Biodiversity and seasonal abundance of mites associated with two varieties of date palm in Giza and Sohag Governorates, Egypt.

Mariam, A.El-Sanady[1] and Azza,A. Mohamed[2]
marim_elsanady@yahoo.com
[1]College Of Art and Sciences Dhahran El-Ganob King Khalid University
[2]Plant Protection Research Institute, Agric. Res. Center, Dokki, Giza. Egypt.

ABSTRACT

The large number of mites are known associated with different varieties of date palm through out the world. Their distributional pattern is, however not constant everywhere, which varies according to climatic factors. These mite species could be either Phytophagous, Parasitism, Predatism, Phoresy in addition to Saprophagous and Fungivorous species. In this study 37 mite species representing 31 genera, under 17 families, resembling three Sub-orders, Actinedida; Gamasida and Acaridida. These mite species classified according to their feeding habits into four Categories; plant feeders which causing great damage for both leaves and fruits, parasitic and predaceous mites play an important role as biocontrol agents of different insect and mite pests and fungivorous as well as uncertain feeding behavior mites inhabiting date palm. The population fluctuation of Phytophagous mites; Eutetranychus orientalis; Oligonychus afrasiaticus (Tetranychidae); Raoiella indica; Phyllotetranychus aegypticus (Tenuipalpidae) on Sewi variety was higher than Zaghloul variety as well as in Giza than Sohag during the two seasons of 2010 and 2011. The population of predaceous and parasitic mites associated with different pests infesting date palm increase as well as the population of pests increase, therefore, the biocontrol agents suppressing the populations of different pests in both varieties of date palm in two localities

Key words: biodiversity of phytophagous, peredaceous and parasitic mites, date palm.

INTRODUCTION

Date palm (*phoenix dactylifera* L.) production is a world agricultural industry producing about 4.7 million tones of fruit in 1997. The date fruit, which is produced largely in the hot arid regions of southern Asia and North Africa is marketed all over the world as a remains on extremely important substance crop in most of disert regions. (FAO,1998). Date palm fruit produced in Egypt are considered the best date fruit varieties, which can be exported to foreign markets provided that the product qualities are most satisfactory, being free from infestation of pests and residues of pesticides, El –Dakroury et al 2002. The date palm and its fruits are subject to attacks by several insect and mite pests that are in most cases well adapted to the Oasis environment. Damage caused by pests is considerable and lead to economic losses. Biodiversity of mites associated with palm trees, phytophagous, predaceous, parasitic, fungivorous, phoretic and saprophagous mites are very important to through lights on.

The present work aims to study the biodiversity and seasonal abundance of the economic mite pests which cause a great damage to palm trees and associated predaceous, parasitic mites on Zaghloul and Sewi varieties in Giza and Sohag Governorates.

MATERIALS AND METHODS

An area of two feddans in both Giza an Sohag Governorates cultivated with Zaghloul and Sewi varieties, feddan for each variety, about ten years old, during the period of April to August 2010 and 2011 samples of 15 leaflets from three trees for each variety were collected. Fortnight intervals exchange between Giza and Sohag during the period of study from April to August2010 and 2011. Samples of 15 leaflets from three palms for each variety were collected randomly. Transferred to laboratory to examine using stereomicroscope.

The population fluctuation of different mite species were recorded during period of study for both varieties in two localities of Giza and Sohag Governorates speciemen of 2-3 individuals for each mite species were put in Nesbitt,s clearing agents, then mounted on glass slide using Hoyer,s medium for examination. Lables with necessary data were stuck on the slides .

