

COMPARATIVE ACTIVITY OF SOME INSECT PESTS AND
APHID PARASITIDS ON CULTIVATED VEGETABLES
UNDER PLASTIC-HOUSE CONDITIONS

By

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ABSTRACT

Population density of four insects pests, cotton whitefly *Bemisia tabaci*. (Genn.), cotton aphid *Aphis gossypii*, Glov., green peach aphid *Myzus persicae* (Sulz.) and leafminer *Liriomyza trifolii* (Burgess) were estimated on three vegetables (tomato, cucumber and pepper) which planted under plastic-hous conditions. Data collected during two successive seasons of 1999 and 2000 (from mid-February to early June) showed that *B. tabaci* was the most abundant pest on tomato, where aphid species was the alternately pest on cucumber. Leafminer occupied the third site on the tested vegetables. Pepper was highly infested with *M. persicae*, whereas rare numbers of the other two pests were observed.

Large numbers of aphid parasitoids were found and varied on the three vegetables. In 1999 season parasitism rates averaged 46.8, 45.3 and 38.9 % on cucumber, tomato and pepper, respectively, whereas during the second one (2000) they were 49.0, 42.6 and 39.8% in the same previous order, respectively.

Key words : *B. tabaci*, *A. gossypii*, *M. persicae* and *L. trifolii*. Population abundance Vegetables, Plastic-house. Aphid parasitoids. Parasitism rate.

INTRODUCTION

The protected cultivation spread in recent years in Egypt and different countries all over the world. Greenhouses are considered the alternative method to produce different crops during the adverse conditions of their production. In Egypt, various vegetables and ornamentals are cultivated commercially in greenhouses, (among the most important crops, tomato, cucumber, pepper, okra, cantaloup, gerbera, soybean, cabbage, cut flowers ... etc.). These crops are liable to be attacked by several insect pests. Some of the most abundant pests are aphid, whitefly, and leafminer. (Baufeld and Motte, 1992; Ulubilir and Yabas. 1996; Mifsud, 1997; Souliotis *et al.*, 1998; Corredor *et al.*, 1999 and Viscarret *et al.*, 2000).

The present work aimed to estimate the population density of three insect pests, on some vegetable plants. Also, incidence of aphid parasitoids and parasitism rates were determined during two successive seasons (1999 and 2000).

MATERIALS AND METHODS

This experiment was conducted to study the population density of aphid, whitefly and leafminer on tomato, pepper and cucumber planted under plastic-house conditions at Shebin El-Kom region. Standard agricultural practices were applied; all experimental plots did not received any pesticides during the experiment periods. The plants were cultivated in January - February plantation for the two successive seasons (1999 and 2000). Samples of ten leaves from each vegetable were picked up weekly at random, after about one month from sowing date until removing of plants. Samples were transferred to the laboratory in paper bags and then, examined carefully by aid of stereoscopic-binocular microscope. The insects were counted and classified into different species. The records of micro-climate

conditions were $25 \pm 5^{\circ}\text{C}$ and $80 \pm 5\%$ relative humidity throughout the period of study. The data were subjected to analysis of variance (ANOVA) and the Least Significant Difference (L.S.D.) test was used for mean separation.

RESULTS AND DISCUSSION

The occurrence of three insect pests [*Bemisia tabaci* (Genn.), *Aphis gossypii*, Glov., *Myzus persicae* Sulz. and *Liriomyza trifolii* Burg.] on tomato, pepper and cucumber which cultivated under plastic-house conditions is summarized in Tables (1 - 3).

1. Population density of insect pests on tomato plants :

Data presented in Table (1) show that tomato plants received *Bemisia tabaci* infestation from the beginning of March, 1999 and from late February, 2000 season. The whitefly population fluctuated to record three peaks of abundance : the first week of March, third week of April and first week of May in both seasons. The population reached its maximum numbers during the first peak with an average of 37.2 and 39.8 insects / leaf in both seasons, respectively.

Aphid, *A. gossypii* population abundance data showed high infestation during the third week of February in 1999 and 2000 seasons, with an average numbers of 17.5 and 19.6 individuals / leaf, respectively. Other two peaks of population abundance occurred during the first week of March and third week of April.

