

SURVEY AND POPULATION FLUCTUATIONS OF PARASITIDS OF THE GREEN PEACH APHID, *MYZUS PERSICAE* (SÜLZER) ATTACKING SQUASH PLANTATIONS AND ADVERSE EFFECTS OF INSECTICIDE APPLICATIONS ON IT

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Abstract

The current study was carried out at both laboratory and experimental farm of Sakha Agric. Res. Station, Kafr El-Sheikh Governorate during two successive seasons 2003/2004 and 2004/2005 (summer, nili and winter Plantations), to survey and investigate population fluctuations of parasitoids of the green peach aphid, *Myzus persicae* (Sülzer) attacking squash (*Cucurbita pepo* L.) plantation. Also, adverse effects of insecticidal applications on parasitoid populations were considered. Three solitary hymenopterous parasitoids were detected, i.e. *Diaretella rapae* McIntosh, *Aphidius matricariae* Haliday and *Aphidius colemani* Viereck. Percentage of parasitism by *D. rapae* was higher than those of *A. matricaria* and *A. colemani*. In the summer squash plantation, the parasitism by the first parasitoid ranged 8.80-6.57%, the second parasitoid 1.06-1.35% and the third one ranged 0.73-0.72%, respectively. Corresponding values of nili plantation were 7.29-7.31, 0.82-0.65% and 0.42-0.44%. In winter plantation, parasitism by *D. rapae* greatly exceeded those of *A. matricariae* and *A. colemani*; 12.18-3.30%, 3.21-1.65% and 1.28-1.65%, respectively. Population fluctuation of total parasitism in untreated plots of summer plantation ranged 4.39-18.80 and 2.65-17.00 in 2003 and 2004 seasons, respectively. The corresponding values in treated plots were 1.13-13.42 and 3.23-26.67%. In nili plantation, total parasitism was the lowest on September and the highest during November and December. In winter plantation, parasitism in 2004, was relatively low during the last week of January and second week of March but high during the second week of February. In 2005, the lowest values were obtained on early January and by mid-February, while the parasitoids were totally absent at last week of February and second week of March. It was found that spraying squash plantation by Marshal (200 g/100 L of water) negatively affected the parasitoid population. They were reduced by 34.66, 37.75 and 47.81% in summer, nili and winter plantations, respectively in 2003/2004 season. The corresponding reduction values in 2004/2005 were 13.79, 16.67 and 31.68%. Accordingly, insecticides should be avoided, or wisely applied.

Key words: *Cucurbita pepo*, *Myzus persica*, parasitoids, population fluctuations, adverse effect of insecticides.

INTRODUCTION

Vegetables are very important crops, particularly they have rich minerals and vitamins, which are needed for human nutrition. Cucurbits are commonly planted in Egypt all the year round, where squash is an important crop of them.

Climatic conditions that are favourable for cultivating squash during three plantations (summer, nili and winter) help the insects to reproduce and build up population. Accordingly, squash plantations are subjected to numerous insect infestations, mainly homopterous insects. These pests, with their piercing-sucking mouth parts impair squash plants directly by sapping plant juices, and indirectly by transmitting viral diseases (Abdel-Kareim, 1980; El-Zohairy *et al.*, 1989; Afsah, 1993 and Kassem, 1996). Whiteflies, aphids and jassids are the most insect species encountered from squash plantations (Nor El-Din, 1984, El-Gindy, 1997 and Kassem, 2002).

Aphids are the most important pest insects in the agriculture of the temperature climatic zones (Minks and Harrewija, 1987). Aphids may damage a crop directly through feeding on the phloem, indirectly through the production of honeydew which covers the leaves and fruits, and, most importantly, through the transmission of viruses (Straub and Boothroyd 1980 and Hegab *et al.*, 1985 & 1988).

