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INCIDENCE OF BLACK VINE THRIPS, *Retithrips syriacus* MAYET AND RED EUROPEAN MITE, *Panonychus ulmi* (KOCH) INFESTING GRAPEVINES IN ASSIUT GOVERNORATE IN RELATION TO YIELD

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Abstract: The present study was carried out to evaluate the incidence of infestation with black vine thrips, *Retithrips syriacus* Mayet [Thysanoptera; Thripidae] and red European mite, *Panonychus ulmi* (koch) [Acari: Tetranychidae] on three grapevine varieties in Assiut Governorate, during two successive seasons (2005-2007). Generally, the population of *R. syriacus* was greater than that of *P. ulmi* in both investigated seasons. The highest population numbers of *R. syriacus* were recorded during June and July in the first season (2005 / 2006) and during September in the second one (2006 / 2007), on the grapevine varieties (Flame, Thompson and King Rubby). However, the peak of *P. ulmi* population generally occurred during May and June, in both investigated seasons. Meanwhile, the lowest numbers were recorded during December and January of the first season and during March and April of the second one. With regard to the yield, King Rubby variety exhibited the highest yield, while the lowest yield was that of Thompson variety. In view of the plant content of N, P and K, it was quite obvious that nitrogen and phosphorus positively affected infestation by both pests, while potassium affected negatively.

Key words: *Retithrips syriacus, Panonychus ulmi* and yield.

Introduction

Grapevines (*Vitis vinifera*) are widely grown as fruit crops in many countries. Vineyards cover an approximate area of 10 million hectares and the cost of international grapevine production exceeds $ 1.5 billion (Pearson and Geheen, 1996). In Egypt, grapevine is an economically important crop for both local consumption and exportation. More than 140 thousand feddans are planted as vineyards in different governorates (Mohamed, 1996).

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Thrips (Thysanoptera: Thripidae) are considered as an important pest of grapevines. Damage associated with different thrips infestations on grapes had been summarized by many investigators (Guerra Sobrevilla, 1989; Ciampolini *et al.*, 1990; Gonzalez, 1995; Lucas-Espadas, 1996; Moleas *et al.*, 1996; Childers, 1997; Lopes *et al.*, 2002; Tsitsipis *et al.*, 2003). Corky scars and halo spots are the results of ovipositional activities of thrips early in the growing season just after blooming (Jensen, 1973). Severe injuries by direct feeding of thrips also result in surface scars that may crack during ripening and become the cause of saprophytic fungal infection (Gonzalez, 1995 and Lopez *et al.*, 2002) or during the flowering period (Moleas *et al.*, 1996; Somma and Ruggeri, 1998). Many thrips species infesting grapevine including *Retithrips syriacus* Mayet (Shibao, 1996; Dubois and Quilici, 1999; Medina-Guad and Franqui, 2001).

On the other hand, several mite species were found to be associated with grapevine in many regions of the world (Duso and Vetorazzo, 1999; Tixier *et al.*, 2000). Recently, population of European red mite, *Panonychus ulmi* Koch (Acari: Tetranychidae), have increased in Ontario (Canada) vineyards and densities reached the point of damaging or bronzing grape foliage (Marshall and Lester, 2001). In Egypt, grapes were shown to be infested by different tetranychid mites (Zaher *et al.*, 1973).

The present study was carried out to elucidate the incidence of black vine thrips and European red mite in grapevine plantations in Upper Egypt.

Materials and Methods

The present study was conducted at Faculty of Agriculture Experimental Farm, Assiut University, through the two successive seasons of 2005-2007 in order to study the seasonal abundance of black vine thrips, *Retithrips syriacus* Mayet and European red mite, *Panonychus ulmi* (Koch) on three grapevine varieties, namely Flame, Thompson and King Rubby. Weekly sample of 25 leaves was randomly collected from each grapevine variety and carefully transferred to laboratory. Leaves were examined under a stereoscopic microscope (Zeis, Germany). Black vine thrips and European red mite inhabiting both leaf surfaces were counted. Assessment of yield was conducted at the end of season. Fifteen vines of each variety were randomly chosen and their clusters were weighted.

