



## Influence of Some Insecticides on The Incidence of Common Lepidopterous Insect-Pests in Cotton Field

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### ABSTRACT

Field studies were conducted in Assiut Governorate during the growing cotton season of 2017 to investigate the effect of five IGR's compounds (Ivcoron, Cligeron, Kfarussel, Kligeron & Hixie) in addition to, Abizo as one oxadiazine and Defensor-c as one pyrethroid against the cotton leafworm, *Spodoptera littoralis* (Boisd.); two pyrethroids; (Super-Muthran & Karelol El-Nasr Gold); three organophorous compounds (Actacron, Agricron & Deliron El-Nasr Star) and Jinyu as one carbamate compound against the cotton bollworms; pink bollworm, *Pectinophora gossypiella* (Saund.) and spiny bollworm *Earias insulana* (Boisd.). Results indicated that Agricron gave a higher reduction of the cotton bollworms infestation amounted to 82.52% followed by Actacron (79.72%), then, Super-Muthran, Karelol El-Nasr Gold, Jinyu & Deliron El-Nasr Star (79.04, 79.04, 78.71 & 78.12%) respectively. For the cotton leafworm, Kfarussel and Abizo proved to be the most effective in initial and residual activity causing 65 & 75% mortality respectively, while Hixie was the least effective. The field trials suggest that these tested compounds reduce the population growth of cotton leafworm and bollworms by affecting its development (larval instars) so, these compounds can be integrated pest management programs of cotton.

### INTRODUCTION

Cotton is still among the most important commercial crops in Egypt, heavy losses are yearly recorded due to attack by various pests during the different stages of its development, the major insect-pests of cotton plants under study are the cotton leafworm, *Spodoptera littoralis* (Boisd.); the cotton bollworms, pink bollworm, *Pectinophora gossypiella* (Saund.) and spiny bollworm, *Earias insulana* (Boisd.), considered are a worldwide pest of cotton and in some regions of the world are the key cotton pests where, considered of the most destructive serious pests attacking cotton plants in the subsequent vegetative and fruiting stages of growth and later stages, most of its damage is directed to the green bolls, as well to flower buds and flowers, larvae also damage the quality of the lint, seeds of fully-mature bolls and loss extend to oil contents in the seeds, it has been recorded to cause about 30-40% losses in the yield and increase the costs of insect control

with substantial indirect losses occur as a result of the destruction of beneficial insects and development of insecticides resistance in cotton (Haque, 1991; Mireulle *et al.*, 1999 and El-Bassiony 2001). Therefore, cotton growers in Egypt have experienced severe economic loss from cotton pests due to reduced yield, low lint quality and increased costs of insecticides. Therefore, plant protection has now become a necessity of obtaining good yield. Control of these pests depended exclusively on insecticides, (Amin and Gergis 2006) as a result, this pest may develop resistance to those insecticides in many areas. Therefore, the continuous evaluation of the insecticides efficiency for controlling the insect in different areas became urgent. This will give the chance to replace the failed controlling agents by the effective alternatives. Moreover, the establishment of baseline susceptibility and the mechanism of resistance are necessary for effective resistance management strategies.

Therefore, the present study aimed to evaluate the efficacy of some recommended compounds to control some pests attacking cotton belonged five IGR:s; Ivcoron, Cleveron, Kfarussel, Kligeron & Hixie); Defensor-c as one pyrethroids and Abizo as one oxadiazine against the cotton leafworm; two pyrethroids; (Super-Muthran & Karelol El-Nasr Gold); three organophorous compounds (Actacron, Agricron & Deliron El-Nasr Star) and Jinyu as one carbamate compound against the cotton bollworms.

## MATERIALS AND METHODS

### Tested Insecticides:

The evaluated insecticides, common names and rates were introduced in the following Table (1).

