

INFLUENCE OF PHEROMONE AND LIGHT TRAPS ON THE CAPTURED OF THE COTTON LEAFWORM, *Spodoptera littoralis* (BOISD.) MALE MOTHS

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ABSTRACT

The present study was conducted to evaluate the efficiency of pheromone and light traps on capturing the male moths of *Spodoptera littoralis* throughout two successive seasons (2002-2003) at Qalubia Governorate and to establish a relationship between adult male moths population of the cotton leafworm *S. littoralis* and numbers of eggmasses in the field. Pheromone traps attracted more numbers of male moths than light trap during the two seasons. In 2002 numbers of attracted males to pheromone traps were 358,447,404 and 211 in May, June, July and August, respectively, in comparison to light trap which attracted 33,29,21 and 16 male moths during the same months. In 2003, pheromone traps attracted 757,720,424 and 276 male moths in comparing with light trap which attracted 29,22,24, and 26 male moths, respectively, during the same previous months. The Correlation between the number of eggmasses and the density of trapped male moths was higher in pheromone traps in the two growing seasons ($r = 0.7$ and 0.5 in 2002 and 2003) than in light ones ($r = 0.2$ and 0.1 in 2002 and 2003 season). Therefore, pheromone traps can be counted on to evaluate the density of *S. littoralis* male moths and to reduce in the number of eggmasses deposited in the field, and subsequently reduce the infestation level.

INTRODUCTION

The Egyptian cotton leafworm, *Spodoptera littoralis* (Boisd.) (Lepidoptera: Noctuidae) is a key pest of cotton and other crops in Egypt. Heavy infestations may occur in cotton during May to July, larvae which cause economic damage by feeding on leaves (Hosny *et al.* 1986, Russell *et al.* 1993). Many problems have been exited as a result of using insecticides against this pest. Few years ago, scientists synthesized sex pheromone of this pest to be used as a biological control agent to avoid the problems of insecticides.

Sex pheromone and light traps were used for monitoring the changes in the population density of *S. littoralis* and *Pectinophora gossypiella* (Saunders) in Egypt (Abul-Nasr *et al.* 1973, Campion *et al.* 1974, Campion *et al.* 1976, Ahmed 1979, Zanaty *et al.* 1984, Cai *et al.* 1985, Gupta and Agrawal 1985, Hossain 1990, Athanassiou *et al.* 2002, Nassef and Watson 2002 and Mart *et al.* 2002). They all agreed that trapping *S. littoralis* male moths by sex pheromone traps was useful in reducing their populations. Nasr and wissa (1974) suggested that pheromone traps could be considered as an early warning system to help predicting level of infestation.

The principle aim from this study was conducted to evaluate the efficiency of pheromone and light traps throughout two successive seasons, (2002-2003) at Qalubia Gcvernorate and to establish a relationship between

the population density of male moths of the cotton leafworm, *S. littoralis* and numbers of eggmasses on cotton field.

MATERIALS AND METHODS

Field experiments were carried out in Aghor El-Soghra, Qalubia Governorate, during two cotton growing seasons, 2002 and 2003. Cotton variety, Giza 85 was sown on March 5th and March 1st during the two successive seasons, respectively. Pheromone and light traps were used to study the changes in the population density of the cotton leafworm, *S. littoralis* during the periods of investigation.

Three pheromone traps (square tray type) were distributed at equal distances apart within one feddan. Every trap was mounted on a metal stand, situated little above the cotton plants, and it was progressively adjusted according to plant height. Each trap was provided with a pheromone capsule to attract male moths of *S. littoralis* and enough soapy water as a killing agent. The used pheromone was, (Z,E)9,11 tetradecadien(-1-Y1 acetate) which was utilized by (El-Zanan and El-Hawary 1999). Every three days, traps were inspected to count captured males and to renew the soapy water (Badr 1999). The pheromone capsules were replaced every fifteen days. Pheromone traps were setup in the experimental area from the May to last August during the two seasons.

Also, an ultra-violet light trap (250watt) Robinson (1950) was utilized from the May till same date. Male and female moths captured by the light trap were classified to record the male numbers only, so a comparison the number of captured male moths in sex pheromone and light traps can be made.

In addition, the relationship between numbers of male moths attracted to different kinds of traps and numbers of eggmasses laid on cotton plants was investigated. Thus, a cotton field measured one feddan and free from pheromone traps was used as a check besides the experimental field.

Five plots (6x7m _ 0.01m²) were chosen in each field for counting the numbers of eggmasses on cotton plants every three days. One plot in the center and the other four were terminal the field. Numbers of eggmasses resulting from the five plots were imputed to feddan.

Statistical analysis was conducted to find out the correlation between numbers of *Spodoptera littoralis* male moths captured in the two types of traps as well as the numbers of eggmasses in 2002 and 2003.

RESULTS

Data revealed that during the two studying seasons (2002&2003) more male moths of *S. littoralis* were attracted to pheromone traps than to light trap. Also, the number of male catches in pheromone traps in 2003 was higher than in 2002, while, in light trap more numbers of captured males were obtained in 2002. Tables (1 and 2) showed that the highest number of captured male moths was recorded in May, June and July during the two successive seasons. In 2002, pheromone and light traps attracted 1420 and 99 male moths, respectively. The same trend occurred during 2003 where the

numbers of males caught by pheromone and light traps were 2177 and 101, respectively. Table (1) show that the ratio between number of captured male moths in sex pheromone and light traps during May, June, July and August in 2002 were 10.9:1 , 15.4:1 , 19.2:1 and 13.2:1 respectively, while, in table (2) they were 26.1:1 , 32.7:1 , 17.7:1 , and 10.6:1 in 2003 season, during the same months.

