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Efficiency of Different Control Methods Against the Cotton Pink Bollworm *Pectinophora gossypiella* (Saund.) in Cotton Fields in Egypt

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ABSTRACT

In Egypt, the pink boll worm (PBW), *Pectinophora gossypiella* (Saund.) (Lepidoptera: Gelechiidae) is a serious mid- and late-season cotton pest that causes severe damage. Trials included; releasing of the egg parasitoid, *Trichogramma evanescens* (West.) (Hymenoptera: Trichgramatidae) and/or mass-trapping of the male moths of PBW compared with the conventional insecticide applications; for controlling the pest were carried out in the cotton fields in Menoufia Governorate, Egypt during the two cotton growing seasons of 2013 and 2014 to compare the efficiency of different methods against the pest. Nine parasitoid releases were undertaken in each season. Mass-trapping of the PBW moths showed the highest reduction in the green bolls' infestation, followed by releases of the parasitoid alone, while the insecticide applications recorded the highest infestation rates during the two seasons. Seasonal reduction percentages in green boll infestation at the parasitoid release and the mass-trapping plots attained (30.65 and 43.1% in season, 2013 and 37.66 and 49.77% in season, 2014), respectively, opposed to (37.78 and 47.30%) at the insecticide application plot. Therefore, integrated pest control programs are highly recommended against the cotton pests, especially the boll worms, in Egypt.

Keywords: Cotton field, *Pectinophora gossypiella*, *Trichogramma evanescens,* Release, Mass-trapping, Egypt.

INTRODUCTION

Cotton is still among the most economical commercial crops in Egypt. The world's largest cotton producing and consuming countries are China, United States, India and Pakistan. These four countries account as much as 60% of the world cotton production and consumption.

The cotton plants are subject to attack by several insect pests. The lepidopterous pink bollworm (PBW), *Pectinophora gossypiella* (Saund.) (Lepidoptera: Gelechiidae) is a serious mid- and late-season cotton pest. It is one of the most destructive pests of cotton in most of the cotton-producing countries in the world, including Egypt. Organophosphates, carbamates and synthetic pyrethroids are being used to control it in different infested areas of Egypt. The wide use of chemical insecticides on cotton has created many problems such as development of resistance in pest strains, disturbance of the natural balance between pests and their natural enemies, secondary pest outbreaks, and increase of the environmental pollution. In Egypt, for all these reasons, there is always a need to develop and implement an Integrated Pest Management (IPM) program for controlling the cotton pests, especially PBW.

In the frame of IPM, utilization of bio-agents have been considered to reduce the protection costs by at least by 65% as well to increase the efficiency of other pest suppression means (Khidr *et al.*, 2003 and El-Heneidy *et al.,* 2004). The egg parasitoid, *Trichogramma evanescens* West. (Hymenoptera: Trichgramitidae) has been used successfully for controlling the cotton bollworms, pink and spiny in cotton fields not only in Egypt but also in many other countries (Khidr *et al.*, 2003; Mesbah *et al.*, 2003 and El-Nemaky, 2012).

The objective of this study was to evaluate the efficacy of the egg parasitoid, *T. evanescens* in integration with mass-trapping of PBW adult moths for controlling the pest population compared with insecticidal applications.

MATERIALS AND METHODS

Field experiments were conducted at Quesna district, Menoufia Governorate, Egypt during the two cotton growing seasons, 2013 and 2014. An area of about 6 feddans (= 6 acres) was divided into three separated plots (A, B and C), two feddans each. In plot (A), only one pheromone baited trap + releases of the egg parasitoid, *T. evanescens* were applied; in plot (B), 4 pheromone baited traps (as mass-trapping) + releases of *T. evanescens* were practiced, while in plot (C), only one pheromone baited trap + recommended insecticides were used. The pheromone baited trap in plots A and C was used for monitoring the number of PBW moths, while in plot B, the 4 traps served as mass-trapping. The three plots were sown in March 23rd, 2013 and March 25th, 2014, using the cotton variety, Giza 89. All recommended regular agricultural practices were carried out throughout the growing seasons.

Methodology

Monitoring of the PBW moths' population was carried out in the experimental plots at Quesna district, Menoufia Governorate, as one of the hot spot areas of boll worms' infestation in Egypt, for the two successive cotton growing seasons 2013 and 2014.

Sex attractant pheromone of *P. gossypiella*: Gossyplure was used as pheromone baited traps with capsules loading 2 mg *i.e.* each. Capsules were obtained from Central Administration for Pest Control, Ministry of Agriculture. The pheromone traps were first placed in different plots as mentioned above by the end of April in seasons 2013 and 2014.