To study the relationship between the plant content of N, P and K and the infestation of *R. syriacus* and *P. ulmi*, leaf samples were collected from the base of the shoots (opposite to the first cluster) at the flowering stage. The leaves were separated into blades and petioles, cleaned to remove dust, dried at 70°C, then grounded in

stainless steel mill and stored for chemical analysis (Nijjar, 1985). The ground material of each petiole sample was digested with concentrated sulfuric acid and 30% hydrogen peroxide, according to the method described by Evenhuis and Dewaard (1980) for analyzing P and K. Total P and K were determined by spectrophotometer and flame photometer methods, respectively. Total N in other samples was determined according to the method of Bremner and Mulvaney (1982).

Results and Discussions

Through the first season (2005 / 2006) the number of *R. syriacus*, started with low levels of abundance (monthly avg. 0.31, 1.37 and 1.06 individuals / leaf) during April, then increased to moderate levels of abundance during May (monthly avg. 3.56, 8.52 and 6.33 individuals /leaf on Flame, Thompson and King Rubby, respectively). The maximum numbers were recorded during June and July, when the monthly average reached 21.71, 23.01 and 20.36 individuals /leaf during June and 20.25, 22.45 and 19.3 individuals /leaf during July on the three varieties. Then, the number of *R. syriacus* rapidly declined during the next six successive months, and completely disappeared during February and March (Table 1).

Table (1): Monthly mean numbers of *R. syriacus* and *P. ulmi* on three grapevine varieties, in Assiut governorate during 2005 / 2006 season.

Month	No. individuals/leaf						Mean	
	Flame		Thompson		King Rubby			
	R. syriac	*P. ulmi*	*R. syriac*	*P. ulmi*	*R. syria*	*P. ulmi*	*R. syriac*	*P. ulmi*
Mar.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Apr.	0.31	2.03	1.37	0.99	1.06	0.36	0.91	1.13
May	3.56	23.69	8.52	19.36	6.33	6.21	6.14	16.42
Jun.	21.71	8.13	23.01	4.4	20.36	11.32	21.69	7.95
Jul.	20.25	0.89	22.45	0.35	19.3	0.39	20.67	0.54
Aug.	10.81	1.37	9.99	0.61	9.64	0.19	10.15	0.72
Sep.	1.86	0.98	1.57	0.6	1.55	0.45	1.66	0.68
Oct.	2.24	1.31	3.63	0.13	6.29	0.19	4.05	0.54
Nov.	1.79	1.15	1.94	0.04	4.57	0.04	2.77	0.41
Dec.	0.75	0.06	0.77	0.12	1.08	0.01	0.87	0.06
Jan.	0.44	0.06	0.86	0.0	0.38	0.01	0.56	0.02
Feb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grand total	63.72	39.67	74.11	26.6	70.56	19.17	69.46	28.48
Grand avg.	5.31	3.31	6.18	2.22	5.88	1.60	5.79	2.38
Yield (Kg./ vine)	10.75		6.84		11.81		9.8	

The number of European red mite, *P. ulmi* was low during April (monthly avg. 2.03, 0.99 and 0.36 individuals / leaf on Flame, Thompson and King Rubby, respectively). The number of this mite species increased rapidly during May on the two varieties of Flame (23.69 individuals / leaf) and Thompson (19.36 individuals / leaf), and during June on King Rubby (11.32 individuals / leaf). Then, a sharp decrease occurred through the following months, and the red mite disappeared in February and March. Zaher *et al.* (1973) found that tetranychid mites infested grape in relatively few numbers throughout a period extended from July to December with a peak in August.

It was also noticed that during the first season (2005 / 2006) the population density of *R. syriacus* was more abundant with grand means of 5.31, 6.18 and 5.88 individuals /leaf than *P. ulmi* (3.31, 2.22 and 1.6 individuals / leaf) on the three tested grapevine varieties.

