Bull.Fac. Agric., Cairo Univ., 53 (2002): 653-670.

POPULATION FLUCTUATIONS AND DIURNAL ACTIVITY OF THE LEAFHOPPER , *Empoasca decipiens* ON SOME SUMMER CROPS IN KALUBIA GOVERNORATE , EGYPT

(Received: 10.2.2002)

By
I.M.A. Ebadah

Pests and Plant Protection Department , National Research Center,Egypt.

ABSTRACT

The present work is a study on population fluctuations and diurnal activity of the leafhopper, *Empoasca decipiens* (Paoli) on seven early summer crops (green bean ,cowpea, potato , tomato , squash , cucumber and hairy cucumber) as well as six late summer crops (mungbean , egg-plant ,green pepper , okra , pumpkin and Jerusalem artichoke). Results showed that squash and egg – plant were the most infested crops .The insect had three peaks of seasonal abundance; on 8 May (the highest) which occurred on the early summer, on 5 June (the lowest) and on 31 July (medium) on the late summer. The insect passed throughout four generations from mid-April to the end of August. The climatic conditions during the above peaks were about 24.6 – 27.8 °C and 58.9 – 60.3% R.H.

Three critical periods were suggested to control this pest in the field . The population density of *E. decipiens* was the highest on cowpea, squash (early summer crops), egg - plant and okra (late summer crops). These crops were selected as representatives of early and late summer plants to study the diurnal activity of *E. decipiens*. The number of insects increased progressively from 8 a.m onwards and reached its highest peak at 2 p.m in cowpea and squash, then decreased to a minimum level at 6 p.m. on egg – plant and okra. The highest peak was attained at 12 noon, after which the population gradually decreased.

Key words: *climatic conditions, leafhopper, predator.*

1. INTRODUCTION

Leafhopper species are important pests in view of plant pathogen transmission to different vegetable plants (Nielson , 1968 ; Nault and Ammar , 1989). These insects, invade vegetable and field crops in Kalubia Governorate causing damage to plants . The present work aimed to study the seasonal and diurnal fluctuation of one of these leafhoppers , *i.e., Empoasca decipiens* (Paoli) which is abundantly found on the summer crops, to test the effect of the main climatic conditions as well as other biotic factors.

2. MATERIALS AND METHODS

Nearby fields cultivated with early summer crops, *i.e.,* bean *(Phaseolus vulgaris),* cowpea *(Vigna sinensis)* , potato*(Solanum tuberosum)*, tomato *(Lycopersicum esculentum),* squash *(Cucurbita pepo)*, cucumber *(Cucumis sativus)* , hairy cucumber *(Cucumis melo)* followed by other late summer crops , *i.e.,* mungbean (*Vigna radiata L.*) ,egg–plant*(Solanum tuberosum)* , green pepper *(Capsicum frutescens)* , okra *(Hibiscus esculentus)* , pumpkin *(Cucurbita marima)* and Jerusalem artichoke *(Helianthus tuberosus)* were chosen for sampling purposes at *(El–Kanater El -Khairia)* , El-Kalubia Governorate .The early summer crops were cultivated during the first week of March, while the late summer crops during 5-10 April 2001 .

To estimate population fluctuation activity, sweep-net technique was applied. For this purpose a sweep- net 30 cm diameter,60 cm. deep of the conical fine muslin and long wooden handle (1.6 m) was used. The weekly samples started 5 weeks after cultivation date and continued till the harvest. Each sample was represented by 25 double strokes, taken at random from the cardinal directions of a fixed area (35×20 m) .

To study the diurnal activity, the initial sample was taken at 8 a.m and then repeated 6 times at 2-hour intervals to 6 p.m. The captured insects were collected and transferred into polyethylene bags to be examined in the laboratory. The samples were sorted into the target species as well as the coccinellid predator species (adult) . The counts of both adults and nymphs of the cicadellid during the day (6 samples)

on hosts were considered as the population index for each week .

To estimate the number and duration of generations, the methods adapted by Audemard and Milaire (1975) and Iacob (1977) were followed.

3. RESULTS AND DISCUSSION

Identification of the captured leafhoppers according to Paoli (1936) showed that the majority was the target species, *Empoasca decipiens* (Paoli), while the main predator adults were identified *as Coccinella undecimpunctata* Reiche.

3.1. Population fluctuations of the leafhopper, *Empoasca decipiens* (Paoli).

Results of the weekly counts of *E. decipiens* and its coccinellid predator on early and late summer crops with the corresponding climatic conditions are given in Tables (1&2) and represented by Fig. (1). From these results, it is clear that this insect has three peaks of seasonal abundance, one of the highest size (29476 insects) during 8th May, 2001 on the early summer crops, while two other peaks during 5 June (12466 insects) and 31 July, 2001 (12745 insects) on the late summer crops. Correlating these peaks with the main climatic conditions during the preceding week before sampling, it was found that 24.6°C and 58.9% R. H. was correlated with the highest peak (from 1 to 15 May, 2001). As to the lowest peak, it occurred on 31 July where the climatic conditions were 27.8 °C and 60.3% R.H.