**Table 1:** The tested pesticides and their application rates which used in this study

Pesticides	Group	Rate of application feddan
Chlorfluazuron 5% EC (Ivcoron)	IGR:s	400 cm <sup>3</sup>
Lufenuron 5% EC (Cleveron)	IGR:s	100 cm <sup>3</sup>
Lufenuron 5% EC (Kfarussel)	IGR:s	100 cm <sup>3</sup>
Flufenoxuron 10% EC (Kligeron)	IGR:s	200 cm <sup>3</sup>
Hexa-Flumuron 10% EC (Hixie)	IGR:s	200 cm <sup>3</sup>
Indoxacarb 30% WG (Abizo)	Oxadiazine	125 cm <sup>3</sup>
Methomyl 24.7% SC ( Jinyu)	Carbamate	300 cm <sup>3</sup>
Cypermethrin 25% EC (Super Muthran)	Pyrethroids	600 cm <sup>3</sup>
Lambda-Cyhalothrin 5% EC (Karelol El-Nasr Gold)	Pyrethroids	375 cm <sup>3</sup>
Lambda-Cyhalothrin 10% SC (Defensor-c)	Pyrethroids	50 cm <sup>3</sup> /100 litter
Profenofos 72% EC (Actacron)	O.P.	750 cm <sup>3</sup>
Profenofos 50% EC (Agricron)	O.P.	1 liter
Profenofos 50% EC (Deliron El-Nasr Star)	O.P.	1 liter

### Experiment:

Field experiments were carried out at the farm Faculty of Agriculture in Assiut Governorate during the season of 2017 whereas, in the season an area was cultivated with cotton variety "Giza 70". Five insect growth regulators (IGR:s); one oxadiazine and one pyrethroid were evaluated against the cotton leafworm as shown in Table (1). The experimental area was consisting of five feddans for each treatment which divided into four replicates and involved an untreated check. The spraying was carried out on July, the 26<sup>th</sup> 2017. The performed treatments three organophosphorous insecticides; two pyrethroids and one carbamate compound were also evaluated against the cotton

bollworms. For all tested compounds, three sprays were done with two weeks interval between sprays. Sprays were done on July 26<sup>th</sup>, 1<sup>st</sup> and 23<sup>rd</sup> August for 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> sprays, respectively in 2017 cotton season. In all treatments, one back motor was used with 80 liter of spraying preparation / feddan, for each compound.

### **Sampling Technique:**

#### **1. Determination of Insecticide Residual Toxicity:**

Random samples of 100 cotton plants were chosen from each replicate (400 plants per each treatment) were collected from each replicate just before spraying and after 24h from spray (zero time) and then 7 & 10 days post spray and transferred directly to the laboratory for feeding 2<sup>nd</sup> and 4<sup>th</sup> larval instars field strain of *S. littoralis*, were collected as egg masses from cotton fields in farm Faculty of Agriculture in Assiut Governorate, larvae reared on castor oil leaves under laboratory conditions ( $27 \pm 2$  °C and RH 65 %  $\pm$  5), experimental larvae were selected from the next generations of the first generation. The treated leaves had dried under laboratory conditions before being an offer to hundred larvae in four replicated used for each insecticide. Newly moulted 2<sup>nd</sup> and 4<sup>th</sup> larval instars were starved for three hours before used in the tests to make insure on empty intestine hundred larvae in four replicates of each insecticide were allowed to fed on the treated leaves in a glass jar covered with muslin for 24 h and then the survived larvae were transferred to jars containing fresh untreated leaves, larvae were fed on leaves immersed in only fresh castor oil leaves as a control. Mortality percentages were recorded after 24hr, 7 & 10 days of treatment, percent mortality was corrected according to Abbott equation (Abbott, 1925).

#### **2. Representative Samples of Bollworms Infestation:**

For assessing the infestation with cotton bollworms, *Pectinophora gossypiella* (Saund.) and *Earias insulana* (Boisd.), weekly random samples of 100 green bolls were collected from each replicate (400 bolls per each treatment) just before spraying and after 7 & 14 days of each spray; they were externally and internally examined. The collected bolls were transmitted directly to the laboratory and inspected carefully to find out the infested bolls with pink and/or spiny bollworms. The numbers of inspected larvae in green bolls were calculated to compare the efficacy of the tested insecticides with the untreated check. The equation of Henderson and Tilton (1955) was used to calculate the reduction percentage of infestation.

#### **Statistical Analysis:**

The mean number for each treatment was calculated and compared with a one-way analysis of variance (ANOVA). Duncan's multiple range test was used to determine significant differences ( $P < 0.05$ ) between treatments by Costat system for windows, Costat Program (2006).

