

Mite Fauna Inhabiting Animal Manures at Ismailia Governorate, Egypt

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Abstract: Survey as well as population density of mite's fauna inhabiting organic manures in different animal sheds *i.e.* buffalo, cow, sheep and goats was conducted during the period from March 2013 to February 2015 in the Experimental Farm, Faculty of Agriculture, Suez Canal University. Results indicated that thirty-three species belonging to twenty-eight genera and twenty-one families within 2 orders were recorded and identified. Order Acariformes was represented by suborder Actinedida (6 families and 12 species); suborder Acaridida (3 families and 3 species) and suborder Oribatida (2 families and 2 species). Order Parasitiformes was represented only by suborder Gamasida (10 families and 16 species). Furthermore, six families (9 species) were recorded in buffalo sheds; 13 families (18 species) in cow sheds; 20 families (27 species) in sheep sheds and 8 families (9 species) in goat sheds. Data also revealed that *Tyrophagus putrescentiae* Schrank was recorded in highest numbers, while *Macrocheleus merdarius* (Berlese) was relatively rare.

Keywords: Mites, Survey, animal sheds, organic manures

INTRODUCTION

Organic manures improve soil phase and play an important role in humification and provide plants with important minerals. This manure is favorite habitats for harmful and beneficial arthropods of which mites constitute the major part. Organic manures are a heterogeneous substrate, with numerous microhabitats available to the arthropods (Lindquist *et al.*, 2009; Arjomandi *et al.*, 2013). Mites were classified according to different feeding habitats, some of them were predators, parasites and others were free living. Surveyed mites inhabiting organic manures were studied by Mohamed (1975) in Giza region. Sherref *et al.* (1980) recorded mites from different organic manures, which collected from various regions of Egypt. Zaher *et al.* (1980) studied the population density of mites in three types of organic manures. Accumulated knowledge of the mite fauna and their density inhabiting organic manures of domestic animals is extremely poor as compared with other habitats. So the main objective of this work was a survey of mite fauna inhabiting organic manures at four animal sheds of buffalo, cow, sheep and goats in the farm of Faculty of Agriculture, Suez Canal University, at Ismailia Governorate.

MATERIALS AND METHODS

The present study was carried out from March 2013 to February 2015 in the Experimental Farm of Faculty of Agriculture, Suez Canal University, Ismailia Governorate. Samples were collected twice monthly from animal manures sheds of buffalo, cow, sheep and goats. Samples were taken from surface layer of different studied sheds, each samples was about 500 gm. Samples placed in plastic bags and transferred to the laboratory of Acarology of Department of plant protection, Faculty of Agriculture. Mites were extracted by using Tullgren funnels for at least 48 h. and collected in beakers containing 70% ethanol alcohol, examined under stereomicroscope and counted. Collected mites kept in Nesbit's solution for few hours for clearing then mounted in Hoyer's medium. Mites were counted and

identified by using keys of Krantz (1978) and Zaher (1986). According to the total individual mite families and species, the order of dominance was divided into four categories; high dominant (++++) >100, dominant (+++) > 50 < 100, influent (++) > 25 < 50 and recedent (+) < 25, (Cusack *et al.*, 1975).

RESULTS AND DISCUSSION

Thirty-three mite species belonging to Twenty-eight genera and twenty-one families were found. These collected mites were: Order Acariformes which was represented by suborder Actinedida 6 families (12 species); suborder Acaridida 3 families (3 species) and suborder Oribatida 2 families (2 species) (Table 1).

Suborder Actinedida

Family Bdellidae Dugas was represented by 2 species, these were, *Cyta laterostris* (Hermann) which was found in few numbers in sheep manures, and *Spinibdella bifurcate* Atyeo which was found in rare numbers in sheep and goat manures.

Family Cheyletidae Leach was represented by 4 species, these were, *Cheyletus malaccensis* Oudemans which was found in moderate numbers in buffalo, cow and sheep manures; *Cheyletus badryi* Zaher&Hassan which was found in few numbers in buffalo and cow manures; *Cheyletus eruditus* (Schrank) which was found in rare numbers in buffalo manures and *Hemicheyletia bakeri* (Ehara) which was found in rare numbers in buffalo and cow manures. Our results are in agreement with Zaher (1986) who recorded *Cheyletus malaccensis* in organic manures in Giza region, and mentioned that this mite feed on acarid mite, *Rhizoglyphus robini*, collembola, eggs and larvae of housefly.

Family Cunaxidae Thor was represented by one Species, *Neocunaxoides* sp. which was found in rare numbers in sheep and goat manures.

Family Pygmephoridae Cross was represented by one Species, *Pygmephorus* sp. which was found in few numbers in buffalo, cow, sheep manures and in rare numbers in goat manures.

Table (1): List of mite species collected from different organic manure heaps in animal sheds at Ismailia Governorate.

