

NEW APPROACH FOR THE CONTROL OF THE PINK BOLLWORM,
PECTINOPHORA GOSSEYPIELLA (Saund.).

By

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ABSTRACT

The present study was designed and conducted for the aim of using the microcapsulated sex pheromone as a part of integrated pest management (IPM) programmes of the pink bollworm, *Pectinophora gossypiella* (Saund.). Two procedures were investigated in this line. In the first one, the microcapsulated formulation was experimented as to substitute the conventional insecticidal applications partially, using pheromone early in the season in three consecutive applications followed by ~~two~~ ^{two} insecticidal applications in Dakahlia Governorate. The second was a belt trial, in that procedure, the whole surface of the field was sprayed with microcapsulated pheromone three times early in the season, at two weeks intervals, and four times of spraying with the pheromone were applied in the belt (the narrow strip of land to a width of 15-20 meters towards the inside of the field). The average percent of infested green bolls by the pink bollworm were 1.72, 1.22 and 1.39% for the outbelt during 1987, 1988 and 1988 seasons, respectively, while it was 0.29, 0.39 and 0.89% for the belt during the same seasons. On the other hand, the infestation percent of fields sprayed with insecticides were 2.51, 5.21 and 3.52.

INTRODUCTION

Cotton is attacked by many enemies from the time of planting till the ginning operation. One of the most dangerous of these enemies is the pink bollworm, *P.gossypiella* which causes when neglected an

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enormous damage and loss, qualitatively and quantitatively to the crop.

This study aims to use some of the modern concepts of the pest control is defending the cotton crop against this injurious pest or at least reduce or minimize its effect on the plant. On this concern, the use of sex attractant pheromone of the pink bollworm as an element of the integrated pest management (IPM) system against this insect. It was used early in the season in three applications of the pheromone followed by two applications of the conventional insecticides at late season. Another method of pheromone application in the same line of IPM was the belt trials which introduced a new methodology in handling these products against the mentioned pest.

MATERIALS AND METHODS

Pheromone formulation: Microcapsulated formulation of 1:1 (Z,Z) and (Z,E) 7,11-hexadecadienyl acetate, which was supplied by ICI of the U.K. as a 2% a.i. aqueous suspension prepared by interfacial polymerization (Hall et al.,⁴1982). Slow release of the pheromone occurred by premeation through the capsule.

Pheromone fields were treated with the encapsulated formulation at the rate of 200 ml/feddan

using fixed wing plane.

Another method of pheromone application in the same line (IPM) was the belt trial. The fields were treated with the pheromone 3 times by 2 weeks intervals, except the belt area which received an application every week. The belt area was the area surrounding the whole experimental fields at a width of 15-20 meters. Those extra applications were made by a shoulder-mounted sprayer. After the pheromone application the fields received two insecticidal applications.

the control fields were treated four times with conventional insecticides.

These trials were conducted in Dakahlia Governorate, Manzala District. The treated areas were about 1000-1500 feddans for pheromone fields (out or belt), 150-200 feddans for the belt trial and about 1000 feddans for insecticides.

RESULTS AND DISCUSSION

These experiments were carried out to evaluate the control method of pheromone belt, the main target of this study, pheromone out the belt and insecticides.

These trials aimed to increase the disruption of the pinkbollworm male moths by surrounding the fields treated with microcapsulated pheromone by a continuous

belt or strip, in about 15-20 meters in depth towards the inside of the field in the pheromone treatment, therefore the residues of the pheromone were still highly effective when the second pheromone application was applied to the whole pheromone area. Therefore, the whole pheromone area in this trial was sprayed 3 times with the microcapsulated pheromone two weeks separated every two applications. While the belt was sprayed four times, then followed by the conventional insecticides. On this concern, it worth to point out that the terminology used was as follows:

In the belt: is applied to the whole cotton area surrounded by the belt, comprises the belt area itself.
Out belt: the pheromone area other than of the belt trial, and treated with the same pheromone.

Insecticide areas: are those treated normally with the conventional insecticides only during the season.

Results presented in Table (1) show the mean percent of infestation of the nine inspections for the three different treatments. The analysis of variance reflects a significant difference between these treatments at P.0.05. It could be stated that the belt trial increased the efficiency of pheromone in reducing the infestation with the pink bollworm as compared with the other two methods. On the other hand, pheromone

Table (1): Average percent of the infested green bolls with the pink bollworm during the cotton growing season, 1987.

Date	Infested bolls %		
	in belt	out belt	insecticides
July, 12	0.0	0.0	0.5
, 19	0.0	0.0	0.5
, 25	0.0	0.5	1.63
Aug., 1	0.5	0.5	1.13
, 8	0.5	1.0	1.88
, 16	0.0	1.0	3.25
, 23	0.0	3.5	3.75
, 30	0.0	4.5	6.5
Sep., 6	1.5	4.5	4.5

Mean	0.29 a	1.72 b	2.51 c

Numbers followed by the same letter are not significantly different according to Duncan's Multiple Range Test.

treatments reduced the infestation by this pest more than of using insecticides only. Furthermore, it is evident that application of the belt trial could successfully keep the rate of infestation to nearly zero throughout the period extending from mid July to late August, in which flowers and newly formed green bolls are sensitive to infestation.

