



## Occurrence of mites associated with stored products in some localities in Egypt

Aisha, Anas El Mosalami; Abdel-Sattar, Mohammed Metwally; Awad, Ali Abdallah and Mohamed, Abdel-Hady

*Department of Zoology and Nematology, Faculty of Agriculture, Al-Azhar University, Cairo, Egypt.*

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#### Abstract:

This study proves the occurrence of 45 different mite species belonging to 30 genera under 15 families. These mites are belonging to 3 suborders Acaridida (Astigmata), Actinedida (Prostigmata) and Gamasida (Mesostigmata). The 45 mite species were collected from 8 different stored product sources: Potato, oats, barley, garlic, corn, onion, wheat bran and flour, which were collected from 10 regions at 2 governorates, during the two successive years 2019 and 2020. The astigmatid mites in this study were represented by 6 families and 20 different species. On the other hand, the number of mite species in suborder Prostigmata was 11 species belonging to 4 families. The obtained data indicated that the mesostigmatid was represented by 14 different species in 5 different families.

### Introduction

Large numbers of mites are known to occur associated with stored products throughout the world. They attack damaged and undamaged grains devouring the embryos and other surrounding tissues. This prevents grain germination and reduces its nutritive value. They also feed on fungi and other micro-organisms. Contamination by alive and dead mite different stages as well as exuviae and faeces results in being harmful for human consumption (Hughes, 1976). Stored products mites are found in different product stores and sometimes, in high concentration. Mites flourish in warm and damp environments where they feed on protein rich substances such as grain, fungi and other micro-organisms.

Mites cause significant grain weight losses and a decrease of

germinability. Their activities cause heating of grain mass and moisture translocation, which permits the development of molds and germination of the grain, contamination by alive and dead mites, different stages as well as exuviae and faeces resulting in being harmful for human consumption (Hughes, 1976). Mites are vectors of toxicogenic fungi. Which contribute to the contamination of food and feed with mycotoxins.

Also, the mites influence the weight and quality of stored products, the effect depends on their density and the length of infestation. If it was evaluated separately the effect can be neglected because the losses caused by mite contamination are quite higher and infested commodities are unsuitable for consumption due to contamination by hazardous compounds. The mites

change the quality of infested food by the production of secrets and faeces. The massive infestation of mites changes the smell of stored products. The stored-product mites cause hypersensitivity not only for stored grain and farm workers, millers and bakers, but they also seriously endanger the health of the city population (Musken *et al.*, 2003). Studies on mites inhabiting stored products were reported previously by Wafa *et al.* (1966), Attiah (1969), Hughes (1976), Taha (1985), Zaher *et al.* (1986) and recently, by Hoda *et al.* (1990), Fawzy (1996), Halawa (2003), El-Sanady (2005), Yassin *et al.* (2018) and Halawa *et al.* (2021).

So, the present work investigates the occurrence of mites associated with stored products in two governorates in Egypt.

## **Materials and methods**

### **1. Mites collection:**

General occurrence from 10 regions at 2 Egyptian governorates was undertaken for two successive years 2019 and 2020. The studied governorates were: El-Menofia (Shubra Qabala, Kafr El Salameh, Quesna, Ashlim and Shimandil districts) and El Giza (Abou Rawash, Sheikh Zayed, 6th of October, Bolak Al-Dakroun and Imbaba districts). Samples of 8 different stored product sources: Potato, oats, barley, garlic, corn, onion, wheat bran and flour were collected monthly from some groceries and houses.

Samples about 1kg. each, of the previous materials, was picked and singly kept in tightly closed polyethylene bags. A label including all necessary information concerning habitat, locality and date of the collection was attached to each bag and then, transferred to the laboratory.

### **2. Mounting, preservation and identifications:**

A sample of 250 gm of 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 the airing of Vaseline mixed with citronella oil to prevent mite escape (Metwally, 1976). Active mite individuals were transferred by a camel hair brush and examined using a stereomicroscope. Isolated specimens were placed in Nesbitt as a clearing solution (40 gm chloral hydrate, 25 ml distilled water and 2.5 ml concentrated hydrochloric acid) for 24 hours (Krantz and Walter, 2009). After that, mites were mounted singly by placing in a drop of Hoyer's medium which was prepared as follows: distilled water (50 ml), chloral hydrate (50 gm), glycerin (20 ml), and Arabic gum (30 gm) (Hughes, 1976 and Krantz and Walter, 2009).

