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ECOLOGICAL STUDIES ON SOME HOMOPTEROUS INSECTS INFESTING CERTAIN CITRUS AND GUAVA TREES

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ABSTRACT

The present work was conducted during the two successive seasons of 2012/ 2013 and 2013/2014 in order to survey and study the population density of aphids, leafhoppers and whitefly insects infesting navel orange (*Citrus sinensis*), mandarin (*Citrus reticulate*) and guava (*Psidium guava*) trees in Diarb-Nigm District, Sharkia Governorate, Egypt. Aphid species were *Aphis citricolla* (Goot) and *Aphis gossypii* (Glover). Leafhopper insect species included *Empoasca decipiens* (Paoli), *Empoasca decedens* (Paoli), *Cicadulina chinai* (Ghauri) and Planthoppers were *Sogatella vibix* (Haupt) and *S. furcifera* (Horv), while whitefly species was *Bemesia tabaci* (Genn.). The aforementioned insects were collected by three different sampling techniques from navel orange, mandarin and guava trees *i.e.*, plant sample, sweeping net and yellow sticky board trap. The obtained results showed that the plant sample proved to be the best method to collect both aphid and whitefly insects of the present work, while sweeping net proved to be the best technique to collect the leafhopper and planthopper insects. The seasonal abundance of *A. citricolla* on navel and mandarin trees showed one peak of population density, which occurred at the 4th week of March, for the two investigating seasons. While, *A. gossypii* on navel orange and mandarin trees showed three peaks of population density. The first one occurred at the 4th week of November. The second peak was recorded at the 4th week of March for both seasons. The third peak was recorded at the 4th week of June (2012/ 2013) and the 2nd week of July (2013/2014) on navel orange trees but on mandarin trees, it was at the 2nd week of June in both seasons. While, on guava trees two peaks of population density were recorded at the 4th week of August and the 4th week of June in both seasons. Whitefly *B. tabaci* showed three peaks on citrus trees which were at the 4th week of November, the 2nd week of April and August in both seasons, respectively, but on guava trees they were at the 4th week of October and April in both seasons, the third peaks were at the 2nd week of February (2012/2013) and the 2nd week of January (2013/2014). Three peaks, the first two peaks for *E. decipiens* and *E. decedens* on citrus trees were occurred at the 4th week of October and the 2nd week of June during the two seasons and the third peak was at the 2nd week of July for *E. decipiens* in both seasons and for *E. decedens* at the 4th week of June and the 2nd week of July, but on guava trees were at the 4th week of October and April in the two seasons, respectively. *C. chinai*, *S. vibix* and *S. furcifera* had two peaks occurred at the 4th week of October and the 2nd week of September for the two seasons on citrus trees and the third peak of *C. chinai* was on navel orange trees at the 2nd week of June and the 4th week of May at the two seasons, but on mandarin trees was at the 4th week of June. The third peak of *S. vibix* on navel orange trees and *S. furcifera*, was at the 2nd week of May while it was at the 2nd week of May on the season of (2013/2014), but the third peak of *S. vibix* was on mandarin trees at the 4th week of March, and the 2nd week of April and for *S. furcifera* the third peak was at the 4th week of March in both seasons, respectively.

Key words: Ahpids, leaf hoppers, plant hoppers, whitefly, citrus trees, guava trees, population fluctuations, sampling techniques.

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INTRODUCTION

Aphids, leafhoppers and whitefly insects are considered serious pests infesting navel orange, mandarin and guava trees. Several investigators recorded the role of certain homopterous insect species in transmitting the pathogens of plant diseases (Nielson, 1968; Maramorosch and Harris, 1979; Hegab, Ola, 1997 and 2001). The faunae of these insects on most navel orange, mandarin and guava trees as well other fruit trees were studied in Egypt (Herakly,1970; Abd-Elsamad, 1999; El-Serafi *et al.*, 2004; Al-Moaalem *et al.*, 2005; Malik *et al*., 2010) who reported considerable data on the aphids, leafhoppers, planthoppers and whitefly infesting navel orange, mandarin and guava trees. The aim of the present work was to determine the population density of aphids, leafhoppers, planthoppers and whitefly on navel orange, mandarin and guava trees using three different sampling techniques, as well as to clear the population fluctuations of these species during 2012/2013 and 2013/2014 seasons in Diarb-Nigm District, Sharkia Governorate, Egypt.

MATERIALS AND METHODS

These experiments were carried out in Diarb-Nigm District, Sharkia Governorate, during the period from October to September on navel orange (*Citrus sinensis*), mandarin (*Citrus reticulate*) and from August to July on guava (*Psidium guava*) trees (2012/2013 and 2013/ 2014).

Three different sampling techniques for colleting each group of the tested insect pests infesting navel orange, mandarin and guava trees were conducted and continued at biweekly intervals throughout the seasons. The following three procedures of sampling were used:

Plant Sample

Five trees were chosen randomly from each species of citrus trees (navel orange and mandarin) and guava trees. From each tree twenty five newly emerged shoots were taken randomly at biweekly intervals during the period ranged from October to September from citrus trees. Weeds growing among the trees were permuda grass (*Cynodon dactylon*), common grounded (*Senecio vulgaris*), common lampsauarters (*Chenopodium albom*), common purslane, jungle rice (*Echinchlea colonum*) and yellow foxtail *(Citaria viridis* L.) and from September to July from guava trees during the two studied seasons. These sampling (25 newly emerged shoots) were replicated three times and the samples were placed in paper bags and transferred to the laboratory for inspection. The biweekly total numbers of individuals of aphids and whitefly (adult stage) were separately counted using a hand lens, according to (Hegab *et al.*, 1987).

Sweeping Net

A sweeping net (35 cm diameter and 60 cm deep) was used and each sample consisted of 100 double strokes taken randomly. The sample was replicated three times in the orchard during the investigated seasons 2012/2013 and 2013/ 2014.

Yellow Sticky Board Trap

Board traps (20 × 20 cm for each) coated with sticky material was hung in the aforementioned orchards. Counts of captured leafhoppers and winged aphids were done.

For clearing the effect of certain weather factors such as the means of temperature and relative humidity on the population density of the studied insects, the daily means of the two factors were provided by the Meteorological Central Laboratory for Agricultural Climate, Agricultural Research Center during the whole period of navel orange, mandarin and guava orchards during the seasons of 2012/2013 and 2013/2014. To show the effect of each factor as well as their total effect on insects population density, the values of simple correlation coefficient (r), partial regression coefficient (b) and coefficient of determination (C.D.%) were calculated using Costat Software Microcomputer Program (Anonymous, 1990) .

