

ABUNDANCE OF PREDACEOUS MITES AND SPIDERS ASSOCIATED WITH GRAPEVINE PESTS IN FAYOUM REGION, EGYPT

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Abstract

Survey of predacious mites and spiders associated with different grapevine pests were carried out in two different regions of Fayoum Governorate, Egypt in two seasons (from April to September 2007 and 2008) to determine prospective species for the control of the pest. The obtained data indicated the presence of six predatory mite species on leaves, four of them were belonging to sub-order Prostigmata and two species only belonging to sub-order Mesostigmata. The most abundance of the mites species were, *Pronematus ubiquitous* (Tydeidae) and *Euseius scutalis* (Phytoseiidae). The period of June–August was the most favorable for abundance of the collected mites. The collected spiders associated with pest infesting grapevine leaves, were 14 species belonging to 13 families. The dominant spiders were recorded *Erigone dentipalpus* (Linyphiidae), *Tetragnathus nitens* (Tetragnathidae), *Plexippus paykulli* (Salticidae), *Thomisus spinifer* (Thomisidae), *Theridion aegyptiacum* (Theridiidae) and *Thanatus albin* (Philodromidae). While, nine predacious mites inhabiting grapevine soil under 6 families namely, Cunaxidae, Camerobiidae, Bdellidae, Tydeidae, Stigameidae and Cheyletidae. The most common species were *Cunaxa capreolus* (Berlese) (Cunaxidae) and *Cheyletus eruditus* (Schrank) (Cheyletidae). On the other hand, the mesostigmatid mites inhabiting grapevine soil were, *Androlaelaps casalis* (Berlese) (Laelapidae), *Baltiscolius tarsalis* (Berlese) (Ascidae), *Urobouvilla krantzi* Zaher and Afifi (Uropodidae) and *Parasitus consanguinus* Oudemans and Voigits (Parasitidae). However, *A. casalis* and *U. krantzi* were the most abundant mites. Considering the spider inhabiting soil of grapevine plants, it was noticed that the presence of three non-identified species, *Hogna* sp. (Lycosidae), *Oecobius* sp. (Oecobiidae) and *Zelotes* sp. (Gnaphosidae). All collected spiders were recorded in the period (May–August).

INTRODUCTION

Fayoum Governorate is one of the most important regions in Egypt for providing The Highest Cairo Sector with vegetables and orchard crops all over the year. Grapevine is one of the most important crops for local using or exporting. Mites are well-known in many vine trees in the world. In Egypt, vineyards are often damaged by harmful mites. The expensive use of pesticides for controlling different pests create several problems i.e. environmental pollution, destruction of beneficial insects, mites

and spiders and resistance to many pesticides. Consequently, it has indicated that urgent need for an Integrated Pest Management (IPM) strategy for their control. Many researchers have provided descriptions of spider species abundance or composition in a variety of agro-ecosystems Costello (1997, Hendawy and Abul-Fadl (2004).

Natural population levels of predators should be conserved as much as possible. Predatory mites can also be conserved through the use of selective materials such as sulfur. Insecticides ensure this either by periodically introducing (wild) predators into their colonies (e.g. periodically dusting them with sulfur). In the Mediterranean area, mite communities on vines are characterized by a low number of herbivorous species (mainly tetranychids and eriophyids), a pool of predators (mainly generalist phytoseiids) and a number of unspecialized feeders (predominantly tydeids, which may be fungivores, predators, scavengers or feeders on different plant exudates and pollens) Kreiter *et al.*, (2000), Papaioannou-Souliotis, (2006) and Peverieri *et al.*, (2009). Studies on the relationships among these species have clarified that the main cause of tetranychid outbreaks in vineyards is the reduced presence of phytoseiids, their natural enemies (Castagnoli *et al.*, (2001), Duso, (1997), Kreiter *et al.*, (2002). Much of the available data concerns the influence of chemicals, vine varieties, agronomic practices, soil characteristics and surrounding vegetation on phytoseiid and other vine mite populations, Duso and Vettorazzo (1999), Duso *et al.*, (2004), Pozzebon *et al.*, (2002). Despite the difficulty in inferring general rules from studies conducted in a wide range of situations, the evidence is that each change in vineyard management, including the choice of variety, affects the mite composition and relationship among species, Peverieri *et al.*, (2009). The adult females of a new phytoseiid species *Neoseiulella neoviniferae* from grapevine leaves, *Vitis vinifera* L., infested with the two-spotted spider mite, *Tetranychus urticae* Koch are described and illustrated, Basha *et al.*, (2004).

