THE SIMULTANEOUS EFFECT OF CERTAIN RECOMMENDED INSECTICIDES AND SELECTIVE BIOCIDES ON THE CHANGES IN THE POPULATION DENSITY OF COTTON LEAFWORM AND ITS RELEATED BIOAGENTS INHABITING COTTON FIELDS

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Abstract

Certain recommended chemical insecticides (Curacron, Baythroid and Larvin), Xentari (a bioinsecticide of *Bacillus thuringiensis* var .*kurstaki*), *Clerodendron inerme* (plant extract) and Insect Growth Regulator (Mimic) were tested during 1998 & 1999 cotton growing season in Qalubia Governorate. Thirteen predaceous and five parasitoid adult species were counted, the percentages of parasitism and the damage caused by the cotton leafworm were calculated. The tested chemical insecticides caused severest effect expressed on entomophagous insects followed by Insect Growth Regulator, while both *C. inerme* extract and Xentari were safe for beneficial insects. The lowest rate of damage caused by *S. littoralis* infestation to cotton leaves were (10.64 & 15.26%) in chemical insecticides opposed to (18.75 & 20.09 %) in control for 1998 & 1999 cotton seasons, respectively. The mentioned bioinsecticide or *C. inerme* extract may be recommended, as these materials may not cause any kind of pollution on the environment.

INTRODUCTION

The extensive use of chemical pesticides led to environmental pollution and subsequntly toxicity of both farm animals and beneficial organisms. Insect Growth Regulators display a delayed and latent toxicity against the parasite progenies (Madrid and Stewart, 1981; Zaki *et al.* 1987; Kares 1990 and Dejiu *et al.*,1992). On the other hand, bioinsecticide demonstrate a slight effect on entomophagous insect numbers Morallo Rejesus *et al.*, 1992 and Atwood *et al.*, 1997).

The plant extracts however affected on one or more parameters: feeding, growth, development, durations, repellence, moulting cycle, oviposition, enzyme activity, endocrine system and toxic activity (Mansour, 1997 and Youssef, 1998). The present work was conducted to evaluate the impact of certain recommended chemical insecticides, Insect Growth Regulator (Mimic) a bacterial preparation (Xentari) or plant extract (*C. inerme*) on the populations density of the most dominant entomophagous insects in cotton fields, the percentages of parasitism, density consequently damage loss assessments for cotton leafworm.

MATERIALS AND METHODS

An area of about ½ feddan was chosen and divided to 15 equal plots that received 4 treatments each 3 replicates 3 times and each, distributed in complete randomized block design. Each plot consistes of 20 rows each of 6 meters long and 70 cm. apart (about 84 m^2). Cotton seeds (Giza 85 variety) were sown on March 15 th 1998 and 20 th 1999. All plots received the normally recommended agricultural practices. The tested recommended chemical insecticides used for controlling the cotton leaf worm were represented by treatment (B). Treatment (C) which received three applications of *Clerodendron inerme,* for the bacterial bioinsecticide (Xentari) applications were represented by treatment (D). Plots of treatment (E) were sprayed by the insect growth regulator (Mimic). Plots of treatment (A) were left free (check) of any insecticide applications as control.

materials used:

A- Recommended chemical insecticides:

1-Curacron72 % E.C. at rate of 375 cm^3 /feddan.

2- Baythroid_5 % E.C. at rate of 375 cm^3 /feddan.

3-Larvin_37.5 % L. at rate of 250 cm^3 /feddan.

B. Bioinsecticide (Xentari) at rate of 500 grm./feddan.

C. Insect Growth Regulator (Mimic): at rate of 350 cm^3/ feddan.

D. Water suspension of *Clerodendron ine rme*: at rate of 2 kg./ feddan

All treatments were applied by means of 20 L. Knapsack sprayer using a total volume of 200 L./ feddan. Three sprays were started on July,15th and repeated at 15 day intervals.

Sampling procedure started from May, 29th and continued weekly until September, 25th 1998 and on May, 28th 1999 until September, 24th 1999. Samples were taken by 10 random double sweeping net strakes/ plot (30 strakes/ treatment). The captured insects were transported to the laboratory, for careful examination, the predators and parasitoids were identified and counted Larvae of cotton leaf worm were weekly collected from the experimental plots of each treatment. Cotton leaf worm larvae were transported to the laboratory and reared on castor-bean leaves until emergence of parasitoids. The percentages of parasitism were estimated according to the following formula:

Parasitism % = (Number of parasitized larvae ÷ Total number of collected larvae) × 100

The cumulative damage score caused by *S. littoralis* larvae was estimated for each treatment by sampling 100 cotton leaves at random. Each leaf was inspected and the crosponding score according to the category of larval damage (Kasopers, 1965), the percentage of infestation was estimated according to the following formula:

Damage score % = (Σ (n x v) ÷ ZN) ×100

P = Rate of infestation. ;n = number of leaves in each category. ;v = score of each category.

