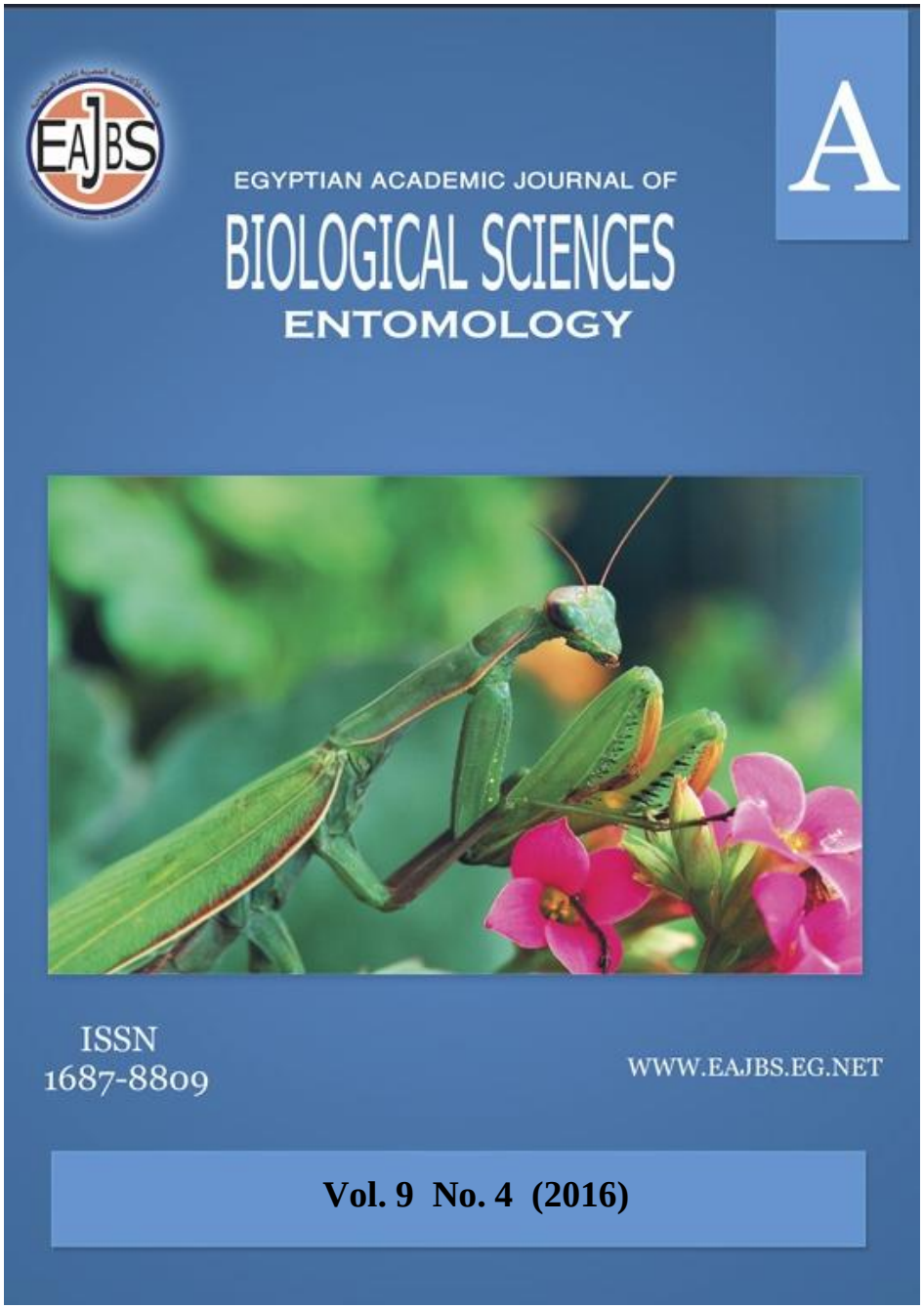

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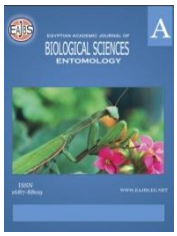

Seasonal Activity of Certain Insect Pests on Green Pea at Giza Governorate, Egypt

