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POPULATION FLUCTUATION OF CERTAIN PIERCING SUCKING INSECT PESTS INFESTING MARJORAM IN RELATION TO ASSOCIATED PREDATORS AND SOME WEATHER FACTORS AT GIZA GOVERNORATE

BY

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ABSTRACT

An experiment was conducted on marjoram,*Origanum marjorana.* L. (Family: Labiatae) at El-Saff district, Giza Governorate during two successive years (2001 and 2002) to determine the population fluctuations of leafhoppers, *Erythroneura alexandrina* (Edw.) and *Empoasca decipiens* Paoli (Cicadellidae: Homoptera), green peach aphid, *Myzus persicae* Sulzer (Aphididae: Homoptera), and plant bug *Nysius cymoides* (Spinola.) (Lygaeidae: Hemiptera). The associated predators,*Coccinella undecimpunctata* Reiche, *Chrysoperla carnea* (Schm) and *Paederus alfierii* Koch were also monitored together with three weather factors . means of temperature, R.H. % and wind velocity). They were undertaken to estimate the relationship between them and populations fluctuations of these insects. Marjoram is a perennial plant and had three vegetative crops per year around to be harvested on early Jun., early Sept. and the end of Dec. The first crop harbored the highest population for *E. alexandrina* and *M. persicae*. The first insect had two peaks in the first year (2001) on mid-Mar. and a higher one at the end of May. The same insect had three peaks in the second year (2002), on mid-Mar., on mid Apr. and the highest one was by the late of May.

M. persicae had three peaks during the same period, on mid-Feb., 8th Mar. and the highest one was by the 5th Apr., 2001, and on mid Feb., mid-Mar. (the highest) and on 11th April 2002. The other two insects had lower populations with small peaks during the two years.

The second period of plant growth harbored high populations of *E. decipiens* only. This insect had three peaks in the two years, on the 5th July., 26th July and the highest one on the 23th Aug. 2001. In year 2002 the peaks were on 25th July, 15th Aug. and on 5th Sept. (the highest). The other three insect sp. Had low populations during this plant girth period of 2001 & 2002.

The third period of plant growth had the high population of *N. cymoides*. It had three peaks of population during this period. They were on the 4th of Oct. (the highest), Oct. 18th and on Nov. 15th. 2001 and on Sept. 26th. Oct. 17 (the

highest) and Nov. 22, 2002. The other three insects had low populations during this plant girth period of 2001 & 2002.

The relation between this average of tested weather factors, the three predators and population fluctuations of studied insects did not provide a consistent pattern. These factors gave different correlations with population's activity at different periods of plant growth during the two years. They generally resulted in high combined effects.

INTRODUCTION

Marjoram, *Origanum marjorana* L. (F: Labiatae) is one of the most important medicinal and aromatic plants. Its origin is the Mediterranean basin. It has been known in Egypt since ancient times. Recently, the area cultivated with marjoram in Egypt increased especially in the new reclaimed land. The demand for marjoram expands from local manufacturing for medicine, perfumes, creams and cosmetic powders, ... etc., to export to the European market. Egyptian marjoram has higher volatile oils than other cultivars grown in other countries. Thus, it plays an important role in the national economy of Egypt as an export to many foreign countries.

Marjoram is subject to infestation with various insect pests during its growing season (from plantation to the harvest), especially piercing sucking insects. The most important ones are the leafhoppers, *Erythroneura alexandrina* (Edw.) and *Empoasca decipiens* Paoli (Cicadellidae: Homoptera), the green peach aphid, *Myzus persicae* Sulzer (Aphididae: Homoptera), and the plant bug *Nysius cymoides* (Spinola.) (Lygaeidae: Hemiptera). This group of insects causes in certain cases qualitative and quantitative yields loss (Mesbah *et al.*, 1982; Wheeler *et al.*, 1983; Ramadan, 1988; Ismail, 2001 and Sabra, 2002).

The present study concerned with the population fluctuations of the mentioned insects and their associated predators on marjoram. The relationship between these insects' populations and associated predators together with three weather factors is undertaken in consideration.

MATERIALS AND METHODS

To estimate the population of the four above mentioned insects, an area of ¼ Feddan were chosen at El-Desami village, El-Saff region, Giza governorate. This area was divided into three plots (2 kerats m2) and was transplanted as permanent area with marjoram seedlings in mid Jan. Marjoram is a perennial crop and its vegetative part was subject for harvesting three times a year (around, early Jun., early Sept., and the end of Dec. So data for each period for each crop were presented separately.

Samples were collected after fifteen days from transplanting at weekly intervals during the two successive years (2001 & 2002), using a sweeping net (25 double strokes/plot) for *Erythroneura alexandrina, Empoasca decipiens* and

Nysius cymoides. For *Myzus persicae* counts were conducted by direct examination on five shoots (10 cm) taken randomly/plot. Samples were taken after preparing them in polyethylene bags to the laboratory to sorting, identification and counting, then recorded for the insect pest specie and associated predators.

Weekly data of temperature (°C), R.H. (%) and wind velocity (Wv.) were obtained from the Meteorological Station, Agric. Research Center, located at Giza to recalculate these factors a weak earlier than inspection. Simple correlation and partial regression were used to elucidate the effect of recorded abiotic and biotic factors on the population of the four insects. Statistical analysis was conducted using Procs. Reg. and ANOVA in SAS (SAS Institute, 1988) with the help computer .

RESULTS AND DISCUSSION

The population fluctuations of the four piercing sucking pests (*i.e., E. alexandrina, E. decipiens, M. persicae* and *N. cymoides*) are tabulated and graphically presented in Tables (1 & 2) for the two years (2001&2002), respectively. Presented data showed that, the *E. alexandrina* was the most abundant insect during the first period followed by *M. persicae, E. decipiens* and then *N. cymoides*. The general mean numbers of the four insect pests during the first period of the year were (211.67, 101.73, 34.83 and 5.72) and (158.78, 91.03, 11.72 and 5.83) insects/sample during 2001 and 2002, respectively.

In the second period of the year, *E. decipiens* had the highest population followed by *M. persicae, E. alexandrina* and then *N. cymoides*. The general mean numbers of insects during the second period were (55.62, 9.81, 9.23 and 1.85) and (58.86, 15.11, 13.64 and 8.63) insects/sample for the above-mentioned insect pests during 2001 and 2002, respectively.

