

Mites associated with stored products

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Abstract

This work was conducted to incidence the mites associated with stored products during the two successive years (2013 and 2014). Fifty two mite species from fifteen different stored product; wheat, rice, bean, maize, garlic, hay, onion, corn, pea, bread bean, animal feed, seeds, flour, grain barley and faba bean were collected from two governorates Gharbia and Cairo. The collected mites belonging to 2 orders, 4 suborders and 23 families. Suborder Gamasida included 16 species of 7 families; suborder Actinedida included 16 species of 9 families ;suborder Acaridida included 19 species of 6 families; suborder Oribatida included 1 species of 1 family.

Key words: Incidence, Mites, stored products

Introduction

Stored product mites play an important role in human life. In many cases they caused serious economic loss or health problems. Mites inhabited mainly the stored food, plant material and debris. In stored plant grain and oilseeds the mites' infestations were studied intensively. Among the next commodities well documented are the mite infestation in cereal based food, dried fruits, root crops and ornamentals, and chesses (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 three pest risks are suggested; (i) 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 medius, initiating growth and spread mould, (Sinha and Wallace, 1977; Taha, 1985; Gulati and Mathur, 1995); (ii) interaction to microorganisms leading to the transfer of mycotoxins production fungi or pathogenic bacteria; (iii) production of hazardous compounds among them the allergens are of the highest importance.

Materials and Methods

The sampling procedure

The present investigation tended to record the different mite species associated with the different stored products bring from different districts at Gharbia and Cairo governorates. 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 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 40watt electric lamps. The mites were collected into petri- dishes with aring of Vaseline mixed with citronella oil to prevent mite escape (Metwally, 1976). Active mite individuals were transferred by 0.3 mm camel hair brush and examined using stereomicroscope.

Isolated speciemens were placed in **Nesbitt 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)** Individual mite was pressed carefully to the botton of the droplet and arranged using a cleep pair of forceps, a cover slip was picked up at its edge, applied the opposite edge to the edge of the Hoyer's droplet to allow the cover slip to fall into its place, then, mounted slide was placed on hot plate at 40 -50 °c for 2-4 days (Krantz, 1978; EL- Sanady, 2005).

Identification, the specimens were identified and kept on the mite collection of Agric, Zoology, Nematology Department Faculty of Agric. AL– Azher University. Identification was carried out according, **Griffiths, (1960); Lindquist and Evans, (1965); Hughes, (1961-1976); 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 (2013 and 2014). The collected mites belonging to both orders: Parasitiformes and Acariformes.

Order Parasitiformes

Obtained results are presented in Table (1). This order was represented by suborder Gamasida which included seven families: Ascidae, Ameroseiidae, Rhodacaridae, Digamaseiidae, Ologamasidae, Macrochelidae, and Parasitidae. These families have sixteen species belong to nine genus.

Family Ascidae

Many investigators recorded some species belonging to family ascidae associated with pests infesting stored products (Hughes, 1976; Taha, 1985). This family was represented by eight species; the first three species belong to genus *Proctolaelaps*. The first species was *Proctolaelaps pygmaus*, which was isolated from wheat and maize collected from Nawag and Sammanoud by rare numbers. Also, *Proctolaelaps bickley*, was isolated from garlic and bread bean collected from Nawag and Sammanoud by rare numbers. The third species was *Proctolaelaps cossi*, which was isolated from animal feed and seeds collected from Nawag and Kafr El-Hema by rare numbers.

The second three species belong to genus *Lasioseius* *Lasioseius africanus*, was isolated from wheat, floor and rice collected from Nasr City and Nawag by intermediate numbers. *Lasioseius sewai*, was isolated from onion, corn and pea collected from Nawag and Sammanoud by rare numbers. *Lasioseius aegypticus* was isolated from wheat and grain collected from Nawag and Nasr City by few numbers. The last two species belong to genus *Blattisocius* the first species was *Blattisocius keegani*, was isolated from barley and faba bean collected from Nawag, Sammanoud and Nasr City by few numbers. The second one *Blattisocius tarsalis*, was isolated from barley, grain and seeds collected from Nawag and Kafr El-Hema by few numbers. All Ascidae mite species were recorded through the year.

