Evaluation of consequent performed new insecticides regime for suppressing cotton bollworms and other Non-target pests in cotton filed.

El-Bassouiny H. M.[1], Haity M. Tadrose[1] and A. M. Kordy[2]

1- Agricultural Research center - Plant Protection Institute - bollworms Department.
2- Alexandria University- Faculty of Agriculture (Saba Bash)- Plant protection Department.

ABSTRACT: Field experiment was conducted in two different locations namely, Besntway and El-Zeny in Abo-houms district, El-Behira governorate to evaluate the efficiency of eight new insecticides – regime in four treatmental sequences beside the recommended regimen by the Egyptian Ministry of Agriculture (Sequence No.: 5) to suppress the incidence of cotton bollworms infestation. The insecticides regiment in the 4th sequence contained Coach® (Fipronil), followed Voliam Flexi® (mixture of chlorantraniliprole + thiamethoxam), Radiant® (spinetoram) and ended by Engeo® (mixture of lambda-cyhalothrin + thiamethoxam) suppressed the cotton bollworms infestation up to 1.3, 1.9 larvae/100 bolls, with average reduction of 90, 89 % in both locations respectively. In addition, the third sequence which started with Engeo® (mixture of lambda-cyhalothrin + thiametoxam) followed by Coragen® (clorantraniliprol), proclaim® (emamectin benzoate) and ended with Radiant® (spinetoram) achieved also a good efficient control (1.8, 2.0 larvae/100 bolls) and average reduction of bollworms infestation comprised 87 and 86%. Comparatively, the 5th sequence regimen (recommended by Egyptian ministry of Agriculture) gave less satisfactory efficacy (2.4, 3.3 larvae/100 bolls) and the average redaction of bollworms infestation amounted 81% and 82%, in respect. Moreover, the obtained results showed that each of the 3rd and 4th sequences gave highest effectiveness against Non target insect-pests i.e., Jassids (*Empoasca lyibica*), Aphids (*Aphis gossypii*) and whiteflies (*Bemisia tabaci*) compared with the other sequnces.

KEYWORDS: Consequence, regimen, insecticides, bollworms, Non-target pest.

1.INTRODUCTION

In Egypt the Ministry of Agriculture established a chemical spray rotated regime for cotton bollworms starting with organophosphate insecticides, followed by a synthetic pyrethroid and one of new insecticides group, i.e. emamectin benzoate or/and spinosad in order to reduced the population density of cotton bollworms and achieve the highest yield. This strategy has been successfully applied for the last years, therefore the replay of this insecticides regiment may be rather drastic influence for the surrounding environmental factors. So it is of greet need to look after for standby strategies for cotton bollworms control. Thus, ceratin insecticides in four sequences were suggested and evaluated in two locations at El-Behira Governorate, throughout the growing cotton season of 2015, for selecting the best sequence to be standby for the currently applied as needed.

2. MATERALS AND METHODS

Two field experiments in complete randomized block design were conducted at El-Behaira Governorate in two different locations namely, (Bsantway and ElZeny Villages) during the growing cotton season of 2015. Giza 86 veriety was sown in these trails. Each experiment consisted of five treatments of regime included 5th sequences, in each four insecticides recommended by Egyptian Ministry of Agriculture to control cotton bollworms and/or pests of other crops. These insecticides are exhibited in Tables (1 &2). The consequently tested insecticides regiment are explained in Table(2)

Table(1): The common and trade name of pesticides used

N	Common Name	Trade Name	Formulation	Rates / 100 L
1	Fipronil	Coach®	20% SC	25 cm^3
2	Emamectin benzoate	proclai®	5% SG	60g
3	Chlorantraniliprol	Corage®	20% SC	60 cm^3
4	Spinetoram	Radian®	12% SC	35 cm^3
5	Methoxyfenozide	Runner®	24% SC	150 cm^3
6	Chlorantraniliprol + thiametoxam	Voliam Flexi®	40% WG	160 cm^3
7	lambda-cyhalothrin + thiametoxam	Engeo®	24.7 % SC	160 cm^3
8	Pyridalyl	Pleo®	50% EC	100 cm^3
	Indoxacarb	Avant	15% EC	25cm^3

Table(2): The consequently tested insecticides

Sequence	insecticides regiment
1st	Pleo® Runnr® Avant® Coach®
2nd	Runnr® Radiant® Coach® Pleo®
3rd	Engeo® Coragen® proclaim® Radiant®
4th	Coach® Voliam Flexi® Radiant® Engeo®
5th	Chlorozed® Alafazed® Exlant® Spentor®

The sequential insecticides sprays were started from mid July to late August 2015 by using Hydraulic Knapsack hand sprayer. The cotton plants in all treatments were sprayed four times during the whole season. Treatments were run in four replicates and evaluated according to its efficiency in reducing the occurrence of bollworms infestation. Samples of 100 green bolls per treatment (25 boll/replicate) were diagonally collected at random along different sampling intervals. Bolls were examined externally before dissected, and the occurrence of infestation was based on the appearance of injury symptoms regardless the presence of spiny and pink bollworm larvae.