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ABSTRACT

Green *pea Pisum sativum,leguminasae* is one of the most popular vegetable crops in Egypt. It is liable to be attacked by several destructive pests that cause great yield damage, which can result in greater than 50 %yield reduction. Many insect pests belonging to the different orders, such as *Liriomyza trifolii* (Burgess), white fly *Bemisia tabaci* Genn and red spider *Tetranychus urticae*. The goal of the present work is to determine the population activities of certain pests infesting Green pea as well as the numbers and duration of seasonal field generations. The combined effects of some climatic factors on the tested insect pests also were studied**.** Experiments were conducted at Manawat district, Giza Governorate on the autumn's of 2014 and 2015 seasons. The relationship between the minimum, maximum temperatures and relative humidity average as well as the age of plants against the population of the target pests infesting on the leaves of green peas were studied in 2014 and 2015

INTRODUCTION

Green *pea Pisum sativum*, *leguminasae* is one of the most popular vegetable crops in Egypt. It is liable to be attacked by several destructive pests that cause great yield damage, which can result in greater than 50 % yield reduction. Many insects' pests belonging to the different orders, such as *Liriomyza trifolii* Burgess, white fly *Bemisiatabaci* Genn., and red spider *Tetranychus urticae*, Saleh 2011. *Liriomyza trifolii* (Burgess) is a polyphagous insect and attacks a wide range of vegetables and ornamentals all over the world Schuster and Everett, 1983; Parrella, 1987. The larvae feed on leaf mesophyll and reduce chlorophyll content Parrella, 1987, Younes *et al*. 2001

In Egypt, Significant positive correlation between some weather factors (Temperatures degrees and Relative humidity) and sucking pest's populations on soybean varied according to pests' species was stated. In addition to, the white, fly *Bemisia tabaci* Genn., and red spider *Tetranychus urticae* are known attack green pea (Awadalla *et al*. 1991).

Therefore, the goal of the present work is to determine the population fluctuation of certain pests infesting Green pea *Pisum sativum* as well as the numbers and duration of seasonal field generations. The combined effects of some climatic factors on the tested insect pests also were being studied.

MATERIALS AND METHODS

Seasonal activity of certain insect pests on green pea:

Experiments were conducted at Manawat district, Giza Govemorate on the autumn's of 2014and 2015 seasons. Green pea seeds' were sown in 10th of September and stayed in the felid to 15th December 2014and 2015. Three replicates about 175 m each were used. . Inspection was started 15 days after sowing, and continued weekly until the harvest time. Numbers of pests at the different stages of *B. tabaci* (Eggs and nymphs), *L. trifolii* (larvae) and *T. urticae* (Eggs and movable stage) were counted on five leaves (15 leaflets) per replicate that collected randomly at early morning. Samples were kept in paper bags and transferred to the laboratory to examine by the aid of stereomicroscope in the same day for examination and counting.

Generation numbers and its duration for tested insects pests' were calculated according to Audemard and Milaire1975 and modified by Jacob 1977.

Effect of certain weather factors on the seasonal fluctuations of the tested pests on green pea:

The relationship of certain weather factors (weekly mean of Maximum temperature, Minimum temperature and Mean relative humidity R.H %) and the age of plants were tested with the seasonal fluctuations of the goal insects pests' at two successive seasons (2014 and 2015). Metrological data were obtained from the metrological station, Agricultural Research center, Giza for the investigated seasons. The simple correlation coefficient (r) and the regression coefficient (b) were calculated between each of the above mentioned factors and the weekly mean numbers of pests at locations and seasons. The partial regression used to obtain basic information about the amount of variability in the activity of the studied pests. The combined effects of these four factors were obtained by applying C-multipliers formula and expressed as percentage of explained variance. Statistical analysis was carried by using SAS system 1988.

RESULTS AND DISCUSSION

Changes in the population densities of three insect pests; *B. tabaci* (Eggs and nymphs), *L. trifolii* (larvae) and *T. urticae* (Eggs and movable stage) on green pea were monitored during 2014 and 2015 cultivation seasons at Manawat district, Giza Govemorate.

Seasonal activity of some sucking insects pests on green pea:

Bemisia tabaci:

Data illustrated in Figures (l and 2) showed that the *B. tabaci* individuals started to appear by the end week of September being (22and 17 eggs and 100and 132 nymph) in 2014and 2015 respectively, and continued to the mid-week of December for two seasons.

