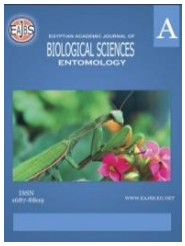
Egypt. Acad. J. Biolog. Sci., 13(2):189-194 (2020)

Egyptian Academic Journal of Biological Sciences
A. Entomology

ISSN 1687- 8809
http://eajbsa.journals.ekb.eg/



Some Mesostigmated Mites Associated with Food Stuff

Mohammed El-Sayed Gad[1], Abdel-Sattar Mohammed Metwally[2], Ahmed Saber Bream[2].

1- Department of Zoology and Entomology, Faculty of science (Cairo), Al–Azhar University.

2- Department of Agricultural Zoology and Nematology, Faculty of Agriculture (Cairo), Al–Azhar University.

Email: **mohammedgad1990@yahoo.com**

ARTICLE INFO

Article History
Received:30/3/2020
Accepted:13/5/2020

Keywords:
Incidence, Mites, Foodstuff

ABSTRACT

This work was conducted to study the incidence of the mites associated with stored foodstuff during the two successive years 2018 and 2019. Twenty-seven mite species from ten different stored products; wheat grain, wheat flour, wheat bran, rice grain, maize grain, pea, corn, bread bean, animal feed, and barley were collected from El-Sharqia governorate. The collected mites belonged to one order **Parasitiformes,** one suborder **Gamasida (Mesostigmata),** and 7 families, with 27 species distributed among 15 genera. The recognised families were Ascidae Vogits Oudemans, Ameroseiidae Evans, Lealapidae Berlese, Macrochelidae Vitzithum, Uropodidae Kramer, Rhodacaridae Oudemans and Parasitidae Oudemans).

INTRODUCTION

Stored product mites play an important role in human life. In many cases, they caused serious economic losses or health problems. Mites inhabited mainly the stored food, plant material, and debris. Among the next commodities well documented are the mite infestation in cereal-based food, dried fruits, root crops and ornamentals, honey, and cheeses (Hughes, 1976).

Mites are a major cause of qualitative and quantitative losses to several stored products. The pest importance of stored product mites has been reviewed and pest risk is suggested that caused direct consumption on human food, animal feed or other products changing the quality of infested products, they can penetrate the hard grains and feed directly on the grain kernels, therefore they destroy their germination power, change the moisture contents of the medium, initiating growth and spread mould (Taha, 1985).

Mites (Acari) are the most diverse group of arachnids (Arachnida) with about 45,000 described species. Mites are typically very small in size (0.09-30 mm of the compact body). Mites inhabit all types of habitats and they can be either free-living or parasitic. Free-living mites are more common. The free-living mites possess many physiological adaptations that enable them to act as predators, saprophages, fungivores, phytophages, microphages, coprophages, and necrophages (Tomáš Erban, 2012).

Mites are numerous species of minute arthropods, members of class Arachnida

subclass Acari or Acarina, and pests of many economic prominences living in a wide range of habitats. Mites are predators and parasites, performing crucial means of biological control, essential herbivores, and detritivores, acting fungivorous and saprophytic, vectors of diseases, and play a vital role in soil formation. These live on plants and animals, in the depths of the ocean, in soil and fresh or brackish water, in the lungs of birds and animals, in stored grains and stored products, on leaves of the rainforest, and in human clothes and bedding (Sarwar Muhammad, 2019).

MATERIALS AND METHODS

A-The Sampling Procedure:

The present investigation tended to record the different mite species associated with the different stored products bring from different districts at El-Sharqia governorate. The samples of stored food products were picked and singly kept in tightly closed polyethylene bags. A label including all necessary information concerning habitat, locality, and date of the collection were stuck on each bag and then, transferred to the laboratory.

A sample of 250 gm from each material was isolated by modified Tullgren funnels, in 3cm deep layers and kept for 24 hours below 40-watt electric lamps. The mites were collected into petri-dishes with a ring of Vaseline mixed with citronella oil to prevent mite escape (Metwally, 1976). Active mite individuals were transferred by 0.3 mm camel hairbrush and examined using a stereomicroscope. Isolated specimens were placed in Nesbiti solution (Krantz and Walter, 2009) (40 gm chloral hydrate, 25 ml distilled water and 2.5 ml concentrated hydrochloric acid) for 24 hours, then mounted by placing a drop of Hoyer's medium (Hughes, 1976; Krantz and Walter, 2009).