As for, the population abundance of leafminer, *L. trifolii*, the data in Table (1) showed that the initial population occurred with the first week of April and fourth week of March and then increased gradually showing two peaks of activity took place on the second week of April and third week of May. The highest average numbers were observed during the first peak

Table (1) : Average numbers and percentage of population abundance of three insects on tomato plants in plastic-house during two successive seasons (1999 and 2000).

Date	Average numbers of insects / leaf and percentage											
	1999 season						2000 season					
	<i>B. tabaci</i>		<i>L. trifolii</i>		<i>A. gossypii</i>		<i>B. tabaci</i>		<i>L. trifolii</i>		<i>A. gossypii</i>	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Feb., 21	00.0	00.0	00.0	00.0	17.5	100	00.0	00.0	00.0	00.0	19.6	100
28	00.0	00.0	00.0	00.0	13.8	100	1.8	12.3	00.0	00.0	12.8	87.7
Mar., 7	37.2	70.6	00.0	00.0	15.5	29.4	39.8	67.8	00.0	00.0	18.9	32.2
14	31.8	70.0	00.0	00.0	13.6	30.0	28.4	66.5	00.0	00.0	14.3	33.5
21	21.2	64.8	00.0	00.0	11.5	35.2	23.9	70.1	00.0	00.0	10.2	29.9
28	2.5	39.1	00.0	00.0	3.9	60.9	4.8	34.0	00.8	5.7	8.5	60.3
Apr., 4	5.5	27.6	12.9	64.8	1.5	7.6	8.8	31.2	14.8	52.5	4.6	16.3
11	18.5	53.6	14.0	40.5	2.0	5.8	21.9	43.1	21.6	42.5	7.3	14.4
18	26.0	77.2	4.2	12.5	3.5	10.3	32.8	65.6	8.6	17.2	8.6	17.2
25	21.8	79.3	2.8	10.2	2.9	10.5	26.4	68.6	6.2	16.1	5.9	15.3
May, 2	13.5	79.0	1.8	10.5	1.8	10.5	17.8	67.2	4.3	16.2	4.4	16.6
9	5.7	54.3	3.3	31.4	1.5	14.3	10.2	61.4	2.9	17.5	3.5	21.1
16	5.2	46.4	4.5	40.2	1.5	13.4	8.2	47.4	6.7	38.7	2.4	13.9
23	2.8	41.8	2.7	40.3	1.2	17.9	5.6	48.3	3.9	33.6	2.1	18.1
30	1.0	27.8	1.4	38.9	1.2	33.3	3.2	42.7	2.5	33.3	1.8	24.0
Jun., 6	0.5	50.0	00.0	00.0	0.5	50.0	1.6	42.1	0.7	18.4	1.5	39.5
Average	12.1	48.8	3.0	18.1	7.7	33.1	14.7	48.0	4.6	18.2	7.9	33.8
L.S.D.5%	3.2						3.7					
1%	4.3						4.8					

with 14.0 and 21.6 individuals / leaf during the two successive seasons of 1999 and 2000, respectively.

The above results, demonstrated that the population density of the three pests varied on tomato during two successive seasons of 1999 and 2000 showing that whitefly was most commonly classified as an occasional insect pest of tomato followed by aphid and leafminer, at which, the abundance percentage of each insect reached 48.8, 33.1 and 18.1% in 1999 season, respectively, and 48.0, 33.8 and 18.2 %, respectively in 2000 season. El-Maghraby *et al.* (1990) reported that *Bemisia tabaci* was the most dominant pest on tomato plants cultivated in plastic tunnels. Manzaroli and Benuzzi (1995) and Ulubilir and Yabas (1996) mentioned that, whitefly, aphid and leafminer were the pests of economic importance at sites producing vegetable under cover in Italy and Turkey.

Statistical analysis showed highly significant differences of population density between *Bemisia* and the other two insects (*Aphis* and *Liriomyza*) and insignificant differences occurred between aphid and leafminer population in both seasons.