Liriomyza trifolii

Fig. (3) Demonstrated the seasonal activity *L. trifolii* on green pea during two successive years; 2014 and 2015. The population of *L. trifolii* was higher during the second season than the first season, with mean number of 196 and 156 larvae /10 leaves throughout the two studied seasons, respectively.

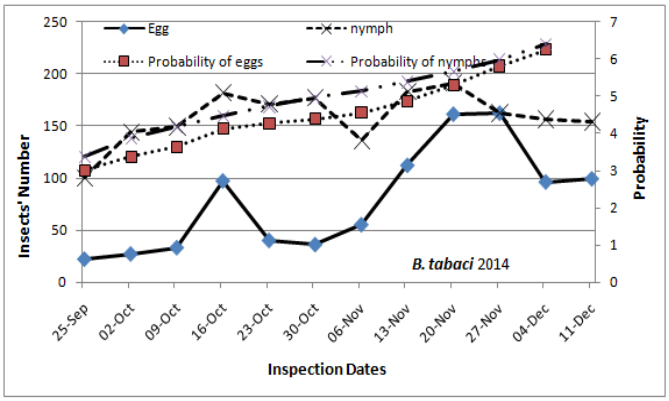

Fig. 1: population fluctuations of ***B. tabaci*** on green pea plants during 2014 season at Manawat district, Giza Govemorate.

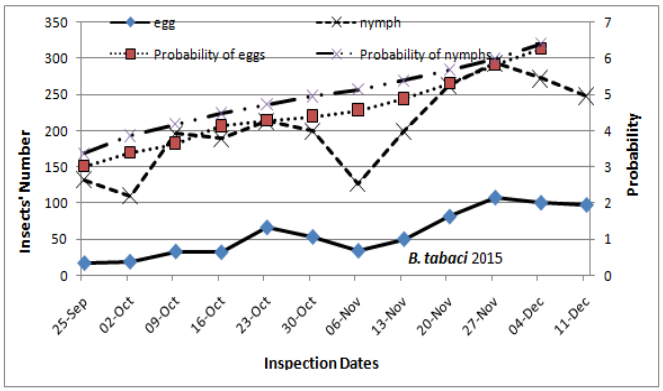

Fig. 2: population fluctuations of ***B. tabaci*** on green pea plants during 2015 season at Manawat district, Giza Govemorate.

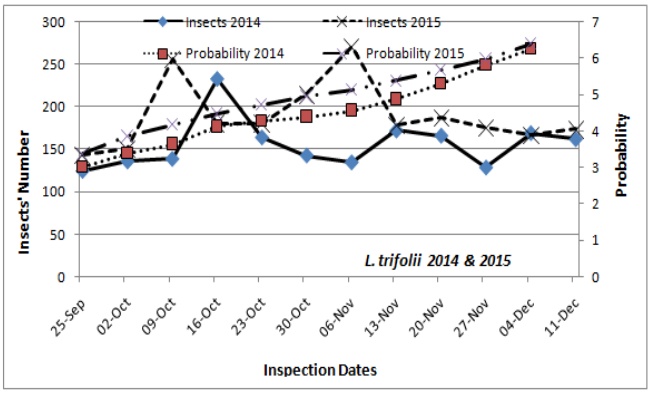

Fig. 3: population fluctuations of ***Liriomyza trifolii*** on green pea plants during 2014 and 2015 seasons at Manawat district, Giza Govemorate.

Tetranychus urticae

The seasonal activities of *T.* ***urticae*** on green pea during two successive years; 2014 and 2015 for both eggs and immature stages were illustrated Figs. (4 and 5). The population density of *Tetranychus urticae* increased until reaching its peak during the end of October or during November.

Generation numbers and its duration:

Generation numbers and its duration for tested insects pests' were calculated according to Audemard and Milaire (1975) and modified by Jacob (1977).