Sub order	Family	Species	Types of organic manure heaps
Order: Acariformes			
Actinedida	Bdellidae	<i>Cyta laterostris</i> (Herman)	Sheep ⁺⁺
		<i>Spinibdella bifurcate</i> Atyeo	Sheep ⁺ , Goats ⁺
	Cheyletidae	<i>Cheyletus malaccensis</i> Oudemans	Buffalo ⁺⁺⁺ , Cow ⁺⁺⁺ , Sheep ⁺⁺⁺
		<i>Cheyletus badryi</i> Zaher & Hassan	Buffalo ⁺⁺ , Cow ⁺⁺
		<i>Cheyletus eruditus</i> (Schrank)	Buffalo ⁺
		<i>Hemicheyletia bakeri</i> (Ehara)	Buffalo ⁺ , Cow ⁺
	Cunaxidae	<i>Neocunaxoides</i> sp.	Sheep ⁺ , Goats ⁺
	Pygmephoridae	<i>Pygmephorus</i> sp.	Buffalo ⁺⁺ , Cow ⁺⁺ , Sheep ⁺⁺ , Goats ⁺
	Raphignathidae	<i>Raphignathus bakeri</i> Zaher&Gomaa	Sheep
	Stigmaeidae	<i>Stigmaeus</i> sp.	Sheep ⁺
		<i>Apostigmaeus</i> sp.	Cow ⁺
		<i>Stigmaeus africanus</i> Gomaa&Soliman	Sheep ⁺
	Acaridida	Acaridae	<i>Tyrophagus putrescentiae</i> Schrank
Glycyphagidae		<i>Glycyphagus domesticus</i> (Degeer)	Cow ⁺⁺ , Sheep ⁺⁺
Pyroglyphidae		<i>Dermatophagoides</i> sp.	Cow ⁺ , Sheep ⁺
Oribatida	Oppiidae	<i>Oppia sticta</i> Popp	Sheep ⁺ , Goats ⁺
	Oribatulidae	<i>Zygoribatula</i> sp.	Sheep ⁺ , Goats ⁺
Order: Parasitiformes			
Gamasida	Ameroseiidae	<i>Kleemannia plumosus</i> (Oudemans)	Cow ⁺ , Sheep ⁺
	Ascidae	<i>Protogamasellus denticus</i> Naser	Buffalo ⁺ , Cow ⁺ , Sheep ⁺
		<i>Lasioseius aegyptiacus</i> Afifi	Cow ⁺⁺ , Sheep ⁺⁺
		<i>Blattisocius dentriticus</i> (Berlese)	Sheep ⁺⁺
	Digamasellidae	<i>Dendrolaelaps zheri</i> Metwally&Mersal	Sheep ⁺
	Laelapidae	<i>Androlaelaps casalis</i> (Berlese)	Sheep ⁺
		<i>Hypoaspis baloghi</i> Shreef & Afifi	Cow ⁺⁺⁺⁺ , Sheep ⁺⁺⁺⁺
	Phytoseiidae	<i>Laelaspis stronemicus</i> (Koch)	Cow, Sheep ⁺⁺
		<i>Typhlodromus zaheri</i> Denmark	Cow ⁺⁺ , Sheep ⁺⁺
	Uropodidae	<i>Uropovella</i> sp.	Buffalo ⁺⁺
	Macrochelidae	<i>Macrocheleus merdarius</i> (Berlese)	Buffalo ⁺ , Cow ⁺ , Sheep ⁺ , Goats ⁺
		<i>M. muscadomesticae</i> Scopoli	Cow ⁺⁺⁺⁺ , Sheep ⁺⁺⁺⁺ , Goats ⁺⁺
		<i>M. glaber</i> Muller	Goat ⁺⁺ , sheep ⁺⁺⁺⁺
	Ologamasidae	<i>Gamasiphis</i> sp.	Cow ⁺ , Sheep ⁺
Parasitidae	<i>Parasitus badrii</i> Hafez and Nasr	Cow ⁺⁺⁺⁺ , Sheep ⁺⁺⁺⁺ , Goats ⁺⁺⁺⁺	
Rhodacaridae	<i>Rhodacarus roseus</i> Oudemans	Sheep ⁺⁺	

+ = recedent < 25, ++ = influent >25 <50, +++ = dominant >50 <100, ++++ = High dominant >100

Family Raphignathidae kramer was represented by one Species, *Raphignathus bakeri* Zaher & Gomaa which was found in few numbers in sheep manures.

Family Stigmaeidae Oudemans was represented by 3 species, these were, *Stigmaeus* sp. which was found in rare numbers in sheep manures; *Apostigmaeus* sp., which was found in rare numbers in cow manures and *Stigmaeus africanus* Gomaa & Soliman which was found in rare numbers in sheep manures. El-Sharabasy (2010a) found *Stigmaeus zaheri* Gomaa and Hassan in organic manures as a predator associated with small arthropods.