During the third period of plant growth, the highest population activity was for *N. cymoides* followed by *E. alexandrina, E. decipiens* then *M. persicae* during year 2001 with general mean numbers of 55.53, 24.8, 16.27 and 16.05 insects/sample. In similar period during 2002, *N. cymoides* had the highest population followed by *E. decipiens, M. persicae* and then *E. alexandrina* with general means of 37.50, 13.00, 10.58 and 10.43 insects/sample, respectively.

The population fluctuation of each insect species per each period of year is discussed as follows:

1- *E. alexandrina*:

This insect was most abundant than other species throughout the first period of plant growth. During the first year (2001), this insect began to attack marjoram in the first week of Feb. and gradually increased with the increase in temp to reach the first peak on. 22nd Marc, after that, the population fluctuated up and down during Apr. and then increased to reach the second and the highest peak on 31st May with average number of 604 insect/sample at temperature of 33.1°C, R.H. as 41.42 % and wind velocity as 6.2 m/s., (Table 1).

Table (1). Weekly mean number of insect pests infesting marjoram accompanied with associated predators and some weather factors during 2001, at El-Saff, Giza Governorate.

Per-iods	Date	Insects/25 double strokes			Insects/ 5 plant shoots	Predators			Weather factors		
		E. alex.	*E. decip.*	*N. cym.*	*M. persicae*	*C. und.*	*C. car*	*P. alfier.*	Temp. °C	R.H. %	W.v. m/sec.
1st	1/2/2001	3	0	0	18	5	3	1	16.38	50.57	10.4
	8	5	6	3	83	3	1	2	16.52	48.57	8.3
	15	11	14	8	119	5	3	4	17.37	43.28	7.8
	22	7	9	5	34	2	1	2	15.60	46.00	7.1
	1/3	32	44	19	229	7	4	3	19.40	41.28	5.6
	8	187	78	27	256	11	5	1	21.32	46.14	5.6
	15	164	62	13	183	13	3	4	21.70	49.00	7.5
	22	408	96	15	149	6	1	2	22.87	45.42	4.2
	29	313	46	4	238	11	3	0	21.85	43.14	7.2
	5/4	346	68	0	270	14	2	1	23.32	46.42	7.2
	12	89	7	0	156	10	0	0	22.24	41.71	15.8
	19	102	11	0	57	7	0	0	25.70	40.71	13.5
	26	247	19	0	30	4	0	0	25.70	41.57	7.6
	3/5	222	12	0	9	0	0	0	27.94	43.85	8.2
	10	276	18	0	0	0	0	0	27.77	45.14	7.0
	17	311	24	0	0	0	0	0	26.47	47.00	5.6
	24	483	42	0	0	0	0	0	30.62	44.14	6.1
	31	604	69	0	0	0	0	0	33.10	41.42	6.2
	Total	3730	627	13	1831	98	26	20			
2nd	7/6	0	0	0	0	0	0	0	30.25	39.85	6.4
	14	0	2	0	0	0	0	0	30.38	40.28	7.8
	21	2	9	2	0	1	0	0	31.57	46.14	8.6
	28	3	22	1	3	3	1	0	31.71	44.71	8.7
	5/7	13	87	8	7	1	0	0	30.27	50.57	2.3
	12	7	58	6	18	0	0	0	28.48	45.57	3.6
	19	11	39	0	9	0	0	0	27.98	51.71	3.1
	26	34	88	5	21	2	0	0	29.18	52.28	2.8
	2/8	19	47	2	10	4	1	0	28.88	56.57	3.2
	9	5	78	0	7	5	2	1	29.22	56.71	3.8
	16	8	97	0	13	3	1	1	30.40	55.28	3.0
	23	11	117	0	16	4	2	0	29.70	57.57	2.7
	30	7	79	0	23	2	1	0	30.54	54.14	4.0
	6/9	0	0	0	0	0	0	0	28.90	53.85	3.5
	Total	120	723	24	128	25	8	2			
3rd	13/9	2	3	4	0	0	0	1	29.52	56.71	3.3
	20	6	9	41	2	2	1	1	25.87	58.42	3.4
	27	11	6	73	7	1	2	2	28.21	57.71	4.0
	4/10	19	23	146	11	0	3	1	25.38	59.14	2.3
	11	9	16	76	17	2	0	0	25.20	61.85	4.9
	18	41	41	112	16	1	0	1	27.30	53.14	2.5
	25	26	13	64	28	3	0	0	22.00	52.85	2.3
	1/11	30	24	83	19	4	0	2	23.98	53.28	2.1
	8	11	9	17	10	2	1	1	19.50	51.28	2.2
	15	113	44	111	69	3	4	2	25.40	48.42	1.3
	22	69	25	46	27	6	2	3	22.85	51.28	2.2
	29	19	17	18	18	9	5	1	20.98	53.14	2.4
	6/12	11	9	42	11	7	3	3	19.54	61.00	2.1
	13	5	5	0	6	11	5	2	19.20	59.57	3.7
	Total	372	244	833	241	51	26	20			
Yearly total		5222	1594	870	2200	174	60	42			

Table(2). Weekly mean number of insect pests infesting marjoram accompanied with associated predators and some weather factors during 2002, at El-Saff, Giza Governorate.

