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ECOLOGICAL STUDIES ON PREDACEOUS AND PARASITIC MITES ASSOCIATED WITH SOME STORED PRODUCTS

Wedad A. Atwa[(1)], M. E. El-Naggar[(2)], A. M. Khalil[(2)], Manal E. El-Shaer[(1)] and Zeinab M.M. Mostafa[(2)]

[(1)] Department of Zoology Faculty of Science Al-Azhar University

[(2)] Plant Protection Research Institute, A.R.C., Dokki, Egypt

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ABSTRACT: ***The occurrence of mites associated with stored products was estimated at different regions of Giza governorate, Egypt (6th October City, Osim, Al-aiat, Faisal, Dahshour and El-Baragil). The seven localities were chosen to conduct this study along three years (2016-2018). Seventy-nine mite species belonging to 44 genera, 22 families and 4 suborders were collected from examined stored products e.g. (chocolate, dried molokhia, wheat flour, maize, bean, rice, date palm fruits, hulling rice, wheat grain, dried fig, turkey cheese, wheat flour, dried milk, peanut). The obtained results indicated that Acarus farrie, Dermatophagoides pteronyssinus, and Blomia freemani were the dominant astimatidmites in all examined store products. Whereas, Cheletogenes ornatus, Blattisecius keegani and Hypoaspis oseii were the most common predatory mites. The highest population of astimatid mites was recorded in March and the lowest level was recorded during August on wheat grain. While . on dried fig the astigmatid mites reached the highest population during April, whereas, the lowest population was recorded during August, along the two successive years.***

Key words: ***Stored product, mites, grains, population, occurrence, Astigmata.***

INTRODUCTION

Mites inhabited mainly the stored food and plant materials. In stored plant grain and oilseeds mite infestations were studied intensively allover the world. Among the next commodities well documented are the mite infestation in cereal based food, dried fruits, root crops and ornamental plants, as well as chesses (Hughes, 1976). The study of mite populations in stores is important, due to that mites cause severe damage in these products (Solomon, 1946). Knowledge of the distribution of pests in storerooms is important from the point of view of their ecology as well as their control (Zdarkova *et al.,* 1983). Storage mites are mainly found in stored products such as dried eggs, ham, herring meal, cheese, and different kinds of nuts (Olsson and Hamsten, 2000). The mite infestation decrease food safety because mites are allergen products and transmit mycotoxin- producing fungi (Hubert *et al.,* 2003).

Damage by insects, mites fungi, and sprouting causes hundreds millions of dollars of economic losses to grain producers, merchandisers, and processors each year (Harein and Meronuck 1995). The mites cause direct and indirect damage to stored grains and their products by raising their moisture content, generation sufficient heat for the growth of infection bacteria and fungi. The acarid mite, *Tyrophagus putrescentia* (Schrank) can infest a wide range of food stuffs, plant and animal materiasl where environmental conditions are suitable, and is considered to be a cosmopolitan stored product pest of significant economic and sanitary importance. *Tyrophagus putrescentia* is most frequently found in stored food with a relatively high fat and protein content, such as wheat and Soy, flour, cheese, rye

bread, herring meal, bacon, dried milk and various seeds (Duek *et al.,* 2001). Many studies on the incidence of storage mites have been reported by El Nggar *et al*., (1992), Fawzy (1996), Mohamed (2003), El- Sanady, (2005), Mostafa *et al.,* (2006), Yassin *et al*., (2009), Abou-El Enien, (2011), Abdel-Khalik (2013) and El-Sayed (2017) in Egypt who recorded different mite species in different varieties of stored products.

This study was conducted to throw a light on the incidence, distribution and dynamics of mite populations in different stored products.

MATERIALS AND METHODS

In this study, different regions of Giza governorate (6th October City, Osim, Al-Aiat, Faisal, Dahshour and El-Baragil) were chosen to achievement this study.

Collection of mites and identification:

Samples of different stored products (wheat, biscuit, onion, cheese, dried milk, wheat grains, rice grain, bran, garlic bulbs, chocolate, cowpea, maize grains, soy bean, date palm fruits, barley, hulling rice, dry molokhia, cow pea, dried fig, peanut, lentil, and broken bean grains), were collected monthly during two consecutive years (2016/ 2018). The mites samples were brought to Acarology Research Laboratory in cotton and field crops Acarology Department, Plant protection Research Institute, Agricultural Research Center, for examination in the same collection day. Plastic bags were used to transfer samples to Laboratory, and were marked by a label denoting data. For extracting mites, samples of 250 gm were used and separated using the modified Tullgren funnels. Mites were received in Petri-dishes (6 cm. Diameter, high 1.5 cm). Half –filled with water and smearing its sides with a layer of Vaseline to prevent mites escaping. Extracted mites were cleared in Nesbitt's solution, then mounted in Hoyer's medium on glass slides. Specimens were identified and classified into their taxonomical rank by using different specific keys (Griffiths, 1960; Hughes, 1976; Lindquist and Evans, 1965; Summer and Price, 1970; Karg, 1971; Johnston, 1975; Zaher, 1984 and 1986; and Krantz and Walter, 2009).

Population dynamics study:

During the study season from (2016 to 2018) the wheat grains and Dried fig fruits had chosen to estimate the infestation of the different mites to these hosts at Dahshour region, Giza governorate, it was found that the commonest collected mites were belonging to suborder Acaridida, Actinedida and Gamasida. The population dynamics of these mites in relation to abiotic factors and biotic factors was calculated.

Statistical analysis:

Data were analyzed by correlation coefficient between the mite population and weather factors using SAS statistical software (SAS Institute, 2010).