RESULTS AND DISCUSSION

In this study 37 mite species belonging to 31 genera, representing 17 families under three suborders, Actinedida, Gamasida and Acaridida .Identification of mounted species were identify according to review given by Hughes, 1976., Zaher,1984, Zaher, 1986 and Mourya and Jamil 1982, Soliman et al (1973), and wafa et al (1986). These mite species were classified according to their feeding behavior into four group as follows:

Phytophagous mites

Suborder: Actinedida

1- FAMILY: Tetranychidae Donnadeiu. The date palm leaf brown mite *Eutetranychus orientalis* (Klein) which causes injury to leaf date palm trees. This mite species is feeding on upper leaf surface produces a multitude of gray spots, which gives leaves a chlorotic appearance. The infested leaves become weaken and finally drop. This mite species was recorded in rarely numbers in Giza and Sohag Governorates 2010 and the population increased during 2011 to moderate level, while, the date palm leaf brown mite E. orientalis population increased during the course study of 2011 in both localities Giza and Sohag on both Zaghoul and Sewi varieties Tabbles (1,5&6)

2-The mite date palm *Oligonychuin afrasiaticus* (McGregor) was collected in moderate numbers on both Zaghloul and Sewi varieties during the course study 2010 in Giza, while the population of mite, *O. afrasiaticus* was rarely on Zaghloul and moderate on Sewi varieties during the season 2010. On the other hand during the course study of 2011 sewi variety aggregated high numbers in Giza Table (1). Observation fieleds showed a heavy deposit of fine webbing collects dust. This mite species feed a long the midrib on lower surface of leaves causing yellowish patches at the points of attack. The mite, *O . afrasiaticus* feed on dates produces scar tissues on date skin, causing it harden crack and shrivel with subsequent reduction in fruit grade marketing. Population of mites increasing during July and August Table (5&6).

2-FAMILY : Tenuipalidae Berlese. The red palm,*Raoiella indica* Hrist . Also, known as the coconut mite. Data palms appear to be the most severely injured, *R. indica* lives on abaxia (lower)surfaces and is usually found on the under side of the leaves of the host plant in very large numbers. All active stages of the mite are dark red in colour with black markings. Attacked leaves display severe yellowing.

The population fluctuation of R. indica during this study showed that the both Zaghloul and Sewi varieties were moderate levele infestation in Giza during 2010 and 2011, while zaghloul variely during the period of study 2011 in sohag aggregated the high numbers comparing with 2010 season whereby it was moderate infestation Sewi variety was moderate infestation 2010 and high infestation 2011. Tabble (1,5&6). The tenuipalped mite, *Phyllotetranychus aegypticus* Sayed was recorded in the highest numbers on leaves of both varieties during the season 2010 and 2011 in the two localities except on zaghoul variety in Giza locality was in moderate level infestation.

The infestation oh *Ph. Aegypticus* symptoms appears difler from that of *R. indica* by whiches blotches due to the aggregation of mites for their which fanlike setage. The heavy mite infestation produce sufficient webbing. High temperature is favor mite development, therefore, population of this mite in sohag locality was highest than population in Giza locality Table (1,5&6).

3- FAMILY : Tarsonemidae Kramer. Some sprcies of tarsomemid mites had become serious pests on different crops. These mite species, *Polyphagotarsonemus latus* (Banks) and *stenotarsonemus spirifix* March were recorded on Zaghloul and Sewi varieties in Giza and Sohag Governorates. Tables (1). Pena et al 2006 reported that the red palm mite *R. indica* is an important pest of coconut, date palms and other palm species. Flechtmann and Jean Etienne 2004 reported that R. indica threat to palms in the Americas. El-Dakroury *et al.,* 2002 montioned that date palm liable to be infested with so many insect and mite pests. Zaher 1984 studied on phytophagous mitesin nile valley and Delta. Wafa et al (1968-1969) surveyed the occurrence of 18 mite speiec belonging to nine genera of ten uipalpid mites in U.A.R. and Giza

Predaceous mites

Suborder: Gamasida

1-FAMILY : Phytoseiidae Berlese. The Phytoseiid mites were represented by two predators associated with different pests infesting date palm trees. *Euseius Scutalis* A-H was recorded on both date palm varielies in few numbers in Giza and Sohag localities. *Amblyseius swirskii* (A-H) found in moderate numbers in Giza and high numbers in sohag on both varieties

2- FAMILY : Ascidae Voigts & Oudemans. Four predatory mite species of family acides were recorded associated with pests infested date palm trees in bothe Giza and Sohag localities in rarely numbers during the periods of study 2010 1nd 2011 years . Table(2).