Releases of *T. evanescens* (Plots A & B): castor paper vials, containing parasitized eggs with *T. evanescens* glued on cards, were hanged on the cotton plants, using pieces of wire. Each vial contained three ages of parasitized eggs, so parasitoid adults could emerge in three waves, every other day. The rate of release was 100 000 individuals/ feddan/ release at 10-12 day intervals. This rate was provided as 40 paper cards, each containing approximately 2500 parasitized eggs. *Trichogramma* releases were conducted starting annually with the beginning of square formation of

cotton plants (most probably by mid-June). The parasitized egg cards were obtained from the mass-rearing unit at the Central Administration for Pest Control, Ministry of Agriculture. Nine *Trichogramma* releases were applied at 16/6, 25/6, 5/7, 15/7, 25/7, 5/8, 15/8, 25/8 and 4/9 during the cotton season, 2013 and 18/6, 27/6, 7/7, 17/7, 27/7, 7/8, 17/8, 27/8 and 7/9 during the cotton season, 2014.

Insecticidal applications (Plot C): started late June depending upon the trap catches and/ or recommended infestation threshold level (3%). The insecticides; pestban, demeuron, alphacyper and dorsil were used in rotation to avoid resistance build up. The applied insecticides were sprayed using Kubota knapsack motor sprayer with 20 liters of water capacity.

Data were collected twice a week (every three days) to record moth catches in the traps and to follow the population buildup of the target pest.

Green bolls' infestation

Population fluctuation of PBW, based on the number of larvae and rate of infestation in cotton green bolls, was estimated during the two successive cotton seasons, 2013 and 2014. Random samples (100 green bolls/ treatment) were picked up weekly from both diagonals of each plot area. The bolls were inspected in the laboratory to fetch up the *P. gossypiella* larvae and/or their damages. Weekly number of larvae at each treatment and percentages of infestation was counted in the two seasons.

Comparative evaluation of the control methods against PBW

By the end of the experiments, the efficiency of the tested control methods was evaluated based on the general mean percentages in the infestation rates with PBW as well with the control index and potency levels using the following equations (Khidr *et al.,* 2004):

$$\text{Control index} = \frac{\text{Lowest general mean of infestation percentage}}{\text{General mean of infestation percentages of control methods}}$$

$$\text{Potency levels} = \frac{\text{Highest general mean of infestation percentage}}{\text{General mean of infestation percentages of control methods}}$$

Statistical analysis

Data was subjected to analysis of variance (ANOVA) and the means were compared with LSD test at 0.05 levels, using the SAS program (SAS Institute, 1988).

RESULTS AND DISCUSSION

Monitoring of PBW moth population

The population peaks of *P. gossypiella* male moths fluctuated from one season to another. The approximated numbers of the population density as well as the peaks of PBW moths were worked out depending on the periodically sex attractant trap catch figures by using pheromone baited traps throughout the period extended from 1st week of April till mid-September during the two successive cotton seasons, 2013 and 2014 at Quesna district, Menoufia Governorate, Egypt. Monthly mean numbers of PBW moths captured in the two seasons of the study are presented in table (1). Obtained results demonstrated relatively 4 peaks of the PBW male moths occurred during the period from the end of April to mid- September.

Table 1. Monthly mean numbers of PBW moths captured in sex attractant pheromone baited traps during the two cotton seasons, 2013 and 2014 at Quesna district, Menoufia Governorate, Egypt

Month / Year	Mean of male moths/ trap/ 6 days in plot A, B			Mean of male moths/ trap/ 6 days In plot C		
	2013	2014	Mean±S.E.	2013	2014	Mean±S.E.
April	2	2	2.0 ± 0	2	2	2.0 ± 0
May	5.2	6.8	6 ± 0.8	5.2	4	4.6 ± 0.6
June	7.8	9.4	8.6 ± 0.8	8	9	8.5 ± 0.5
July	11.8	14.2	13 ± 1.2	10.8	7.11	8.96 ± 1.85
August	13	14.4	13.7 ± 0.7	13.2	14.9	14.05 ± 0.85
September	22.33	29.33	25.83 ± 3.5	21.25	25.83	23.54 ± 2.29
General mean	10.36	12.69	11.53 ± 1.17	10.08	10.47	10.28 ± 0.19
F	877.3	1076.6	1153.4	800.2	862.4	876.2
L.S.D	0.88	1.09	0.91	0.87	0.82	0.88