RESULTS AND DISCUSSION

Insects Population Density as Influenced by Three Sampling Techniques

The obtained results in Table 1, clearly show the total numbers of some homopterous insect species estimated by using three different sampling techniques on navel orange, mandarin and guava trees at Diarb-Nigm District during the two successive seasons of 2012/2013 and 2013/2014. The obtained results can be presented and discussed as follows:

Table 1. Total numbers of some homopterous insect species collected from navel orange, mandarin and guava fruit trees using three sampling techniques during 2012/2013and 2013/ 2014 seasons

Insect species	Fruit trees	2012/2013			2013/2014		
		Plant sample	Sweeping net	Yellow sticky board trap	Plant sample	Sweeping net	Yellow sticky board trap
Aphis citricolla	Navel orange	1523	175	177	3637	202	135
	Mandarin	2957	95	122	4416	112	143
Aphis gossypii	Navel orange	6973	215	310	7744	295	344
	Mandarin	5203	152	264	5447	424	297
	Guava	3773	95	127	4113	184	130
Emopasca decipiens	Navel orange	191	3427	198	189	4072	240
	Mandarin	170	2172	175	182	2615	197
	Guava	125	1411	94	142	1459	124
Emopasca decedens	Navel orange	137	2309	165	194	2487	192
	Mandarin	128	1213	138	156	1799	158
	Guava	104	637	131	110	840	134
Cicadullina chinai	Navel orange	144	1608	138	150	1735	140
	Mandarin	126	1338	111	115	1384	124
Sogatella vibix	Navel orange	92	1657	92	100	2040	130
	Mandarin	83	1326	94	98	1333	114
Sogatella furcifera	Navel orange	80	1548	89	89	1668	137
	Mandarin	78	1272	100	76	1318	112
Bemisia tabaci adults	Navel orange	5719	134	102	6431	140	132
	Mandarin	5113	125	89	5401	132	129
	Guava	2507	121	62	2674	127	137

Aphid insects

From the data given in Table 1, it is very obvious that plant samples proved to be the best method for the studying of aphids population density showing the highest total numbers of 1523, 3637 and 2957, 4416 individuals/twenty five newly emerged shoots samples for aphid species *Aphis citricolla* on navel orange and mandarin during 2012/2013 and 2013/2014 seasons, successively. The highest total numbers of 6973, 7744 and 5203, 5447 individuals/ twenty five newly emerged shoots for *A. gossypii* were recorded on navel orange and mandarin trees, but the lowest ones of 3773 and 4113 were found on guava trees during 2012/2013 and 2013/2014 seasons, respectively.

Leafhopper insects

As clearly shown in Table 1, the collected leafhopper insect species can be descendingly arranged according to their abundance as follows: *E. decipiens* followed by *E. decedens* and *C. chinai* during 2012/2013 and 2013/2014 seasons excepting that concerning plant samples in the second season wherein a switch in position occurred in case of the two latter species. The total numbers of 3427, 2309 and 1608 insects/100 double strokes during 2012/ 2013 by using sweeping net and 4072, 2487, 1735 for leafhopper species *E. decipiens*, *E. decedens* and *C. chinai* insects/ 100 double strokes during 2013/2014 on navel orange trees.

The highest total numbers of these insects on mandarin trees were 2172, 1213, 1338, insects/100 double strokes during 2012/ 2013 season and 2615, 1799 and 1384 insects/100 double strokes at 2013/2014 for leafhopper species *E. decipiens*, *E. decedens* and *C. chinai* on mandarin but the total numbers of *E. decipiens* and *E. decedens* recorded on guava trees were 1411, 637 and 1459, 840 insects/ 100 double strokes during 2012/2013 and 2013/ 2014 seasons, respectively. Regarding, planthopper species *S. vibix* and *S. furcifera*, the total numbers recorded 1657, 1548 and 2040, 1668 insects/100 double strokes were recorded on navel orange trees, but on mandarin trees they were 1326, 1272 and 1333, 1318 in both seasons, respectively. Both leafhoppers and planthoppers were collected in high numbers by using sweeping net technique as compared to the other two tested techniques.

Whitefly insect

The highest populations of *B. tabaci* adults were obtained in case of plant samples exhibiting 5719, 6431 and 5113, 5401 insects/ twenty five newly emerged shoots in navel orange and mandarin trees in 2012/2013 and 2013/2014 seasons, consecutively. But, in guava trees the insect populations were 2507and 2674 whitefly adults/twenty five newly emerged shoots for the two seasons, respectively.

These results agreed with the findings of Hegab *et al*. (1987) who found that sticky board and yellow pan traps have a remarkable selectivity for attracting certain leafhoppers species from different field crops, vegetable crops and fruit orchards.

Seasonal Population Fluctuations of the Dominant Insect Species

Navel orange trees

Aphis citricolla

Samples (twenty five newly emerged shoots) were taken biweekly from navel trees during 2012/2013 and 2013/2014 seasons. The seasonal population fluctuations of *A. citricolla* on navel orange trees are shown in Tables 2 and 3. One peak of the population density was recorded for *A. citricolla*. The peak occurred at the fourth week of March with total numbers of 930 and 1493 insects/sample for *A. citricolla* at means of 20.04ºC and 19.15ºC, with 43.97% and 53.22% R.H. for the two seasons, respectively.

Aphis gossypii

The seasonal population abundances of *A. gossypii* on navel orange trees in 2012/2013 and 2013/2014 are shown in Tables 2 and 3. Three peaks of population density were recorded for *A. gossypii*. The first one occurred at the fourth week of November with total number of 1177 and 2237 insects/twenty five newly emerged shoots at means of 16.35ºC, 20.7ºC with 62% and 68.0% R.H. for the two seasons, respectively. The second peak occurred at the fourth week of March with total number of 1375 and 1728 insects/sample at means of 20.04ºC and 19.15ºC with 43.97% and 53.22% R.H. for the two seasons, respectively. The third peak occurred at the fourth week of June with total number of 110 insects/sample at mean of 28.19ºC with 50.77% R.H. for the first season (2012/2013) and the total number of 210 insects/ sample for 2013/2014 season occurred at the second week of July at means of 29.28ºC with 52.92% R.H.

Leafhopper insects

The leafhopper species *Empoasca decipiens* , *E. decedens* and *Cicadulina chinai* were the most abundant species on navel orange trees. Three peaks of population density were recorded for *E. decipiens* and *E. decedens* on navel orange trees. The first peak occurred at the fourth week of October with a total number of 399, 441 and 282, 345 insects/100 double stroke respectively, at means of 22.2ºC, 24.45ºC with 56.25% and 66.0% R.H. The second peak was recorded at the second week of June with a total number of 444, 508 and 255, 239 insects/ sample for *E. decipiens* and *E. decedens* at mean temp. 28.15ºC, 26.71ºC with 42.29% and 45.64% R.H. The third peak was recorded at the second week of September of 159, 213 and 85, 98 insects/sample for *E. decipiens* and *E. decedens* at means temp. 24.75ºC, 28.85ºC with 66% and 51.85% R.H. for the two seasons, respectively. While, the first peak of *C. chinai* 204 and 235 insects/sample was recorded at the fourth week of October at mean temperature of 22.2ºC, 24.45ºC with 56.25% and 66.0% R.H. for the two seasons, respectively. The second peak

Table 2. Seasonal population fluctuations of aphid, leafhopper, planthopper and whitefly insects infesting navel orange trees in Diarb-Nigm District, Sharkia Governorate during 2012/ 2013 season

