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SURVEY, POPULATION FLUCTUATION AND BIOLOGICAL CONTROL OF SOME PESTS INFESTING CERTAIN VEGETABLE CROPS

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ABSTRACT

Owing to the importance of the Egyptian leek, *Allium ampeloprasum L., Dill, Anethum graveolens* L. and parsely, *petroselinum crispum* (Mill.) as an important part of medicinal properties and fresh eating. Therefore, the present work was carried out to study the survey, population fluctuation of injured pests and some related climatic factors (temperature and relative humidity) and control the dominant species of pests by *Beauveria bassiana*. The obtained results cleared that, the three tested plants infested with *Aphis gossypii*, *Myzus persica*, *Liriomyza trifolii*, *Tetranychus telarius* and *Thrips tabaci*. The population of *T. tabaci* recorded high individuals on the three tested plants during the two successive seasons. The two climatic factors proved to have no significant effect on the population density of *T. tabaci* nymph on the three tested plants during the two successive seasons. The effect of *Beauveria bassiana*, illustrated that percent reduction were increasing gradually by time from 3rd to 10th day, whereas biofly liquid solution was more effect formulation than biover w. p. against *T. tabaci* nymph on the two tested plants *A. ampeloprasum* and *A. graveolens* during the two successive seasons.

INTRODUCTION

The Egyptian leek, *Allium ampeloprasum L.,Dill, Anethum graveolens* L. and parsely, *petroselinum crispum* (Mill.) belonging two families (Alliaceae and Apiaceae). These vegetable plants used in industrial medicine drugs whereas have medicinal properties and used as fresh eating. The previous plants were infested with some insects such as *Heliothis armigera* (Judal and Upadhyay 1989), *Thrips flavus* (Schr.) (Sagar 1986). Also some pollinating insects such as *Apis mellifera*, Visitor the previous plants in flowering phase (Ricciardelli and Albore 1986). From the forming, it is important to avoid the use of chemical insecticides on tested plants whereas caused delayed residues on foliage. The foliage contains oils, which increase the stability of insecticides stability plus the environmental pollution and also affect the natural enemies, so that the used of bio insecticides are preference.

There for the present study aimed to

1- Survey the pest species infesting the three tested plants and estimate the population fluctuation of the injured pests.
2- Evaluation of two *Beauveria bassiana* formulation against the more economic important and the most predominant pest on their hosts.

MATERIALS AND METHODS

The experiments were carried out in station of Horticulture Research Institute, Kaha, Qualiobia Governorate during two successive seasons (2004, 2005) and (2005, 2006). In case of (2004, 2005) seasons the seedling beginning from7th October to 7th April while the seedling in (2005, 2006) seasons beginning from 1st October and continue till 30 March.

1- Survey of pests and population fluctuation of injured pests

An experimental area of about 504 m. ^{2} was choice to be cultivated by Egyptian leek (*A. ampeloprasum L.),* Dill*(A. graveolens* L.) and Parsely (*P. crispum* (Mill.)). All area was divided into 12 plots each of 42 m^2 in order to survey of pests; all plots were kept free of any insecticide treatments. The experiments were conducted in completely randomized blooks design with four replicates each of 42 m^2 for each plant species . Samples were collected randomly for each tested plants at weekly intervals (9 inspections). The samples were transferred to the laboratory in the same day for inspection by the binocular microscope.

2- Evaluation of two formulation of *Beauveria bassiana* against Thrips tabaci on *A*. ***ampeloprasum*** **and *A. graveolens***

Area of about 1008 m^2. was chosen and divided into 24 plots (each of 42m^2) including control were planted with the three tested plants. The tested formulations of *B. bassiana* and their rates per feddan were used as follow:

A - Bio-fly liquid (active ingredient *B. bassiana* 100% w.w. 30x10^6 live cell/cm) at a rate of 100cm/ 100 liter water was supplied by El-Naser Bio-insecticides and fertilizer company, El- Sadat, Egypt.

B - Biover wettable powder (active ingredient *B. bassiana* 32x10^6 viabk spores /mg. 10%) at a rate of 150 gm. /100 liter water was supplied by bio-insecticide production unit, Plant Protection Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt. When the pests in the chosen plant species were sprayed two times in the two successive seasons. The first and second spray occurred on 15 and 25 March 2005 &2006, respectively by Kanabsac sprayer. Mean temperature and relative humidity during experimental period were (24.6 ºC, 10.0 ºC and 52.4% R.H.) for the first and second seasons, respectively.