In the case of July,31 peak, the climatic conditions showed relatively similar readings 28.5 and 60.7 % R.H. from 29 May to 12 June , 2001 .This means that the optimal climatic temperature and relative humidity were 24.6-27.8 °C and 58.9-60.3 R.H.% respectively.

In this aspect, Willcocks (1937) stated that the unfavorable climatic conditions are among the main reasons for the slow increase of the jassid in Egypt . He added that jassids tended to prevail about late August and early Septemper, starting to appear in early May on cotton plants in Egypt. Hanna (1950) and Joyce (1961) reported that rainfall and high humidity in July and August in Sudan reduced the population.

Sami (1963) found that *E. decipiens* on cotton reached its maximum population level during May and decreased during late August and early September in Giza region. Hosny and El-Dessouki

(1967) found that *Empoasca* spp reached the main peak during the first half of August and there were small peaks between that date and mid September on cotton plants at Shobra El-Kheima and Bahteem. Ammar *et al.,* (1986) demonstrated that *Empoasca spp* reached the highest population in late June and early August on cotton plants at Kafer – El- Sheikh. Hamdy (1992) found 3 peaks one of 30 May , while diminishing other two peaks were recorded on 8 August and 20 September .

With regard to the predator, *C. undecimpunctata*, the total weekly number of the adults captured on the early and on late summer crops are shown in Tables (1&2) . The results showed that generally the predator appeared in few numbers in the first stages of the growing plants. Afterwards its numbers generally increased, to reach the highest population (98 insects) on 29 May in the early summer crops and (394 insects) on 19 June in the late summer crops , then decreased gradually to reach its minimum numbers once again by the time of harvest. This indicates that coccinellid predator activity is associated with the activity of the leafhopper on the host plant. Chiu (1979) stated that coccinellids feed upon nymphs and adults of this leafhopper.

3.2. Host plant preference

From Tables (1 & 2) the population index of *E. decipiens* on both early and late summer crops showed highly significant differences between host plants. For instance, squash plant appeared to be the most preferable (62087 insects / week) by this insect , compared with other plants ; 3228.5 insects / week for the cowpea , 2286.4 insects / week for potato ; 1812.7 insects / week for green bean ; 1221.2 insects / week for tomato ; 1181.5 insects / week for hairy cucumber and 1073.3 insects / week for cucumber . In the late summer crops , results indicated that egg- plant appeared to be the most preferable host: 4682.8 insects / week followed by the okra 2205 insects / week ; pumpkin 778.3 insects / week ; green pepper 584.7 insects / week and Jerusalem artichoke 502.5 insects / week, while mungbean plant was the least favorable 248.2 insects / week. In this aspect, it seems that the nature of the leaf surface whether it had hairs or not , as well as the dense distribution of these hairs, play a role in the host – plant preference .

Table (1): Weekly counts of *E.decipiens* (nymphs & adults) on the early summer plantations at Kalubia Governorate with corresponding data of the main climatic factors during 2001.

Sampling date 2001	Total no./ 150 double strokes							Total	No. of predator	Daily mean	
	Green bean	Cowpea	Potato	Tomato	Squash	Cucumber	Hairy cucumber			Temp. °C	R. H.%
17-Apr.	940	3254	1834	1069	3754	753	794	12398	33	24.9	53.3
24	1392	5053	1724	1520	6144	1209	1314	18356	47	22.8	59.9
1 May	1973	6585	2154	2121	7547	1573	1473	23426	53.	24.1	59.4
8	3017	7646	2643	2865	9666	1942	1697	29476	70	24.6	58.9
15	3785	4581	1775	2535	7009	1898	1675	23258	75	23.6	56
22	2722	3844	2527	1421	7910	1487	1994	21905	87	24.5	55.4
29	2361	3537	3489	858	8650	822	1715	21432	98	26.5	59.2
5 Jun.	1749	1776	4440	686	7671	795	788	17905	91	28.5	60.7
12	1406	503	3303	569	6556	803	889	14029	80	29.3	58.4
19	1107	678	1921	348	4955	620	727	10356	75	28.3	55.9
26	806	793	946	405	2955	525	645	7075	65	27.7	56.4
3 Jul.	494	492	681	257	1687	452	467	4530	52	30.7	60.1
Total	21752	38742	27437	14654	74504	12879	14178	204146	812		
Mean	1812.7	3228.5	2286.4	1221.2	6208.7	1073.3	1181.5				

L.S.D. =1197.19 at 1% and 899.03 at 5% .

Table (2): Weekly counts of *E.decipiens* (nymphs & adults) on the late summer plantations at Kalubia Governorate with corresponding data of the main climatic factors during 2001.