Per-iods	Date	Insects/25 double strokes			Insects/ 5 plant shoots	Predators			Weather factors		
		E. alex.	*E. decip.*	*N. cyni.*	*M. persicae*	*C. und.*	*C. ear.*	*P. alfier.*	Temp. °C	R.H. %	W.v. m/sec.
1st	31/1/20002	2	6	4	10	1	2	1	12.81	59.71	7.8
	7/2	8	11	9	114	5	3	2	16.00	65.00	4.8
	14	23	28	8	172	8	6	1	17.20	62.14	5.3
	21	17	11	4	134	6	4	3	16.17	55.85	8.7
	28	82	16	11	91	3	1	2	16.17	52.28	5.8
	7/3	187	24	9	287	8	5	3	19.40	58.00	6.1
	14	312	37	17	293	11	7	4	21.58	48.57	6.4
	21	78	6	2	120	7	4	3	17.92	57.28	13.1
	28	276	18	5	94	5	2	4	18.62	54.14	4.9
	4/4	219	9	9	35	3	1	0	17.20	57.71	5.8
	11	274	17	23	167	7	4	2	21.67	57.00	7.8
	18	97	3	4	97	5	2	1	19.41	57.42	10.9
	25	65	8	0	22	8	3	2	20.40	54.85	8
	2/5	46	0	0	3	0	0	0	20.45	63.14	12.5
	9	311	4	0	0	0	0	0	24.72	48.85	7.0
	16	417	7	0	0	0	0	0	25.95	53.57	7.2
	23	121	0	0	0	0	0	0	24.41	52.57	11.5
	30	323	6	0	0	0	0	0	25.85	52.00	6.2
	Total	2858	210	205	1729	77	44	28			
2nd	6/6	0	0	0	0	0	0	0	27.90	54.42	5.9
	13	0	0	0	0	0	0	0	26.45	55.42	9.6
	20	3	4	0	0	2	0	1	28.25	54.00	8.6
	27	11	9	4	0	3	1	2	28.48	59.42	7.7
	4/7	18	25	11	3	1	0	1	29.60	56.71	6.4
	11	29	46	0	11	2	3	2	32.14	56.85	7.0
	18	42	77	0	19	1	1	0	33.25	56.14	6.7
	25	26	94	0	6	1	0	0	32.58	57.85	5.1
	1/8	8	83	14	2	2	0	0	31.80	58.57	6.0
	15	14	96	11	21	1	1	0	30.92	66.42	5.0
	22	18	111	37	36	3	1	0	31.87	65.57	6.0
	29	7	89	24	29	1	0	0	29.95	65.00	5.5
	5/9	3	76	16	46	2	1	0	30.80	64.71	6.2
	12	12	114	0	39	0	0	0	30.28	56.28	3.6
	Total	191	824	117	211	19	8	6			
3rd	12/9	0	0	4	0	0	0	0	26.88	58.71	3.3
	19	6	3	11	0	2	0	0	27.80	56.60	3.1
	26	18	14	48	3	4	0	0	28.24	55.42	2.9
	3/10	11	9	29	15	2	0	0	25.32	47.42	3.5
	10	17	17	67	19	1	0	0	24.45	33.85	2.6
	17	32	28	94	30	0	0	0	24.58	33.28	1.6
	24	19	11	75	23	2	0	0	22.34	34.38	2.1
	31	14	7	43	7	1	0	0	23.41	58.14	3.3
	7/11	0	5	26	10	3	0	2	19.50	58.57	5.1
	14	0	13	34	7	1	0	1	19.64	57.14	6.8
	21	4	34	78	4	2	0	0	19.65	57.85	5.9
	28	11	16	13	8	6	2	3	17.17	58.28	2.6
	5/12	5	19	0	10	5	4	2	16.24	54.71	8.9
	12	9	6	3	13	8	3	4	15.64	60.85	7.7
	Total	146	182	525	148	37	9	12			
Yearly total		3195	1216	847	2088	133	61	46			

A drop in population was noticed on 12th and 19th Apr. counts (*i.e.* 89 and 102 insect/sample). This drop can be attributed to the Khamaceen winds during this period (15.8 and 13.5 m/sec.) which affected the sampling dramatically. The mean weather values during the first period of the year 2001 ranged between 15.6-33.1°C, 40.71-50.57 % R.H. and 4.2-15.8 m/sec. Wv.(Table 1).

During the second year (2002), the insect began to attack marjoram at the end of Jan. (3 insects/sample), then gradually increased to reach its first peak on 14th Marc. (312 insect/sample) then suddenly dropped to reach 78 insect/sample on the 21th Marc. and again increased to reach the second peak (276 insect/sample) on the 28th Marc. after that the population decreased gradually until reach 46 insect/ sample the on 2nd May and again increased to reach the highest peak with density of 417 insect/sample on the 16th May. Similar to the first year, a drop of insect density also were noticed during the period of Khamaceens wind. The mean weather values during this period ranged between 12.81-25.85°C, 48.9-65 % R.H. and 4-13.1 m/sec. Wv., (Table 2).

The population in the second period was relatively less than first period and had two small peaks on the. 5th and 26th July in the first year and on the 18th July and 15th Aug. in the second one (2002). The mean weather values during this period ranged between 28-31.6°C & 28- 33.3°C.,39.9-57.6 % & 54-66.4 % R.H. and 2.3-8.7 & 3.6- 9.8 m/sec. Wv. in the two years, respectively.

The population in the third period of 2001 was relatively similar to that occurred during the second period. The population at the third period of growth had two peaks in 2001 and three peaks in the second one (2002), (Tables 1 & 2), and similar trend for population was observed in the same period of the second year (2002). The mean weather factors during this period ranged between 19.5-29.5°C & 16.2-28.2°C, 48.4-61.8 % & 33.3-58.7 % R.H. and 1.3-4.9 & 1.6-8.9 m/sec. Wv. for the two years, respectively. The mentioned above results are in agreement with that obtained by Ramadan (1988) and Sabra (2002) who recorded this leafhopper on marjoram from Jan. to Dec. at Fayoum governorate.

Statistical analysis of population activity in relation to the three tested biotic and the three a biotic factors affecting it was conducted and presented in (Table 3). Data in this Table indicated a highly positive significant relationship between weekly mean temp before sample and the population of *E. alexandrina* in the first period, while this relation was negative and insignificant in the second period and positively insignificant in the third period of two years (Table, 3). Regarding the relation between R.H., there was significant and negative relation in the first period of the year of 2002 and during the third period of two years but insignificant in other periods. For wind velocity there was significant and negative relation with the insect population in the first period of both tested years, while it was generally negative and insignificant in the rest of both tested years.

The three predators gave insignificant relation to the population activity of this insect.

Table (3). Simple correlation and partial regression value of three biotic and three abiotic factors with their significant levels and percentages of explained variances on the population activity of *Erythroneura alexandrina* in the first, second and third periods before cuts during 2001-2002 on marjoram at El-Saff, Giza Governorate.