Cotton season 2013

The first catch of PBW male moths in the sex attractant pheromone baited traps was found in April, 30th in the 3 plots. The population density of the pest moths increased from April till the 1st week of June. A peak of (13 moths/trap) was recorded in June, 6th on plot A, B and (9 moths/ trap) on June, 9th in plot C. The number of the captured male moths in the sex attractant pheromone baited traps decreased gradually from the 2nd week of June. The 2nd peak took place by the end of June to reach (14 male moths/trap) on July, 6th in plots A, B and C. The 3rd peak of the population (17 male moths/trap) was recorded in July, 30th in plots A, B and (15 male moths/trap) in plot C. The population density of the male moths decreased sharply from August 5th, when the trapped catches reached (14 male moths/trap) till August, 23rd, when they caught (10 moths/trap) in plots A, B and C. The population density of the pest increased to reach its peak (24 male moths) in September, 10th in plots A, B and (22 male moths) in September, 7th in plot C.

Cotton season of 2014

Four peaks of the captured male moths in the sex attractant pheromone baited traps included overwintering generation (diapause) were detected during the study period from the end of April till mid-September in the cotton growing season, 2014. A peak of (12 male moths/trap) was recorded in May, 28th in plots A, B and (8 male moths/trap) in May, 22th in plot C. The population density of PBW moths decreased gradually from 3rd to 15th June when the corresponding numbers of the caught male moths were (9 and 4 male moths/trap), respectively. After this period, the population density of the moths increased to reach the reliable occurrence of the second peak (18 male moths/trap) on June, 27th. The reliable peak (25 male moths/trap) in this period took place in July, 27th the 4th peak took place in the 3rd week of August. The captured male moths of pest recorded (12 male moths/trap). Thereafter, the trap catches increased to reach the peak in plots A, B and C. After this peak, the numbers of the captured male moths decreased gradually to reach (28 male moths/trap) in September 7th and then increased

again to reach (30 male moths/trap) in September, 13th in plots A, B and (26 male moths/trap) and in September, 4th in plot C.

It is obvious that the lowest mean population density of PBW moths occurred in April, May and June during both seasons. The corresponding monthly mean numbers of the trapped male-moths in season, 2013 were (2, 5.2 and 7.8 males-moths/trap) in plots A, B and (2, 5.2 and 8 male moths/trap) in plot C, respectively, whereas the corresponding mean numbers in season, 2014 were (2, 6.8 and 9.4 male-moths/traps). However, the highest incidences of the captured male-moths of PBW extended along July, August and September during the two cotton seasons. Generally, the means in season, 2013 were lower than those in season, 2014 (Table 1). Based on the calculated means, the mean population density of PBW could be divided into three main levels; the lowest one (2.0 male-moths/trap), recorded in April; the moderate level (6 and 8.6 male moths/trap) recorded in May and June, respectively, and the highest level (13.0, 13.7 and 25.8 male-moths/trap) recorded in July, August and September, respectively.

The obtained results are in agreement with those recorded by Beasly and Adams (1996) in California, USA and Hashem *et al.* (1997) who revealed that PBW had three generations on cotton plants in Egypt in addition to the overwintering generation based upon the trap catches. The results are in close agreement with those reported by Nassef *et al.* (1999) who revealed that the use of 5 sex pheromone traps per feddan for mass-trapping of PBW moths was equivalent to using 300 PB-ROPE dispensers per feddan. They also added that these treatments reduced the number of insecticide sprays needed when boll infestation with PBW exceeded the (3%) level. The results of the present study are in agreement also with Mart *et al.* (2002) who investigated the utilization of pheromone traps for estimation of the adult emergence rate and the observation of the seasonal population dynamics of *P. gossypiella.* As well, with those recorded by Seleman (2010) who estimated four generations and four peaks of PBW using sex attractant baited pheromone traps in Kafr El-Sheikh Governorate during the two cotton seasons of 2007 and 2008. Yones *et al*. (2012) used remote sensing technologies and sex pheromone baited traps of PBW to estimate annual field generations. They revealed that *P. gossypiella* had four generations on cotton plants during the period from May, 1st to September 30th, in addition to an overwintering generation, when moths emerged from diapause's larvae. The obtained results are also agree with those recorded by Abdel-Salam *et al.* (2013) who reported that the pest had four generations included the overwintering generation with four peaks during two cotton seasons of 2011 and 2012 in Egypt.