RESULTS AND DISCUSSION

A. Ecological study:

A.1. Survey study:

A large number of mites are known to infest different varieties of stored products throughout the world. The current study was carried out during the period of 2016- 2018 in different locations to record the mites associated with different stored products at El-Giza governorate. These regions were 6th October city, Osim, Faisal, Dahshour, El-Baragil and Al-Aiat. This work as shown in Table (1) proves the occurrence of (79) mite species belonging to (45) genera under (22) families. These families are belonging to 4 suborders: Acaridida (Astigmata), Actinedida (Prostigmata) and Gamasida (Mesostigmata) and Oribatidae (Cryptostigmata) collected

from different stored products e.g. (chocolate, dried molokhia, wheat flour, maize, bean, rice, date palm fruits, hulling rice, wheat grain, dried fig, turkey cheese, wheat flour, dried milk, peanut. etc). Table (1) also shows the collected mites abundant with their habitat locations.

A.1.1. Suborder: Acaridida (Astigmata). Canestrini 1891:

The most common abundant families was Acaridida the commonest species was *Dermatophagoides pteronyssinus* (Trouessart). The Acaridida is a large assemblage of primarily terrestrial mites which with few exceptions are non predatory in habit. Many species are exclusively Saprophytic, fungivorous or graminivorous and several groups are exclusively parasitic. Most Acaridida are slow –moving, weakly or incompletely sclerotized mites which range in size from 200 to 1800 um Krantz and Walter (2009). In this study, as shown in Table (1), the collected astigmatid mite species which collected from different stored products materials were 34 different species in 19 genera and 7 families. The families and genera were (Acaridae), *Caloglyphus rhizoglyphoids, C. stammeri, C. berlesei, Rhizoglyphoids robini, R. echinopus* (Banks) *Acarus siro, A. farrie, A. gracilis, A.immobilis. Aleuroglyphus ovatus, Lardoglyphus zacheri, Tyrophagus tropicus, T. longior, T. putrescentia, Tyrolichas casie* and *Thyreophagus entomophgus* and 8 species belonging to family Glycyphagidae, *Lepidoglyphus michaeli, L. destructor, Glycyphagus ornatus, G. bycaudatus, G. domesticus, Austrogly cyphagus, Blomia feeemani and Gohieria fusca.* The mites of the family Pyroglyphidae in this study were *Dermatophagoides farinae, D.pteronyssinus, D.microceras, Euroglyphus maynei, Ctenacarus araneola* (Grandjean) *Pyroglyphus africanus* and *Gymnoglyphus carmlitus.* On the other hand, there were 2 speceis belonging to family Carpoglyphidae; *Carpoglyphus lactis* and *C. munroi* and 2 speceis belonging to family Suidasidae; *Suidasia nesbitti* and *Suidasia medanensis.*

A.1.2. Suborder: Actinedida (Prostigmata) :

The Prostigmata is a suborder of mites belonging to the Trombidiformes, which contain the sucking members of the true mites (Acariformes). Some of the prostigmata parasitizing vertebrates are of medical relevance due to causing skin diseases in human, many of them live associated with stored products and food stuffs and others live in soil. In the current study, Table (1) showed the presence of 22 different prostigmatid mites associated with different stored products materials in 13 genera in 7 families: Cunaxsidae: *Cunaxa capreolus* (Berlese), *Conaxa woners leyi* (Baker and Haffmann), *Neocunaxoi desandrei* (Baker&hoff.); Cheyletidae: *Acaroesis sollers, Cheyletus badryi, Cheletogenes ornatus* (C.&F.) *C.* linsdalei (Baker), *C. malaccensis, C. davisi, C. troussart* (Oud.) *C.bologhi, C. eruditus, C. vorax, Acaropsellina docta*; Caligonellidae: *Molothrognthus minutes*; Bdellidae: *Spinibdella corticic* (Ewing), *Cyta latirostris* (Hermann); Tydeidae: *Orthotydeas californicus* (Banks), *Lorryia ferula (*Baker); Smarididae: *Trichomaris jacoti* (Southcott); Raphignathoidea: *Raphignathus ehari* (Zaher&Gomaa), *Raphignathus niloticus* (Gomaa& Hass) and family Stigmaeidae: *Apostigmaeus aegypticus* (Soliman& Gomaa).

A.1.3. Suborder: Gamasida (Mesostigmata):

The present study, Table (1) indicated that there are 21 different mesostigmatid mites belonging to 11 genera and 6 families as follows: Family Ascidae:

Table (1): Occurrence of different collected stored product mites at Giza Governorate during 2016-2018

Family	Scientific name	Abundance	Host (s)	Locality
Sub order: Astigmata				
Acaridae	*Caloglyphus rhizoglyphoids* (Zach)	++	Rice grain, garlic, Dried fig	El-aiat, Osim, Faisal
	Caloglyphus berlesei (Michael)	+	Rice grain, Broad bean	6th October city, EL- Baragil
	Caloglyphus stammeri (Bursa)	++	Onion, Wheat grains, Bread	Osim, Faisal , Dahshour
	Aleuroglyphus ovatus (Troupeau)	+	Spices , nuts, Biscuit, Dried fig	El-aiat, El-Baragil
	Rhizoglyphus robini (Lapopede)	++	Wheat, Maize grains	6th October city, El-aiat
	Acarus siro (Hypopus)	+++	Dried milk, Spices, nuts	6th October city, El-aiat Dahshour, El-Baragil
	Acarus farrie (Oud.)	+++	Dried milk, Biscuit, dried fig	Dahshour , El-Baragil
	Acarus gracilis (Hughes)	++	Hulling rice, garlic, Dried fig	6th October city, El-aiat
	Rhizoglyphus echinopus (Banks)	++	Bread, Wheat flour	El-aiat, Osim, Faisal
	Acarus immobilis. (Griffiths)	+++	Cowpea, broken bean, dried fig, wheat grains	Dahshour , El-Baragil
	Lardoglyphus zacheri (Oud.)	+	Barley & nuts	Osim, Faysal
	Tyrophagus tropicus (Robertson)	+++	Bean grain, Cowpea and dried fig	6th October city, Osim, Faisal, Dahshour, El-Baragil
	Tyrophagus longior (Gervais)	++	Wheat, Maize grains	El-aiat, Osiml
	Tyrophagus putrescentia (Schrank)	+++	Hulling rice	6th October city, El-aiat, Osim , El-Baragil
	Tyrolichas casie (Oud.)	+	Bean grain, bran	Osim, Faisal
	Thyreophagus entomophgus (L.)	+++	Biscuit, Rice grain and Barley, wheat grains	Osim, Faisal, Dahshour
Glycyphagidae	*Lepidoglyphus michaeli* (Oud)	++	Barley, Chocolate, Dried fig	6th October city, El-aiat
	Lepidoglyphus destructor (Schrank)	++	wheat grains, Barly, dried fig	6th October city, El-aiat, Dahshour, El-Baragil
	Glycyphagus ornatus (Kramer)	++	Cowpea, Hulling Rice	Osim, Faisal,
	Glycyphagus bicaudatus (Hughes)	+	Lentil, Dry molokhia	6th Oct. city, El-aiat, Osim