Important aphid species that transmit vegetable virus diseases are *Aphis gossypii* and *M. persicae* (Van Steenis, 1995). *M. persicae* and *A. gossypii* attack a wide range of host plants (Guenauoui and Chaabane, 1991; Hurni and Städler, 1993) and have a high rate of reproduction. Parasitoids of the genus *Aphidius* have been used against these aphids more or less successfully for more than 20 years (Polgar, 1987 and Shijko, 1989). All members of the genus *Aphidius* only parasitize species of aphids; they are solitary, endophagous parasitoids (Viggiani, 1984). These beneficials, above all *A. matricariae* and *A. colemani* are mass produced by different companies in Europe and North America (Fernandez and Nentwing, 1997). The biological control remains a very essential component in insect pest management. This is specially recommended in vegetable plantations, because crops are most likely used as fresh food or after simple cooking. Natural enemies of aphids have been applied on a large scale and growers consider it a more reliable method than chemical control. The positive spinoff is reduced environmental pollution, a healthier

work environment for growers and appreciation of residue-poor or free products by consumers. It is anticipated that biological control of aphid pests with aphelinid parasitoids will strongly increase in the near future (Van Steenis, 1995). This work was conducted, therefore to survey parasitoids of the green peach aphid, *M. persicae* attacking squash plantation, studying population fluctuations, and adverse effects of insecticide applications on it.

MATERIALS AND METHODS

The present investigation was carried out at both of laboratory and the experimental farm of Sakha Agric. Res. Station, Kafr El-Sheikh Governorate for two successive years, 2003/2004 and 2004/2005. Field experiments were carried out during the three squash plantations, summer, nili and winter. All normal cultural practices were followed as recommended except insecticidal applications. Weekly sample of 10 squash leaves infested with *M. persicae* individuals were picked up, put in paper bag and transferred to the laboratory for detecting parasitoids, and monitoring their population fluctuations. Portions of leaves having aphid individuals were counted and kept into petri dishes provided with cotton piece saturated by water for the emergence of parasitoids. The petri dishes were daily observed, and the formed aphid mummies were collected, counted and kept into vials till the emergence of adult parasitoids. The emerging parasitoids were mounted on glass slides using Hoyer's medium. Parasitoids specimens were identified in the Biological Control Research Department, Plant Protection Research Institute, Giza, Egypt. In addition, percentage of parasitism was calculated by dividing number of emerging parasitoids by number of aphid. The population fluctuation of parasitism was assigned throughout the study period.

During the period of study, the squash plantations were usually sprayed by Marshal 25% WP to control aphids and whiteflies. So, the effect of such spray on parasitoid populations was considered. Samples of squash leaves treated and untreated with the abovementioned insecticide were collected to find out percentages of parasitism. A comparison was held between the two samples to find out the adverse effect of such chemical spray on parasitism.

RESULTS AND DISCUSSION

1. Survey of parasitoids

Samples of squash leaves infested with *M. persicae* were collected from summer, nili and winter plantations to find out whether this insect pest is parasitized or not. The survey was carried out for two successive years, 2003/2004 and 2004/2005 at Kafr El-Sheikh region. Only three parasitoids have emerged from aphid *M. persicae* throughout the whole period of study. The three hymenopterous parasitoids encountered are: *Diaretiella rapae* McIntosh, *Aphidius matricariae* Haliday and *Aphidius colemani* Viereck, both of them are internal parasitoids. Horn (1988), in USA surveyed *D. rapae* as a parasitoid of *Brevicoryne brassicae* and *M. persicae*. Neuenschwander *et al.* (1989), in North America reported that *M. persicae* was parasitized by *A. matricariae* and *A. colemani* Reed *et al.* (1995) in USA found that *D. rapae* is a parasitoid of several aphid species, including *M. persicae* and *B. brassicae* infesting squash and cabbage respectively. Fernandez and Nentwing (1997) in Switzerland, used the aphid parasitoid, *A. colemani* in greenhouse to control *M. persicae* and *A. gossypii*. Megahed (2000) in Egypt, surveyed *D. rapae*, *A. matricariae* and *A. colemani* as parasitoids on *M. persicae* and *A. gossypii* on squash and weeds.

