

INFLUENCE OF SOME INSECTICIDE SEQUENCES ON NATURAL AND ARTIFICIAL INFESTATION WITH PINK BOLLWORM *PECTINOPHORA GOSSYPIELLA* (SAUND.)

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Abstract

Trials were carried out during 1996 cotton season at Sakha Agricultural Research Station Farm to evaluate the efficiency of some insecticide sequences against pink bollworm larvae and to determine if the recommended interval (14 days) between two sprays for organophosphorus or pyrethroid is enough for insecticides to give good control or not by using the recommended and half of the recommended dosage.

The percentage reductions of natural pink bollworm infestation for the different sequences ranged between 44.77 - 60.78% and 38.26-60.19% for both recommended and half of recommended dosage, respectively at two-week intervals.

In the case of using the recommended dosage, all treatments reduced the percentage of artificial pink bollworm infestation. The sequence Cutabron, Kendo, Dursban induced the highest reduction, while the sequence Kendo-Cutabron-Dursban came in the lowest order.

In case of half of recommended dosage, the artificial infestation for sequence (Dursban, Kendo, Cutabron) induced a high reduction (54.19%). Cutabron and Dursban were highly effective when used at the beginning.

In artificial infestation, larval mortality decreased with increasing the period after spraying. In case of using the recommended dosage, all insecticides gave less than 60% after 10 days post treatment for the 1st and 2nd sprays. Kendo insecticide resulted in larval mortality less than 60% after 7 days post treatment in the 1st spray but it showed the highest mortality in the 3rd spray.

INTRODUCTION

Profitable cotton production in Egypt depends on successful and efficient pest management programme which reduces the risk disastrous crop losses caused by pests. Pink bollworm, *Pectinophora gossypiella* (Saund.) is the most important pest

attacking cotton bolls. The currently used insecticides have been and will continue to be of major importance, till other efficient alternatives are available (Rizk, 1994).

The efficiency of different spraying programmes and their sequences against cotton pests have been studied by many investigators such as, Abo El-Ghar *et al.* (1973), Kassem *et al.* (1981), Watson *et al.* (1981), Abo El-Ghar *et al.* (1984) and El-Feel *et al.* (1973). Moreover, the success of cotton bollworm control programme relies on the use of pesticides belonging to different groups in a certain sequence (Watson *et al.* 1986) and timing of application and intervals of spraying (El-Feel *et al.*, 1991).

The aim of this study is to evaluate the efficiency of some insecticide sequences against pink bollworm following two methods: the natural and artificial infestation by using the recommended dosage and half of it. Also, to reevaluate if the recommended interval (14 days) between sprays is sufficient to cause good protection or not.

MATERIALS AND METHODS

Experimental sites : The experiment was conducted during 1996 cotton growing season at Sakha Agricultural Research Station Farm, Kafr El-Sheikh Governorate. The efficiency of recommended insecticides used against bollworms has been studied. Trials were carried out on an area of about one feddan. Treatments were arranged in complete randomized blocks with three replicates. The area of each replicate was 1/100 feddan and all agricultural processes were carried out as usual. About 1/50 feddan was used as untreated control area. All plots were planted with Giza 77 cotton variety.

Insecticides used : Cutabron (50% EC); Profenofos (73.6 gr a.i.) + chlorflurazuron (26.4 a.i) at the sate of 750 ml per feddan.

Dursban (48% EC); Chloropyrifos at the rate of 1 liter per feddan.

Kendo (5% EC) Lamdacyhalothrin at the rate of 375 ml per feddan.

Experimental procedures: Spray applications took place for each treatment at 2-week and 1-week intervals according to the schedule in Table 1. Insecticides were sprayed after dilution with water (200 L/fed.) using CP3 sprayer with one nozzle.

The percentage of natural infestation of pink bollworm was assessed according

to the technique recommended by El-Heneidy et al. (1987). A sample of 25 cotton bolls was taken from each replicate.

