J. Agric. Sci. Mansoura Univ., 29 (10): 5925 - 5938, 2004

EFFECTS OF DIFFERENT FIELD TREATMENTS ON MAJOR INSECT PESTS ATTACKING FABA BEAN PLANTS.

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ABSTRACT

The present work was carried out to record the major insect pests attacking faba bean plants and their related predators, from the 2nd week of January to the 1st week of April, 2004, at Moshtohor region (Qalubia Governorate). In addition, the effects of each of five treatments; Mesrona oil, Castor oil, *Beauveria bassiana*, Vertemic and the chemical insecticide Confidor, were evaluated, against major insect pests (including, *Aphis craccivora* Koch., *Empoasca* spp., *Thrips tabaci* (Linn.) and *Liriomyza trifolii* (Burg.)), which were found. The obtained data revealed that, *A. craccivora* (344.82±238.33 individuals/ season), was the most abundant on this crop. While, the two predatory species *Crysoperlla carnea* (Steph.) and *Coccinella undecimpunctata* Linn. were the most abundant predators (where, the total number was 56 individuals/ season, for each of them), in faba bean field. Data also indicated that, Confidor was the most effective compound against the previous pests, followed by Vertimec, Mesrona oil, *B. bassiana* and Castor oil, respectively. This chemical insecticide induced the highest percentages of reduction in the population densities of the different key pests. Moreover, the effects of such materials were evaluated on resulted crop yield; including green and dry pods, seeds protein contents and finally, the quantity of crop yield. Accordingly, using alternative insecticides such as mineral oils, plant oil seeds, bioinsecticides containing the fungus *B. bassiana* and natural insecticides containing Abamectin, may be recommended when planning and promoting I.P.M. programs against major pests of faba bean plants, as contributing materials containing a degree of safety for man and his surrounding environment.

Keywords: Faba bean, Pests, Piercing sucking insects, *Liriomyza trifolii*, Predators, Control.

INTRODUCTION

In Egypt, the continuous need to increase the national food supply, especially that contains high protein contents, is a challenge of agricultural scientists. Faba bean plants (*Vicia faba*), is one of the most important economic winter leguminous field crops, that people prefer it as a source of protein (Metwally *et al.*, 1997). In the field, faba bean plants are subjected to attack by several insect pests, affecting the quantity of the yield and also quality of resulted crop seeds. Piercing sucking insects are important economic pests, which cause severe injury by their direct feeding as well as acting as vectors of important faba bean viruses (Rizkalla *et al.*, 1994). Moreover, the leafminer *Liriomyza trifolii* (Burg.), represents a harmful and widespread species on faba bean plants allover the country. Its larvae mine between tissues and consequently reducing photosynthesis capacity, resulting in getting considerable yield loss (Abd El-Rahman, 2003). Many authors supported the using of safe alternative control methods such as natural enemies (Eid, 1998 and Ahmed *et al.*, 2001).

Recently, there is a great interest in the use of microbial control, where the utilization of microbial agents is increasingly developed and encouraged (El-Khawas and Abd El-Gawad, 2002). The entomopathogenic fungi, *Beauveria bassiana* represented one of these beneficial control agents (Mansour, 1999). As, many investigators obtained good results by using many commercial bioinsecticides containing this fungus, against major piercing sucking insect pests (Abd El – Salam, 2000; Negam and El – Sayed, 2000; Rizk, 2001 and El – Khawas *et al.*, 2003).

Therefore, field studies were carried out, aiming to evaluate the effects of five different materials including; the fungus *B. bassiana* , an oil of a plant seeds (Castor oil), a mineral oil (Mesrona oil), a natural insecticide (Vertimec) and a chemical insecticide (Confidor), against major piercing sucking insect pests (*Aphis craccivora* Koch., *Empoasca* spp. and *Thrips tabaci* Linn.) and also against the leafminer *Liriomyza trifolii* (Burg.), attacking faba bean plants. Their effects on the associated predatory species were also involved. At the same time, other insect pests found in faba bean field, were surveyed during the period from the 3rd week of January until the 1st week of April, 2004. Moreover, the effects of these five previous materials on the mean weights of resulted faba bean pods and seeds and percentages of seeds protein contents , were evaluated.