2. Population fluctuations of parasitoids under investigations

Data in Tables (1, 2 and 3) declared population fluctuations and percentage of parasitism of the three parasitoids, *D. rapae*, *A. matricariae* and *A. colemani* in summer, nili and winter squash plantations. In addition, parasitism status of the three parasitoids on *M. persicae* was compared in the squash plants, treated and untreated with a conventional insecticide. Parasitism of *M. persicae* by *D. rapae* was relatively higher than *A. matricariae* and *A. colemani* in both years of study. These results are in agreement with that obtained by Horn (1984), who found that *D. rapae* was the predominant species parasitizing the green peach aphid, *M. persicae*, while parasitism by *Aphidius* spp. was largely limited. Also obtained results are in agreement with that obtained by Megahed (2000), who studied the relative abundance of *D. rapae*, *A. matricariae* and *A. colemani* attacking *M. persicae*. He reported that *D. rapae* was the most abundant species, where recorded 29.02% of the total surveyed parasitoids on economic plants followed by *A. matricariae* (9.10%) and *A. colemani* (8.81%).

Summer squash plantation

In 2003, parasitism by *D. rapae* was 8.80% compared to 1.06% and 0.73% by the another two parasitoids. The corresponding values in 2004 season were lower; 6.57, 1.35 and 0.42%, respectively (Table 1). Parasitism by *D. rapae* in 2003 was relatively higher during fourth week of April (16.24%) and reached its lowest value by the second week of June (3.76%). The same trend was attained in case of *A. matricariae* and *A. colemani*. The total parasitism (sum of *D. rapae*, *A. matricariae* and *A. colemani*) was 15.94 and 18.80% during first and end week of April, but decreased during the second week of June to reach a bottom of 4.39%. In 2004 summer squash season, the highest total parasitism was recorded in samples of *M. persicae* examined on third week of April (17.00%) followed by total parasitism on last week of June (14.16%). The lowest values of total parasitism were those in *M. persicae* collected on 4 May (2.65%) and 18 May (3.79%). McLeod (1989), in USA, noticed that the high density of *M. persicae* may have been related to low parasitoids, *Aphidius* spp. activity. In April and May the percentae of parasitism was high when aphid population was decreased and accordingly the parasitoids were active in controlling a good portion of this low population. Ibraheem (1993), recorded percentage of parasitized aphid, *M. persicae* on potato plants during April with a percentage of 16.66%. In case of pepper, the highest percentage was recorded at early July (38.46%). The lowest percentage of parasitized aphid was recorded on egg plant 27.95%.

Treating squash plantation with Marshal 25% W.P. to control dominant homopterous insect pests negatively affected the percentage of parasitism of the considered parasitoids (Table 1). In 2003 parasitism by *D. rapae* was reduced from 8.80 in untreated plantation to 5.38% in treated one. The same situation was found in case of *A. matricariae* and *A. colemani*, as the parasitism was 1.06 and 0.73 decreased to 1.03 and 0.51% in the untreated and treated summer squash plantations, respectively. The total parasitism resulting from three parasitoids decreased from 10.59% in the untreated squash plantation to 6.92% in the treated one. Thus, it could be reported that insecticidal treatment eliminated more than 34% of parasitoid populations. In 2004, the total parasitism resulting from the three parasitoids decreased from 8.37 in the untreated squash plantation to 7.19% in the treated one.

Nili squash plantation:

Percentage of *M. persicae* parasitized by *D. rapae*, *A. matricariae* and *A. colemani* during nili plantation is presented in Table (2). Percentage of parasitism by *D. rapae* in 2003 figured 7.29% while that of *A. matricariae* and *A. colemani* figured lower, 0.82 and 0.42%, respectively. Results of 2004 were almost the same, 7.31, 0.65 and 0.44% for the first, second and the third one, respectively.