## **RESULTS AND DISCUSSION**

### **Insecticide Residual Toxicity:**

The means of mortality percentages resulted from exposing 2<sup>nd</sup> and 4<sup>th</sup> instar larvae to different treatments are summarized in Table (2). The statistical analysis indicated that the high percentage of second instar larvae mortalities was recorded as 65% at zero interval time for Kfarussel<sup>®</sup> the average of mortality percentage for second instar larvae throughout the experiment time indicated that Abizo was the most active treatment (79% mortality), while, the Hixie and Defensor-c were less active, also, all treatments low active against fourth instar larvae. According to the Ministry of Agriculture recommendation for using the chemical compounds on controlling pests, succeeded material should give more than 70% reduction and residual effect, not less than 40% (Rizk *et al.*, 1999). The results obtained to evaluate the mortality percentage of second and

fourth instar larva together carried out within the first 24h, during feeding of pretreated leaves sampled at zero time called initial effect, and that carried out within the followed 10 days as residue. As shown in Table (2) that the high initial effect (65% mortality) was recorded by Kfarussel<sup>®</sup> while low initial effect (38% mortality) was recorded by Abizo. Concerning the latent effect, Ivcoron, Kfarussel, and Abizo were caused 71; 71 & 75% mortality respectively, while each tested compound caused about 60% mortality. The residual effect of all tested treatments ranged from 75% to 50% mortality. Regarding to general effect, the most active treatment was Abizo, while the lowest active treatment was Hixie Clearly, and tested compounds have been equal residual effects, however, Kfarussel the only compound caused high initial effect, In general, the tested IGR's cause slight initial effect, while all tested treatments Abizo, Ivcoron, Kfarussel, Cleveron, Cligeron, Defensor-c, and Hixie had high latent and residual effect. The results are in agreement with Clarke and Jewess (1990) who showed that the enhanced toxicity of flufenoxuron to *S. littoralis* the compared with diflubenzuron can probably be attributed to its slow metabolism and reduced excretion. In addition, YuXian *et al.*, (2003), found that the deduced inhibition values for carboxylesterase activity after feeding the second-instar larvae of *S. exigua* on treated leaves with chlorfluazuron (50 mg/litre) was 60.56%. Also, Sandeep *et al.*, (2006) and Ismail (2018) proved that between four insecticides tested against cotton leafworm, indoxcarb was the most effectively controlled in cotton.

**Table 2:** Effects of tested insecticides against second and fourth instars *Spodoptera* larvae

Compounds	Mortality percentage of second larvae at				Mortality percentage of fourth larvae at				Mean of residual effect %
	zero time*	7 days**	10 days**	Average	zero time	7 days	10 days	Average	
<b>Hixie</b>	56	56	43	50	45	45	60	49	50
<b>Abizo</b>	38	82	76	79	33	71	68	70	75
<b>Ivcoron</b>	41	76	70	73	39	69	66	68	71
<b>Cligeron</b>	56	63	60	62	60	45	62	54	58
<b>Cleveron</b>	45	62	66	64	42	58	60	59	62
<b>Kfarussel</b>	65	60	78	69	50	77	67	72	71
<b>Defensor-c</b>	40	49	60	55	36	48	51	50	53

Zero time\* = Initial effect %

7 days & 10 days\*\* = Residual effect %

#### Efficacy of the Evaluated Compounds on Cotton Bollworms:

The implied results in (Table, 3) elucidate that after the first sprat, Jinyu gave the least mean number of infested bolls (0.84 /100bolls), while, for the other treatments ranged from 1.2 for Agricron to 1.4 /100bolls for Deliron El-Nasr Star<sup>®</sup> compared to the untreated check (6.00 /100bolls). However, after the second and third sprays, there were significant differences between the tested compounds where they gave means values of infested bolls ranged between 1.2 to 2.4 and 100bolls after the second spray and from 1.7 to 2.1 /100bolls after the third spray in comparison with the untreated check (7.1 and 7.7 infested bolls /100bolls, respectively). The calculated overall means of infested bolls \100 bolls amounted to 1.32, 1.36, 1.44, 1.61 and 1.9 for Actacron, Jinyu, Karelol El-Nasr Gold, Super-Muthran Deliron El-Nasr Star, and Agricron, respectively (Table, 4). Moreover, the exhibited data in (Table, 4) show that the performed treatments of Actacron and Super-Muthran gave high reduction of infested bolls after the first spray comprised 82.19% and 79.98% respectively, but values consequently, more or less decreased after the 2<sup>nd</sup> spray up to 79.26% and 78.41% respectively; and after the 3<sup>rd</sup> spray up to 77.70% and 77.29% respectively, in respect. Moreover, the treatment of