Z = Score of the highest category (5).and N = Total number of inspected leaves

The analysis of variance was estimaed and the L.S.D. values were calculated to determine the significant differences between means of treatments.

RESULTS

The field trails revealed also the presence of thirteen predaceous species belonging to five families which were identified and counted. The data in Table 1 two hemipterous, namely *Orius spp.* (mainly *albidipennis* Reut. and *laveigatus* Fieb.) [Anthocoridae]; one neuropteran, *Chrysoperla carnea* (Steph.) [Chrysopidae]; six coleopterous, *Scymnus spp.* (mainly *interruptus* Goeze and *syriacus* (Mars.), *Coccinella undecimpunctata L., Cydonia vicina* var. *nilotica* Muls. And *Cydonia vicina* var. *isis* Muls. [Coccinellidae]; and *Paederus alfierii* Kock. [Staphylinidae] ; and four dipterous, *Syrphus corollae* F., *Sphaerophoria flavicauda* Zett., *Xanthogramma aegyptium* Wiel. and *Paragus aegyptius* Macq. [Syrphidae].

The study was also conserned with five parasitic species three hymenopterous; *Microplitis rufiventris* kok., *Zele spp.* [*chlorophthalma* (Ness) and *migricornis* (Walk)] (Braconidae) , and two dipterous species*; Tachina larvarum* L. and *Periboea orbata* Wield [= *Strobliomyia aegyptia*] (Villen)(Tachinidae)

The changes in the population densities of predator species in relation to selected treatments:

Data tabulated in Tables 1 & 2 and illustrated in Fig 1-A demonstrate the changes in the seasonal activity of each of the counted predaceous insect species. It is clear that for both cotton growing seasons, *Orius spp.*adults were the most common on cotton fields, followed by ladybird beetle adults, *Paederus alfierii, Chrysoperla carnea, Scymnus spp.* and finally *Syrphid* individuals.

It was also shown that the untreated cotton plots harbored the highest numbers of total predator survivars (332.8 & 313.6) followed by, plant extract (328.3 & 307.9), bacterial bioinsecticide (325.2 & 305.5), insect growth regulator (293.3 & 272.7) and chemical insecticides (287.4 & 269.5) adults in for both 1998 and 1999 cotton growing seasons, respectively.

The changes in the population density of parasitoids populations in relation to the treatments:

The changes in the seasonal abundance of adults of different parasitoids on cotton plants of different treatments as shown in Fig. 1-B revelaed the obvious occurrence of *M. rufiventris* followed by *Zele spp.* , *T. larvarum* and *P. orbata.* The two tachinid parasitoids *T. larvarum* and *P. orbata* , were much less common than *M. rufiventris* and *Zele spp.* in this respects

As shown in Tables 3 & 4 the untreated cotton plants harbored the highest numbers of parasitoids, (97.9 & 114.5) followed by, plant extract (93.3 &111.1), bacterial bioinsecticide (92.2 & 109.0), insect growth regulator (75.3 & 95.2) and chemical insecticides (72.2 & 92.2) for 1998 and 1999 cotton growing seasons, respectively.

Levels of parasitism in different selected treatments:

The data tabulated in Table 5 for the two tested seasons of the present study reveal, that the untreated cotton harboured the highest rate of parasitism by *M. rufiventris, Chelonus inanitus, P. orbata., Zele spp.* and *T. larvarum.* The highest rate of parasitism in 1998 was 3.6 in control , followed by 3.3 % bacterial bioinsecticide, 3.2 % plant extract, 1.2 % I.G.R. and 1.0 % in chemical insecticides, while for 1999 season it was (3.0, 2.9 , 2.7, 1.4 and 1.0 %) in control, plant extract, bacterial bioinsecticide , I.G.R. and chemical insecticides, respectively.

Rate of damage due to *S. littoralis* infestation:

It is clear from data in Table 6 that the percentages of damage caused to cotton leaves by the cotton leaf worm was (18.75 & 20.09) in control, (17.37 & 19.02) in plant extract, (16.27 & 18.33) in bacterial bioinsecticide, (11.52 & 15.74) in insect growth regulator and (10.64 & 15.26) % in chemical insecticides for 1998 and 1999 cotton growing season, respectively.