Sampling date 2001	Total no./ 150 double strokes						Total	No. of predator	Daily mean	
	Mung-bean	Egg-plant	Green pepper	Okra	Pumpkin	Jerusalem artichoke			Temp. °C	R. H.%
22-May	63	1237	481	1253	1701	797	5532	127	24.5	55.4
29	82	2144	883	3421	1951	1083	9564	195	26.5	59.2
05-Jun.	119	2494	1322	5277	1984	1270	12466	354	28.5	60.7
12	134	2147	957	4915	1816	1379	11348	309	29.3	58.4
19	187	1973	488	4757	1130	878	9413	394	28.3	55.9
26	681	1906	544	3554	836	537	8058	221	27.7	56.4
03-Jul.	599	1796	734	2183	615	204	6131	196	30.7	60.1
10	424	3157	598	2215	519	136	7049	103	29.3	60.3
17	469	5205	490	1756	288	127	8335	157	28.6	59.4
24	352	9052	455	948	207	75	11089	134	30.1	60.1
31	273	10998	348	885	176	65	12745	146	27.8	60.3
07-Aug.	112	8908	412	692	114	294	10532	56	28.6	69.5
14	98	6820	418	577	103	246	8262	64	27.6	65.9
24	76	6936	354	328	137	252	8083	37	28.8	66.4
28	54	5468	287	314	98	194	6415	33	29.9	65.9
Total	3723	70241	8771	33075	11675	7537	1350			
Mean	248.2	4682.8	584.7	2205	778.3	502.5				

L.S.D. = 1186.68 at 1% and 1605.66 at 5%

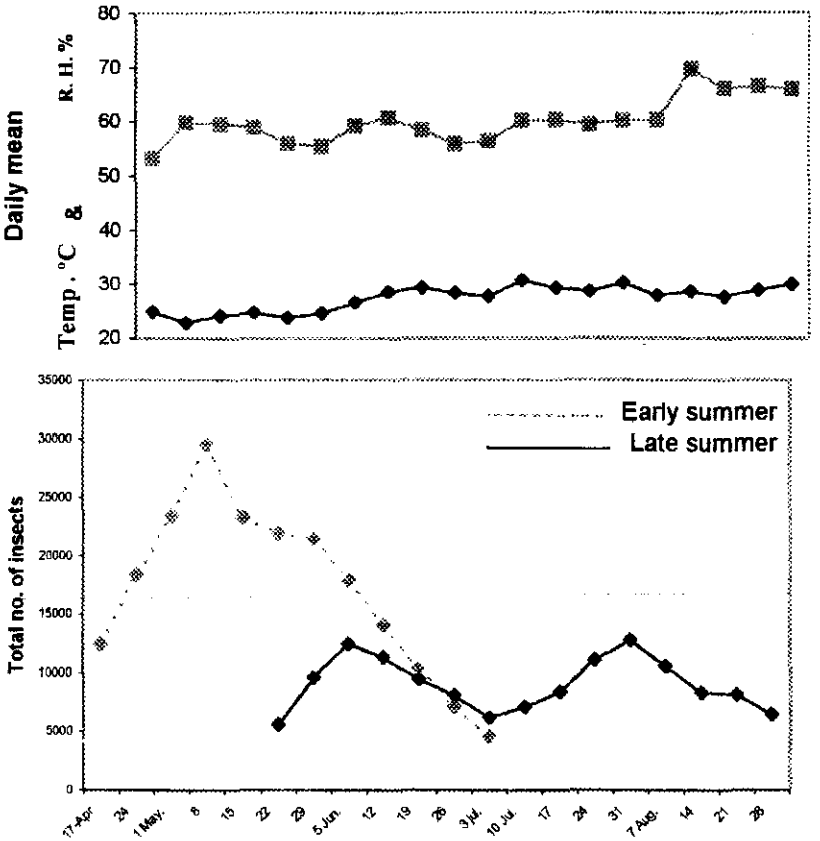

Fig.(1):The weekly counts of the leafhopper *E. decipiens* on early and late summer plantations in Kalubia Governorate during 2001.

Brewer *et al.*, (1986) found that perennial hair species of alfalfa and highly lingnified tissues contributed to resistance by mechanically or chemically deterring or preventing feeding and oviposition against *E. faba*. Zareh (1987) found that there were significant correlations between infestation by *Empoasca* spp. and the density of hairs and glands on the lower surface of cotton leaf where they reduced number of insects in a cultivar having thick hairs.

3.3. Number and duration of generations

Results in Tables (3&4) and Fig. (2) indicate that *E. decipiens* passed throughout four generations during early and late summer crops 2001 .Durations of these generations were estimated to be as follows: The 1st from 17 April to 1 May (14 days), the 2nd from 8 May to 5 June (28 days), the 3rd from 5 June to 17 July (42 days) and the 4th from 24 July to 28 August (35 days) for the summer crops 2001.Hamdy (1992) indicated 5 generations for *E. decipiens* during the period from 2 May to 4 October in some summer vegetables in Sharkia. Hegab *et al.*, (1989) estimated 3 generations during summer, the 1st in mid-August on vegetable marrow and cucumber at Salhia. On the other hand, Hosny and El-Dessouki (1967) estimated 10 generations / year for *Empoasca* spp on cotton plants at Shoubra El-Kheima and Bahteem.