Family Ameroseiidae

This family was represented by two species *Klemania kossi*, which was isolated from corn, onion and garlic collected from Nawag and Sammanoud by rare numbers. Also, *Klemania plumosus*, was isolated from onion, maize and bread bean collected from Nawag and Sammanoud by few numbers during the two successive years.

Family Rhodacaridae

This family was represented by one species *Rhodacarus tabeeni*, which was isolated from onion, rice and bean collected from Nasr City and Nawag by rare numbers during the two successive years.

Family Digamaseiidae

This family was represented by two species *Dendrolaelaps aegypticus*, which was collected from rice, wheat and barley from Nasr City, Sammanoud and Kafr El-Hema by rare numbers during the

summer season 2014. *Dendrolaelaps rasmii*, which was isolated from animal feed and collected from Nasr City and Nawag by rare numbers.

Family Ologamasidae

This family was represented by one species *Gamasiphis pulchellus*, which was isolated from pea, rice and faba bean collected from Sammanoud and Nawag only by a few number during summer season 2014.

Family Macrochelidae

The family Macrochelidae was represented by one species *Macrocheles scutatus*, which was inhabiting animal feed collected from Nawag and Kafr El-Hema by few numbers during the summer season 2014.

Family Parasitidae

This family included one species *Parasitus consoginues*, which isolated from animal feed and maize collected from Nawag by a few number during the whole year of 2014.

Order Acariformes

Obtained results are presented in Table (2 and 3). This order was represented by three suborder Actinidida, Acaridida and Oribatida.

A – Suborder Actinidida which included sixteen species, fourteen genus of nine families Pyemotidae, Acarophenacidae, Pygmophoridae, Scutacaridae, Bdellidae, Cunaxidae, Tarsonemidae, Cheyletidae and Stigmaeidae as show in (table 3).

B-Suborder Acaridida which included nineteen species, eleven genus of six families Acaridae, Suidasidae, Carpoglyphidae, Glycyphagidae, Labidophoridae and Chortoglyphidae as show in (table 2).

C - Suborder Oribatida which included one species of one family Oppiidae as show in (table 3).

A – Suborder Actinidida

Obtained results are presented in Table (3).

Family Pyemotidae

This family was represented one species *Pyemotis herfisi*, which was isolated from grain and faba bean collected from Nawag and Kafr El-Hema by dominant numbers during all the period of the study.

Family Acarophenacidae

This family was included one species *Acarophenax* sp., which was isolated from rice, wheat and bean collected from Sammanoud by rare numbers during the whole year of 2014.

Family Pygmophoridae

This family was included one species *Pediculaster* sp., which was isolated from onion and

hay collected from Nawag and Sammanoud by rare numbers during summer seasons.

Family Scutacaridae

This family included one species *Scutacarus* sp., which was isolated from animal feed collected from Nasr City by rare numbers during the both summer seasons.

Family Bdellidae

The family Bdellidae was represented by one species *Spinibdella bitoreata*, which was isolated from animal feed and rice collected from Nawag by rare numbers during the whole year of 2014.

Family Cunaxidae

This family included one species *Cunaxa* sp., which was isolated from animal feed collected from Nasr City and Kafr El-Hema by a few numbers during the whole year of 2014.

Family Tarsonemidae

The tarsonemid mites have been reported by several investigators, from Egypt (Taha, 1985), in England (Hughes, 1976), Canada (Sinha and Wallace, 1966). This family included one species *Tarsonemus* sp., which was isolated from grain, faba bean and pea collected from Nawag and Kafr El-Hema by intermediate numbers during the whole year of 2014.

