

SURVEY OF DIFFERENT MITES AND INSECT PESTS ASSOCIATED WITH DATE PALM FRUITS IN DIFFERENT LOCATIONS OF EGYPT

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(Manuscript received 16 February 2018)

Abstract

The present study was conducted during two years (2015 and 2016) to shed additional light on the acarofauna and insect pests of the date palm fruits in different regions covering 9 Egyptian governorates differed in their ecological conditions. This study revealed the occurrence of 44 mite species differed in their feeding behavior infesting different fruits, belonging to 31 genera and 16 families under four suborders. Suborder Acaridida Astigmata which represented by 14 different species belonging to 9 genera and 4 families. The recorded families were Acaridae (9 species), Lardoglyphidae (one species), Glycyphagidae (3 species) and Pyroglyphidae (one species). Also, Suborder Actinidida Prostigmata presented in this study was recorded by 19 mite species belonging to 14 genera in 7 families. The families were Tydeidae (6 species); Cheyletidae (7 species), Stigmaeidae (2 species); Pyemotidae, Caligonellidae, Bdellidae, and Tarsonemidae (one species for each). On the other hand, the mesostigmatid mites (Gamasida) were represented by 8 mite species belonging to 6 genera in 4 families and the most common family was Ascidae and represented by 4 mite species. The cryptostigmatids (Oribatida) in this study included three mite species belong to two genera from Family Oribatidae. In this study, 12 insect species in 3 orders and 8 families are surveyed as important insect pests of date palm fruits. The most abundant family was Nitidulidae (5 species), while, the rest collected families (Scolytidae, Silvanidae, Ptinidae, Tenebrionidae, Muscidae, Eulophidae and Pteromalidae) were represented as one species for each. The stored date fruits were attacked by *Carpophilus hemipterus* (L.), *Carpophilus mutilatus* Eribhson, *Coccotrypes dactyliperda* F., *Oryzaeophilus surinamensis* (L.), *Lasioderma serricorne* (F.) and *Tribolium confusum* Jacquelin du Val. While, the fallen fruits were infested by *Carpophilus hemipterus* (L.), *C. Obsoletus* Eribhson, *Carpophilus mutilatus* Eribhson, *C. dimidiatus* (F.), *Carpophilus* sp., *Coccotrypes dactyliperda* F. and *Lasioderma serricorne* (F.). On the other hand, *Lasioderma serricorne* (F.), *Fannia incisurata* (Zetterstedt), *Tetrastichus* sp. and *Pteromalus* sp. were observed associated with the fresh date fruits. The most common insects in this study were *C. hemipterus*, *C. mutilatus* and *T. confusum*, as, they infested fruits throughout the period of study with very high abundance, while *C. dactyliperda* was least abundant insect.

INTRODUCTION

Date palm (*Phoenix dactylifera* L.) is one of the oldest known fruit crops and has been cultivated in the Middle East and North Africa for at least 5000 years, Zohary and Hopf (2000). In the Nile delta, there is one third of the productive date palm in Egypt (2,000,000 trees). The date fruit is a good source of food providing, fiber, carbohydrates, minerals and vitamins besides having anti-mutagenic and anti-carcinogenic properties (Baloch *et al.*, 2006). Date palms are attacked by many pests and diseases which vary in nature and severity with cultivar, location, weather and cultural practices (Carpenter and Elmer, 1978). The most comprehensive publication available on pests and diseases of date palm was given by Carpenter and Elmer (1978) who reported 54 species of mite and insect pests of date palm worldwide. A more recent review on arthropod pests of date palm and their management was given by Blumberg (2008) who reported 16 major and 15 minor species. The distribution pattern of mites is not constant everywhere, but differs according to the environmental factors, where it either free living (phytophagous, graminivorous, fungivorous and sarcophagous), parasitic and predacious mites on other injuries insects and mites, Putatunda (2005). Sever infestation with mite results in economic reduction in the quality and quantity of crop production. The aim of this study is focused on survey of different mites and insect pests associated with date palm fruits in the field and in store in different Egyptian localities during the study periods (2015-2016).

MATERIALS AND METHODS

1. Study regions: The study governorates were: El-Dakahlia (Mansoura, Aga, El-Sinbilawein, Meit Ghamr and Meneit El-Nasr districts), El-Behira (Rashid, Housh Eisa and Wadi El-Natroun districts), Damietta (Damietta and New Damietta districts), El-Sharkia (Belbees district), El-Menofia (El-Sadat and Ashmoun districts), Cairo (Rawd El-Farag), Giza (Giza, El-Wahat El-Baharia districts), Sohag (Sohag district), Beni Suief (Beni Suief district).

