sup>, season 2001 and continued regularly every two weeks. Representative samples of (100 green bolls) per treatment (25 bolls/rep.)

were collected at random from both diagonals of each plot before each spray and then weekly through period of experiment (six week). Bolls were externally as well as internally examined and the number of spiny and pink bollworms larvae and percent of infestation in each sample were recorded. Percent of reduction in larval population was calculated by using the equation of Henderson and Tilton (1955).

## RESULTS AND DISCUSSION

The effect of tested synthetic pyrethroids, organophosphorus and carbamates insecticides sprayed three times at 15 days intervals on the population density of pink bollworm *Pectinophora gossypiella* (Saund) and the spiny bollworm *Earias insulana* (Boisd.) infesting cotton during 2000 and 2001 seasons is shown in Tables 1 and 2.

As shown in Table 1 overall mean of percent of reduction in population density of pink and spiny bollworms during 2000 season for synthetic pyrethroids ranged between 77.78% and 54.42%. In this respect Fenthtrin was the most effective compound as it caused 77.78% reduction followed by Superalfa and Actamethrin causing 60.24 and 56.91% reduction, respectively whereas Catron was the least effective (54.42% reduction). This results a great extent with those obtained by Abo-Sholoua *et al.* (2000).

As for the two organophosphorus insecticide Dursban showed more higher potency (57.56% reduction) than Bestan (42.98% reduction) while carbamate insecticide pyrophane showed (46.14% reduction). As a general trend as shown in Table (1) all the tested pyrethroids afforded a good % reduction followed by organophosphorus and carbamate insecticide which achieved a moderate % reduction. The results indicated that percent of reduction in bollworms larval number after 3 successive sprays is higher than the corresponded obtained after the first and the second spray for all treatments. These results agree with those obtained by Mourad *et al.* (1991).

In season 2001, the percent of reduction in bollworms larval number is shown in Table 2 for synthetic pyrethroids a high % reduction which could be arranged descendingly by as follows Fenthtrin (83.00%), Actamethrin (79.90%), super alpha (78.0%) and Catron (77.40% reduction). Watson *et al.* (1981b) found that cypermethrin, fenvalerate and deltamethrin reduced significantly the infestation by pink bollworm and spiny bollworm as it induced 88.2, 84.6 and 81.9% reduction, respectively. The organophosphorus insecticides Dursban and Bestan caused 66.2 and 59.2% reduction respectively. The carbamate insecticides Pyrophane showed 70.32% reduction. The results indicated that reduction percentage of population could be arranged ascendingly as follows, one, two and three sprays, where the third spray induced higher reduction for all treatments. Watson *et al.* (1981a) found that synthetic pyrethroid sprayed three times reduced significantly the population of the pink bollworm. Watson *et al.* (1986) mentioned that three sprays at 2 weeks interval with Fenprothrin, fenvalerate and deltamethrin induced the highest reduction in pink bollworm larval population (86.4, 81.3 and 79.1%, respectively).

**Table (1): Mean number and percent of reduction in cotton bollworms following the application of tested compounds during 2000 season.**

Treatment	Rate/ feddan	Pre- spray	Mean number of larva/100 bolls				% reduction			
			After 1 <sup>st</sup> spray	After 2 <sup>nd</sup> spray	After 3 <sup>rd</sup> spray	Overall mean	After 1 <sup>st</sup> spray	After 2 <sup>nd</sup> spray	After 3 <sup>rd</sup> spray	Overall mean
<b>Synthetic pyrethroids:</b>										
Fenthrin	500 ml	6	8.0	9.0	6.0	7.67	68.63	75.65	89.06	77.78
Actamethrin	400 ml	3	7.0	9.5	6.5	7.67	46.10	48.24	76.40	56.91
Super alfa	250 ml	5	9.0	15.5	13.0	12.5	57.54	51.50	71.68	60.24
Catron	750 ml.	3	7.00	10.5	7.50	8.33	46.10	44.37	72.79	54.42
<b>Organophosphates:</b>										
Dursban	1 litre	5	10.0	13.0	18.5	13.83	53.32	59.31	60.06	57.56
Bestan	1 litre	4	10.0	14.5	120.5	15.0	41.65	42.83	44.47	42.98
<b>Carbamates:</b>										
Pyrophane	300 gm	4	9.5	14.5	18	14	44.29	42.83	51.32	46.14