During the present work, it was observed that this insect species moves after the 6th generation to other hosts during autumn to complete its development.

In this aspect, Hegab *et al.*, (1989) found *E decipiens* on cabbage and cauliflower in winter at Salhia. Hence, the insect species appeared to have a wide range of host-plants in different localities of Egypt.El-nahal *et al.*, (1977a & 1977b) surveyed *E. decipiens* on 57 hosts at Giza region, Egypt. Shaheen (1979 a & 1979 b) found it on tomato and soybean in low and middle Egypt, Ammar *et al.*, (1978- 1979) found it on rice in northern Egypt .

3.4. Diurnal activity of the leafhopper, *Empoasca decipiens* (Paoli)

The population density of *E . decipiens* was the highest on cowpea, squash , egg-plant and okra. These hosts were thus selected as representatives of early and late summer host plants to study the diurnal activity of *E. decipiens* (Tables 5-8 and Fig. 3).

Table (3) : Accumulated numbers of the total weekly counts of *E. decipiens* (nymphs & adults) on the early summer crops in Kalubia Governorate during 2001 (According to Audemord and Milaire, 1975 and Iacob 1977).

Sampling date 2001	Accumulated days of samples	Weekly counts of insects	Accumulated weekly count	%
17-Apr-01	7	12398	12398	6.07
24	14	18356	30754	15.06
01-May	21	23426	54180	26.54
8	28	29476	83656	40.98
15	35	23258	106914	52.37
22	42	21905	128819	63.1
29	49	21432	150251	73.6
05-Jun	56	17905	168156	82.37
12	63	14029	182185	89.24
19	70	10356	192541	94.32
26	77	7075	199616	97.78
03-Jul	84	4530	204146	100

Table (4): Accumulated numbers of the total weekly counts of *E. decipiens* (nymphs & adults) on the late summer crops in Kalubia Governorate during 2001 (According to Audemord and Milaire, 1975 and Iacob 1977) .

Sampling date 2001	Accumulated days of samples	Weekly counts of insects	Accumulated weekly count	%
22-May-01	7	5385	5385	4.02
29	14	8905	14290	10.66
05-Jun	21	11506	25796	19.24
12	28	11140	36936	27.55
19	35	10247	47183	35.2
26	42	8471	55654	41.52
03-Jul	49	5885	61539	45.91
10	56	7049	68588	51.17
17	63	8335	76923	57.38
24	70	11089	88012	65.66
31	77	12745	100757	75.16
07-Aug	84	10532	111289	83.62
14	91	8262	119551	89.18
21	98	8083	127634	95.21
28	105	6415	134049	100

