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EVALUATION OF CHINMIX, SPINTOR AND BIOREPEL AGAINST THE COTTON BOLLWORMS IN THE FIELD

BY

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ABSTRACT

The present work was carried out during the two successive seasons of 2000 and 2001 at Kafr El-Geraeyaa, Zagazig region, Sharkia Governorate to evaluate the effects of Chinmix, Spintor and Biorepel compounds against cotton bollworms (*Pectinophera gossypiella* and *Earias insulana*) in cotton fields. The results showed that Chinmix, Spintor and Biorepel caused reduction in cotton bolls infestation by cotton bollworms (*P. gossypiella* and *E. insulana*). Chinmix was the most effective compound against cotton bollworms followed by Spintor and Biorepel showing annual reduction averages of 93.90, 63.72 and 34.71%; 94.31, 69.21 and 37.72 % in 2000 and 2001 seasons, respectively. Also the above–mentioned compounds caused significant reduction in the yield losses as compared to the control in both seasons. The use of these compounds may be an important factor in an integrated control program of boll worma.

INTRODUCTION

The cotton bollworms (*P. gossypiella* and *E. insulana*) are considered the most destructive pests infesting cotton plants in Egypt. It cause serious damage to cotton bolls and consequently considerable losses in yield and reducing the quality of lint [Khidr *et al.*, 1996].

Cotton bollworms (*P. gossypiella* and *E. insulana*) control program, was based mainly on use of insecticides, which created some problems such as insecticides-resistance, environmental pollution and hazard to natural enemies and beneficial insects [Abbas *et. al.*, 1996]. Hence, the recent approaches now focused upon the use of environmentally safe compounds as pest control agents.

Nowadays, plant extracts have more attention in controlling many pests, that are less toxic to man and animals, possess distinct toxicity and also lead to antifeeding activity and inhibition growth of some pests [Badr *et al.*, 2000].

On the other hand, the discovery and characterization of the metabolites of actinomycete *Saccharopolyspora spinosa* marks the beginnings of a new class of insect control products. Products within the Naturalyte class are based on

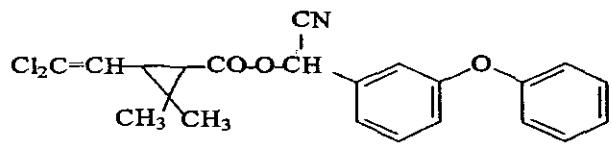
natural metabolites derived from living organisms. They have a novel molecular structure and mode of action that provide the excellent crop protection typically associated with synthetic products and low human and environmental risk of many biological products.

Spintor is the first active ingredient in the Naturalyte class of insect control. Products within this class offer an unique combination of attributes. These products provide control equal to or better than synthetic insecticides in several insect orders [Thompson *et al.*, 1997] The present work aimed to evaluate the effect of Chinmix, Spintor and Biorepel compounds against cotton bollworms (*P. gossypiella* and *E. insulana*).

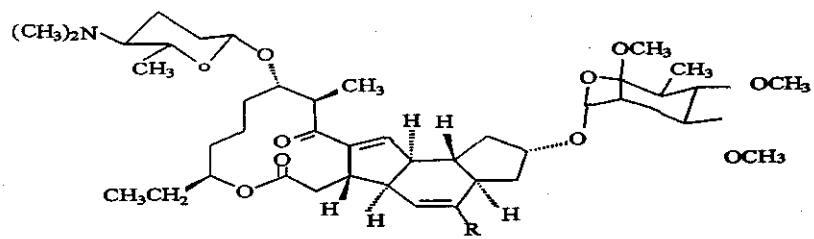
MATERIALS AND METHODS

Tested compounds:

1- Beta-cypermethrin (Chinmix; 5 % EC)



2- Spintor (Spinosad 25 % WG)



Spinosyn A: R=H, MW=731.98.
Spinosyn D: R=CH_3, MW=746.00.

3- Biorepel 10% E (*a. i.* Garlic juice) manufactured by JH Biotech., Inc. California, U S A. the recommended rate is 10 ml./L.