3- FAMILY : Laelapidae Berlese. 1- *Androlaelaps casalis* Berlese, 2-*Hypoospis miles* Berlese, 3- *H. Sardo* Berlese. Three mite speieces belong to family laelapidae recorded between rarely and moderate numbers on Zaghloul and Sewi varialies in two localities Giza and Sohag Governorates.

4-FAMILY : SeJidae Berlese. The predatory mite, *SeJius paloghi*, the only one species of Sejid mites recorded during 2011 on two varieties of date palm trees in rarely numbers in Giza and Sohag Governorates.

5- FAMILY : Macrocgelidae vitzthum. 1- *Macrocheles Carintus* Koch, 2- *M. Mascaedomestica* Scopti, 3- *Gllyptholaspis confuse* (Fao). The macrochelid mites play an important role as a bio-control agent which suppressing the different pests poupulation on different crops, as well as date palm trees.

6-FAMILY: Uropodidae Berlese. Two Uropodid mite species, *uropoda minima* Kramer,was recorded in moderate numbers, while, *Chiropluropoda bakeri* Zaher &Afifi recorded in rarely numbers on both varieties and localities.

Suborder Actinedida

1- FAMILY: Cheyletidae leach. The Chelelid mites represented by three species which recorded on Zaghloul and Sewi varieties in both localities Giza and Sohag during the 2010 and 2011 years Table(2).

2- FAMILY: Cunaxidae Thor. *1- Cunaxa carpeolus* Berlese, 2- *Pulaeus Zaheri* El-Bishlawi&Rakha The predatory mites of Cunaxidae were recorded in rarely numbers Table (2).

3- FAMILY: stigmaidae oudmans . *1- Agistemus exsertus* Gonzlis . This predatory mite found in moderate numbers associated with pests infesting date palm varietes in two localities in Giza and Sohag governorates, 2. *aficanus* Soliman & Gomaa. The predatory mite species was recorded in rarely numbers on zaghloul and Sewi variettes in Giza and Sohag governorates . Table (2)

4- FAMILY: Tydeidae Kramer. Tow predatory mite speies were recorded, whereas, *Pronematus mhignitus* found in high numbers, while *Tydeus Californicus* found in moderate numbers associated with different pests infesting date palm trees under investigation in Giza and Sohag governorates . Table (2)

Suborder : Acaridida

1- FAMILY: Hemisarcoptidae, Oudemans. The predatory mite, *Hemisarcoptes malus* (Shimer) recorded in moderate numbers associated with scale insects in fasting date palm trees in Giza and Sohag governorates. The predatory mites associated with different pasts attracted many authers, El-Halawany et al 1986 recorded *H. malus* as a predatory mite on scale inserts, Attia et al 2012 studied on the predaceous mites associated with scale insects and other pests infesting mango trees at Qalubia Governorate, They found that the predatory mite *H.malus* considered one of the most biocontrol agents of diaspidid scale insects. Taha 1985 identified and described 15 mite species belong to suborders Astignta, prostigmata and mesostigmata . Sallam et at 2007 studied the predatory insects, mites and spiders associated with pests infesting date palm in Rashid region, El-Beheira Governorate . Soliman et al 1973 Survey 15 predaceous mites belonging to six families found associated with different pests infesting fruit trees Thomas and Timothy 1999 provide an overview of an integrated management program for pests installed palms.