(+) = rare (less than 3 individuals/500 g sample), (++) = moderate (3-9 individ. / 500 g sample) (+++) = high (more than 9 individ. / 500 g sample)

Table (1): Cont.

Family	Scientific name	Abundance	Host (s)	Locality
	Glycyphagus domesticus (De.Gear)	++	Wheat flour, Peanut	Osim, Faisal, Dahshour
	Austrogly cyphagus (Vitzthum)	++	Wheat flour & Peanut, Lentil, Dry molokhia	6th October city, El-aiat, Faisal, Dahshour
	Blomia freemani (Hughes)	++	Roselle , Rice seeds, dried fig	Osim, Faisal, Dahshour
	Gohieria fusca (Oud.)	++	Dried fig	6th October city
Ctenoglyphidae	*Diamesoglyphus intermedius* (Garestrine)	+	Peanut , wheat grains	El-Baragil
	Ctenacarus araneola (Grandjean)	+	Cowpea, Dried fig	Faisal
Pyroglyphidae	*Dermatophagoides farina* (Hughes)	++	Macarony, Lentil	Dahshour, El-Baragil
	Dermatophagoides pteronyssinus (Trouessart)	+++	Onion, Turkish cheese, granular chicken feed,.etc.	El-aiat, Osim, Faisal, Dahshour, El-Baragil
	Dermatophagoides microceras (Griffiths)	++	Cowpea, wheat grains and Hulling Rice	Faisal, Dahshour
Chortoglyphidae	*Chortoglyphus arcuatus (troupeau)*	++	Cowpea and Hulling Rice	Osim, Faisal , El-Baragil
Carboglyphidae	*Charboglyphus lactis* (L.)	++	Onion, Turkish cheese, granular chicken feed,.etc.	Dahshour , El-Baragil
	Charboglyphus Munroi (Hughes)	+	Wheat grains, Peanut, Lentil, Dry molokhia	El-aiat, Osim, Faisal , Dahshour
Suidasidae	*Suidasia nesbitti* (Hughes)	++	Wheat , Maize grains, Dried fig	El-Baragil
	Suidasia medanensis (H.)	++	Spices , nuts, wheat grains	Dahshour, El-Baragil
Suborder: Prostigmata				
Cunaxidae	*Cunaxa capreolus* (berlese)	++	Wheat flour, Peanut, Lentil	Osim, El-Baragil
	Cunaxa woners leyi (Baker& Huffmann)	+	Nuts, Dried fig	6th October city
	Neocunaxoi desandrei (Baker& hoff.)	++	Biscuit, garlic, bran	El-Baragil &Osim
	Acaropsis sollers (Rohd.)	++	Onion, granular chicken feed	6th Oct. city& El-aiat

(+) = rare (less than 3 individuals/500 g sample), (++) = moderate (3-9 individ. / 500 g sample) (+++) = high (more than 9 individ. / 500 g sample)

Table (1): Cont.

Family	Scientific name	Abundance	Host (s)	Locality
Cheyletidae	*Cheyletus badryi* (Zaher & Hassan)	+++	Wheat flour, Peanut, Lentil, Dry molokhia	El-aiat, El-Baragil, Osim
	Cheyletus davisi (Baker)	++	Cowpea, Hulling Rice, bran	Dahshour, El-Baragil
	Cheyletus erioditus (Schrank)	+++	Onion, Turkish cheese, granular chicken feed,.etc.	6th Oct. city,Dahshour , El-Baragil
	Cheyletus malaccensis (Oud.)	+++	Wheat grains , Peanut, Lentil , Dried fig	El-Baragil &Osim
	Cheletogenes ornatus (C.&F.)	+++	Wheat grains , Peanut, Lentil , Dry molokhia	6th Oct. city,Dahshour, El-Baragil
	Cheyletus linsdalei (Baker)	+	Date palm fruit, soybean	Dahshour, Faisal
	Cheyletus baloghi (Volgin)	++	wheat grains , dried fig	El-Baragil
	Cheyletus troussart (Oud.)	++	Date palm fruit, soybean	El-aiat, Osim , Faisal
	Acaropsellina docta (Berlese)	++	wheat grains , dried fig	Dahshour , Faisal
	Cheyletus vorax (Oud.)	++	Lentil, roselle	6th October city
Caligonellidae	*Molothrognathus minutes* Soliman, 1971	++	Biscuit, garlic, anise	El-aiat , Osim
Bdellidae	*Spinibdella corticic* (Ewing)	+	Lentil, bran	Osim , Baragil
	Cyta latirostris (Hermann)	++	Dried fig , Biscuit, garlic, anise	El-aiat, Osim , Faisal
Tydeidae	*Orthotydeas californicus* (Banks)	++	Date palm fruits, bran	El-Baragil
	Lorryia ferula (Baker)	+	Dried fig	El-Baragil
Cunaxidae	*Cunaxa capreolus* (Berlese)	++	Wheat flour, Peanut, Lentil	Osim, El-Baragil
Smarididae	*Trichomaris jacoti* (Southcott)	++	Dried fig, date palm fruit	El-aiat , Dahshour
Raphignathoidea	*Raphignathus ehari* (Zaher&Gomaa)	++	bran , biscuit	6th October city
	Raphignathus niloticus (Gomaa& Hass)	++	date palm fruit , dried fig	Faisal , Osim
Suborder: Mesostigmata				
	Arctoseius butleri (Hughes)	++	Cowpea, Hulling Rice, Wheat grains, Dried fig	Osim, Faisal , Dahshour
	Hypoaspis lubrica (Voigts .Oud.)	+	Wheat, Maize grains	Dahshour , El-Baragil