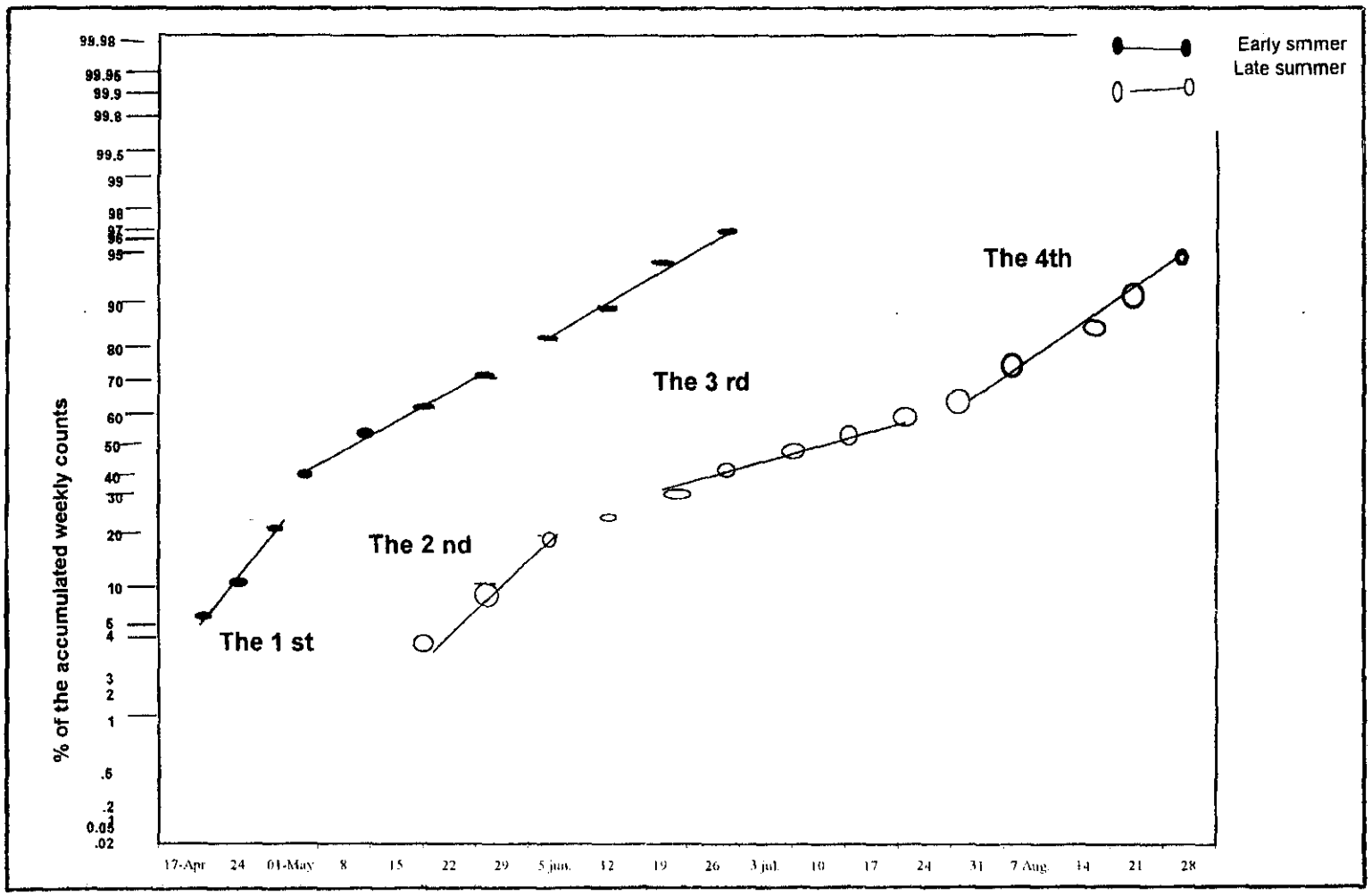

Fig. (2): The number of generations of *E. decipiens* on early and late summer crops in Kalubia Governrate during 2001.

Table (5): Weekly counts of *E.decipiens* (nymphs & adults) on cowpea (early summer crop) between 8 a.m and 6 p.m throughout the period from April 17 to Jul.2, 2001.

Sampling date 2001	Sampling hours						Total
	8 a.m	10 a.m	12 m	2 p.m	4 p.m	6 p.m	
17 Apr.01	341	652	706	884	396	275	3254
24	357	977	1313	1582	438	386	5053
01-May	561	1329	1618	1964	656	457	6585
8	753	1619	1768	2136	944	426	7646
15	534	783	1157	1085	549	473	4581
22	512	647	873	989	418	405	3844
29	418	616	765	883	432	423	3537
5 Jun.	172	287	323	443	319	232	1776
12	67	74	98	136	83	45	503
19	78	97	183	178	74	68	678
26	59	98	187	294	88	67	793
2 Jul.	44	66	146	122	55	59	492
Total	3896	7245	9137	10696	4452	3316	38742
Mean	324.67	603.75	761	391.33	371	276.33	

L.S.D. = 255.964 at 1% and 192.839 at 5%.

Generally, it was found that the insect populations are found in low numbers at early morning (8a.m), after which the population increased progressively as time elapsed, to reach the maximum density at 2p.m on cowpea and squash of early summer crops and 12 noon on plants egg-plant and okra of late summer crops. The insect activity decreased gradually after that time and reached its minimum at 6p.m. These results are in agreement with those obtained by Hamdy and Emam (1994) . It has been observed that the insects were normally residing beneath the leaves at the lower parts of the plants between 8a.m and 10a.m. The insects moved to the middle parts between 12 noon and 4p.m. At 6p.m. the insects tended to feed on the lower parts of the plant again. These results are in agreement with those obtained by Ammar *et al.*,(1986).The rise in soil temperature and the extremely hot temperature prevailing during May and June in Egypt (compared to the temperature during August and September) may explain the reason why this insect starts to accumulate on the middle parts of the plant between 10a.m and 2p.m in early crops and between 12m and 4p.m in late crops. Perfect and Cook (1982) and Pedgaham *et al.*, (1987) stated

Table (6): Weekly counts of *E.decipiens* (nymphs & adults) on squash (early summer plantation) between 8 a.m and 6 p.m throughout the period from April 17 to Jul.2, 2001.

Sampling date 2001	Sampling hours						Total
	8 a.m	10 a.m	12 m	2p.m	4p.m	6 p.m	
17 Apr.01	498	956	661	682	363	594	3754
24	592	1072	918	2194	766	602	6144
01-May	882	1346	2361	1422	685	851	7547
8	983	1452	2275	3164	883	909	9666
15	662	953	2657	1782	518	437	7009
22	776	1523	1451	2054	1293	813	7910
29	811	1785	1934	2157	1282	681	8650
5 Jun.	919	1829	1981	1243	993	706	7671
12	833	1461	1217	1341	719	985	6556
19	776	1082	1166	791	539	601	4955
26	405	514	684	582	356	414	2955
2 Jul.	184	416	271	313	218	285	1687
Total	8321	14389	17576	17725	8615	7878	74504
Mean	693.42	1199.08	1464.67	1477.08	720.92	656.5	

L.S.D. = 415.703 at 1% and 313.184 at 5%.