Parasite mites

The parasitic mites play an important role in controlling some insect pests associated with date palm trees . Sally et al 2013 identified uropodid mite *Aegyptus rhynchophorus* as a parasitic on pupae and adults of the red palm weevil *Rhynchophorus ferrugineus* (Olivier), Al-Dhafar and Al-Qahtani 2012 recorded three mite species were found on date palm, one of them which *Aegyptus alhassa* new.sp as a parasitic collected from egg, Lurrue and pupae of the red palm weevil *R.Farrugineus.*

In this study the uropodid mite, *Leiodinychus Karmeri* was recorded associated with pupae and adults of the red palm weevil *R.Ferrugineus* and the two pyemotid mite species, *Pyemotes herfici and P.tritic* were recorded associated with some insects. Hassan et al 2011 recorded thirteen mite species associated with adults and pupae of *R.Ferrugineus* in Ismailia governorate .

Fungivorous mites

Three mite species of family (Acaridae.Acaridida) were recorded of leaves of date palm of the two varieties, Zaghloul and Sewi in both localities Giza and Sohag . These mite

species, *Tyrophegous Putrescentiae* which found in moderate numbers on two varieties and localities, *T.entomophagus* and *Mycetoglyphus funginorus* were found rarely numbers during 2010 and in moderate numbers during 2011.

Aboundance of four phytophagous mites infesting date palm varieties in Giza and Sohag Governorates:

1- The date palm leaf brown mite, *Eutetranychus orientalis*. The aboundance of mites (numbers of motle stages/inch) of *E.orientalis* on zaghloul and sewi varieties of date plam in Giza and Sohag governorates. The investigation period extended between April and Augest in the Two successive years 2010 and 2011. As shown in Table (5) The population aboundance of this mite species started in few numbers in April, then increased to its maximum in Augest on both Zaghloul and sewi varieties although the level infeslation of sewi was 1.4 times than zaghloul variety in Giza while in Sohag, it was 1.6 times during the season 2010. The population curve of *O.afriasiaticus*, *R.indica* and *phyleotetranychus aegypticus* on the two varieties showed almost the same trend during the two studied seasons. The population of these phylophagous mites, were 1.5, 1.4 and 1.2 times on Sewi variety than zaghloul variety in Giza location at the same pattern. In sohag region data revealed that during the season 2010 population fluctuation of different phytophegous mite species were high on Sewi than zaghloul variety by 1.6,1.1,1.2,1.1and 1.6 for *E.orientalis, O.afriaticus, R.indica* and *ph.aegyptious respectrely* . Table (5). As shown in (table 6) during the season 2011 obtained data revealed that the Sewi variety aggregated high numbers than zaghloul variety in both localities excyet the date plam lcaf brown mite *E.orientalis* the total numbers of mites on Sewi variety equal 0.7 of the population on zaghloul variety Table (6) zaher et al 1969 carried out biological studied on the red palm *R.indica* and *phyllotetranychus aegyptiacus* infesting date palm trees. Zaher, 1984 studied the ecology of phylephagous, predaceous and sail mites in nile valley and delta .

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Tables

Table (1): Incidence of Phytophagous mites infesting date plam trees in Giza and Sohag Governorates, Egypt, during 2010 &2011.

Suborders Families	Species	Abundance							
		Giza				Sohag			
		2010		2011		2010		2011	
		Z	S	Z	S	Z	S	Z	S
Atinedid Tetranychidae Donnadeiu	*Eutetranych orieutoilis* (klein)	+	++	++	++	+	++	++	++
	Oilgonychus afrsiaticus (MCGregor)	++	++	++	+++	++	+	++	++
Tenuipulpidae Berlese	*Raoiella indica* Hirst	++	++	++	++	++	++	+++	+++
	Phyllotetranychus aegyptiacus Sayed	++	+++	+++	+++	+++	+++	+++	+++
Tarsonemidae Kramer	*Polyphagotarsonemus latus* (Banks)	+	++	++	+++	+++	+++	++	+++
	Stenotarsonemus Spirifix March	+	++	++	+++	++	+++	++	+++

Z=Zaghloul variety S= Sewi variety + = Rare (1-2 individuals inch) ++=Moderate (3-4 individuals inch) +++= High (more than individuals)

Table (2): Incidence of predaceous mites collected from date plam trees in Giza and Sohag Governorates, Egypt, during 2010 &2011.

