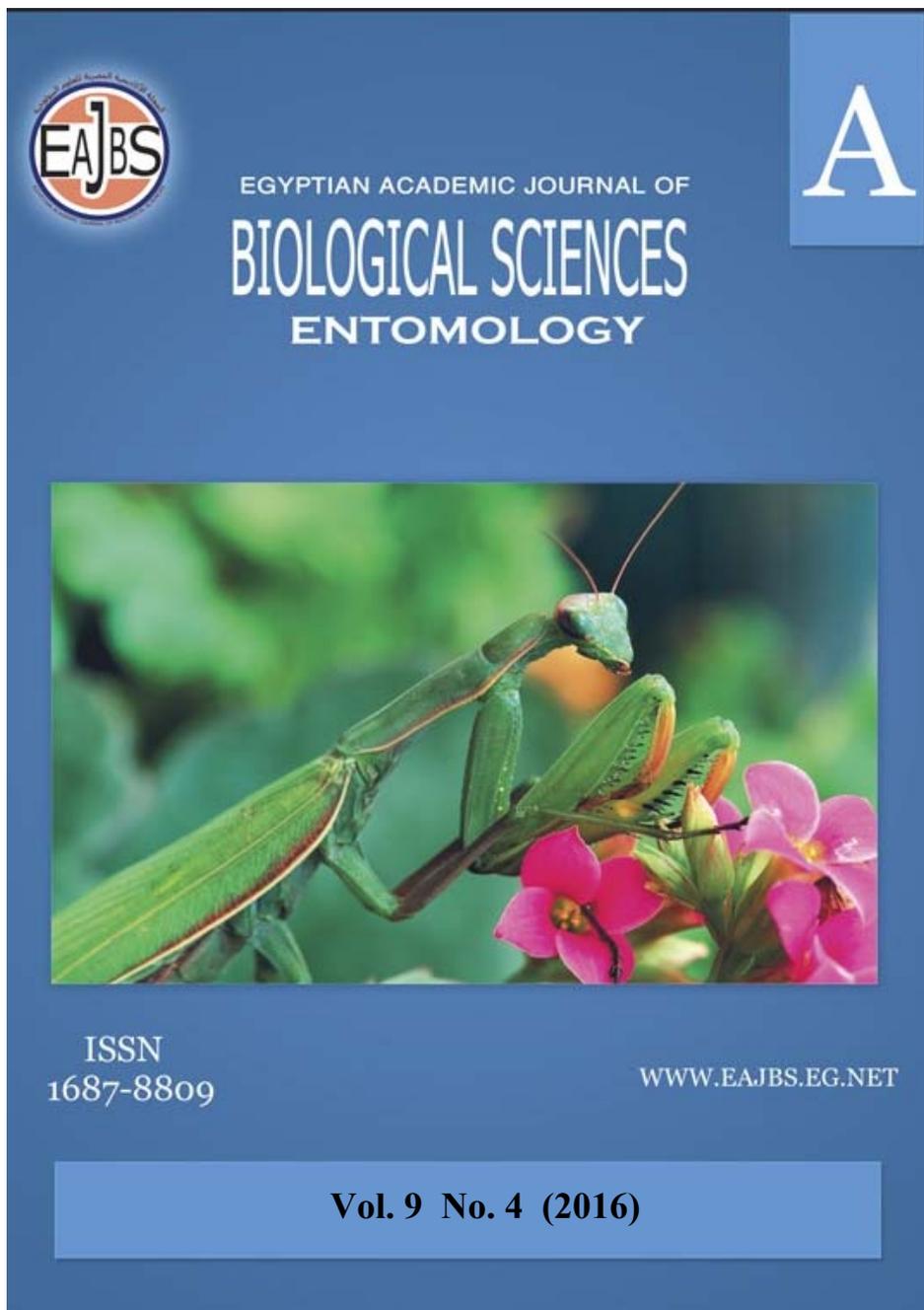


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**Occurrence of Mite Species Associated with Some Organic Manures at
El-Menofia Governorate**