Also, total parasitism of both years was similar (8.53 and 8.40%), respectively. Total parasitism percentage (*D. rapae*, *A. matricariae* and *A. colemani* altogether) in 2003 fluctuated in narrow range (5.87-9.24%) throughout sampling dates of nili plantation, but exhibited a considerable increase (13.48%) when sampled on 19 November. In 2004, the highest total parasitism was detected on 8 December (12.93%), while the lowest was on 29 September (6.29). Total parasitism in other sampling dates ranged between 6.50% (on 13 October) and 11.20% (on 24 November). The effect of insecticidal treatment was also investigated. In general, it could be reported that Marshal insecticide applied to squash plantation has almost diminished *D. rapae*, *A. matricariae* and *A. colemani* particularly in the former year. In 2003, only 15 individuals (2.57% parasitism) were detected from the first parasitoid, and 8 individuals (1.37% parasitism) were detected from the second and third one throughout the investigation period in nili plantation. In 2004 the corresponding numbers of the three parasitoids were 26, 11 and 4 individuals (4.44, 1.88 and 0.68% parasitism, respectively). To express the highly toxic effect of the applied insecticide in terms of figures, total parasitism sharply decreased through 2003 from 8.53% in the untreated filed to 5.31% in the treated ones. In 2004, the parasitism was reduced from 8.40% in the untreated filed to 7.00% in treated ones.

Winter squash plantation

Parasitism status on *M. persicae*, during winter plantation, is presented in Table (3). It was clear that very few numbers of the three parasitoids were recorded on that plantation, which means that the activity of these parasitoids, are greatly reduced by low temperature prevailing during winter. Total parasitism of *M. persicae* by *D. rapae* was 12.18% during 2004 and 3.30% in 2005. The parasitoid was completely disappeared from the second week of February in 2004 and by the last week of January in 2005 to the end of winter season. Megahed (2005), noticed the emergence of *D. rapae* during the months, January, August, September and December. While, the emergence of *A. matricaria* noticed during January, July and

August and the emergence of *A. colemani* was noticed during January, February, August, September and December.

As detected with both summer and nili plantations, total parasitism of the three parasitoids was greatly reduced by the application of the insecticide. Through 2004 total parasitism was figured 16.67% in the untreated squash plots, but it was only 8.70% in the treated one. The same trend was obtained in 2005, as the parasitism was 6.66% and 4.55% in the untreated and treated plots, respectively.

To reveal the effect of insecticide application (Marshal 25% WP, at a rate of 200 g/100 liter of water) on both *M. persicae* and its parasitoids, obtained data were summarized in Table (4).

During summer plantation of the first year of study, it was evident that, insecticide application removed 68.22% of the insect pest population, and 34.66% of the parasitoid population. However, in the nili plantation, the insecticide effectiveness on the pest potentiality was most profound by 89.82% reduction compared to 37.75% reduction in the parasitoid population. The corresponding values of winter plantation were 85.26 and 47.81%.

During the next year of study, the reduction in the parasitoid populations ranged between 13.79% in summer plantation and 31.68% in winter one. As an overall average, for plantations, pest populations were reduced by 81.10 and 87.95% in the first and second years, respectively. On the other hand, parasitoid populations were reduced by 40.07 and 20.71% in both years, respectively. These values explain the more negative impact of the insecticide against the parasitoids compared to that against the pest. When we consider the fast recovery for *M. persicae* population due to high reproductive capacity because of parthenogenesis phenomenon, insecticidal application should be avoided or wisely applied on squash plantation. Until now, pests have been controlled through the use of pesticides. However, problems with residues, chemical resistances and low development rates of new pesticides have increased the demand for alternatives (Bigler, 1993; Hurni and Stadler, 1993). The increasing use of insecticides is main factor causing hazards to man and his domestic animals and deleterious effects to the natural balance (El-Dafrawi *et al.*, 2003).

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Table (1): Fluctuations of hymenopterous parasitoid species emerged from aphid, *M. persicae* in treated and untreated summer squash plantation.