Suborders &Families	Species	Abundance			
		Giza		Sohag	
		2010	2011	2010	2011
Gamasida Phytoseiidae Berlese	Euseuis scutalis A-H	+	+	+	+
	Amblyseeius swirskii(A-H)	++	++	+++	+++
Ascidae Voigts &Oud.	Blattisocius keegani(Fox)	+	+	++	++
	Lasioseius bispnous Evans	+	+	++	++
	Proctolaelaps pygmaseus Muller	+	+	+	++
	Melichares ornate Berlese	+	+	+	+
Laelapidae Berlese	Androlaelaps casalis Berlese	+	++	+	++
	Hypoaspis mites Berlese	+	++	+	++
	Hypoaspis sardo Berlese	+	+	+	
Sejidae Berlese	Sejius paloghi	-	+	-	+
Macocholidae Vitzhum	Macrocheles carintus Koch	++	++	++	++
	Macrocheles mascaedomestica Scopli	+	++	++	+++

Suborders &Families	Species	Abundance			
		Giza		Sohag	
		2010	2011	2010	2011
	Glyptholaspis confusa (Fao)	+	+	+	+
Uropodidae Berlese	Uropoda minma Kramar	++	+++	++	+++
	Chiropluropoda bakeri Zaher&Afifi	+	+	+	+
Actinedidae Cheyletidae Leach	Cheyletus malaccensis Oud.	++	++	++	++
	Cheyletus fortis Oud.	+	+	++	++
	Cheyletogenes ornatus (Can&Fons.)	+	+	+	++
Cunaxidae Thor.	Cunaxa carpeolus Berlese	+	+	+	+
	Pulaeus zaheri (El-Bishlawi& Raleha)	+	+	+	+
Stigmadae Oud.	Agistemus axertus Gonz	++	++	++	++
	Agistemus africanus soliman &Gomaa	+	+	+	+
Tydeidae Kramer	Pronematus ubiquitus McGregor	+++	+++	+++	+++
	T ydeus califrnicus (Banks)	++	+++	++	+++
Acaridida Hemisarcoptidae	Hemisarcoptes malus (Shimer)	++	++	++	+++

+ = Rare (1-2 individuals Leaf) ++=Moderate (3-4 individuals Leaf) +++= High (more than individuals Leaf)

Table (3): Incidence of parasitic mites associated with pests infesting date plam trees in Giza and Sohag Governorates, Egypt, during 2010 &2011.

Suborders&Families	Species	Abundace			
		Giza		Sohag	
		2010	2011	2010	2011
Actinedidae Pyemotidae Oud.	Pyemotes herfici(Oud.)	+	++	+	++
	Pyemotes tritci(La-Gree-Fossat&Mantane)	+	++	+	+++
Gamasida Uropodidae	Leiodinychus karmoeri (G.&R.,Canestrini)	+	++	+	++

+ = Rare (1-2 individuals Leaf) ++=Moderate (3-4 individuals Leaf) +++= High (more than individuals Leaf)

Table (4): Incidence of fungivorus mites collected from leaflets of date palm trees in Giza and Sohag Governorates, Egypt, during 2010 &2011.

Suborders&Families	Species	Abundace			
		Giza		Sohag	
		2010	2011	2010	2011
Acanididae Acaridae Ewixg&Nesbitt.	Tyrophagus putrescentiae (Sharnk)	++	++	++	++
	Tyrophagus entomopgagus	+	++	+	++
	Mycetoglyphus fungivorus Oud.	+	++	+	++

+ = Rare (1-2 individuals Leaf) ++=Moderate (3-4 individuals Leaf) +++= High (more than individuals Leaf)

Table (5): Seasonal Abundance of phytophagous mites infesting two varieties of date palm in two governorates during 2010.