The individual mite was pressed carefully to the bottom of the droplet and arranged using a clean pair of forceps, a cover slide was picked up at its edge, applied the opposite edge to the edge of the Hoyer's droplet to allow the cover slide to fall into its place, then, mounted slide was placed on a hot plate at 40-50 ^{o}C for 2-4 days (Krantz, 1978; EL- Sanady, 2005).

B-Identification:

The specimens were identified and kept on the mite collection of Agric, Zoology, Nematology Department Faculty of Agric. AL–Azhar University. Identification was carried out according to Griffiths (1960); Lindqust and Evans (1965); Hughes (1976); Summer and Price (1970); Zaher *et al*., (1984); Krantz and Walter (2009).

RESULTS AND DISCUSSION

Incidence of Mites Associated with Stored Products:

Mites of stored products were recorded during the two successive years (2018 and 2019). The collected mites are belonging to order: Parasitiformes.

Order: Parasitiformes:

Obtained results are presented in Table (1). This order was represented by suborder Gamasida (Mesostigmata) which included seven families: Ascidae, Lealapidae, Ameroseiidae, Macrochelidae, Uropodidae, Rhodacaridae, and Parasitidae. These families have twenty-seven species belonging to fifteen genera.

Family: Ascidae Vogits and Oudemans:

Many investigators recorded some species belonging to family Ascidae associated with pests infesting stored products (Hughes, 1976; Taha, 1985). Also, Ghazy (2016) collected only two ascid species from three types of food bran, rice, and flour. Lindquist and Evans (1965) Hughes (1976) showed that this family comprises more than 22 genera, with several hundred predatory and micro-phytophagous species distributed around the world.

This family was found in a wide variety of habitats, ranging from stored products to the surface litter of forests and grasslands. Their chelicerae indicated that they are predatory or mycophagous organisms.

This family was represented by five species; the first three species belong to genus *Blattisocius.*

The first species was ***Blattisocius tarsalis* (Oudemans),** which was isolated from wheat flour and maize grain, collected from Zagazig and Deyarb Negm by rare numbers during the period of the study.

Also, ***Blattisocius dentriticus* (Berlese),** which isolated from wheat flour and maize grain, collected from Zagazig and AboHammad by rare numbers during the period of the study.

Also, ***Blattisocius keegani* Fox,** isolated from wheat flour and maize grain, collected from AboHammad and Deyarb Negm by few numbers. The fourth species was ***Lasioseius africanus* Nasr,** belonging to genus ***Lasioseius*** and collected from Zagazig and Deyarb Negm by a few numbers.

The fifth species was ***Proctolaelaps pygmaeus* (Muller),** belonging to genus *Proctolaelaps* and isolated from barley grain and maize grain, collected from Zagazig, Deyarb Negm and AboHammad by a few numbers. All ascid mite species were recorded throughout the whole 2019 year. These results agree to the results of Metwally, *et al*. (2016) in which they isolated eight species belong to three genera from Gharbia and Cairo governorates during the two successive years (2013 and 2014). Also, these results agree to the results of Nagah (2018), in which she extracted 12 species belonging to 6 genera from Qalubia governorate during the two successive years (2017 and 2018).

Family: Lealapidae Berlese

This family was represented by eight species as follows:

The first species was ***Haemogamaus pontiger* Berlese,** belonging to genus *Haemogamaus* which extracted from wheat grain and barley grain, collected from AboHammad and Zagazig by rare numbers.

The second species was ***Ololaelaps sellnicki* Bregetova**, belonging to genus *Ololaelaps* which was extracted from maize flour, collected from Zagazig and AboHammad by intermediate numbers during the period of the study.

The third species was ***Stratiolaelaps scimitus*,** belonging to genus *Stratiolaelaps* which was isolated from maize flour and maize grain, collected from AboHammad and Kafr Saqr.

Also, the fourth species ***Hypoaspis kifli* Metwally & Ibrahim,** was isolated from wheat flour and barley grain, collected from Zagazig and Kafr Saqr by few numbers.

The fifth species belonged to genus *Laelaps*, there was ***Laelaps transvaalensis* zumpt**, isolated from wheat flour, collected from Zagazig and Kafr Saqr by few numbers.

Also, the sixth species ***Laelaps keegani* Thurman,** was isolated from wheat flour collected from Zagazig and Deyarb Negm in rare numbers.