The efficiency of each of tested insecticides regimen in sequence against the larvae of bollworms and non-target pests were deduced by using equation of Hinderson and Tillton (1955).

3.Results and Discussions:

3.1.Effect of insecticides regimen against pink and spiny bollworms:

Data presented in Tables (3 and 4) indicate that the best results were obtained by using the fourth regimen of consequent insecticides application of Coach® (Fipronil), followed by Voliam Flexi® (mixture of (clorantraniliprol + thiametoxam), Radiant® (spinetoram) and ended by Engeo® (mixture of lambda-cyhalothrin + thiametoxam). Whereas, recorded the lowest population of the cotton bollworms larvae (1.3, 1.9 larva/100 bolls) and the highest reduction (90, 89%) bollworms infestation at both localities of Bentway and El-Zeny, respectively.

Table(3): Efficiency of sequently sprayed insecticides in tested regime on the bollworm infestation during cotton season 2015 in Besntway, Abo-homus, El-behera, Governorate.

Insecticides Sequence*	Number of larvae 100 bolls %		Average of reduction %
	Before Spray	After Spray**	
1st	3.0	2.8	78.0
2nd	3.0	2.9	77.0
3rd	3.3	1.8	87.0
4th	3.0	1.3	90.0
5th	3.0	2.4	81.0
control	3.8	15.5	

*1st = (Pleo®, Runnr®, Avant®, Coach®) – 2nd = (Runnr®, Radiant®, Coach®, pleo®) – 3rd = Engeo®, Coragen®, Proclaim®, Radiant®) – 4th = (Coach®, VoliamFlexi®, Radiant®, Engeo®) – 5th = Chloroze®, Alafaze®, Exlant®, Spentor®).

** Average of pink and spiny bollworms infestation bolls % after the four insecticidal treatment applied in each sequence.

While, the Seqeuntly sprayed insecticides in the third regimen, which started with Engeo® (mixture of lambda-cyhalothrin + thiametoxam), followed by Coragen® (clorantraniliprol), proclaim® (emamectin benzoate) and ended with Radiant® (spinetoram) also achieved a good results (1.8, 2.0 larvae/100 bolls) and high reduction of bollworms infestation (87, 86%), in both localities, respectively.

Table(4): Efficiency of sequently sprayed insecticides in tested regime on the bollworm infestation cotton season 2015 in El-Zany, Abo-homus, El-behera, Governorate.

Insecticides Sequence*	Number of larvae 100 bolls %		Average of reduction %
	Before Spray	After Spray**	
1st	3.3	3.7	75.0
2nd	3.3	3.6	76.0
3rd	3.0	2.0	86.0
4th	3.8	1.9	89.0
5th	4	3.3	82.0
control	4	17.8	

*1st = (Pleo®, Runnr®, Avant®, Coach®) – 2nd = (Runnr®, Radiant®, Coach®, pleo®) – 3rd = Engeo®, Coragen®, Proclaim®, Radiant®) – 4th = (Coach®, VoliamFlexi®, Radiant®, Engeo®) – 5th = Chloroze®, Alafaze®, Exlant®, Spentor®).

** Average of pink and spiny bollworms infestation bolls % after the four insecticidal treatment applied in each sequence.

Comparatively, the 5th regimen implemented by Egyptian Ministry of Agriculture gave less satisfactory results where the levels of infestation were 3.0, 3.3 larvae/100 bolls with reduction of 81,. 82% in bollworms infestation as compared with the consequent insecticides regiment of number 4 and/or 3. But it was more active in suppressing cotton bollworms infestation more than both of the other insecticides regiment i.e., the first one [Pleo® (Pyridalyl), Runnr® (Methoxyfenozide), Avant® (indoxcarb) and Coach®(fipronil)] and the second one [(Runnr® (Methoxyfenozide), Radiant® (spinetoram), Coach®(Fipronil) and Pleo® (Pyridalyl)], which came at the last rank of efficiency recording control values of (2.8, 3.7 and 2.9, 3.6 larvae/100 bolls) and percent reduction of (78.0, 75.0 and 77.0, 76.0) in both locations, respectively.

Moreover, the tested insecticides regime were efficient and showed superiority in suppressing the cotton bollworm infestation in compared with the untreated check (15.5 and 17.8 larvae/100 bolls) in both locations.