Field experiments:

The present study was carried out to evaluate the efficacy of Chinmix, Spintor and Biorepel at recommended rates against the pink and spiny bollworms infesting cotton plants (cotton variety Giza 85) was cultivated on 30 March 2000 and on 28 March 2001 during the two successive cotton seasons of 2000 and 2001 at Zagazig region, Sharkia Governorate.

The experimental area was divided into 12 plots in order to represent three treatments besides the untreated plots (control plots). Three plots were reserved for each treatment.

The area of each plot was 1/24 fedan. Each compound used in 3 sprays at 21 day intervals for Chinmix and 15 days intervals for Spintor and Biorepel. The first application was undertaken (carried out) at July 15th in both 2000 and 2001 seasons, when the general average of bollworm infestation reached about 3 %. The spraying was achieved by using a motor sprayed solo of 12 L. size at the rates of 240L./fedan.

To evaluate the compound efficiency against bollworm infestations, samples of 300 green bolls were collected randomly from the upper level of cotton plants in each treatments under study. They were collected in the days before each spray and weekly intervals after application till the end of each season. The samples were taken to the laboratory in cotton cloth bags and dissected to determine the infestation percentages of bollworms. The formula of Henderson and Tilton (1955) was used to calculate the percentage of reduction in the bolls infestation.

Reduction % = [1 –A/B x C/D] x 100

Estimation of the cotton yield loss:

At the end of the season, the loss assessment from the boll samples, 100 plants were randomly selected in each treatment was determined according to Hosny *et al.*, (1968), and the losses in the yield were estimated as a percentage of the total potential yield from the first pick only.

Statistical analysis:

Data obtained were statistically analyzed according to completely randomized design and factorial experiments. The appropriate methods were used for the analysis of data according to Little and hills (1975) and the proper "F" value was calculated as described by Fisher (1950) and Snedecor (1970).

RESULTS AND DISCUSSION

Data in Tables (1 and 2) showed reduction percentages in cotton bolls infestation after the application of three sprays of Chinmix, Spintor and Biorepel using at the recommended rate of each during the two consecutive cotton growing seasons of 2000 and 2001. The results obtained revealed that Chinmix was the most effective compound followed by Spintor and Biorepel. Chinmix showed annual percent reduction averages of 93.90, 63.72 and 34.71 for the first season, while were 94.31, 69.21 and 37.72 % for the second season, respectively. All treatments reduced the infestation percent in cotton bolls after the three sprays.

In the first, second and third sprays Chinmix was the most efficient than Spintor and Biorepel. The data showing of Chinmix compound gave the highest percentages in infestation reductions of 86.58, 98.16 and 97.0% in the first season (2000) for first, second and third spray respectively, and percentages in infestation reductions were 89.05, 97.76 and 96.19% in the second season (2001) for first, second and third spray respectively. While the lowest percentages in infestation reductions recorded with Biorepel compound were 31.26, 36.54 and 34.71% in the first season(2000) for first, second and third spray respectively, and percentages in infestation reductions were 34.99, 39.42 and 38.76% in the second season (2001) for first, second and third spray respectively. On the other hand,

Spintor compound showed the median average percentages in infestation reductions of 57.87, 65.66 and 63.72% in the first season (2000) for first, second and third spray respectively and percentages in infestation reductions were 66.27, 70.46 and 70.91% in the second season (2001) for first, second and third spray respectively.

These results agree with the findings of Dhawan *et al.*, (1992), Khidr *et al.*, (1996), Brickle *et al.*, (1999), Kharboutli *et al.*, (1999) and Johanson *et al* (2000) who showed that Spinosad and Pyrethroids effectively controlled cotton bollworms. Khedr (2002) found that the mean rate of reduction in the infestation percentage of cotton leafworm as a result to plant extracts applied recorded 33.92 $\pm$ 0.44%, 14.11 $\pm$ 0.32% and 13.55 $\pm$ 0.43% in the first season, while were 39.88 $\pm$ 0.11%, 28.77 $\pm$ 0.43% and 24.52 $\pm$ 0.38%, in the second season one for NemAzal, Soybean and Biorepel, respectively.

Estimation the loss in cotton yield:

At the end of every cotton-growing season, the yield losses caused by the bollworms damage were determined. The mean percentages of yield loss in the cotton fields treated with Chinmix,Spintor and Biorepel are *summarized* in Tables (3 and 4).