### **3. Mite identification:**

Identification was carried out according to, Hughes (1976), Summers and Price (1970), Zaher *et al.* (1984), and Krantz and Walter (2009). Mite specimens were kept in the mite collection of Agric., Zoology and Nematology Department Faculty of Agric., Al-Azhar University.

## **Results and discussion**

The collected data proves the occurrence of 45 mite species inhabiting different stored product sources: Potato, oats, barley, garlic, corn, onion, wheat bran, and flour which were collected from 10 regions at 2 Governorates, during the two successive years in 2019 and 2020. They feed on stored materials, fungus, or being predators or parasites and the latter may be of great benefit in the biological control of associated insect and acarine pests. Data in Table (1) shows the occurrence of 20 astigmatid mite species belonging to 6 families, while prostigmatid mites are represented by 11 mite species belonging to 4 families, in addition to

14 mite species of mesostigmatid mites belonging to 5 families.

**1. Suborder: Astigmatida (Canestrini)**

**1.1. Family: Acaridae**

As shown in Table (1) the family Acaridae included two mite species:

**1.1.1.** *Acars siro* L. was collected from flour, corn, oats and wheat bran in four districts.

**1.1.2.** *Acars farries* Oud. which was collected from oats, barley, and wheat bran in three districts.

**1.2. Family: Tyroglyphidae**

The family Tyroglyphidae as shown in Table (1) was represented by 12 mite species:

**1.2.1.** *Tyrophagus putrescentiae* (Schrank) was found in 3 different sources onion, potato and garlic in three districts.

**1.2.2.** *Tyrophagus tropicus* Robertson which was extracted from corn, barley and oats in 3 districts.

**1.2.3.** *Tyrophagus similis* Volgin was associated with three different stored materials corn, barley, and oats in three districts.

**1.2.4.** *Tyrophagus longior* (Gervais) was infested with flour, wheat bran, and barley at Shubra Qabala, Kafr El Salameh, and Abou Rawash.

**1.2.5.** *Tyrophagus* sp. was collected inhabiting garlic and potato at Shimandil and Bolak Al-Dakrou.

**1.2.6.** *Tyroliticus casei* Oud was collected from onion, potato and garlic in 3 districts.

**1.2.7.** *Tyroborus lini* Oud was found in three different sources flour, potato and garlic in three districts.

**1.2.8.** *Aleuroglyphus ovatus* (Troupeau) was extracted from wheat bran, oats and barley in three districts.

**1.2.9.** *Caloglyphus berlese* (Michael) was associated with two different stored materials onion and potato in two districts.

**1.2.10.** *Caloglyphus mycophagus* (Megnin) was infested with corn, wheat bran, and barley in three districts.

**1.2.11.** *Mycetoglyphus fungivorus* Oud. was collected inhabiting garlic, potato, and flour in three districts.

**1.2.12.** *Caloglyphus betae* Attiah was collected from barley, wheat bran, and oats in three districts.

**1.3. Family: Rhizoglyphidae**

Data in Table (1) shows the family Rhizoglyphidae is represented by only one species:

**1.3.1.** *Rhizoglyphus robini* Claparede was collected from oats and potato in two districts.

**1.4. Family: Chortoglyphidae**

The family Chortoglyphidae included one species:

**1.4.1.** *Chortoglyphus* sp. was collected from potato, flour and barley in two districts.

**1.5. Family: Carpoglyphidae**

The family Carpoglyphidae included one species:

**1.5.1.** *Carpoglyphus lactic* (Linne) was collected from garlic and onion in two districts.

**1.6. Family: Glycyphagidae**

As shown in Table (1) the family Glycyphagidae included three mite species:

**1.6.1.** *Lepidoglyphus michaeli* Oud. was found in two different sources as wheat bran and barley at Kafr El Salameh and Abou Rawash.