MATERIAL AND METHODS

Field experiments were carried out at the experimental farm of the Faculty of Agriculture at Moshtohor, Qalubia Governorate, during the period from the 2nd week of December, 2003 to the 1st week of April, 2004. Broad bean variety "Masr 1", was used. Sowing of seeds was conducted on December 13th, 2003, while harvesting of this crop took place after 155 days from planting. An area of about 1/8 feddan (525 m^2), was chosen and divided into 24 equal plots, and arranged in randomized complete blocks. These plots were specified for 6 treatments with 4 replicates, including the untreated control. The experimental unit plot measured (20 m^2). All the usual cultural practices were followed during the experiments.

The following five materials were applied in order to find out their efficacy against major piercing sucking insects (*Aphis craccivora*, *Empoasca* spp. and *Thripis. tabaci*), and also against the leafminer *Liriomyza Trifolii*, according to the infestation levels of the recorded pests in the present study.

a- Entomopathogenic fungi *Beauveria bassiana* of 33×10^7 c. f. u / 1ml. It was applied at a rate of 6.0 liters / feddan.

b-Castor oil(30%), a natural oil extracted from castor seeds. It was applied at a rate of 0.6 liter / feddan, which was dissolved in 4 liters / feddan of the organic solvent, triethylamine .

c-Mesrona 85% EC, a local commercial mineral oil, formulated as an emulsifiable concentrate. It was applied at a rate of 10.0 liters / feddan.

d-Vertimec 1.8% EC, a natural commercial acaricide product, contains the effective material Abamectin, which is produced in nature by certain organisms that live in the soil. It was applied at a rate of 1.0 liter / feddan.

e- Confidor 20% SL, a chemical insecticide that was applied at a rate of 1.0 liter / feddan.

I-Treatments:

The different treatments tested were applied by a 20 L- knapsack sprayer. They were applied twice, at 6 weeks intervals, starting at 44 days after sowing (the two dates of spraying of these materials were January 28th, 2004 and March 17th, 2004), where the numbers of the target pests, were adequate for control purpose. The untreated check didn't receive any treatments except water.

The effects of the different treatments against major piercing sucking insect pests, were estimated as mean numbers / 8 plants and also as percentages of reduction at indicated days after treatment. The sampling period extended for 12 weeks, started from the third week of January until the first week of April, 2004. Weekly counts, for *A. craccivora*, *Empoasca* spp., *T. tabaci* (adults and nymphs), on both surfaces of the leaves of faba bean plants, were made. The mean numbers of alive *L. trifolii* larvae / 30 leaflets were also counted for each treatment. At the same time, the effects of such materials on the common predatory species found associated with the major insect pests on this crop, were also determined.

II- Effects on resulted faba bean crop yield:

The effects of different treatments on the mean numbers of resulted green pods for each faba bean plant and the mean weights of 25 pods / replicate, were calculated. The effects of the different tested materials on mean numbers of dry pods and seeds / faba bean plant were recorded. Moreover, the effects of spraying these different compounds on resulted bean seeds (mean weights of resulted seeds and also the percentages of protein contents of these seeds, were evaluated. After harvesting, hundred seeds from each treatment were weighed and compared with the same number from the untreated control. Each group was replicated 4 times. Besides , the resulted total yield from different treatments were estimated transformed to represent the yield / feddan.

However, data were subjected to analysis of variance (ANOVA) and the means were compared by L.S.D. test at 0.05 levels, according to the technique described by Snedecor (1970).

RESULTS AND DISCUSSION

I- Major pests attacking faba bean plants:

The following pests were the most abundant insect species recorded during the survey period of study; *Aphis craccivora*, *Empoasca* spp., *Thrips tabaci* and *Liriomyza trifolii*. So, in this study, the control by different materials was applied against these major pests.

Data in Table (1) indicated that, the population of *A. craccivora* started to appear on faba bean plants after 33 days from planting. After that, they continued to appear until 114 days. The maximum total number of *A. craccivora* adults and nymphs (769 individuals / 8 plants), was recorded at the first week of March, 2004. While, the lowest total number of *A. craccivora*

(26 individuals / 8 plants), was recorded at the third week of January, 2004. The infestation of faba bean plants by the previous species was mentioned by many authors (Abou-Elhagag& Salman, 2001; Sallam, 2001/2002 and Katayana& Suzuki, 2003).