Evaluation of the releases of *T. evanescens*

Introduction and conservation of parasitoids in cotton fields can prove a good base for any sustainable IPM program. Efficacy of the egg parasitoid, *T. evanescens* used alone compared with the insecticide applications against PBW were evaluated in the two cotton growing seasons. Data summarized in table (2), showed the efficacy of *T. evanescens* during the cotton season, 2013 as the earliest incidence of the larval infestation in both parasitoid plots and insecticidal treatments was recorded on July12th.

Total number of larvae and infestation percentages with PBW was always lower in the *Trichogramma* plot (A) than in the insecticidal plot (C). Respective means of a reduction in the larval numbers and infestation percentages attained (60, 60, 30.56, 29.41 and 19.97, 25.87%) in July, August and September, respectively and (26.55 and 30.65%) in the whole cotton season 2013, respectively. The lowest infestation rates caused by the pest occurred in July when the infestation means recorded (1.4 and 3.5%) in both plots. The corresponding highest numbers of larvae and infestation percentages in green bolls caused by PBW were recorded in September, where the correspondent means were (18.67 & 14.33% and 23.33 & 19.33%), respectively. In August, the numbers of larvae per 100 green bolls as well as infestation percentages resulted from the two control methods occupied middle levels among those recorded in July and September. The correspondent means were (6.25 & 6.0 and 9.0 & 8.5%), respectively.

In cotton season, 2014, similar results were approximately obtained. The earliest incidence of the PBW larvae was recorded on 24th and 12th of July, 2014 in the *Trichogramma* and insecticidal plots, respectively (Table 2).

The results of the mean of infestation percentages with PBW in the *Trichogramma* release and insecticidal experimental plots (A and C) as means in the two cotton seasons, 2013 and 2014 are presented in table (2). It is obvious that the mean infestation percentages in the green bolls caused by PBW were much lower in July that may due to limited available green bolls attacked by the larvae of the pest. Whereas the green bolls that were progressively formed in August and September were subjected to being highly attacked. The gradual increase in the green boll infestation by PBW in the *T. evanescens* release plot was noticed in comparably remarkable of much increase in the green boll infestation at the insecticidal plot.

The means number of larval as well as infestation percentages with PBW in the green bolls collected from the *Trichogramma* plot in July, August, September and in the whole season were (1.0 & 1.0, 7.75 & 7.0, 21.33 & 17.0 and 10.03 & 8.33%), respectively, compared with 4.3 & 4.3, 12.75 & 11.63, 25.83 & 22.33 and 14.28 & 12.78%) in the insecticidal plot; respectively. Based on the baseline of the means of infestation rates in the green bolls at the insecticidal plot, the *Trichogramma* releases caused reduction in the mean averages of number of larvae and infestation percentages with PBW larvae in the green bolls, being (76.74 & 76.74%) in July, (39.22 & 39.81%) in August, (17.42 & 23.87%) in September and (29.76 & 34.82%) in the whole season; respectively.

Table 2. Monthly mean infestation rates of PBW (no. of larvae/ in green bolls) in the experimental cotton field in Menoufia Governorate, Egypt seasons 2013 and 2014

Month	Plot A		Plot B		Plot C	
	No. of larvae	Infestation %	No. of larvae	Infestation %	No. of larvae	Infestation %
2013						
July	1.4	1.4	0.4	0.4	3.6	3.6
Red%	60	60	88.75	88.75	-	-
August	6.25	6	6.25	5.75	9	8.5
Red%	30.56	29.41	30.56	32.35	-	-
September	18.67	14.33	14.67	11.67	23.33	19.33
Red%	19.97	25.87	37.12	39.63	-	-
General mean	8.77	7.24	7.11	5.94	11.94	10.44
Reduction %	26.55	30.65	40.45	43.1	-	-
2014						
July	0.6	0.6	0.6	0.6	5	5
Red%	88	88	88	88	-	-
August	9.25	8	7.75	6.5	16.5	14.75
Red%	43.94	46.67	53.03	56.67	-	-
September	24	19.67	19.33	15.67	28.33	25.33
Red%	15.28	22.35	31.77	38.14	-	-
General mean	11.28	9.42	9.23	7.59	16.61	15.11
Reduction %	32.09	37.66	44.43	49.77	-	-

In season, 2013, earliest incidence of PBW was recorded on 24th of July in plot (B), whereas the corresponding date in plot (C) was on 12th of July, 2013 (Table 2). As shown in the table, the mean percentage of infestation with PBW was always significantly lower in plot (B), *i.e. Trichogramma* and mass-trapping than in the insecticidal plot. Respective reduction means with larval numbers and infestation percentages in the green bolls attained (88.75 & 88.75, 30.56 & 32.35, 37.12 & 39.63 and 40.45 & 43.10%) in July, August and September, in the whole season, respectively compared with insecticidal applications.