Through the second season (2006 / 2007) the incidence of *R. syriacus*, showed lower monthly averages during April 0.02 and 0.01 individuals / leaf on Flame and Thompson, and during June 1.9 individuals / leaf on King Rubby. Then, the population increased through July and August to exhibit moderate monthly averages on the three varieties. The highest numbers were recorded in September with monthly averages of 12.85, 25.79 and 24.85 individuals / leaf on Flame, Thompson and King Rubby varieties, respectively. Through November, December and January, the monthly averages decreased gradually, and the pest completely disappeared in February on all the varieties tested (Table 2).

Regarding *P. ulmi* the population was low with monthly averages of 0.3, 0.1 and 0.08 individuals / leaf during March on Flame, Thompson and King Rubby varieties, respectively. The number increased rapidly during June on Flame and King Rubby varieties, and during May on Thompson variety, reaching the highest monthly averages of 32.3, 19.41 and 33.57, respectively. Then, decreased sharply during July and August, and disappeared from September to February. Duso and Vettorazzo (1999) studied mite populations in two vineyards; each had two grape varieties with different leaf hair density. Relative abundances of the mite species were found to differ on different varieties in the same vineyards accompanied with different leaf hair.

It was also evident from the results of the second season (2006 / 2007) that the number of *R. syriacus* was higher with grand means of 5.31 and 7.01 individuals / leaf than *P. ulmi* (4.72 and 2.48 individuals / leaf) on the Thompson and King Rubby varieties, respectively. While, the contrary

Table(2): Monthly mean numbers of *R. syriacus* and *P. ulmi* on three grapevine varieties, in Assiut governorate during 2006 / 2007 season.

Month	No. individuals/leaf						Mean	
	Flame		Thompson		King Rubby			
	R. syriacus	*P. ulmi*	*R. syriacus*	*P. ulmi*	*R. syriacus*	*P. ulmi*	*R. syriacus*	*P. ulmi*
Mar.	0.0	0.3	0.02	0.1	0.0	0.08	0.01	0.16
Apr.	0.02	0.51	0.01	0.44	0.0	0.04	0.01	0.33
May	0.55	31.5	0.33	33.57	0.0	9.19	0.29	24.75
Jun.	3.01	32.3	5.48	20.88	1.9	19.41	3.46	24.20
Jul.	4.79	0.45	7.42	0.6	3.97	0.21	5.39	0.42
Aug.	4.38	2.1	9.23	1.09	5.76	0.81	6.46	1.33
Sep.	12.85	0.0	25.79	0.0	24.85	0.0	21.16	0.0
Oct.	6.14	0.0	8.69	0.0	24.29	0.0	13.04	0.0
Nov.	3.37	0.0	4.34	0.0	17.62	0.0	8.44	0.0
Dec.	1.95	0.0	1.98	0.0	4.58	0.0	2.84	0.0
Jan.	0.14	0.0	0.42	0.0	1.1	0.0	0.55	0.0
Feb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grand total	37.2	67.16	63.71	56.68	84.07	29.74	61.66	51.19
Grand avg.	3.1	5.60	5.31	4.72	7.01	2.48	5.14	4.27
Yield (Kg./ vine)	10.81		6.82		11.42		9.68	

was true for Flame variety, *P. ulmi* was higher with a grand mean of 5.60 individuals / leaf than *R. syriacus* (3.1 individuals / leaf).

From the previous results (Tables 1 and 2), it could be generally concluded that the grand total of *R. syriacus* population, recorded through the first season was higher than that recorded through the second season for the two grapevine varieties of Flame and Thompson, while the contrary was true for the variety of King Rubby. In addition, comparing the population of *P. ulmi*, it is clear that the population was lower during the first season than the second one on the three grapevine varieties. These variations between the two seasons may be attributed to the weather conditions prevailing through the investigated seasons, as the variation among the varieties may be due to growth characters. Where, Flame variety is growing early and King Rubby growing late, while Thompson is in between.