The jassids, *Empoasca* spp., were observed after 33 days from planting. Their populations increased gradually, then fluctuated up and down until reaching the end of the season after 114 days. The maximum total number of *Empoasca* spp. (adults and nymphs) per 8 plants was 24 individuals, which was recorded during the 1st and last weeks of March, 2004. While, the lowest total number of *Empoasca* spp. (one individual / 8 plants), was recorded at the last week of February, 2004 (Table, 1). Similar to the previous findings, these species were reported attacking faba bean by Helal *et al.* (1996); Metwally *et al.* (1997) and Abou-Elhagag& salman (2001).

Data showing the infestation period by *T. tabaci* revealed that, this piercing sucking insect pest was found on faba bean plants after33 days from planting. Its population continued to appear until the end of the season, after 114 days. The maximum total number of *T. tabaci* individuals / 8 plants (48 adults and nymphs), was recorded in the 1st week of February, 2004. While, the lowest total number of *T. tabaci* (3 individuals / 8 plants), was recorded at the first week of April, 2004 (Table, 1). The attack of faba bean plants by *T. tabaci* was reported before by Shibao and Tanaka (2003).

Table (1): Total numbers of the main insect pests attacking faba bean plants during season, 2004, at Qalubia Governorate.

Sampling dates	Mean of piercing insect pests / 8 plants				Mean no. of *L trifolii* larvae/ 30/leaflets
	A. craccivora	*Empoasca* spp.	*T. tabaci*	Total	
24/1/2004	26	10	13	49	76.50
4/2	181	2	48	231	61.80
11/2	723	3	8	734	37.50
18/2	354	2	9	365	30.00
25/2	373	1	15	389	26.40
3/3	769	24	10	803	35.90
10/3	302	9	9	320	37.50
17/3	345	18	19	382	43.80
24/3	181	19	8	208	70.50
31/	464	24	11	499	81.90
7/4	75	17	3	95	29.40
Total no. of individuals	3793	129	153	4075	
Mean total no. of individuals	344.82 ± 238.33 (26-769)	11.73 ± 9.01 (1-24)	13.91 ± 12.05 (3-48)	370.46± 237.46 (49-803)	48.79 ± 20.44 (26.40-81.90)

As for the leafminer *L. trifolii*, the infestation of plant leaves was recorded after 33 days from planting. This infestation continued up to the end of the season after 114 days (at the 1st week of April, 2004). The highest

mean number of alive pest larvae that infested faba bean/ 30 leaflets (81.90 larvae), was recorded at the last week of March, 2004. While, the lowest mean total number of *L. trifolii* 30 leaflets (26.50 larvae), was recorded at the last week of February, 2004 (Table, 1) Similarly, the infestation of faba bean plants by *L. trifolii* was shown by El-Khouly *et al.* (1997); Eid (1998) and Abd El- Rahman (2003).

II- Common recorded predatory species:

Field observations concerning the most common predatory species associated with the major insect pest species (attacking faba bean plants), are shown in Table (2). Six predators were observed and recorded during the period from the 2nd week of January until the 1st week of April, 2004. These predatory species belong to 4 orders of 5 families. The highest total number of these predatory species / 8 plants (28 individuals), was recorded in the 1st week of March. Only one true spider was found during the 3rd week of February.

The two predators; *Coccinella undecimpunctata* (adults, pupae, larvae and eggs) and *Chrysoperla carnea* (eggs , larvae and adults) were the highest in their numbers per season (56 individuals for each predatory species), among other observed predatory species on the studied field crop. Their percentages of occurrence were 39.16 and 39.16 %, comparing with the other recorded predatory species (either adults or developmental stages). The maximum total numbers of these two predatory species were 21 and 10 individuals, which were recorded during the first and third weeks of March, 2004, respectively. Many authors indicated the occurrence of these two predators such as, Sharama and Yadov (1994); Eid (1998) and Abou – Elhagag and Salman (2001). However, their existence on faba bean plants may be related to the occurrence of major piercing sucking pests especially *A. craccivora* and also related with the leafminer *L. trifolii* (Table, 1).