The percentages of cotton yield losses in the cotton areas treated with each compound were less than that of untreated cotton areas (control). The highest yield losses of 31.36 and 28.34% were recorded in untreated cotton areas during 2000 and 2001 seasons, respectively. Whereas, the lowest yield losses of 2.26 and 0.89% were recorded in cotton areas treated with Chinmix during 2000 and 2001 seasons, respectively. The cotton treated areas with Spintor and Biorepel showed the median average percent of yield losses 12.55, 10.23% and 23.85, 19.15%, respectively.

The obtained data cleared that the second season had lower yield loss than the first one this may be returned to raising of reduction percentages of cotton bollworms infestation in the second season.

Statistical analysis revealed that, there were highly significant differences in the yield losses between treatments and control in both seasons.

These results are in agreement with those obtained by Bhamburkar (1988), El-Feshawi *et al.*, (1991) and Raslan (1994) they found that the insecticides application reduced the incidence of bollworms infestation on cotton and decreased loss percentage of cotton yield. Kharboutli *et al.*, (1999) and Johanson *et al.* (2000) found that the treatment with tracer and pyrethriods caused significantly less damage of cotton bollworms. In addition, Mansour (2001) indicated nonsignificant difference between bioinsecticide and plant extract treatments, also between insect growth regulator and chemical insecticides treatment, but there were significant differences between the first two treatments and the other treatments. The most damaged bolls were 22.64 & 20.22% in control treatment, while the lowest damaged bolls were 19.50 & 16.36% in chemical insecticides in 1998 and 1999 cotton seasons, respectively.

Table (1): Reduction percentages of cotton bollworms infestation after Chinmix, Spintor and Biorepel spraying in cotton fields at Zagazig district Sharkia . Governorate during 2000.

Treatment	Recommended rate	Mean infestation percentage before spray / 100 bolls	Infestation and reduction percentages in cotton bolls																		Mean of reduction after the first spray	Mean of reduction after the second spray	Mean of reduction after the third spray	Seasonal average of reduction
			1st week		2nd week		3rd week		4th week		5th week		6th week		7th week		8th week		9th week					
			% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.				
Chinmix	500 ml/ feddan	3.0	2.0	72.71 *	1.00	91.50 *	1.00	95.38 *	1.00	96.43 **	0.00	100.0 **	1.00	98.05 **	2.00	97.10 ***	1.00	98.71 ***	4.00	95.18 ***	86.58	98.16	97.00	93.90
Spintor	50 g/ feddan	3.0	3.3	54.57 *	4.66	61.17 *	7.66	64.64 **	9.33	66.68 **	11.33	69.65 ***	17.66	65.60 ***	-	-	-	-	-	-	57.87	65.66	67.63	63.72
Biorepel	10 ml/ liter	2.66	4.66	28.30 *	7.00	34.21 *	12.00	37.52 **	16.00	35.55 **	20.33	38.58 ***	30.00	34.08 ***	-	-	-	-	-	-	31.26	36.54	36.33	34.71
Control		3.0	7.33		12.0		21.66		28.00		37.33		51.33		69.00		78.00		83.00					

* After 1st spray. ** After 2nd spray. *** After 3rd spray.

Both spintor and Bioropel were evaluated for two weeks, whereas Chinmix evaluated for three weeks.

Table (2): Reduction percentages of cotton bollworms infestation after Chinmix, Spintor and Biorepel spraying in cotton fields at Zagazig district Sharkia Governorate during 2001.