Inspection date		Zaghloul variety								Sewi variety							
		Giza				Sohag				Giza				Sohag			
		E. orientalis	*O. afrsiaticus*	*R. indica*	*P. aegypticus*	*E. orientalis*	*O. afrsiaticus*	*R. indica*	*P. aegypticus*	*E. orientalis*	*O. afrsiaticus*	*R. indica*	*P. aegypticus*	*E. orientalis*	*O. afrsiaticus*	*R. indica*	*P. aegypticus*
April	1	12	22	18	26	8	15	16	19	24	39	35	48	21	18	22	35
	15	16	26	22	28	10	18	21	21	33	45	38	56	25	21	31	42
May	1	19	39	32	43	13	21	30	28	38	48	42	75	32	22	35	48
	15	25	42	35	56	15	32	33	33	41	54	45	68	35	35	39	61
June	1	31	54	44	72	22	35	35	39	45	62	49	85	41	36	45	77
	15	37	62	51	78	25	41	45	45	35	75	58	94	40	48	44	68
July	1	42	71	54	85	28	44	49	48	52	78	76	101	42	49	56	74
	15	53	76	60	94	33	52	55	58	66	87	89	105	48	56	60	84
August	1	58	85	62	111	38	56	59	57	75	89	98	111	50	68	68	91
	15	62	104	68	129	48	68	62	55	89	94	115	125	66	75	75	96
Total		355	581	446	717	240	385	405	403	498	671	645	868	400	428	475	676
Mean		35.5 b	58.1 ab	44.6 b	71.7a	24 b	38.5 a	40.5 a	40.3 a	49.8 b	67.1 ab	64.5 b	86.8 a	40 b	42.8 b	47.5 b	67.6 a
LSD		**22.67**				**13.91**				**21.48**				**16.24**			

Table (6): Seasonal Abundance of phytophagous mites infesting two varieties of date palm in two governorates during 2011.

Inspection date		Zaghloul variety								Sewi variety							
		Giza				Sohag				Giza				Sohag			
		E. orientalis	O. afrsiaticus	R. indica	P. aegypticus	E. orientalis	O. afrsiaticus	R. indica	P. aegypticus	E. orientalis	O. afrsiaticus	R. indica	P. aegypticus	E. orientalis	O. afrsiaticus	R. indica	P. aegypticus
April	1	19	32	23	55	5	20	32	72	15	28	28	62	18	25	45	168
	15	29	45	35	59	11	18	39	69	22	44	30	66	21	32	52	188
May	1	31	48	38	67	13	28	44	85	19	59	40	75	33	38	66	201
	15	38	53	42	68	18	31	49	88	33	62	45	89	45	41	78	218
June	1	42	64	55	81	25	38	58	95	41	77	61	32	48	45	89	249
	15	45	69	64	84	38	49	84	111	48	89	68	99	49	49	94	277
July	1	54	72	63	114	44	50	94	121	45	94	69	112	50	48	97	312
	15	61	72	68	95	59	63	105	131	49	98	75	10	52	58	104	345
August	1	68	78	75	108	62	75	111	142	54	101	88	122	68	65	112	380
	15	75	88	88	145	65	98	122	155	58	111	96	125	75	78	122	415
Total		462	627	551	876	340	470	738	1069	339	763	600	947	459	479	859	1140
Mean		46.2 b	62.7 b	55.1 b	87.6 a	34 c	47 c	73.8 b	106.9 a	38.4 b	76.3 a	60 ab	94.7 a	45.9b	47.9 b	85.9 b	275.3 a
LSD		19.41				25.49				42.72				41.76			