Table (7): Weekly counts of *E.decipiens*(nymphs & adults) on Egg-plant (late summer plantation) between 8 a.m and 6 p.m throughout the period from May 22 to August.28, 2001.

Sampling date 2001	Sampling hours						Total
	8 a.m	10 a.m	12 m	2p.m	4p.m	6 p.m	
22-May-01	56	117	417	334	252	61	1237
29	119	182	759	558	367	159	2144
5 Jun.	182	326	702	688	432	164	2494
12	193	217	419	593	417	308	2147
19	264	424	312	315	298	360	1973
26	116	312	627	297	258	296	1906
03-Jul	133	321	528	271	231	212	1796
10	272	483	936	794	296	376	3157
17	564	1055	1559	1039	573	415	5205
24	473	1516	2182	3495	687	699	9052
31	672	1972	3730	3060	766	798	10998
7 August.	884	1468	2742	2098	819	897	8908
14	768	1118	1843	1654	743	694	6820
21	883	1022	1738	1473	958	862	6936
28	592	738	1114	1834	791	399	5468
Total	6271	11271	19608	18503	7888	6700	70241
Mean	418.07	751.4	1307.2	1233.53	525.87	446.67	

L.S.D. = 406.61 at 1% and 306.191 at 5%.

that most of plant hoppers migrate during the crepuscular hour, with a large flight at dusk than at dawn.

Table (8): Weekly counts of *E.decipiens* (nymphs & adults) on okra (late summer crop) between 8 a.m and 6 p.m throughout the period from May 22 to August.28, 2001.

Sampling date 2001	Sampling hours						Total
	8 a.m	10 a.m	12 m	2p.m	4p.m	6 p.m	
22-May	124	148	369	421	117	74	1253
29	246	405	983	1156	359	272	3421
05-Jun	539	653	1614	1475	594	402	5277
12	724	847	1363	1266	372	343	4915
19	856	944	1237	914	351	455	4757
26	417	329	915	1263	319	311	3554
03-Jul	219	223	635	637	210	259	2183
10	277	218	613	586	219	302	2215
17	284	255	447	252	239	279	1756
24	126	162	298	142	134	86	948
31	114	187	218	152	163	51	885
7 August	98	143	194	121	76	60	692
14	68	78	176	117	84	54	577
21	25	44	93	77	53	36	328
28	21	31	88	92	44	38	314
Total	4138	466.7	9243	8671	3334	3022	33075
Mean	275.87	311.13	616.2	578.07	222.27	201.47	

L.S.D. = 184.181 at 1% and 138.69at 5%

It could be suggested that to achieve effective control of *E. decipiens*, control measures should be taken between 10 a.m and 2p.m in early summer crops and between 12noon and 4p.m in late summer crops at the times where populations of insects reach their maxima.

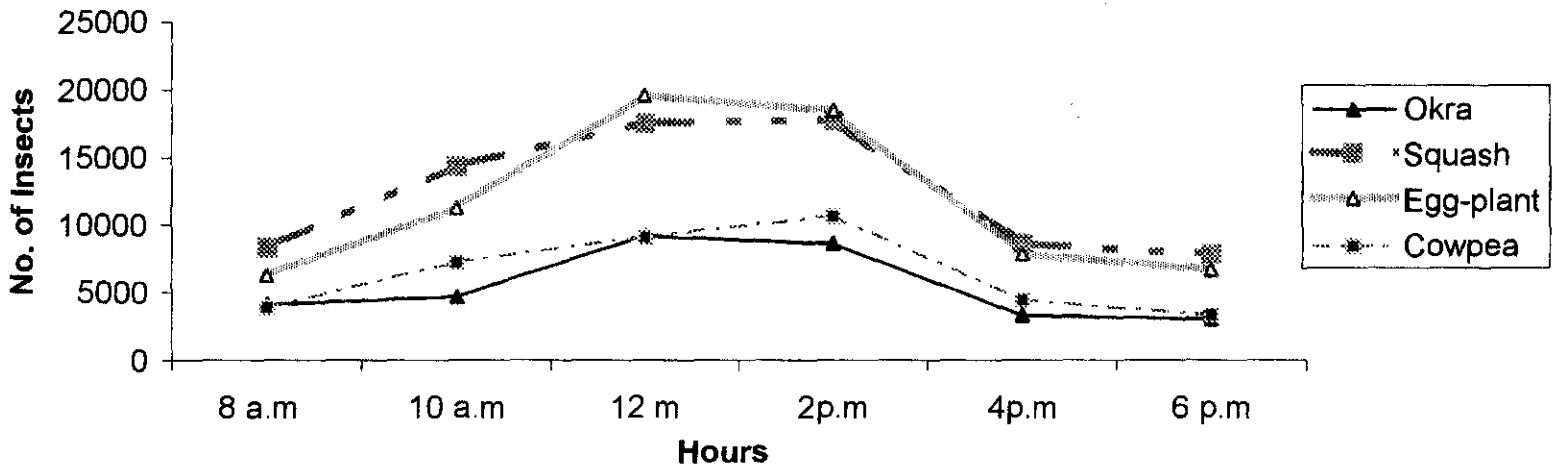

Fig. (3): The diurnal activity of *E.decipiens* in early and late summer plantations of cowpea, squash, egg- plant and okra in Kalubia Governorate, 2001.