**Table (2): Mean number and percent of reduction in cotton bollworms following the application of tested compounds during 2001 season.**

Treatment	Rate/ Feddan	Pre- spray	Mean number of larva/100 bolls				% reduction			
			After 1 <sup>st</sup> spray	After 2 <sup>nd</sup> spray	After 3 <sup>rd</sup> spray	Overall mean	After 1 <sup>st</sup> spray	After 2 <sup>nd</sup> spray	After 3 <sup>rd</sup> spray	Overall mean
<b>Synthetic pyrethroids:</b>										
Fenthrin	500 ml	3	2.33	2.00	2.00	2.11	69.5	87.3	92.1	83.00
Actamethrin	400 ml	5	4.00	4.33	3.67	4.00	65.0	83.4	91.5	79.90
Super alfa	250 ml	4	3.67	3.33	.67	3.22	59.5	83.8	92.3	78.50
Catron	750 ml.	3	3.00	2.33	2.00	2.44	55.4	84.7	92.1	77.40
<b>Organophosphates:</b>										
Dursban	1 litre	6	6.00	7.50	6.00	6.50	54.0	64.7	79.9	66.20
Bestan	1 litre	6	7.0	8.5	8.5	8.00	46.1	59.4	72.1	59.20
<b>Carbamates:</b>										
Pyrophane	300 gm	5	5.6	3.5	4.00	4.33	47.3	79.5	84.2	70.32

Data indicated that all tested pyrethroids were the most effective followed by carbamate and organophosphorus insecticides during 2001 season.

As in general trend two treatments with the same active ingredient of organophosphorus Dursban induced higher reduction in bollworm populations than Bestan during two seasons. This difference might be due to the different supplementary substances in formulations.

Generally, results indicated that overall mean of percent of reduction in population density of bollworms during 2001 was more than which compared to that 2000 season for all treatments, where the percent of reduction ranged between 42.98% to 77.78% during 2000 season while it ranged between 59.20% to 83.00% during 2001 season.

Finally, the results indicated that, the important role of chemical groups and additive material of used products in addition to sprays number in determining their efficiency in reducing cotton bollworms infestation

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دراسات على الكفاءة الحقلية لبعض المبيدات ضد ديدان اللوز على القطن  
فايزة حسن شرف

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تم إجراء هذه التجربة في موسمی ٢٠٠٠/٢٠٠١ لدراسة فعالية بعض المبيدات ممثلة لثلاثة مجاميع مختلفة وهي البيروثرويدات المخلفة والفوسفورية الى جانب الكاربامات وذلك برشها ثلاث رشات متتالية لدراسة تأثيرها على نسبة الخفض في الإصابة بدودة اللوز القرنفلية والشوكية تحت الظروف الحقلية وقد أوضحت النتائج أن نسبة الخفض في تعداد اليرقات كان يزيد في الرشة الثالثة عنه في الرشة الثانية والاولى على الترتيب وذلك في كلا الموسمين.

وكانت نسبة الخفض في موسم ٢٠٠١ اعلى منها في موسم ٢٠٠٠ حيث تراوحت نسبة الخفض بين ٤٢,٩٨% الى ٧٧,٧٨% في موسم ٢٠٠٠ وكانت بين ٥٩,٢ الى ٨٣,٠ في موسم ٢٠٠١ على التوالي.

وأوضحت النتائج أن مجموعة المبيدات التي تنتمي لمجموعة السيروثرويدات اكثر تأثيرا في خفض تعداد اليرقات تليها المبيدات الكارباماتية واخيرا المبيدات الفوسفورية العضوية وذلك في موسمی التجربة. باستثناء مبيد الدورسيان الذي تفوق على الكاربامات وذلك في موسم ٢٠٠٠.

ولقد كان هناك تأثير مختلف لنفس المادة الفعالة وهي الكلوربيروفوس التابعة لمجموعة المبيدات الفوسفورية عندما جهزت بطريقتين مختلفتين حيث اعطى الدورسيان نسبة خفض اعلى من البستان في موسمی التجربة.