Actacron gave a high reduction of 82.19% after the first spray, then decreased to 79.26% after the second one, also, decreased again 77.70% after the third spray. In general, the overall means reduction values were higher for the treatments of Actacron and Agricron (79.72% and 82.52% respectively), while they were 79.04, 79.04, 78.71 and 78.12 for Super-Muthran, Karelot El-Nasr Gold, Jinyu and Deliron El-Nasr Star respectively. These data were in harmony with the finding of many investigators, Mahar *et al.*, (2004), who reported that fenpropathrin, chlorpyrifos, and endosulfan insecticides were effective against the pink bollworm. Also, El-Aswad and Aly (2007) reported that the pyrethroids were more effective in reducing infestation bollworms than organophosphorus compounds. In addition, Zidan *et al.* (2012) indicated that alpha-cypermethrin and lambdacyhalothrin were more toxic against predators than chlorpyrifos and methomyl, which induced moderate toxicity.

**Table 3:** Means numbers of infested bolls with bollworms before and after insecticides spraying

N.S	Ins.	Re.	Treatments													
			Super-Muthran <sup>®</sup>		Karelot El-Nasr Gold		Actacron <sup>®</sup>		Agricron <sup>®</sup>		Deliron EL-Nasr Star <sup>®</sup>		Gito <sup>®</sup>		Untreated Check	
			N.B.S*	N.A.S**	N.B.S	N.A.S	N.B.S	N.A.S	N.B.S	N.A.S	N.B.S	N.A.S	N.B.S	N.A.S	N.B.S	N.A.S
1 <sup>st</sup> Spray	1 <sup>st</sup> Ins.	1	7.50	1.00	7.50	1.75	7.50	1.00	5.50	1.25	7.50	1.50	7.50	1.25	3.50	7.50
		2	6.25	1.00	6.25	1.00	6.25	0.50	6.25	1.00	6.25	1.25	6.25	1.00	4.25	6.25
		3	7.00	0.75	7.00	1.50	7.00	0.50	7.25	1.00	7.00	1.75	7.00	1.00	5.25	7.00
		4	6.50	0.75	6.50	1.25	6.50	0.75	6.50	1.00	6.50	1.50	6.50	1.25	5.50	6.50
	2 <sup>nd</sup> Ins.	Av.	6.81	0.88	6.81	1.38	6.81	0.69	6.28	1.06	6.81	1.50	6.81	1.13	4.63	6.81
		1	6.00	1.50	6.00	1.00	6.00	1.25	7.00	1.50	6.00	1.50	6.00	0.75	3.50	6.00
		2	7.50	1.00	7.50	0.75	7.50	1.00	8.50	1.00	7.50	1.25	7.50	1.00	4.25	7.50
		3	8.75	1.50	8.75	1.00	8.75	1.50	8.00	1.50	8.75	1.00	8.75	1.25	5.25	8.75
		4	8.50	1.75	8.50	0.50	8.50	1.00	8.75	1.50	8.50	1.50	8.50	1.00	3.75	8.50