This study aimed to know the necessary information for the development and implementation of an integrated pest management program for grapevines through study the behaviour and incidence of the different predacious mites and spiders.

MATERIALS AND METHODS

1- The experimental area: An area of about 1/2 feddan in the two tested regions of Fayoum Governorate was chosen (Sennoris and Fayoum Districts) cultivated with ten years old grapevine trees during the period from April to September 2007 and 2008 to study the abundance of the different predatory mites and spiders associated with pests infesting this crop (leaves, stem and soil). About 20 trees, randomly distributed were examined for recording the different predator (mites and spiders).

2- Mites: The collected leaf and soil samples were put in polyethylene bags and transferred to the laboratory. All active tested forms of mites were recorded on the lower surface of the leaves which examined by using stereomicroscope in the same day of collection. The soil mites were collected by using Berlese Tulgren funnel, Krantz (1978).

3- Spiders: The spider lives on the foliage were collected by shaking the plants on a cloth or a shake sheet. This method is referred as the drop cloth method, Sallam (2002). Twenty plants of grapevine were shacked over the shaking white cloth (1 m x 1 m) twice monthly during the surveying period. The spiders were kept in glass vials containing 75 % ethyl alcohol and droplets of glycerin. Living specimens were collected by camel hair brush (000) and examined by using stereomicroscope. Identification of the collected spiders was available for adults only. The identification of female is depending on the epigynum plate, but in case of male the palp (palpal organ) anatomy is an important factor for male identification..

4- Pit-fall traps method: Samples of the soil spider's fauna were collected from the study areas by pit-fall trap method described by Singsby and Cook (1986) and Southwood and Henderson (2000).

RESULTS AND DISCUSSION

As shown in table (1), eight predator mites species were recorded associated with different pests infesting grapevine, six predator mites belonging to sub-order Prostigmata and two predator mite species under sub-order Mesostigmata. The highest abundance of the mites was *Pronematus ubiquitous* McGregor, *Orthotydeus lambi* (Baker) and *O. caudatus* (Banks) (Tydeidae) and *Euseius scutalis* (A.-H.) (Phytoseiidae). The period of (June–August) was the most favorable for abundance of the collected mites, in table (1). Mites belonging to the Tydeidae were numerous in most study times with high numbers, although their function remains uncertain. In this study, *O. lambi* found at relatively high densities during the two seasons It was stated that the tydeid mites feed on Homopteran honeydew and the resultant sooty mould fungi, on other epiphytes, pollen and various plant debris, Gerson, (1985). In the vineyards of the San Joaquin Valley, California, the tydeid mites, *Homeopronematus anconai* (Baker), was found to be a pollen and fungus feeder, but also served as supplementary food source for the predaceous mite, *Typhlodromus occidentalis* (Nasbitt), Knopp and Hoy (1983). In his study the occurrence of natural enemies of phytophagous mites on grapevine leaves following application of fungicides for disease control Schwartz (1993) noticed that both Arachnida and Insecta, were present on the grapevine leaves following the application of these fungicides for the control of

powdery mildew and the phytoseiid mite, *Amblyseius addoensis* Van der. Merwe & Ryke, was the most abundant in all treatments, although the more presence of other predators was encouraging with regard to integrated pest management. Ferragut *et al.*, (2008) identified the natural enemies of the phytophagous mite, *Colomerus vitis* (Pagenstecher) (Acari: Aryophidae) and mentioned that this mite is integrated by Phytoseiidae (*Euseius stipulatus* (Athias-Henriot), *Kampimodromus* sp., *Phytoseiulus persimilis* Athias-Henriot, *Typhloseiella isotricha* (Athias-Henriot), *Typhlodromus phialatus* Athias-Henriot, *Typhlodromus rhenanoides* Athias-Henriot, Tydeidae (*Orthotydeus caudatus* (Duges).) and Diptera..The predator *Euseius scutalis* (A.-H.) is common predator mite species in Egypt on several spontaneous plants and cultivars. It constitutes a good species as a biological control agent of tetranychid mites, such as the two spotted spider mite, *Tetranychus urticae* (Koch)

As shown in Table (2), the collected spiders associated with grapevine leaves were 14 species. Nine of them were identified to species category, while four spider species category were identified as genus level and one spider only did not identified (juvenile). The collected spiders were belonging to 13 families, namely. Miturgidae, Gnaphosidae, Dictynidae, Linyphiidae, Lycosidae, Pholcidae, Salticidae, Oxyopidae, Thomisidae, Theridiidae, Oecobiidae, Tetragnathidae and Philodromidae. The dominant spiders in this study was observed for *Erigone dentipalpus* (Wider) (Linyphiidae), *Tetragnathus nitens* (Audouin) (Tetragnathidae), *Plexippus paykulli* (Audouin) (Salticidae), *Thomisus spinifer* Cambridge (Thomisidae), *Theridion* sp. (Theridiidae) and *Thanatus albini* Denis (Philodromidae). In the current study, *Dictyna* sp. and *Oxyopus* sp. were observed during 2007 and disappeared in 2008.