Table 1. Treatments and sequences.

Treatment	Interval	Sequence
Recommended dosage	2 weeks	Cutabron (CT)- Kendo (K)-Dursban (DU) K-CT-DU DU-K-CT K-DU-CT CT-DU-K*
Half of recommended dosage	2 weeks	CT-K-DU K-CT-DU DU-K-CT K-DU-CT CT-DU-K*
Half of recommended dosage	1 weeks	CT-K-DU K-CT-DU DU-K-CT K-DU-CT CT-DU-K*

This sequence was only used to calculate the mortality percentage of larvae after spraying Kendo in the 3rd spray

The percentage of artificial infestation was examined and calculated according to the technique recommended by Khalifa et al. (1980). Twelve healthy bolls (4 bolls x 3 replicates) were picked up from each treatment and transferred to the laboratory and kept in glass vials. The bolls were infested with the new hatching of the first instar pink bollworm larvae (3 larvae/boll) after 0,2,7,10 and 14 days after spraying. These bolls were examined five days later after infestation. The larval mortality in these artificially infested bolls was recorded and corrected by using Abbott's formula (1925).

In order to measure the effects of the tested insecticides, Hinderson and Tilton equation (1955) was used to calculate the reduction percentage of the examined pest.

RESULTS AND DISCUSSION

A. Effect of natural infestation

Two week intervals

1. Recommended dosage : Data presented in Table 2 showed that all treatments reduced the ratio of natural pink bollworm infestation during the three sprays. Sequence 1 (60.78%) came in the first order, followed by sequence 2 (54.96%) then sequence 3 (53.60%) while sequence 4 (44.77%) was the least.

2. Half of recommended dosage: As shown in Table 3 the pink bollworm infestation in all treatments declined during the three sprays. The results showed that organophosphorus i.e. Cutabron (CT) 33.69% and Dursban (Du) 37.50% were highly effective when used at the beginning of first spray. This finding agreed with El-Gogary (1987), El-Feel *et al.* (1993), and El-Sorady *et al.* (1995). The results also indicated the importance of the presence of synthetic pyrethroids.

From these results, it can be noted that six sprays using half of recommended dose at one-week interval may be better than using the same insecticides three times at recommended dose with two-week intervals.

B. Effect on artificial infestation

Two-week intervals.

1. Effect of recommended dosage: Data presented in Table 4 showed that all treatments reduced the ratio of pink bollworm infestation during the three sprays. The different sequences could be arranged in a descending order according to the general reduction percentage as follows: sequence 1 (56.69%) followed by sequence (4) (52.67), and sequence 3 (50.86%), while sequence 2 (48.43%) came in the last order.

From these results, it is obvious that Cutabron and Dursban were highly potent in reducing infestation when used at the beginning (first and second spray). These conclusions agreed with those of El-Gogary (1987), El-Feel *et al.* (1991) and El-Feel *et al.* (1993). According to the residual activity, all used insecticides showed low effect after ten days from spraying. More studies are needed to evaluate the recommended interval (14 days) in order to obtain good results in field application.

2. Effect of half of recommended dosage

The results in Table 5 showed that sequence 3 (54.19%) was effective than

Table 2. Reduction percentage of natural pink bollworm infestation during 1996 cotton season after spraying the recommended dosage at 2-week intervals.

Treatment	% prespray infestation	1st spray		2nd spray		3rd spray			General Reduction	Time of spray		
		1-week	2-weeks	1-week	2-weeks	Mean	1-week	2-weeks			Mean	
1. CT-K-DU	6.67	40.02	57.10	48.56	62.30	67.62	64.96	64.01	73.61	68.81	60.78	1st 7/8/96
2. K-CT-DU	6.67	20.00	40.65	30.32	48.00	81.09	64.55	66.43	73.61	70.02	54.96	2nd 23/8/96
3. DU-K-CT	5.33	25.00	50.47	37.73	56.47	39.21	47.84	67.00	83.49	75.25	53.60	3rd 7/9/96
4. K-DU-CT	4.00	16.60	45.00	30.80	71.00	46.00	58.50	44.00	56.00	50.00	44.77	
Control	5.33	10.66	16.00		18.66	20.00		22.66	24.00			

Table 3. Reduction percentage of natural pink bollworm infestation during 1996 cotton season after spraying the half recommended dosage at 2-week intervals.