Highly significant differences were obtained in PBW infestation rates between the integrated and insecticidal experimental plots. In the cotton season, 2014, similar trend of data was noticed. The earliest incidence of PBW in the two experimental plots, *i.e.* integrated and insecticidal plots occurred on 24th and 10th of July, respectively. The infestation rates with PBW were always much lower in the integrated plot than that in the insecticidal one. Reduction means of PBW represented by larval numbers and infestation percentages in the green bolls in the integrated plot compared with the insecticidal plot were (88 & 88, 53.03 & 56.67, 31.77 & 38.14 and 44.43 & 49.77%) in the months of July, August, and September and in the whole season of 2014, respectively. Also, highly significant differences in the percentages of infestation occurred between the integrated and insecticidal experimental plots under this investigation regarding the efficiency of the combination between the *Trichogramma* releases and mass-trapping as means in the two successive cotton seasons, 2013 and 2014 (Table 2). It is evident that significant reduction in infestation either in larvae numbers or infestation percentages in green bolls caused by PBW was noticed by using additional mass-trapping of the pest male moths. Rates of larval numbers and infestation means with PBW in *Trichogramma* releases combined with mass-trapping were lower by (88.37 & 88.37, 45.10 & 47.29, 30.63 & 38.78 and 42.79 & 47.03%) in the months of July, August, September and in the whole seasons; respectively compared with the insecticidal plot.

Comparative evaluation of the control methods against PBW

General means of infestation rates with PBW, presented in tables (3), showed the efficiency of the three different control methods tested against the pest. Based on the general mean percentages in the infestation rates with boll worm as averages of the two successive cotton seasons of 2013 and 2014, the efficiency of the tested control methods could be divided into three categories; the first included *Trichogramma* releases supported with mass-trapping as the most promising one (Plot B), the corresponding mean of the infestation percentages with PBW was (6.77%), the second comprised *Trichogramma* releases alone (Plot A), where the mean infestation percentage was (8.33%), and the third one, the insecticidal applications (Plot C) the respective mean of infestation with PBW attained (12.78%).

Table 3. Comparative efficiency of three different control methods based on general means of infestation percentages with PBW, control index and potency levels as an average of two cotton seasons, 2013 and 2014

Control methods	% General mean of infestation	Control index	Potency levels
T. evanescen alone	8.33	81.27	1.53
T. evanescen + mass trapping	6.77	100	1.89
Insecticides	12.78	52.97	1

According to a comparison based on the control index and potency levels, the obtained results are summarized in table (3). Khidr *et al.* (2004) described the control index as a mean for comparing the relative efficiency of the tested materials. It seems always

convenient to consider the efficacy of the different control agents by comparing them with a standard compound. In this study, *Trichogramma* release supported by mass-trapping of PBW adults was taken as a standard control method and given arbitrary index value of 100 units. The efficiency of the other two control methods, namely, *Trichogramma* releases alone and insecticidal applications attained (81.27 and 52.97%) as effective as the efficiency of *Trichogramma* releases supported by mass trapping of PBW adults. Furthermore, the relative potency level can be used as a convenient method in comparing the degree of the efficiency of different control methods to any pest. The potency level of the tested materials is expressed as number of folds, at the required reduction level, compared with the least efficient control method included in the evaluation against the tested insects. Hence, the number of folds representing the potency level was obtained by dividing the mean average of infestation percentage of the corresponding figures of *Trichogramma* releases alone and *Trichogramma* releases supported by mass-trapping of PBW adults. In this respect, insecticidal application was considered the standard control method.

For controlling PBW larvae, the relative potency level is expressed as the number of folds. Data in table (3) showed that the two control methods, namely, *Trichogramma* releases alone and *Trichogramma* releases integrated with mass-trapping were (1.53 and 1.89) times more effective for controlling the pest larvae than the efficacy of the insecticide application, respectively.

Timing of parasitoid releases seemed to be a critical factor in the success of such IPM program. Obtained data showed that early of Trichogramma releases at the flowering stage minimized the use of the chemical applications in seasons, 2013 and 2014, maintain the rate of infestation below the economic threshold (3%) and also led to enhance the role and abundance of the predators in cotton fields El-Heneidy *et al.* (1987) and Mesbah *et al.* (2003) estimated the increase in the predatory numbers in the *Trichogramma* release areas compared with insecticidal applications one by 3 folds. Khidr *et al*. (2003) stated that the release of the egg parasitoid in the cotton fields for controlling the boll worms during the flowering stage was more effective in reducing the green boll infestation than the release at boll formation stage.