2. Population density of insect pests on pepper plants :

The average numbers of insect pests summarized in Table (2) indicated that, *Myzus persicae* was the most dominant pest found on pepper plants in plastic-house in two successive seasons of 1999 and 2000. Few numbers of *Bemisia* and *Liriomyza* were observed throughout the period of investigation.

M. persicae recorded two peaks of activity, the first peak took place on the first week of March in both 1999 and 2000 seasons with an average of 34.2 and 38.4 individuals / leaf. The second peak seemed to be much higher with an average of 77.6 individuals / leaf during late May in 1999 season and 74.2 individuals / leaf during first week of June in 2000 season.

Table (2) : Average numbers and percentage of population abundance of three insects on pepper plants in plastic-house during two successive seasons (1999 and 2000).

Date	Average numbers of insects / leaf and percentage											
	1999 season						2000 season					
	<i>B. tabaci</i>		<i>L. trifolii</i>		<i>M. persicae</i>		<i>B. tabaci</i>		<i>L. trifolii</i>		<i>M. persicae</i>	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Feb., 21	0.5	3.0	0.0	0.0	16.5	97.0	0.0	0.0	0.0	0.0	18.8	100
28	0.3	1.2	0.0	0.0	24.6	98.8	0.0	0.0	0.0	0.0	23.6	100
Mar., 7	0.0	0.0	0.0	0.0	34.2	100	0.7	1.8	0.0	0.0	38.4	98.2
14	0.0	0.0	0.0	0.0	15.2	100	0.6	2.7	0.0	0.0	21.2	97.3
21	0.0	0.0	0.0	0.0	13.1	100	0.2	1.1	0.2	1.1	16.8	97.8
28	0.0	0.0	0.0	0.0	10.3	100	0.0	0.0	0.2	0.5	13.2	98.5
Apr., 4	0.0	0.0	0.0	0.0	6.8	100	0.0	0.0	0.0	0.0	9.6	100
11	0.0	0.0	0.0	0.0	4.8	100	0.6	8.9	0.3	4.5	5.8	86.6
18	0.3	7.0	0.3	7.0	3.7	86.0	0.4	9.8	0.1	2.4	3.6	87.8
25	0.0	0.0	0.0	0.0	5.5	100	0.2	3.3	0.0	0.0	5.9	96.7
May, 2	0.0	0.0	0.0	0.0	5.8	100	0.0	0.0	0.0	0.0	3.3	100
9	0.1	1.3	0.0	0.0	7.4	98.7	0.3	5.1	0.0	0.0	5.6	94.9
16	0.0	0.0	0.0	0.0	61.8	100	0.2	0.4	0.0	0.0	55.8	99.6
23	0.0	0.0	0.0	0.0	63.8	100	0.2	0.3	0.0	0.0	58.6	99.7
30	0.0	0.0	0.0	0.0	77.6	100	0.0	0.0	0.0	0.0	72.6	100
Jun., 6	0.0	0.0	0.0	0.0	72.8	100	0.0	0.0	0.0	0.0	74.2	100
Average	0.08	0.8	0.02	0.44	26.5	98.8	0.21	2.1	0.05	0.6	26.7	97.3
L.S.D.5%	7.1						7.8					
1%	9.5						10.4					

The percentages of aphid population abundance were 98.8 and 97.3 %, respectively. In this respect El-Magharby *et al.* (1990) reported that, aphids (*Aphis gossypii* and *Myzus persicae*) were the most dominant pest on pepper plants in greenhouse.

3. Population density of insect pests on cucumber plants :

As shown in Table (3), the results indicate that *Bemisia* population peaked during the third week of February in both 1999 and 2000 seasons. In 1999, the insect population abundance reached 17.5 insects / leaf, after that the population abundance declined gradually through March and April. The population of *Bemisia* increased again during the third week of May, reaching 6.5 insects / leaf. While, in 2000, the population abundance of insect recorded during the same periods were 19.3 and 7.3 insects / leaf, respectively.