Family Cheyletidae

Work on the cheyletid mites has also been done by other workers in Egypt. El-Badry *et al.* (1980) reported that the extensive distribution of the cheyletid mites have been seen not only in Egypt but also abroad.

Hughes, 1976 mentioned that the cheyletid mites are generally found associated with acarid mites in granaries, warehouses, beans and also in the leaf-litter, and top soil inhabited by different kinds of micro arthropods. This family was represented by six species as

- *Cheyletus malaccensis* was isolated from flour, rice and grain collected from Nasr City and Sammanoud by intermediate numbers during the whole year of 2014.
- *Cheyletus fortis* was isolated from grain and animal feed collected from Nasr City and Nawag by rare numbers during the whole year of 2014.
- *Cheyletus eruditus* was isolated from maize, flour and wheat collected from Sammanoud and Kafr El-Hema by few numbers all the period of the study.
- *Hemichetus bakeri* was isolated from onion and wheat collected from Nawag by few numbers during all the period of the study.
- *Chletomorpha* sp. was isolated from animal feed and flour collected from Nasr City by

intermediate numbers during all the period of the study.

- *Ker bakeri* was isolated from rice and faba bean collected from Nawag and Sammanoud by few numbers during the whole year of 2014.

Family Stigmaeidae

This family included three species, *Stigmaeus africanus*, was isolated from rice and wheat collected from Nasr City and Sammanoud by few numbers during the whole year of 2014. *Agistimus exertus*, was isolated from barley and garlic collected from Nawag and Nasr City by rare numbers during all the period of the study. *Stigmus zaheri*, was isolated from garlic and onion collected from Sammanoud by rare numbers during the whole year of 2014.

B - Suborder Acaridida

Obtained results are presented in Table (2).

Family Acaridae

The family was represented by 9 species, *Tyrophagus putrescentiae*, it is noticeable that this mite species happens to be the commonest species of storage acari found in only 4 different sources, onion, barley, flour and rice collected from Sammanoud and Kafr El-Hema by dominant numbers during the period of study. In addition, it has been found in different sources outside Egypt Hughes, (1976) and Maurya and Jamil, (1982). *Tyrophagus palmarum*, was isolated by few numbers from three sources wheat, hay and rice, collected from Nasr City and Sammanoud during the two years (2013 and 2014). *Tyrophagus longior*, was isolated by intermediate numbers from wheat and flour collected from Sammanoud and Nawag during the summer seasons. *Acarus siro*, was isolated by few numbers from rice, barley and faba bean, collected from Nasr City through the two years. *Acarus farriers*, is a field species but it was isolated by few numbers from flour and grain, collected from Sammanoud during all the period of study. *Caloglyphus rizoglyphoides*, was isolated from animal feed collected from Nasr City and Nawag by intermediate numbers during the summer and autumn seasons. *Caloglyphus berlesi*, was isolated by intermediate numbers from three sources wheat, grain and flour collected from Nawag and Sammanoud during all the period of the study.

Incidence of the mite species has also been reported by Hughes, (1976) and Sinha *et al.* (1979). *Caloglyphus mycophagous*, was isolated by intermediate numbers from wheat and grain, collected from Nawag and Sammanoud during all the period of the study. *Rhizoglyphus robini*, was isolated by intermediate numbers from onion and garlic, collected from Sammanoud during all the period of the study. Incidence of acarid mites had, been examined by many authors Hughes, (1976);

Thind and Clark, (2001); Mohamed, (2003) and Abdel-Khalik, (2013).

Family Suidasidae

This family was represented by two species *Suidasia nesbitti*, which was isolated from flour, wheat and pea, collected from Sammanoud and Nawag by rare numbers during the period of the study. Also, *Suidasia* sp., which isolated from flour and maize, collected from Nawag and Kafr El-Hema by rare numbers during the summer season.

Family Carpoglyphidae

This family was represented by one species *Carpoglyphus* sp., which was isolated from animal feed, collected from Nasr City by few numbers during all the study period.