Random samples of 40 leaves and plants from *A. ampeloprasum* and *A. graveolens*, respectively, was collected and transfered to laboratory to inspect, before spraying and after 3, 5, and 10 days of treatment. Percent reduction in pest populations were calculated according to Henderson and Tilton (1955).

RESULTS AND DISCUSSION

These study comprise the identify of certain pests infesting various vegetable crops caltivated in Kaha Research Station, Qualiobia Governorate. Moreover, some ecological aspects such as population dynamics and incidence were investigated. Also, biological control instruments for the prevalent pest species on the heavily infested hosts were evaluated.

1- Survey and distribution

An extensive survey was carried out on insect pests infesting different vegetable crops. Data presented in Table 1 (a and b) indicated the occurrence of *Aphis gossypii* and *Myzus persica* on *Allium ampeloprasum* through the period of 7th March to 21st March, *Liriomyza trifolii* on *Petroselinum*, from 18th February to 14th March, *Tetranychus telarius* on *A. ampeloprasum* and *P. crispum* from (7th March to 7th April)and 7th March, respectively, while *Thrips tabaci* was occurred on *A. ampeloprasum*, *A. graveolens* and *P. crispum* during the periods from (18th February to 28th March), (18th February to 7th April) and (7th March to 21st March) respectively, during the first season.

Concerning the second season, it is clear that *Liriomyza trifolii* was occurred on *Petroselinum crispum* from (7th March to 21st March) while *T. telarius* was found on *A. ampeloprasum* from (25th February to 28th March) and on *P. crispum* from 7th March. In respect of *T. tabaci*, it was occurred on *A. ampeloprasum*, *A. graveolens* and *P. crispum* at the periods from (18th February to 28th March), (18th February to 28th March) and (25th February to 21st March), respectively.

In conclusion, the occurrence periods of these pests on the three tested plants during first& second can be illustrated as follows. *A. gossypii* and *M. persica* were occurred from 25th February to 21st March in the first season, while at second season the period extended from 25 February to 7th April. The period of occurrence of *L. trifolii* extended from 18th February to 14th March and 7th March to 21st March during 2005& 2006, respectively. *T. telarius* was presence from 7th, 14th, March to 7th April during the first and second seasons, respectively. In case of *T. tabaci*, the occurrence period on the tsted plants extended from 18th February to 28th March and 18th February to 28th March during the first and second seasons, respectively.

From the aforementioned results, it could be concluded that *T. tabaci* was the most abundance pest infesting the three tested crops.

2- Population density

Data in Table1(a and b) showed that *T. tabaci* had the upper hand in population density on the three tested plants than the other pests.

Data illustrated in Table 1(a and b) revealed that the highest average numbers (14.22 and 8.277) nymph/ 10 leaves were recorded on *A. graveolens* during the period from (18th February to 28th March). While the lowest values of (1.28 and 0.722) were recorded on *P. crispum* during the period from (7th March to 21st March) and (25th February to 21st March) during the two tested seasons, respectively.

Regarding the population density of the rest of pests, the recorded mean numbers (nymph/ 10 leaves) in disending order were 1.166, 0.277 and 0.111 for *T. telarius*, *A. gossypii* and *M. persica* on *A. ampeloprosum* plants during the period from (7th March to 7th April) and (7th March to 21st March), respectively. Except *T. tabaci* insects no pest infestations were recorded on *A. groveolens*, while average of 0.611 and 0.055 nymph/ 10 leaves of *L. trifolii* and *T. telorius* on *P. crispum* were recorded through the period from 18th February to 14th March and 7th March, respectively. In contrast average number of 0.333 and 0.611 nymph/ 10 leaves were recorded of *L. trifolii* and *T. telarius* on *P. crispum* and *T. telarius* only, respectively.

T1

3- Population fluctuation of the dominant pest, *Thrips tabaci* lind. on the three tested plants(*A. ampeloprasum*, *A. graveolens* and *P. crispum*) and the effect of some environmental factors.