2. Mites collection. Date palm fruit samples (500 gm) were collected from different fauna (freshly on tree, stored in stores, residue on the tree, fallen fruits under trees and from Ajwa product). Variety Ajwa, was obtained from local market. The collected samples were transferred to the department of Cotton and Field Crops Acarology at Plant Protection Research Institute. Mites were extracted by using a Berlese funnels and/or stereomicroscope. Specimens were removed, cleared in Nesbitt's solution, and mounted in Hoyer's medium on glass microscopic slides for identification. The slides were placed on an oven at 45 °C for three days and then the specimens were

examined using a light microscope. Specimens were deposited in the Acarological Collection at Plant Protection Research Institute.

3. Mites identification. The identification of different collected mites was conducted according to Hughes 1976, Summers and Price 1970, Zaher 1986, Fain and Zhang, 2003, 2007 and Krantz and Walter, 2009.

4. Insects identification. The collected insects were identified by Insect Classification and Survey Dept., Plant Protection Res. Inst., Dokki, Giza.

RESULTS AND DISCUSSION

A-) Survey of mite species associated with different date fruits in different regions of Egypt. General survey on 9 Egyptian governorates was conducted for two years 2015 and 2016. This study revealed the occurrence of 44 mite species infesting different fruit materials, belonging to 31 genera and 16 families belonging to four suborders as follows, Table (1).

1- Suborder: Acaridida (Astigmata): As shown in Table (1), this suborder was represented by 14 different species belong to 9 genera and 4 families. The recorded families were Acaridae (9 species), Lardoglyphidae (1 species), Glycyphagidae (3 species) and Pyroglyphidae (1 species). The most abundant mites in this subfamily were *Tyrophagus putrescentiae*, *Rhizoglyphus robini*, *R. echinopus* (Acaridae) and *Lepidoglyphus destructor* (Glycyphagidae).

2- Suborder Actinedida (Prostigmata): The tabulated data in Table (1) showed that the prostigmatid mites inhabiting different date fruits were represented by 19 mite species belonging to 14 genera in 7 families. The recorded families were Tydeidae (6 species); Stigmaeidae (2 species); Pyemotidae, Caligonellidae, Bdellidae and Tarsonmeidae (one species for each family); and Cheyletidae (7 species). The most abundant prostigmatid mites were *Orthotydeus longisetosus*, *O. californicus* (Tydeidae); *Acaropsellina docta* and *Cheyletus malaccensis* (Cheyletidae).

3. - Suborder Gamasida (Mesostigmata): Eight mite species belonging to 6 genera in 4 families of gamasid mites were recorded. The recorded families were Ascidae (4 species); Macrochelidae and Pachylaelapidae (one species) and Laelapidae (2 species), Table (1) The dominant mesostigmatid species were *Proctolaelaps aegyptiaca* and *Blattisocius keegani* (Ascidae) and *Androlaelaps aegyptiaca* (Laelapidae).

Table 1. Survey of different mite species associated with date palm fruits at different regions of Egypt.

Family	Species	Habitat	Location (s)	Abund.
Suborder Astigmata				
Acaridae	<i>Tyrophagus putrescentiae</i> (Schrank)	Fresh fruits	El-Sadat , Rashid	++++
		Fallen fruits	El-Sadat	++++
		Fallen fruits	Wadi El-Natroun	++++
		Residual on tree	Aga, Rashid, Giza	++++
	<i>T. longior</i> (Gervais)	Stored fruits	El-Wahat El-Baharia	+++
	<i>T. neiswanderi</i> Johnstone & Bruce	Stored fruits	El-Wahat El-Baharia	+++
		Fallen fruits	Wadi El-Natroun	+
	<i>Rhizoglyphus robini</i> (Fumouze & Robin)	Stored fruits	Ashmoun, Aga	++++
	<i>R. echinopus</i> (Fumouze & Robin)	Stored fruits	Ashmoun, Rashid	++++
		Stored fruits	Ashmoun	++
		Fallen fruits	Rashid	+++
<i>Caloglyphus berlesei</i> (Michael)	Stored fruits	Ashmoun, Sohag	+++	
	Fresh fruits	Belbees	+	
<i>C. mycophagous</i> (Megnin)	Stored fruits	El-Sinbilawein	++	
<i>Suidasia nesbitti</i> Hughes	Stored fruits	Aga, Beni Suief	+++	
<i>Acarus farris</i> (Oudemans)	Fallen fruits	Wadi El-Natroun	+	
Lardoglyphidae	<i>Lardoglyphus zacheri</i> (Oudemans)	Stored fruits	Ashmoun	+
Glycyphagidae	<i>Glycyphagus ornatus</i> (Kramer)	Stored fruits	Ashmoun	+
	<i>Glycyphagus domesticus</i> (De- Geer)	Stored fruits	Meneit El-Nasr	+++
	<i>Lepidoglyphus destructor</i> (Schrank)	Fallen fruits	Giza, Rashid, El-Sadat	++++
Stored fruits		Ashmoun, Rashid, Aga	++++	
Pyroglyphidae	<i>Dermatophagoides farinae</i>	Stored fruits	Aga, Sohag, Ashmoun	+

Table 1. Cont.