Regarding the occurrence of the remaining predatory species; *Orius* spp. (adults and nymphs) were only observed on faba bean plants during the 1st week of February and from 1st week of March until the 1st week of April, 2004 (where, the total number of these predators / season was 26 individuals). Only one individual of *Paederus alfierii* (one adult) was found during the 2nd week of March. Also, one individual of *Scymnus* sp. (one larva) was recorded during the last week of February, 2004. While, two *Syrphus* sp. (one adult and one larva) individuals were recorded during the 1st and the last weeks of March. Our results are in agreement with findings of Gonzalez – Zamora *et al.* (1994); Wojciechowicz – Zyto (2000) and Abou-Elhagag and Salman (2001).

In general, from Tables (1) and (2), it could be mentioned that the predatory species occurrence was synchronized with that of the major piercing sucking insect pests and the leafminer *L. trifolii*, recorded during this study.

Table (2): Total numbers of predatory species associated with the main insect pests infesting faba bean plants, during season, 2004, at Qalubia Governorate.

Sampling dates	Total no. predatory species	Total no. of each predatory species						
		C. carnea	*C. undecimpunctata*	*Orius* sp.	*Scymnus* sp.	*Syrphus* sp.	*P. alfierii*	True spiders
24/1/2004	0	0	0	0	0	0	0	0
4/2	1	0	0	1	0	0	0	0
11/2	3	3	0	0	0	0	0	0
18/2	6	5	0	0	0	0	0	1
25/2	3	2	0	0	1	0	0	0
3/3	28	5	21	1	0	1	0	0
10/3	10	7	2	1	0	0	1	0
17/3	24	9	7	8	0	0	0	0
24/3	25	10	7	8	0	0	0	0
31/3	18	7	7	3	0	1	0	0
7/4	25	8	12	5	0	0	0	0
Total	143	56	56	26	1	2	1	1
Mean total numbers	13.00± 11.09 (0-28)	5.09± 3.48 (0-10)	5.09 ± 6.72 (0-21)	2.36 ± 3.20 (0-8)	0.09 ± 0.30 (0-1)	0.18 ± 0.41 (0-1)	0.09 ± 0.30 (0-1)	0.09 ± 0.30 (0-1)
% occurrence of predatory species	100.00%	39.16%	39.16%	18.18%	0.70%	1.40%	0.70%	0.70%

III- Effects of different treatments on major pests attacking faba bean:

Data represented in Table (3) showed that, the mean percentages of reduction in the numbers of *A. craccivora* in relation to untreated control were; 80.99, 65.81, 87.98, 88.43 and 98.76%, for *B. bassiana*, Castor oil, Mesrona oil, Vertimec and Confidor, respectively. Obtained results showed that, the treatment with the chemical insecticide Confidor had the highest effects on *A.craccivora* (adults and nymphs), followed by Vertimec, Mesrona oil and *B. bassiana*, respectively. The treatment with Castor oil showed the lowest effect on the population of *A. craccivora*. Statistical analysis of data indicated significant differences in the mean total numbers of aphids between the untreated control and the other five treatments. While, difference between Mesrona oil and Vertimec treatments was insignificant, but significant differences were found between these two treatments among all other three treatments (Table, 3). These results are in agreement with those of Metwally *et al.* (1994); Abd El-Salam (2000) and El-Khawas *et al.* (2003). treatments among all other three treatments (Table, 3). These results are in agreement with those of Metwally *et al.* (1994); Abd El-Salam (2000) and El-Khawas *et al.* (2003).

The mean percentages of reduction of *Empoasca* spp. (adults and nymphs than control were; 51.16, 38.76, 45.74, 58.14 and 70.54 %, for *B. bassiana*, Castor oil, Mesrona oil, Vertimec and Confidor, respectively. Statistical analysis of data showed significant differences in the mean total numbers of *Empoasca* spp. individuals between the untreated control and all other treatments. Besides, significant differences were also found between the efficacies of different treatments. These findings are similar to those previously shown by El-Khawas *et al.* (2003).

The mean percentages of reduction of *T. Tabaci* (adults and nymphs) than control were; 40.52, 41.83, 47.71, 76.47 and 78.43%, for *B. bassiana*, Castor oil, Mesrona oil, Vertimec and Confidor, respectively. Statistical analysis of of the present data cleared significant differences in the mean total numbers of *T. tabaci* individuals between the untreated control and all other treatments tested. Besides, significant differences were found between all treatments (Table, 3). Similar findings were shown by Hsu and Quarles (1995); Liutashiu (1997) Abd El-Aziz (2001/2002).