Therefore, our obtained results in this study are of a great importance and prove the possibility of using one or more of the tested insecticides regiment that gave promising efficacy against bollworms, as standby alternative of that regime of the Egyptian Ministry of Agriculture if it became less efficient or cases any problem.

Our findings in this study are in agreement with the approved results by **Carneiro *et al.* (2014)** who stated that spinosad was effective against third instar larvae of *H. armigera*. chlorantraniliprole and fipronil had good responses to control of *H. armigera*. And also with the data provided by **The Syngenta Cotton Program (2010)**, which elucidated that the applied New foliar insecticides Voliam Flexi® (mixture of clorantraniliprol + thiametoxam), Radiant® (spinetoram) and Engeo® mixture of (lambda-cyhalothrin + thiametoxam) were effective individually applied against *Helicoverpa armigera* as well as range of sucking pests.

3.2.Effect of insecticides regimen against sucking pests:

Data presented in Table (5 & 6) showed that the of tested sequences of applied insecticides were effective upon the reduction of cotton aphid; *Aphis gossypii* specially these related to sequence No.4 (93.3%, 91.9%) followed by sequence No.3 (89.2%, 88.3%) in both locations, in respect. While, the sequence No. 2(75.5%, 76.8%) and sequence No. 1 (74.9, 74.6%) gave less reduction, followed by sequence No. 5 which recorded reduction values of (68.1%, 73.4%) representing the least efficacy against of Aphid, in both localities, respectively.

Table(5): Effect of consequtly applied insecticides in tested regime on the Non target insect-pests during cotton season 2015 in Besntway, Abo-homus, El-behera, Governorate.

Sequence	General Mean No. before spray			General Mean No. after spray*					
	A	G	W	A	R %	G	R %	W	R %
1st	8.7	11.7	9.3	1.7	74.6	2.8	71.3	2.3	67.8
2nd	7.3	11.3	8.8	1.3	76.8	2.6	72.4	2.1	69.0
3rd	7.8	11.0	8.8	0.7	88.3	1.7	81.5	0.8	88.2
4th	8.0	11.8	9.0	0.5	91.9	1.5	84.7	0.6	91.8
5th	8.3	11.8	8.4	1.7	73.4	2.9	70.5	2.4	62.9
Cont	8.0	11.3	8.3	6.3		9.7		6.6	

* General Mean Number after the four spray which applied in each sequence. A= Aphid, G= Gassids, W= Wight fly, R %= reduction %

The insecticides significantly reduced the mean percent of jassid population; *Empoasca lyibica*, The maximum population reduction (78.4, 84.7%) was noticed in the sequence No. 4 which contains (Coach®, Voliam Flexi®, Radiant® , Engeo®), followed by sequence No. 3(Engeo®, Coragen®, proclaim® & Radiant®) recorded percent reduction (73.0, 81.5%), While, sequences No. 1,.2 and 5 achieved a less percent reduction of jassid (67.8, 66.2, 62.9) and (73.3, 72.4, 70.5%) in both locations, respectively.

Table(6): Effect of consequently applied insecticides in tested regime on the Non target insect-pests during cotton season 2015 in El-Zany, Abo-homus, El-behera, Governorate.

Sequence	General Mean No. before spray			General Mean No. after spray*					
	A	G	W	A	R %	G	R %	W	R %
1st	5.7	12.3	7.3	1.1	74.9	3.3	67.8	3.0	54.8
2nd	5.3	11.7	7.8	1.0	75.5	3.3	66.2	3.1	56.3
3rd	6.0	12.0	6.8	0.5	89.2	2.7	73.0	0.9	85.4
4th	5.8	12.8	7.0	0.3	93.3	2.3	78.4	0.7	89.0
5th	5.3	12.3	7.4	1.3	68.1	3.8	62.9	3.1	53.9
Cont	5.7	12.6	7.5	4.3		10.5		6.6	

* General Mean Number after the four spray which applied in each sequence. A= Aphid, G= Gassids, W= Wight fly, R %= reduction %

Also, all the tested insecticides regime significantly reduced the general mean percent of whitefly; *Bemisia tabaci* population where the sequence No. 4 reduced the whitefly population by (89.0, 91.8 %) and was significantly better than that recorded in sequence No.3 (85.4, 88.2%) in both localities, respectively. While, the recorded results of performed sequences of tested insecticides regiment No. 1, 2 & 5 were not satisfactory efficient in reducing the general mean percent of whitefly.