Family	Species	Habitat	Location (s)	Abund.
Suborder Prostigmata				
Tydeidae	<i>Orthotydeus longisetosus</i>	Fallen fruits	El-Sadat, Beni Suef	++++
	El-Bagoury and Momen	Fallen fruits	Wadi El-Natroun	++++
		Fresh fruits	Damietta	++++
		<i>O. caudatus</i> (Duges)	Fresh fruits	Beni Suef
	<i>O. kochi</i> (Oudemans)	Fallen fruits	Giza, Belbees	+++
		Fresh fruits	Housh Eisa	+++
	<i>O. californicus</i> (Banks)	Fresh fruits	Giza, Rashid	++++
		Fallen fruits	El-Sadat	++++
Fresh fruits		Rashid	++	
<i>Tydeus ferulus</i> (Baker)	Fallen fruits	Rashid	+++	
<i>T. bakeri</i> Brickhill	Fallen fruits	Wadi El-Natroun	+++	
Stigmaeidae	<i>Mediolota brevistis</i> Wood	Fresh fruits	Rashid	+
	<i>Ledermulleriopsis insica</i> Wood	Fresh fruits	Ashmoun	+++
		Fallen fruits	El-Sadat	+
Stored fruits		Ashmoun	+	
Pyemotidae	<i>Pyemotes herfesi</i> Oudemans	Stored fruits	El-Wahat El-Baharia	++
Caligonellidae	<i>Neognathus oblongus</i> (Soliman)	Stored fruits	Ashmoun	+
Bdellidae	<i>Spinibdella bifurcata</i> Atyeo	Fallen fruits	Ashmoun	+
		Fallen fruits	El-Sadat , Belbees	+
Cheyletidae	<i>Hemicheyletia congensis</i> (Cunliffe)	Fallen fruits	Wadi El-Natroun	+
		Fallen fruits	Rashid	+
		Fallen fruits	El-Sadat	+
	<i>Acaropsellina docta</i> (Berlese)	Stored fruits	Cairo, Aga, Sohag	++++
	<i>Acaropsis sollers</i> Kuzin	Fallen fruits	Wadi El-Natroun	+++
	<i>Lepidocheylea solimani</i> Zaher and Hassan	Fallen fruits	El-Sadat	+
		<i>Acarosella notchi</i> Gomaa & Hassan	Fallen fruits	El-Sadat
	Fallen fruits		El-Sadat	+++
	<i>Cheyletus malaccensis</i> (Oudemans)	Stored fruits	Giza, Rashid, Sohag	++++
Stored fruits		Ashmoun, Aga	++++	
<i>Cheyletus badryi</i> (Zaher & Hassan)	Stored fruits	Cairo	+++	
	Agwa fruits	Giza, Rashid	+++	

Table 1. Cont.

Family	Species	Habitat	Location (s)	Abund.
Tarsonmeidae	<i>Tarsonmeus granaries</i> Lindquist	Fresh fruits	Damietta, Rashid	+++
		Fallen fruits	El-Sadat	++++
Suborder Mesostigmata				
Ascidae	<i>Proctolaelaps aegyptiaca</i> Nasr	Fallen fruits	Rashid, El-Sadat	++
			El-Wahat El-Baharia,	+++
			Belbees, Ashmoun	++++
		Stored fruits	Ashmoun, El-Wahat	++
		Fresh fruits	El-Baharia	+++
	<i>Proctolaelaps pygmaeus</i> (Muller)	Fallen fruits	El-Wahat El-Baharia	+++
		Residue fruits	El-Sadat	+++
		Fresh fruits	El-Sadat, Rashid	+++
	<i>Proctolaelaps orientalis</i> Bhattacharyya	Fallen fruits	El-Sadat	++++
	<i>Blattisocius keegani</i> Fox	Fallen fruits	El-Sadat	+++
Stored fruits		Ashmoun, Aga,	++++	
Residue fruits		Sohag, Rashid	++++	
		El-Sadat		
Macrochelidae	<i>Macrocheles meridorius</i> (Berlese)	Fallen fruits	Wadi El-Natroun	+++
Pachylaelapidae	<i>Pachylaelaps reticulatus</i> (Berlese)	Fallen fruits	Wadi El-Natroun	+++
Laelapidae	<i>Laelaspis astronomicus</i> (Koch)	Fallen fruits	Wadi El-Natroun	+++
	<i>Androlaelaps aegypticus</i> Hafez, Elbadry & Naser	Stored fruits	El-Wahat El-Baharia	++++
		Fallen fruits	El-Sadat, Belbees	++++
Suborder Mesostigmata				
Oribatulidae	<i>Schleoribatus zaheri</i> (Youssif and Nasr, 1978)	Fallen fruits	New Damietta	++
	<i>Schleoribatus laevigatus</i> (Koch)	Fallen fruits	Wadi El-Natroun	++
	<i>Zygoribitula sayedi</i> El-Badry and Nasr	Fresh fruits	El-Sadat	+
		El-Sadat	++	