Periods of growth	Year	Factors	Simple correlation		Partial regression values				
			r	P	b	P	F	p	E.V. %
1st	2001	W.m. temp.	0.816	0.0001	23.78	0.003			
		W.m. R.H.	-0.086	0.7400	-4.19	0.647			
		W.m. wind v.	-0.407	0.1040	-41.10	0.003			
		C.undecimpunctata	-0.217	0.4020	18.52	0.015	14.000	0.00	89.52
		C. carnea	-0.324	0.2040	-46.08	0.078			
		P. alfierii	-0.511	0.0362	-11.86	0.552			
	2002	W.m. temp.	0.706	0.0010	29.53	0.010			
		W.m. R.H.	-0.609	0.0090	-2.52	0.694			
		W.m. wind v.	-0.353	0.1640	-19.82	0.025			
		C.undecimpunctata	-0.238	0.3570	-0.10	0.996	5.257	0.01	75.93
		C. carnea	-0.218	0.3990	-6.04	0.845			
		P. alfierii	-0.118	0.6510	21.46	0.415			
2nd	2001	W.m. temp.	-0.462	0.1110	-0.90	0.64			
		W.m. R.H.	0.51	0.0740	0.14	0.83			
		W.m. wind v.	-0.62	0.0210	-1.93	0.218			
		C.undecimpunctata	0.22	0.4500	7.56	0.017	6.133	0.0221	85.90
		C. carnea	-0.05	0.8500	-16.22	0.009			
		P. alfierii	-0.131	0.6600	-8.63	0.102			
	2002	W.m. temp.	0.752	0.0030	7.92	0.017			
		W.m. R.H.	-0.169	0.5800	0.30	0.762			
		W.m. wind v.	-0.248	0.4120	3.39	0.242			
		C.undecimpunctata	0.006	0.9840	-6.78	0.142	4.686	0.0411	82.40
		C. carnea	0.46	0.1130	-2.32	0.652			
		P. alfierii	0.115	0.7070	9.13	0.198			
3rd	2001	W.m. temp.	0.202	0.4200	2.67	0.163			
		W.m. R.H.	-0.54	0.0100	-3.96	0.045			
		W.m. wind v.	-0.61	0.0060	-5.54	0.512			
		C.undecimpunctaa	0.002	0.9900	0.11	0.972	3.361	0.039	64.71
		C. carnea	0.22	0.3700	3.62	0.441			
		P. alfierii	0.43	0.0700	8.28	0.259			
	2002	W.m. temp.	0.357	0.1590	-0.01	0.98			
		W.m. R.H.	-0.715	0.0010	-0.50	0.04			
		W.m. wind v.	-0.549	0.0220	-2.01	0.137			
		C.undecimpunctata	-0.116	0.6550	1.40	0.331	3.913	0.0282	70.13
		C. carnea	-0.71	0.785	2.67	0.29			
		P. alfierii	-0.267	0.2980	-2.39	0.3			

"r" : Simple correlation coefficient value "b" : Partial regression

"P" : Probability level E.V. (%) : Explained variance.

Generally, positive and significant effect of any factor means that this factor was below the optimal range of population activity, while negative and significant effect means that this factor was above the optimal range. Insignificant positive or negative effect means the factor was within the optimal range.

Saroja *et al.* (1993) studied the effect of four weather factors on green leafhopper. They stated that temperature had high negative effect on population.

Helal *et al.* (1997) studied the effect of three weather factors on *Empoasca* spp. and they found insignificant effect on the population of the leafhoppers on faba bean.

In relation to predators, Ramadan (1988) found lady birds beetles the most dominant in marjoram fields. El-Sayed *et al.* (1993) stated that *Coccinella* and *Chrysoperla carnea* were numerous in medicinal and aromatic fields.

2- *M. persicae:*

This insect was the second abundant species throughout the all periods 45of plant growth. During the first year (2001), this insect began to attack marjoram with relatively high number in the first week of February (18.1 insects) and gradually increased to reach the first peak on 18th Feb, thereafter, the population fluctuated up and down during Apr. and reach the second peak on 8th Mar. and the third and highest peak on 5th Apr. with average number (270 insect/sample) at temperature 23.32°C, R.H. 46.42 % and wind velocity 7.2 m/sec., Then the population decreased steadily and disappeared completely from 10th May till the end of this period (Table 1).

During the second year (2002), the insect began to attack marjoram at the end of January (10 insects), then gradually increased to reach its first peak on 14th Feb (172 insect) then dropped before re-increasing to reach the second peak (293 insect/sample) on 14th Mar., thereafter population decreased gradually until reach 35 insect on 4th Apr. and again increased to reach the third peak 167 insect/sample on 11th Apr. (Table 2).

The population in the second period was relatively less than first period and had two small peaks on 21th July and 30th Aug in the first year and on18th July and 29th Aug in the second one (2002). The mean weather values during this period ranged between 28-31.6°C & 28- 33.3°C, 39.9-57.6 % & 54-66.4 % R.H. and 2.3-8.7 & 3.6- 9.8 m/sec. Wv. in the two years, respectively.

The population in the third period of 2001 was relatively higher than the second year. The population at the third period of growth had two peaks in both years, (Tables 1 & 2) The mean weather factors during this period ranged between (19.5-29.5°C & 16.2-28.2°C), (48.4-61.8 % & 33.3-58.7 % R.H.) and (1.3-4.9) & (1.6-8.9 m/sec. Wv.) for the two years, respectively.

Statistical analysis of population activity in relation to three biotic and three abiotic factors affecting it was conducted, Table (4). Data in this table

indicated insignificant relationship between weekly mean temperature and the population of *M. persicae* during all the studied periods, (Table 4). Regarding the relation between R.H., there was significant and positive relation in the second period of year 2002 while this relation was negative and significant in the third period of the two years and insignificant relation in the rest periods. For wind velocity there was significant and negative relation with the insect population in the second period of 2002 and in the third one of the first year, while it was insignificant in the rest.

C. undecimpunctata and *C. carnea* gave significant and positive relation on the population activity of this insect during the first period of the two years, and insignificant in the rest. *P. alfierii* had significant and positive relation in the second period of the second year (2002), but it had insignificant relation in the rest.

Azab *et al.* (1965) studied the changes in the seasonal abundance of *B. brassicae* and *M. persicae* on brussels sprouts with some aphids on their host together with their predators in Egypt. They recorded three peaks of seasonal abundance for *M. persicae* during March, May and July.

Daiber (1970) noticed that the population density of *M. persicae* on cabbage plants reached its maxumum numbers in summer and autumn and found in relatively numerous in winter, while in spring and early summer was scarce in South Africa. He added that temperature had a great effect on the seasonal abundance of this insect.