Date of inspection (Biweekly)		Total number of insects								Mean Temp.°C	Mean R.H. (%)
		Aphid		Leafhopper			Planthopper		Whitefly		
		A. citricolla	*A. gossypii*	*E. decipiens*	*E. decedens*	*C. chinai*	*S. vibix*	*S. furcifera*	*B. tabaci*		
Oct.	**2nd**	0	189	231	209	69	73	179	260	26.00	49.8
	4th	0	119	399	282	204	243	181	237	22.20	56.25
Nov.	**2nd**	0	296	291	249	158	166	167	278	19.30	59.80
	4th	0	1177	204	154	130	106	102	627	16.35	62.00
Dec.	**2nd**	0	699	71	75	98	29	48	379	15.25	64.85
	4th	0	280	22	27	28	0	12	151	14.60	64.10
Jan.	**2nd**	0	30	39	22	16	0	0	53	13.40	62.18
	4th	0	105	19	12	0	0	0	54	16.65	45.66
Feb.	**2nd**	0	340	10	0	0	0	0	0	15.93	50.50
	4th	30	568	10	6	0	0	0	0	14.85	53.00
Mar.	**2nd**	370	940	34	19	0	0	0	119	20.05	43.57
	4th	930	1375	103	78	0	0	8	209	20.04	43.97
Apr.	**2nd**	193	497	104	95	4	16	10	356	21.29	46.58
	4th	0	91	72	136	11	25	16	273	20.59	43.8
May	**2nd**	0	0	151	138	17	28	22	246	25.93	45.22
	4th	0	0	309	249	31	30	27	126	27.38	39.10
Jun.	**2nd**	0	53	444	255	42	42	31	0	28.15	42.29
	4th	0	110	248	57	5	48	48	60	28.19	50.77
Jul.	**2nd**	0	81	157	52	93	66	55	330	27.44	59.57
	4th	0	23	85	14	105	65	63	423	28.13	54.68
Aug.	**2nd**	0	0	57	13	129	134	70	570	27.40	67.00
	4th	0	0	89	20	137	161	98	389	25.85	66.00
Sept.	**2nd**	0	0	159	85	229	221	230	374	24.75	66.00
	4th	0	0	119	62	102	204	178	205	24.15	66.00
Total		1523	6973	3427	2309	1608	1657	1545	5719		

Table 3. Seasonal population fluctuations of aphid, leafhopper, planthopper and whitefly insects infesting navel orange trees in Diarb-Nigm District, Sharkia Governorate during 2013/ 2014 season

Date of inspection (Biweekly)		Total number of insects								Mean Temp.°C	Mean R.H. (%)
		Aphid		Leafhopper			Planthopper		Whitefly		
		A. citricolla	*A. gossypii*	*E. decipiens*	*E. decedens*	*C. chinai*	*S. vibix*	*S. furcifera*	*B. tabaci*		
Oct.	**2nd**	0	0	385	316	100	22	209	25	24.15	66.0
	4th	0	0	441	345	235	299	291	171	24.45	66.0
Nov.	**2nd**	0	573	386	212	118	255	138	313	23.8	67.0
	4th	0	2237	161	96	183	132	90	556	20.7	68.0
Dec.	**2nd**	0	658	86	89	113	76	49	385	18.8	66.0
	4th	0	208	31	29	44	22	34	348	15.25	65.0
Jan.	**2nd**	108	0	37	33	10	12	0	381	14.15	67.57
	4th	20	0	23	25	2	7	0	112	16.05	52.34
Feb.	**2nd**	0	30	16	0	0	0	0	215	15.28	60.16
	4th	248	299	22	19	0	0	0	189	16.15	62.5
Mar.	**2nd**	678	763	42	44	4	6	8	243	18.49	44.33
	4th	1493	1728	76	62	15	22	14	286	19.15	53.22
Apr.	**2nd**	784	455	81	81	22	27	17	415	20.28	47.0
	4th	306	343	146	111	24	34	38	311	24.12	45.8
May	**2nd**	0	69	157	176	31	70	64	255	24.71	37.0
	4th	0	0	201	143	80	49	45	96	26.02	42.8
Jun.	**2nd**	0	0	508	239	55	43	12	108	26.71	45.64
	4th	0	129	385	81	74	62	39	311	28.95	43.92
Jul.	**2nd**	0	210	271	77	80	76	55	370	29.28	52.92
	4th	0	42	103	43	93	64	64	372	28.33	54.34
Aug.	**2nd**	0	0	65	33	62	120	88	518	29.35	53.28
	4th	0	0	92	46	109	149	103	202	29.81	55.82
Sept.	**2nd**	0	0	213	98	201	258	178	136	28.85	51.85
	4th	0	0	144	89	80	235	132	113	28.15	49.93
Total		3637	7744	4072	2487	1735	2040	1668	6431		

of *C. chinae* was recorded at the second week of June with a total number of 42 at mean temperature of 28.15ºC with 42.29% R.H (2012/ 2013) and at the fourth week of May with total number of 80 at mean temperature of 26.02 with 42.8% R.H. (2013/2014) The third peak of *C. chinae* was noticed at the second week of September with a total number of 229, 201 insects/ sample at a means temperature of 24.75, 28.85ºC with 66.0% and 51.85% R.H. (Tables 2 and 3).

These results are in harmony with the findings of Baspinar and Uygun (1991), Hegab *et al.* (2003) and Menegatti *et al.* (2008) who mentioned that leafhopper insects have three peaks on citrus trees.

Planthopper insects

Three peaks of *S. vibix* and *S. furcifera* population density were recorded on navel orange for the two seasons. The first one occurred at the fourth week of October with total numbers of 243, 299 and 181, 291 insects/ sample at temperature means of 22.2ºC, 24.45ºC with 56.25% and 66.0% R.H. for the two seasons, respectively. The second peak of *S. vibix* and *S. furcifera* occurred at the second week of May with total numbers 70, 64 insects/ sample at a mean temperature of 24.71ºC with 37% R.H. for the season of (2013/ 2014). The third peak was recorded at the second week of September with total numbers of 221, 258 and 230, 178 insects/ sample at temperature means of 24.75ºC, 28.85ºC with 66.0% and 51.85% R.H. for the two seasons, respectively (Tables 2 and 3).

Whitefly insect

Three peaks of population density were recorded for *B. tabaci* adult stage on navel orange as shown in Tables 2 and 3. The first one occurred at the fourth week of November with total numbers of 627 and 556 insects/twenty five newly emerged shoots at a mean temperature of 16.35 ºC and 20.7ºC with 62.0% and 68.0% R.H. for the two seasons, respectively. The second peak was recorded at the second week of April with a total number 356 of and 415 insects/ sample at temperature means of 21.29ºC and 20.28ºC with 46.58% and 47.0% R.H.% for the two seasons, respectively. The third peak was noticed at the second week of August with a total number of 570 and 518 insects/ sample at a mean temperature of 27.4ºC and 29.35ºC with 67.0% and 53.28% R.H.% for the two seasons, successively.

These results are in agreement with the findings of Chen and Wong (1998) and Hegab *et al.* (2003) who mentioned that whitefly has three peaks on citrus trees.

Mandarin Trees

Aphis citricoll

Samples (twenty five newly emerged shoots) were taken biweekly from mandarin trees during 2012/2013 and 2013/2014 seasons. The seasonal population abundance of *A. citricolla* on mandarin trees are shown in Tables 4 and 5. One peak of the population density was recorded for *A. citricolla*. The peak occurred at the fourth week of March with a total number of 1429 and 2595 insects/sample at temperature means of 20.04ºC and 19.15ºC, with 43.97% and 53.22% R.H. for the two seasons, respectively.

