FACULTY OF AGRICULTURE

Minia J. of Agric. Res. & Develop.
Vol. (29) No. 2 pp 349- 367, 2009

BIONOMICS OF CERTAIN MITES AND INSECTS INHABITING GRAPEVINES IN ASSIUT GOVERNORATE

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Received 3 March 2009 Accepted 15 June 2009

ABSTRACT

Seasonal activity of certain mites and insects inhabiting three different grapevine varieties Flame, Thompson and King Rubby in Assiut Governorate, was studied during the two successive seasons of 2005/2006 and 2006/2007. Data revealed the occurrence of three pests namely; black vine thrips, (*Retithrips syriacus* Mayet) [Thysanoptera:Thripidae]; the two-spotted spider mite, (*Tetranychus urticae* Koch) (Acari: Tetranychidae) and European red mite, (*Panonychus ulmi* Koch) (Acari: Tetranychidae) and two predators namely, the predacious thrips, (*Scolothrips longicornis* Priesner) [Thysanoptera: Thripidae] and the predacious mite, (*Typhlodromus* spp.) (Acari: Phytoseiidae) on the grapevine varieties. Population activity of these species differed during the two seasons from one grapevine variety to another. Also, *T. urticae* occurred in relatively low numbers during short period and *Typhlodromus* spp. appeared early in the two seasons than *S. longicornis*.

Dominance and abundance degrees of these species were calculated on the three grapevine varieties. The two pests (*R. syriacus* and *P. ulmi*) indicated high dominance and abundance degrees during the two seasons.

The effect certain biotic and abiotic factors on the population density of *R. syriacus*, *T. urticae* and *P. ulmi* were investigated. The data showed that the relative humidity, *Typhlodromus* spp. and *S. longicornis* played the most important role in regulating the population density of these pests.

INTRODUCTION

Several insect and mite species occurr on grapevine in many regions of the world (Duso and Vettorazzo, 1999; Rosi *et al.*, 2006). Thrips species injurious to grapes are known as pests in vine yards all over the world, while *R. syriacus* is pantropical in distribution, known in many countries including Egypt (Wilson, 1975; Medina-Guad and Franqui, 2001). Recently, *P. ulmi* and *T. urticae* have become a significant problem in the eastern of United States and Canada (Jessica, 2001). In Egypt, many tetranychid mites infested grapes (Zaher *et al.*, 1973). Rizk *et al.*, (2005) found *Typhlodromus* spp. on grapevine. Hidenari and Ishizue, (2006) recorded *S. longicornis* preying tetranychid mites.

The population dynamics of spider mites and thrips are affected by various biotic and abiotic factors, which play important roles in regulating their populations (Takafuji, 1996; Kitashima and Gotoh, 2003).

The objectives of this study were to investigate the seasonal activity of certain mite and insect species inhabiting leaves of some grapevines varieties in Assiut Governorate. Also, to evaluate dominance and abundance degrees of the different species as well as the effect of certain biotic and abiotic factors in regulating the abundance of these pests.

MATERIALS AND METHODS

This study was carried out at Faculty of Agriculture Experimental Farm, Assiut University, during the two successive seasons (2005/2006 and 2006/2007) to study the seasonal population activity of two insects species, the black vine thrips, *(Retithrips syriacus* Mayet) and the predacious thrips, *(Scolothrips longicornis* Priesner) as well as three mite species, *(Tetranychus urticae* koch, *Panonychus ulmi* Koch and the predacious mite, *Typhlodromus* spp.) on three grapevine varieties (Flame, Thompson and King Rubby). Weekly sample of 25 leaves was randomly collected from each grapevine

variety and carefully transferred to the laboratory. Both leaf surfaces were examined under a stereoscopic microscope (Zeis, Germany) to count the individuals of certain insects and mites species.

Dominance degrees (D) for the five species were calculated using the formula of Facylate (1971):

$$D = \frac{t}{T} \times 100 \quad \text{where :}$$

t = total number of each species during the collecting period.
T= total number for all species collected during the collecting period.

The abundance degrees or percentage of abundance (A) of the five species collected during the whole sampling period was calculated using the formula of Facylate (1971):

$$A = \frac{n}{N} \times 100 \quad \text{where :}$$

n = total number of samples in which each species appeared.
N = total number of samples taken all over the season.

Records of maximum and minimum temperature, daily mean temperature and average relative humidity (abiotic factors) were obtained from the meteorological station located at the Fac. Agric. Exp. Farm, Assiut University. The average number of *S. longicornis* and *Typhlodromus* spp. (biotic factors) were tested for population analysis of the three pests (i.e., *R. syriacus*, *T. urticae* and *P. ulmi*). The relationship between the population density of the three pests and both abiotic factors and biotic factors, within the inspected periods and through the examined seasons, was statistically analysed using Multiple Regression Analysis (Fisher, 1950).

RESULTS AND DISCUSSION

I: Seasonal activity of pests and predators associated with grapevines:

a) During 2005 / 2006 season

The population densities of certain leaf-pests namely *R. syriacus*, *T. urticae* and *P. ulmi* as well as two predators namely *S. longicornis* and *Typhlodromus* spp, inhabiting three grapevine varieties (Flame, Thompson and King Rubby) during 2005 / 2006 season are illustrated in Fig. 1. Results clearly revealed that the initial infestation of these pests took place in April, then increased rapidly during May for *T. urticae* and *P. ulmi*, and during June for *R. syriacus* on Flame, Thompson and King Rubby grapevine varieties. The number of individuals decreased sharply from August to February, and disappeared completely from July to February for *T. urticae* on the same abovementioned varieties.