Herakly and El-Ezz (1970) studied the seasonal abundance for *Myzus persicae* (Sulzer) and *Brevicoryne brassicae*. They observed these species on cabbage plants through the year and found that its peak occurred in July-August.

Dawood (1971) recorded that ornamental plants had been attacked by many species of Aphids. The commonest species were *Aphis gossypii* (Glover), *Aphis craccivora* and *M.persicae* in which caused large damage to tested ornamental plants.

El-Sayed (1993) reported that *M. persicae* reached its highest population in the 4*th* week of January on *Coriandrum sativum* during 1990 and 1991 years.

3- *E. decipiens*:

This insect came the third in abundant during the first period of plant growth. During the first year (2001), this insect began to attack marjoram in the first week of Feb and gradually increased with the increase in temp to reach the first peak on 22nd March, thereafter, the population fluctuated up and down during April and again increased to reach the second and the highest peak on May 31 with average number (69 insect/sample) at temp 33.1°C, R.H. 41.42 % and wind velocity 6.2 m/sec., (Table 1).

Table (4). Simple correlation and partial regression value of three biotic and three abiotic factors with their significant levels and percentages of explained variances on the population activity of *Myzus persicae* in the first, second and third periods before cuts during 2001-2002 on marjoram at El-Saff, Giza Governorate.

Periods of growth	Year	Factors	Simple correlation		Partial regression values				
			r	P	b	P	F	p	E.V. %
1st	2001	W.m. temp.	-0.367	0.1460	-3.39	0.247			
		W.m. R.H.	0.125	0.6300	-3.79	0.342			
		W.m. wind v.	-0.034	0.8960	-7.36	0.152			
		C.undecimpunctata	0.909	0.0001	16.25	0.0002	26.520	0.05	94.09
		C. carnea	0.817	0.0001	16.27	0.139			
		P. alfierii	0.399	0.1120	-10.29	0.274			
	2002	W.m. temp.	-0.365	0.1490	3.89	0.423			
		W.m. R.H.	0.089	0.7320	1.38	0.675			
		W.m. wind v.	-0.255	0.3210	-3.52	437			
		C.undecimpunctata	0.841	0.0001	-14.21	0.252	10.663	0.05	86.48
		C. carnea	**0.901**	**0.0010**	**49.09**	**0.013**			
		P. alfierii	**0.742**	**0.0006**	**23.89**	**0.131**			
2nd	2001	W.m. temp.	**0.312**	**0.3790**	**3.98**	**0.051**			
		W.m. R.H.	**0.181**	**0.6150**	-1.61	**0.249**			
		W.m. wind v.	**-0.416**	**0.2310**	**-6.31**	**0.085**			
		C.undecimpunctata	-0.21	0.5590	2.10	0.477	2.430	0.05	48.86
		C. carnea	-0.13	0.7190	0.01	0.998			
		P. alfierii	-0.215	0.5490	-3.92	0.431			
	2002	W.m. temp.	0.341	0.2530	-7.14	0.122			
		W.m. R.H.	0.615	0.0250	-0.84	0.6			
		W.m. wind v.	-0.597	0.0310	-9.68	0.062			
		C.undecimpunctata	-0.024	0.9360	80.84	0.262	3.090	0.05	75.57
		C. carnea	0.142	0.6430	17.88	0.066			
		P. alfierii	-0.47	0.1050	-22.84	0.067			
3rd	2001	W.m. temp.	0.049	0.8600	0.32	0.616			
		W.m. R.H.	-0.635	0.0100	-2.60	0.184			
		W.m. wind v.	-0.503	0.0550	-4.19	0.577			
		C.undecimpunctata	-0.027	0.9230	-0.07	0.981	1.201	0.05	47.39
		C. carnea	0.147	0.5990	0.64	0.643			
		P. alfierii	0.16	0.5680	0.06	0.991			
	2002	W.m. temp.	0.173	0.5040	-0.12	0.798			
		W.m. R.H.	-0.683	0.0020	-6.32	0.042			
		W.m. wind v.	-0.298	0.2440	-1.67	0.434			
		C.undecimpunctata	-0.117	0.6540	-0.73	0.682	1.979	0.05	54.28
		C. carnea	0.007	0.9770	0.70	0.495			
		P. alfierii	-0.081	0.7560	2.90	0.46			

"r" : Simple correlation coefficient value "b" : Partial regression

"P" : Probability level E.V. (%) : Explained variance.

A drop in population was noticed in 12th and 19th April counts (*i.e.* 7 and 11 insect/sample). This drop can be attributed to the Khamaceen winds during this period (15.8 and 13.5 m/se.) which affected the sampling. The mean weather values during the first period of year 2001 ranged between 15.6-33.1°C, 40.71-50.57 % R.H. and 4.2-15.8 m/sec. Wv., (Table 1).

During the second year (2002), the insect began to attack marjoram at the end of January (6 insects), then gradually increased to reach its first peak on 14th Feb. (28 insect) then suddenly dropped and again increased to reach the second peak (37 insect/sample) on 14th March, thereafter population decreased gradually until completely disappeared on 2nd May, then the population fluctuated until the end of this period (Table 2).

The population in the second period was relatively high than first period and had three distinct peaks on 5th July, 28th July and 23rd Aug in the first year and on 25th July, 15th Aug and 5th Sept in the second one (2002). The mean weather values during this period ranged between 28-31.6°C & 28- 33.3°C, 39.9-57.6 % & 54-66.4 % R.H. and 2.3-8.7 & 3.6- 9.8 m/sec. Wv. in the two years, respectively.

The population in the third period of 2001 was relatively similar to that occurred during the first period. The population at the third period of growth had two peaks in 2001 and three peaks in the second one (2002), (Tables 1 & 2), and similar trend for population was observed in the Sam period of the second year (2002). The mean weather factors during this period ranged between 19.5-29.5°C & 16.2-28.2°C, 48.4-61.8 % & 33.3-58.7 % R.H. and (1.3-4.9 & 1.6-8.9 m/sec. Wv. for the two years, respectively. The mentioned results above are in agreement with that obtained by Ammer *et al.* (1977) and Sabra (2002) who recorded this leafhopper on marjoram plants all a year around in Egypt.