In general, the results are in agreement with those obtained by *Panchbhai et al.* (2004) and Mohamed (2007) who revealed that the release of *Trichogramma* integrated with *Chrysoperla carnea* proved to be effective in reducing the infestation in squares, flowers and green bolls by cotton bollworms. The study performed by Ahmad *et al.* (2005), supported also the results obtained in this study. They carried out trials in Pakistan to evaluate the augmentation release of the egg parasitoid, *Trichogramma chilonis* in conjugation with pheromone to suppress the infestation with cotton bollworms; *i.e.Helicoverpa armigera* and *Earias* sp. in cotton fields. They stated that the integrated treatment of parasitoids in combination with pheromones suppressed boll worm infestation effectively. Moreover, the cotton boll worms management cost by the combination treatment was less than the insecticide treatment alone. The results of the present work are going in line also with that of Aragonesas (2009) who evaluated sex pheromone as mating disruption system for controlling PBW in more than 100 Hectares in Spain, and reported that the mating disruption system was a promising alternative to chemical control in endemically infested area and can become a key tool to fight PBW in cotton fields. In this field of investigation, El-Ashry (2011) revealed that the use of the egg parasitoid, *T. evanescens* supported with either additional belt of the same parasitoid or integrated with the predacious insect, *Chrysoperla carnea* (Steph.) gave significant results regarding a reduction in the rates of infestation with both the pink and spiny boll worms. The mass-trapping of PBW male moths had a potential effect on its infestation when integrated with different control methods.

Reviewing the previous results one could conclude that mass-trapping of the PBW male moths had potential effect when integrated with other control methods as mentioned previously for providing prolonged protection of the green bolls. These results are supported by Aref (2002) who revealed that sex pheromone was promising in controlling PBW as part of integrated control program.

It is interested to mention that the obtained results revealed that the role of conventional insecticides is essential for controlling both cotton bollworms; PBW and SPW for the following reasons: the philosophy of protective control programmed is the essential presence of the protective agent at the proper time before the bollworm larvae entered the fruiting parts of cotton plants. Once, the larvae interred the bolls they become in safe places for away from the surrounding. On the other hand, insecticidal treatments could be easily performed at the time of need as it is impossible to omit insecticides from the IPM program (Khidr *et al.,* 1996; Al-Beltagy, 1999; El-Ashry, 2011 and El-Heneidy *et al.,* 2015).

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كفاءة طرق المكافحة المختلفة ضد دودة اللوز القرنفلية(Saund.) *Pectinophora gossypiella* في حقول القطن في مصر

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تعتبر دودة اللوز القرنفلية (Lepidoptera: Gelechiidae) *Pectinophora gossypiella* (Saund.) من آفات منتصف وأواخر موسم القطن الخطيرة التي تسبب أضرارا بالغة. شملت التجارب إطلاق لطفيل البيض Hymenoptera:) *Trichgramma Evanescens* (West.) Trichgramatidae) منفردا أو مع الإصطياد الجماعى لذكور فراشات الآفة مقارنة مع المبيدات الحشرية التقليدية؛ لمكافحة الآفة. نفذت التجارب في حقول القطن في محافظة المنوفية، مصر خلال الموسمين زراعة القطن في 2013 و 2014 لمقارنة كفاءة اساليب المكافحة المختلفة ضد هذه الآفة. أجريت تسعة إطلاقات للطفيل في كل موسم. أظهر الإصطياد الجماعى لذكور فراشات الآفة أعلى انخفاض في مستويات الإصابة فى اللوز الأخضر، تلاها إطلاق الطفيل وحده، في حين سجل استخدام المبيدات الحشرية أعلى معدلات الإصابة خلال الموسمين. بلغ الخفض الموسمي في نسب الإصابة فى اللوز الأخضر في موقعى إطلاق الطفيل والإصطياد الجماعى لذكور فراشات الآفة (30.65 و 43.1٪ في موسم 2013 و37.66 و 49.77٪ في موسم، 2014)، على التوالي، مقابل (37.78 و 47.30٪) في موقع المبيدات الحشرية. لذلك، ينصح بشدة ببرامج المكافحة المتكاملة ضد آفات القطن، وخاصة ديدان اللوز في مصر.