Treatment	Recommended rate	Mean infestation percentage before spray / 100 bolls	Infestation and reduction percentages in cotton bolls																Mean of reduction after the first spray	Mean of reduction after the second spray	Mean of reduction after the third spray	Seasonal average of reduction
			1st week		2nd week		3rd week		4th week		5th week		6th week		7th week		8th week		9th week					
			% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.	% Inf.	% Red.				
Chinmix	500ml/ feddan	3.33	2.00	73.74 *	0.66	93.40 *	0.00	100.00 *	0.00	100.00 **	0.66	97.87 **	2.00	95.42 **	2.00	96.61 ***	3.33	96.30 ***	4.66	95.41 ***	89.05	97.76	96.19	94.31
Spintor	50 g/ feddan	2.66	2.33	61.71 *	3.33	70.83 *	6.0	69.67 **	7.33	71.25 **	9.00	74.57 ***	16.33	67.24 ***	-	-	-	-	-	-	66.27	70.46	70.91	69.21
Biorepel	10 ml/ liter	3.00	4.66	32.10 *	8.00	37.87 *	13.33	40.26 **	17.66	38.58 **	23.33	41.55 ***	36.00	35.96 ***	-	-	-	-	-	-	34.99	39.42	38.76	37.72
Control		2.33	5.33		10.00		17.33		22.33		31.00		43.66		59.00		63.00		71.0		-	-	-	-

* After 1st spray. ** After 2nd spray. *** After 3rd spray.

Both spintor and Bioropel were evaluated for two weeks, whereas Chinmix evaluated for three weeks.

Table (3): Estimation of yield loss under different treatments during cotton season 2000 at Zagazig district Sharkia Governorate.

Treatment	No. of completely open bolls	No. of partially open bolls		No. of green bolls		No. of arid bolls		Total bolls/ plant	Estimated yield loss (%)
		2/3	1/3	Healthy	Infested	Healthy	Infested		
Chinmix	16.74	0.21	0.06	0.74	0.09	1.27	0.19	19.30	2.26
Spintor	14.01	1.18	0.60	0.75	0.40	0.81	0.95	18.70	12.55
Biorepel	10.40	3.0	1.40	0.40	0.64	0.92	1.40	18.16	23.58
Control	8.60	3.80	1.60	0.16	1.0	0.88	2.0	18.04	31.36
F-test									**

L.S.D. $_{0.01}$ = 3.4 ** = Highly significant

Table (4): Estimation of yield loss under different treatments during cotton season 2001 at Zagazig district Sharkia Governorate.

Treatment	No. of completely open bolls	No. of partially open bolls		No. of green bolls		No. of arid bolls		Total bolls/ plant	Estimated yield loss (%)
		2/3	1/3	Healthy	infested	Healthy	infested		
Chinmix	17.38	0.11	0.02	0.84	0.03	1.15	0.08	19.61	0.89
Spintor	14.16	1.02	0.44	0.63	0.36	0.97	0.71	18.29	10.23
Biorepel	11.60	2.40	1.00	0.22	0.44	0.88	1.30	17.84	19.15
Control	9.10	3.40	1.80	0.20	0.80	0.76	1.60	17.66	28.34
F-test									**

L.S.D. $_{0.01}$ = 4.42 ** = Highly significant

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تقييم تأثير مركبات الشنمكس والسبينتور والبيوربل على ديدان لوز القطن الشوكية والقرنفلية في الحقل

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أجريت هذه الدراسة خلال عامين متعاقبين ٢٠٠٠، ٢٠٠١ م في قرية كفر الجراية، منطقة الزقازيق، محافظة الشرقية، لتقييم تأثير ثلاث مركبات هي Chinmix و Spintor و Biorepel ضد ديدان اللوز في حقول القطن. أوضحت النتائج المتحصل عليها بأن المركبات الثلاثة تحت الدراسة وهي Chinmix و Spintor و Biorepel سببت إنخفاضاً في إصابة لوز القطن بديدان اللوز bollworems بالحقل إلا أن مركب Chinmix كان الأكثر فاعلية ضد ديدان اللوز bollworms ثم مركب Spintor و جاء مركب Biorepel في المرتبة الأخيرة وكانت معدلات الخفض السنوية التي سجلت في هذه التجربة هي ٩٣,٩٠، ٦٣,٧٢، ٣٤,٧١ % و ٩٤,٣١، ٩,٢١، ٣٧,٧٢ % خلال موسمي الدراسة ٢٠٠٠، ٢٠٠١ م على التوالي. كما أتضح من النتائج أيضاً أن نسبة الخسارة في محصول القطن كانت كبيرة في مساحات القطن الغير معاملة (الكنترول) مقارنة بالمساحات المعاملة بالمبيدات تحت الدراسة، كما كانت النتائج المتحصل عليها في هذة الدراسة معنوية جدا خلال موسمي الدراسة.