4. REFERENCES

Ammar E.D., Fouad S.H, Megahed M.M. and Sewaify G.H. (1986). Population density and vertical distribution *of Empoasca* leafhopper on cotton plants in Kafr-el Sheikh using two sampling methods. *Annals Agric. Sci.,* Fac. Agric. Ain Shams Univ., Cairo, 24:1655- 1664

Ammar E.D., Lamie O. and. Khodeir I.A. (1978 – 1979). Population studies of leaf hopper and plant hoppers in rice plants at Kafr-el-Sheikh, Egypt. (Hom., Auchenorrhyncha). *Bull. Soc. Ent. Egypt,* 62:63.70.

Audemard H. and Miliaire H.G. (1975). La piecage carpocape (*Laspeyreia pomoneil* L.) arec une pheromone sexuelle de synthere, premiere results utilisables pour l estimation et la conduite de la lutt. *Ann.. Zool.Ecol. Anim.*,7:61.

Brewer G.I., Sorensen E.I. Horber B. and Kreitner G.I. (1986). Alfalfa stem anatomy and potato leafhopper (Hom.,Cicadellidae) resistance. *J.Econ. Entomol*, 97: 1249-1253.

Chiu S. (1979). Biological control of the brown leaf hopper. Inter. Rice Res. Instit.: 335-355

El-nahal A.K.M., Ammar E.D., and Elbolok M.M. (1977a). Survey and population density of leafhoppers, plant hoppers and froghoppers (Homoptera, Auchenorrhyncha) on field and vegetable crops at Giza. *Bull. Soc. Ent. Egypt,* 61: 99-107.

El-nahal A.K.M., Ammar E.D., and Elbolok M.M. (1977b). Fluctuations of population densities of *Empoasca decipens* Paoli and *Balclutha hortensis* Lindb. At Giza, Egypt (Homoptera: Cicadellidae). *Bull. Soc. Ent. Egypt,* 61:245-255.

Hamdy M.K. (1992), Some ecological aspects on the leaf hopper, *Empoasca decipiens* (Paoli) (Homoptera: Cicadellidae) attacking summer vegetable plants in Sharkia Governorate during 1989. *Annals. Agric.Sci.*, Ain Shams Univ., Cairo, 37:613-620.

Hamdy M.K. and Emam A.K. (1994). Diurnal activity of the leafhopper, *Empoasca decipiens* (Paoli)(Homoptera: Cicadellidae) on summer vegetable plants in Egypt. *Annals. Agric. Sci.*, Ain Shams Univ., Cairo, 39(1), 425-430.

Hanna A.D.(1950). The effect of rainfall on the cotton jassid *Empoasca lybica* de Berg in Gezira, Anglo Egyptian Sudan. *Bull.Ent.Res.*, 41:359-369.

Hegab A.M., Helaly M.M. and Hassanein S.M. (1989). Survey and seasonal abundance of leafhopper species (Hom., Cicadellidaee) infesting certain cruciferous and cucurbitaceous vegetable plants in newly reclaimed sandy area at Salhia disctrict, Egypt. *Zagazig J. Agric . Res.*, 6:111-121.

Hosny M.M. and EL- Dessouki S.A. (1967). Ecological and biological studies on *Empoasca* spp. (Jassidae)in Cairo Area. *Zeit. Angew. Ent.*, 60:397-411.

Iacob N. (1977). Un Model metameric pentruu stabilirea economice de toleranta a atacului moli fructeior, in lupta integrata Analela I.C.P.P.15:179, Romania.

Joyce R.J.V.(1961). Some factors affecting numbers of *Empoasca lybica* (de Berg), (Homo., Cicadellidae) infesting cotton in the Sudan Gezira. *Bull.Ent. Res.*, 52: 191-232-

Nault L.R. and Ammar E.D. (1989). Leafhopper and planthopper transmission of plant viruses . Annual Rev.Ins., 34: 301-329 .

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

Paoli I.G. (1936). Descrizione de alcune nouve species di *Empoasca virenti* in Egitta (Hemiptera – Homoptera). *Bull.Soc.Ent.* Egypt , 20:144-151.

Pedgaham D.E., Perfect T.J. and Cook A.G. (1987). Flight behaviour in the brown plant hopper, *Nilaparvata lugens* Stal (Hemi., Delphacidae). Insect Sci. Applic ., 8:71-75.