Our exhibited results in this study are in agreement with those findings at by Wafaa A. **Al-kherb(2011)** she proved that thiamethoxam was most effective compound against white fly. Also, **Kilpatrick *et al.* (2005)** mentioned that acetamiprids and thiamethoxam exhibited significant mortality against field-deposting egg of bollworm, *H. Zea* (Boddie). Both thiamethoxam and dicrotophos plots exhibited bollworm numbers that were approximately three times higher than treatment thresholds (three larvae per 100 plants), whereas numbers in untreated plotswere below threshold levels. Also, These results are agree with the carried out investigations by various scientists **(Afzal *et al.*, 2001; Tayyib *et al.*, 2005 and Shah *et al.*, 2007)**, who found that neonicotinoids were very effective against sucking insect pests of cotton. These insecticides can be recommended to the growers to manage the population of the sucking insect pests of cotton below economic threshold.

REFERANCE:

Afzal, M., Z. Ahmad, and T. Ahmad(2001). The comparative efficacy of insecticides spray schedule against sucking insect pests on FS-628 cotton. Pak. J. Agri. Sci., 38(1-2): 23-24

Carneiro E., L. B. Silva, K. Maggioni, Vilmar Buenos dos Santos, T. F. Rodrigues, S. S. Reis and B. E. Pavan (2014). Evaluation of Insecticides Targeting Control of *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae). Sci. Res. http://www.scirp.org/journal/ajps.

Kilpatrick, A. L. Kilpatrick, A. M. Hagerty, S. G. Turnipseed, M. J. Sullivan, and W. C. Bridges (2005). Activity of Selected Neonicotinoids and Dicrotophos on Nontarget Arthropods in Cotton: Implications in Insect Management. Journal of Economic Entomology 98(3):814-820.

Shah, M.J., A. Ahmad, M. Hussain, M.M. Yousaf and B. Ahmad (2007). Efficacy of different insecticides against sucking insect pest complex on the growth and yield of mungbean (Vigna radiata L.) Pak. Entomol., 29(2) 83-85.

SyngentaCotton Program (2010) http://www.syngenta.com.au.

Tayyib, M., A. Sohail , A. Shazia, A. Murtaza, and F.F. Jamil (2005). Efficacy of some new chemistry insecticides for controlling the sucking insect pests and mites on cotton. Pak. Entomol., 27(1): 63-66.

Wafaa A. Al-kherb(2011). Field efficacy of some Neonicotinoid insecticides on whitefly Bemicia tabaci and natural enemies in cucmber and Tomato plants in Al-qassim Region, KSA. Jour., Entom., 8(5): 429-439.

الملخص العربى

تقيم فعالية المبيدات الحديثة فى نظام تتابع لقمع ديدان اللوز و غيرها من الآفات الأخرى الغير مستهدفة فى حقول القطن

هشام محمد محمد البسيونى[١]، هايتى مكرم تادرس[١]، أحمد محمد كردى[٢]

١- مركز البحوث الزراعية- معهد بحوث وقاية النبات- قسم بحوث ديدان اللوز
٢- جامعة الإسكندرية - كلية الزراعة (سابا باشا)- قسم وقاية النبات

أجريت التجربة في موقعين مختلفين بمركز أبوحمص محافظة البحيرة و هما بسنتواى و الزينى لتقيم فعالية ثماني مركبات نظمت في أربعة تتابعات بجانب التتابع الموصى به من قبل وزارة الزراعة المصرية للحد من تأثير ديدان اللوز فى القطن. أظهر التتابع الربع و الذى يتكون مبيدات (كوتش®، فوليام فليكس®، رادينت® و إنجيو®) إنخفاضا فى تعداد يرقات ديدان اللوز إلى ١,٣، ١,٩ يرقة/١٠٠ لوزة، بنسبة إنخفاض بلغت ٩٠، ٨٩ % فى الموقعين على التوالى. بالأضافة لذلك فقد أدى التتابع الثالث الذى يبدأ بمركب إنجيو® يتبعه مركبات كوراجين®، بروكليم® وينتهى بمركب رادينت® انخفاضا فى تعداد يرقات ديدان اللوز إلى ١,٨، ٢ يرقة/١٠٠لوزة بنسبة إنخفاض ٨٧، ٨٦%. مقارنة بالتتابع الخامس الموصى به من وزارة الزراعة المصرية الذى أظهر تأثيراً منخفضاً ٢,٤ و ٣,٣ يرقة/١٠٠لوزة و بنسبة إنخفاض بلغت ٨٢ و ٨١% لكلاً من الموقعين على التوالى.

علاوة على ذلك أوضحت النتائج أن أعلى تأثير للمبيدات المستخدمة على الآفات الحشرية الغير مستهدفة (المن- الجاسيدز- الذبابة البيضاء) كان لكلا من التتابع الثالث و الرابع.