Treatment	% prespray infestation	1st spray		2nd spray		3rd spray			General Reduction	Time of spray		
		1-week	2-weeks	1-week	2-weeks	Mean	1-week	2-weeks			Mean	
1. CT-K-DU	5.33	25.00	42.23	33.62	34.70	25.68	30.19	45.96	56.00	50.98	38.26	1st 7/8/96
2. K-CT-DU	6.67	10.00	21.00	15.50	47.82	40.61	44.22	47.21	69.22	58.22	39.31	2nd 23/8/96
3. DU-K-CT	8.00	25.00	50.00	37.50	71.00	68.50	69.75	76.00	70.65	73.33	60.19	3rd 7/9/96
4. K-DU-CT	6.67	10.00	47.25	28.62	47.82	40.61	44.22	56.82	64.81	60.82	44.55	
Control	5.33	10.66	16.00		18.66	20.00		22.66	24.00			

Table 6. Reduction percentage of artificial infestation at 1 week interval in green bolls after spraying the half recommended dosage.

Treatment	No. of infested bolls before spray	1st spray		2nd spray		Third spray		General Mean			
		48h	7 days	48h	7 days	48h	7 days				
1. CT-K-DU	10	91.67	60.00	75.84	81.82	40.00	60.91	83.34	63.64	73.49	70.08
2. K+CT+DU	10	58.34	30.00	44.18	81.82	40.00	60.91	66.68	45.46	56.07	53.72
3. DU+K+CT	12	86.12	66.67	76.40	84.85	66.66	75.75	86.12	69.70	77.91	76.69
4. K+DU+CT	12	58.34	50.00	54.17	69.70	50.00	59.85	72.22	54.55	63.39	59.14
Control infestation	10	12	10		11	10		12	11		
		1st spray 7/8/1996		2nd spray 15/8/1996		3rd spray 23/8/1996					

Table 7. Effect of the three insecticidal sprays on mortality percentage of pink bollworm larvae after different periods of artificial infestation.

No. spray, dosage and interval insecticide and period	First spray			Second spray			Third spray		
	R.D 2-Weeks	1/2 R.D 2-Weeks	1/2 R.D 1-Weeks	R.D 2-Weeks	1/2 R.D 2-Weeks	1/2 R.D 1-Weeks	R.D 2-Weeks	1/2 R.D 2-Weeks	1/2 R.D 1-Weeks
Dursban									
Zero time	95.45	90.91	90.91	100.00	100.00	90.48	80.00	70.00	65.00
48 hs	94.74	68.42	68.42	90.00	80.00	80.00	68.18	54.55	59.09
7 days	80.00	60.00	70.00	83.33	55.55	61.11	47.37	36.84	36.84
10 days	70.00	60.00		63.64	54.55		33.33	33.33	
14 days	55.66	44.44		42.11	31.58		20.00	5.00	
Cutabron									
Zero time	100.00	95.45	90.91	100.00	100.00	95.24	90.00	80.00	70.00
48 hs	100.00	89.47	89.47	85.00	75.00	85.00	90.90	59.09	59.09
7 days	90.00	70.00	70.00	72.22	66.67	61.11	63.16	31.58	36.84
10-days	70.00	60.00		72.22	68.16		38.06	23.81	
14 days	55.56	44.44		57.89	47.37		25.00	10.00	
Kendo									
Zero time	90.91	81.82	86.36	90.48	90.48	95.24	90.00	85.00	80.00
48 hs	78.95	68.42	63.16	85.00	80.00	90.00	81.82	72.72	77.27
7 days	70.00	60.00	55.00	72.22	66.67	72.22	73.68	57.89	63.16
10 days	50.00	40.00		72.72	72.72		71.43	57.14	
14 days	33.33	22.22		57.89	52.63		60.00	45.00	

R.D. = Recommended dosage.

the others and had a higher reduction percentage during the three sprays.