For the population abundance of cotton aphid, *A. gossypii*, the data indicated that insect infestation initiated on the fourth week of February, in 1999 season, and on the first week of March in 2000, season. Two peaks of aphid populations were observed on the third week of April (14.2 and 15.6 individuals / leaf) and the first week of May (33.2 and 30.5 individuals / leaf) in 1999 and 2000 seasons, respectively. Another peak took place on first week of June in 2000 season, reaching 28.9 insects / leaf.

The occurrence of leafminer, *L. trijolii*, population on cucumber was not peaked until up to ten weeks from sowing date. The infestation appeared for the first time during first week of April in 1999 season and second week of April in 2000 season. The population increased to reach its maximum with only one peak of activity during fourth week of May in both 1999 (29.5 insects / leaf) and 2000 (24.6 insects / leaf) seasons.

Data in Table (3) summarized also average percentages of the three

Table (3) : Average numbers and percentage of population abundance of three insects on cucumber plants in plastic-house during two successive seasons (1999 and 2000).

Date	Average numbers of insects / leaf and percentage											
	1999 season						2000 season					
	<i>B. tabaci</i>		<i>L. trifolii</i>		<i>A. gossypii</i>		<i>B. tabaci</i>		<i>L. trifolii</i>		<i>A. gossypii</i>	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Feb., 21	17.5	100	0.0	0.0	0.0	0.0	19.3	100	00.0	00.0	00.0	00.0
28	12.3	87.2	0.0	0.0	1.8	12.8	16.5	100	00.0	00.0	00.0	00.0
Mar., 7	10.8	81.2	0.0	0.0	2.5	18.8	13.2	85.2	00.0	00.0	2.3	14.8
14	8.8	81.5	0.0	0.0	2.0	18.5	9.6	84.2	00.0	00.0	1.8	15.8
21	3.8	69.1	0.0	0.0	1.7	30.9	5.8	79.5	00.0	00.0	1.5	20.5
28	2.7	75.0	0.0	0.0	0.9	25.0	4.6	29.1	00.0	00.0	11.2	70.9
Apr., 4	1.8	14.2	0.4	3.3	10.4	82.5	3.2	21.6	00.0	00.0	11.6	78.4
11	0.8	5.0	1.3	8.2	13.8	86.8	2.1	11.6	1.8	9.9	14.2	78.5
18	0.5	3.0	1.8	10.9	14.2	86.1	1.6	8.1	2.6	13.1	15.6	78.8
25	0.4	2.9	3.2	23.2	10.2	73.9	1.3	6.6	4.8	24.1	13.8	69.3
May, 2	0.8	2.1	3.6	9.6	33.2	88.3	1.5	4.0	6.2	16.2	30.5	79.8
9	2.5	5.8	8.8	20.5	31.6	73.7	3.2	9.1	9.2	26.3	22.6	64.6
16	6.5	12.0	17.8	32.8	29.9	55.2	7.3	17.3	16.8	39.7	18.2	43.0
23	4.2	8.0	29.5	49.4	26.0	43.6	5.6	10.6	24.6	46.7	22.5	42.7
30	2.3	5.3	21.0	49.0	19.6	45.7	3.8	6.8	23.2	42.0	28.3	51.2
Jun., 6	1.2	3.9	10.5	34.8	18.5	61.3	1.9	3.8	18.6	37.7	28.9	58.5
Average	4.8	34.8	6.1	15.2	13.5	50.2	6.3	36.1	6.7	16.0	13.9	47.9
L.S.D.5%	3.3						3.0					
1%	4.4						4.0					

insects. It was obvious that the highest occurrence (50.2 and 47.9 %) was recorded for aphids, followed by whitefly (34.0 and 36.1 %), whereas the least occurrence was for the leafminer (15.2 and 16.0 %), in two seasons, 1999 and 2000, respectively.

The population density of aphid was highly significant in comparison with that of both *Bemisia* and *Liriomyza*, while, the differences between the later two pests were not significant.