The predacious mite, *Typhlodromus* spp. firstly appeared in March while the predacious thrips, *S. longicornis* started to occur lately during April in relatively low numbers for the two predators on the three grapevine varieties. *Typhlodromus* spp. recorded the highest number during April (0.64 individuals/leaf) for Flame variety and during June (0.51 and 0.33 individuals/leaf) for Thompson and King Rubby varieties, respectively. *S. longicornis* showed different dates of activity period according to grapevine variety, where the highest number (0.49, 0.46 and 0.20 individuals/leaf) was recorded during September, May and June for Flame, Thompson and King Rubby, respectively. Therefore, the population of the two predators fluctuated in few numbers and disappeared completely during January and February.

b) During 2006 / 2007 season

From Fig. 2 it is clear that *P. ulmi* began to appear during March instead of April in the first season, while *R. syriacus* started in April as the first season.

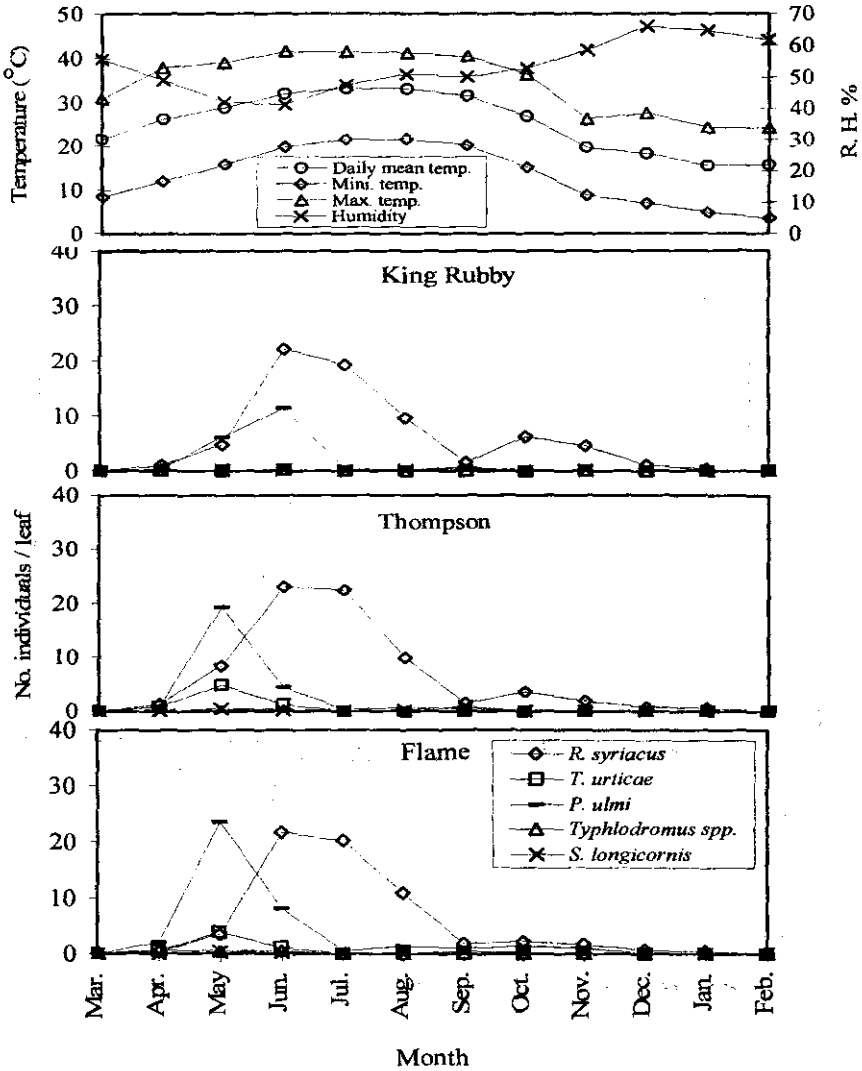

Fig. 1: Seasonal abundance of *R. syriacus*, *T. urticae*, *P. ulmi*, *Typhlodromus* spp. and *S. longicornis* on Flame, Thompson and King Rubby grapevine varieties and the corresponding weather records, Assiut (2005 /2006).