+ = 1-3 individuals

++ = 4-8 individuals

+++ = 9- 20 individuals

++++ = more than 20 individuals

4-Suborder Oribatida (Cryptostigmata). As shown in Table (1), the cryptostigmatids mites were represented by three different species belongs to family Oribatulidae namely *Schleoribatus zaheri*, *Schleoribatus laevigatus* and *Zygoribitula sayedi*. This survey study emphasizes the important of mites associated with different date palm fruits in understanding and preventing economic losses caused by mite contamination of these agricultural products. A study was conducted on mite

populations associated with stored dried dates on the Gazally date variety in Alexandria, Egypt by Rezk (2016). Ten mite species belonging to seven families were collected and recorded. The most common mites belong to family Acaridae (27.69%) followed by the families Ascidae (19.7%), Glycyphagidae (15.49%), Carpoglyphidae (13.1%) and Cheyletidae (11.21%). The most dominant species were *T. putrescentiae*, *Blomia freemani*, *B. keegani*, *Carpoglyphus lactis* and *C. malaccensis*. The feeding behavior of the collected mites differed according to the mite species. The most of the acarid mites feed as fungivorous mites, Pimentel *et al.*, (1960), Stratil *et al.*, (1980), Zaher (1986), Chmielewski, (1991), Zhang (2003) but others can feed as granivorous mites, Hughes, (1976), Chmielewski, (2002). On the other hand, the most feeding behavior of the prostigmatid mites is predacious on other micro arthropods pests, Zaher (1986), Duso *et al.*, 2005. However, the most collected mesostigmatid mites were predators on other mites and insects pests, Zaher, (1986). The feeding habits of the cryptostigmatids mites was fungivorous and in most cases uncertain, Zaher (1986).

B-) Insect pests attacking dates during plantation, harvesting and storage

Twelve species in 3 orders and 8 families are listed as important pests of date palm during different times, Table (2). The most abundant family in this study was Nitidulidae (5 species), but the rest collected families were one species for each. The stored fruits were attacked by *Carpophilus hemipterus*, *C.mutilatus*, *Coccotrypes dactyliperda*, *Oryzaephilus surinamensis*, *Lasioderma serricornis* and *Tribolium confusum*. On the other hand, the fallen fruits in this study were infested by *Carpophilus hemipterus*, *C. obsoletus*, *C. mutilatus*, *C. dimidiatus*, *Carpophilus* sp., *Coccotrypes dactyliperda* and *Lasioderma serricornis*. The fresh date palm fruits in this study were attacked by *Lasioderma serricornis*, *Fannia incisurata*, *Tetrastichus* sp. and *Pteromalus* sp. The most common date fruits insects in this study were *Carpophilus hemipterus*, *C. mutilatus* and *Tribolium confusum*, as, they appeared in infested fruits throughout the period of study with very high abundance. On the other hand, *C. dactyliperda* was collected at moderate numbers during 2014 and 2015 seasons. Similar results were obtained by El-Shafie (2012) who reported about 22 insect species that can infest date fruit during harvesting and storage. Among them majority of the species belong to order Coleoptera and Lepidoptera. In a survey of date palm insect pests in Libya done by Bitaw and Ben-Saad (1990), 12 species of insects were recorded to infest date palm trees; five of which were recorded for the first time. Al Antary *et al.*, (2015) noticed that the dried fruit beetle *Carpophilus hemipterus* (L.) was the most abundant stored product pest in the field.