Statistical analysis of population activity in relation to three biotic and three a biotic factors affecting it was shown in (Table 5). Data in this table indicated positive insignificant relationship between weekly mean temperature and the population of *E. decipiens* in the first and third period in the first year, while this relation was negative and insignificant in the second period, also positive and significant relation was found during the second period in the second year (Table 5). Regarding the relation between R.H., there was significant and positive relation in the second period of both years. For wind velocity there was significant and negative relation with the insect population in the first & second period in both years and in the third period of the first year, while it was negative and insignificant in the rest.

The three predators gave insignificant relation on the population activity of this insect except *C. undecimpunctata* which had positive effect in the first period in 2002 and *P. alfierti* which had negative relation in the first and second period in 2002, while *C. carnea* had positive and significant effect in the first period of 2002.

Table (5). Simple correlation and partial regression value of three biotic and three abiotic factors with their significant levels and percentages of explained variances on the population activity of *Empoasca decipiens* in the first, second and third periods before cuts during 2001-2002 on marjoram at El-Saff, Giza Governorate.

Periods of growth	Year	Factors	Simple correlation		Partial regression values				
			r	P	b	P	F	p	E.V. %
1st	2001	W.m. temp.	0.185	0.4770	2.81	0.063			
		W.m. R.H.	0.188	0.4690	0.86	0.667			
		W.m. wind v.	-0.57	0.0160	-7.81	0.006			
		C.undecimpunctata	0.404	0.1070	4.91	0.005	7.103	0.05	81.00
		C. carnea	0.437	0.0790	-2.93	0.58			
		P. alfierii	0.157	0.5450	3.24	0.461			
	2002	W.m. temp.	-0.36	0.1590	0.11	0.819			
		W.m. R.H.	0.044	0.8640	0.02	0.958			
		W.m. wind v.	-0.64	0.0050	-1.90	1-404			
		C.undecimpunctata	0.74	0.0001	-1.43	0.198	18.330	0.05	91.67
		C. carnea	0.807	0.0001	4.98	0.006			
		P. alfierii	0.642	0.0050	1.11	0.387			
2nd	2001	W.m. temp.	-0.29	0.3400	16.05	0.055			
		W.m. R.H.	0.82	0.0060	0.47	0.846			
		W.m. wind v.	-0.82	0.0060	-17.09	0.015			
		C.undecimpunctata	0.54	0.0560	-1.54	0.86	8.709	0.05	89.70
		C. carnea	0.529	0.0620	14.88	0.378			
		P. alfierii	0.363	0.2220	-0.41	0.98			
	2002	W.m. temp.	0.717	0.0020	-0.07	0.982			
		W.m. R.H.	0.547	0.0520	-0.92	0.478			
		W.m. wind v.	-0.88	0.0001	-19.29	0.001			
		C.undecimpunctata	-0.09	0.7580	10.58	0.089	39.316	0.05	97.52
		C. carnea	-0.006	0.9990	14.78	0.09			
		P. alfierii	-0.63	0.0210	-34.36	0.005			
3rd	2001	W.m. temp.	0.155	0.5390	0.59	0.561			
		W.m. R.H.	-0.44	0.0680	-0.87	0.391			
		W.m. wind v.	-0.56	0.0150	-4.87	0.3			
		C.undecimpunctata	-0.08	0.7450	-0.37	0.827	1.240	0.05	40.34
		C. carnea	0.103	0.6820	0.73	0.775			
		P. alfierii	0.256	0.3050	1.21	0.754			
	2002	W.m. temp.	-0.07	0.7980	-0.84	0.18			
		W.m. R.H.	-0.4	0.1110	-0.38	0.311			
		W.m. wind v.	-0.32	0.2130	-2.49	0.37			
		C.undecimpunctata	-0.08	0.7680	0.27	0.906	0.970	0.05	36.80
		C. carnea	0.004	0.9990	1.48	0.645			
		P. alfierii	-0.2	0.4340	-0.37	0.94			

"r" : Simple correlation coefficient value "b" : Partial regression

"P" : Probability level E.V. (%) : Explained variance.

Abd-El-Wahab (1980) reported *Emposaca decedens, Balclutha sp.* and *Orosius albicinctus*, on sesame plants. Maximum abundance took place between late Aug. and late Sept. in three successive broods throughout the season.

Sewify *et al.* (1996) found that *Empoasca decipiens* population appeared on early planted cotton in Giza by late April and reached maximum between late May and Mid June in late planted cotton.

Helal *et al.* (1997) studied the effect of three weather factors on *Empoasca* spp. and they found insignificant effect on the population of the leafhoppers on faba bean.

In relation to predators, Ramadan (1988) found lady birds beetles the most dominant in marjoram fields. El-Sayed *et al.* (1993) stated that *Coccinella septempunctata* and *Chrysoperla carnea* were numerous in medicinal and aromatic fields.

4- *N. cymoides*:

This insect was the least abundant species on marjoram plants. During the first year (2001), this insect began to attack marjoram in the second week of Feb. and gradually increased with the increase in temp to reach its peak on 8th Mar., thereafter, the population decreased to reach its minimum in 29th Marc and completely disappeared from 12th Apr. till the end of the first period (Table 1).

During the second year (2002), the insect began to attack marjoram at the end of Jan. (4 insects/sample), then gradually increased to reach its first peak on 14th Mar.(17 insect/sample) then the population decreased before its increase again to reach second peak on 11th Apr.(23 insects/sample). The insect completely disappeared from 25th Apr till the end of the first period. The mean weather values during this period ranged between 12.81-25.85°C, 48.9-65 % R.H. and 4-13.1 m/sec. Wv. (Table 2).

The population in the second period was relatively high than first period and had only one small peak on 5th Jun. in the first year and two peaks on 4th July and 15th Aug. in the second one (2002). The mean weather values during this period ranged between 28-31.6°C & 28- 33.3°C, 39.9-57.6 % & 54-66.4 % R.H. and 2.3-8.7 & 3.6- 9.8 m/sec. Wv. in the two years, respectively.