DISCUSSION AND CONCLUSION

Data obtained from this investigation indicate that the bioinsecticide (Xentari) or the plant extract (*C. inerme)* demonstrates the least harmful effect on entomophagous insect populations which were significantly lower than those counted in control. The safety of bacterial bioinsectcide was studied to insect predators by Salama and Zaki (1984) and Kares (1991 a&b) and to insect parasitoid populations by , Morallo-Rejesus *et al.,* (1992), and Atwood *et al.*, (1997). On the contrary, chemical insecticidesreduced significantly, the numbers of predaceous and parasitic species than all other treatments. Similar effects were previously recorded by Shalaby *et al.*, (1986). Also, insect growth regulators display a delayed and latent toxicity on entomophagous insect populations that was recorded by Madrid and Stewart, 1981; Zaki *et al.,* 1987; and Dejiu *et al.,* 1992.

In general, it could be concedered the highest populations of predaceous insects and those of parasitoids occurred during the last week of June and early July. Accordingly, it could be recommended that however avoiding field applications of chemical insecticidal application on cotton during this period to save as far as possible the entomophagous insects from the direct harmful effect on these beneficial insects and minimizing the environmental pollution by insecticides.

Table 1. Averages in numbers of predaceous individuals as indicated by10 double strokes of sweeping net in different treatments during 1998 cotton season.

Date	Averages number of predator individuals																																					
	Coccinella undecimpunctata					*Cydonia vicina* var. Isis & nilotica					*Scymnuss* spp.					*Paederus alfierii*					*Chrysoerla carnea*					*Orius* spp					Syrphids				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
29 / 5			3.7					0.0					2.3					2.7					2.0					3.7					0.7		
5 / 6			5.3					0.0					2.7					3.7					3.7					4.7					0.7		
12 / 6			6.7					0.0					1.3					4.7					4.3					8.0					1.0		
19 / 6			6.0					0.0					2.7					8.3					1.7					13.7					1.3		
26 / 6			6.3					0.0					2.0					5.7					2.0					17.3					1.3		
3 / 7			7.3					0.0					1.7					7.0					1.7					22.3					1.7		
10 / 7			3.7					0.0					4.7					8.7					0.0					16.7					1.3		
	First treatment (15 / 7)																																					
17 / 7	2.3	1.3	2.3	2.0	1.3	0.0	0.0	0.0	0.0	0.0	4.0	1.3	3.7	3.3	1.3	9.0	7.3	8.7	8.7	7.7	0.0	0.0	0.0	0.0	0.0	6.3	2.7	6.3	6.0	3.0	0.3	0.0	0.3	0.3	0.0
24 / 7	1.3	0.3	1.0	1.0	0.7	0.0	0.0	0.0	0.0	0.0	1.7	0.3	1.7	1.7	0.7	6.7	6.0	7.0	6.7	6.3	0.0	0.0	0.0	0.0	0.0	4.0	1.3	3.7	3.7	1.3	1.0	0.3	0.7	0.7	0.7
	Second treatment (30 / 7)																																					
31 / 7	1.0	0.0	0.7	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	2.7	3.7	3.3	3.0	0.0	0.0	0.0	0.0	0.0	2.7	1.3	2.7	2.7	1.3	0.0	0.0	0.0	0.0	0.0
7 / 8	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	2.0	2.3	2.3	2.3	0.0	0.0	0.0	0.0	0.0	1.7	0.7	1.7	1.3	0.7	0.0	0.0	0.0	0.0	0.0
14 / 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.7	2.0	2.0	1.7	0.0	0.0	0.0	0.0	0.0	1.0	0.3	0.7	1.0	0.3	0.7	0.3	0.7	0.7	0.3
	Third treatment (15 / 8)																																					
21 / 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.3	3.3	3.3	1.7	2.7	1.7	2.3	2.3	1.7	0.7	0.0	0.7	0.7	0.0	1.0	0.3	1.0	0.7	0.7
28 / 8	0.0	0.0	0.0	0.0	0.0	2.7	2.3	2.3	2.3	2.0	0.0	0.0	0.0	0.0	0.0	2.0	1.7	2.0	2.0	1.7	2.0	1.0	2.0	2.0	1.0	0.3	0.0	0.3	0.0	0.0	1.7	0.3	1.7	1.7	0.3
4 / 9	1.0	0.3	1.0	1.0	0.3	6.0	4.0	5.0	5.7	4.0	0.0	0.0	0.0	0.0	0.0	1.7	1.3	1.3	1.7	1.3	3.3	2.3	3.3	3.3	2.3	0.0	0.0	0.0	0.0	0.0	1.7	1.0	0.7	1.7	1.0
11 / 9	4.7	3.3	4.3	4.7	3.7	7.0	5.7	7.0	7.0	5.7	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.7	1.0	1.0	4.7	3.7	4.3	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	1.7	0.7	0.7
18 / 9	4.0	2.3	3.7	3.3	2.7	5.3	4.3	5.6	5.6	4.6	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.7	3.7	2.7	3.7	3.7	2.7	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.7
25 / 9	2.7	1.7	2.3	2.3	1.7	5.0	4.3	4.6	4.6	4.4	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.7	0.3	0.3	3.0	2.0	3.0	3.0	2.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3
Total	56.3	48.2	45.6	46.3	49.7	26.0	20.0	25.5	25.2	20.3	23.1	19.0	22.8	22.4	19.4	73.4	66.9	73.1	72.7	68.5	34.8	28.8	34.0	33.7	29.4	103.1	92.7	102.5	101.8	93.0	16.1	11.9	15.8	15.5	12.7
Mean	3.13	2.68	3.03	3.02	2.76	1.44	1.11	1.42	1.40	1.13	1.28	1.06	1.27	1.24	1.08	4.08	3.71	4.06	4.04	3.80	1.93	1.60	1.89	1.87	1.63	5.73	5.15	5.69	5.66	5.17	0.89	0.66	0.88	0.86	0.71
L.S.D.	0.1709					0.1964					0.2265					0.1962					0.1629					0.3557					0.1395				