The mean percentages of reduction of *L. trifolii* were 28.85, 28.66, 29.34, 71.43 and 76.23 % for *B. bassiana*, Castor oil, Mesrona oil, Vertimec and Confidor, respectively (Table, 3). Statistical analysis of data revealed significant differences in mean total numbers of *L.trifolii* larvae between the untreated control and all remaining treatments. The same results were indicated by Omar and Faris (2000).

In general, all tested materials, had shown different effects on the mean numbers of major sap sucking insect pests and also on the leafminer *L. trifolii,* attacking faba bean plants. This effects related directly to the main components of each tested material. Highly effects were obtained by using both Confidor and Vertimec treatments against *A. craccivora, Empoasca* spp., *T. tabaci* and *L. trifolii.* Besides, considerable effects were also detected by using *B. bassiana*, Castor oil and Mesrona oil against *A. craccivora*.

Table (3): Mean total counts / season of *A. craccivora*, *Empoasca* spp., *T. tabaci* (adults and nymphs), *L. trifolii* (larvae) and reduction percentages after using the different treatments on faba bean plants, at Qalubia Governorate.

Treatments	*A. craccivora*		*Empoasca* spp.		*L. trifolii*		*T. tabaci*	
	Mean no. of individuals	% of reduction	Mean no. of individuals	% of reduction	Mean no. of larvae	% of reduction	Mean no. of individuals	% of reduction
B. bassiana	65.55±57.34 (C)	80.99 (D)	5.73±5.82 (D)	51.16 (C)	34.36±18.64 (C)	28.85 (C)	8.27±13.35 (B)	40.52 (E)
Castor oil	117.91±95.45 (B)	65.81 (E)	7.18±6.74 (B)	38.76 (E)	34.45±18.26 (C)	28.66 (C)	8.09±10.51 (C)	41.83 (D)
Mesrona oil	41.45±23.14 (D)	87.98 (C)	6.36±6.83 (C)	45.74 (D)	43.12±20.31 (B)	29.34 (D)	7.27±5.82 (D)	47.71 (C)
Vertimec	39.91±49.09 (D)	88.43 (B)	4.91±4.50 (E)	58.14 (B)	13.94±22.84 (D)	71.43 (B)	3.27±3.93 (E)	76.47 (B)
Confidor	4.27±7.66 (E)	98.76 (A)	3.45±3.88 (F)	70.54 (A)	11.48±22.29 (E)	76.23 (A)	3.00±4.02 (F)	78.43 (A)
Untreated control	344.82±238.33(A)		11.73±9.01(A)		48.29±20.44 (A)		13.91±12.05(A)	
F- value	29940.58		26529.76		29586.53		28969.82	
L. S. D $_{0.05}$	2.27		0.06		0.28		0.07	

: Note: means with the same letter are not significantly different.

These three previous treatments were less effective on *Empoasca* spp. and *T. tabaci* individuals, while those had slight effects on larvae of *L. trifolii.* Moreover, the present study showed that, Mesrona oil and/ or Vertimec can be firstly used and followed by low rates of the chemical insecticide Confidor; for getting more effective control. Also, *B. bassiana* may be firstly used in the field against the three previous pests followed by low rate of the chemical insecticide, in order to decrease the environmental pollution. The time and methods of application of such compounds depends greatly on the economic increase in *A. craccivora, Empoasca* spp. , *T. tabaci* and *L. trifolii* populations.

IV-Effects of treatments on the associated common predatory species:

The mean percentages of reduction in the numbers of the common predatory species were; 58.74, 41.26, 59.44, 55.94 and 81.12 %, for *B. bassiana*, Castor oil, Mesrona oil, Vertimec and Confidor , respectively (Table, 4). Obtained results showed harmful effects of the chemical insecticide Confidor on the common predatory species found associated with the major insect pests on faba bean plants. While, Vertimec, Castor oil, Mesrona oil and *B. bassiana* were harmful on these beneficial species, indicating the possibility of using such materials in the control strategies performed against major pests attacking faba bean plants. From these results it was also found that, Castor oil had the lowest harmful effect on these beneficial predatory species. Statistical analysis of data showed significant differences in the mean total numbers of common predatory species between the untreated control and all other treatments. Significant differences were also detected between different treatments in the mean numbers of common predatory species and also in the mean percentages of reduction of these predatory species (Table, 4). Thase result are in agreement with those of Eid (1998) and Rizk (2001)

Table (4): Mean total numbers of predatory species observed associated with major faba bean pests and percentages of their reduction, after using the different treatments, at QalubiaGovernorate.