**1.6.2.** *Lepidoglyphus destructor* (Schrank) was extracted from garlic and potato at Shimandil and Bolak Al-Dakrou.

**1.6.3.** *Austeroglyphus genicalas* (Vithum) was associated with three different stored materials onion, potato and garlic at Imbaba, Shimandil and Bolak Al-Dakrou.

**2. Suborder: Prostigmata (Kramer)**

**2.1. Family: Cheyletidae**

The family Cheyletidae as shown in Table (1) was represented by four mite species:

**2.1.1.** *Cheyletus eruditus* (Schrank) was extracted from corn at Ashlim district.

**2.1.2.** *Cheyletus malaccensis* Oud. was associated with three different stored materials garlic, barley and potato in three districts.

**2.1.3.** *Acaroopsis sollers* Rohdenorf which was infested with wheat bran and oats at Kafr El Salameh and Sheikh Zayed districts.

**2.1.4.** *Euchyeltia* sp. was collected inhabiting garlic and potato at Shimandil and Bolak Al-Dakroul districts.

## **2.2. Family: Pyemotidae**

As shown in Table (1) the family Pyemotidae included two mite species:

**2.2.1.** *Pyemotes herfsi* Oud. was collected from flour and barley at Shubra Qabala and Abou Rawash districts.

**2.2.2.** *Pyemotes tritici* Oud. was collected from flour and barley at Shubra Qabala and Abou Rawash districts.

## **2.3. Family: Tydeidae**

As shown in Table (1) the family Tydeidae included two mite species:

**2.3.1.** *Tydeus kaochi* Oud. was collected from wheat bran and oats at Kafr El Salameh and Sheikh Zayed districts.

**2.3.2.** *Pronematus* sp. was collected from corn and oats at Ashlim and 6th of October district.

## **2.4. Family: Stigmaeidae**

The family Stigmaeidae as shown in Table (1) was represented by three mite species:

**2.4.1.** *Agistimus exertus* Gonzalez was extracted from garlic and potato at Shimandil district.

**2.4.2.** *Agistimus vulgaris* Gonzalez was associated with two different stored materials flour and barley at Shubra Qabala and Abou Rawash districts.

**2.4.3.** *Stigmaeus africanus* (Meyer and Ryke) which was infested with onion at Imbaba district.

## **3. Suborder: Mesostigmata Canestrini**

### **3.1. Family: Ascidae**

The family Ascidae as shown in Table (1) was represented by four mite species:

**3.1.1.** *Proctolealaps orientalis* (Muller) which was extracted from corn at Ashlim district.

**3.1.2.** *Proctolealaps aegyptiaca* Oud. was infested with flour and oats at Shubra Qabala and Sheikh districts.

**3.1.3.** *Proctolealaps pgymeus* (Muller) which was infested with wheat bran and oats at Kafr El Salameh and 6th of October districts.

**3.1.4.** *Dendrolaelaps rasmii* Nasr and Mersal was collected inhabiting barley and oats at Abou Rawash and 6th of October districts.

### **3.2. Family: Rhodacaridae**

The family Rhodacaridae as shown in Table (1) was represented by four mite species:

**3.2.1.** *Rhodacarillus* sp. was extracted from corn and barley at Ashlim and Abou Rawash districts.

**3.2.2.** *Lasiosius lindquisti* Nawar and Nasr was infested with garlic at Shimandil district.

**3.2.3.** *Blattisocius keageni* (Fox) was infested with onion and potato at Quesna and Bolak Al-Dakroul districts.

**3.2.4.** *Blattisocius tarsalis* (Berlese) was collected inhabiting wheat bran and barley at Kafr El Salameh and Abou Rawash districts.

### **3.3. Family: Laelapidae**

The family Laelapidae as shown in Table (1) was represented by four mite species:

**3.3.1.** *Hypoaspis* sp. was extracted from garlic at Shimandil district.

**3.3.2.** *Csmolaelaps keni* (Berlese) was associated with two different stored materials corn and oats at Ashlim and Sheikh Zayed districts.