Table 1. The predacious mites associated with pests infesting leaves and stems of grapevines in Fayoum Governorate during 2007 and 2008

Family	Species	Time	Abundance
Suborder : Prostigmata			
Stigameidae	<i>Agistemus exertus</i> Gonzales	June -July	++
Tydeidae	<i>Pronematus ubiquitous</i> McGregor	April-August	+++
	<i>P. rykei</i> Meyer and Rodriguez	June - July	+
	<i>Orthotydeus lambi</i> (Baker)	June-August	+++
	<i>Orthotydeus caudatus</i> (Banks)	July-August	+++
Camerobiidae	<i>Neophyllobius. aegyptium</i> *	July-August	++
Suborder : Mesostigmata			
Phytoseiidae	<i>Euseius scutalis</i> (A.-H.)	June-August	+++
	<i>Typhlodromus occidentalis</i> (Nasbitt)	May- August	++

* Appearance during first season only ++ = rare (1-3 mites) +++ = moderate (4-9 mites)
+++ = high (more than 9 mites)

Table 2. Occurrence of different spiders on the leaves of grapevines in Fayoum Governorate during 2007/2008 season

Family	Spider species	Time	Abundance
Miturgidae Simon	<i>Chericanthium Isiacum</i> Cambridge	May-August	++
Gnaphosidae Pocock	<i>Zelotes</i> sp.	April	++
Dictynidae Cambridge	<i>Dictyna</i> sp.*	July	++
Linyphiidae Blackwall	<i>Erigone dentipalpus</i> (Wider)	May-August	+++
Lycosidae Sundeval	<i>Hogna ferox</i> (Lucas)	May	++
Pholcidae Koch	J.	August	+
Salticidae Blackwall	<i>Plexippus paykulli</i> (Audouin)	June- August	+++
Oxyopidae Thorell	<i>Oxyopes</i> sp.*	July-August	++
Thomisidae Sundeval	<i>Thomisus spinifer</i> Cambridge	June-August	+++
Theridiidae Sundeval	<i>Theridion</i> sp.	May-August	+++
Oecobiidae Blackwall	<i>Oecobius annulipes</i> Lucas	July-August	++
Tetragnathidae Meng	<i>Tetragnathus nitens</i> (Audouin)	May-August	+++
Philodromidae Thorell	<i>Philodromus</i> sp.	June-August	++
	<i>Thanatus albinii</i> Denis	June-August	+

* Appearance during first season only + = 1-3 individual ++ = 4-9 individuals +++ = > 9 individual

J. = Juvenile

As shown in Table (3), nine predacious soil mites under six families namely Cunaxidae, Camerobiidae, Bdellidae, Tydeidae, Stigameidae and Cheyletidae. The most abundant species in this study were *Cunaxa capreolus* (Berlese) (Cunaxidae) and *Cheyletus. eruditus* (Schrank) (Cheyletidae) were recorded. On the other hand, four predators mites belonging to sub-order mesostigmata were recorded, *Androlaelaps casalis* (Berlese) (Laelapidae), *Baltiscolius tarsalis* (Berlese) (Ascidae), *Urobovella krantzi* Zaher and Afifi (Uropodidae) and *Parasitus consanguinus* Oudemans and Voigits (Parasitidae). However, *A. casalis* and *U. krantzi* were the most abundant mites. However, it was noticed that *Coleoscerius baptois* (Chaudhri) (Cunaxidae) and *Neophyllobius aegyptium* Soliman and Zaher (Camerobiidae) were recorded during the second season 2008 only and this may be due to the climatic factors in differences seasons.