One Week interval

Half of recommended dosage: Table 6 showed the same trend of reduction during the three sprays. Sequence 3 (76.69%) was the most effective one.

As mentioned above according to the residual activity, it could be noted that the pyrethroid compound was highly potent in reducing the infestation of pink bollworms in the 2nd spray as also observed by El-Feel et al. (1991).

C. Mortality percentage of artificial infestation larvae: Data in Table 7 and Fig 1 showed the toxic effects of Dursban, Cutabron and Kendo on 1st instar larvae at 0, 2, 7, 10 and 14 days. The results indicated that Cutabron and Dursban had the higher mortality percentage than Kendo in both 1st and 2nd sprays at all intervals. It could be noted that Kendo toxicity gradually increased and had higher mortality than Cutabron and Dursban in the 3rd spray at all dosages with different intervals.

The results showed that the mortality decreased with prolonging the increasing period after spraying. In case of using the recommended dosage, all insecticides gave mortality percentage less than 60% in both first and second sprays 10 days post treatment. Meanwhile, Kendo in the first spray gave mortality percentage less than 60% after 7 days post treatment. The same trends were obtained in case of half of recommended dosage except Dursban in the 2nd spray which showed mortality percentage of 55.55% after 7 days post treatment.

The results demonstrated that the mortality percentage for Kendo in the third spray was higher than for both Dursban and Cutabron which became less effective at all dosages and intervals.

Generally, it can be noted that the recommended intervals between sprays (14) days are too long to give good control against the pink bollworm.

A considerable decrease in residual toxicity was observed for all tested insecticides (less than 70% mortality) after 10 days post-treatment for the recommended dosage.

These findings underline the importance of doing more research to determine suitable intervals for insecticides used to show maximum efficiency.