Aphis gossypii

The seasonal population abundances of *A. gossypii* on mandarin trees in 2012/2013 and 2013/2014 are shown in Tables 4 and 5. Three peaks of population density were recorded .The first one occurred at the fourth week of November with a total number of 1902 and 798 insects/sample at temperature means of 16.35ºC, 20.7ºC with 62.0% and 68.0% R.H. for the two seasons, respectively. The second peak occurred at the fourth week of March with a total number of 1066 and 1142 insects/sample at temperature means of 20.04ºC and 19.15ºC with 43.97% and 53.22% R.H. for the two seasons, respectively. The third peak occurred at the second week of June with a total number of 155 and 105 insects /sample at a temperature mean of 28.15ºC, 26.71ºC with 42.29% and 45.64% R.H. for the two seasons, respectively

Leafhopper insects

The leafhopper species *E. decipiens*, *E. decedens* and *C. chinai* were the most abundant species on mandarin trees. Three common distinict peaks of population density were recorded for *E. decipiens* and *E. decedens* on mandarin trees. The first peak occurred at the fourth of October with a total number of 322, 299 and 227, 259 insects/sample, respectively at temperature means of 22.2ºC, 24.45ºC with 56.25% and 66.0% R.H. The second peak was recorded at

Table 4. Seasonal population fluctuations of aphid, leafhopper, planthopper and whitefly insects infesting mandarin trees in Diarb-Nigm District, Sharkia Governorate during 2012/ 2013 season

Date of inspection (Biweekly)		Total number of insects								Mean Temp. °C	Mean R.H. (%)
		Aphid		Leafhopper			Planthopper		Whitefly		
		A. citricolla	*A. gossypii*	*E. decipiens*	*E. decedens*	*C. chinai*	*S. vibix*	*S. furcifera*	*B. tabaci*		
Oct.	**2nd**	0	0	38	4	27	100	121	0	26	49.8
	4th	0	90	322	227	154	283	177	3	22.2	56.25
Nov.	**2nd**	0	806	306	73	88	135	90	304	19.3	59.8
	4th	0	1902	149	19	69	54	80	490	16.35	62
Dec.	**2nd**	0	50	107	15	49	26	62	391	15.25	64.85
	4th	0	60	43	8	10	34	10	378	14.6	64.1
Jan.	**2nd**	30	0	24	9	2	0	0	367	13.4	62.18
	4th	30	0	14	3	4	0	0	130	16.65	45.66
Feb.	**2nd**	0	0	10	2	7	0	0	94	15.93	50.5
	4th	253	120	22	1	10	6	10	0	14.85	53
Mar.	**2nd**	690	551	29	7	11	14	16	57	20.05	43.57
	4th	1429	1066	38	8	14	28	25	142	20.04	43.97
Apr.	**2nd**	465	373	45	11	15	8	15	391	21.29	46.58
	4th	60	20	78	60	18	14	19	307	20.59	43.8
May	**2nd**	0	0	93	140	34	16	13	191	25.93	45.22
	4th	0	0	116	148	36	5	8	106	27.38	39.1
Jun.	**2nd**	0	155	254	274	46	5	25	0	28.15	42.29
	4th	0	10	153	55	54	8	29	68	28.19	50.77
Jul.	**2nd**	0	0	88	45	61	12	35	307	27.44	59.57
	4th	0	0	74	11	65	12	45	331	28.13	54.68
Aug.	**2nd**	0	0	35	10	75	71	55	443	27.4	67
	4th	0	0	35	21	141	171	78	331	25.85	66
Sept.	**2nd**	0	0	62	44	212	225	226	173	24.75	66
	4th	0	0	37	23	136	99	133	109	24.15	66
Total		2957	5203	2172	1213	1338	1326	1272	5113		

Table 5. Seasonal population fluctuations of aphid, leafhopper, planthopper and whitefly insects infesting mandarin trees in Diarb-Nigm District, Sharkia Governorate during 2013/ 2014 season

Date of inspection (Biweekly)		Total number of insects								Mean Temp. °C	Mean R.H. (%)
		Aphid		Leafhopper			Planthopper		Whitefly		
		A. citricolla	*A. gossypii*	*E. decipiens*	*E. decedens*	*C. chinai*	*S. vibix*	*S. furcifera*	*B. tabaci*		
Oct.	2nd	0	143	157	77	5	93	118	162	24.15	66.0
	4th	0	223	299	259	216	193	145	288	24.45	66.0
Nov.	2nd	0	408	164	153	103	74	109	422	23.8	67.0
	4th	0	798	87	93	67	65	86	693	20.7	68.0
Dec.	2nd	0	396	73	38	60	34	44	449	18.8	66.0
	4th	0	30	34	29	43	14	0	296	15.25	65.0
Jan.	2nd	0	0	15	7	36	0	0	185	14.15	67.57
	4th	20	37	8	0	16	0	0	115	16.05	52.34
Feb.	2nd	82	63	14	2	14	0	0	64	15.28	60.16
	4th	362	411	49	3	34	0	0	4	16.15	62.5
Mar.	2nd	682	895	68	7	22	10	10	64	18.49	44.33
	4th	2595	1142	74	40	17	25	20	65	19.15	53.22
Apr.	2nd	565	572	86	99	22	30	4	574	20.28	47.0
	4th	110	191	101	103	15	22	8	213	24.12	45.8
May	2nd	0	0	188	130	16	16	7	164	24.71	37.0
	4th	0	0	201	145	22	10	21	103	26.02	42.8
Jun.	2nd	0	105	308	223	45	2	25	0	26.71	45.64
	4th	0	33	225	94	61	19	14	0	28.95	43.92
Jul.	2nd	0	0	140	67	12	28	67	154	29.28	52.92
	4th	0	0	93	13	19	34	88	218	28.33	54.34
Aug.	2nd	0	0	26	22	88	115	100	474	29.35	53.28
	4th	0	0	19	28	94	157	113	281	29.81	55.82
Sept.	2nd	0	0	104	85	223	257	238	223	28.85	51.85
	4th	0	0	82	82	134	135	101	190	28.15	49.93
Total		4416	5447	2615	1799	1384	1333	1318	5401		

the second week of June with a total number of 254, 308 and 274, 223 insects/sample for *E. decipiens* and *E. decedens* at mean Temp. of 28.15ºC, 26.71ºC with 42.29% and 45.64% R.H. The third peak was recorded at the second week of September with a total number of 62, 104 and 44,85 insects/ for *E. decipiens* and *E. decedens* at mean Temp. of 24.75ºC, 28.85ºC with 66.0% and 51.85% R.H. for the two seasons, respectively. The first peak of *C. chinai* recorded 154 and 216 insects/sample was recorded at the fourth week of October at mean temperature of 22.2ºC, 24.45ºC with 56.25% and 66.0% R.H. for the two seasons, respectively. While, the second peak of *C. chinai* was noticed at the fourth week of June with a total number of 61 insects/ samples at a mean temperature of 28.95ºC with 43.92% R.H. for the second season (2013/2014). The third peak of *C. chinai* was noticed at the second week of September with a total number of 212, 223 insects/sample at temperature means of 24.75, 28.85ºC with 66.0% and 51.85% R.H. (Tables 4 and 5).

These results agree with the findings of Baspinar and Uygun (1991), Hegab *et al.* (2003) and Menegatti *et al.* (2008) who mentioned that leafhopper insects have two peaks on citrus trees.