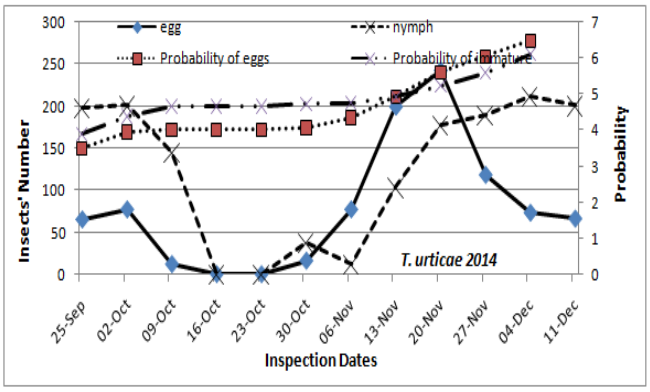

Fig. 4: population fluctuations of *Tetranychus urticae* on green pea plants during 2014 season at Manawat district, Giza Govemorate.

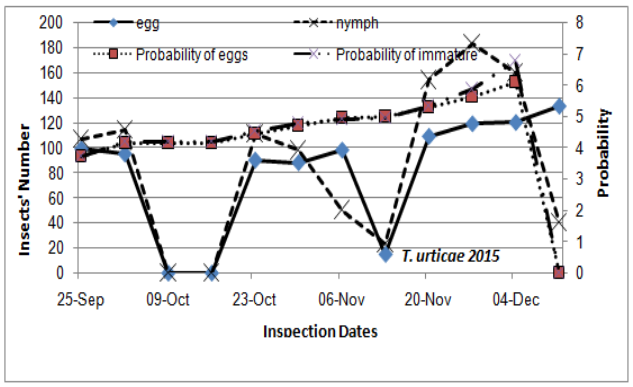

Fig. 5: population fluctuations of *Tetranychus urticae* on green pea plants during 2015 season at Manawat district, Giza Govemorate

Bemisia tabaci:

Eggs

Monitoring the eggs of *B. tabaci* reveled of two active generations; the first one started at the 25th of September to the 30th of October 2014 lasting 35 days. The peak of this generation occurred at 16th of Oct. recording 97 individuals. The second generation happened from 30/10-11/12/2014 lasting 41 days. The climax of this generation occurred on 27th Nov. with 162 individuals. The same results were obtained in 2015; the first generation occurred 25/9-6/11/2015 and lasted 42 days, its peak was 23/10/2015. This peak recorded 66 individuals. The second generation happened from 6/11-11/12/2015 with duration 35 days recorded 107 individuals at 27th Nov.

Nymphs

The same trend of *B. tabaci*'s eggs was repeated with its nymphs. Examination of plants recorded two peaks of nymphs in 2014: the first was 25/9-30/10/2014 and the second generation happened from 30/10-11/12/2014 lasting 41 days. In 2015, the two generations occurred also 25/9-6/11/2015 and lasted 42 days; its peak was 23/10/2015. This peak recorded 213 individuals. The second generation happened from 6/11-11/12/2015 with duration 35 days recorded 273 individuals at 27th Nov.

Liriomyza trifolii

As it could be seen and extracted from *Liriomyza trifolii* had two generations in each of the two tested seasons. In 2014's season first generation happened 25/9-30/10/201 and the second on 30/1-11/12/2014. The generations lasted 35 and 42 days respectively. The first peak was on 16th Oct. with 232 insects. The second generation

was on 13th Nov. with 196 individuals. In 2015 three generations occurred; 25/9-16/10, 16/10-13/11 and 13/11-11/12/2015 with durations: 21, 28 and 28 days respectively. The peaks of these generations were on: 10/9, 6/11 and 27/11/2015 respectively. Population size recorded 256,270 and 157 individuals respectively.

Tetranychus urticae

Eggs

Monitoring the eggs of *T. urticae* reveled of two active generations; the first one started at the 25th of September to the 30th of October 2014 lasting 35 days. The second generation happened from 30/10-11/12/2014 lasting 41 days. The same results were obtained in 2015; the first generation occurred 25/9-30/10/2015 and lasted 35 days. The second generation happened from 30/10-11/12/2015 with duration 42 days.

Immature stages

The same trend of *T. urticae* eggs was repeated with its immature stages. Examination of plants recorded two peaks of nymphs in 2014: the first was 25/9-30/10/2014 and the second generation happened from 30/10-11/12/2014 lasting 41 days. In 2015, the two generations occurred also 25/9-30/10/2015 and lasted 42 days, the second generation happened from 30/10-11/12/2015 with duration 41 days.