A= Control B= chemical insecticides C= Plant extract D= Bacterial bioinsecticide E = Insect Growth Regulator

Table 2. Monitoring the changes in the population density of predaceous adults/ 10 double strokes of sweeping in different treatments through 1999 cotton season.

Date	Averages number of predator individuals																																					
	Coccinella undecimpunctata					*Cydonia vicina* var. Isis & nilotica					*Scymnuss* spp.					*Paederus* alfierii					*Chrysoerla carnea*					*Orius* spp					Syrphids				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
28 / 5			0.7					0.0					0.7					2.3					1.0						3.0					0.3	
4 / 6			.1.3					0.0					1.0					2.7					2.3						4.3					0.7	
11 / 6			1.7					0.0					1.7					3.3					3.3						8.7					1.0	
18 / 6			2.7					0.0					1.0					6.3					1.3						14.0					1.7	
25 / 6			.5.0					0.0					1.3					5.7					2.3						17.3					1.7	
2 / 7			5.0					0.0					2.7					6.7					1.7						21.7					2.3	
9 / 7			7.7					0.0					4.3					8.3					1.3						14.3					2.0	
First treatment (15 / 7)																																						
16 / 7	4.3	3.3	4.0	3.7	3.7	0.0	0.0	0.0	0.0	0.0	2.7	0.3	2.7	2.3	0.3	9.0	7.0	8.0	7.7	7.3	0.0	0.0	0.0	0.0	0.0	7.7	3.0	6.7	7.0	3.3	1.7	0.3	1.3	1.3	0.7
23 / 7	3.7	3.0	3.3	3.0	3.0	0.0	0.0	0.0	0.0	0.0	1.3	0.7	1.3	1.3	0.7	5.7	4.7	6.3	6.7	5.3	0.0	0.0	0.0	0.0	0.0	4.3	2.3	4.3	4.3	2.7	0.7	0.3	1.0	0.7	0.3
Second treatment (30 / 7)																																						
30 / 7	3.0	2.3	3.0	2.7	2.3	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.7	0.7	0.0	2.7	2.7	3.0	3.0	2.7	0.0	0.0	0.0	0.0	0.0	2.7	1.0	2.3	2.7	1.3	0.3	0.3	0.3	0.3	0.3
6 / 8	1.7	0.3	1.7	2.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.3	2.3	2.0	1.3	0.0	0.0	0.0	0.0	0.0	1.3	0.3	1.0	1.0	0.7	0.0	0.0	0.0	0.0	0.0
13 / 8	0.7	0.0	0.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.3	2.7	2.7	2.3	0.0	0.0	0.0	0.0	0.0	1.7	0.7	1.7	1.7	0.3	0.3	0.0	0.3	0.3	0.0
Third treatment (15 / 8)																																						
20 / 8	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.7	2.3	2.0	1.3	1.7	1.0	1.7	1.7	1.3	0.7	0.3	0.7	0.7	0.3	0.7	0.0	0.3	0.3	0.0
27 / 8	0.0	0.0	0.0	0.0	0.0	4.0	1.3	3.6	2.3	1.7	0.0	0.0	0.0	0.0	0.0	1.7	1.7	1.3	1.7	1.7	2.7	2.3	2.7	2.3	2.3	0.3	0.0	0.3	0.3	0.0	0.7	0.3	0.7	0.7	0.3
3 / 9	0.7	0.3	0.7	0.7	0.3	6.0	4.0	6.0	6.0	4.3	0.0	0.0	0.0	0.0	0.0	1.3	1.3	1.3	1.3	1.3	3.3	3.3	3.3	3.3	2.7	0.0	0.0	0.0	0.0	0.0	1.0	0.3	1.0	0.7	0.3
10 / 9	4.7	4.3	4.3	4.7	4.3	7.3	6.7	7.0	7.4	7.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	4.7	3.0	4.3	4.3	3.3	0.0	0.0	0.0	0.0	0.0	0.7	0.3	0.3	0.0	0.0
17 / 9	3.7	3.0	3.7	3.3	3.3	6.0	5.3	6.4	6.3	5.3	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.7	4.3	2.7	4.0	4.0	3.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.3
24 /9	2.3	1.7	2.0	1.7	1.3	5.7	5.0	5.7	5.7	5.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.7	0.3	0.3	3.7	2.7	3.7	3.7	2.3	0.0	0.0	0.0	0.0	0.0	0.7	0.3	0.7	0.7	0.3
Total	48.9	42.3	47.1	46.6	42.6	30.3	23.3	29.7	29.0	23.3	17.4	13.7	17.4	17.0	13.7	65.3	60.0	46.9	64.4	59.5	33.6	27.8	32.9	32.5	28.1	102.0	90.9	100.3	101.0	91.9	16.1	11.8	15.6	15.0	12.2
Mean	2.72	2.35	2.62	2.59	2.37	1.68	1.24	1.65	1.61	1.29	0.97	0.76	0.97	0.94	0.76	3.63	3.33	3.61	3.58	3.31	1.87	1.54	1.83	1.81	1.56	5.67	5.05	5.57	5.61	5.11	0.89	0.66	0.87	0.83	0.68
L.S.D.	0.1629					0.2165					0.2050					0.2039					0.1747					0.3821					0.1152				