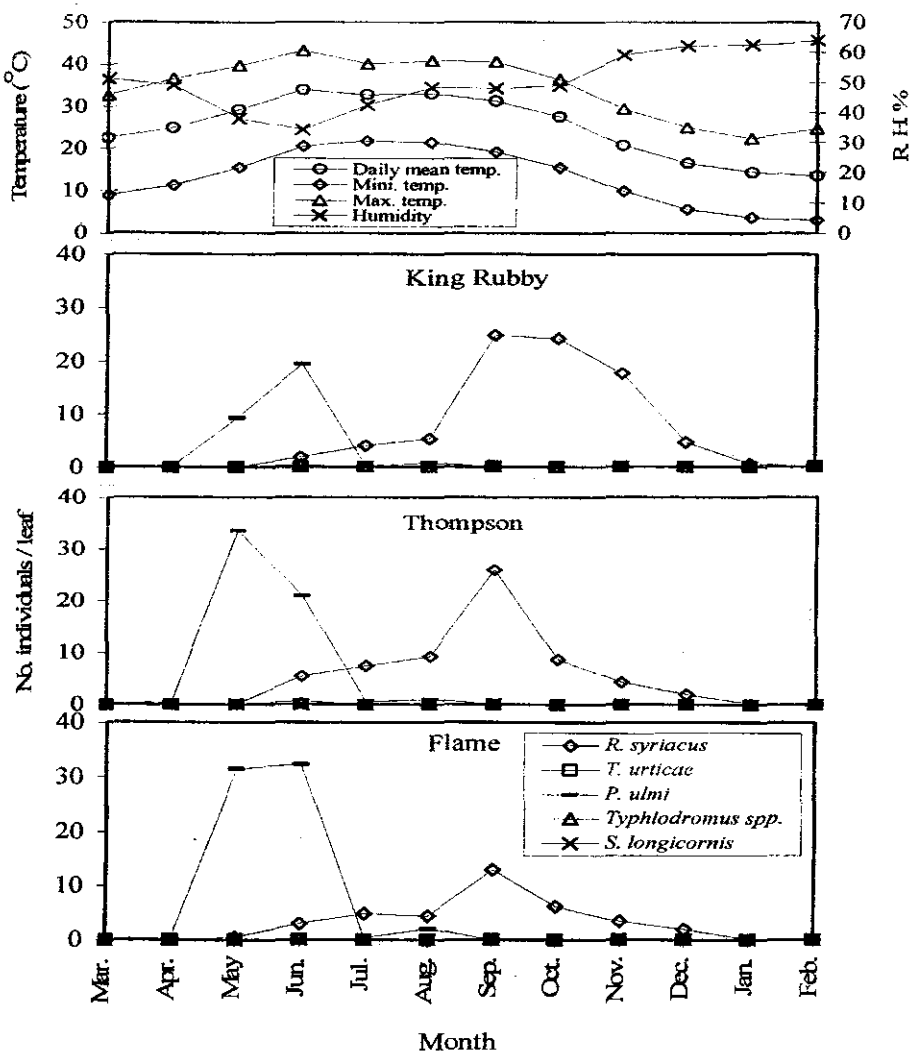

Fig. 2: Seasonal abundance of *R. syriacus*, *T. urticae*, *P. ulmi*, *Typhlodromus* spp. and *S. longicornis* on Flame, Thompson and King Rubby grapevine varieties and the corresponding weather records, Assiut (2006 /2007).

The abundance of R. *syriacus* and *P. ulmi* was characterized by a gradual increment recording the highest mean number lately compared with the first season. Where, *R. syriacus* showed the peak in September (12.85, 25.79 and 24.85 individuals/leaf) for Flame, Thompson and King Rubby grapevine varieties, respectively. Whereas, *P. ulmi* had the peak during June (32.30 and 19.41 individuals/leaf) for Flame and King Rubby, during May (33.57 individuals/leaf) for Thompson variety. The population gradually declined from October to January and disappeared completely in February for *R. syriacus*, while a sharp diminishing during July and August and completely disappearing from September to February for *P. ulmi*. As for *T. urticae*, the individuals started to appear during April and occurred through three months in relatively low numbers for Flame, while started during May and occurred through a short period of two months in relatively low numbers for Thompson and King Rubby varieties.

Typhlodromus spp. started in March for Flame and King Rubby, and in April for Thompson in few numbers, whereas the highest number was recorded during June for the three grapevine varieties. The individuals decreased sharply through the rest months, and disappeared from September to February. *S. longicornis* started to occur during June and occurred through a short period of four months in low numbers and completely disappeared through the rest months of the season.

II: Dominance and abundance degrees of certain insect and mite species:

Dominance and abundance degrees of some insect and mite species inhabiting the three studied grapevine varieties (Flame, Thompson and King Rubby) are summarized in Tables 1 and 2. The dominance degrees of each species compared with the total catch of all species during 2005/2006 and 2006 /2007 seasons were counted. The highest dominant species were *R. syriacus* followed by *P. ulmi* on the same abovementioned varieties during the two studied seasons, except for Flame variety in the second season in which *P. ulmi* showed higher dominance than *R. syriacus*.

Table 1: Dominance and abundance degrees of certain insect and mite species on some grapevine varieties during 2005/2006 season, Assiut Governorate.

Month	Total numbers of samples	No. Samples in which the species appeared																	
		Flame						Thompson						King Rubby					
		Total catch	*1	2	3	4	5	Total catch	1	2	3	4	5	Total catch	1	2	3	4	5
Mar.	2	0.6	0	0	0	2	0	1.0	0	0	0	2	0	0.52	0	0	0	1	0
Apr.	4	14.16	1	1	2	4	1	14.56	1	1	2	4	1	7.32	2	1	2	4	2
May	4	128.8	4	4	4	4	4	135.08	4	4	4	3	4	45.84	4	4	4	2	4
Jun.	5	158.0	5	4	5	5	5	147.04	5	5	5	5	4	171.08	5	3	5	5	5
Jul.	4	84.96	4	0	4	3	2	91.68	4	0	4	1	3	79.4	4	0	4	4	3
Aug.	4	49.28	4	0	4	3	2	43.4	4	0	3	2	2	40.24	4	0	4	2	4
Sep.	5	17.04	5	0	5	4	5	15.96	5	0	5	5	5	14.28	5	0	5	4	5
Oct.	4	15.1	4	0	4	1	4	15.68	4	0	3	2	3	26.04	4	0	4	0	2
Nov.	4	12.04	4	0	3	0	3	8.44	4	0	2	1	3	19.16	4	0	2	2	4
Dec.	5	4.1	5	0	3	0	2	4.38	5	0	2	1	3	6.3	5	0	1	0	4
Jan.	4	2.0	4	0	1	0	0	2.44	4	0	0	0	0	1.56	4	0	1	0	0
Feb.	2	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0
Total	47	486.08	40	9	35	26	28	479.66	40	10	30	26	28	411.74	41	8	32	24	33
Dominance %			57.44	4.82	34.53	1.82	1.39		66.92	6.16	23.23	1.66	2.03		74.73	0.52	21.48	1.15	2.12
Abundance %			85.11	19.15	74.47	55.32	59.58		85.11	21.28	63.83	55.32	59.58		87.23	17.02	68.09	51.06	70.21

