

## EFFICACY OF DIFFERENT PESTICIDES PROGRAMS AGAINST THE PINK BOLLWORM IN COTTON FIELDS

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### Abstract

The present investigation was conducted to evaluate six control programs in reducing the incidence of pink bollworm on cotton crop at Zagazig district, Sharkia Governorate during 2013 and 2014 seasons. Results indicated that the highest reduction percentages of the pink bollworm, *Pectinophora gossypiella* (Sounders) were 85.65 and 83.90 % with programs E and C, respectively during 2013. Meanwhile in the second season, it was 85.19 and 83.31 % with program E and C, respectively. The highest yield production was 1260.00 and 1157.00 kg/fed was recorded for E and C programs during 2013 season, while it was 1088.00 and 1056.00 kg/fed. was recorded for E and C programs during 2014 season; compared with 630.00 and 610.00 kg/fed of the untreated plots during 2013 and 2014 cotton seasons, respectively. Finally, it could be concluded that the best insecticidal programs were E and C, results showed that those programs revealed the lowest infestation percentages of the pink bollworm larvae and yield production increase.

**Key words:** Pyrban, Lambda-super, Teliton, Segiron, Angio, Chlorzan, Chlorplus, Vantex, pink bollworm, *Pectinophora gossypiella*, reduction, yield.

### INTRODUCTION

Cotton production in Egypt has threatened with several insects, especially lepidopteran insects; such as pink bollworm, *P. gossypiella*, which causes an enormous damage in cotton yield (El-Aswad and Aly 2007). The larvae of pink bollworm attack buds, flowers and bolls and cause high losses to the cotton green bolls, fiber and seeds and resulted in great reduction in the cotton yield (Khurana and Verma 1990). It is important to compare the efficacy of insecticides against the pest in order to get program as well as reducing indiscriminate use of insecticides. (Hegab, 2008) recorded that all tested insecticide programs influences the boll infestation percentages of cotton bollworms compared with untreated cotton. The highest reduction of larval numbers in green cotton bolls was recorded when chlorpyrifos was applied followed by Es-fenvalerate and thiodicarb recorded an average was about 76.66 % reduction during three cotton seasons. (Zaki, 2012) found that the pyrethroid compounds included Alpha-cypermethrin and Deltamethrin were more toxic than Profenophos against larvae of the pink bollworm. (Abd EL-Mohsen *et al.*,

2013) mentioned that the best control program of methomyl followed by oxydemeton-methyl + proflumicarb and lambda-cyhalothrin induced the least reduction of pink bollworm larvae which being 38.02 % reduction. The effect of the synthetic pyrethroids, (Fenprothrin, Esfenvalerate and lambda-cyhalothrin) gave the highest reduction in bollworms infestation followed by the synthetic inhibitors, flufenoxuron, hexaflumuron mixed with chlorpyrifos the organophosphorous insecticide, chlorpyrifos, while the use of chitin synthetic inhibitors alone gave least reduction (El-Metwally *et al.*, 2003).

The aim of the present work is to evaluate different control programs against pink bollworm on cotton fields.

## MATERIALS AND METHODS

### 1. Insecticides:

Trade name	Common name	Recommended rate of application
Pyrban 48 % EC	Chlorpyrifos	1000 ml water / feddan
Lambda-super, 10 % WP	Lambda-cyhalothrin	50 g /100L water
Teliton 72 % EC	Profenofos	750 ml water / feddan
Segiron 10 % EC	Alpha-cypermethrin, 7% EC + Flufenoxuron, 3 % EC	250 ml water / feddan
Angio 24.7 % SC	Thiamethoxam 14.1% + Lambda- cyhalothrin 10.6 %	160 ml water / feddan
Chlorozan 48 % EC	Chlorpyrifos	1000 ml water /feddan
Chlorplus 29 % EC	Chlorpyrifos, 25 % + Cypermethrin, 4 %	750 ml water / feddan
Vantex 6 % CS	Gamma-cyhalothrin	100 ml water/ feddan

### 2. The tested programs used were:

Programs	1 <sup>st</sup> spray	2 <sup>nd</sup> Spray	3 <sup>rd</sup> Spray
A	Pyrban	Teliton	Lambda-super
B	Segiron	Teliton	Lambda-super
C	Angio	Teliton	Lambda-super
D	Chlorozan	Teliton	Segiron
E	Chloroplus	Teliton	Segiron
F	Vantex	Teliton	Segiron

### **3. Field experiment:**

A field experiments was carried out at Zagazig District, Sharkia Governorate during two successive cotton the seasons; 2013 and 2014 to evaluate the efficacy of insecticides programs, (A, B, C, D, E and F). All tested insecticides were used the recommended rates against the pink bollworm. Three and half feddans were cultivated by cotton Giza 86 variety sown on 20<sup>th</sup> and 15<sup>th</sup> March during 2013 and 2014 seasons, respectively. The experimental area was divided into six treatments in addition to the untreated once. Each treatment was 2010 m<sup>2</sup> divided into four replicates (each replicate 525m<sup>2</sup>). The tested programs applied on cotton fields against the pink bollworm when the infestation of the green cotton bolls reached about 3 %, and two weeks at interval times between each spray. The insecticides were diluted with water 200 L/ fed. and dorsal solo motor sprayer (20L capacity) with one nozzle was used. The first spray was implemented on the 1<sup>st</sup> and the 3<sup>rd</sup> of August during 2013 and 2014 seasons, respectively.