(+) = rare (less than 3 individuals/500 g sample), (++) = moderate (3-9 individ. / 500 g sample) (+++) = high (more than 9 individ. / 500 g sample)

Table (1): Cont.

Family	Scientific name	Abundance	Host (s)	Locality
Ascidae	*Proctolaelaps solyti* (Evans)	++	Spices , nuts	6th October city
	Blattisecius meli (Oud)	+++	Onion, Turkish cheese, granular chicken feed,.etc.	El-aiat, Faisal, Baragil
	Blattisecius keegani (Fox.)	+++	Wheat flour, onion, Dried fig	Faisal, Dahshour, Baragil
	Lasioseius bispinosus (Evans)	++	Wheat flour, Wheat grains, Dried fig	Faisal, Dahshour
	Lasioseius penicilliger (Berlese)	+++	Dried fig, Turkish cheese, date palm fruit, bran	6th October city, Dahshour
	Blattisecius linguistic (Berlese)	++	Wheat grains, Onion, dried fig	Osim, Faisal
	Blattisecius dentriticus (Berlese)	+++	Wheat grains, Maize, Onion, dried fig	Faisal, Dahshour, El-Baragil, Osim
	Blattisecius tarsalis (Berlese)	+++	Onion, Turkish cheese, granular chicken feed,.etc.	Dahshour, El-Baragil,
	Mycolaelaps maxinae (Lindquist)	+	Wheat, Maize grains	El-aiat, Dahshour
	Gamasellodes ericae (Walter)	+	Spices, nuts	6th October city, El-aiat
	Proctolealaps pomorum (Oud.)	++	Date palm fruit, soybean	Dahshour, El-Baragil
	Proctolealaps pygmaeus (Muller)	++	Date palm fruit , soybean	Osim, Faisal
Digamasellidae	*Digamasellus presepum* (Berlese)	+	Dried fig, date palm fruit	6th October city, Baragil
Parasitidae	*Eugamasus butleri* (Hughes)	++	Wheat, Maize grains	El-aiat
Phytoseiidae	*Neoseiulus barkeri* (Hughes)	++	Wheat grains, Dried fig, Dry molokhia	Dahshour, El-aiat
Laelapidae	*Hypoaspis oseii* (Berlese)	++	Spices, bran	El-Baragil
	Hypoaspis mali (Berlese)	++	Spices, nuts, bran	El-Baragil
	Hypoaspis sardous(Berlese)	++	Wheat grains, Dried fig	Dahshour Faisal
Dermanysidae	*Dermanyssus gallinae* (De-geer)	+++	Lentil, garlic, Dry molokhia	Osim, Faisal
Suborder: Cryptostigmata				
Aphelacaridae	*Aphelacarus acarinus* (Berless)	++	Wheat Flour, Maize grains	Osim, Dahshour
Malaconothridae	*Malaconothrus robustus* (Hammer)	+	Spices, nuts	El-aiat

(+) = rare (less than 3 individuals/500 g sample), (++) = moderate (3-9 individ. / 500 g sample) (+++) = high (more than 9 individ. / 500 g sample)

Arctoseius butleri **(Hughes)*, Hypoapis lubrica (*Voigts Oud.)*, Proctolaelaps solyti*** **(Evans), *Blattisecius meli*** **(Oud.), *Lasioseius bispinosus*** **(Evans), *Lasioseius penicilliger*** **(Berlese), *Blattisecius linguistic*** **(Berlese), *Blattisecius dentriticus*** **(Berlese), *Blattisecius tarsalis*** **(*Berlese*), *Mycolaelaps maxinae*** **(Lind quist), *Gamasellodes ericae*** **(Walter) *Proctolealaps pomorum*** **(Oud.), *Proctolealaps pygmaeus*** **(Muller). Digamasellidae: *Digamasellus presepum*** **(Berlese), Parasitidae *Eugamasus butleri*** **(Hughes). Phytoseiidae: *Neoseiulus Barkeri*** **(Hughes) Laelapidae*: Hypoaspis oseii*** **(Berlese), *Hypoaspis miles*** **(Berlese), *Hypoaspis sarrdoa*** **(Berlese) and Dermanysidae: *Dermanyssus gallinae*** **(De-geer).**

A.1.4. Suborder Oribatida (Cryptostigmata):

The oribatid mites in this study represented with 2 species in 2 genera and 2 families as follows: Aphelacaridae*: Aphelacarus acarinus* **(Berlese) and Malaconothridae: *Malaconothrus robustus*** **(Hammer).**

These results are confirmed with those obtained by El Nggar *et al.,* (1992) who recorded 53 mites species associated with stored grains in Egypt, of those, ten species belonging in five families of astigmatid mites. The highest number of mite's species was found associated with squash seed and peas. Fawzy (1996) surveyed 50 of stored mites belonging to 42 genera and 17 families from different stored products, stored flour, rice, maize, animal milk, wheat bran, dried fruits, rice germ, Turkish cheese, cotton seeds, bean, akalona of wheat, and house dusts.

El-Sanady (1999) collected twenty-four species of astigmatid mites from different localities of Egypt associated with fifteen materials of stored products. She mentioned that the family Acaridae was found to be the most common family of the storage Acari, which represented by thirteen species. She added that the high population was found in wheat and wheat bran.