Table 3. Occurrence of soil predacious prostigmatid mites inhabiting grapevine soil at Fayoum Governorate during 2007/2008

Family	Species	Time	Abundance
Suborder : Prostigmata			
Family: Cunaxidae	<i>Cunaxa capreolus</i> (Berlese)	May-July	+++
	<i>Neocunaxoides andrei</i> (Baker and Hofmann)	April-July	++
	<i>Coleoscerius baptois</i> (Chaudhri)*	May-August	+
Family: Camerobiidae	<i>Neophyllobius aegyptium</i> Soliman and Zaher*	May-June	+
Family : Bdellidae	<i>Spinibdella</i> sp.	June - July	+
Family: Tydeidae	<i>Orthotydeus kochi</i> (Oudemans)	May-August	++
Family :Stigmeidae	<i>Stigmaeus</i> sp.	July	+
Family :Cheyletidae	<i>Cheyletus malaccensis</i> (Oudemans)	May-July	++
	<i>C. eruditus</i> (Schrank)	April -June	+++
Suborder : Mesostigmata			
Family : Laelapidae	<i>Androlaelaps casalis</i> (Berlese)	June -July	+++
Ascidae Voigits	<i>Baltiscolus tarsalis</i> Berlese)	June-August	++
Family : Uropodidae	<i>Urobovilia krantzi</i> Zaher and Affi	July-August	+++
Family : Parasitidae Oudemans	<i>Parasitus consanguinus</i> Oudemans and Voigits	May-June	+

* recorded in the second season 2008 only.

Considering the spider inhabiting soil of grapevine plants, Table (4), the data indicated that the presence of three non-identified species, *Hogna* sp. (Lycosidae), *Oecobius* sp. (Oecobiidae) and *Zelotes* sp. (Gnaphosidae). All collected spiders were recorded in the period (May-August) and recorded during the two seasons (2007-2008). The beneficial role of spiders and predaceous mites might be interpreted by the low populations of the pests when they existed. Accordingly conservation of these beneficial species is necessary to keep the natural balance in the ecosystems, Hendawy and Abul-Fadl (2004). This could be mainly done by minimizing the application of any chemicals. Barrion and Linstinger 1980 and Nentwig 1987 reported that small pests, such as thrips, midges and aphids, may die by being eaten or caught in the webs of large spiders.

Table 4. Survey of spiders in grapevine soil at Fayoum Governorate during 2007/2008

Family	Spider	Time	Abundance
Lycosidae	<i>Hogna</i> sp.	May-August	++
Oecobiidae	<i>Oecobius</i> sp.	May-July	++
Gnaphosidae	<i>Zelotes</i> sp.	April-August	++

++ = moderate numbers (4-9 individuals)

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تواجد المفترسات الاكاروسية والعناكب المرتبطة بأفات العنب بمنطقة الفيوم - مصر

جيهان محمد السيد سلام ، نهلة على إبراهيم عبد العظيم ، عصام محمد عبد السلام ياسين

معهد بحوث وقاية النباتات - مركز البحوث الزراعية -الفي - جيزة

أجريت الدراسات الحقلية في محافظة الفيوم وذلك لعمل حصر لأنواع الاكاروسات والعناكب المفترسة في حقول العنب خلال عامين متتاليين ٢٠٠٧ و ٢٠٠٨. ولقد أسفرت النتائج المتحصل عليها على تواجده ستة أنواع اكاروسية مفترسة على الأوراق تنتمي إلى تحت رتبة ذات الثغر الامامي Prostigmata واثنين إلى تحت رتبة ذات الثغر المتوسط Mesostigmata وكانت انواع الاكاروسات *Pronematus ubiquitous* و *Orthotydeus lambi* و *Orthotydeus caudatus* و *Euseius scutalis* من أكثر الأنواع تواجدا. كما تم حصر ١٤ نوع من العناكب تنتمي إلى ١٣ عائلة مختلفة وكان أهم الأنواع تواجدا على أوراق العنب هي الأنواع *Erigone dentipalpus* و *Theridion* ، *Thomisus spinifer* ، *Plexippus paykulli* ، *Tetragnathus nitens* و *Thanatus albini* و *aegyptiacum* . ومن الدراسة أيضاً أتضح وجود ٩ أنواع من الاكاروسات المفترسة في تربة نباتات العنب تنتمي إلى ٦ عائلات منها ٤ تنتمي إلى تحت رتبة ذات الثغر الامامي وأهم هذه الاكاروسات هو النوع *Cunaxa capreolus* (Berlese) والمنتمى لعائلة Cunaxidae والنوع *Cheyletus eruditus* المنتمى لعائلة Cheyletidae: وكان هناك أربعة أنواع من الاكاروسات المفترسة تنتمي إلى تحت رتبة ذات الثغر المتوسط وأهمها تواجدا هما النوعان *Androlaelaps casalis* و *Uroboviliaa krantzi* . أما العناكب في هذه الدراسة فكانت ممثلة بثلاث أنواع فقط لم يصل تعريفها إلى مرتبة النوع *Zelotes* sp., *Oecobius* sp., و *Hogna* sp. وتم جمعهم جميعاً في الفترة من مايو - أغسطس..