Treatments	Means no. of predatory species / 8 plants		% of reduction in their populations	
B. bassiana	5.36±4.57	(D)	58.74	(C)
Castor oil	7.64±6.50	(B)	41.26	(E)
Mesrona oil	5.27±5.62	(E)	59.44	(B)
Vertimec	5.73±6.39	(C)	55.94	(D)
Confidor	2.45±1.81	(F)	81.12	(A)
Untreated control	13.00±11.09	(A)		
F- value	27333.99			
L. S. $D_{0.05}$	0.07			

Note: means with the same letter are not significantly different.

V- Effects of treatments on the crop yield:

As showin Table (5), the obtained results indicated that, the tested materials caused increases in the mean numbers of green pods, their mean

weights and also the mean numbers of seeds in the green pods. Confidor treatment showed the highest effects, followed by Vertimec. While, Castor oil treatment showed the lowest effect among the other tested treatments.

Table (5): Effects of the different treatments used on mean numbers of green pods, mean weights of green pods and mean numbers of green seeds.

Treatments	Mean no. of green pods / plant	Mean weight of 25 green pods (gm)	Mean no. of green seeds / one green pod
B. bassiana	49.00±5.38 (C)	189.76±12.89 (C)	2.98±0.13 (B)
Castor oil	40.75±11.62(E)	185.34±17.21(D)	2.97±0.08(C)
Mesrona oil	43.25±11.93(D)	190.07±11.00 (C)	2.98±0.15 (B)
Vertimec	60.50±33.31(B)	207.72±34.57(B)	3.02±0.27 (A)
Confidor	67.00±19.92(A)	216.25±21.99(A)	3.02±0.25 (A)
Untreated control	34.75±14.29(F)	147.70±24.43(E)	2.80±0.20 (D)
F- value	30331.46	30268.68	99999.99
L. S. D. $_{0.05}$	0.22	0.43	0.001

Note: means with same letter are not significantly different.

Data represented in Table (6) showed that, the treatments including *B. bassiana*, Castor oil, Mesrona oil, Vertemic and Confidor, had increased the mean numbers of dry pods per plant, the mean numbers of dry seeds per plant, the mean weight of dry seeds per five plants and the mean weight of 100 dry seeds. Confidor treatment showed the highest effects followed by Vertimec, while Castor oil treatment showed the lowest effect.

An increase of crop yield of faba bean seeds was obtained by using all the treatments, comparing with the untreated control. The treatments with Confidor gave the highest crop yield, followed by Vertimec treatment (Table, 7). Similar findings were shown by Omar and Faris (2000).

Table (6): Effects of the different treatments used on mean numbers of dry pods, dry seeds and mean weights of seeds.

Treatments	Mean no. of dry pods/ plant	Mean no. of dry seeds / plant	Mean weights of dry seeds / 5 plants	Mean weights (gm.) / 100 dry seeds
B. bassiana	16.20±2.56 (D)	37.90±8.29 (D)	114.64±19.87 (C)	67.41±6.95 (D)
Castor oil	16.00±1.63()	37.75±4.69 (E)	109.26±15.68 (D)	62.66±6.48 (E)
Mesrona oil	16.75±1.89 (C)	38.45±3.04 (C)	126.89±17.42 (F)	69.77±3.83 (B)
Vertimec	18.50±1.98 (B)	45.45±6.68 (B)	142.29±27.76 (B)	68.34±3.08 (C)
Confidor	18.85±1.14 (A)	47.00±3.82 (A)	155.14±25.62 (A)	72.05±7.25 (A)
Untreated control	14.90±4.21 (F)	33.55±10.37 (F)	93.51±19.34 (E)	61.98±8.44 (F)
F- value	28561.92	32502.87	30176.77	31250.43
L. S. D. $_{0.05}$	0.03	0.09	0.82	0.07

Note:means with the same letter are not significantly different.