Suborder Acaridida

Family Acaridae Ewing & Nesbitt was represented by one Species, *Tyrophagus putrescentiae* Schrank, which was found in high numbers in buffalo, cow, sheep and goat manures. Members of family Acaridae are widely distributed and free-living, some of them are associated with insects or found in nests of small animals and living on all kinds of organic substrates (Mahgoob, *et al.*, 2006).

Family Glycyphagidae Berlese was represented by one Species, *Glycyphagus domesticus* (Degeer), which was found in few numbers in cow and sheep manures.

Family Pyroglyphidae Cunliffe was represented by one Species, *Dermatophagoides* sp., which was found in few numbers in cow manure and rare in sheep manures.

Suborder Oribatida

Family Oppiidae Grandjean was represented by one Species, *Oppia sticta* Popp, which was found in rare numbers in sheep and goat manures. Lindquist *et al.* (2009) collected *O. sticta* with very relatively low frequency in buffalo manure and they mentioned that this species may feed on spores of fungi.

Family Oribatulidae Thor was represented by one Species, *Zygoribatula* sp., which was found in rare numbers in sheep and goat manures.

Order Parasitiformes was represented by suborder Gamasida with 10 families (16 species) (Table 1). These families are:

Family Ameroseiidae Evans was represented by one Species, *Kleemannia plumosus* (Oudemans), which was found in rare numbers in cow and sheep manures. Members of family Ameroseiidae feed on spores of fungi and hyphal fragments. This finding is in agreement with that found by Zaher (1986) who mentioned that *K. plumosus* was successfully reared on some soil fungi such as *Fusarium solani*.

Family Ascidae Voigts & Oudemans was represented by 3 species, these were, *Blattisocius dentriticus* (Berlese) which was found in rare number in sheep manures. *Lasioseius aegyptiacus* Afifi also was found in few numbers in cow and sheep manures, whereas *Protogamasellus* sp. was found in rare numbers in buffalo, cow and sheep manures. El-Sharabasy (2010b)

recorded *Protogamasellus denticus* Nasr in organic manures in animal sheds at Ismailia governorate.

Family Digamasellidae Evans was represented by one Species, *Dendrolaelaps zheri* Metwally & Mersal, which was found in rare numbers in sheep manures.

Family Laelapidae Berlese was represented by 3 species, these were, *Androlaelaps casalis* (Berlese) which was found in rare number in sheep manures; *Hypoaspis baloghi* Shreef & Afifi, which was found in high numbers in cow and sheep manures and *Laelaspis stronemicus* (Koch), which was found in few numbers in cow and sheep manures.

Family Phytoseiidae Berlese was represented by one Species, *Typhlodromus zaheri* Zaher & El-Badry which, was found in few numbers in cow and sheep manures.

Family Uropodidae was represented by one Species, *Uropovella* sp., which was found in few numbers in buffalo manures.

Family Macrochelidae Vitzthum was represented by 3 species, these were, *Macrocheleus merdarius* (Berlese) which was found in rare number in sheep, buffalo, cow and goat manures; *M. muscadomesticae* Scopoli which was found in high numbers in cow, sheep, and goat manures and *M. glaber* Muller which was found in few numbers in sheep and goat manures. *M. muscadomesticae* was presented in all of the samples examined except buffalo manure, and this is an agreement with Kazemi and Rajaei (2013).

Family Ologamasidae Ryke was represented by one Species, *Gamasiphis* sp., which was found in rare numbers in cow and sheep manures.

Family Parasitidae Oudemans was represented by one Species, *Parasitus badrii* Hafez and Nasr, which was found in high numbers in cow, sheep and goat manures.

Family Rhodacaridae Oudemans was represented by one Species, *Rhodacarus roseus* Oudemans, which was found in few numbers in sheep manures.

Data showed that diversity of mite community within buffalo manures is low. This could be attributed mainly to the high moisture content. Augustin and Rahman (2010) revealed that humidity in different manure types might affect mite diversity.

A total of 12598 mite individuals were extracted during the two successive years. Mites extracted from manure of sheep recorded the highest collected (38.38% from total collected mites). On other hand, manure from goats recorded the lowest number of collected mites (21.16%) (Table 2).

Also results showed that there 9 species belonging to 6 families were recorded from buffalo manures. On the other hand, 18 species belonging to 13 families; 10 species belonging to 8 families and 27 species belonging 20 families were recorded from cow, goats and sheep manures; respectively (Table 1).

Table (2): Total number of mites extracted from different manure heaps from March 2013 to February 2015 at Ismailia Governorate

Manure types	2013		2014		Total	%
	No	%	No	%		
Buffalo	1126	21.41	1353	18.43	2479	19.67
Cow	2047	38.92	1638	22.31	3685	29.25
Sheep	1297	26.66	3539	48.22	4836	38.38
Goats	789	15.00	809	11.02	1589	12.61
Total	5259		7339		12598	

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