Data in Table (2) indicated the importance of *T. tabaci* as a pest infested the three tested plants in the field during the two successive tested seasons. The population density of *T. tabaci* varied during the months of each season on the three tested plants. The numbers of the collected insects were reached their maximum during March on the three tested plants during the two plantation seasons. The population density of *T. tabaci* in the second season was lower than that of the first season. The dissimilarities in the population are *related to unpredictable reason(S), although they have similar patterns and trends.*

Table (2): Mean number of *Thrips tabac*i Lind. nymph per 10 leaves on *Allium ampeloprasum* and per 10 plants on *Anethum graveolens* and *Petroselinum crispum* during two successive seasons.

Sampling date	First season (2004/2005)			Second season (2005/2006)		
	Mean No. of thrips /10 leaves	Mean No. of thrips /10 plants		Mean No. of thrips /10 leaves	Mean No. of thrips /10 plants	
	A. ampeloprasum	*A. graveolens*	*P. crispum*	*A. ampeloprasum*	*A. graveolens*	*P. crispum*
Feb. 4	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0
18	4.0	0.0	0.0	2.67	0.67	0.0
25	9.67	28.9	0.0	5.00	18.0	1.33
March 7	23.0	24.0	3.0	11.67	12.33	1.33
14	11.0	20.67	3.33	5.67	11.67	1.33
21	19.0	12.67	1.33	10.00	6.33	0.33
28	10.67	0.0	0.0	5.00	1.33	0.0
April 7	0.0	0.0	0.0	0.0	0.0	0.0
Total	77.34	85.34	7.66	40.01	50.33	4.32
Mean/Season	8.59	9.48	0.85	4.45	5.59	0.48
L.S.D. (0.05)	**5.13**			**2.88**		

Data also revealed that thrips often prefer *A. graveolens* in the two plantation seasons. The pattern of population fluctuation of *T. tabaci* was increased suddenly to reach it's population maximum and recorded (28.0 & 18.0 individual/leaves) at 25 Feb. at the two successive seasons (2005&2006), followed by gradually decreasing unitl 21 March. The period of activity of *T. tabaci* on *A. ampeloprasum* was extended from 25Feb. to 21 March. The infestation with *T. tabaci* nymph on *A. ampeloprasum* increased successively up to 7 March, as the highest peak was observed during the first and second seasons (23.0 and 11.67 nymph/leaves), respectively. Another peak(19.0 and 10.0 nymph/leaves) was occurred at 21 March and then decreased until the end of the season, while in case of *P. crispum* one peak was observed at 14 March during the two tested seasons (3.33 and 1.33 nymph/plants),respectively, and then decreased until the end of the season. The obtained data indicated that the dominant pest during the period of study is *T. tabaci*. Sagar (1986), Theunissen and Legutowska (1991) and Richter et al. (1999) mentioned that *Thrips tabaci* Lind. Is the most serious pest of onion, leek and cabbage in central Europe. In spite of the differences in climatic factors between Egypt and central Europe, but *T.tabaci* is the dominant pests in leek. Hence the chemical component of leek considered the important element to attract. *T. tabaci.* Also we can add that, presence of common component in onion, leek and cabbage to attract *T. tabaci.*

Table (3) clear the correlation between the population fluctuation of thrips and some weather factors during the two seasons (2004/2005) and (2005/2006).

The results indicated that, in the first season, the Maximum temperature affected significantly the population of thrips in case *of Allium ampeloprasum* plants. The r value were 0.57, while minimum temperature had significant effect in case of *Anethum graveolens* (r value= 0.67). But the three considered climatic factors affected insignificantly the population of thrips on *Petroselinum crispum*.

During the second season, the maximum temperature and relative humidity had significant effect on the population of thrips on *A. ampeloprasum* and *A. graveolens*, r value were (0.41 and 0.45), respectively. While the other factors showed insignificant effect on the population of thrips on the three tested plants.

Table (3): Sample

T3

4 -Evaluation of two formulations of *Beauveria bassiana* against *Thrips tabaci* lind. on *Allium ampeloprasum* and *Anethum graveolens*.

The results in tables 4&5 clearly indicated that the tested compounds varied in their efficiency against thrips and infestation (mean number) with thrips decreased as a result of treatments and as increasing period after treatments up to 10 days.

T4-5

Data in Table(4) proved that Biofly was the most effective against *T. tabaci* nymph during the first and second seasons, except in 3rd day the biover gave higher % reduction than biofly (40.45 &33.50) and (35.90 & 18.70)% during the first and second seasons, respectively, indicating remarkable residual action of biofly.