Respecting the yield income, the highest yield was achieved with

King Rubby (red variety) in both seasons (11.81 and 11.42 Kg / vine) followed by Flame (red variety) (10.75 and 10.81 Kg / vine), while the lowest yield was recorded with Thompson (white variety) (6.84 and 6.82 Kg / vine) for the first and second seasons, respectively. Roditakis and Roditakis (2007) assessed the damage potential of three thrips species (*Frankliniella occidentalis*, *Thrips tabaci* and *Drepanothrips reuteri*) on white variety table grape – *In Vitro* experiments. *F occidentalis* was significantly more injurious, causing more than 90% damage in 8 days, and 100% in 16 days, combined with severe fungal infection. *T. tabaci* and *D. reuteri* caused 76.7% and 45.3% damage on grape berries respectively in 16 days.

On the other hand, by throwing some light on the relation between the plant content of N, P and K and the infestation of *R. syriacus* and *P. ulmi* (Table 3), it is clear that both pests recorded positive correlation with nitrogen and phosphorus with significant difference in both seasons except for *R. syriacus* in the first season. The infestation by *T. tabaci* was almost proportional with increasing the amount of nitrogen fertilize (El-Saadany and Salman, 2000). Also, the higher level of soluble nitrogen in the sap of the host plant was an important factor in increasing the population of the red spider mite (Wermelinger *et al.* 1985). On the other hand, with regard to potassium, the relationship was negative for *P. ulmi*. Storms (1967 and 1969) indicated that potassium deficiency might not affect the population of certain mite species. El-Kady *et al.* (1988) suggested that high levels of nitrogen fertilization increased infestation by *Aphis gossypii* and *T. tabaci*. They also added that in the presence of potassium, the level of infestation by thrips was decreased.

Table(3): Correlation coefficients between mean numbers of *R. syriacus* and *P. ulmi*, and plant content of N, P and k in grapevine during 2005 / 2007 seasons.

Pest		*Retithrips syriacus*		*Panonychus ulmi*	
Season		2005/2006	2006/2007	2005/2006	2006/2007
content	N	0.176	0.930**	0.934**	0.854*
	P	0.442	0.826*	0.996**	0.718*
	K	-0.992**	-0.876*	-0.403	-0.781*

* Significant ** Highly significant

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حدوث الإصابة بتربس العنب الأسود والآكاروس الأحمر الأوروبي على أشجار العنب في محافظة أسيوط وعلاقتها بالمحصول

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أجريت هذه الدراسة لتقييم تواجد مجاميع تربس العنب الأسود *Retithrips syriacus* والآكاروس الأحمر الأوروبي *Panonychus ulmi* على ثلاثة أصناف من العنب وهي فلام، طومسون وكنج روبي في محافظة أسيوط خلال موسمين (2005 / 2007).

بوجه عام كانت أعداد تربس العنب الأسود أعلى من أعداد الآكاروس الأحمر الأوروبي خلال موسمي الدراسة. وقد سجل أعلى تعداد لتربس العنب خلال شهري يونيو ويوليو في الموسم الأول وخلال شهر سبتمبر في الموسم الثاني. بينما سجل اقل تعداد لتربس العنب خلال شهر يناير في الموسم الأول وخلال اشهر يناير ومايو و يونيو في الموسم الثاني. في حين أن الآكاروس الأحمر الأوروبي سجل أعلى تعداد له في شهر يونيو خلال موسمي الدراسة، إلا أن اقل تعداد سجل خلال شهري ديسمبر ويناير للموسم الأول وفي مارس وابريل للموسم الثاني.

عند تقدير المحصول للثلاثة أصناف ، فقد أعطى الصنف كنج روبي أعلى محصول (11.81 كجم / شجرة ، 11.42 كجم / شجرة) ، بينما أعطى الصنف طومسون اقل محصول (6.84 كجم / شجرة ، 6.82 كجم / شجرة) خلال الموسم الأول والثاني على التوالي.

أيضا تم دراسة علاقة الارتباط البسيط بين محتوى النبات من عناصر النيتروجين والفوسفور والبوتاسيوم N P K وعلاقتهم بدرجة الإصابة بتربس العنب والآكاروس الأحمر الأوروبي ، وقد دلت النتائج على أن هناك ارتباط موجب بين النيتروجين والفوسفور ودرجة الإصابة ، في حين كان الارتباط سالبا في حالة البوتاسيوم.