Table 2. Survey of the different insect species associated with different date fruits in Egypt

Order	Family	Species	Localities	Fruits state	Abun.
Coleoptera L.	Nitidulidae Latreille	<i>Carpophilus hemipterus</i> (Linnaeus)	El-Sadat	Fallen	++++
			Ashmoun	Stored	+++
		<i>C. obsoletus</i> Erichson	Rashid	Fallen	+++
			El-Sadat	Fallen	++++
		<i>C. mutilatus</i> Erichson	El-Sadat	Fallen	++++
			Ashmoun	Stored	+++
	<i>C. dimidiatus</i> Fabricius	El-Sadat	Fallen	+++	
	<i>Carpophilus</i> sp.	El-Sadat	Fallen	+++	
		Rashid	Fallen	+++	
	Scolytidae Latreille	<i>Coccotrypes dactyliperda</i> Fabricius	Ashmoun	Stored	++
			El-Sadat	Fallen	+++
Silvanidae Kirby	<i>Oryzaephilus surinamensis</i> Linnaeus	Ashmoun	Stored	+++	
		El-Mansoura	Stored	+++	
Ptinidae Latreille	<i>Lasioderma serricorne</i> (Fabricius)	Tanta, Ashmoun, El-Wahat El-Baharia	Stored	+++	
		Damietta, El-Sadat	Fresh	+++	
		Rashid	Fallen	+++	
Tenebrionida e Latreille	<i>Tribolium confusum</i> Duval	El-Mansoura	Stored	++++	
Diptera L.	Muscidae Latreille	<i>Fannia incisurata</i> (Zetterstedt)	Damietta	Fresh fruits	+++
Hymenoptera L.	Eulophidae Westwood	<i>Tetrastichus</i> sp.	Damietta	Fresh fruits	+++
	Pteromalidae Dalman	<i>Pteromalus</i> sp.	Damietta	Fresh fruits	+++

+ = 1-3 individuals

++ = 4-8 individuals

+++ = 9- 20 individuals

++++ = more than 20 individuals

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حصر للاكاروسات المختلفة والافات الحشرية المصاحبة لثمار البلح فى مناطق مختلفة من مصر

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اجريت هذه الدراسة فى الفترة (٢٠١٥ و ٢٠١٦) لالقاء بعض الضوء على البيئة الاكاروسية والحشرية المصاحبة لثمار البلح فى تسعة محافظات مختلفة من مصر تختلف فى الظروف المناخية وهى المنوفية - البحيرة - الجيزة - الدقهلية - الشرقية - دمياط - بنى سويف - سوهاج - القاهرة. ولقد اسفرت الدراسة على تواجده ٤٤ نوع اكاروسى مختلفة فى طبيعتها الغذائية فى ٣١ جنسا و ١٦ عائلة اكاروسية داخل ٤ تحت رتب اكاروسية مختلفة كالاتى:- حيث شملت تحت رتبة عديمة الثغر Astigmata على ١٤ نوع اكاروسى فى ٩ اجناس داخل ٤ عائلات حيث شملت عائلة Acaridae على ٩ انواع وعائلة Lardoglyphidae على نوع واحد فقط وعائلة Glycyphagidae على ٣ انواع مختلفة اما عائلة Pyroglyphidae فقد شملت على نوع واحد من الاكاروسات. وقد شملت مجموعة تحت رتبة الاكاروسات الامامية الثغر Prostigmata فى هذه الدراسة على ١٩ نوع اكاروسى ينتموا الى ١٤ جنسا داخل ٧ عائلات اكاروسية مختلفة حيث شملت عائلة Cheyletidae على ٧ انواع وعائلة Tydeidae على ٦ انواع وعائلة Stigmaeidae على نوعين اثنين . اما عائلات Pyemotidae و Caligonellidae و Bdelellidae و Tarsonemidae على نوع واحد داخل كل عائلة. ومن ناحية اخرى فقد وجد ان الاكاروسات المتوسطة الثغر Mesostigmata قد شملت على ٨ انواع اكاروسية داخل ٦ اجناس فى ٤ عائلات بينما شملت الاكاروسات ذات الحلم الخنفسى Cryptostigmata على ٣ انواع داخل عائلة واحدة وهى عائلة Oribatidae وفى هذه الدراسة تم جمع ١٢ نوع حشرى داخل ٣ رتب فى ٨ عائلات مختلفة حيث كانت عائلة Nitidulidae اكثر العائلات انتشارا وشملت على ٥ انواع ومثلت باقى العائلات بنوع واحد فقط داخل كل عائلة وهى Scolytidae و Silvanidae و Ptiniidae و Tenebrionidae و Muscidae و Eulophidae و Pteromelidae