The population of *T. tabaci* nymph infesting *A. ampeloprasum* decresed gradually post-treatment, which reduction% increasing gradually till 10th day post- treatment. The accumulation effect (mean number and mean %reduction at 5th and 10th day after treatment) of biofly produced 93.80 and 76.40 % reduction followed by biover produced 86.85 and 74.70 % reduction during first and second seasons, respectively.

Results indicated that there are significant differences between treatments in accumulation effect during the first season, but there are insignificant differences between treatments during the second season.

The results in Table (5) had the same trend in previous table where proved that biofly was more effective than biover against *T. tabaci* nymph on *A. Graveolens* during the first and second seasons. The two formulation of *B. bassiana* had significant differences in accumulation effect during the first and second seasons. Finally , The effect of *B. bassiana* on the population of *T. tabaci* nymph infesting the two tested plants during the first season were higher than the effect during second season, this could be attributed to degree of temperature and relative humidity which significantly reduced fungal germination rotes Sun et al.(2003). The result gained in this study are in harmony with those obtained by El-Zoghby(2003) who found that, *B. bassiana* $1X10^{6}$ conidia/ml decreased the bug population, *Nezara viridula* L. by 23% after 25 days. Geden and Steinkraus(2003) found that the granular formulation provided the greatest degree of suppression (60-90%) 0f beetle larvae of lesser meal worm and hide beetle, when used three formulations E.C., ground corn granular and waste product of fungal *Beauveria bassiana.* Dhembare and siddique (2004) showed that the increase in spore intensities increased mortality and the maximum reduction was observed after 72 hour post-treatment by *Beauveria bassiana* against gram pod borer *Helicoverpa armigera*.

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الحصر والتذبذب العددي والمكافحة البيولوجية لبعض الأفات التى تصيب محاصيل الخضر

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معهد بحث وقاية النباتات – الدقى – الجيزة – مصر.

نظراً لاهمية الكرات المصرى والشبت والبقدونس كجزء هام من نباتات الخضر التى تستخدم فى العقاقير الطبية وتؤكل طازجة استهدفت الدراسة حصر الأات الحشرية ودراسة ديناميكية عشائر هذه الأفات وأوضحت النتائج المتحصل عليها أن هذه النباتات تصاب بالأفات التالية:من القطن ومن الخوخ وصانعات أنفاق ورق الفول والعنكبوت الأحمر وتربس القطن .وقد سجل تربس القطن أعلى تعداد متبوعاً بالعنكبوت الأحمر ومن القطن وصانعات أنفاق ورق الفول وأخيراً من الخوخ .واثبتت الدراسة أن نبات الشبت كان أكثر إصابة يلية الكرات المصرى ثم البقدونس . وكان تربس القطن موجود على الأنواع الثلاثة حيث سجل قمتين على الشبت والكراتوقمو واحدة على البقدونس .وكان لدرجات الحرارة العظمى والصغرى والرطوبة النسبية تأثيراً غير معنوياً على حشرة تربس القطن على الثلاث نباتات خلال عامى الدراسة.

وأوضحت النتائج أن المكافحة باستخدام نوعين من تجهيزة فطر البيوفاريا باسيانا ضد تربس القطن الذى يصيب الشبت والكرات خلال موسمى الدراسة أن تجهيزة البيوفلاى كانت أكثر تأثيراً عن تجهيزة البوفر ضد حشرة التربس

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Table (1): Survey and relative susceptibility of pests attacking Egyptian leek, *Allium ampeloprasum, Dill, Anethum graveolens*, and Parsely, *Petroselinum crispum* at Kaha region, Qualubia Governorate, during two successive seasons.

a) First season (2004/2005)

Pests	*Allium ampeloprasum*			*Anethum graveolens*			*Petroselinum crispum*			L.S. D 0.05
	Occurrence period	Mean No. /sample	Site of occurrence	Occurrence period	Mean No. /sample	Site of occurrence	Occurrence period	Mean No. /sample	Site of occurrence	
Aphis gossypii	7/3 – 21/3	0.277 a	leaves	-	0.0 b	-	-	0.0 b	-	0.159
Myzus persica	7/3 – 21/3	0.111 a	leaves	-	0.0 b	-	-	0.0 b	-	0.130
Liriomyza trifolii	-	0.0 b	-	-	0.0 b	-	18/2 – 14/3	0.611 a	Leaflets	0.469
Tetranychus telarius	7/3 – 7/4	1.166 a	leaves	-	0.0 b	-	7/3	0.055 b	Leaflets	0.528
Thrips tabaci	18/2– 28/3	12.89 a	leaves	18/2 – 7/4	14.22 a	Leaves & stem	7/3 – 21/3	1.28 b	Leaflets	4.418

b) Second season (2005/2006)