Perfect T.J. and Cook A.G. (1982). Diurnal periodicity of flight in some Delphacidae and Cicadellidae associated with rice. *Ecol. Entomol.*, 7:317-326.

Sami O. (1963). Studies on Hemipterous and Homopterous insects found on cotton plants in Giza , Egypt . (M. Sc. Thesis , Fac. Of Agric., Cairo Univ.) pp. 88 – 91.

Shaheen A. H. (1979a).Survey of pests attacking tomato in Egypt with some ecological notes. *Agric. Res. Rev.*, Minst . Agric., 55:49-57.

Shaheen A.H. (1979b). Survey of pests attacking soybean in Egypt with some ecological notes. *Agric. Res. Rev.*, Minst . Agric.,55:59-65

Willcocks F.C (1937) . The insects and related pests of Egypt. Bull 2, Vol 1 , *Technical Sec . Agric. Soc.* Pt 2, Cairo.

Zareh N. (1987). Evaluation of six cotton cultivars for their resistance to trips and leafhoppers. *Iran Agric. Res.*, Shiraz Univ., 4:89-97.

تغيرات الأعداد والنشاط النهاري لنطاط الأوراق *Empoasca decipiens* على بعض المحاصيل الصيفية في محافظة القليوبية

إبراهيم محمد عبد المنعم عبادة

قسم آفات ووقاية النبات ــ المركز القومي للبحوث - مصر

ملخـــص

تم إجراء دراسات بيئية على نطاط الأوراق *Empoasca decipiens* الـــذي يهاجـــم بعض النباتات (فاصوليا ــ لوبيـــا ــ بطـــاطس ــ طمـــاطم ــ كوســـة ــ خيـــــار ــ قثاء) وذلك في الزراعة الصيفية المبكرة وزراعات فول المانج ــ باذنجان ــ فلفل ــ بامية ــ قرع عسلي ــ طرطوفة وذلك في الزراعة الصيفيـــة المتـــأخرة في عام ٢٠٠١م بالقليوبية .

ويمكن تلخيص النتائج المتحصل عليها كما يلي : ــ

١ــ للحشرة ثلاث فترات للنشاط الموسمي تبدأ الأولى ما بين ١ــ ٨ ما يو في الزراعـــات المبكرة ، الثانية ما بين ٢٩ ــ ٥ يونيه والثالثة ما بين ٢٤ــ ٣١ أغســـطس ٢٠٠١م على الزراعات الصيفية المتأخرة .

٢ــ تفضل الحشرة الكوسة (٦٢٠٨,٧ حشرة / أسبوع) ثم يليـــها اللوبيـــا،البطـــاطس ، الفاصوليا ، الطماطم ، القثـــاء (٣٢٢٨,٥، ٢٢٨٦,٤، ١٨١٢,٧، ١٢٢١,٢، ١١٨١,٥ حشرة / أسبوع) على الترتيب في حين كان الخيار اقل عرضة للإصابـــة (١٢٨٧٩ حشرة / أسبوع) وذلك في الزراعة الصيفية المبكرة .

٣ــ تفضل الحشرة الباذنجان (٤٦٨٢,٨ حشرة / أسبوع) ثم يليـــها الباميـــة ، القـــرع العسلى ، الفلفل ، الطرطوفة (٢٢٠٥، ٧٧٨,٣، ٥٨٤,٧، ٥٠٢,٥ حشرة / أســـبوع) على الترتيب وكان اقل عرضة للإصابة فول المانج (٢٤٨,٢ حشرة/ أسبوع) وذلك في الزراعة الصيفية المتأخرة .

٤ــ للحشرة أربعة أجيال على العوائل الصيفية المبكرة والمتـــأخرة مـــا بيـــن أبريـــل ، أغسطس ٢٠٠١ م.

٥ــ تتراوح الظروف البيئية المثلى لنمـــو الحشرة ما بين ٢٤,٦ــ ٢٧,٨ درجة مئويـــة ، ٥٨,٩ – ٦٠,٣ %رطوبة نسبية .

٦ــ أظهرت النتائج عدم وجود فرق في النشاط اليومي للحشرة بين الزراعـــات المبكـــرة والزراعات المتأخرة وتم اختيار نباتي اللوبيا والكوسة ليمثلا الزراعات المبكرة ونباتي الباذنجان والفلفل ليمثلا الزراعات المتأخرة وقد لوحظ أن تعداد الحشرات على نبـــاتي اللوبيا والكوسة يتزايد من الثامنة صباحا حتى يصل إلى زروته فـــي الثانيـــة عشـــرة ظهرا ثم تناقص بعدها تعداد الحشرات تدريجيا.

المجلة العلمية – لكلية الزراعة – جامعة القاهرة-المجلد (٥٣) العدد الرابع (أكتوبر ٢٠٠٢) : ٦٥٣-٦٧٠.