		Av.	9.25	1.44	9.25	1.06	9.25	1.19	8.06	1.38	9.25	1.31	9.25	1.19	4.19	9.25
GM.N.S.***		-----	1.16c	-----	1.22c	-----	0.94b	-----	1.22c	-----	1.41c	-----	1.16c	-----	8.08a	
2 <sup>nd</sup> Spray	3 <sup>rd</sup> Ins.	1	7.00	1.50	7.00	1.00	7.00	0.75	8.00	1.00	7.00	1.50	7.00	1.00	3.50	7.00
		2	8.50	1.25	8.50	1.25	8.50	1.25	7.75	0.75	8.50	2.00	8.50	1.25	4.25	8.50
		3	9.00	1.00	9.00	1.50	9.00	1.00	9.50	1.25	9.00	1.25	9.00	1.50	5.25	7.75
		4	7.75	1.25	7.75	1.75	7.75	1.25	8.50	1.00	7.75	1.75	7.75	1.00	5.50	6.00
		Av.	8.06	1.25	8.06	1.38	8.06	1.19	8.44	1.00	8.06	1.63	9.06	1.19	4.63	7.31
	4 <sup>th</sup> Ins.	1	6.00	2.00	6.00	1.50	6.00	1.25	9.00	1.50	6.00	2.00	6.00	1.00	3.50	6.00
		2	11.00	1.50	11.00	1.50	11.00	1.50	10.50	1.25	11.00	1.50	11.00	1.25	4.25	9.50
		3	10.25	2.25	10.25	1.25	10.25	1.00	11.00	1.50	10.25	1.25	10.25	1.50	5.25	11.00
		4	9.50	1.75	9.50	1.25	9.50	1.75	9.75	1.00	9.50	1.75	9.50	1.25	3.75	10.25
		Av.	9.75	1.88	9.75	1.38	9.75	1.38	10.06	1.31	9.75	1.63	9.75	1.25	4.19	9.19
GM.N.S.***		-----	1.57d	-----	1.38c	-----	1.29c	-----	1.16c	-----	1.63d	-----	1.22c	-----	8.25a	
3 <sup>rd</sup> Spray	5 <sup>th</sup> Ins.	1	7.50	1.00	7.50	2.00	7.50	1.50	10.00	2.50	7.50	1.50	7.50	1.50	3.50	7.50
		2	10.00	1.50	10.00	2.50	10.00	1.50	12.25	2.00	10.00	1.75	10.00	1.25	4.25	10.00
		3	12.50	2.00	12.50	1.25	12.50	2.00	13.50	1.75	12.50	2.00	12.50	1.75	5.25	12.50
		4	13.75	1.25	13.75	1.50	13.75	1.25	14.00	1.25	13.75	2.25	13.75	1.50	5.50	13.75
		Av.	10.94	1.81	10.94	1.63	10.94	1.56	12.44	1.88	10.94	1.88	10.94	1.50	4.63	10.94
	6 <sup>th</sup> Ins.	1	6.00	2.75	6.00	2.00	6.00	2.25	11.25	1.50	6.00	2.50	6.00	2.00	3.50	6.00
		2	13.00	2.25	13.00	1.50	13.00	1.50	13.00	1.75	13.00	2.50	13.00	2.25	4.25	11.50
		3	15.25	2.00	15.25	1.75	15.25	2.50	14.75	1.00	15.25	1.50	15.25	1.50	5.25	13.00
		4	11.50	2.50	11.50	2.00	11.50	1.25	15.50	1.50	11.50	2.00	11.50	1.75	3.75	13.25
		Av.	14.75	2.38	14.75	1.81	14.75	1.88	13.63	1.44	14.75	2.13	14.75	1.89	4.19	11.43
GM.N.S.***		-----	2.10d	-----	1.72d	-----	1.72d	-----	3.32e	-----	2.01d	-----	1.70d	-----	11.19a	
O.M.N.****		-----	1.61d	-----	1.44c	-----	1.32c	-----	1.9d	-----	1.68d	-----	1.36c	-----	9.17a	