Planthopper insects

Three common peaks of *S. vibix* and *S. furcifera* population density were recorded on mandarin trees for the two seasons. The first one occurred at the fourth week of October with a total number of 283 and193 and 177 and 145 insects/ sample at temperature means of 22.2ºC, 24.45ºC with 56.25% and 66.0% R.H. for the two seasons, respectively. The second peak occurred at the fourth week of March with a total number of 28, 25 insects/ sample at mean temperature of 20.04ºC, with 43.97% R.H. during the first season (2012/2013) and the peak of *S. vibix* was recorded at the second week of April with a total number of 30 at a mean temperature of 20.28ºC, with 47.0% R.H. at the season of 2013/2014 (Tables 4 and 5) and the second peak of *S. furcifera* recorded at the fourth week of March with a total number of 20 at mean temperature of 19.15ºC with 53.22 R.H. The third peak was recorded at the second week of September with a total number of 225 and 257 and 226 and 238 insects/ sample at means temperature of 24.75ºC, 28.85ºC with 66.0% and 51.85% R.H. for the two seasons, respectively.

Whitefly insects

Three common peaks of population density were recorded for *B. tabaci* adult stage for the two seasons on mandarin trees as shown in Tables 4 and 5. The first one occurred at the fourth week of November with a total number of 490 and 693 insects/sample at temperature means of 16.35ºC and 20.7ºC with 62.0% and 68.0% R.H. for the two seasons, respectively. The second peak was recorded at the second week of April with a total number of 391 and 574 insects/ sample at temperature means of 21.29ºC and 20.28ºC with 46.58% and 47.0% R.H.% for the two seasons, respectively. The third peak was noticed at the second week of August with a total number of 443 and 474 insects/ sample at temperature means of 27.4ºC and 29.35ºC with 67.0% and 53.28% R.H.% for the two seasons, successively.

These results are confirmed with the findings of Chen and Wong (1998) and Hegab *et al.* (2003) who mentioned that whitefly has three peaks on citrus trees.

Guava trees

Aphid insects

The results in Tables 6 and 7 obviously show that two peaks of *A. gossypii* population density were recorded. The first one occurred at the fourth week of August showing total numbers of 701 and 651 insects/sample at temperature means of 25.85ºC, 29.4ºC with 66.0% and 57.05% R.H. for the two seasons, respectively. The second peak was recorded at the fourth week of June with a total number of 689 and 689 insects/ samples at temperature means of 28.19ºC, 28.95 ºC with 50.77% and 43.92% R.H.% for the two seasons, successively.

Leafhopper insects

The leafhopper species *E. decipiens* and *E. decedens* were the most abundant species on guava trees during 2012/2013 and 2013/2014 seasons, as clearly shown in Tables 6 and 7. Three peaks were recorded. The first peak occurred at the fourth week of October with a total number of 116, 94 and 96, 104 insects/ sample at temperature means of 22.2ºC, 24.45ºC

Table 6. Seasonal population fluctuations of aphid, leafhopper and whitefly insects infesting guava trees in Diarb- Nigm District, Sharkia Governorate during 2012/2013 season

Date of inspection (Biweekly)		Total number of insects				Mean Temp. ºC	Mean R.H. (%)
		Aphid insects	Leafhopper insects		Whitefly		
		A. gossypii	*E. decipiens*	*E. decedens*	*B. tabaci*		
Aug.	**2nd**	351	30	8	76	27.4	67.0
	4th	701	34	13	63	25.85	66.0
Sept.	**2nd**	290	34	40	26	24.75	66.0
	4th	117	51	52	37	24.15	66.0
Oct.	**2nd**	89	82	64	217	26	49.8
	4th	53	116	96	327	22.2	56.25
Nov.	**2nd**	16	101	55	180	19.3	59.8
	4th	0	59	14	149	16.35	62.0
Dec.	**2nd**	0	47	10	93	15.25	64.85
	4th	0	31	6	69	14.6	64.1
Jan.	**2nd**	0	58	2	7	13.4	62.18
	4th	0	28	3	9	16.65	45.66
Feb.	**2nd**	0	30	5	168	15.93	50.5
	4th	0	24	5	83	14.85	53.0
Mar.	**2nd**	0	44	2	97	20.05	43.57
	4th	0	79	5	112	20.04	43.97
Apr.	**2nd**	0	87	50	124	21.29	46.58
	4th	0	132	103	228	20.59	43.8
May	**2nd**	0	107	55	176	25.93	45.22
	4th	256	60	17	130	27.38	39.1
Jun.	**2nd**	477	51	10	75	28.15	42.29
	4th	689	46	11	2	28.19	50.77
Jul.	**2nd**	526	46	6	0	27.44	59.57
	4th	208	34	5	59	28.13	54.68
Total		3773	1411	637	2507		

Table 7. Seasonal population fluctuations of aphid, leafhopper and whitefly insects infesting guava trees in Diarb- Nigm District, Sharkia Governorate during 2013/2014 season

Date of inspection (Biweekly)		Total number of insects				Mean Temp. °C	Mean R.H. (%)
		Aphid	Leafhopper		Whitefly		
		A. gossypii	*E. decipiens*	*E. decedens*	*B. tabaci*		
Aug.	**2nd**	372	11	6	48	29.29	53.72
	4th	651	30	13	43	29.4	57.05
Sept.	**2nd**	415	57	16	81	30.85	49.86
	4th	206	57	27	160	29.46	54.8
Oct.	**2nd**	152	87	69	127	24.15	66.0
	4th	114	94	104	420	24.45	66.0
Nov.	**2nd**	37	74	62	210	23.8	67.0
	4th	10	48	26	101	20.7	68.0
Dec.	**2nd**	0	34	12	61	18.8	66.0
	4th	0	44	6	60	15.25	65.0
Jan.	**2nd**	0	47	19	114	14.15	67.57
	4th	0	46	9	42	16.05	52.34
Feb.	**2nd**	0	37	9	36	15.28	60.16
	4th	0	35	12	23	16.15	62.5
Mar.	**2nd**	0	40	15	44	18.49	44.33
	4th	0	64	20	55	19.15	53.22
Apr.	**2nd**	0	95	62	230	20.28	47.0
	4th	0	140	98	273	24.12	45.8
May	**2nd**	0	124	80	154	24.71	37.0
	4th	208	88	63	82	26.02	42.8
Jun.	**2nd**	526	78	50	72	26.71	45.64
	4th	689	42	12	16	28.95	43.92
Jul.	**2nd**	477	53	28	65	29.28	52.92
	4th	256	34	22	157	28.33	54.34
Total		4113	1458	840	2674		

with 56.25%, 66.0% R.H. for the two seasons, respectively. The second peak occurred at the fourth of April with a total number of 132, 140 and 103, 98 insects/sample at temperature means of 20.59ºC, 24.12ºC with 43.8%, 45.8% R.H. for the two seasons, respectively The third peak of *E. decipiens* was recorded at the second week of July with a total number of 46.0, 53.0, insects/ sample at temperature means of 27.44 ºC, 29.28ºC with 59.57%, 52.92% R.H. But, for *E. decedens* was detected at the fourth week of June with a total number of 11.0, insects/ sample at means of 28.19ºC, 50.77 (2012/2013) and at temperature the second week of July with a total number 28.0. insects/sample at a mean temperature of 29.28ºC with 52.92% R.H. (2013/2014).

These results agree with the findings of El-Serafi *et al.* (2004) and Menegatti *et al.* (2008) who mentioned that aphid and leafhopper insects have two peaks on guava trees.