*1- *R. syriacus* 2- *T. urticae* 3- *P. ulmi* 4- *Typhlodromus* spp. 5- *S. longicornis*

Table 2: Dominance and abundance degrees of certain insect and mite species on some grapevine varieties during 2006/2007 season, Assiut Governorate.

Month	Total numbers of samples	No. Samples in which the species appeared																	
		Flame						Thompson						King Rubby					
		Total catch	*1	2	3	4	5	Total catch	1	2	3	4	5	Total catch	1	2	3	4	5
Mar.	2	0.64	0	0	2	1	0	0.24	1	0	2	0	0	0.2	0	0	1	1	0
Apr.	4	1.2	2	1	3	1	0	1.88	1	0	4	2	0	0.2	0	0	3	1	0
May	4	128.44	2	2	4	0	0	136.0	3	3	4	1	0	37.04	0	2	4	3	0
Jun.	5	178.36	5	2	4	3	3	135.48	5	1	4	3	1	109.0	5	1	3	5	3
Jul.	4	21.04	4	0	2	1	1	32.2	4	0	2	1	1	17.2	4	0	1	1	2
Aug.	4	26.14	4	0	4	3	1	41.56	4	0	4	2	3	24.36	4	0	3	1	1
Sep.	5	64.32	5	0	0	0	1	129.24	5	0	0	0	4	124.31	5	0	0	0	1
Oct.	4	24.54	4	0	0	0	0	34.76	4	0	0	0	0	97.16	4	0	0	0	0
Nov.	4	13.48	4	0	0	0	0	17.36	4	0	0	0	0	70.48	4	0	0	0	0
Dec.	5	9.67	5	0	0	0	0	9.92	5	0	0	0	0	22.88	5	0	0	0	0
Jan.	4	0.28	2	0	0	0	0	0.84	2	0	0	0	0	2.2	2	0	0	0	0
Feb.	2	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0
Total	47	468.2	37	5	19	9	6	539.48	38	4	20	9	9	505.03	33	3	15	12	7
Dominance %			35.51	0.19	63.94	0.28	0.08		53.62	0.08	45.86	0.70	0.10		71.95	0.06	27.36	0.51	0.12
Abundance %			78.72	10.64	40.43	19.15	12.77		80.85	8.51	42.55	19.15	19.15		70.21	6.38	31.92	25.53	14.89

*1- *R. syriacus* 2- *T. urticae* 3- *P. ulmi* 4- *Typhlodromus* spp. 5- *S. longicornis*

Their dominance degrees were (57.44 and 34.53; 66.92 and 23.23; 74.73 and 21.48 %) during 2005/2006 and (35.51 and 63.94; 53.26 and 45.86; 71.95 and 27.36 %) during 2006/2007 for Flame, Thompson and King Rubby, varieties respectively. Also, as shown in Tables 1 and 2 the abundance degrees were obvious that the most abundant species were *R. syriacus* and *P. ulmi*. Their abundance degrees were (85.11 and 74.47; 85.11 and 63.83; 87.23 and 68.09 %) during 2005 / 2006 and (78.72 and 40.43; 80.85 and 42.55; 70.21 and 31.92 %) during 2006/2007 season for Flame, Thompson and King Rubby, respectively. As for *T. urticae*, the obtained data showed that *T. urticae* has low dominance and abundance during the two seasons on the three grapevine varieties.

III: Simultaneous effects of certain abiotic and biotic factors on the population activity of some pests inhabiting grapevines:

Biotic and abiotic factors play a great role in population abundance of many insect and mite species. Therefore, the predators (i.e., *Typhlodromus* spp. and *S. longicornis*) as well as some physical factors, particularly average relative humidity, daily mean temperature, minimum temperature and maximum temperature were investigated in the present study to find out the simultaneous effects on the population density of *R. syriacus*, *T. urticae* and *P. ulmi* inhabiting Flame, Thompson and King Rubby grapevine varieties.

Tables 3 and 4 show the multi-regression analysis results between the population of *R. syriacus*, *T. urticae* and *P. ulmi*, and the predators as well as certain weather factors, during the two studied seasons (2005/2006 and 2006/2007) on the three grapevine varieties. Data of 2005/2006's season, presented in Table 3 reveal that the simple correlation coefficient of *Typhlodromus* spp. and *S. longicornis* was insignificantly positive with *R. syriacus*, *T. urticae* and *P. ulmi* on Flame, Thompson and King Rubby grapevine varieties, while was significantly positive with *T. urticae* and *P. ulmi* on Flame variety. The four studied weather factors had significant effect with *R. syriacus* on the three grapevine varieties, except highly significant for minimum temperature on Flame and Thompson varieties.