Also, the seventh species of ***Laelaps astronomicus* (Koch),** which extracted from wheat grain and collected from Zagazig and Kafr Saqr in few numbers.

The eighth species was ***Androlaelaps casalis* Berlese,** belonging to genus *Androlaelaps***,** isolated from barley grain and rice grain**,** collected from AboHammad and Zagazig by intermediate numbers during the period of the study**.**

These results are agreeing with the results of Nagah (2018), in which she extracted 5 species belonging to 2 genera from Qalubia governorate during two successive years (2017 and 2018).

Family: Ameroseiidae Evans

Nagah (2018) isolated 3 species belonging to 2 genera, of family Ameroseiidae, collected from Qalubia governorate. In the present study, ameroseiid mites were represented by two genra, ***Kleemania* and *Ameroseius***.

The first genus was ***Kleemania*,** including three species, the first species was ***Kleemania***

***plumigera* Oudemans,** isolated from rice grain and maize grain, collected from Zagazig and AboHammad by rare numbers,

-The second species **was *Kleemania kossi* El-Badry, Nasr & Hafez,** extracted from rice grain and maize grain, collected from Zagazig and AboHammad by rare numbers, this agrees with results of El-Bltagy (2017), who extracted ***Kleemania* genus** from onion, maize and bread bean collected from Nawag and Sammanoud(Gharbia governorate) by few numbers.

-Also, the third species ***Kleemania plumosus* (Oudemans),** which was isolated from rice grain and barley grain, collected from Zagazig and Deyarb Negm by few numbers.

The second genus was ***Ameroseius,*** including only one species that was ***Ameroseius egypticus* Nasr**, extracted from barley grain, and collected from Zagazig by few numbers through the two years.

Family: Macrochelidae Vitzthum

Family Macrochelidae was represented by seven species, the first five species belonged to genus *Macrocheles*.

The first species was ***Macrocheles* sp,** isolated from barley grain and rice grain, collected from Zagazig and Deyarb Negm by rare numbers during the summer season.

The second species was ***Macrocheles matrius* (Hull),** isolated from barley grain, collected from Zagazig and Deyarb Negm by rare numbers during the summer season.

The third species was ***Macrocheles muscadomestica* (Scopoli),** isolated from barley grain and rice grain, collected from Zagazig, Deyarb Negm, and Kafr Saqr by intermediate numbers during the whole year of 2018. Also, the fourth species was ***Macrocheles merdarius* (Berlese),** extracted from barley grain, collected from Zagazig, Deyarb Negm and Kafr Saqr by few numbers during summer season.

The fifth species was ***Macrocheles sembelawanii* Hafez, El-Badry & Nasr,** extracted from rice grain, collected by rare numbers during the whole 2018 year. This agrees with the results of El-Bltagy (2017), who extracted *Macrocheles scutatus*, from animal feed, collected from Nawag and Kafr El-Hema (Gharbia governorate) by few numbers during the summer season 2014.

While the other sixth and seventh species belonged to the genus ***Holocelano*.** The sixth species was ***Holocelano anogmos* Evans,** isolated from wheat flour and bread bean, collected from Zagazig**,** AboHammad, and Deyarb Negm by dominant numbers during the whole 2019 year.

Also, the seventh species was ***Holocelano shoemakei* Evans,** extracted from wheat grain, collected from Zagazig**,** Kafr Saqr, and Deyarb Negm by few numbers during the whole 2019 year.

Family: Uropodidae Kramer

This family was represented by one species ***Uropovilla* sp.,** belonged to the genus *Uroporella*, isolated from Maize grain, pea and corn, collected from Zagazig by rare numbers during the summer season.

Family: Rhodacaridae Oudemans

This family was represented by one species ***Rhodacarus* sp.,** which belonged to the genus *Rhodacarus* was extracted from wheat flour and animal feed, collected from Deyarb Negm and Kafr Saqr by few numbers during the 2018 year. This result was similar to the results of El-Bltagy (2017), in which she extracted *Rhodacarus tabeeni* from Nasr City (Cairo governorate) and Nawag (Gharbia governorate) during the study period.

Family: Parasitidae Oudemans

This family included one species ***Parasitus* sp.** which was isolated from wheat grain, animal feed, pea, and corn, collected from Zagazig by a few numbers during the whole year of 2019. This result was similar to the results of El-Bltagy (2017), which was extracted *Parasitus consoginues* (Odu. and Vogits) from animal feed, maize by few numbers collected from Nawag (Gharbia governorate) during the year of 2017.