Results in Table (2) show the efficiency of the belt application which is quite evident in this season due to the high population of the pest and consequently highly raising of green bolls infestation. The application of pheromone in the belt trial could suppress the invasion of the pest particularly from July, 20th to August 10th, while the percentage of infestation in cotton fields sprayed with insecticides remained high and ranged between 3.25 and 7.38. In late cotton season, the infestation percent in the insecticide treated fields was 9.5, while this percent was about one fourth in the out belt trial and one tenth in the belt trial.

Data in Table (3) gives the same impression as that of the two previous seasons. The analysis of variance showed a highly significant difference ($P < 0.01$) between the three treatments.

This study showed, in part, that the use of these synthetic sex pheromones had greatly and positively

Table (2): Average percent of the infested green bolls with the pink bollworm during the cotton season, 1988.

Date	Infested bolls %		
	in belt	out belt	insecticides
July, 6	0.5	1.0	1.25
,13	0.5	0.5	3.88
,20	0.0	1.0	3.25
,27	0.0	0.0	2.63
Aug., 3	0.0	0.5	3.88
,10	0.0	0.0	7.38
,17	0.5	2.0	6.75
,24	1.0	2.5	9.50
,31	1.0	3.5	8.38

Mean	0.39 a	1.22 b	5.21 c

Numbers followed by the same letter are not significantly different according to Duncan's Multiple Range Test.

Table (3): Average percent of the infested green bolls with the pink bollworm during the cotton season, 1969.

Date	Infested bolls %		
	in blet	out belt	insecticides
July, 9	0.0	1.0	1.33
,16	0.0	1.0	2.33
,23	0.0	1.5	2.50
,30	1.0	0.5	1.67
Aug., 6	1.0	1.0	2.17
,13	2.0	3.5	4.67
,20	1.0	1.5	4.67
,27	1.0	1.5	5.00
Sep., 3	2.0	1.0	7.33
Mean	0.89 a	1.39 b	3.52 c

Numbers followed by the same letter are not significantly different according to Duncan's Multiple Range Test.

influenced the population of the pink bollworm and resulted in a marked reduction in the rate of infestation. It happened by a very specific way of suppression directed mainly and affected only the target insect by the disruption of premating pheromone communication between males and females (Gaston et al., 1977)³. Also, it was found by Merkle and Flint (1981)⁵ in Arizona that about 90% fewer males of P. gossypiella caught in the fields treated with nine different mixtures of the (Z7,11E) and (Z7,11E) in gossyplure premated than in the untreated ones. Results of field tests carried out in Arizona and California on the Nomate PBW at a rate of 2.86 a.i./ha. by aerial application from early to mid season control of P. gossypiella on cotton demonstrated that percentage damage by the pest was less than or about the same as that on cotton received treatment with the recommended¹ insecticides (Butler and Las., 1983). It was also found that the same pheromone was very effective in controlling the pest throughout the 2nd generation as the infestation of the bolls averaged 5.8% in the pheromone treated areas against 32.6% in the conventional insecticides treated areas (Doane and Brooks, 1981)².

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اتجاه حديث في مكافحة دودة اللوز القرنفلية

أحمد أسماعيل جاد الله عبد العزيز أبو العلا خضر محمد علي محمد أحمد مرسى

تهدف هذه الدراسة إلى استعمال الفيزيوس الخاص بعودة اللون القرصية كعمر من
بواسط المعالجة المتكاملة لهذه الأداة . و يهتم في استخدام الفيزيوس
على أساسه بعض الملامح وخصائص استثنائية والفترة بين كل منها أسبوعين تم أعطت تلك
معاملة بالحقن الفيزيوس و طريقة أخرى استخدم فيها نفس المعامل مع إجراء دوران
بفرض الفيزيوس بقرص ١٥ - ٢٠ كم كرمية إضافية بعد المعاملة الأولى بالفيزيوس عند
أسبوع ١ و ثوربت السبب المنوية للأصابة بزيادة اللون في هذه الحقول بمعدل
معالجة بعد استخدام الحسنة المودمي بها .

و قد أظهرت دراسة العوام نتائج مشجعة حيث كانت متوسط نسبة الإصابة بمرض
التور في الحقول المأهولة بالعزمون دون العوام ١,٧٢ ، ١,٢٢ ، ١,٣٩ / بينما كانت
في الحقول المأهولة بالعوام ٢,٢٩ ، ٣,٩١ ، ٨,٩١ / مقارنة بمتوسط نسبة الإصابة ٢,٥١
٢,٢١ ، ٣,٥٢ في حقول الميديات خلال مواسم ١٩٨٧ ، ١٩٨٨ ، ١٩٨٩ على
الترتيب