Table 3: Multi-regression analysis between the number of *R. syriacus*, *T. urticae* and *P. ulmi* and certain biotic and abiotic factors, 2005 /2006 season, Assiut Governorate.

Variety	Removed variable	Pest														
		Retithrops syriacus					*Tetranychus urticae*					*Panonychus ulmi*				
		r	R	R^2 × 100	Decrease in $R^2 \times 100$	E. V. %	r	R	R^2 × 100	Decrease in $R^2 \times 100$	E. V. %	r	R	R^2 × 100	Decrease in $R^2 \times 100$	E. V. %
Flame	Non	-	0.960	92.2	-	-	-	0.846	71.6	-	-	-	0.851	72.4	-	-
	Typhlodromus spp.	0.159	0.959	92.0	0.2	2.5	0.666*	0.826	68.2	3.4	44.3	0.628*	0.833	69.4	3.0	39.4
	S. longicornis	0.006	0.765	58.5	33.7	0.1	0.566*	0.798	63.8	7.8	17.5	0.605*	0.805	64.9	7.5	22.0
	Humidity	-0.614*	0.897	80.4	11.8	74.2	-0.581*	0.834	69.6	2.0	0.6	-0.618*	0.834	69.6	2.8	0.0
	Daily mean Temp.	0.686*	0.905	81.4	10.8	0.0	0.261	0.844	71.3	0.3	7.7	0.317	0.848	71.8	0.6	8.2
	Mini. Temp.	0.711**	0.877	76.8	15.4	13.7	0.203	0.842	70.9	0.7	1.2	0.270	0.843	71.0	1.4	2.4
	Max. Temp.	0.634*	0.952	90.5	1.7	1.7	0.319	0.845	71.3	0.3	0.3	0.362	0.849	72.0	0.4	0.4
Thompson	Non	-	0.939	88.1	-	-	-	0.807	65.1	-	-	-	0.770	59.3	-	-
	Typhlodromus spp.	0.262	0.936	87.5	0.6	6.8	0.618*	0.807	65.1	0.0	38.2	0.559	0.770	59.3	0.0	31.3
	S. longicornis	0.007	0.789	62.3	25.8	0.1	0.292	0.789	62.2	2.9	6.1	0.339	0.742	55.1	4.2	8.8
	Humidity	-0.689*	0.769	59.2	28.9	61.8	-0.580*	0.670	44.9	20.2	1.9	-0.562	0.638	40.7	18.6	2.0
	Daily mean Temp.	0.705*	0.792	62.7	25.4	2.6	0.258	0.791	62.6	2.5	17.6	0.271	0.755	57.0	2.3	16.2
	Mini. Temp.	0.719**	0.771	59.4	28.7	16.6	0.196	0.803	64.5	0.6	0.0	0.224	0.764	58.3	1.0	0.5
	Max. Temp.	0.666*	0.796	63.4	24.7	0.2	0.320	0.799	63.8	1.3	1.3	0.317	0.767	58.8	1.0	0.5
King Rubby	Non	-	0.928	86.1	-	-	-	0.908	82.4	-	-	-	0.921	84.8	-	-
	Typhlodromus spp.	0.282	0.874	76.5	9.6	7.9	0.488	0.908	82.4	0.0	23.8	0.546	0.867	75.2	9.6	29.8
	S. longicornis	0.017	0.822	67.6	18.5	0.2	-0.013	0.906	82.1	0.3	0.0	0.064	0.915	83.7	1.1	0.9
	Humidity	-0.636*	0.917	84.2	1.9	36.2	-0.691*	0.579	33.6	48.8	27.6	-0.670*	0.709	50.3	34.5	18.1
	Daily mean Temp.	0.680*	0.896	80.2	5.9	11.0	0.358	0.839	70.3	12.1	22.4	0.404	0.790	62.5	22.3	10.5
	Mini. Temp.	0.707*	0.823	67.7	18.4	30.7	0.309	0.862	74.4	8.0	3.5	0.382	0.776	60.2	24.6	20.9
	Max. Temp.	0.628*	0.927	86.0	0.1	0.1	0.413	0.879	73.3	9.1	5.1	0.436	0.896	80.2	4.6	4.6

r = Correlation coefficient. R = Multiple regression coefficient. R^2 = Coefficient of determination.

E. V. % = Explained variance percentage. ** Significant at 1 % level of probability. * Significant at 5 % level of probability.

Table 4: Multi-regression analysis between the number of *R. syriacus*, *T. urticae* and *P. ulmi* and certain biotic and abiotic factors, 2006 /2007 season, Assiut Governorate.