Whitefly insect

Three common peaks of *B. tabaci* adults population density were recorded (Tables 6 and 7). The first peak occurred at the fourth week of October with a total number of 327 and 420 adults/sample at temperature means of 22.2ºC, 24.45ºC with 56.25% and 66.0% R.H. for the two seasons, respectively. The second peak was recorded at the second week of February with a total number of 168 at temperature means of 15.93ºC, 50.5% R.H. for 2012/2013 season and the total number of 114 was recorded at the second week of January at temperature means of 14.15ºC 67.57% R.H. for 2013/ 2014 season. The third peak occurred at the fourth week of April with a total number of 228 and 273 adults/samples at temperature means of 20.59ºC, 24.12ºC with 43.8% and 45.8% R.H. for the two seasons, respectively.

The obtained results are in agreement with those obtained by El-Serafi *et al.* (2004), Sottoriva *et al.* (2011) and Radonjic *et al.* (2014).

Effect of Mean Temperature and Relative Humidity on The population Density of Some Dominant Homopterous Insects Infesting Citrus and Guava Trees

A. citricolla

The obtained results in Table 8 appear that the correlation coefficient between population density of *A. citricolla* and mean temperature was notsignificant (r_1= 0.209 and 0.176) in the two seasons, respectively. Also, relative humidity has insignificant effect on the population density of the tested aphid (r_2 = 0.125 and 0.262) in the two seasons, successively. The partial regression between *A. citricolla* and mean temperature and relative humidity were negative and insignificant (b_1= 10.569 and 5.213) and (b_2 =4.108 and 2.071) in the two seasons, respectively.

A. gossypii

The obtained results appeared that the correlation coefficient between population density of *A. gossypii* and mean temperature was negative and significant (r_1= -0.514 and -0.427) in the two seasons, respectively (Table 5). Wheareas, the effect of relative humidity was positive and insignificant (r_2 = 0.215 and 0.202) in the two season, successively. The partial regression between *A. gossypii* population and mean temperature and relative humidity was negative and insignificant (b_1 = -6.309 and -4.405) and (b_2= 3.746 and 1.294) in the two seasons, respectively.

E. decipiens

The correlation coefficient between population density of *E. decipiens* and mean temperature was positive and insignificant (r_1 = 0.333) in the first season, while it was positive and highly significant (r_1= 0.525**) in the second season. But the correlation coefficient between population density and relative humidity was negative and insignificant (r_2= -0.302) during 2012/ 2013, while it was negative and highly significant (r_2= -0.560**) in the second season. The partial regression coefficients between the population of *E. decipiens* and mean temperature, as well relative humidity were insignificant (b_1 = 0.919 and 1.420), (b_2= -1.175 and -0.939) in the two seasons, consecutively.

E. decedens

The correlation coefficient between population density of *E. decedens* and mean temperature was positive and significant (r_1 =0.441* and 0.486*). But in case of relative humidity they were negative and highly significant (r_2= -0.516** and -0.574**) in the two seasons, respectively. The partial regression coefficients between population of *E. decedens* and mean temperature as well

Table 8. Simple correlation coefficient(r), partial regression coefficient (b) and coefficient of determination (CD) between some weather factors and the population density of some homopterous insects infesting citrus and guava trees in Diarb-Nigm District, Sharkia Governorate during 2012/2013 and 2013/2014 seasons

Insect	Simple correlation coefficient				Partial regression coefficient				Total C.D.%	
	2012/2013		2013/2014		2012/2013		2013/2014		2012/2013	2013/2014
	r_1	r_2	r_1	r_2	b_1	b_2	b_1	b_2		
A. citricolla	0.209	0.125	0.176	0.262	10.569	4.108	5.213	2.071	0.214	0.338
A. gossypii	-0.514*	0.215	-0.427*	0.202	-6.309	3.746	-4.405	1.294	0.276	0.183
E. decipiens	0.333	-0.302	0.525**	-0.560**	0.919	-1.175	1.420	-0.939	0.128	0.387
E. decedens	0.441*	-0.516**	0.486*	-0.574**	1.016	-1.682	1.052	-1.757	0.295	0.446
C. chinai	0.256	-0.038	0.567**	-0.330	0.480	-0.100	0.990	0.357	0.038	0.323
S. vibix	0.455*	-0.209	0.583**	-0.454*	1.284	-0.838	-1.433	-0.692	0.212	0.370
S. furcifera	0.489*	-0.222	0.538**	-0.527**	1.132	-0.727	1.217	-0.739	0.245	0.371
B. tabaci	0.040	-0.234	0.142	-0.479*	0.100	-0.845	0.426	-0.890	0.070	0.246

r_1 =Simple correlation coefficients for mean temperature, and r_2 for mean relative humidity.
b_1 = Partial regression for mean temperature, and b^2 for mean relative humidity.
r without stars indicates that the correlation coefficient is notsignificant at 0.05% level of probability.
r*with star indicates that the correlation coefficient is significant and with 2 stars (r^{**}) indicates highly significant correlation at 0.01% level of probability.

relative humidity were positive and negative (b_1 = 1.016 and 1.052), (b_2= -1.682 and -1.757) in the two seasons, respectively.

C. chinai

The correlation coefficient between population density of *C. chinae* and mean temperature was positive and insignificant (r_1 = 0.256) in the first season, while in the second one it was positive and highly significant whereas, those regarding, (r_1= 0.5671**) and relative humidity they were negative and insignificant (r_2 = -0.038, -0.330) for the two seasons. The partial regression coefficients between population of *C. chinae* and mean temperature as well relative humidity were insignificant (b_1 = 0.480 and 0.990); (b_2= -0.100 and 0.357) in the two seasons, successively.

S. vibix

The correlation coefficients between *S. vibix* and mean temperature were positive significant and highly significant (r_1 = 0.455* and 0.583**) in the two seasons, successively. But, those concerning the relationship between the population of *S. vibix* and relative humidity proved to be negative, insignificant and significant (r_2= -0.209 and -0.454*) during the two seasons, respectively. The partial regression coefficients between population of *S. vibix* and mean temperature as well relative humidity were significant (b_1 = 1.284 and -1.433) and (b_2= -0.838 and -0.692) in the two seasons, respectively.

S. furcifera

The correlation coefficient between *S. furcifera* and mean temperature was positive significant and highly significant (r_1 = 0.489* and 0.538**) in the two seasons, while those in respect to coefficient, relative humidity they were negative insignificant and highly significant (r_2= -0.222 and -0.527**) in the two seasons, respectively. The partial regression coefficients between population of *S. furcifera* and mean temperature as well relative humidity were significant (b_1 = 1.132, 1.217) and (b_2 = -0.727, -0.739) in the two seasons, respectively.

B. tabaci

Insignificant and significant correlation coefficients were found between adult stage population of *B. tabaci* and mean temperature as well relative humidity showing (r_1 = 0.040 and 0.142) and (r_2= -0.234 and -0.479*) in the two seasons, respectively. The partial regression between the population of adult stage and mean temperature as well relative humidity was

insignificant (b_1 = 0.100 and 0.426) and (b_2 = -0.845 and -0.890) in two seasons, respectively. Data in Table 8 show that r_2, both correlation coefficient and coefficient of determinatnation greatly influenced by the two aforementioned meteorological factors which played a conspicuous role in detecting the activity of these insectpests during the aforementioned investigated seasons.

Parh (1986) and Raupach *et al*. (2002) explained that the temperature and relative humidity affect the insects population density under study on citrus and guava trees.