Effect of certain weather factors on the seasonal fluctuations of the tested pests on green pea*:*

***Bemisia tabaci* (Genn.)**

Statistical analysis for the effects of the three selected weather factors and the plant age against the population of *B. tabaci* eggs during both seasons at Giza Governorate are given in Tables (1 and 2). These results revealed insignificant negative effects of minimum and maximum temperature on the seasonal fluctuations of *B. tabaci* eggs in the first season but in the second season had significant negative whereas "r" values were -0.70 and -0.85 during 2014, respectively. While the mean percentages of relative humidity had insignificant positive effect in first seasons, but in the second seasons had significant positive.

Age of plant had significant positive effect in the both seasons. The combined effect (E.V) of these ecological factors on *B. tabaci* eggs showed that these factors were responsible as a group for 63 % and 60 % effects on the population dynamics of *B. tabaci* eggs throughout both seasons, respectively.

Table 1: Simple correlation and partial regression values of the three main weather factors and age of plant on egg of *B. tabaci* at, Giza Governorate during 2014 and 2015 seasons.

Year	2014						2015					
Tested	**Simple**		**Partial**			**%**	**Simple**		**Partial**			**%**
Factors	**correlation**		**Regression**				**correlation**		**Regression**			
	r	**P**	**B**	**S.E.**	**P**	**E .V.**	**r**	**P**	**B**	**S.E.**	**P**	**E .V.**
Max. Temp.	-0.70	0.01	-1.99	17.1	0.91	63%	-0.85	0.0003	1.82	5.1	0.73	60%
Min. Temp.	-0.7	0.01	-6.4	18.79	0.74		-0.9	<.0001	-6.36	5.05	0.24	
RH%	0.51	0.09	-5.69	4.2	0.21		0.58	0.04	-2.05	2.1	0.36	
Age	0.73	0.006	1.54	1.88	0.43		0.9	<.0001	0.88	0.76	0.28	
	F=3.08*						F= 11.87*					

Table 2: Simple correlation and partial regression values of the three main weather factors and age of plant on nymph of *B. tabaci*at Giza Governorate during 2014 and 2015 seasons.

	2014						2015					
Tested	**Simple**		**Partial**			**%**	**Simple**		**Partial**			**%**
Factors	**correlation**		**Regression**				**correlation**		**Regression**			
	r	**P**	**B**	**S.E.**	**P**	**E .V.**	**r**	**P**	**B**	**S.E.**	**P**	**E .V.**
Max. Temp.	-0.26	0.4	6.25	9.58	0.53	55%	-0.78	0.002	8.5	12.85	0.52	75%
Min. Temp.	-0.25	0.41	6.84	10.52	0.53		-0.82	0.0009	-19.82	12.72	0.16	
RH%	0.15	0.62	-1.46	2.35	0.55		0.45	0.14	-6.66	5.28	0.24	
Age	0.41	0.17	2.74	1.05	0.03		0.78	0.002	1.38	1.92	0.49	
	F= 2.13						F= 5.42*					

Also the effect of these factors both minimum and maximum temperature showed insignificant negative in the first season but in the second season had significant negative whereas "r" values were -0.26 and -0.78 during 2015, respectively. While the mean percentages of relative humidity had insignificant positive effect in both season. Age of plant had insignificant positive effect in the first season but in the second season had significant positive effect. The percentage of the explained variances (E.V) for three selected ecological factors during both seasons were 55 % and 75 % effects on the population dynamics of *B. tabaci* nymphs for the both seasons, respectively.

Liriomyza trifolii

Statistical analysis for the effects of the three selected weather factors on the population dynamics of *L. trifolii* during 2014 and 2015 seasons were given in Table (3). These results revealed that minimum and maximum temperature had insignificant positive effects on seasonal fluctuation of larvae throughout two successive seasons.

Table 3: Simple correlation and partial regression values of the three main weather factors, of plant and biotic factors on larvae *of L. trifolii*at, Giza Governorate during 2014 and 2015seasons.