Variety	Removed variable	Pest														
		Retithrops syriacus					*Tetranychus urticae*					*Panonychus ulmi*				
		r	R	R^2 × 100	Decrease in R^2 × 100	E. V. %	r	R	R^2 × 100	Decrease in R^2 × 100	E. V. %	r	R	R^2 × 100	Decrease in R^2 × 100	E. V. %
Flame	Non	-	0.945	89.4	-	-	-	0.964	92.9	-	-	-	0.902	81.4	-	-
	Typhlodromus spp.	-0.012	0.803	64.5	24.9	0.0	0.836**	0.943	89.0	3.9	69.9	0.640*	0.895	80.2	1.2	40.9
	S. longicornis	0.437	0.786	61.9	27.5	76.4	0.705*	0.963	82.7	10.2	0.0	0.523	0.902	81.4	0.0	0.3
	Humidity	-0.247	0.908	82.5	6.9	0.2	-0.694*	0.880	77.4	15.5	8.2	-0.713*	0.732	53.6	27.8	21.4
	Daily mean Temp.	0.537	0.934	87.2	2.2	11.7	0.434	0.955	91.1	1.8	14.1	0.435	0.886	78.5	2.9	16.9
	Mini. Temp.	0.597*	0.940	88.3	1.1	0.7	0.375	0.960	92.2	0.7	0.4	0.371	0.893	79.7	1.7	1.6
	Max. Temp.	0.483	0.943	89.0	0.4	0.4	0.482	0.962	92.6	0.3	0.3	0.486	0.901	81.1	0.3	0.3
Thompson	Non	-	0.931	86.7	-	-	-	0.909	82.5	-	-	-	0.858	73.7	-	-
	Typhlodromus spp.	-0.008	0.929	86.3	0.4	0.0	0.723**	0.892	79.6	2.9	52.2	0.529	0.857	73.4	0.3	28.0
	S. longicornis	0.914**	0.787	61.9	24.8	85.7	-0.021	0.907	82.3	0.2	1.7	-0.068	0.857	73.5	0.2	2.1
	Humidity	-0.247	0.928	86.0	0.7	0.0	-0.699*	0.806	65.0	17.5	17.0	-0.668*	0.695	48.3	25.4	27.7
	Daily mean Temp.	0.537	0.930	86.6	0.1	1.0	0.410	0.896	80.3	2.2	10.3	0.382	0.839	70.3	3.4	13.9
	Mini. Temp.	0.590*	0.931	86.7	0.0	0.0	0.344	0.903	81.5	1.0	1.3	0.312	0.849	72.0	1.7	1.8
	Max. Temp.	0.493	0.931	86.7	0.0	0.0	0.464	0.908	82.5	0.0	0.0	0.439	0.857	73.5	0.2	0.2
King Rubby	Non	-	0.683	46.7	-	-	-	0.995	99.0	-	-	-	0.994	98.9	-	-
	Typhlodromus spp.	-0.216	0.668	44.6	2.1	4.7	0.928**	0.935	87.5	11.5	86.1	0.937**	0.927	85.9	13.0	87.9
	S. longicornis	-0.077	0.606	36.7	10.0	0.3	0.026	0.968	93.7	5.3	0.7	0.038	0.969	94.0	4.9	11.0
	Humidity	0.024	0.676	45.7	1.0	2.9	-0.686*	0.941	88.5	10.5	4.3	-0.692*	0.949	90.0	8.9	0.0
	Daily mean Temp.	0.237	0.680	46.2	0.5	34.9	0.431	0.977	95.4	3.6	3.3	0.450	0.979	95.8	3.1	0.0
	Mini. Temp.	0.286	0.660	43.6	3.1	3.8	0.378	0.975	95.0	4.0	4.5	0.400	0.976	95.3	3.6	0.0
	Max. Temp.	0.190	0.683	46.6	0.1	0.1	0.472	0.995	98.9	0.1	0.1	0.487	0.994	98.9	0.0	0.0

r = Correlation coefficient. R = Multiple regression coefficient. R^2 = Coefficient of determination.

E. V. % = Explained variance percentage. ** Significant at 1 % level of probability. * Significant at 5 % level of probability.

The weather factors had insignificant correlation with *T. urticae* and *P. ulmi*, except significant correlation for average relative humidity on the three varieties. Both biotic and abiotic factors had positive effects, except in the case of average relative humidity which had negative effect on the population changes of these pests inhabiting Flame, Thompson and King Rubby grapevine varieties. The coefficient of determination (R^2) was (0.922, 0.716 and 0.724; 0.881, 0.651 and 0.593; 0.861, 0.824 and 0.848), indicating that the six mentioned variables (predators and weather factors) were responsible for (92.2, 71.6 and 72.4; 88.1, 65.1 and 59.3; 86.1, 82.4 and 84.8 %) of the population changes for *R. syriacus*, *T. urticae* and *P. ulmi* on Flame, Thompson and King Rubby grapevine varieties, respectively during the studied period.

It is also evident from Table 3 that by dropping one of each variable, step by step from the input analysis data, to explain the gradual representing efficiency of each variable on the population changes of *R. syriacus*, *T. urticae* and *P. ulmi* (Explained Variance, E. V. %), the difference of varieties lead to difference in the effect of each variable. Regarding *R. syriacus*, while the average relative humidity (74.2, 61.8 and 36.2 %) and the minimum temperature (13.7, 16.6 and 30.7 %) was ranked the first and second important factor with Flame, Thompson and King Rubby varieties, respectively. Whereas, daily mean temperature, S. *longicornis* and maximum temperature (0.0, 0.1 and 0.1 %) ranked the lowest variables with Flame, Thompson and King ruby grapevine varieties, respectively. As for *T. urticae*, the predatory mite, *Typhlodromus* spp. (44.3 and 38.2 %) with Flame and Thompson respectively, and average relative humidity (27.6 %) with King Rubby ranked the first important factor, while maximum temperature, minimum temperature and *S. longicornis* (0.3, 0.0 and 0.0 %) with Flame, Thompson and King Rubby varieties, respectively were ranked the lowest variable. In case of *P. ulmi*, the first important factor was *Typhlodromus* spp. (39.4, 31.3 and 29.8 %) with the three varieties, while the average relative humidity, minimum temperature and *S. longicornis* (0.0, 0.5 and 0.9

%) for Flame, Thompson and King ruby varieties, respectively were ranked the lowest ones.