Table (7): Effects of the different treatments used on the resultant crop yield / feddan (Ardab) and also on the percentages of protein in resulted seeds crop.

Treatments	Total weights of crop yield / feddan (Ardab)		% of protein in resulted seeds	
B. bassiana	13.37(1925.28kg)	(D)	30.90	(B)
Castor oil	12.75(1836.00kg)	(E)	30.16	(C)
Mesrona oil	14.80(2131.20kg)	(C)	28.24	(F)
Vertimec	16.60(2390.40kg)	(B)	28.27	(E)
Confidor	18.10(2606.40kg)	(A)	30.12	(D)
Untreated control	10.91(1571.04kg)	(F)	31.92	(A)
F- value	29282.27			
L. S. D. $_{0.05}$	0.05			

Note: means with the same letter are not significantly different.

As a conclusion, these tested materials could be used against the insect pests attacking faba bean plants and considered as alternative control measures, that could be used to minimize the harmful effects on the environment.

ACKNOWLEDGEMENT

The authors wish to express their profound gratitude and deep thanks to Prof. Dr. Mostafa S.I El- Dakroury, for his continuous kind advices and support, to carry out this work.

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تأثير معاملات حقلية مختلفة على الآفات الحشرية الرئيسية المهاجمة لنباتات الفول البلدى وتقدير نسب البروتين للحبوب الناتجة بعد تلك المعاملات.

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هدفت هذه الدراسة إلى حصر الآفات الرئيسية التي تهاجم نباتات الفول البلدي و كذلك المفترسات المصاحبة، خلال الفترة من الأسبوع الثالث من يناير و حتى الأسبوع الأول من أبريل سنة ٢٠٠٤، في محافظة القليوبية. و بالإضافة لذلك، فإنه قد تم تقدير التأثير لخمسة معاملات مختلفة تشمل زيت خروع، زيت مصرونا، فطر البيوفاريا، مبيد الفيرتيمك ومبيد كيماوي كونفيدور، وذلك على الحشرات المستهدفة [من الفول (*Aphis craccivora*)، الجاسيدات (*Empoasca* spp.) ، التربس (*Thrips tabaci*) و صانعة أنفاق أوراق الفول (*Liriomyza trifolii*)] وهى الآفات الأكثر تواجداً خلال تلك الفترة السابقة.

أظهرت النتائج المتحصل عليها أن المن (٣٤٤,٨٢±٢٣٨,٣٣ فرداً/ للموسم)، هو الآفة الأكثر تواجداً على المحصول، بينما كان المفترسين أسد المن (*Chrysoperla carnea*) و أبو العيد ١١ نقطة (*Coccinella undicempunctata*) (٥٦ فرداً لكل منهما / موسم) هما الأكثر تواجداً بين أنواع المفترسات الأخرى.

تبين من النتائج أن المبيد الكيماوي كونفيدور كان أكثر المواد المستخدمة تأثيراً يليه المبيد فيرتيمك، زيت مصرونا، فطر البيوفيريا ثم زيت الخروع، على الترتيب على الحشرات المستهدفة بالدراسة. وقد أحدث المبيد الكيماوي التأثير الاعلى في خفض تعداد الأنواع المختلفة من تلك الحشرات.

و تناولت الدراسة أيضاً تقدير استخدام تلك المواد على المحصول الناتج من حيث القرون الخضراء و الجافة و البذور الناتجة لكلا النوعين من تلك القرون و كذلك التأثير على المحتوى البروتيني للبذور وأيضا التقدير الكمي للمحصول الناتج بعد الجمع.

و على ذلك، استنتاجا من هذه الدراسة ، فإنه يمكن أن يوصى باستخدام المواد البديلة للمبيدات الكيماوية مثل الزيوت المعدنية و زيت بذور بعض النباتات ، كذلك استخدام المبيدات التي تحتوي على الفطر بيوفيريا و المبيدات التي تحتوي على مادة أبامكتين و ذلك لمكافحة الآفات الرئيسية الهامة التي تهاجم محصول الفول البلدي في مصر ، ضمن منظومة برامج المكافحة المتكاملة للآفات، و ذلك تدعيما لصحة الإنسان و سلامته و حفاظاً على البيئة من التلوث.