The population in the third period was the highest and had three peaks on 4th Oct,18th & 15th Nov. in 2001; and 26th Sept,17th Oct.& 21th Nov.in 2002, (Tables 1 & 2) The mean weather factors during this period ranged between 19.5-29.5°C & 16.2-28.2°C, 48.4-61.8 % & 33.3-58.7 % R.H. and 1.3-4.9 & 1.6-8.9 m/sec. Wv. for the two years, respectively. The mentioned results above are in agreement with that obtained by Priesner and Alfierii (1953) and Ismail, Omnia (2001) who recorded this bug on marjoram and other medicinal plants all the year in Egypt.

Statistical analysis of population activity in relation to three biotic and three a biotic factors affecting it was shown in Table (6). Data in this table indicated insignificant relationship between weekly mean temperature and the population of *N. cymoides* in the three periods during the two years (Table 6). Regarding the relation between R.H., there was only significant and positive

relation in the second period of the year (2002) and insignificant in the rest. For wind velocity there was insignificant relation with the insect population except significant and negative relation in the third period of 2002.

C. undecimpunctata had significant relation with the population of insect, but was positive in the first period and neagtive in the third one for the two years, but insignificnt in the rest. *C. carnea* only had significant and positive realtion during the first period of the two years, negative in the third period of 2002 and insignificant relation in the rest periods. *P. alfiereii* had significant relation but positive in the first period of 2001 and negative in the third one of 2002, while it insignificant in the rest, (Table, 6).

Table (6). Simcorrelation and partial regression value of three biotic and three abiotic factors with their significant levels and percentages of explained variances on the population activity of *Nysius cymoides* in the first, second and third periods before cuts during 2001-2002 on marjoram at Giza Governorate.

Periods of growth	Year	Factors	Simple correlation		Partial regression values				
			r	P	b	P	F	p	E.V. %
1st	2001	W.m. temp.	-0.457	0.0650	0.04	0.922			
		W.m. R.H.	0.26	0.3130	0.00	0.994			
		W.m. wind v.	-0.419	0.0930	-0.64	0.364			
		C.undecimpunctata	0.554	0.0200	0.29	0.498	6.488	0.05	79.56
		C. carnea	0.872	0.0001	3.18	0.060			
		P. alfierii	0.571	0.0160	0.48	0.705			
	2002	W.m. temp.	-0.312	0.2210	-0.12	0.875			
		W.m. R.H.	0.055	0.8310	-0.07	0.893			
		W.m. wind v.	-0.375	0.1370	-0.65	0.307			
		C.undecimpunctata	0.585	0.0130	0.39	0.826	1.268	0.05	43.22
		C. carnea	0.595	0.0110	1.13	0.649			
		P. alfierii	0.454	0.660	-0.36	0.862			
2nd	2001	W.m. temp.	-0.158	0.6060	0.82	0.385			
		W.m. R.H.	-0.064	0.8340	-0.34	0.293			
		W.m. wind v.	-0.315	0.2940	-1.31	0.090			
		C.undecimpunctata	-0.263	0.3840	1.81	0.144	1.896	0.05	65.47
		C. carnea	-0.467	0.1070	-4.05	0.091			
		P. alfierii	-0.299	0.3190	-1.81	0.417			
	2002	W.m. temp.	0.243	0.4230	-0.76	0.793			
		W.m. R.H.	0.789	0.0001	1.41	0.215			
		W.m. wind v.	-0.416	0.1560	-0.63	0.858			
		C.undecimpunctata	0.432	0.1400	5.64	0.254	2.901	0.05	74.37
		C. carnea	-0.033	0.9140	1.55	0.771			
		P. alfierii	-0.325	0.2780	-4.59	0.505			
3rd	2001	W.m. temp.	0.381	0.1300	-0.85	0.820			
		W.m. R.H.	-0.138	0.5960	0.49	0.887			
		W.m. wind v.	-0.222	0.3910	-10.50	0.515			
		C.undecimpunctata	-0.576	0.0150	-11.29	0.077	1.394	0.05	45.54
		C. carnea	-0.221	0.3920	5.84	0.511			
		P. alfierii	0.09	0.9710	4.44	0.748			
	2002	W.m. temp.	0.252	0.3270	-2.33	0.159			
		W.m. R.H.	-0.25	0.3310	-0.29	0.774			
		W.m. wind v.	-0.675	0.0020	-12.44	0.081			
		C.undecimpunctata	-0.485	0.0480	-1.82	0.751	2.226	0.05	57.19
		C. carnea	-0.523	0.0310	-4.10	0.619			
		P. alfierii	-0.597	0.0110	4.47	0.709			

"r" : Simple correlation coefficient value "b" : Partial regression
"P" : Probability level E.V. (%) : Explained variance.

REFERENCES

Abd-El-Wahab, A.Z. (1980): Survey and population studies on the oil crops in Egypt M. Sc. Thesis, Fact. Agric Cairo Univ., Egypt.

Azab, A.K.; Tawfik, M.F.S. and Ismail, I.I. (1965): Seasonal changes in the abundance of certain aphids and their predtors in Giza. Bull. Soc. Ent. Egypte, 49: 11-24.

Daiber, C.C. (1970): Cabbage aphids in South Africa: The influence of the host plant on the biology of cabbage aphid *Brevicoryne brassicae* (L.). Phytophylactica, 2: 69-70.

Dawood, M.Z. (1971): Surveyed of aphids and mealy bugs infestated ornamental plants. M.Sc. Thesis, Fac. of Agric., Cairo Univ.

El-Kordy, M.W.; Mohamed, A.A.; Marzouk, I.A. and Mohamed, H.A. (1999): The changes in population density of aphids attacking some medicinal and aromatic plants in Egypt. J. Agric. Res., 77 (1): 195-204.

El-Sayed, A.M.K.; Abdel-Galel, F.A.; Daruish, Y.A.; El-Hagag, G.H.A. and Abou-Hagag, G.H. (1999): Incidence and dominance of arthropods associated with roselle, caraway and coriander plants in Upper Egypt. Assiut J. of Agric. Sci., 21 (3): 153-165.

El-Sayed, H.A.M. (1993): Studies on aphid fauna infesting medical and aromatic plants in Egypt. M.Sc. Thesis, Fac. Agric., Al-Azhar Univ., 73 pp.

Helal, H.A.; El-Khouly, A.S.; Khalafalla, E.M.E.; Metwally, M.M. and El-Mezaien, A.B. (1997): Preliminary studies on the population of legume aphid, *Aphis craccivora* (Koch) and jassids *Empoaca* spp. on different faba bean varieties and breeding lines under the field conditions of Kafr El-Sheikh Governorate, Egypt. Egypt. J. Agric., 75 (4): 951-959.