Means followed by the same letter are not significantly different according to DMRT (P<0.05).

G.M.N.S.\*\*\* = General Mean Numbers of spray

O.M.N.\*\*\*\* = Overall Mean

Numbers each insecticide

N.B.S\* = Number Before Spray

N.A.S\*\* = Number After Spray

**Table 4:** The calculated percentage of reduction of infested bolls with bollworms after application of evaluated insecticides

N. Spray	Inspections	Replicates	The percentage reduction %					
			Super-Muthran <sup>®</sup>	Karelol El-Nasr Gold	Actacron <sup>®</sup>	Agricron <sup>®</sup>	Deliron El-Nasr Star <sup>®</sup>	Jinyu <sup>®</sup>
1 <sup>st</sup> Spray	1 <sup>st</sup> Ins.	1	78.47	78	80.61	81	75.19	82.19
		2	77.66	76.3	77.98	78	73.80	82.20
		3	81	78.10	85.59	84	73.35	70.56
		4	80.32	78.10	87.23	77	77	71.54
	2 <sup>nd</sup> Ins.	M. R. %	79.36	78.02	82.85	80	74.84	76.62
		1	82	78.31	70.64	77.70	83	82.7
		2	83.5	75.55	89	82	82.14	82
		3	73	80.15	82.47	75.43	78.30	77
		4	84	80	84	83	73.77	73.66
		M. R. %	80.6	78.50	81.53	79.53	79.30	78.84
General Means Reduction % of Spray			79.98	78.26	82.19	79.77	77.07	77.73
2 <sup>nd</sup> Spray	3 <sup>rd</sup> Ins.	1	77.6	70.78	75	85	76.5	88.45
		2	82	89	77	83	75.44	89.60
		3	75	82.52	77	84	79	64.76
		4	77.2	84.36	81.46	80.99	77	73.21
		M. R. %	77.92	81.67	77.62	83.25	76.99	79.01
	4 <sup>th</sup> Ins.	1	82.7	77	79.5	70.99	80	92.9
		2	82	79	83.5	82	80.20	91
		3	77.21	75.2	83	89	75.66	64.89
		4	73.70	76	77.6	84.35	78.93	72.39
		M. R. %	78.90	76.80	80.90	81.59	78.70	80.30
General Means Reduction % of Spray			78.41	79.24	79.26	82.42	77.85	79.66
3 <sup>rd</sup> Spray	5 <sup>th</sup> Ins.	1	75.50	79	75.19	80.61	74.6	73.14
		2	77	77.15	73.70	77.98	76	78.66
		3	76	85	73.35	85.50	82	83.10
		4	81	87	77	87	83	83
		M. R. %	77.38	82.04	74.81	82.77	79.65	79.48
	6 <sup>th</sup> Ins.	1	77.34	77.20	83	85.38	77.80	79
		2	82	77	77.4	94	82.60	76
		3	82	76	83	83.57	75	78
		4	79	80.6	79	88.8	85.40	79
		M. R. %	80.09	77.20	80.60	87.94	79.20	78
General Means Reduction % of Spray			78.74	79.62	77.71	85.36	79.43	78.74
Overall Mean of Reduction			79.04	79.04	79.72	82.52	78.12	78.71

## CONCLUSION

From the obtained results, it could be concluded that the tested compounds have a significant effect on cotton leafworm and cotton bollworms, where reduced the insect population these effects are very important from a practical point of view. Thus these compounds could be recommended as important tools in integrated management programs to obtain a successful control for these insect pests.

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## ARABIC SUMMARY

## تأثير بعض المبيدات الحشرية على خفض مستويات الإصابة بأفات القطن الحشرية من رتبة حرشفية الأجنحة في حقول القطن

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إجريت هذه الدراسة في محافظة أسيوط خلال موسم ٢٠١٧ بهدف دراسة تأثير خمس مركبات من منظمات النمو الحشرية (إيفكورون؛ كليفرون؛ كفروسيل؛ كليجرون و هيكسي) ومركب ابيزو من مجموعة اوكساديازين ودفنسر c كمركب بيرثرويد ضد دودة ورق القطن. وكذلك دراسة تأثير مركبين بيرثرويد (سوبرمثرين وكاريلوت النصر جولد) وثلاث مركبات فوسفورية (أكتاكرون؛ أجريكرون ودليرون النصر ستار) بالإضافة إلى مركب انجيو من الكارباميت ضد ديدان اللوز (القرنفلية والشوكية). أوضحت النتائج بالنسبة لديدان اللوز أن مركب أجريكرون أعطى معدل خفض ٨٢,٥٢٪ يليه الأكتاكرون ٧٩,٧٢٪ ثم يليهم كلاً من سوبر مثرين؛ كاريلوت النصر جولد؛ انجيو ودليرون النصر ستار بنسب خفض ٧٨,١٢٪، ٧٨,٧١، ٧٩,٠٤ و ٧٩,٠٠ على التوالي. أما بالنسبة لدودة ورق القطن فقد إنخفضت فاعلية المركبات تدريجياً بعد الرش فكان مركب كفروسيل أعلى المركبات فى التأثير الأولي (٦٥٪) بينما ابيزو أعلى المركبات فى التأثير المتبقي (٧٥٪) وأقل المركبات فاعلية هو مركب هيكسي. ومن خلال نتائج هذه التجارب الحقلية يتضح أن هذه المركبات المختبرة أدت إلى انخفاض عالي فى أعداد دودة ورق القطن وديدان اللوز من خلال التأثير على النمو (التأثير على الأطوار اليراقية) وعلى ذلك يمكن دمج هذه المركبات فى دورات تبادلية ضمن برامج المكافحة المتكاملة للقطن.