Sampling date	Untreated								Treated									
	<i>M. persicae</i>		<i>D. rapae</i>		<i>A. matricariae</i>		<i>A. colemani</i>		T. P.	<i>M. persicae</i>		<i>D. rapae</i>		<i>A. matricariae</i>		<i>A. colemani</i>		T.P.
	No.	%	No.	%	No.	%	No.	%		%	No.	%	No.	%	No.	%	%	
2003																		
April	69	9	13.04	2	2.90	0	0.00	15.94	32	1	1.13	0	0.00	0	0.00	0	0.00	1.13
	85	5	5.88	2	2.35	0	0.00	8.23	57	0	0.00	1	1.75	0	0.00	0	0.00	1.75
	117	19	16.24	0	0.00	3	2.56	18.80	72	3	4.17	0	0.00	0	0.00	0	0.00	4.17
May	210	21	10.00	1	0.48	5	2.38	12.86	56	2	3.57	0	0.00	2	3.57	7.14		
	427	42	9.84	6	1.41	1	0.23	11.48	82	8	9.76	3	3.66	0	0.00	13.42		
June	319	12	3.76	2	0.63	0	0.00	4.39	91	8	8.79	0	0.00	0	0.00	8.79		
Total	1227	108		13		9			390	21		4		2				
Overall parasitism %			8.80		1.06		0.73	10.59			5.38		1.03		0.51	6.92		
2004																		
April	100	10	10.00	6	6.00	1	1.00	17.00	20	1	5.00	0	0.00	0	0.00	5.00		
May	189	3	1.59	0	0.00	2	1.06	2.65	15	0	0.00	0	0.00	1	6.97	6.67		
	226	17	7.52	3	1.33	0	0.00	8.85	27	1	3.70	1	3.70	0	0.00	7.40		
June	317	9	2.84	3	0.95	0	0.00	3.79	59	3	5.08	0	0.00	0	0.00	5.08		
	229	25	10.92	2	0.87	0	0.00	11.79	31	1	3.23	0	0.00	0	0.00	3.23		
	127	14	11.02	2	1.57	2	1.57	14.16	15	2	13.33	1	6.67	1	6.67	26.67		
Total	1188	78		16		5			167	8		2		2				
Overall parasitism %			6.57		1.356		0.42	8.34			4.79		1.20		1.20	7.19		

T. P. = Total Parasitism

Table (2): Fluctuation of hymenopterous parasitoid species emerged from aphid, *M. persicae* in treated and untreated nili squash plantation.

Sampling date	Untreated								Treated									
	<i>M. persicae</i>		<i>D. rapae</i>		<i>A. matricariae</i>		<i>A. colemani</i>		T. P.	<i>M. persicae</i>		<i>D. rapae</i>		<i>A. matricariae</i>		<i>A. colemani</i>		T.P
	No.	%	No.	%	No.	%	No.	%		%	No.	%	No.	%	No.	%	%	
2003																		
Sept.	750	29	3.87	10	1.33	5	0.67	5.87	112	2	1.79	1	0.89	0	0.00	2.68		
	927	42	4.53	12	1.29	5	0.54	6.36	122	5	4.10	2	1.64	0	0.00	5.74		
Oct.	1115	92	8.25	9	0.81	2	0.18	9.24	140	5	3.57	2	1.43	0	0.00	5.00		
	1320	86	6.52	9	0.68	9	0.68	7.88	85	2	2.35	1	1.18	3	3.53	7.06		
Nov.	910	77	8.46	5	0.55	1	0.11	9.12	72	1	1.39	0	0.00	4	5.56	6.95		
	712	92	12.92	2	0.28	2	0.28	13.48	53	0	0.00	2	3.77	1	1.89	5.66		
Total	5734	418		47		24			584	15		8		8				
Overall parasitism %			7.29		0.82		0.42	8.53			2.57		1.37		1.37	5.31		
2004																		
Sept.	810	40	4.94	7	0.86	4	0.49	6.29	121	7	5.83	1	0.83	1	0.83	7.49		
Oct.	985	65	5.69	2	0.20	6	0.61	6.50	119	4	3.36	2	1.68	0	0.00	5.04		
	1320	70	5.30	7	0.53	9	0.68	6.51	127	6	4.72	1	0.79	0	0.00	5.51		
Nov.	1000	70	7.00	9	0.90	3	0.30	8.20	82	2	2.44	3	3.66	2	2.44	8.54		
	920	92	10.00	9	0.98	2	0.22	11.20	77	5	6.49	2	2.60	0	0.00	5.09		
Dec.	820	100	12.20	4	0.49	2	0.24	12.93	60	2	3.33	2	3.33	1	1.67	8.33		
Total	5855	428		38		26			586	26		11		4				
Overall parasitism %			7.31		0.65		0.44	8.40			4.44		1.88		0.68	7.00		