A= Control B= chemical insecticides C= Plant extract D= Bacterial bioinsecticide E = Insect Growth Regulator

Table 3. The fluctuations in the average numbers of parasitoid adults as indicated by 10 double strokes of sweeping net collected from different treatments through 1998 cotton season.

Date	Averages in numbers of parasitoid individuals																			
	Microplitis rufiventris					*Zele* spp.					*Tachina larvarum*					*Priobea orbata*				
	A	B	C	D	E		B	C	D	E	A	B	C	D	E	A	B	C	D	E
29 / 5			1.3					1.7					0.3					0.0		
5 / 6			1.7					2.0					0.7					0.7		
12 / 6			2.3					2.7					1.0					1.0		
19 / 6			3.0					3.0					1.7					1.7		
26 / 6			2.3					0.7					1.0					1.0		
3 / 7			2.0					0.3					1.3					0.3		
10 / 7			1.3					0.3					0.7					0.0		
	First treatment																			
17 / 7	0.7	0.3	0.3	0.7	0.3	0.3	0.3	0.3	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
24 / 7	1.0	0.7	0.7	0.7	0.3	1.3	0.3	0.7	1.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Second treatment																			
31 / 7	1.3	0.7	0.7	1.0	0.7	1.7	0.3	1.3	1.0	1.3	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.3	0.3	
7 / 8	1.3	0.7	1.3	0.7	0.7	3.0	1.7	2.7	2.7	2.0	0.0	0.0	0.0	0.0	0.0	0.7	0.3	1.0	1.0	0.7
14 / 8	1.7	1.0	1.7	1.3	1.3	2.7	1.3	2.3	2.3	1.0	0.7	0.0	0.3	0.7	0.3	1.0	0.7	0.7	0.7	0.7
	Third treatment																			
21 / 8	2.0	1.0	2.0	1.0	2.0	2.3	1.0	2.3	1.7	1.0	1.3	0.0	1.0	1.0	0.0	1.3	1.0	1.0	1.0	1.0
28 / 8	2.7	1.7	3.0	3.0	2.3	2.3	0.7	2.0	1.3	0.7	1.0	0.3	1.3	0.7	0.7	1.7	1.3	1.3	1.3	1.0
4 / 9	1.7	1.3	2.3	2.3	1.3	1.3	0.3	1.0	1.0	0.3	1.3	1.0	1.3	1.0	1.0	1.3	1.0	1.7	1.3	1.0
11 / 9	2.3	1.7	2.7	2.7	1.7	0.7	0.0	0.7	0.7	0.3	1.7	1.3	1.7	1.3	1.3	1.0	0.7	1.3	1.0	0.7
18 / 9	1.0	1.3	1.0	1.3	1.0	0.0	0.0	0.0	0.0	0.0	2.0	1.7	2.0	1.7	1.0	0.7	0.3	0.7	0.7	0.3
25 / 9	0.7	1.0	0.7	1.0	0.7	0.0	0.0	0.0	0.0	0.0	1.7	1.3	1.3	1.7	1.3	0.0	0.0	0.0	0.0	0.0
Total	30.3	25.3	29.9	29.6	26.2	26.0	16.3	23.7	22.8	18.0	16.4	12.4	15.6	14.8	12.3	13.1	10.0	12.7	12.0	10.1
Mean	1.68	1.41	1.66	1.64	1.46	1.44	0.91	1.32	1.27	1.0	0.91	0.68	0.87	0.82	0.68	0.73	0.56	0.71	0.67	0.56
L. S. D.	0.1846					0.1881					0.1347					0.0941				