### **4. Sample technique:**

Weekly samples of 100 green cotton bolls about (14-21 days old) (25 bolls from each replicate) were randomly were collected. Samples were collected directly before spraying and then after one and two weeks. All samples were transferred to the laboratory in cloth bags, examined externally and dissected to determined the number of the pink bollworm larvae. The reduction percentages of the pink bollworm larvae were calculated according to Henderson and Tilton (1955).

### **5. Yield estimation:**

The cotton yield for each program was estimated and compared untreated plots.

## **RESULTS AND DISCUSSION**

### **1. Effectiveness of the tested compounds against the pink bollworm:**

Data illustrated in Table, (1) showed that the mean numbers of pink bollworm larvae were influenced by the tested programs in compared with untreated cotton area. In this respect, the highest mean numbers of the pink bollworm larvae were 7.33 and 5.00 larvae/ 100 green bolls in achieved at program B during 2013 and 2014 seasons, respectively while, the lowest average numbers were 3.50 and 2.33 larvae/100 green bolls at program C followed by 5.00 and 2.83 larvae/sample at programs E and D during the two cotton seasons of study, respectively compared with 33.66 and 30.00 larvae/100 green bolls in untreated check during 2013 and 2014 cotton seasons.

Table 1. Effect of tested controlling programs on the number of the pink bollworm larvae during 2013 and 2014 seasons.

programs	Pre-treatment		Weekly average larvae numbers of the pink bollworm larvae at indicated programs							
	2013	2014	2013				2014			
			1 <sup>st</sup> Spray	2 <sup>nd</sup> Spray	3 <sup>rd</sup> Spray	Seasonal average	1 <sup>st</sup> Spray	2 <sup>nd</sup> Spray	3 <sup>rd</sup> Spray	Seasonal average
A	4.00	5.00	4.00	7.50	5.00	5.50	2.50	4.00	4.00	3.50
B	4.00	6.00	4.00	6.00	12.00	7.33	3.00	4.00	8.00	5.00
C	3.00	4.00	3.00	4.50	3.00	3.50	2.00	2.50	2.50	2.33
D	3.00	3.00	2.50	8.50	5.00	5.33	1.50	4.00	3.00	2.83
E	4.00	6.00	3.00	6.00	6.00	5.00	2.00	4.00	5.00	3.66
F	4.00	5.00	3.00	7.50	9.00	6.50	2.00	4.50	5.00	3.83
Control	3.00	6.00	11.50	31.00	58.50	33.66	10.50	29.50	50.00	30.00

**The tested programs were:**

A= Pyrban, Teliton and Lambada-super B= Segiron, Teliton and Lambada-super

C= Angio, Teliton and Lambada-super D= Chlorozan, Teliton and Segiron

E= Chloroplus, Teliton and Segiron F= Vantex , Teliton and Segiron

Present results in Table (2) showed that the highest seasonal average of reduction percentages were 85.65 and 83.90 % at program F and C during 2013 season mean while the lowest average were 80.01 and 80.30 % at D and B programs, but in 2014 season the highest seasonal average of reduction percentages were 85.19 and 83.31 % at E and C programs, while the lowest seasonal average of reduction percentages were 76.81 and 80.36 % achieved at D and B program. The efficacies of synthetic pyrethroid, conventional insecticides were evaluated in the cotton fields for the control of the noctuids *Earias vittella*, *Helicoverpa armigera* and *P. gossypiella* on cotton. The successive Alternation of two sprays of cypermethrin with two phosalon applications at 15 day interval reduced damage to green bolls to reach 8, 5 and 3, 8 %, respectively (Thangaraju *et al.*, 1988). Spray of cotton fields using synthetic pyrethroids (Fenprothrin, esfenvalerate and lambda-cyhalothrin) gave the highest reduction of bollworms infestation followed by chitin synthesis inhibitors, flufenoxuron, hexaflumzuron mixed with the organ phosphorous insecticide, chlorpyrifos, while chitin synthesis inhibitors alone gave least reduction (El-Metwally *et al.*, 2003).

Table 2. Effect of tested controlling programs on the reduction percentages of pink bollworm larvae and cotton yield during 2013 and 2014 seasons.