4. Competitive relationship among the insect pests

Relative numbers of the four insect pests occurred on the vegetables studied were illustrated in Fig. (1). The competitive relationship occurred clearly showed that the population density of *Bemisia* dominated most of the period of season on tomato than that of the other two pests. Domination period of whitefly was about 12 weeks while, aphid occupied three weeks only. Aphid and leafminer exchanged their sites throughout the season. The highest percentage of *Bemisia* population appeared for 5 or 6 weeks on cucumber, while aphid and leafminer occupied the remained period (10 - 11 weeks), but the domination during this period was for aphid.

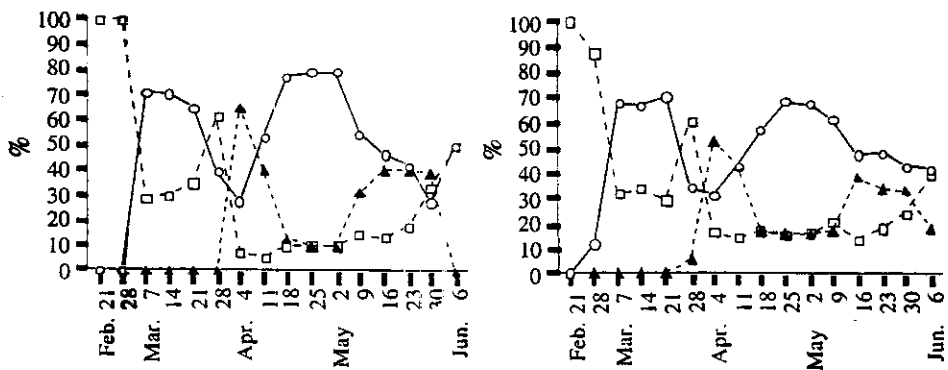
The population of *M. persicae* dominated completely on pepper with no competition with other pests, which, observed occasionally in few numbers from time to time.

5. Parasitism rates in aphid populations on three vegetables

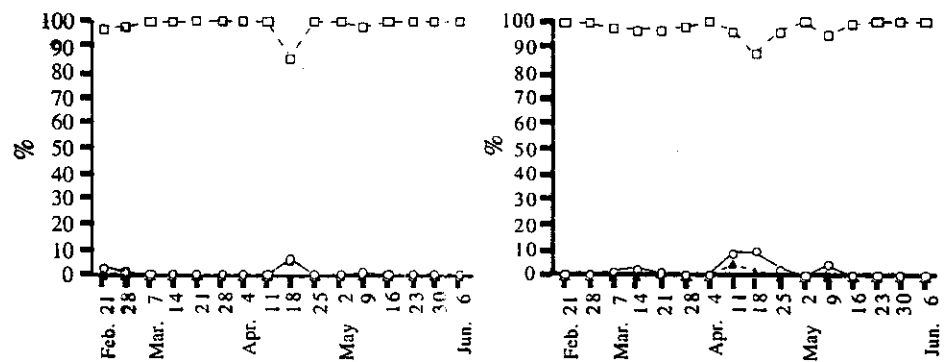
The collected specimens of parasitized aphids showed that there are two hymenopterous parasitoids belonging to : 1. Family : Aphelinidae (*Aphelinus sp.*, parasitoid of *A. gossyii*) and 2. Family : Aphidiidae (*Diaertiella rapae*, parasitoid of *M. persicae*).

Data represented in Table (4) and Fig. (2) show the number of parasitoids and rate of parasitism on three vegetables throughout two