Family Glycyphagidae

Glycyphagid mites has been also studied by **Criffiths, (1960); Sinha and Wallace, (1966); Hughes, (1976); Attiah, (1969) and Taha, (1985).** This family was represented by four species; *Ctenoglyphus hughesi*, which was isolated from flour and onion, collected from Nawag by a few numbers during the period of the study. *Glycyphagus ornatus*, was isolated from garlic and wheat, collected from Sammanoud and Nawag by rare numbers. *Glycyphagus domesticus*, was isolated from onion, flour and rice, collected from Nasr City and Sammanoud by a few numbers during the period of the study. *Glycyphagus aegyptiacus*, was isolated from flour, maize and faba bean, collected from

Sammanoud and Nawag by rare numbers during the summer season.

Family Labidophoridae

This family was represented two species *Gohieria fusca*, was isolated from maize and wheat, collected from Nawag by rare numbers during the summer season. *Lebidoglyphus destructor*, was isolated from garlic and onion, collected from Sammanoud and Nawag by few numbers during the summer season.

Family Chortoglyphidae

This family included one species *Chortoglyphus* sp., which was isolated from animal feed, collected from Nasr City and Nawag by a few numbers during the summer season only.

C - Suborder Oribatida

Obtained results are presented in Table (3).

Family Oppiidae

This family was included one species *Oppia* sp., which was isolated from animal feed, collected from Nasr City and Sammanoud by a few numbers during the summer season. The studies on the incidence of storage mites have been reported by El- **Sanady, (2005)** and **Abou- El Enien, (2011)** in Egypt who recorded different mite species in different varieties of stored products.

Table 1. Incidence of Order Parasitiformes, Suborder Gamasida mite species in Gharbia and Cairo Governorates for two years (2013 and 2014)

Order : - Parasitiformes Suborder : - Gamasida				
Family	Species	Habitat	Abundance	Locality
Ascidae Vogits and Oudemans	<i>Proctolaelaps pygmaeus</i> (Muller)	wheat –maize	+	Nawag _ Sammanoud
	<i>Proctolaelaps bickleyi</i> (Lindquist and Hunter)	garlic – breadbean	+	Nawag – Sammanoud
	<i>Proctolaelaps cossi</i> (Evans)	animal feed – seeds	+	Nawag- Kafr El-Hema
	<i>Lasioseius africanus</i> Nasr	wheat –flour – rice	+++	Nasr City – Nawag
	<i>Lasioseius sewai</i> Nasr and Abou Awad	onion – corn- pea	+	Nawag – Sammanoud
	<i>Lasioseius aegypticus</i> (Afifi)	wheat – grain	++	Nawag –Nasr City
	<i>Blattisocius keegani</i> Fox	barley- faba bean	++	Nawag –Sammanoud – Nasr City
Ameroseiidae Evans	<i>Klemania kossi</i> El - Badry and Nasr , Hafis	corn – onion – garlic	+	Nawag – Sammanoud
	<i>Klemania plumosus</i> (Oudemans)	onion – maize – bread bean	++	Nawag – Sammanoud
Rhodacaridae Oudemans	<i>Rhodacarus tabeeni</i>	onion – rice - bean	+	Nasr City – Nawag
Digamaseilidae Evans	<i>Dedroplaelaps aegypticus</i> (Metwally and Mersal)	rice – wheat – barley	+	Nasr city – Sammanoud - Kafr El-Hema
	<i>Dendrolaelaps rasmii</i>	animal feed	+	Nasr City – Nawag
Ologamasidae	<i>Gamasiphis pulchellus</i>	pea- rice –faba bean	++	Sammanoud- Nawag
Macrochelidae Vitzithum	<i>Macrocheles scutatus</i> (Berlese)	animal feed	++	Nawag- Kafr El-Hema
Parasitidae Oudemans	<i>Parasitus consoginues</i> (Odu and Vogits)	animal feed – maize	++	Nawag