Mohamed (2003) recorded 105 different species of stored products belonging to 60 genera and 31 families under four suborders (Astigmata, Prostigmata, Mesostigmata, Pyroglyphidae, Chortoglyphidae, Glyciphagidae, Suidasidae, Acaridae, and Tyroglyphidae).

Mostafa *et al.,* (2006) recorded 93 species of mites belonging to 53 genera, 26 families and 4 sub orders association stored products at 16 Egyptian Governorates.

Yassin *et al.,* (2009) noticed that the most abundant family collected was Pyroglyphidae representing 27.27% of the total number distributed between two different species of the Genus *Dermatophagoides* (*D. pteronyssinus* and *D. farinae*). This followed by families Cheyletidae and Dermanyssidae; each comprises 25.75% of the total with a single species for each; *C. malaccensis* and *Dermanyssus* sp. Respectively. Family Acaridae was represented by (21.21% of the total) and came later in abundance.

Abou El- Enien (2011) The study proved the occurrence of 102 mite species belonging to 64 genera in 30 families and 4 suborders: Astigmata, Prostigmata, Mesostigmata and Cryptostigmata. The astigmatid mite species which collected from different stored products materials were 34 different species in 20 genera and 8 families the actinedid mites in this study included 43 different mite species in 26 genera belonging to 14 families. Also, there were 25 mites' species belonging to

16 genera in 8 families belonging to the suborder Mesostigmata .

Abdel-Khalik (2013) surveyed the mites associated with different stored products at different areas at Menofia Governorate. Data proved the occurrence of 82 mite species belonging to 54 genera under 30 families belonging to 4 suborders.

A.2. Occurrence of mites in 500 gm in 50 samples collected from El- Giza Governorates during the period of study from 2016 to 2018:

The graphically illustrated in Fig. (1) Showed the total number and percentage of the different collected Food products mites families. The study indicated that the Acaridae mites number was 158 different mite with ratio of 14.4 of the total collected families followed by the different families: Pyroglyphidae (11.2%), Cheyletidae (11.2%), Ascidae (11.1), Laelapidae (10.4) Glycyphagidae (7.9%), Suidasidae (5.2 %) Bdellidae (5.1), Cunaxsidae (4.2%), Caligonellidae (1.4), Raphignathoidea (3.1), Parasitidae (2.0), Carpoglyphidae (1.7), Ctenoglyphidae (1.5 %), Dermanyssidae (1.6), Tydeidae (1.6), Smarididae (0.7), Chortoglyphidae (1.1), Digamasellidae (1.1), Phytoseiidae (0.9), Aphelacaridae (0.6) and Malaconothridae (0.5).

A.3. Population dynamics study:

During the study season from (2016 to 2018), the wheat grains and Dried fig fruits had chosen to estimate the infestation of the different mites to these hosts at Dahshour region, Giza governorate, it was found that the commonest collected mites were belonging to suborder Acaridida, Actinedida and Gamasida.

A.3.1. Wheat grains:

In this study, the most common collected mites associated with Wheat grains were belonging to suborder: Acaridida, Actinedida and Gamasida as shown in Figures (2&3).

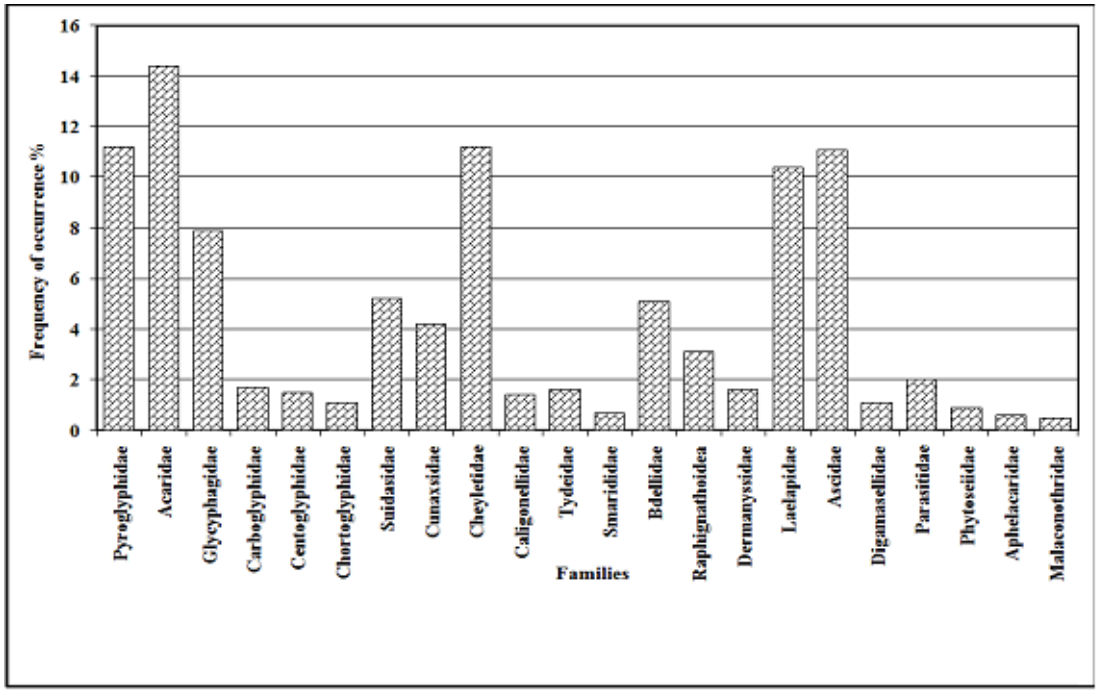

Fig. (1): Frequency of occurrence (F.O.%) mite families collected from 500 gm in 50 samples at El- Giza Governorate during the period of study from 2016 to 2018.