Table 1: Incidence of Order Parasitiformes, Suborder Gamasida (Meostigmata) mite species in El-sharqia governorate for two years (2018 and 2019).

Family	Species	Habitat	Abundance	Locality
Ascidae Vogits and Oudemans	*Blattisocius tarsalis* (Oudemans)	wheat flour -maize grain	+	Zagazig - Deyarb Negm
	Blattisocius dentriticus (Berlese)	wheat flour -maize grain	+	Zagazig - AboHammad
	Blattisocius keegani Fox	wheat flour –maize grain	++	AboHammad - Deyarb Negm
	Lasioseius africanus Nasr	wheat flour -maize grain	++	Zagazig- Deyarb Negm
	Proctolaelaps pygmaeus (Muller)	barley grain - maize grain	++	Zagazig - Deyarb Negm AboHammad
Lealapidae Berlese	*Haemogamaus pontiger* Berlese	wheat grain- Barley grain	+	AboHammad - Zagazig
	Ololaelaps sellnicki Bregetova	maize flour	+++	Zagazig - AboHammad
	Stratiolaelaps scimitus	maize flour- maize grain	+	AboHammad - Kafr Saqr
	Hypoaspis kifli Metwally & Ibrahim	wheat flour- barley grain	++	Zagazig - Kafr Saqr
	Laelaps transvaalensis Zumpt	wheat flour	++	Zagazig - Deyarb Negm
	Laelaps keegani Thurman	wheat flour	+	Zagazig – Deyarb Negm
	Laelaps astronomicus (Koch)	wheat grain	++	Zagazig - Kafr Saqr
	Androlaelaps casalis Berlese	barley grain - rice grain	+++	AboHammad - Zagazig
Ameroseiidae Evans	*Kleemania plumigera* Oudemans	rice grain - maize grain	+	Zagazig - AboHammad
	Kleemania kossi El - Badry and Nasr, Hafez	rice grain - Barley grain	+	Zagazig - AboHammad
	Kleemania plumosus (Oudemans)	rice grain - Barley grain	++	Zagazig - Deyarb Negm
	Ameroseius egypticus Nasr	barley grain	++	Zagazig
Macrochelidae Vitzithum	*Macrocheles* sp	berley grain - rice grain	+	Zagazig - Deyarb Negm
	Macrocheles matrius (Hull)	barley grain	+	Zagazig- Deyarb Negm
	Macrocheles muscadomestica (Scopoli)	barley grain - rice grain	+++	Zagazig - Deyarb Negm - Kafr Saqr
	Macrocheles merdarius (Berlese)	barley grain	++	Zagazig - Deyarb Negm - Kafr Saqr
	Macrocheles sembelawanii Hafez, El-Badry & Nasr	rice grain	+	Zagazig- Kafr Saqr
	Holocelano anogmos Evans	wheat flour-bread	++++	Zagazig - AboHammad Deyarb Negm
	Holocelano shoemakei Evans	wheat grain	++	Kafr Saqr - Deyarb Negm - Zagazig
Uropodidae Kramer	*Uropovilla* sp.	maize grain - pea corn	+	Zagazig
Rhodacaridae Oudemans	*Rhodacarus* sp	wheat flour- animal feed	+	Deyarb Negm -Kafr Saqr
Parasitidae Oudemans	*Parasitus* sp	wheat grain- animal feed- pea-corn,	++	Zagazig

Dominant ++++: The mite species number forming more than 10% of the total population.
Intermediate +++: The mite species number forming between 5-10 % of the total population.
Few + +: The mite species number forming between 2- 5 % of the total population.
Rare +: The mite species number forming less than 2% of the total population.

REFERENCES

El-Bltagy (2017). Ecological and biological studies on some mites associated with stored products. M.Sc. Thesis, Fac. of Agric. A1-Azhar Univ., 134pp.

El-Sanady (2005). Studies on some stored product mites and their predators, Ph.D. Thesis Fac., Sci., Al-Azhar Univ., pp.193.

Ghazy (2016). Biological studies on some mites associated with stored products in Damietta Governorate. M.Sc. Thesis in Agri. Zool. Dep. Fac. of Sci. Al-Azher Univ. 107 pp.