Programs	Weekly average reduction of the pink bollworm larvae at indicated programs								Cotton weight/kg/fed		
	2013				2014				2013	2014	Seasonal average
	1 <sup>st</sup> Spray	2 <sup>nd</sup> Spray	3 <sup>rd</sup> Spray	Seasonal average	1 <sup>st</sup> Spray	2 <sup>nd</sup> Spray	3 <sup>rd</sup> Spray	Seasonal average			
<b>A</b>	73.44	82.99	93.79	83.40	71.67	82.26	90.55	81.49	1150.00	1015.00	1082.50
<b>B</b>	71.25	85.10	84.57	80.30	70.84	86.28	83.97	80.36	1017.00	970.00	993.50
<b>C</b>	71.25	85.64	94.81	83.90	70.84	86.96	92.14	83.31	1157.00	1056.00	1106.50
<b>D</b>	77.50	71.18	91.35	80.01	72.26	70.43	87.76	76.81	989.00	871.00	930.00
<b>E</b>	80.62	84.00	92.35	85.65	80.56	85.21	89.80	85.19	1260.00	1088.00	1174.00
<b>F</b>	78.44	81.00	88.32	82.58	75.00	79.40	87.42	80.60	1020.00	990.00	1005.00
<b>Control</b>									630.00	610.00	620.00

The tested programs were: (A, B, C, D, E, F)

The highest reduction of larval numbers in green cotton bolls was recorded when applied chlorpyrifos followed by Es-fenvalerate followed by thiodicarb recorded average 76.66 % reduction during three cotton seasons (Hegab, 2008). (Zaki, 2012) recorded that the tested Alpha-cypermethrin and Deltamethrin compounds were more toxic than Profenophos against larvae of the pink bollworm.

The obtained results indicated that the tested synthetic pyrethroids were the most efficient compounds during the two seasons. (Nour El-Hoda A. Zidan *et al.*, 2012) found that the efficacy of the insecticides used could be descending arranged according to the average of two seasons as follows; Alpa-cypermethrin (81.45 %), lambda-cyhalothrin (71.91 %), methomyl (68.33%), profenophos (66.75%) and chlorpyrifos (62.58 %) against the pink bollworm. (Abd EL-Mohsen *et al.*, 2013) revealed that the best control program was noticed in case of using methomyl followed by oxymatrine + prosuler and lambdacyhalothrin induced the least reduction against pink bollworm larvae which being 38.02 % reduction. The percentages of reduction in the pink bollworm infestation to cotton bolls by using lambda-cyhalothrin, thiamethoxam and buprofezin were 85.7, 39.3 and 19.5%, respectively; during 2009 cotton season, and 80.1, 64.7 and 39.1%, respectively, during 2010 cotton season (Sabry, 2013).

## **2-Effect of different spray programs on cotton yield:**

Present data In Table (2) cleared that the cotton yield estimated could be arranged descending according to the average of the two seasons as follows; 1260, 1157.00, 1150.00, 1020.00, 1017.00 and 989.00 at E, C, A, F, B and D programs kg/fed. compared with 630.00 kg/fed. in untreated plots in 2013 season, but in case of 2014 season the cotton yield estimated could be arranged descending as follows: 1088.00, 1056.00, 1015.00, 990.00, 970.00 and 871.00 kg/fed at E, C, A, F, B, and D programs as compared with 610.00 kg/fed. in untreated one Table (2).

It is clear from these results that the best spraying programs in reducing infestation of the pink bollworm E followed by C and A during 2013 and 2014 seasons.

Field evaluation was carried out to study the efficacy of synthetic pyrethroid and conventional insecticides in the cotton fields for the control of the noctuids *E. vittella* and *H. armigera* and *P. gossypiella* on cotton. (Thangaraju *et al.*, 1988) found fenvalerate caused the highest yield of seed cotton (2751kg //ha). The effect of different insecticides, (Choloropyrefos, Profenophos Es-fenvalerat) as programs against the pink bollworm, *P. gossypiella*. The highest mean yield of seed cotton was achieved when cotton plants were sprayed by Es-fenvalerate then profenofos then thiodicarb programs at 3 % infestation of green bolls, gave the highest means of seed

cotton of 1912.05 kg /feddan in the first season and 1478.925 kg /feddan in the second one (Hegab, 2002).

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## فعالية برامج المبيدات المختلفة ضد دودة اللوز القرنفلية في حقول القطن

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أجريت الدراسة الحالية لتقييم ستة برامج لخفض الإصابة بدودة اللوز القرنفلية على محصول القطن في منطقة الزقازيق محافظة الشرقية، خلال موسمي ٢٠١٣ و ٢٠١٤. أشارت النتائج إلى أن أعلى نسبة خفض في دودة اللوز القرنفلية كانت ٨٥.٦٥ و ٨٣.٩٠ % للبرنامج E يليه البرنامج C على التوالي خلال موسم ٢٠١٣. بينما في الموسم الثاني، كانت نسبة الخفض ٨٥.١٩ و ٨٣.٣١ % للبرنامج E و C، على التوالي. أيضا، أظهرت النتائج أن أعلى معدل للعائد من محصول القطن كان ١٠٨٨.٠٠ و ١٠٥٦.٠٠ كيلو جرام/فدان للبرنامج E و C خلال موسم ٢٠١٤ مقارنة بـ ٦٣٠.٠٠٠ و ٦١٠.٠٠٠ كيلو جرام/فدان في القطع الغير معاملة خلال موسمي ٢٠١٣ و ٢٠١٤. يتضح من تلك التجارب أن أفضل البرامج المطبقة E, C حيث حققت تلك البرامج أقل نسبة إصابة بدودة اللوز القرنفلية مع زياده في إنتاج القطن خلال موسمي الدراسة.