A= Control B= chemical insecticides C= Plant extract D= Bacterial bioinsecticide E = Insect Growth Regulator

Table 4.The fluctuations in the average numbers of parasitoid adults/ 10 double strokes of sweeping net collected from different treatments through 1999 cotton season.

Date	Averages in numbers of parasitoid individuals																			
	Microplitis rufiventris					*Zele spp.*					*Tachina larvarum*					*Priobea orbata*				
	A	B	C	D	E		B	C	D	E	A	B	C	D	E	A	B	C	D	E
28 / 5			2.0					2.3					0.3					0.0		
4 / 6			2.7					2.7					0.7					0.7		
11 / 6			3.3					3.3					1.0					1.3		
18 / 6			4.3					4.0					1.3					1.7		
25 / 6			3.3					1.3					1.0					0.7		
2 / 7			3.0					0.3					0.7					0.3		
9 / 7			2.7					1.0					0.3					0.0		
	First treatment																			
16 / 7	2.7	2.0	2.3	3.0	2.7	1.7	1.3	1.7	1.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23 / 7	2.0	1.3	2.0	2.3	2.0	2.0	1.0	2.0	1.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Second treatment																			
30 / 7	2.3	1.3	2.7	2.0	1.0	2.3	1.7	2.3	2.0	1.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.0
6 / 8	3.0	1.7	3.0	1.7	1.7	3.0	1.0	2.7	2.3	1.3	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.3	0.7	0.3
13 / 8	3.3	2.3	3.0	2.7	2.3	2.7	2.3	2.3	2.7	2.3	0.3	0.0	0.3	0.3	0.0	1.0	0.3	0.7	1.0	0.7
	Third treatment																			
20 / 8	2.0	1.7	1.7	1.7	1.0	2.3	2.0	2.3	2.3	1.0	1.0	0.3	0.7	0.3	0.3	0.3	0.7	1.3	1.0	1.0
27 / 8	3.0	3.0	2.7	2.7	2.7	2.0	1.7	2.0	2.0	1.7	0.7	0.7	0.3	0.7	0.7	1.7	1.3	1.7	1.7	1.3
3 / 9	3.0	2.7	3.3	3.0	3.0	0.7	1.0	1.0	1.0	1.3	0.3	0.3	0.3	0.3	0.3	2.0	1.7	2.0	1.7	1.3
10 / 9	2.7	2.3	3.0	3.3	2.3	0.3	0.3	0.3	1.7	1.7	0.7	0.3	0.7	0.7	0.3	1.3	1.0	1.7	1.3	1.0
17 / 9	2.3	2.0	2.0	2.3	2.0	0.0	0.0	0.0	0.0	0.0	1.7	0.7	1.3	1.3	0.7	1.0	0.7	1.0	1.0	1.0
24 /9	2.0	1.3	1.7	1.3	1.7	0.0	0.0	0.0	0.0	0.0	1.3	0.3	1.3	1.0	0.3	0.0	0.0	0.0	0.0	0.0
Total	49.6	42.9	48.7	47.3	43.7	31.9	27.9	31.5	31.3	27.5	11.3	7.9	10.2	9.9	7.9	14.0	10.4	13.7	13.4	11.3
Mean	2.76	2.38	2.71	2.63	2.45	1.77	1.51	1.75	1.74	1.53	0.63	0.44	0.57	0.55	0.44	0.78	0.58	0.76	0.74	0.63
L. S. D.	0.1973					0.1822					0.1171					0.0964				

A= Control B= chemical insecticides C= Plant extract D= Bacterial bioinsecticide E = Insect Growth Regulator

Table 5. The changes in percentages of parasitized *S. littoralis* larvae collected from different treatments throughout 1998 and 1999 cotton growing seasons.