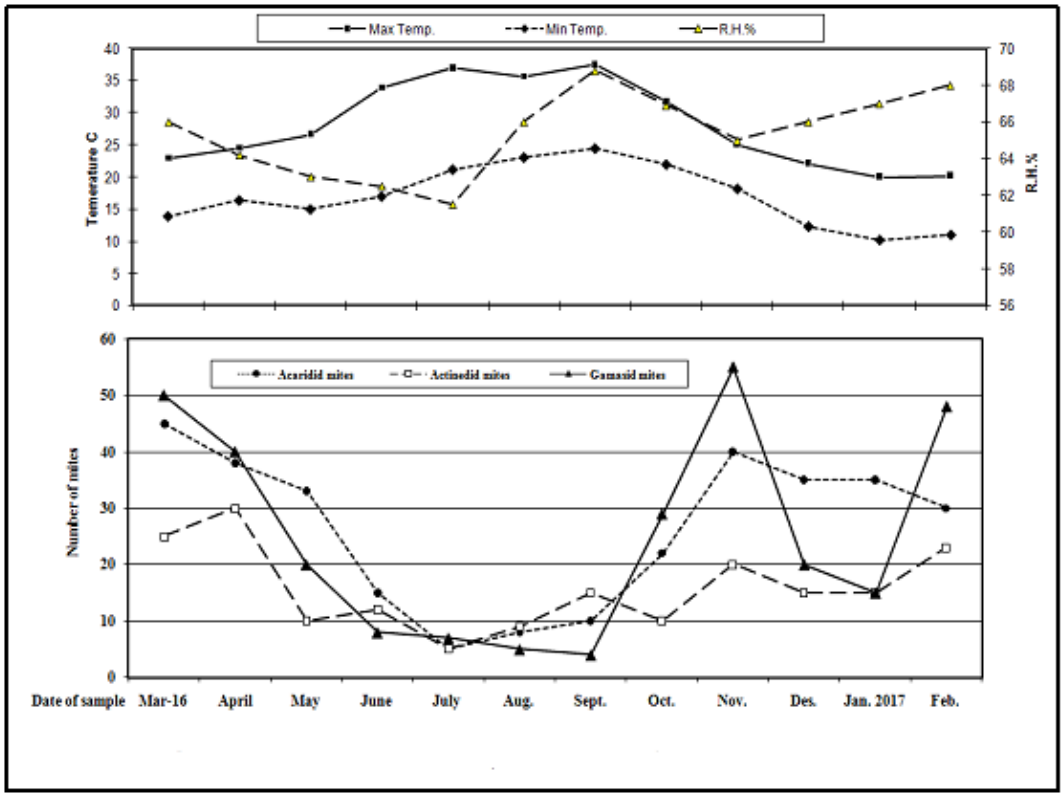

Fig. (2): Population dynamics of the collected mites associated with wheat grains during 2016/2017 at Dahshour region, Giza Governorate.

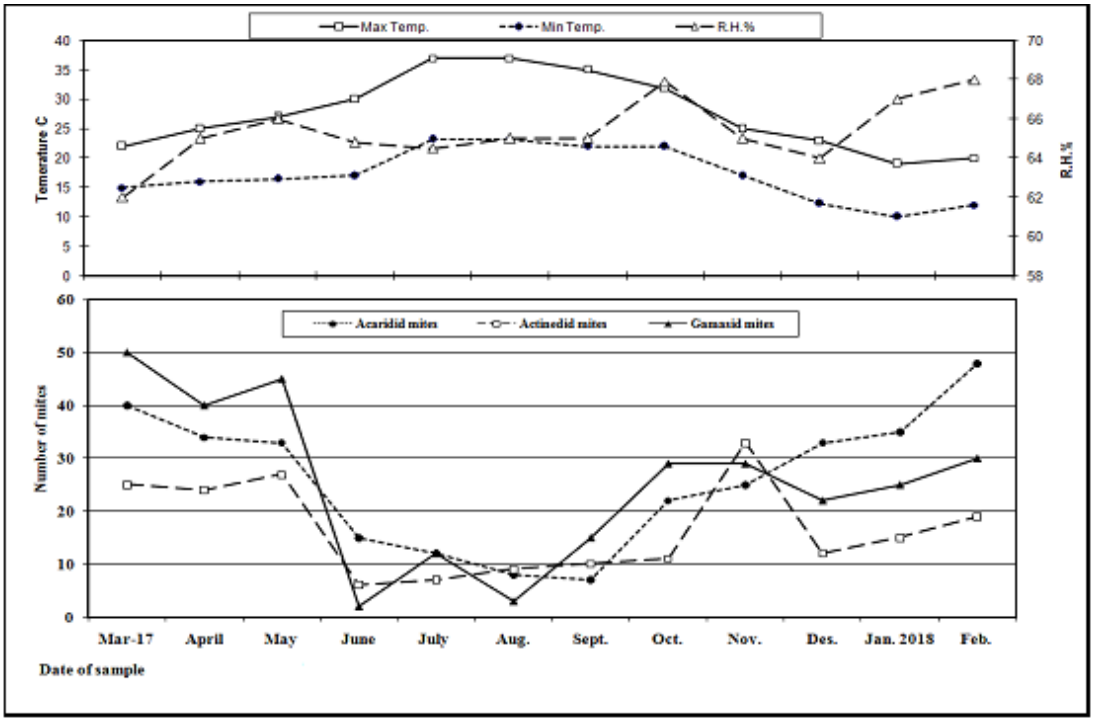

Fig. (3): Population dynamics of the collected mites associated with wheat grains during 2017/2018 at Dahshour region, Giza Governorate.

During 2016/ 2017 season, the highest population of astimatid mites was 40 and 45 mite individuals during November and March, respectively. The lowest level is recorded during July and August (5 and 8 mite individuals), respectively. On the other hand, the actinedid mites (Prostigmata) showed the highest level of abundant during March and April (25 and 30 mite individuals), respectively and the lowest levels recorded during July and August (5 and 9 mite individual) however the gamasid showed the highest level of abundant during March and November (50 and 55 mite individuals) respectively and the lowest level was during August and September (5 and 4 mite individuals).