Data of 2006/2007's season, presented in Table 4 supported the former results of 2005/2006 season regarding the positive effects of the studied temperature parameters and the negative effect of relative humidity on the three pests inhabiting the three grapevine varieties. Whereas, the two predators were responsible for most of the population changes of the three pests. *Typhlodromus* spp. Was responsible for (69.9 and 40.9; 52.2 and 28.0; 86.1 and 87.9 %) out of the total changes (92.9 and 81.4; 82.5 and 73.7; 99.0 and 98.9 %) for *T. urticae* and *P. ulmi* on Flame, Thompson and King Rubby varieties, respectively. While, *S. longicornis* was responsible for (76.0 and 85.7 %) of the total changes (89.4 and 86.7 %) for *R. syriacus* on Flame and Thompson varieties.

From the obtained data it is clear that thrips fluctuated through all over the year. The peak was recorded during June and September for the first and the second seasons on the three grapevine varieties, respectively. The results of this study are in agreement with those obtained by De Villiers and Pringle (2007) who observed that thrips numbers started to increase from September or October, reached the peak during November when monthly temperature started to increase over 20°C. Meanwhile, Rosi *et al.* (2006) showed that population fluctuation of thrips achieved a maximum of adults in early May, whereas the maximum population of larvae was attained at the beginning of June.

Individuals of *T. urticae* started to appear in April and occurred through a short period recording the peak during May and June for the first and second seasons, respectively. These results are in accordance with those of Osman and Mahmoud (2008) who indicated that *T. urticae* in pear orchard was present in high population from the beginning of March and increased gradually to attain the peak during the first ten days of May, then the population strongly decreased toward the end of season during June.

Although, the population fluctuation of *P. ulmi* differed during the two studied seasons, but the peak of the population was recorded

during May or June according to the grapevine variety. However, Jubb Jr. *et al.* (1985) showed that *P. ulmi* reached its peak in the absence of predatory mites from early to mid-September in commercial Concord grape vineyards in Pennsylvania, USA.

The present data cleared that the predacious mite, *Typhlodromus* spp. appeared early during March than the predacious thrips, *S. longicornis* on the three grapevine varieties during the two successive seasons, in harmony with the results obtained by McMurtry and Croft (1997) who showed that the acarine family Phytoseiidae includes a large number of generalist predators develop and reproduce using various food sources as alternatives to their primary prey, tetranychid mites. On the other hand, *R. syriacus* and *P. ulmi* exhibited high dominance and abundance degrees on the three grapevine varieties during the two seasons, indicating that these two species are considered key pests, these matched with the findings of Medina-Guad and Franqui (2001) and Jessica (2001). They showed that *R. syriacus* and *P. ulmi* became a significant problems in grapevines in Puerto Rico, United State and Canada.

Moreover, both temperature and predators had positive effect, while average relative humidity had negative effect on the population changes of these pests. Therefore, it can be concluded that the recorded biotic factors (*Typhlodromus* spp. and *S. longicornis*) and the selected abiotic ones (temperature and relative humidity) played the most important role in regulating the population density of the three pests. These results are in accordance with these obtained by Koleva *et al.* (1996) who noted that *T. pyri* is an effective biological control agent for *P. ulmi* in European vineyards. High *P. ulmi* densities occurred in vineyard with no *T. pyri* or in vineyards with the absence of any phytoseiid predatory mites (Lester *et al.*, 1998). Whereas, *S. longicornis* may be effective for biological control of the two-spotted spider mite in warmer conditions (Pakyari *et al.*, 2009). It was indicated (Van De Varie *et al,* 1972) that rainfall can have a significant negative impact on spider mites that may be exacerbated by high temperatures. Domiciano *et al.* (1993) recorded that thrips

population was negatively correlated with relative humidity and positively with temperature.

REFERENCES

De Villiers, M. and Pringle, K. L. (2007): Seasonal occurrence of vine pests in commercially treated vineyards in the Hex River Valley in the Western Cape Province, South Africa. African Entomology. 15 (2): 241–260.

Domiciano, N. L.; Ota, A. Y. and Tedardi, C. R. (1993): Population fluctuation of thrips on onion, its association with climatic elements and control. Anais da Sociedade Entomologica Do Brazil, 22: 77-83.

Duso, C. and Vettorazzo, E. (1999): Mite population dynamics on different grape varieties with or without phytoseiids released (Acari: Phytoseiidae). Exp. Appl. Acarol. 23, 741–763.

Facylate, K. K. (1971): Field studies of soil invertebrates. 2nd edition Vishia Shkoola Press, Moscow. USSR.

Fisher, R. A. (1950): Statistical methods for research workers. II. Rev. Ed Oliver and Boyed, London.

Hidenari, K. and Ishizue, A. (2006): Effects of predacious insects on the population dynamics of three spider mite species (Acari: Tetranychidae) on Japanese pear. J. Acarol. Soc. Jpn., 15 (1): 47-54.

Jessica, A. M. (2001): *Neoseiulus fallacis* (Garman) (Acari: Phytoseiidae) as apotential biological control agent for spider mites (Acari:Tetranychidae) in Virginia vineyards. M. Sc. Thesis, Fac. Polytechnic, Virginia Univ.

Jubb Jr., G. L.; Masteller, E. C. and Lehman, R. D. (1985): Survey of arthropods in vineyards of Erie County, Pennsylvania: Acari. International Journal of Acarology. 11 (3): 201 – 207.