	2014						2015					
Tested	**Simple**		**Partial**			**%**	**Simple**		**Partial**			**%**
Factors	**correlation**		**Regression**				**Correlation**		**Regression**			
	R	**P**	**B**	**S.E.**	**P**	**E .V.**	**R**	**P**	**b**	**S.E.**	**P**	**E .V.**
Max. Temp.	0.06	0.85	26.63	8.57	0.01	25%	0.2	0.53	1.73	15.44	0.91	88%
Min. Temp.	-0.01	0.96	-12.62	9.41	0.22		0.03	0.91	3.73	15.27	0.81	
RH%	-0.13	0.67	-2.28	2.1	0.31		0.26	0.41	3.59	6.35	0.56	
Age	0.13	0.66	3.32	0.94	0.009		-0.002	0.99	0.02	2.31	0.99	
	F= 4.77*						F= 0.41					

The mean percentage of relative humidity had insignificant negative effects in the first season but in the second season had insignificant positive effects. Age of plant had insignificant negative in both seasons. The percentage of explained variances (E.V) for the three selected ecological factors during both seasons were 80 % and 22 % effects on the population dynamics of larvae of *L. trifolii* for the both seasons, respectively.

Tetrenchys urticae

Statistical analysis for the effects of the three selected weather factors on the

population dynamics of *T. urticae* during 2014 and 2015seasons were given in Tables (4 and 5). These results revealed that minimum, maximum temp. had insignificant negative effects on seasonal fluctuation of *T. urticae* egg during 2014, while in the second season showed significant negative effects where "r" value were -0.35 and -0.56 for the two factors, respectively, while the mean percentages of relative humidity had insignificant positive effect in both seasons.

Table 4: Simple correlation and partial regression values of the three main weather factors and age of plant of egg *T. urticae* at Giza Governorate during 2014 and 2015 seasons.

	2014						**2015**					
Tested factors	**Simple correlation**		**Partial Regression**			**%**	**Simple correlation**		**Partial Regression**			**%**
	R	**P**	**B**	**S.E.**	**P**	**E .V.**	**R**	**P**	**B**	**S.E.**	**P**	**E .V.**
Max. Temp.	-0.53	0.07	-39.79	31.89	0.25	45%	-0.56	0.05	-13.61	17.21	0.45	33%
Min. Temp.	-0.5	0.09	-3.74	35.03	0.91		-0.48	0.11	1.9	17.03	0.91	
RH%	0.4	0.19	-5.95	7.83	0.47		0.24	0.43	2.52	7.08	0.73	
Age	0.42	0.16	-4.44	3.51	0.24		0.46	0.12	-0.86	2.58	0.74	
	F= 1.45						F=0.85					

Table 5: Simple correlation and partial regression values of the three main weather factors andage of plant of movable stage *T. urticae* at, Giza Governorate during 2014 and 2015 seasons.

	2014						***2015***					
Tested Factors	**Simple correlation**		**Partial Regression**			**%**	**Simple correlation**		**Partial Regression**			**%**
	R	**P**	**B**	**S.E.**	**P**	**E .V.**	**R**	**P**	**B**	**S.E.**	**P**	**E .V.**
Max. Temp.	-0.34	0.27	-35.84	33.32	0.31	55%	-0.42	0.17	-10.42	20.19	0.62	48%
Min. Temp.	-0.3	0.33	27.43	36.6	0.47		-0.45	0.13	-28.94	19.98	0.19	
RH%	0.51	0.08	15.53	8.18	0.09		0.17	0.58	1.97	8.31	0.81	
Age	0.23	0.46	-4.85	3.67	0.22		0.28	0.37	-4.65	3.02	0.16	
	F= 2.08						F=1.57					

Age of plant had insignificant positive effects on seasonal fluctuation of *T. urticae* egg during 2014, while in the second seasons (2015) showed significant positive effects. The combined effect (E.V) of these ecological factors on *T. urticae* eggs showed that these factors were responsible as a group for 45% and 33 % effects on the population dynamics of *T. urticae* eggs throughout both seasons, respectively.

Also the effect of these factors both minimum and maximum temperature showed insignificant negative effects on the seasonal fluctuations of *T. urticae* movable stage in the first season, but in the second season showed insignificant negative effects of maximum temp., factor, but minimum temperature had significant negative effect ("r" values was -0.34). While the mean percentages of relative humidity had significant positive effect in first season where "r" values - 0.42 and the second season showed insignificant positive. Age of plant had insignificant positive. The percentage of explained variances (E.V) for the three selected ecological factors during the both seasons were 55 % and 48 % effects on the population dynamics of *T. urticae* nymphs for the both seasons, respectively.