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ABSTRACT

Mite survey proved the occurrence of thirty-six species of mites belonging to 30 genera in 19 families and four suborders recorded in association with different organic manures at El-Menofia Governorate during (January 2014 - January 2016). The suborder Acaridida was represented by the families Acaridae, Glycyphagidae and Chortoglyphidae. The suborder Actinedida was represented by Cheyletidae, Tarsonemidae, Bdellidae, Rhagididae, Scutacaridae, Cunaxidae, and Eupodidae. On the other hand, the suborder Gamasida was recorded by the families Pachylaelapidae, Ameroseiidae, Ascidae, Macrochelidae, Laelapidae, Uropodidae and Ologamasidae, while the oribatid mites were represented by both families Oribatulidae and Oppiidae. The most abundant family in this study was Acaridae (Acaridida) which was represented by different 5 mite species. Also, family Cheyletidae (Actinedid) was the second abundant mites group in this study and included different 4 mite species. Based on the abundance, *Rhizoglyphus echinopus*, *Tyrophagus putrescentiae* (Acaridida); *Cheyletus malaccensis*, *C. eruditus*, *Cunaxa capreolus*, *Eupodes aegypticus* (Actinedida) and *Kleemania plumosus* (Gamasida) and *Oppia sticta* (Oribatida) were the most dominant species in this study. It was noticed that the pigeon organic manure harboured the most collected mites, which included 33 different species, while the chicken organic manures harboured 18 different mites, but the duck manure harboured 7 mite species.

INTRODUCTION

Organic manures of domestic animals improves soil phase as it play an important role in humification, and provide plants with important minerals. These manures are favorable habitats of mites of different groups and feeding habits. In Egypt, the farmers add manure to soil for fertilization. Manure improves the chemical and the physical properties of soil (Pizzeghello *et al.*, 2011). The knowledge of distribution and abundance of manure fauna as part of the structure of an ecosystem is very important in order to understand the dynamics of any ecosystem (El-Shazly *et al.*, 2011). Manure is regarded as a suitable media for certain insects and mites. The Acari exhibit various associations with other organisms, phytophagy; predation and parasitism to intricate commensal and phoritic relationships (Evans *et al.*, 1961). In their study, Minor and Norton (2004) investigated the effects of several soil amendment materials, potentially useful for willow biomass crops, on the abundance, diversity, and community structure of free-living soil mites (Acari: Oribatida, Mesostigmata) in a 4-year replicated field experiment.

Soil treatments included biosolids (lime-stabilized sewage sludge), chicken manure compost, urea fertilizer, black plastic mulch, and control. The study conducted by Badejo *et al.*, (2004) indicated that there was always an initial reduction in the populations of soil mites and in the activity of the epigeic forms whenever a plot was opened up and disturbed mechanically in preparation for cultivation, irrespective of previous organic inputs. However, few details studies on the impact of the different mites associated with organic manures have been conducted in Egypt. Therefore, the aim of this study is to investigate the species composition of mites inhabiting different organic manures at El-Menofia governorate during the study period (January 2014-January 2016).

MATERIALS AND METHODS

Survey study: Field studies were carried out under the prevailing conditions in Ashmoun district (El-Menofia Governorate). The survey extended throughout the elapsed period from January up to December 2014 and 2015. The experiments were conducted to survey certain mite species inhabiting three different types of farm manure, i.e. pigeon, chicken and duck manures.

Extraction and identification of mites: Samples of about 500 gm (randomized collected) were taken from four different organic manures mentioned before. Samples were collected in polyethylene bags and then transferred to laboratory for inspection in the same collecting day. Isolated mites were identified and recorded. Mites were isolated according to Krantz and Walter (2009) by using modified Tullgren's funnel kept for about 24 hours below 60-watt electric lamp. Collected mites were put in Nesbitt's clearing agent, then mounted on glass slide using Hoyer's medium for examination. Labels with necessary data were stuck on the slides. Identification of species followed on review given by Hughes (1961), Attiah (1969), Zaher (1986), and Krantz and Walter (2009).

RESULTS AND DISCUSSION

Mites comprise a significant percentage of the arthropod species inhabiting animal and bird organic manures. A general survey of mites associated with different organic manures at El-Menofia governorate (Ashmoun district) was undertaken for two years 2014 and 2015. The study revealed the occurrence of 36 different mite species belonging to 30 genera 19 families under four suborders as follows, Table (1).

Suborder: Acaridida: This suborder Acaridida was represented by 7 mite species belonging to 5 genera under 3 families. The collected mites were *Rhizoglyphus echinopus*, *Tyrophagus putrescentiae*, *T. tropicus*, *Caloglyphus berlesei*, *C. beta*, *Glycyphagus ornatus* and *Cortoglyphus arcuatus*. The collected mites were feeding on different fungi, Table (1).