T. P. = Total Parasitism

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 APHID, *MYZUS PERSICAE* (SÜLZER) ATTACKING SQUASH PLANTATIONS AND
 ADVERSE EFFECTS OF INSECTICIDE APPLICATIONS ON IT

Table (3): Fluctuation of hymenopterous parasitoid species emerged from aphid, *M. persicae* in treated and untreated winter squash plantation.

Sampling date	Untreated							Treated												
	<i>M. persicae</i>			<i>D. rapae</i>		<i>A. matricariae</i>		<i>A. colemani</i>		T. P.		<i>M. persicae</i>			<i>D. rapae</i>		<i>A. matricariae</i>		<i>A. colemani</i>	
	No.	No.	%	No.	%	No.	%	No.	%	No.	No.	%	No.	No.	%	No.	%	No.	%	
2004																				
Jan.	52	7	13.46	2	3.85	1	1.92	19.23	10	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00	10.00
	42	3	7.14	2	4.76	1	2.38	14.28	9	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	11.11
	30	3	10.00	1	3.33	0	0.00	13.33	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Feb.	10	3	30.00	0	0.00	0	0.00	30.00	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
	7	1	14.29	0	0.00	0	0.00	14.29	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
March	15	2	13.33	0	0.00	0	0.00	13.33	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Total	156	19		5		2			23	2		0		0		0		0		
Overall parasitism %			12.18		3.21		1.28	16.67			8.70		0.00		0.00		0.00		8.70	
2005																				
Jan.	62	2	3.23	2	3.23	0	0.00	6.46	12	1	8.33	0	0.00	0	0.00	0	0.00	0	0.00	8.33
	53	4	7.55	1	1.89	1	1.89	11.33	9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
	30	2	6.67	0	0.00	1	3.33	10.00	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Feb.	15	0	0.00	0	0.00	1	6.67	6.67	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
	13	0	0.00	0	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
March	9	0	0.00	0	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Total	182	6		3		3			22	1		0		0		0		0		
Overall parasitism %			3.30		1.65		1.65	6.66			4.55		0.00		0.00		0.00		4.55	

T. P. = Total parasitism

Table (4): Effect of insecticides on aphid, *Myzus persicae* and its parasitoids (*Diaretiella rapae*, *Aphidius matricariae* and *Aphidius colemani*) in different plantations.

Season	Plantation	Untreated		Treated		Reduction	Reduction
		Total No. of <i>M. persicae</i>	Parasitism %	Total No. of <i>M. persicae</i>	Parasitism %	% in pest	% in parasitoids
2003-04	Summer	1227	10.59	390	6.92	68.22	34.66
	Nili	5734	8.53	584	5.31	89.82	37.75
	Winter	156	16.67	23	8.70	85.26	47.81
Average						81.10	40.07
2003-04	Summer	1188	8.34	167	7.19	85.94	13.79
	Nili	5855	8.40	586	7.00	89.99	16.67
	Winter	182	6.66	22	4.55	87.91	31.68
Average						87.95	20.71

حصر طفيليات من الخوخ الأخضر الموجودة على نباتات الكوسة ودراسة التقلبات العددية والتأثير الضار لاستخدام المبيدات عليها

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محطة البحوث الزراعية بسخا - معهد بحوث وقاية النباتات

أجرى هذا البحث بالمرزعة البحثية بمحطة البحوث الزراعية بسخا بكفر الشيخ فى العروات الصيفية والنيلىة والشتوية خلال موسمى ٢٠٠٣/٢٠٠٤م ، ٢٠٠٤/٢٠٠٥م لحصر طفيليات من الخوخ الأخضر الموجودة على نباتات الكوسه ودراسة التقلبات العددية لهذه الطفيليات. كذلك دراسة التأثير الضار لاستخدام مبيد المارشال على هذه الطفيليات وقد أمكن تلخيص نتائج الدراسة كالتالى:

١- الحصر:

تم حصر طفيليات الذبابة البيضاء فى موسمين متتاليين هما ٢٠٠٣/٢٠٠٤م ، ٢٠٠٤/٢٠٠٥م فى العروات الصيفى والنيلى والشتوى. وقد تم تسجيل ثلاث أنواع من الطفيليات وهما:

Aphidius و *Aphidius matricariae* Haliday & *Diaretiella rapae* McIntosh
colemani Viereck يتبعوا رتبة غشائية الأجنحة Hymenoptera وعائلة Aphidiidae وهى طفيليات إنفرادية داخلية التطفل. وبصفة عامة كان الطفيل الأول أكثر تواجدا من الطفيل الثانى والثالث حيث تراوحت نسبة التطفل بالطفيل الأول بين ٨,٨٠ ، ٦,٠٧% والطفيل الثانى ١,٠٦ ، ١,٣٥% بينما تراوحت نسبة التطفل بالطفيل الثالث بين ٠,٧٣ ، ٠,٧٢% فى العروة الصيفية عامى ٢٠٠٣ و ٢٠٠٤ على التوالى. بالنسبة لقيم التطفل فى العروة النيلى كانت ٧,٢٩ - ٧,٣١ ، ٠,٨٢ - ٠,٦٥% ، ٠,٤٢ - ٠,٤٤%. أما فى العروة الشتوية فقد زاد التطفل بالطفيل *D. rapae* كثيرا عن التطفل بكل من الطفيل *A. matricariae* و *A. colemani* حيث بلغ ١٢,١٨ - ٣,٣٠% ، ٣,٢١ - ١,٦٥% ، ١,٢٨ - ١,٦٥% عامى ٢٠٠٤ و ٢٠٠٥ على التوالى.

٢- التقلبات العددية ونشاط الطفيليات على مدار العام

وصلت نسبة التطفل الكلية فى العروة الصيفية إلى أقل معدل لها فى الأسبوع الثانى من يونيو وأعلى معدل لها فى الأسبوع الأخير من أبريل. أما فى العروة النيلىة تراوحت نسبة التطفل الكلية من ٦,٣٦ - ٩,٢٤% وذلك فى عام ٢٠٠٣م وكانت أعلى معدل لها فى ١٩ نوفمبر (١٣,٤٨%). أما فى عام ٢٠٠٤م تراوحت نسبة التطفل من ٦,٥٠ - ١١,٢٠% وكان أقل قيمة فى آخر سبتمبر.

وفى العروة الشتوى ٢٠٠٤م كانت أقل نسبة للتطفل فى الأسبوع الثانى من شهر مارس

وأعلى ما يمكن فى الأسبوع الثانى من فبراير. أما عام ٢٠٠٥م كانت نسبة التطفل فى أقل معدل لها فى أول شهر يناير ومنتصف شهر فبراير أما أعلى قيمة للتطفل فكانت فى منتصف شهر يناير.

٣- التأثير الضار لاستخدام المبيدات:

أثر رش نباتات الكوسه بواسطة مبيد المارشال ٢٠٠جم/١٠٠ لتر ماء سلبا على تعداد الطفيليات حيث خفض المبيد ٣٤,٦٦ ، ٣٧,٧٥ ، ٤٧,٨١% من تعداد الطفيليات فى العروات الصيفية والنيلية والشتوية على التوالي فى موسم ٢٠٠٣/٢٠٠٤م وفى موسم ٢٠٠٤/٢٠٠٥م كما خفض المبيد الطفيليات بنسب ١٣,٧٩ ، ١٦,٦٧ ، ٣١,٦٨% فى العروات الثلاث على التوالي. ومن هنا يتضح التأثير السيئى لاستخدام المبيدات على الكائنات النافعة وتأثيرها السلبى على التوازن البيئى.