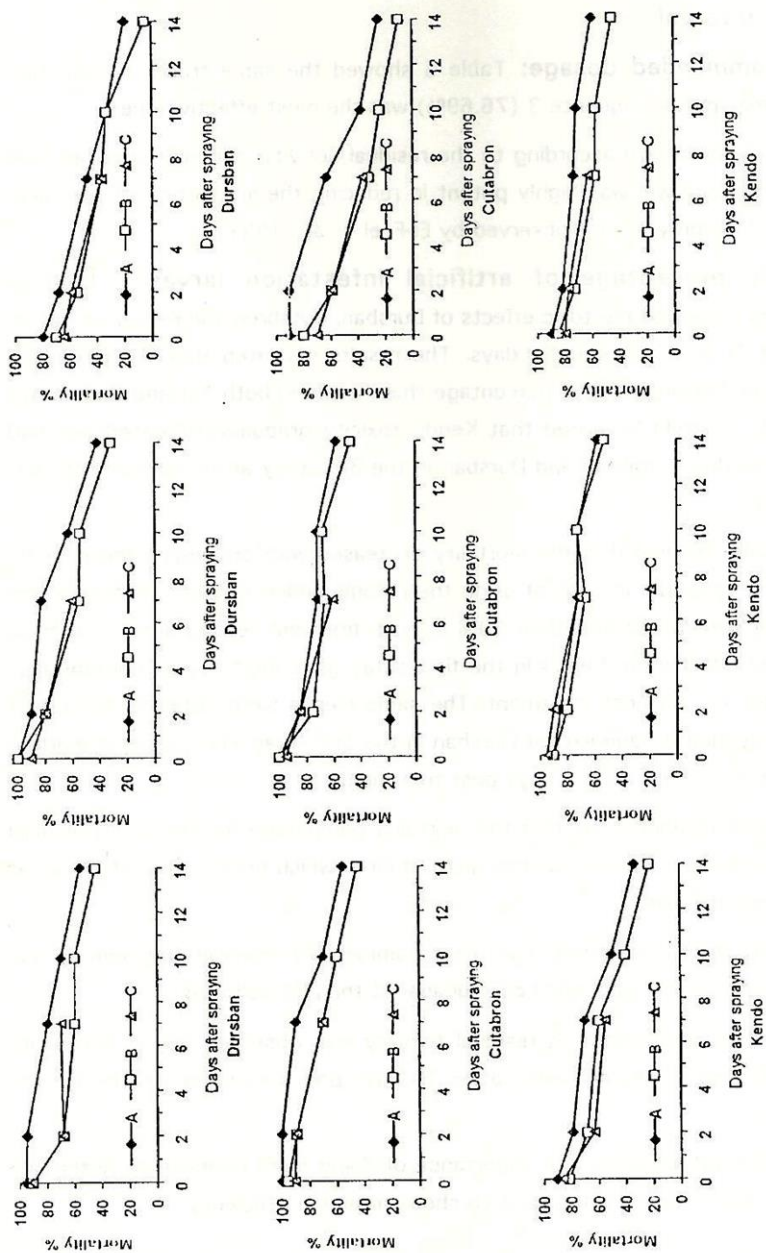


Fig.1. Effect of the three sprays on mortality of pink bollworm larvae using Dursban, Cutabron and

A = Recommended dose every two weeks B = Half recommended dose every two weeks C = Half of the recommended dose

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تأثير تتابع بعض المبيدات على الإصابة الطبيعية والصناعية لديدان اللوز القرنفلية

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إجريت تجارب حقلية فى موسم القطن ١٩٩٦ فى مزرعة محطة البحوث الزراعية بسخا لتقييم تتابع بعض المبيدات المستخدمة ضد يرقات ديدان اللوز القرنفلية لاختبار كفاءة الفترات الموصى بها ما بين الرشاش (١٤ يوم) للمبيدات الفسفورية والبيروثرويدات فى الحصول على أفضل النتائج، وأوضحت النتائج ما يلى :

١ - فى حالة استخدام كل من الجرعة الموصى بها، ونصف الجرعة الموصى بها كل أسبوعين على الإصابة الطبيعية كانت معدلات الانخفاض تقع فى المدى (٤٤,٧٧٪ - ٦٠,٧٨٪) والمدى (٣٨,٢٦٪ - ٦٠,١٩٪) لكل منهما على التوالى.

٢ - فى حالة استخدام الجرعات الموصى بها أدت المعاملات الى خفض معدلات الاصابة الصناعية بديدان اللوز واعطى التتابع (كتابرون - كندو - دورسيان) أعلى نسبة خفض حيث كانت ٥٦,٦٩٪ ، بينما كان التتابع (كندو - كاتبرون - دورسيان) فى المرتبة الأخيرة.

٣ - فى حالة المعاملة بنصف الجرعة بأستعمال الاصابة الصناعية اعطى التتابع (دورسيان - كندو - كاتبرون) أعلى خفض ٥٤,١٩٪ وكان استخدام المخلوط (كاتبرون) والمبيد الفسفورى (دورسيان) أكثر فاعلية فى بداية الرشاش.

٤ - فى حالة العدوى الصناعية إنخفضت نسبة الموت مع زيادة الفترات بعد الرش، وفى حالة استخدام الجرعات الكاملة أعطت كل المبيدات اقل من ٦٠٪ بعد عشرة أيام من المعاملة وذلك فى الرشاشين الاولى والثانية، وأظهر مبيد الكندو نسبة إبادة أقل من ٦٠٪ من المعاملة بعد ٧ أيام من الرشاش الاولى بينما أظهر إبادة عالية عن المبيدات الاخرى عند استخدامه فى الرشاش المتأخرة.