Effect of Chemical Contents of Citrus trees (Navel orange and Mandarin) and Guava trees on the Population Density of Some Homopterous Insects

Total proteins (%)

Statistical analysis of the results presented in Table 9 show that proteins percentage was high significantly correlated with the total number of insects. The obtained results revealed a positive relationship between total protein contents and the insect population density infestations. In case of aphids, the total number of insects was 11381 on navel orange with protein content of 17.65%, this number decreased to 5893and 4113 insects/sample by decreasing the total protein to 13.79% and 8.45% in mandarin and guava trees, respectively.

Concerning leafhoppers, the highest total number of leafhoppers / sample was 8294 on navel orange with the highest percentage of 17.65 proteins content. followed by 5798 and 2251 leafhoppers in mandarin and guava trees with the total proteins of 13.79% and 8.45%, respectively. The total number of planthoppers on navel orange trees was 3708 insects/sample with 17.65% and decreased to 2651 insects/ sample by decreasing total proteins to 13.79% on mandarin trees.

With regard to the total number of whitefly adults (*B. tabaci*), the highest number was recorded on navel orange that had the highest percentage of protein content and the lowest one on guava trees that had the lowest protein content.

Carbohydrates (%)

Statistical analysis of Table 9 show that the effect of carbohydrates percentage was highly significant with the total number of insects. The data presented in Table 9 show that there were positive relationship between carbohydrates (%) in different citrus and guava trees and insect population density. The highest total number of the tested insects; aphids, leafhoppers, planthoppers and whitefly were 11381, 8294, 3708 and 6431 respectively on navel orange that had the highest percentage of carbohydrates, followed by mandarin and guava trees that had the relatively low percentage of carbohydrates.

pH. value

Statistical analysis of Table 9 show that pH value had significant influence on the total number of insects. In respect to the population density of the investigated insects (aphids, leafhoppers, planthoppers and whitefly) it is obvious that insect numbers are decreasing by increasing the pH values on the tested trees. The highest total number of these insects 11381, 8294, 3708 and 6431 were observed on navel orange wherein the lowest pH value (4.216) was found. The highest pH value (4.483) was recorded in guava trees that infested by the lowest total numbers of insects.

Total phenols

Statistical analysis of Table 9 show that the impact of total phenols content was highly significant on the total number of insects. The obtained results revealed reverse relationship between total phenols and insects population density on citrus and guava trees. The total number of aphid insects / sample was 11381on navel orange containing low content 367.357 mg of total phenols. This number decreased to 5893 insects/sample by increasing the total phenols to 434.513 mg total phenols on mandarin and to 4113 insects/sample by increasing the total phenols to 461.686 mg on guava trees

Tannins

Statistical analysis of the results arranged in Table 9 show that tannins content had highly significant effect on the total number of insects.

Table 9. Effect of total proteins, carbohydrates, pH values, total phenols, tannins and phenols oxidize of navel orange, mandarin and guava trees on the population density of certain homopterous insects

Fruit tree	Total protein (%)	Carbohydrate (%)	pH value	Total phenol (mg)	Tannin (mg)	phenols oxidize (ml)	Aphid	Leafhopper	Planthopper	Whitefly
Navel orange	17.65	45.293	4.216	367.357	180.103	5.263	11381	8294	3708	6431
Mandarin	13.79	43.957	4.333	434.513	186.417	5.3867	5893	5798	2651	5401
Guava	8.45	40.35	4.483	461.686	194.593	8.223	4113	2251	-	2674
F.	53.14. **	40.03**	42.32*	23.23**	50.53*	66.61**	33.35**	57.58**	26.46**	97.58**

Respecting the relationship between tannins and insect numbers in citrus and guava trees, there was reverse relationship between insect numbers (aphids, leafhoppers, planthoppers and whitefly) and the level of tannins in the trees. Whereas, the lowest level of tannins in navel orange showed the highest total number of insects and reversing relationship was observed in guava trees.

Phenols oxidize

Statistical analysis of Table 9 show that the influence of total phenol oxidize was highly significant on the total number of insects. It is clear from the obtained results that there was reverse relationship between insect population densities and phenols oxidize content in citrus and guava trees. The lowest phenols oxidize (5.263 ml) caused the highest total number of aphids, leafhoppers, planthoppers and whitefly in navel orange and the highest content (8.223) indicated the lowest total number of insects in guava trees.

These results are in agreement with the finding of Abd-Elsamad (1999) and Hegab, Ola (2001) who found that there were positive correlations between total protein content, carbohydrates content and the population density of homopterous insects on wheat cultivares. Hashem (2005) showed that the concentration of total carbohydrates vegetable plants variety (more susceptible variety) was lower than in vegetable plants variety (least susceptible variety). Also, Hashem *et al.* (2011) recorded that chemical contents of broccoli plants affected the population density of homopterous insects.

Generally, chemical analysis revealed that total proteins, carbohydrates, pH and total phenols were significantly varied in different trees (2013/2014) season as shown in Table 9. The obtained results indicated markedly relationship between these chemical elements and the aforementioned insects population density for the three tested fruit.

REFERENCES

Abd-Elsamad, A.A. (1999). Studies on some homopterous insect vectors of plant diseases. M.Sc. Thesis, Fac. Agric., Zagazig Univ., Egypt, 179.

Al-Moaalem, R.C., I.D. Borgemeister and H.M. Poehling (2005). The influence of different host plants on the green leafhopper *Empoasca decipiens* Paoli (Homoptera: Cicadellidae) and its parasitoid *Anagrus atomus* Halliday (Hymenoptera: Mymaridae). Mitt. Biol. Bund Land-Forst, 396: 103-105.

Anonymous (1990). Costat Software Microcomputer Program; Version 4 – 20, Cohort Software, Berkley CA, USA.

Baspinar, H. and N. Uygun (1991): Faunistic and systematic studies on the cicadellid species found in citrus orchards in the East Mediterranean region of Turkey. Turkiye Entomoloji Dergisi, 15 (3): 157-172.

Chen, D.M. and R.G. Wong (1998). The dominant citrus aphid species, causes of outbreaks and control strategy. South China Fruits, 27 (4):16-17.

El-Serafi H.A., A.A. Ghanim, A.H. Heneidy and M.K. El-Sherbenie (2004). Ecology studies on certain insects infesting guava orchards and their predatory insects J. Biological Pest Control, 14 (1): 87-95.

Hashem, M.S. (2005). Studies on certain piercing-sucking insects infesting some vegetable crops. Ph.D. Thesis, Fac. Agric., Moshtohr, Zagazig Univ., Egypt.

Hashem, M.S., A.A. Abd-Elsamad and A.A.A. Abd-Alla (2011). Effect of certain agricultural practices on infesting of broccoli plants with certain homopterous insects at Minia El-Kamh District, Sharkia Governorate, Egypt. Zagazic J. Agric. Res., 38 (1):179 – 191.

Hegab, A.M., I.M. Kelany and M.M. EI-Maghraby (1987): Survey of leafhoppers and planthoppers infesting maize plants by using three sampling techniques in newly reclaimed sandy areas at Salhia district, Egypt. Minia J. Agric. Res., 9 (2): 945-953.

Hegab, A.M., W.M.H. Desuky, A.A. Attia and A.A.A. Youssef (2003). Ecological studies on certain homopterous insects infesting some citrus trees in Egypt. Egyptian J. Agric. Res., 81 (2): 531-550.

Hegab, Ola, I.M.S. (1997). Studies on certain Homopterous insects vector of plant pathogenic diseases. M.Sc. Thesis Fac. Agric., Zagazig Univ., Egypt.