**3.3.3.** *Androlaelaps zaheri* Hafez, El-Badry and Nasr was infested with wheat

bran and potato at Kafr El Salameh and Bolak Al-Dakrour districts.

**3.3.4.** *Ololaelaps* sp. was collected inhabiting flour and barley at Shubra Qabala and Abou Rawash districts.

**3.4. Family: Uropodidae**

Data in Table (1) show the family Uropodidae is represented by only one species:

**3.4.1.** *Uropoilla marginata* (Koch) was collected from garlic and oats in two districts.

**3.5. Family: Parasitidae**

The family Parasitidae included one species:

**3.5.1.** *Parasitus consanguineous* Oud. and Voigts was collected from garlic and onion in two districts.

Survey research associated with stored product mites was done by many authors; Hughes (1961), Zaher (1986) and Taha (1985) for prostigmatid mites and for acarid mites. Also, Attiah (1969) studied the tyroglyphid mites, while El-Naggar *et al.* (1992); El-Sayed and Ghallab (2007) and Yassin *et al.* (2018) and Halawa *et al.* (2021) recorded several mite species associated with stored products. In their study, Zaher *et al.* (1986) noticed that members of the families Cheyletidae and Acaridae were the most common mites, found in many stored seeds and food products in Upper Egypt.

**Table (1): Occurrence of the mites associated with stored products in some localities in Egypt.**

Family	Species	Host	Locality
<b>Suborder: Astigmata (Canestrini)</b>			
<b>Acaridae</b>	1. <i>Acars siro</i> L.	Flour - Corn – Oats - Wheat bran	Shubra Qabala, Kafr El Salameh, Ashlim, Sheikh Zayed.
	2. <i>Acars farries</i> Oud.	Oats – Barley - Wheat bran	Kafr El Salameh, Abou Rawash, Sheikh Zayed.
<b>Tyroglyphidae</b>	1. <i>Tyrophagus putrescentiae</i> (Schrank)	Onion – Potato – Garlic	Quesna, Shimandil, Bolak Al-Dakrour.
	2. <i>Tyrophagus tropicus</i> Robertson	Corn – Barley – Oats	Ashlim, Abou Rawash,. Sheikh Zayed.
	3. <i>Tyrophagus similis</i> Volgin	Corn – Barley – Oats	Ashlim, Abou Rawash, 6th of October.
	4. <i>Tyrophagus longior</i> (Gervais)	Flour – Wheat Bran- barley	Shubra Qabala, Kafr El Salameh, Abou Rawash.
	5. <i>Tyrophagus</i> sp	Garlic – Potato	Shimandil, Bolak Al-Dakrour.
	6. <i>Tyroliticus casei</i> Oud.	Onion – Potato – Garlic	Imbaba, Shimandil, Bolak Al-Dakrour.
	7. <i>Tyroborus lini</i> Oud.	Flour – Potato- Garlic	Shubra Qabala, Shimandil, Bolak Al-Dakrour.
	8. <i>Aleuroglyphus ovatus</i> (Troupeau)	Wheat Bran– Oats – Barley	Kafr El Salameh, Abou Rawash, Sheikh Zayed.
	9. <i>Caloglyphus Berlese</i> (Michael)	Onion – Potato	Quesna, Bolak Al-Dakrour.
	10. <i>Caloglyphus mycophagus</i> (Megnin)	Corn – Wheat Bran- Barley	Kafr El Salameh, Ashlim, Abou Rawash.
	11. <i>Mycetoglyphus fungivorus</i> Oud.	Garlic – Potato – Flour	Shubra Qabala, Shimandil, Bolak Al-Dakrour.
	12. <i>Caloglyphus betae</i> Attiah	Barley – Wheat Bran- Oats	Kafr El Salameh, Abou Rawash, 6th of October.