Griffiths, D.A. (1960). Mite pests of stored products. Ann. App.Biol., 46 (3): 123-130.

Hughes, A. M. (1976). The mites of stored food products and houses. Tech. Bull.,

Min. Agric, and Fisheries in London, 9: 400 pp.
Krantz, G.W. (1978). A manual of Acarology, Oregon State Univ. Book stares Ltd., Coerallis, Oregon, 335pp.
Krantz, G.W. and Walter, D. E. (2009). A Manual of Acarology. Texas Tech Univ. Press, 807 pp.
Lindquist, E.E. and Evans, G.O. (1965). Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina: Mesostigmata). Mem. Ent. Soc. Can., 47: 1-64.
Metwally, A.M. (1976). Ecological and biological studies on super family parasitoida in Mostorod Region. Ph.D. Thesis, Fac. of Agric., Al- Azhar univ., 166pp.
Metwally, A.M.; AbdAllah, A.A.; Gamal El- Din, Hala M. and El-Bltagy, Hala M. (2016). Mites associated with stored products. Annals of Agric. Sci., 54(3): 649-658.
Nagah (2018) Studies on some mites associated with stored products in Qalubia governorate. M.Sc. Thesis, Fac. of Agric. Benha Univ., 126pp.
Sarwar-Muhammad (2019). Biology and Ecology of some Predaceous and Herbivorous Mites Important from the Agricultural Perception. Intech Open; http://dx.doi.org/10.5772/intechopen.83744.
Summers, F. M. and Price, D.W. (1970). Review of the mite family Cheyletidae. Univ. Calif Publ. Entomol., 61: 153 pp.
Taha, H.A. (1985). Morphological and biological studies on some mites associated with stored products. Ph.D. Thesis, Agric. Zool. & Nematol. Dept. Fac. of Agric. Al-Azhaer Univ., pp.159.
Tomáš Erban (2012). Nutritional biology of synanthropic mites (Acari: Acaridida). Ph.D. Thesis, Fac. of Sci., Charles Univ., pp.52.
Zaher, M.A.; Mohamed, M.l. and Abdel-Halim, S.M. (1984). Incidence of mites associated with stored seeds and food products in Upper Egypt. 17th Int. Cong. Entomol. Hamburg. F. R. G. pp.460

ARABIC SUMMARY

بعض الأكاروسات متوسطة الثغور المرتبطة بالمواد الغذائية

محمد السيد جاد[١] ، عبدالستار محمد متولي [٢] , أحمد صابر بريم[١]
[1]- قسم علم الحيوان كلية العلوم- جامعة الازهر (بنين) (القاهرة).
٢- قسم الحيوان الزراعي والنيماتودا كلية الزراعة- جامعة الازهر(بنين) (القاهرة).

تهدف هذه الدراسة إلي تسجيل بعض الأكاروسات التي تصيب بعض أنواع المواد الغذائية وهي حبوب القمح, نخالة القمح, نخالة الدقيق , حبوب الذرة ,حبوب الشعير , حبوب الأرز , البازلاء , الخبز , الفول , أكل الحيوانات والشعير التي تم جمعها من محافظة الشرقية خلال عامي **٢٠١٨** , **٢٠١٩**. أظهرت النتائج إنتماء جميع أنواع الأكاروسات المجمعة إلي رتبة **Parasitiformes** .
حيث وجد أن هذه الرتبة تحتوي علي تحت رتبة واحدة وهي Gamasida والتي تشتمل علي سبعة عائلات وهي (**Ascidae Vogits Oudemans, Ameroseiidae Evans, Lealapidae Berlese, Macrochelidae Vitzithum, Uropodidae Kramer, Rhodacaridae Oudemans, Parasitidae Oudemans).**
وأظهرت النتائج أن عائلة **Ascidae Vogits Oudemans**تحتوي على **٥** أنواع , **٣** أجناس، بينما وجد أن عائلة Ameroseiidae **Evans**تحتوي على **٤** أنواع , **٢** جنس. بالإضافة إلي عائلة **Lealapidae Berlese** التي تحتوي علي **٨** انواع , **٥** أجناس, أيضا وجد أن عائلة **Macrochelidae Vitzithum** تحتوي **٧** أنواع, **٢** جنس.
بينما وجد أن كلا من عائلة **Uropodidae Kramer**و Rhodacaridae و Parasitidae **Oudemans** تحتوي علي نوع واحد لكل منها.