During 2017/ 2018 season, the highest population of astimatid mites was 48 and 40 mite individuals during February and March, respectively. The lowest level is recorded during August and September (8 and 7 mite individuals), respectively. On the other hand, the actinedid mites (Prostigmata) showed the highest level of abundant during March and November (25 and 33 mite individuals), respectively and the lowest levels recorded during June and July (6 and 7 mite individual) However the gamasid showed the highest level of abundant during March and May (50 and 45 mite individuals) respectively and the lowest level was during August and June (3 and 2 mite individuals).

A.3.2. Dried Fig fruits:

The resulted data in Figure (4) clearly indicated that, during 2016-2017 seasons, the highest population of astimatid mites was 55 and 60 mite individuals during April and May, respectively. Whereas the lowest level is recorded during August and September (2 and 5 mite individuals), respectively. On the other hand, the actinedid mites (Prostigmata) showed the highest level of abundant during February and April (44 and 39 mite individuals), respectively and the lowest levels recorded during July and August (7 and 8 mite individual) However the gamasid showed the highest level of abundant during November and February (35 and 32 mite individuals) respectively and the lowest level was during August and June (3 and 8 mite individuals).

With respect to the data graphically in Figure (5), during 2017-2018 seasons, the highest population of astimatid mites was 50 and 65 mite individuals during March and May respectively. While the lowest level is recorded during July and August 2 and 2 mite individuals), respectively. On the other hand, the actinedid mites (Prostigmata) showed the highest level of abundant during March and April (35 and 32 mite individuals), respectively and the lowest levels recorded during June and August (8 and 5 mite individual) however the gamasid showed the highest level of abundant during March and April (35 and 40 mite individuals) respectively and the lowest level was during August and September (0 and 1 mite individuals).

Effect of certain biotic and a biotic factors on the abundance of acaridid, actinedid and gamasid mites inhabiting wheat grains and dry fig fruits:

The present study evaluate the relation between the biotic and a biotic factors and the population dynamics of the different mites inhabiting both wheat grains and fig fruits during 2016/2018 at Al-Giza Governorate. Correlation coefficient in Table (2&3) gives the simple correlation value of different mites and (maximum and minimum temperature and relative humidity) together with their level of significant during the two tested season (2016/2017 and 2017/ 2018). The correlation values show the most of the tested factors expressed as significantly negative relation on the population of the collected acaridid, actiedid and gamasid mites except the effect of relative humidity which was negatively affected

on wheat grain and dried fig. (Table 2&3). In addition, results showed that all tested factors separately or combined with each other were affected with non significantly relationship on the population dynamics of the collected acaridid, actinedid and gamasid mites in this region during the study periods.

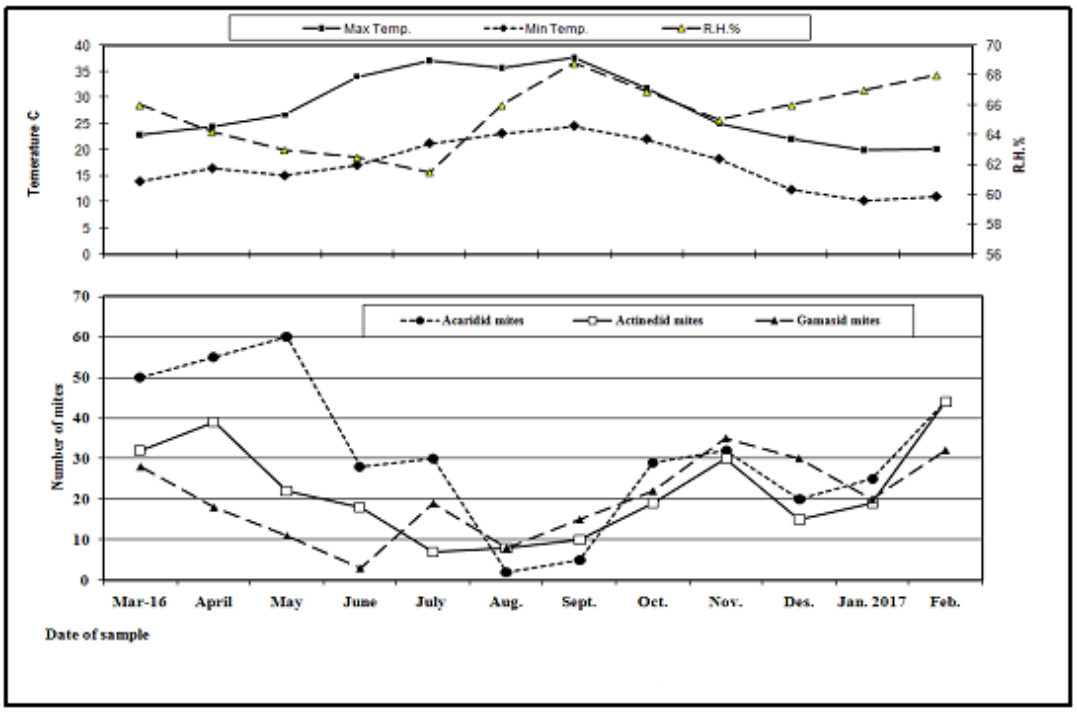

Fig. (4): Population dynamics of the collected mites associated with dried fig fruits during 2016/2017 at Dahshour region, Giza Governorate.