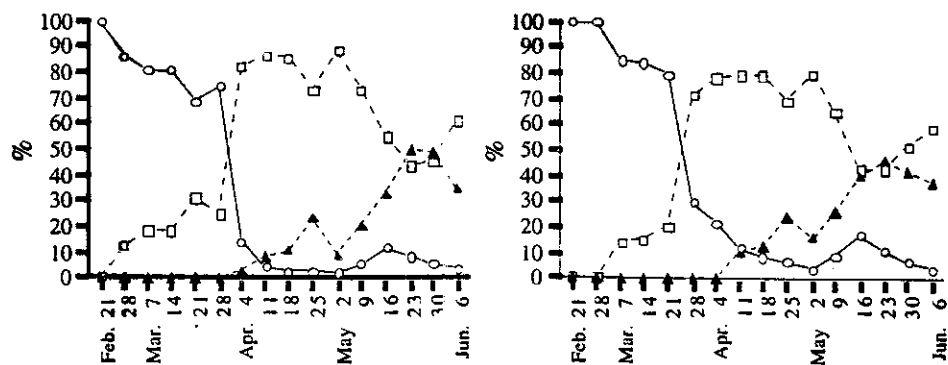
Tomato



Pepper



Cucumber



1999

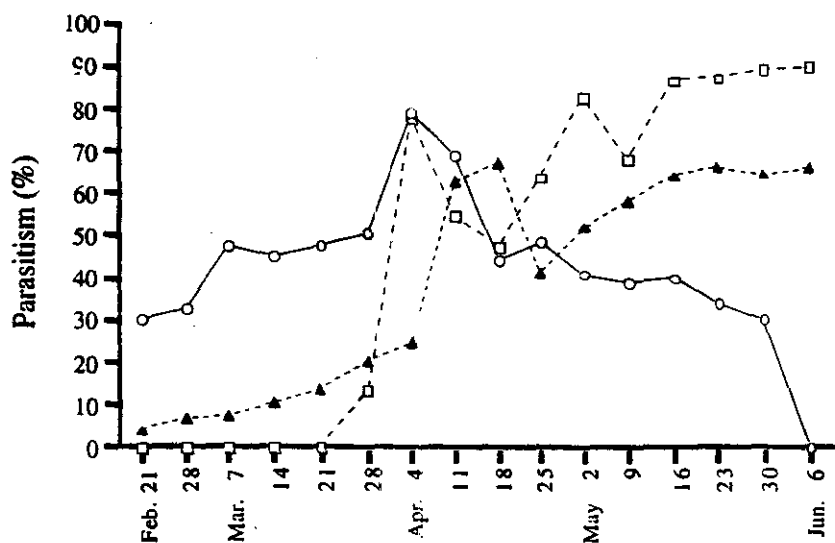
2000

—○— B. tabaci - - -▲- - - L. trifolii - - -□- - - A. gossypii - - -▼- - - M. persicae

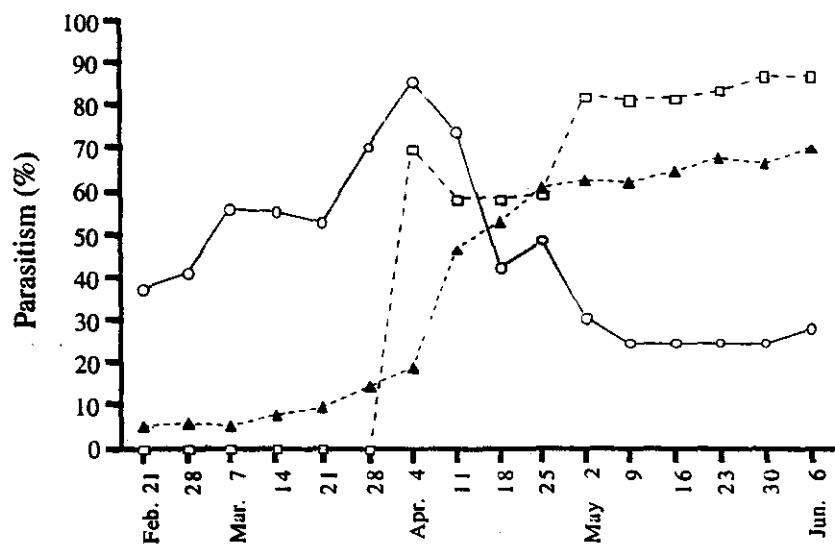
Fig. (1) : Percentage of insect pests on three vegetables during two successive seasons (1999 and 2000) in plastic-house at Shebin El-Kom..

Table (4) : Weekly numbers and percentage of parasitized aphids on three host plants in plastic-house during two successive seasons at Shebin El-Kom.