Table 2. Incidence of Order Acariformes, Suborder Acaridida mite species in Gharbia and Cairo Governorates for two years (2013 and 2014)

Order : - Acariformes		Suborder : - Acaridida		
Family	Species	Habitat	Abundance	Locality
Acaridae Ewing and Nesbitt	<i>Tyrophagus putrescentiae</i> (Schrank)	onion – barley – floor – rice	++++	Sammanoud- Kafr El-Hema
	<i>Tyrophagus palmarum</i> Oudemans	wheat – hay – rice	++	Nasr City – Sammanoud
	<i>Tyrophagous longior</i> (Gervais)	Wheat – flour	+++	Sammanoud – Nawag
	<i>Acarus siro</i> Linnaeus	rice- barley-faba bean	++	Nasr City
	<i>Acarus farris</i> (Oudemans)	flour – grain	++	Sammanoud
	<i>Caloglyphus rhizoglyphoides</i> (Zachvatkin)	animal feed	+++	Nasr City- Nawag
	<i>Caloglyphus berlesei</i> (Michael)	Wheat- grain- flour	+++	Nawag- Sammanoud
	<i>Caloglyphus mycophagus</i> (Megnin)	Wheat – grain	+++	Nawag- Sammanoud
	<i>Rizoglyphus Claparede</i> <i>robini</i>	onion – garlic	+++	Sammanoud
	Suidasidae <i>Attiah</i>	<i>Suidasia Hughes</i> <i>nesbitti</i>	flour – wheat – pea	+
<i>Suidasia</i> sp.		flour –maize	+	Nawag- Kafr El-Hema
Carpoglyphidae Oudemans	<i>Carpoglyphus</i> sp.	animal feed	++	Nasr City
Glycyphagidae Berlese	<i>Ctenoglyphus Attiah</i> <i>hughesi</i>	flour – onion	++	Nawag
	<i>Glycyphagus Kramer</i> <i>ornatus</i>	garlic – wheat	+	Sammanoud- Nawag
	<i>Glycyphagus domesticus</i> (De-Geer)	onion – flour – rice	++	Nasr City- Sammanoud
	<i>Glycyphagus aegyptiacus</i> Attiah	flour – maize - faba bean	+	Sammanoud- Nawag
Labidophoridae <i>oudemans</i>	<i>Lepidoglyphus destructor</i> (Schrank)	garlic – onion	++	Sammanoud- Nawag
	<i>Gohieria (Oudemans)</i> <i>fusca</i>	maize – wheat	+	Nawag
Chortoglyphidae Berlese	<i>Chortoglyphus</i> sp.	animal feed	++	Nasr City- Nawag

Table 3. Incidence of Order Acariformes, Suborder Actinidida mite species in Gharbia and Cairo Governorates for two years (2013 and 2014)