	Treatments									
	Control		Chemical insecticides		Plant extract (C. inerme)		Bioinsecticide (Xentari)		I.G.R. (Mimic)	
	1998									
No. of collected larvae	990		710		952		889		765	
Emerged parasitoids	No.	%	No.	%	No.	%	No.	%	No.	%
M. ruficventris	160	16.2	56	7.9	147	15.4	130	14.6	66	8.6
Zele spp.	18	1.8	8	1.1	17	1.8	15	1.7	9	1.2
Ch. inanitus	36	3.6	7	1.0	30	3.2	29	3.3	9	1.2
T. larvarum	15	1.5	9	1.3	13	1.4	12	1.3	10	1.3
P. orbata	27	2.7	11	1.5	25	2.6	23	2.6	14	1.8
Total	256	25.8	91	12.8	232	24.4	209	23.5	108	14.1
Mean	51.2	5.16 A	18.2	2.56 C	46.4	4.88 AB	83.6	4.70 AB	21.6	282 BC
L.S.D.	2.133									
	1999									
No. of collected larvae	1183		819		1132		1126		782	
Emerged parasitoids	No.	%	No.	%	No.	%	No.	%	No.	%
M. ruficventris	183	15.5	68	8.3	171	15.1	161	14.3	77	9.8
Zele spp.	23	1.9	10	1.2	21	1.9	20	1.8	10	1.3
Ch. inanitus	35	3.0	8	1.0	30	2.7	33	2.9	11	1.4
T. larvarum	20	1.7	9	1.1	17	1.5	16	1.4	10	1.3
P. orbata	33	29	14	1.7	28	2.5	28	2.5	15	1.9
Total	294	24.9	109	13.3	267	23.6	258	22.9	123	15.7
Mean	58.8	5.00 A	21.8	2.66 C	53.4	4.74 AB	51.6	4.58 AB	24.6	3.14 BC
L.S.D.	1.738									

Table 6. Percentages of damage caused to cotton leaves due to infestation by the *S. littoralis* larvae in different treatments throughout 1998 and 1999 cotton season.

Sampling date	Treatments				
	Control	Chemical insecticides	Plant extract C. inerme	Bioinsecticide Xentari	Insect growth regulator Mimic
June 12th 1998	0.0				
June 19th	1.3				
June 26th	2.3				
July 3rd	6.7				
July 10th	9.3				
	First treatment (15 / 7)				
July 17th	11.7	9.3	11.7	11.3	9.3
July 24th	13.0	9.3	12.7	12.3	9.3
	Second treatment (30 / 7)				
July 31st	16.7	9.3	16.3	15.7	9.7
Aug. 7th	18.7	10.3	18.3	18.0	9.7
Aug. 14th	21.3	12.7	20.0	19.7	11.7
	Third treatment (15 / 8)				
Aug. 21st	23.7	12.7	21.7	20.3	11.7
Aug. 28th	27.3	12.7	23.3	21.7	14.3
Sep. 4th	28.7	13.7	25.7	23.3	16.7
Sep. 11th	35.0	17.7	31.3	27.0	20.7
Sep. 18th	39.3	19.7	36.0	32.7	23.3
Sep. 25th	44.0	22.3	40.3	37.7	27.3
Total	300	170.3	277.9	260.3	184.3
Mean	18.75 A	10.64 B	17.37 A	16.27 A	11.52 B
L.S.D. $Treat_{.05}$	1.412				
June 11th 1999	0.0				
June 18th	2.3				
June 25th	4.0				
July2nd	6.0				
July 9th	9.3				
	First treatment (15 / 7)				
July 16th	11.3	9.3	11.3	11.3	9.3
July 23rd	16.3	11.7	15.3	14.3	10.3
	Second treatment (30 / 7)				
July 30th	19.7	15.0	17.7	17.7	15.7
Aug. 6th	21.3	15.3	19.7	19.3	16.7
Aug. 13th	23.3	18.3	21.3	21.7	18.3
	Third treatment (15 / 8)				
Aug. 20th	25.0	19.0	23.7	23.7	19.0
Aug. 27th	27.7	22.3	26.7	25.0	22.3
Sep. 3rd	31.3	24.7	30.7	28.3	25.7
Sep. 10th	35.0	27.0	33.3	31.3	29.3
Sep. 17th	42.3	29.3	39.7	35.7	30.7
Sep. 24th	46.7	30.7	43.3	43.3	32.0
Total	321.5	244.2	304.3	293.2	251.9
Mean	20.09 A	15.26 B	19.02 A	18.33 A	15.74 B
L.S.D. $Treat_{.05}$	1.638				