Table (1): Continued

Family	Species	Host	Locality
Rhizoglyphidae	<i>Rhizoglyphus robini</i> Claparede	Oats – Potato	Sheikh Zayed, Bolak Al-Dakrou.
Chortoglyphidae	<i>Chortoglyphus</i> sp	Potato – Flour – Barley	Shubra Qabala, Abou Rawash, Bolak Al-Dakrou.
Carpoglyphidae	<i>Carpoglyphus lactic</i> (Linne)	Garlic – onion	Quesna, Shimandil.
Glycyphagidae	1. <i>Lepidoglyphus michaeli</i> Oud.	Wheat Bran- Barley	Kafr El Salameh, Abou Rawash.
	2. <i>Lepidoglyphus destructor</i> (Schrank)	Garlic – potato	Shimandil, Bolak Al-Dakrou.
	3. <i>Austeroglyphus genicalas</i> (Vithum)	Onion- potato – Garlic	Imbaba, Shimandil, Bolak Al-Dakrou.
<b>Suborder: Prostigmata (Kramer)</b>			
Cheyletidae	1. <i>Cheyletus eruditus</i> (Schrank)	Corn	Ashlim
	2. <i>Cheyletus malaccensis</i> Oud.	Garlic – Barley – potato	Shimandil, Abou Rawash Bolak Al-Dakrou
	3. <i>Acaroopsis sollers</i> Rohdenorf	Wheat Bran- Oats	Kafr El Salameh, Sheikh Zayed.
	4. <i>Euchyeletia</i> sp	Garlic – potato	Shimandil, Bolak Al-Dakrou
Pyemotidae	1. <i>Pyemotes herfsi</i> Oud.	Flour – Barley	Shubra Qabala. Abou Rawash
	2. <i>Pyemotes tritici</i> Oud.	Flour – Barley	Shubra Qabala, Abou Rawash
Tydeidae	1. <i>Tydeus Kochi</i> Oud.	Wheat Bran- Oats	Kafr El Salameh, Sheikh Zayed
	2. <i>Pronematus</i> sp	Corn – Oats	Ashlim, 6th of October
Stigmaeidae	1. <i>Agistimus exertus</i> Gonzalez	Garlic – potato	Shimandil, Bolak Al-Dakrou
	2. <i>Agistimus valgaris</i> Gonzalez	Flour – Barley	Shubra Qabala, Abou Rawash
	3. <i>Stigmaeus africanus</i> (Meyer & Ryke)	Onion	Imbaba
<b>Suborder: Mesostigmata Canestrini</b>			
Ascidae	1. <i>Proctolealaps orientalis</i> (Muller)	Corn	Ashlim
	2. <i>Proctolealaps aegyptiaca</i> Oud.	Flour – Oats	Shubra Qabala, Sheikh Zayed.
	3. <i>Proctolealaps pygmeus</i> (Muller)	Wheat Bran- Oats	Kafr El Salameh 6th of October
	4. <i>Dendrolaelaps rasmii</i> Nasr & Mersal	Barley – Oats	Abou Rawash 6th of October
Rhodacaridae	1. <i>Rhodacarllus</i> sp	Corn – Barley	Ashlim, Abou Rawash
	2. <i>Lasiosius lindquisti</i> Nawar and Nasr	Garlic	Shimandil
	3. <i>Blattisocius keageni</i> (Fox)	Onion – Potato	Quesna Bolak Al-Dakrou
	4. <i>Blattisocius tarsalis</i> (Berlese)	Wheat Bran- Barley	Kafr El Salameh Abou Rawash

Table (1): Continued

Family	Species	Host	Locality
Laelapidae	1. <i>Hypoaspis</i> sp	Garlic	Shimandil
	2. <i>Csmolaelaps keni</i> (Berlese)	Corn- Oats -	Ashlim, Sheikh Zayed
	3. <i>Androlaelaps zaheiri</i> Hafez, El-Badry and Nasr	Wheat Bran– potato	Kafr El Salameh Bolak Al-Dakrouer
	4. <i>Ololaelaps</i> sp	Flour – Barley	Shubra Qabala, Abou Rawash
Uropodidae	<i>Uropoilla marginata</i> (Koch)	Garlic – Oats	Shimandil, Sheikh Zayed
Parasitidae.	<i>Parasitus consanguineous</i> Oud. and Voigts	Onion – Garlic	Shimandil, Quesna

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