Suborder: Actinedida: Thirteen species belonging to 10 genera belong to 7 families represented suborder Actinedida were collected. All of the collected actinedid mites are predators on other associated pests, Table (1). These mites surveyed were *Cheyletus malaccensis*, *C. badryi*, *C. eruditus*, *Hemicheleytia bakeri*, *Tarsonemus gladifer*, *Spinibdella bifurcata*, *Coccorhagidia clavifron*, *Imparipes* sp., *Scutacarus pigrus*, *Cunaxa capreolus*, *Pulaeus zaheri*, *P. pectinatus*, and *Eupodes aegypticus*

Suborder: Gamasida: The current study indicated that the organic manures were infested with 13 different mesostigmatid mites belonging to 12 genera in 7 different families, Table (1).

Table 1: Incidence of different mites associated with different organic manure at El Menofia Governorate during 2014 and 2015.

Mite species	Pigeon	Chicken	Duck	Feeding habitat	Abun.
Suborder Acaridida					
Family : Acaridae Leach					
<i>Rhizoglyphus echinopus</i> (Fum. & Rob.)	*	*	*	Fungivorous	+++
<i>Tyrophagus putrescentiae</i> (Shrank)	*	*	-	Fungivorous	+++
<i>Tyrophagus tropicus</i> Robertson	*	-	-	Fungivorous	
<i>Caloglyphus berlesei</i> (Michael)	*	-	-	Fungivorous	++
<i>Caloglyphus beta</i> Atiah	*	*	*	Fungivorous	++
Family : Glycyphagidae Berlese					
<i>Glycyphagus ornatus</i> (Kramer)	*	*	-	Fungivorous	+
Family : Chortoglyphidae Berlese					
<i>Cortoglyphus arcuatus</i> (Troup)	*	-	-	Fungivorous	+
Suborder Actinedida					
Family : Cheyletidae Leach					
<i>Cheyletus malaccensis</i> (Oudemans)	*	*	*	Predator	+++
<i>Cheyletus badryi</i> Zaher and Hassan	*	-	-	Predator	++
<i>Cheyletus eruditus</i> (Schrank)	*	*	-	Predator	+++
<i>Hemicheyletia bakeri</i> Ehara	*	*	-	Predator	+
Family : Tarsonemidae Kramer					
<i>Tarsonemus gladifer</i> Mahmuka	*	-	-	Fungivorous	+
Family : Bdellidae Duges					
<i>Spinibdella bifurcata</i> Atyeo	*	*	-	Predator	+
Family : Rhagidiidae Oudemans					
<i>Coccorhagidia clavifron</i> Canestrini	*	-	-	Predator	+
Family : Scutacaridae Oudemans					
<i>Imparipes</i> sp.	*	-	-	Uncertain	+
<i>Scutacarus pigrus</i> Choudhri	*	-	-	Uncertain	+
Family : Cunaxidae Thor					
<i>Cunaxa capreolus</i> (Berlese)	*	*	-	Predator	+++
<i>Pulaeus zaheri</i> El-Bishlawy & Rakha	*	-	-	Predator	+
<i>Pulaeus pectinatus</i> Ewing	-	-	-	Predator	+
Family : Eupodidae Koch					
<i>Eupodes aegypticus</i> Abou Awad & El-Bagoury	*	*	-	Predator	+++
Suborder Gamasida					
Family : Pachylaelapidae Berlese					
<i>Pachylaelaps aegyptiacus</i> Hafez & Nasr	*	-	*	Predator	+
Family: Ameroseiidae Berlese					
<i>Kleemania plumosus</i> (Oudemans)	*	*	*	Fungivorous	+++
Family Ascidae Voigts and Oudemans					
<i>Blattisocius tarsalis</i> (Berlese)	*	*	-	Predator	+
<i>Lasioseius bispinosus</i> Evans	*	-	-	Predator	+
Family: Macrochelidae Vitzthum					
<i>Macrocheles muscaedomesticae</i> (Scopli)	*	*	-	Predator	+
<i>Macrocheles carinatus</i> Koch	*	-	-	Predator	+
Family : Laelapidae Berlese					
1- <i>Hypoaspis miles</i> Berlese	*	*	-		+
2- <i>Androlaelaps casalis</i> (Berlese)	*	-	-	Predators	+
3- <i>Ololaelaps oliv</i> Hafez, El-Badry & Nasr	*	-	-		+
Family Uropodidae Berlese					
1- <i>Uroobovella krantzi</i> (Zaher & Afifi)	-	*	-	Fungivorous and predaceous	+
2- <i>Chiropturopoda bakeri</i> Zaher & Afifi	*	-	-		+
3- <i>Fuscuropoda marginata</i> (Koch)	*	-	-		+
Family: Ologamasidae Ryke <i>Gamasiphis pulchellus</i> (Berlese)	*	*	-	Predator	+
Suborder : Oribatida					
Family: Oribatulidae Thor					
<i>Siculobata sicula</i> (Berlese)				Fungivorous and/ or organic matters feeders	+
<i>Zygoributula sayedi</i> El-Badry and Nasr	*	*	*		+
Family : Oppiidae Grandjean					
<i>Oppia sticta</i> Popp	*	*	*	Fungivorous and/ or organic matters feeders	+++