Date	Average numbers of insects / leaf and percentage											
	1999 season						2000 season					
	Tomato		Pepper		Cucumber		Tomato		Pepper		Cucumber	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Feb., 21	105	37.5	9	5.2	0.0	0.0	86	30.5	15	7.4	0.0	0.0
28	98	41.5	15	5.7	0.0	0.0	63	32.9	18	7.1	0.0	0.0
Mar., 7	198	56.1	20	5.5	0.0	0.0	172	47.6	32	7.7	0.0	0.0
14	167	55.1	13	7.9	0.0	0.0	120	45.6	26	10.9	0.0	0.0
21	130	53.1	14	9.7	0.0	0.0	94	47.9	26	13.4	0.0	0.0
28	93	70.5	18	14.9	0.0	0.0	88	50.9	34	20.5	18	13.8
Apr., 4	91	85.8	16	19.0	242	69.9	175	79.2	32	25.0	419	78.3
11	58	74.4	57	46.3	192	58.2	165	69.3	98	62.8	176	55.6
18	26	42.6	42	53.2	198	58.2	69	44.5	76	67.9	142	47.8
25	18	48.6	86	61.0	150	59.2	56	48.7	42	41.6	248	64.2
May, 2	8	30.8	98	62.8	1580	82.6	31	41.3	48	52.7	1468	82.8
9	5	25.0	122	62.2	1380	81.4	22	38.6	78	58.2	1398	86.1
16	5	25.0	1142	64.9	1350	81.9	16	40.0	989	63.9	1238	87.2
23	4	25.0	1338	67.7	1338	83.7	11	34.4	1153	66.3	1575	87.5
30	4	25.0	1559	66.8	1318	87.1	8	30.8	1334	64.8	2605	90.2
Jun., 6	2	28.6	1992	69.9	1275	87.3	0.0	0.0	1463	66.3	2786	90.6
Average	633	45.3	408.8	38.9	563.9	46.8	73.5	42.6	341.5	39.8	754.6	49.0
L.S.D.5%	182.1	2.98					243.8	3.35				
1%	242.2	3.96					324.2	4.46				



2000



1999

—○— Tomato -▲- Pepper -□- Cucumber

Fig. (2) : Rate of parasitism in aphid populations on three vegetables cultivated under plastic-house for two successive seasons, (1999 and 2000)

successive seasons (1999 and 2000) under plastichouse conditions. The aphid parasitoid numbers showed peaks of activity varying on the different host plants, at which, there were 2 - 3 peaks on tomato and 3 - 4 peaks on both pepper and cucumber. The highest numbers were observed during the first week of March reaching 298 individuals in, 1999 and early April in 2000 / season, reaching 175 individuals on tomato. On pepper the parasitoids occurred during the first week of June in 1999 reached 1992 individuals and 1463 individuals in 2000 season. While, the incidence of parasitoids on cucumber during the first week of May reached 1580 individuals in 1999 season and 2786 in individuals, in the first week of June, 2000.

Rate of parasitism varied on the three vegetables and during the two seasons of study. On tomato, the maximum rates (85.8 and 79.2 %) were recorded on 4 April in 1999 and 2000 seasons, respectively. On cucumber, it reached the highest rate (87.3 and 90.6 %) on 6 June during 1999 and 2000, respectively. While, the highest parasitism rates occurred on pepper were found on 6 June (69.9 %) in 1999 season and on 18 April (67.9 %) in 2000 season. Steenis and Van-Steenis (1995) reported that, *Ahpidius colemani* parasitized 72 - 80 % of the aphids (*Aphis gossypii*) on cucumber in glasshouse. Fernandez and Nentwig (1997) used *A. colemani* to control *Myzus persicae* and *Aphis gossypii*, their results showed that the quality of parasitoid differed according to the host.

The percentage of parasitism averaged 46.8, 45.3, 38.9 % on cucumber, tomato, and pepper, respectively during the first season of 1999, whereas, parasitism rates during second of 2000 on the same vegetables were 49.0, 42.6 and 39.8 %, respectively.