Pests	*Allium ampeloprasum*			*Anethum graveolens*			*Petroselinum crispum*			L.S.D 0.05
	Occurrence period	Mean No. /sample	Site of occurrence	Occurrence period	Mean No. /sample	Site of occurrence	Occurrence period	Mean No. /sample	Site of occurrence	
Aphis gossypii	0.0	0.0	0.0	0.0	0.0 b	0.0	0.0	0.0	0.0	-
Myzus persica	0.0	0.0	0.0	0.0	0.0 b	0.0	0.0	0.0	0.0	-
Liromyza trifolii	0.0	0.0 b	0.0	0.0	0.0 b	0.0	7/3 – 21/3	0.333 a	Leaflets	0.130
Tetranychus telarius	25/2–28/3	0.611 a	leaves	0.0	0.0 b	0.0	7/3	0.0 b	0.0	0.260
Thrips tabaci	18/2–28/3	6.666 a	leaves	18/2–28/3	8.277a	Leaves & stem	25/2–21/3	0.722 b	Leaflets	2.228

Table (4): Efficiency of two formulations of *Beauveria bassiana* against *Thirps tabaci* Lind. nymph infesting *Allium ampeloprasum* during two successive seasons

Treatments	Mean No. of thrips/10 leaves and reduction %																	
	First season (2004/ 2005)									Second season (2005/2006)								
	Pre-treat.	Post- treat.								Pre-treat.	Post- treat.						Accumulation	
		3 days		5 days		10 days		accumulation			3 days		5 days		10 days			
	Mean	Mean	%	Mean	%	Mean	%	Mean	%	Mean	Mean	%	Mean	%	Mean	%	Mean	%
Biofly	67.00	19.00	72.50a	6.66	91.85 a	5.33	95.1 a	93.77	93.47 a	11.66	10.66	22.18b	8.0	46.20 a	1.5	96.04 a	4.75	71.12 a
Biover	39.66	10.66	73.90 a	8.66	82.00 b	6.33	90.2 b	7.50	86.10 b	29.33	26.00	27.40a	23.5	37.17 b	10.0	89.15 b	17.75	63.16 b
Control	10.66	11.00		13.00		17.33		15.33		13.33	15.60	---	17.0	--	43.33	---	30.16	--
L.S.D. (0.05)	---		2.26		2.26		2.26		2.26			2.26		2.26		2.26		2.26

Accumulation = Mean number and reduction % from 5th to 10th days after treatment

Table (5): Efficiency of two formulations of *Beauveria bassiana* against *Thirps tabaci* Lind. nymph infesting *Anethum graveolens* during two successive seasons.

Treat.	Mean No. of thrips /10 leaves and reduction %																	
	First season (2004/ 2005)									Second season (2005/2006)								
	Pre-treat.	Post- treat.								Pre-treat.	Post- treat.						Accumulation	
		3 days		5 days		10 days		accumulation			3 days		5 days		10 days			
	Mean	Mean	%	Mean	%	Mean	%	Mean	%	Mean	Mean	%	Mean	%	Mean	%	Mean	%
Biofly	31.00	28.66	33.50 b	26.33	75.60 a	20.00	85.70 a	21.16	80.65 a	20.00	17.66	18.70 b	15.33	50.20 a	8.00	77.40a	11.66	63.80a
Biover	22.33	19.33	40.45a	36.66	52.80 b	26.33	73.90 b	31.50	63.35 b	26.33	18.33	35.90 a	22.00	45.70b	11.66	75.00b	16.83	60.35b
Control	15.33	21.33	--	53.33	--	69.33		61.33		69.33	75.33	--	106.6		122.6	--	114.6	
L.S.D. (0.05)	-------		2.27		2.26		2.26		2.26			2.26		2.26		2.26		2.26

Accumulation = Mean number and reduction % from 5 th to 10 th days after treatment