* Present - absent

++ moderate (4-9)

+ rare less than 3 individuals

+++ (more than 9 mites)

The mites were *Pachylaelaps aegyptiacus*, *Kleemenia plumosus*, *Blattisocius tarsalis*, *Lasioseius bispinosus*, *Macrocheles muscaedomesticae*, *M. carinatus*, *Hypoaspis miles*, *Androlaelaps casalis*, *Ololaelaps oliv*, *Uroobovella krantzi*, *Chiropturopoda bakeri*, *Fuscuropoda marginata*, and *Gamasiphis pulchellus*, Table (1).

Suborder: Oribatida: The current study indicated that the different organic manures were inhabited with three different mites in two families. *Siculobata sicula*, *Zygoribitula sayedi* (Family Oribatulidae) and *Oppia sticta* (Family: Oppiidae), Table (1).

It was observed that the different mites, *Rhizoglyphus echinopus*, *Caloglyphus beta*, *Cheyletus malaccensis*, *Kleemenia plumosus*, *Siculobata sicula*, *Zygoribitula sayedi*, and *Oppia sticta* were collected from all examined organic manures of pigeons, chicken and ducks. Based on the abundance, *R. echinopus*, *T. putrescentiae* (Acaridida); *C. malaccensis*, *C. eruditus*, *Cunaxa capreolus*, *E. aegypticus* (Actinedida) and *K. plumosus* (Gamasida) and *O. sticta* (Oribatida) were the most dominant species in this study and collected with high numbers during the study investigation. The most common species associates with different investigated organic manures were the predacious mites, specially the cheyletids, cunaxid and laelapid mites which were highly found with the astigmatid mites. These predacious mites may be considered beneficial as they play an important role in biological control of harmful insects and mites in the fauna of indoor birds. It was noticed from the obtained data in Table (1) that the pigeon organic manure harbored the most collected mites, which included 33 different species, while the chicken manures harbored 18 different mites, but the duck manure only harbored 7 mite species. Generally, much research is needed to discuss the relationships between the different mites inhabiting organic manures and other associated microorganisms. In Egypt, Shereef *et al.*, (1980) surveyed mites associated with different organic manures. They found sixty species belonging to 44 genera and 24 families collected from cattle manure, 7 and 11 species were collected from sheep and horses manures, respectively. Also, the population study by Zaher *et al.*, (1980) proved that mesostigmatid mites ranked the first as it included the highest numbers of mites inhabiting the different organic manures, and the macrochelids were the most dominant in all investigated manures, followed by the ascid mites then uropodid and parasitid mites, and a positive relationships were occurred between numbers of macrochelids and the house fly larvae. Mahmood and Aldulaimi (1989) demonstrated the Acari of accumulated cattle and horse manures in Iraq. They found that mites were predominantly Mesostigmata. Moreover, the highest number of species was recorded from cattle manure during winter. According to El-Nenaey (1992), the largest numbers of mites were collected and recorded from buffalo manure followed by rabbit manure and the least one was found in sheep organic manure and noticed that the moisture and temperature factors affecting the abundance and population of these mites. Badejo *et al.*, (2004) noticed that with time, the densities and activities of mites recovered under organic management. The uropodine and oribatid mites in particular benefited more from organic management than gamasine and actinedid mites. The results of current study are in agreement with those found by Achiano and Giliomee (2006) who found the predominant predator *M. mascadomesticae* (Scopoli) in manure at South Africa and showed a wide range of temperature tolerance. A faunistic similar survey was carried out on the manure-inhabiting mesostigmatic mites in Iran by Arjomandi *et al.*, (2011). In this research, 36 species belonging to 23 genera and 14 families were collected and identified of which *Ameroseius pavidus*