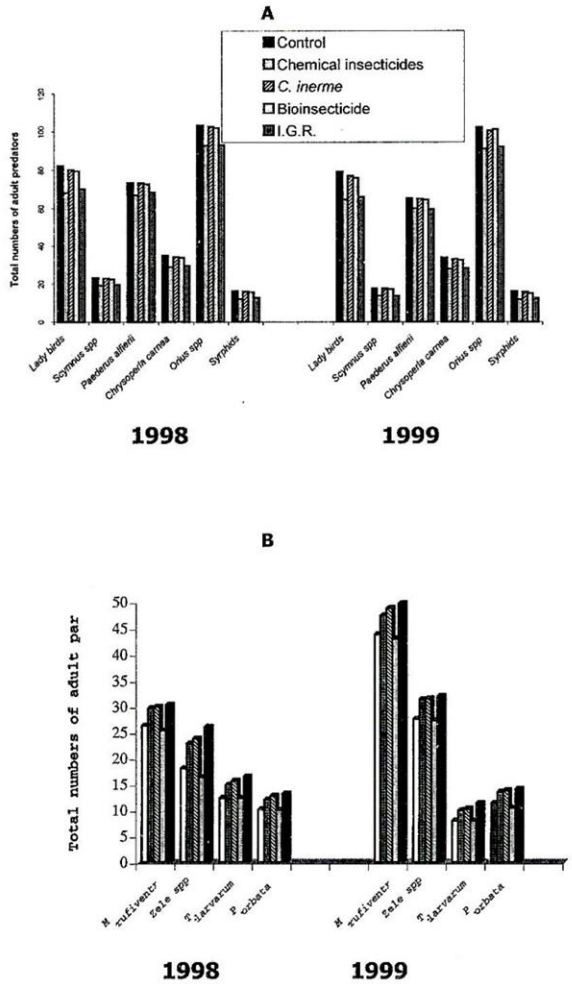

Fig 1. Total numbers of (A) predators and (B) adult parasitoids Counted from different treatments during the whole period throughout 1998 and 1999 cotton seasons

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التأثير المتزامن لبعض المبيدات الكيماوية الموصى بها والمبيدات الحية المتخصصة على التغيرات فى الكثافة العددية لدودة ورق القطن والاعداء الطبيعية المرتبطة بها فى حقول القطن

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اجريت تجربتان حقليتان فى موسمى ١٩٩٨ ، ١٩٩٩ على محصول القطن بمحطة البحث التجريبى بكلية الزراعة بمشتهر استهدفت دراسة تأثير استخدام المبيد البكتيرى (زينتارى) ومنظم النمو الحشرى ميميك والمستخلص النباتى للياسمين الزفر والمبيدات الحشرية الموصى بها على دودة ورق القطن وكذلك التأثير على الاعداء الطبيعية المرتبطة بها.

اظهرت التجارب حصر ١٣ مفترسا ، ٥ طفيليات لدودة ورق القطن وقد تم ايضا العد الاسبوعى لتعداد كل نوع حشرى مفترس او متطفل عن طريق شبكة الجمع او حساب نسب التطفل الحقلية.

اثبتت الدراسات الحقلية ايضا ان المبيدات الكيميائية اكثر ضررا يليها منظم النمو الحشرى (ميميك) كان لهما تأثيرا ضارا شديدا فى خفض تعداد الحشرات المفترسة والمتطفلة بينما كان مقدار الخفض ضعيفا جدا وغير معنوى عن المقارنة باستخدام المبيد البكتيرى (زينتارى) او المستخلص النباتى للياسمين الزفر.

اظهرت النتائج ان معدل الاصابة بدودة ورق القطن هو(١٠,٦٤ & ١٥,٢٦ %) فى معاملة المبيدات الكيمائية مقارنة ب (١٨,٧٥ & ٢٠,٩ %) فى الغيرمعامل (المقارنة) لموسمى ١٩٩٨ & ١٩٩٩ على التوالى ومع ذلك يجب التوصية باستخدام المبيد البكتيرى او المستخلص النباتى فى مكافحة دودة ورق القطن لانها لاتسبب اى نوع من تلوث البيئة كما انها لاتؤثر فى الاعداء الحيوية.