Order : -		Suborder : - Actinidida		Abundance	Locality
Family	Species	Habitat			
Pyemotidae <i>Oudemans</i>	<i>Pyemotis herfsi</i> (Oudemans)	grain- faba bean		++++	Nawag- Kafr El-Hema
Acarophenacidae <i>cross</i>	<i>Acarophenax</i> sp .	rice – wheat – bean		+	Sammanoud
Pygmophoridae <i>Grandjean</i>	<i>Pediculaster</i> sp .	onion – hay		+	Nawag- Sammanoud
Scutacaridae	<i>Scutacarus</i> sp.	animal feed		+	Nasr City
Bdellidae <i>Duges</i>	<i>Spinibdella bifurcate</i> Atyea	animal feed- rice		+	Nawag
Cunaxidae <i>Thor</i>	<i>Cunaxa</i> sp.	animal feed		++	Nasr City- Kafr El-Hema
Tarsonemidae	<i>Tarsonemus</i> sp.	grain – faba bean - pea		+++	Nawag- Kafr El-Hema
Cheyletidae Leach	<i>Cheyletus malaccensis</i> Oudemans	flour – rice – grain		+++	Nasr City- Sammanoud
	<i>Cheyletus fortis</i> Oudemans	grain – animal feed		+	Nasr City- Nawag
	<i>Cheyletus eruditus</i> (Schrank)	maize – flour – wheat		++	Sammanoud- Kafr El-Hema
	<i>Hemicheyletia bakeri</i> (Ehara)	onion – wheat		++	Nawag
	<i>Chletomorpha</i> sp.	animal feed – flour		+++	Nasr City
	<i>Ker bakeri</i> Zaher and Soliman	rice- faba bean		++	Nawag- Sammanoud
Stigmaeidae <i>Oudemans</i>	<i>Stigmaeus africanus</i> Soliman and Gomaa	rice – wheat		++	Nasr City- Sammanoud
	<i>Agistimus exsertus</i> Gonzalez	barley – garlic		+	Nawag- Nasr City
	<i>Stigmaus zaheri</i> Gomaa and Hassan	garlic – onion		+	Sammanoud
Order : - Acariformes		Suborder :- Oribatida		Abundance	Locality
Family	Species	Habitat			
Oppiidae	<i>Oppia</i> sp.	Animal feed		++	Nasr City- Sammanoud

Dominant ++++: The mite species number forming more than 10% of total population.

Intermediate +++ :The mite species number forming between 5-10 % of total population.

Few ++ : The mite species number forming between 2- 5 % of total population.

Rare + :The mite species number forming less than % 2 of total population.

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الأكاروسات المرتبطة بالمنتجات المخزونة

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^٢ قسم العلوم البيولوجية والبيئية كلية الإقتصاد المنزلى جامعة الأزهر طنطا

تهدف هذه الدراسة إلى تسجيل الأكاروسات التى تصيب بعض أنواع المواد الغذائية المخزونة وهى القمح والأرز والبقول والذرة والثوم والقش والبصل والفاصوليا وعلف الحيوانات والدقيق والشعير وفول الصويا التى تم جمعها من محافظتى الغربية والقاهرة خلال عامين ٢٠١٣ و ٢٠١٤ م وقد أظهرت النتائج انتماء الأكاروسات لرتبتين وهما Parasitiformes و Acariformes

أولاً رتبة **Parasitiformes** سجل منها فقط تحت رتبة Gamasida التى تشتمل على سبع عائلات (- Ologamasidae - Parasitidae - Macrochelidae - Ascidae - Ameroseiidae - Rhodacaridae - Digamaseilidae) وقد سجل من هذه العائلات ١٦ نوع، يتبعوا تسع أجناس. فعائلة ال Ascidae بها ثمانية أنواع، وعائلة ال Ameroseiidae بها نوعين، بينما عائلات Digamaseilidae و Ologamasidae و Rhodacaridae و Parasitidae و Macrochelidae بها نوع واحد، وعائلة ال Digamaseilidae بها نوعين.

ثانياً رتبة **Acariformes** سجل منها ثلاث تحت رتب وهم Acaridida و Actinidida و Oribatida.

تحت رتبة Actinidida سجل منها تسع عائلات هم (Cheyletidae Pyemotidae - Acarophenacidae - Bdellidae - Pygmophoridae - Cunaxidae - Tarsonemidae - Stigmaeidae - Scutacaridae) وسجل من هذه العائلات ستة عشر نوع وأربعة عشر جنس.

أما تحت رتبة ال Acaridida فقد سجل منها ستة عائلات (Carpglyphidae - Suidasidae - Acaridae - Chortoglyphidae - Labidophoridae - Glycyphagidae) وقد سجل من هذه العائلات تسعة عشر نوع وإحدى عشر جنس. بينما تحت رتبة Oribatida سجل منها عائلة واحدة Opiidae يتبعها نوع واحد.