These results are agreement with fallowed Saradhi and Patnaik (2004) mentioned that Correlation studies of the serpentine, *Liriomyza trifolii*, revealed that diurnal temperature variation was negatively correlated (r=-0.438) and the number of

rainy days was positively correlated (r= 0.625), Yasir *et al*. (2011) mentioned that effect of temperature and relative humidity on population dynamics of insect pests of mung pea was studied during mung pea growing season of 2005. Pest mite Included *Tetranychus urticae* Koch. Results revealed that the temperature had a negative significant correlation with thrips ($r = -0.860$) and a positive significant correlation with mites ($r = 0.606$) and field cricket ($r = 0.439$). However, the relative humidity displayed a negative insignificant correlation with mites ($r = -0.313$), El-Saidy *et al.* (2012) recorded maximum and minimum temperature had significant positive effects on population of *Tetranychus urticae* stags and *Thrips tabaci* which infested green pea plants under greenhouse conditions, while RH% had insignificant negative effect on the previous two pests but significant negative effect on *Bemisia Tabaci* and *Liriomyza sp*. during the two successive seasons 2010 and 2011. Silva*et al*. 2015 recorded that maximum, minimum temperature and relative humidity were correlated to the total number of eggs, nymphs and adults of *Bemisia tabaci* through Pearson's linear correlation analysis. These abiotic factors influenced

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ARABIC SUMMERY

النشاط الموسمي للآفات الحشرية الهامة على نبات البازلاء الخضراء في، محافظة الجيزة، مصر

عفاف محمد صالح الروبي
معهد بحوث وقاية النباتات - مركز البحوث الزراعية – دقي - جيزة

يهدف البحث الى دراسة التذبذبات العددية لبعض الآفات على نباتات البزلاء وهي (الذبابة البيضاء – صانعات الانفاق-العنكبوت الاحمر). واتضح من الدراسة ان قد تحقق اعلى معدل في تعداد الذبابة البيضاء خلال الاسبوع قبل الاخير والاخير في شهري أكتوبر ونوفمبر (213، 312 فرد حورية/ 10 أوراق). بينما كان أعلى تعداد لحشرة صانعة أنفاق أوراق البزلاء (270,256يرقة/ 10 أوراق) وذلك في الاسبوع الثاني من اكتوبر والاسبوع الاول من نوفمبر، ولقد حقق اعلى معدل تعداد لآفة العنكبوت الاحمر في الفترة ما بين الاسبوع قبل الاخير من اكتوبر والاسبوع الاخير من نوفمبر كان (111, 154 فرد حورية/ 10 أوراق). وتمت دراسة العلاقة بين درجات الحرارة العظمى و الصغرى و متوسط الرطوبة النسبية وبين تعداد الآفات المستهدفة على محصول البزلاء الخضراء وكانت النتائج كالتالي بالنسبة لذبابة البيضاء كانت درجات الحرارة العظمى والصغرى معنوية سالبة بالنسبة الى البيض وطور الحورية اما الرطوبة كانت غير معنوية موجبة وذلك ايضا بالنسبة للبيض وطور الحورية وكان تأثير جميع العوامل على تعداد الافة (٦٠%، ٦٤%) و(٥٥%، ٧٥%)بالنسبة لبيض والحوريات على التوالي، اما بالنسبة الى صانعات أنفاق أوراق الفاصوليا كانت درجة الحرارة الصغرى غير معنوية موجبة بينما كل من درجة الحرارة العظمى معنوية سالبة والرطوبة النسبية معنوية موجبة وكان تأثير جميع العوامل على تعداد الافة (٢٥ %، ٨٨%)، اما بالنسبة لعنكبوت الاحمر فوجدا ان درجات الحرارة الصغرى والعظمى للبيض معنوية سالبة اما بالنسبة الى الافراد المتحركة (الحوريات) كانت درجة الحرارة الصغرى غير معنوية سالبة ودرجة الحرارة العظمى معنوية سالبة وبالنسبة الى الرطوبة النسبية وجد انها غير معنوية موجبة لكل من البيض والافراد المتحركة وكان تأثير جميع العوامل على تعداد الافة (٣٣%،٤٥%) و(٥٥%،٤٨%) لكل من البيض والافراد المتحركة على التوالي.