Kitashima, Y. and Gotoh, T. (2003): Population dynamics of *Panonychus osmanthi* (Acari: Tetranychidae) on two

Osmanthus species. Experimental and Applied Acarolorgy. 29: 227–240.

Koleva, R.; Ferenczy, A. and Jenser, G. (1996): Effect of various plant protection programs on mite populations in vineyards. Hort. Sci. 28, 79–82.

Lester, P. J.; Thistlewood, H. M. A.; Ball, S. and Harmsen, R. (1998): European red mite (*Panonychus ulmi* koch): A new problem in Canadian vineyards. *Proc. Ontario Entomol. Soc.* 128, 105–107.

McMurtry, J. A., Croft, B. A., (1997): Life-styles of phytoseiid mites and their role in biological control. Annual Review of Entomology 42, 291–321.

Medina-Guad, S. and Franqui, R. A. (2001): *Retithrips syriacus* (Mayet), the black vine thrips (Insecta: Thysanoptera : Thripidae) new to Puerto Rico. J. Agric. Univ. P. R. 85, 85–89.

Osman, M. A. M. and Mahmoud, M. F. (2008): Seasonal Abundance Patterns of Insects and Mites on Pear Trees during the Blooming and Fruiting Seasons at Ismailia Governorate, Egypt. Tunisian Journal of Plant Protection. 3 (1): 47-57.

Pakyari, H.; Fathipou, Y.; Rezapanah, M. and Kamali, K. (2009): Temperature-dependent functional response of *Scolothrips longicornis* (Thysanoptera: Thripidae) preying on *Tetranychus urticae*. J. of Asia-Pacific Entomol., 12 (1): 23-26

Rizk, H. A.; Madiha, A. E.; Samia, S. and Nashwa E. (2005): Mites associated with grapevine leaves in Alexandria and the effects of two acaricides on their populations. The Egyptian Sci. Magazine, 2 (1): 26-32.

Rosi M.; Karl-Josef, S.; Friedrich, L. and Claus, P.W. Z. (2006): Neue Erkenntnisse zum Artenspektrum und zur Bekämpfung von Thripsen (Thysanoptera: Thripidae) auf Reben in Rheinland-Pfalz. MITT. DTSCH. GES. ALLG. ANGEW. ENT. 15, 277-280.

Takafuji, A. (1996): Population dynamics. In Principles of Plant Acarology (eds., Ehara, S. and N. Shinkaji). Zenkoku Nouson Kyouiku Kyoukai, Tokyo, pp. 124–140 (in Japanese).

Van De Vrie, M., McMurtry, J. A. and Huffaker, C. B. (1972): Ecology of tetranychid mites and their natural enemies: A review. III. Biology, ecology, and pest status, and host-plant relations of tetranychids. Hilgardia 41: 343-432.

Wilson, T. H. (1975): A monograph of the subfamily Panchaetothripinae (Thysanoptera: Thripidae). Memoirs of the American Entomological Institute. 23: 1-354.

Zaher, M. A.; Soliman, Z. R. and El_Safi, G. S. (1973): Survey and population studies on mites associated with deciduous fruit trees in Giza, Egypt. Bull. Soc. Ent. Egypt, LVII: 425-433.

Mites and insects inhabiting grapevines

دراسات بيئية على بعض الأكاروسات والحشرات التي تتواجد على أشجار العنب في محافظة أسيوط

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تم دراسة بعض الجوانب البيئية متضمنة النشاط الموسمي والسيادة والوفرة الموسمية وكذلك تأثير بعض العوامل الحيوية والغير حيوية على أنواع مختلفة من الأكاروسات والحشرات التي تتواجد على ثلاثة أصناف من العنب وهي فلام ، وطومسون ، كنج روبي في محافظة أسيوط خلال موسمين (٢٠٠٥ / ٢٠٠٦) ، (٢٠٠٦ / ٢٠٠٧)..

أظهرت الدراسة تواجد ثلاثة آفات هي تربس العنب الأسود *R. syriacus* ، آكاروس العنكبوت ذو البقعتين *T. urticae* ، الآكاروس الأحمر الأوروبي *P. ulmi* ، وكذلك تواجد مفترسين هما التربس المفترس *S. longicornis* ، والآكاروس المفترس *Typhlodromus* spp. وذلك على الثلاث أصناف. وقد اختلف نشاط هذه الأنواع على الثلاثة أصناف باختلاف بعض العوامل الحيوية والغير حيوية خلال موسمي الدراسة. كذلك أظهرت الدراسة تواجد آكاروس العنكبوت ذو البقعتين خلال فترة قصيرة وبأعداد قليلة ، كما أن المفترسين تواجدا بأعداد قليلة خلال موسمي الدراسة.

أيضا تم دراسة السيادة والوفرة للأنواع المتواجدة من خلال حساب درجاتها على الثلاثة أصناف. وقد أظهرت النتائج إن كلا من تربس العنب الأسود ، الآكاروس الأحمر الأوروبي سجلا أعلى درجة من السيادة والوفرة خلال موسمي الدراسة مما يجعلهما آفتين رئيسيتين.

العوامل الحيوية والغير حيوية كانت جانب من الجوانب البيئية التي تم دراستها لتوضيح تأثيرها على تعداد الثلاثة آفات خلال موسمي الدراسة. وقد أظهرت النتائج إن الرطوبة النسبية والمفترس الأكاروسي *Typhlodromus* spp. والتربس المفترس *S. longicornis* يلعبوا الدور الأهم في تنظيم أعداد تلك الآفات.