The same letters at the same Governorat are not siginivicanlaty different

Figures

Eutetranychus orirntalis

Eutetranychus orirntalis

Oligonrchus afrasaitius

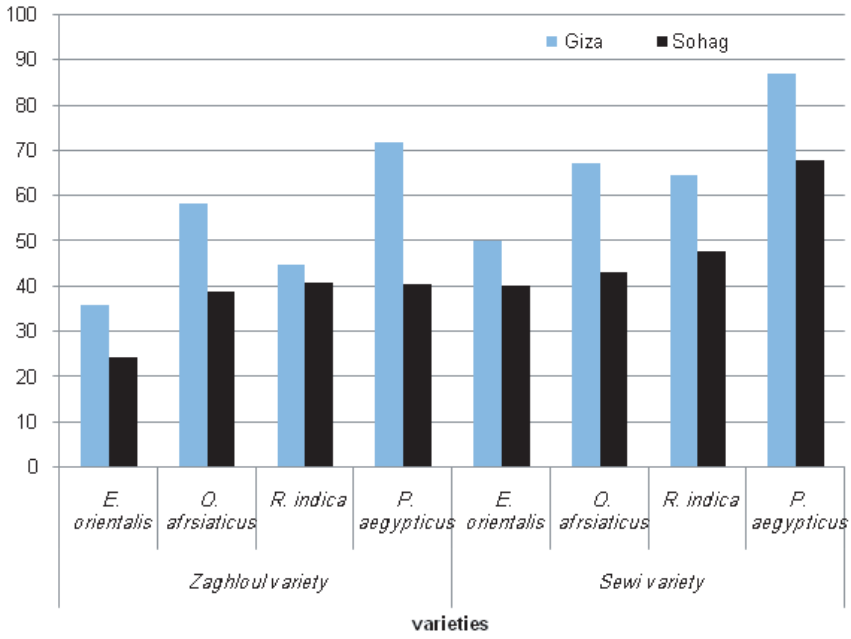

Fig. (1) Average mean numbers of phytophagous mites infesting two varieties of date palm in two governorates during 2010

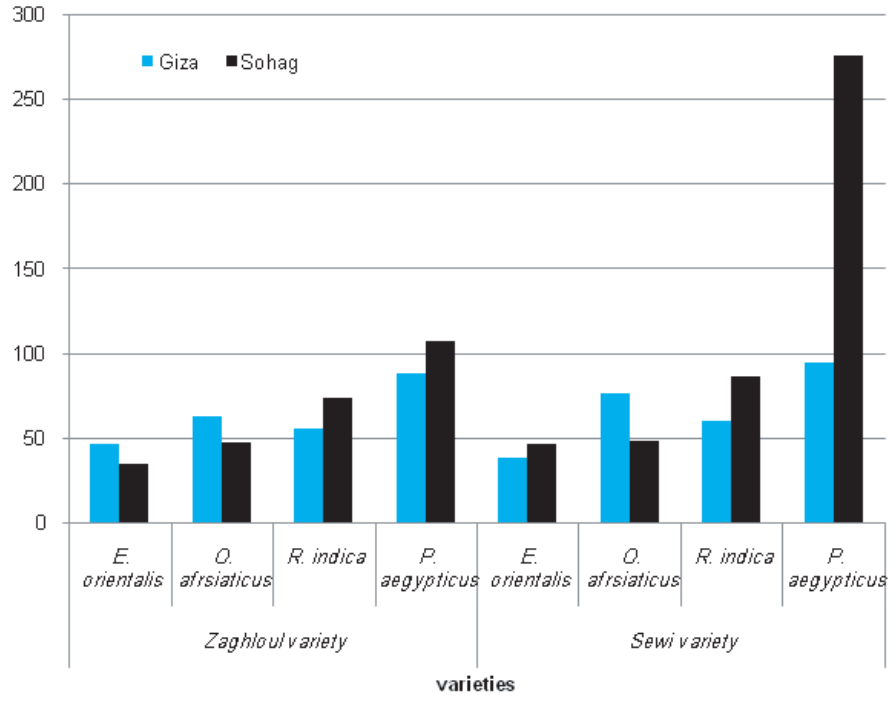

Fig. (2) Average mean numbers of phytophagous mites infesting two varieties of date palm in two governorates during 2011