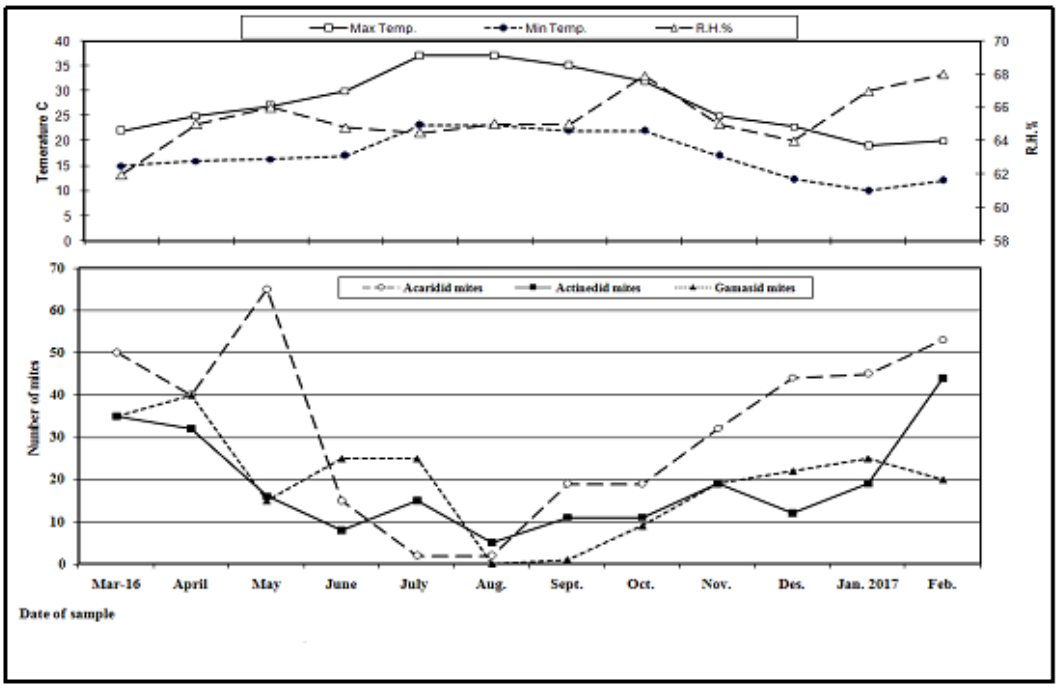

Fig. (5): Population dynamics of the collected mites associated with dried fig fruits during 2017/2018 at Dahshour region, Giza Governorate.

Table (2). Correlation coefficient between abiotic factors and mites on wheat grain.

Mites	Season 2016/2017			Season 2017/2018		
	Max. Temp.	Min. Temp.	R.H.	Max. Temp.	Min. Temp.	R.H.
Acaridid mites	-0.89***	-0.72*	0.13	-0.91***	-0.86**	0.16
Actinedid mites	-0.64*	-0.44	0.30	-0.56	-0.48	-0.09
Gamasid mites	-0.67*	0.42	0.17	-0.61*	-0.50	-0.05
Total mites	-0.80**	-0.57	0.20	-0.78**	-0.68	0.01

Table (3). Correlation coefficient between abiotic factors and mites on dried fig

Mites	Season 2016/2017			Season 2017/2018		
	Max. Temp.	Min. Temp.	R.H.	Max. Temp.	Min. Temp.	R.H.
Acaridid mites	-0.53	-0.52	-0.37	-0.84**	-0.81**	0.09
Actinedid mites	-0.71*	-0.57	0.15	-0.67*	-0.62*	0.05
Gamasid mites	-0.63	-0.40	0.37	-0.58	-0.55	-0.33
Total mites	-0.74*	-0.61*	-0.03	-0.86**	-0.83**	-0.04

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دراسات بيئيه علي الأكاروسات المفترسة والمتطفلة المرتبطة ببعض المنتجات المخزونة

وداد احمد عطوة[١]، محمود السيد النجار[٢] ، عابدين محمود خليل[٢] ، منال السيد الشاعر[١] ، زينب مصطفي محجوب مصطفى[٢]

[١] قسم علم الحيوان– كلية العلوم – جامعة الأزهر

[٢] معهد بحوث وقاية النباتات– مركز البحوث الزراعية– الدقي – جيزة– مصر

الملخص العربى

تم دراسة تواجد الأكاروسات المصاحبة للمواد المخزونة في عدة مناطق بمحافظة الجيزة (٦ أكتوبر، أوسيم، العياط، فيصل، دهشوروالبراجيل) خلال مواسم ٢٠١٦/٢٠١٧ ، ٢٠١٧/٢٠١٨ . تم تصنيف تسعة وسبعون نوعا من الأكاروسات تابعة لأربعة واربعون جنسا والتى تتبع اثنين وعشرون عائلة تابعة لتحت اربع رتب أكاروسية من بعض المواد الغذائية المخزونة وهى الشوكولاتة ، ملوخية مجففة ، دقيق قمح ، ذرة ، فاصوليا ، أرز ، ثمار نخيل ، أرز قشور ، حبوب قمح ، تين مجفف ، جبنة رومي ، دقيق قمح ، حليب مجفف ، فول سوداني الخ . أسفرت النتائج أن النوع *Acarus farrie* ، *Dermatophagoides pteronyssinus* ، *Blomia freemani* هى أكثر الأنواع عديمه الثغر شيوعا فى العينات المدروسة. بينما كانت أكثر المفترسات شيوعا هى *Cheletogenes ornatus*، *Blattisecius keegani*، *Hypoaspis oseii*. سجل أعلى تعداد من الحلم عديم الثغر في مارس وسجل أدنى تعداد خلال شهر أغسطس على حبوب القمح. بينما على التين المجفف ، وصل الحلم عديم الثغر إلى أعلى تعداد له خلال شهر أبريل ، بينما سجل أدنى مستوى له خلال شهر أغسطس ، خلال موسمى الدراسة.

أسماء السادة المحكمين

أ.د/ سعيد عبدالعظيم علام معهد بحوث وقاية النباتات – الدقى – الجيزة

أ.د/ محمد الأمين سويلـــم كلية الزراعة – جامعة المنوفية