The highest ratio between number of captured male moths in sex pheromone and light traps was 33:1 on 25th of June, 2002 and it 44:1 in the same month, 2003. The overall ratio was 14.3:1 in 2002 and 21.6:1 in 2003.

The results are in agreement with those obtained by Nasr *et al.* (1977), Radwan (1979 , 1985), Hussein and Kostandy (2002) and Duran *et al.* (2000) who stated that pheromone traps are more effective in trapping male moths of *S. littoralis* than light ones.

The correlation coefficient (r) values between the captured population densities of *S. littoralis* and the type of trap were positive during the two studying seasons, and they were 0.5 and 0.6 in 2002 and 2003, respectively.

Table (1): The population density and the ratio of *Spodoptera littoralis* male moths attracted to pheromone and light traps at Qalubia Governorate in 2002 .

Sampling date		Pheromone trap	Light trap	No. in pheromone traps/No. in light traps(ratio)
May	Total	358	33	10.9:1
	X	35.8	3.3	
June	Total	447	29	15.4:1
	X	44.7	2.9	
July	Total	404	21	19.2:1
	X	36.7	1.9	
August	Total	211	16	13.2:1
	X	21.1	1.6	
Overall		1420	99	14.3:1

Table (2): The population density and the ratio of *Spodoptera littoralis* male moths attracted to pheromone and light traps at Qalubia Governorate in 2003 .

Sampling date		Pheromone trap	Light trap	No. in pheromone traps/No. in light traps(ratio)
May	Total	757	29	26.1:1
	X	68.8	2.6	
June	Total	720	22	32.7:1
	X	72	2.2	
July	Total	424	24	17.7:1
	X	42.4	2.4	
August	Total	276	26	10.6:1
	X	27.6	2.6	
Overall		2177	101	21.6:1

Additionally, The correlation coefficient (r) value of *S. littoralis* in sex pheromone and number of eggmasses was positive and significant in 2002 (0.65), and in 2003 season it was 0.51 (table 3). No significant correlation was found between the population density of male moths in light trap and the number of eggmasses because the correlation coefficient (r) values were 0.21 in 2002 and 0.13 in 2003.

Table (3) show that in 2002, the numbers of eggmasses laid by *S. littoralis* in the experimental field were 0,440,500 and 20 during May, June, July and August, in that order. Positively, the numbers of eggmasses were higher in the check field (0,620,780 and 140 during the same months). Also, in 2003 the numbers of eggmasses in the check field were higher than the numbers of eggmasses laid on cotton plants in the experimental field. Above results indicate that pheromone traps can reduce the number of eggmasses laid in the field by *S. littoralis* and subsequently can reduce its infestation level.

Table (3): The numbers of eggmasses laid by *Spodoptera littoralis* females in experimental and check cotton fields at Qalubia Governorate in 2002&2003.

Sampling date		No. eggmasses			
		2002		2003	
		Exp.	Check	Exp.	Check
May	Total	0	0	80	120
	X	0	0	7.3	10.9
June	Total	440	620	460	700
	X	44	62	46	70
July	Total	500	780	300	660
	X	45.5	70.9	30.0	66.0
August	Total	20	140	0	60
	x	2	14	0	6
Overall		960	1540	840	1540

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تأثير استخدام المصائد الفرمونية و الضوئية في جذب ذكور فراشات دودة ورق القطن

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تمت الدراسة في محافظة القليوبية في موسمين متتاليين ٢٠٠٢ - ٢٠٠٣ لتقييم كفاءة المصائد الفرمونية و الضوئية في اصطياد فراشات دودة ورق القطن، و تقدير العلاقة بين تعداد الفراشات للذكور في المصائد و تعداد لطع البيض. و وجد أن المصائد الفرمونية تجذب تعداد أكبر من الفراشات بالمقارنة بالمصائد الضوئية في كلا الموسمين، حيث أن في موسم ٢٠٠٢ كان تعداد الفراشات للذكور في المصائد الفرمونية ٣٥٨، ٤٤٧، ٤٠٤ و ٢١١ في شهور مايو و يونيو و يوليو و أغسطس على التوالي بينما كان تعداد للذكور في الضوئية ٣٣، ٢٩، ٢١، ١٦ أثناء نفس الشهور ، و في موسم ٢٠٠٣ كان تعداد الذكور في المصائد الفرمونية ٧٥٧، ٧٢٠، ٤٢٤، ٢٧٦ بينما في الضوئية ٢٩، ٢٢، ٢٤، ٢٦ أثناء نفس الشهور السابقة.

كان معامل الارتباط بين تعداد لطع البيض و تعداد الفراشات للذكور في المصائد الفرمونية أعلى في كلا الموسمين (٢ = ٠,٧ و ٠,٥ في ٢٠٠٢ و ٢٠٠٣) عنه في المصائد الضوئية (٢ = ٠,٢ ، ٠,١ في ٢٠٠٢ و ٢٠٠٣). و على ذلك يمكن الاعتماد على المصائد الفرمونية في تقدير تعداد دودة القطن و أيضا في تخفيض تعداد لطع البيض في حقول القطن و بالتالي تقليل مستوى الإصابة بدودة ورق القطن.