(Koch) (Ameroseiidae) and *Trachytes baloghi* Hirschmann and Zirngiebl-Nicol (Trachytidae) were considered new records for Iran mite fauna. Mite community within cow manure was more diverse than poultry and sheep manures. Based on relative frequency, *Uroobovella marginata* (Koch), *U. difoveolata* Hirschmann and Zirngiebl-Nicol and *Androlaelaps casalis* were the most dominant in cow, sheep, and poultry manures, respectively. Investigations on the occurrence of parasitic and predaceous mites were carried out by El-Sharabasy and Hanafy (2014) on farms of domesticated Japanese quail, *Coturnix japonica*, with two rearing systems (battery cage and deep litter) to study the acarofauna that are in close association with man, aiming to control the parasitic ones. A total of 19 mite species belong to 15 families and three suborders (Mesostigmata, Prostigmata and Astigmata) were recorded in the two examined rearing systems. The mite fauna was dominated by the family Macrochelidae of which, *M. mascadomesticae* was the most abundant, dominant and frequent species (D = 39.8%) of all mites recorded. Species of the family Acaridae, *T. putrescentiae* was numerically dominant among astigmatic mites (D = 30.5).

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ARABIC SUMMERY

تواجد الأكاروسات المرتبطة ببعض المخلفات العضوية بمحافظة المنوفية

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تعتبر فضلات الحيوانات والطيور مأوى مناسباً لكثير من أكاروسات التربة والتي يمكن أن تستخدم كمفترسات ليرقات الذباب وغيره وتعتبر من ضمن الكائنات النافعة للإنسان حيث تتغذى على مفصليات الأرجل الضارة مثل بيض ويرقات الذباب. ولقد اهتمت الدراسة بحصر للأكاروسات المختلفة المرتبطة بالروث أو المخلفات العضوية لبعض الطيور (حمام - دجاج - بط) وذلك بمنطقة أشمون بمحافظة المنوفية خلال عامين فى الفترة (يناير ٢٠١٤ - يناير ٢٠١٦). حيث تم حصر ٣٦ نوع أكاروسى و ٣٠ جنس داخل ١٩ عائلة أكاروسية مختلفة وأربعة تحت رتب أكاروسية مختلفة مرتبطة بهذه المخلفات. ولقد مثلت تحت رتبة الأكاروسات عديمة الثغر Acaridida بثلاث عائلات أكاروسية وهى Acaridae و Glycyphagidae و Chortoglyphidae أما تحت رتبة الأكاروسات أمامية التغذية Actinedida فقد مثلت بسبع عائلات وهى Cheyletidae و Tarsonemidae و Bdellidae و Rhagididae و Scutacaridae و Cunaxidae و Eupodidae ومثلت تحت رتبة الأكاروسات متوسطة الثغر Gamasida بسبعة عائلات وهى Pachylaelapidae و Ameroseiidae و Ascidae و Macrochelidae و Laelapidae و Uropodidae و Ologamasidae أما تحت رتبة الحلم الخنفسى Oribatidae فشملت عائلتين اثنتين وهما Oribatulidae و Oppiidae. ولقد أوضحت الدراسة أن الأكاروسات *Rhizoglyphus echinopus* و *Cunaxa capreolus* و *C. eruditus* و *Cheyletus malaccensis* و *Tyrophagus putrescentiae* و *Eupodes aegypticus* و *Klemania plumosus* و *Oppia sticta* كانت الأكاروسات الأكثر تواجداً أثناء هذه الدراسة. ولقد أثبتت الدراسة أن مخلفات الحمام العضوية قد احتوت على أكثر الأنواع الأكاروسية حيث وجد بها ٣٣ نوعاً أكاروسياً مختلف التغذية بينما جاءت مخلفات الدجاج فى المرتبة الثانية وشملت ١٨ نوعاً من الأكاروسات وجاءت فضلات البط فى المرتبة الأخيرة باحتوائها على سبعة أنواع أكاروسية فقط.