Statistical analysis showed highly significant differences of parasitoid numbers on cucumber and pepper as compared to those on tomato during the two seasons of 1999 and 2000. Cucumber seemed to be highly

significant than pepper and tomato plants, while there were significant differences between the later two vegetables. The percentage of parasitism was highly significant on cucumber and tomato than on pepper during 1999 season, whereas, during 2000 season, highly significant was observed between the parasitism rates on the three vegetables examined. Steenis *et al.* (1995 a,b) and (1996) mentioned that the leaving tendency of the parasitoid decreased only on leaves with a high host density, at a density of 100 aphids, the leaving was lower than at the other aphid densities (less than 100) and increased after 100 aphids.

In general, the population density of the three insect pests which were observed on tomato, cucumber and pepper planted under plastic-house conditions for two successive seasons (1999 and 2000) had an appreciable fluctuations, and showed that, *Bemisia tabaci* was the dominant pest on tomato, while aphids were the alternately pest on cucumber and leafminer come in the third order in both cases. Pepper plants harboured only aphid and rare numbers of other two pests. Aslam and Gebara (1995) indicated that the highest number of *B. tabaci* was on cucumber and tomato in greenhouse. Pepper and okra were the least preferred food plants in the field and the greenhouse. Jagannatha and Viraktamath (1997) found that *L. trifolii* preferred cucumber and tomato more than the other tested plants.

competitive relationship between the insect pests varied on the host plant and with the time, it means that, the population density of pest to be the highest limited by host preferable or suitability and the range of favourable weather factors.

The aphid parasitoids showed 2 - 4 peaks of activity on the three vegetables examined and the highest percentage of parasitism occurred mostly during April and June of both seasons. Rate of parasitism differed significantly on the tested plants at which arranged descendingly in this order : cucumber, tomato and pepper, respectively.

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مقارنة نشاط بعض الآفات الحشرية وطفيليات المن على بعض الخضراوات المنزوعة تحت
ظروف الصوب البلاستيكية

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أجريت هذه الدراسة في منطقة شبين الكوم - محافظة المنوفية على بعض محاصيل
الخضراوات المنزوعة في الصوب البلاستيكية وهي الطماطم والخيار والفلفل لدراسة الكثافة
العديدية لبعض الآفات الحشرية السائدة تحت هذه الظروف وكذلك طفيليات المن خلال
موسم الدراسة ١٩٩٩ ، ٢٠٠٠ ، وذلك ابتداءً من منتصف فبراير وحتى أوائل يونيو
.... وقد توصلت الدراسة إلى ما يلي :

١ - ذبابة القطن والطاطم البيضاء هي الآفة السائدة على الطماطم خلال موسم
الدراسة يليها من القطن وذبابة أوراق الفول .

٢ - كان تعداد من القطن هو الأعلى على محصول الخيار يأتي بعده الذبابة
البيضاء ثم ذبابة أوراق الفول .

٣ - سجلت حشرة واحدة بتعداد عالي وهي من الخوخ الأخضر على نباتات الفلفل
.... بينما سجلت أعدادا متفرقة من الذبابة البيضاء وذبابة أوراق الفول .

٤ - لوحظ أن الإصابة بذبابة أوراق الفول ظهرت مع أواخر مارس - أوائل أبريل
خلال الموسمين على العوائل المختبرة .

٥ - أوضح التحليل الاحصائي في كل الحالات وجود فروق معنوية بين تعداد هذه
الآفات على عوائلها المختلفة تحت الدراسة .

٦ - سُجلت طفيليات المن على العوائل النباتية المختلفة وكانت نسبة التطفل كالتالي :

٤٦٨ ، ٤٥٣ ، ٣٨٩٪ خلال الموسم الأولي (١٩٩٩) .

٤٩٠ ، ٤٢٦ ، ٣٩٨٪ خلال الموسم الثاني (٢٠٠٠) .

على محاصيل الخضراوات الخيار - الطماطم - الفلفل على التوالي .

وقد لوحظ اختلاف معدل التطفل على هذه النباتات وكذلك اختلاف ميعاد ظهورها .
وتعتبر هذه النتائج السابقة الذكر ذات أهمية عند وضع سياسة متكاملة لمكافحة هذه
الآفات على عوائلها المختبرة تحت ظروف الصوب البلاستيكية خلال هذه الفترة من العام