Herakly, F.A. and El-Ezz, A.A. (1970): Seasonal abundance and natural enemies of the cabbage aphid, *Brevicoryne brassicae* L. in U.A.R. Agric. Rev., 48: 119-122.

Ismail, Omnia M. N. (2001): Studies on some insects attacking aromatic and medicinal plants. M.Sc. Thesis, Fac. of Agric., Cairo Univ., 152 pp.

Mesbah, H.; El-Sherif, H.K.; Moursi, K.S. and Mahmoud, M.A. (1982): Survey of the pests infesting medicinal and ornamental plants in Egypt. Proc. 5*th* Arab Pesticide Conf., Tanta Univ.

Priesner H. and Alfieri, A. (1953): A review of the Hemiptera, Heteroptera known to us from Egypt. Bull. Soc. Fouad 1*er* Ent., 37: 1-119.

Ramadan, Mona. A.M. (1988): Ecological and biological studies on certain insects infesting medicinal and oromatic plants in Egypt Ph.D. Thesis. Fac. Agric., Cairo Univ., Egypt. 211 pp.

Sabra, Ibrahim. M. (2002): Species and populations of leafhoppers (Cicadellidae: Homoptera) in fayoum governorate with some biological observations, Ph.D.Thesis, Fac. of Agric., Cairo Univ., Egypt, 137 pp.

Saroja, R.; Raguraman, S. and Paramsivam, K.S. (1993): Influence of weather factors on the population dynamics of rice green leafhoppers. Madras Agriculture J. 80: (11) 644-645.

Sewify; El-Arnaouty, S.A. and Belal, M.H. (1996): The effect of cotton late planting on population densities of sucking insects and their associated predators in Giza region, Egypt. Bull. Fac. Agric., Univ. Cairo, 47: 665-675.

Verma, K.D.; Chandla, V.K.; Lal, L.; Kishore, R.; Ram, G. and Somani, A.K. (1988): Biology of *Myzus persicae* and other aphids transmitting potato virus diseases. Ann. Sci. Rep., Central Potato Res. Inst., India, pp. 135-139.

Wheeler *et al.* (1983): *Eupteryx atr.* North America distribution, seasonal history, host plants and description of the fifth instar nymph (Homoptera: Cicadellidae). Proc. Ent. Soc. Wash., 1983, 85 (3): 528- 536.

التغيرات العددية لبعض أنواع الحشرات الثاقبة الماصة التي تصيب نبات البردقوش وعلاقة ذلك بتعداد المفترسات المصاحبة لها وتأثير بعض العوامل الجوية في محافظة الجيزة

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تم عمل هذه التجربة على نبات البردقوش في منطقة الصف بمحافظة الجيزة خلال عامين متتاليين ٢٠٠١ - ٢٠٠٢ لمعرفة تذبذب نطاط الحشائش وقافزات الأوراق من عائلة (Cicadellidae) ومن الخوخ الأخضر من عائلة Aphididae وبق النبات من عائلة Lygaeidae.

وأيضا دراسة تأثير التعداد لثلاثة من المفترسات هم (أبو العيد ذى الإحدى عشرة نقطة، وأسد المن، والحشرة الرواغة (وثلاثة من المتغيرات الجوية) متوسط درجة الحرارة والرطوبة النسبية وسرعة الرياح(على تعداد الحشرات).

ونبات البردقوش معمر وله ثلاثة دورات نمو على مدار العام .وتبين من خلال الدراسة أن أعلى تعداد فى دورة النمو الاولى من فبراير الى مايو كان لنطاط الحشائش ومن الخوخ الأخضر. وسجل لنطاط الحشائش قمتين فى العام الأول فى منتصف مارس. وأعلى قمة كانت فى نهاية مايو. وفي العام الثانى سجل لهذه الحشرة ثلاثة قمم وكانت على التوالى فى منتصف مارس، ١١ ابريل، وكانت أعلى قمة فى أواخر مايو.

وبالنسبة لمن الخوخ الأخضر سجل له ثلاثة قمم فى نفس الدورة وهم على التوالى فى منتصف فبراير,٨ مارس وسجل له أعلى قمة فى ٥ أبريل ٢٠٠١ وفى العام الثانى سجل له ثلاثة قمم الأولى فى منتصف فبراير. وكانت أعلى قمة فى منتصف مارس والأخيرة كانت فى ١١ أبريل ٢٠٠٢ أما بالنسبة للحشرتين الأخيرتين سجل لهم أقل تعداد على مدار العامين . وبالنسبة للدورة الثانية من يونيو الى أغسطس من نمو النبات سجل فيها أعلى تعداد لحشرة نطاطات الأوراق فقط. وكان لها ثلاثة قمم خلال العامين وكانت على التوالى ٥ يوليو، ٢٦ يوليو، وكانت أعلى قمة فى ٢٣ أغسطس للعام الأول.

وفى العام الثانى كان فى٢٥ يوليو ، ١٥ أغسطس، وكانت أعلى قمة فى ٥ سبتمبر. وسجل للثلاثة حشرات الأخرى أقل تعداد فى نفس الفترة على مدار العامين. وبالنسبة للدورة الثالثة من نمو النبات (من سبتمبر الى ديسمبر (سجل لبق النبات أعلى تعداد وكان له ثلاثة قمم فى نفس الفترة وكانت أعلى قمة فى ٤ أكتوبر,١٨أكتوبر ، ١٥ نوفمبر للعام الأول، ٢٦ سبتمبر، ١٧ أكتوبر كانت أعلى قمة٢٢ نوفمبر للعام الثانى ٢٠٠٢ وسجل للثلاثة حشرات الأخرى أقل تعداد فى نفس الفترة على مدار العامين.

ولم توضح العلاقة بين تأثير العوامل الجوية المختبرة وكذلك المفترسات المتواجدة اية علاقة واضحة مع التعداد المتواجد للحشرات. فلقد كان هناك ارتباطات مختلفة لنفس الظاهرة مع مراحل تذبذب التعداد خلال فترات نمو النبات المختلفة وأن كان التأثير المتداخل لهذه العوامل كان معنويا.