Hegab, Ola, I.M.S. (2001). Studies on certain insect vectors of plant pathogenic agents. Ph. D. Thesis. Fac. Agric., Zagazig Univ., Egypt.

Herakly, F.A. (1970). Studies on certain jassids infesting vegetables in Egypt. M.Sc. Thesis, Fac. Agric., Ain Shams Univ., Egypt, 221.

Malik, L., J. Emmanuelle and C.D. Armelle (2010). Assessment of aphid diversity (Hemiptera: Aphididae) in Algeria: a fourteen-year investigation. Entomology, 62 (2): 73-87.

Maramorosch, K. and K.F. Harris (1979). Leafhoppers Vectors and Plant Disease Agents. Academic Press, New York and London, 654.

Menegatti, A.C.O., F.R.M. Garcia and M. Savaris (2008). Faunistic analysis and population fluctuation of leafhoppers (Hemiptera: Cicadellidae) in citrus orchards at Chapeco, Santa Catarina, Brazil. Biotemas., 21 (1): 53 - 58.

Nielson, M.W. (1968). The leafhopper vectors of phytopathogenic viruses (Homoptera: Cicadeilidae) taxonomy, biology and virus transmission. Agric. Res. Ser. M.S. Dept. Agric., 89: 386.

Parh, I.A. (1986). The reaction of the cowpea leafhopper *E. dolichi* (Paoli) to temperature and humidity. Indian J. Entomol., 48 (3): 346-353.

Radonjic, S., S. Hrncic and C. Malumphy (2014). First record of *Aleurocanthus spiniferus* (Quaintance) (Hemiptera: Aleyrodidae) in Montenegro. Redia, 97 : 141-145.

Raupach, K., C. Borgemeister, M. Hommes, H.M. Poehling and M. Sétamou (2002). Effect of temperature and host plants on the bionomics of *Empoasca decipiens* (Homoptera: Cicadellidae). Crop Prot., 21: 113–119.

Sottoriva, L.D.M., A.R. Roel, A.F.D. Lima, R.O. Souza and A.P. Souza (2011):Survey of Aleirodidae in Campo Grande, MS and region. Revista Agrarian, 4 (13): 251 - 257.

دراسات ايكولوجية على بعض الحشرات متشابهة الأجنحة التي تصيب أشجار الموالح و الجوافة

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أجريت الدراسة خلال موسمين متتاليين ٢٠١٣/٢٠١٢ و٢٠١٤/٢٠١٣ بهدف حصر حشرات بعض أنواع المن ونطاطات الأوراق و نطاطات النباتات وذبابة القطن أو الطماطم البيضاء وكذلك دراسة الوفرة الموسمية للأنواع السائدة التي تصيب أشجار الموالح و الجوافة المزروعة في منطقة ديرب نجم - محافظة الشرقية وذلك باستخدام ثلاثة طرق لأخذ العينات وهى العينة النباتية والمصيدة الشبكية الكانسة والمصيدة اللاصقة، وقد أوضحت النتائج أن انواع حشرات المن التى تصيب أشجار الموالح والجوافة هى *Aphis citricolla* (Goot) and *Aphis gossypii* (Glover) وأنواع نطاطات الأوراق التي تصيب أشجار الموالح هي *Empoasca decipiens* (Paoli) *E. decedens* (Paoli) and *Cicadulina chinai* (Ghauri) وكذلك تم حصر نطاطات النباتات علي أشجار الموالح *Sogatella vibix* (Haupt) and *S. furcifera* (Horv) بينما تم حصر نطاطات الأوراق *Empoasca decipiens* و *E. decedens* و من القطن *A. gossypii* وذبابة القطن أو الطماطم البيضاء *Bemesia tabaci* على أشجار الجوافة، وقد أوضحت النتائج أن العينة النباتية هي أفضل طريقه لتقدير تعداد حشرات المن وذبابة القطن أو الطماطم البيضاء أما الشبكة الكانسة فكانت الأفضل بالنسبة لنطاطات الأوراق والنباتات وبدراسة الوفرة الموسمية للأنواع السائدة على أشجار الفاكهه موضع الدراسة وجد أن من الموالح *A. citricolla* له قمة نشاط واحدة في الأسبوع الرابع من شهر مارس في موسمي الدراسة بينما لمن القطن *A. gossypii* قمتين على البرتقال أبوسرة واليوسفي في الأسبوع الرابع من نوفمبر ومارس خلال موسمي الدراسة والقمة الثالثة للبرتقال أبو سرة كانت في الأسبوع الرابع من يونيو للموسم الأول والأسبوع الثاني من يوليو في الموسم الثاني وكذلك قمة ثالثة لأشجار اليوسفي في الأسبوع الثاني من يونيو خلال موسمي الدراسة وله قمتين في الأسبوع الرابع من أغسطس و يونيو على أشجار الجوافة، أما حشرتي *E. decipiens* and *E. decedens* كان لهما ثلاثة قمم نشاط في الأسبوع الرابع من أكتوبر والأسبوع الثاني من يونيو وسبتمبر على البرتقال أبو سره واليوسفي وكذلك كان لهم في الأسبوع الرابع من أكتوبر وابريل على الجوافة، بينما لحشرة *C. chinai* قمتي نشاط في الأسبوع الرابع من أكتوبر والأسبوع الثاني من سبتمبر على أشجار الموالح خلال موسمي الدراسة وقمه ثالثه لأشجار البرتقال أبو سره في الأسبوع الثاني من يونيو في الموسم الأول والرابع من مايو في الموسم الثاني وعلي أشجار اليوسفي في الأسبوع الرابع من يونيو في الموسم الأول، أما حشرة الذبابة البيضاء *B. tabaci* كان لها ثلاثة قمم نشاط على الموالح خلال الأسبوع الرابع من نوفمبر والثاني من أبريل وأغسطس و لها ثلاث قمم نشاط على الجوافة في الأسبوع الرابع من أكتوبر والقمة الثانية في الأسبوع الثاتي من فبراير للموسم الأول والأسبوع الثاني من يناير للموسم الثاني و القمة الثالثة في الأسبوع الرابع من ابريل خلال موسمي الدراسة، أما نطاطات النباتات *S. furcifera* and *S. vibix* فقد سجلا قمتي نشاط على أشجار الموالح خلال موسمي الدراسة فى الأسبوع الرابع من شهر أكتوبر والأسبوع الثاني من سبتمبر وقمة ثالثة علي البرتقال أبوسرة في الأسبوع الثاني من مايو خلال موسم الدراسة الثاني وعلي أشجار اليوسفي القمة الثالثة في الأسبوع الرابع من مارس للموسم الأول والأسبوع الثاني من أبريل في الموسم الثاني، ومن خلال الدراسة وجد أن لكل من متوسط درجة الحرارة والرطوبة النسبية تأثير كبير على تعداد الحشرات ، يهدف هذا البحث إلى استخدام النتائج المتحصل عليها و الاستفادة منها عند وضع برامج المكافحة المتكاملة لهذه الآفات على أشجار الموالح و الجوافة من خلال تفعيل دوربعض العوامل البيئية الرئيسية (درجة الحرارة و الرطوبة النسبية) المتحصل عليها من هذه الدراسات . ولقد اثبت التحليل الكيميائي للعصارة النباتية وجود ارتباط بين جميع المكونات المختبرة وتعداد الحشرات موضع الدراسة.

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