Field Study on the Two Mite Species; *Hemisarcoptes coccophagus* Meyer (Astigmata: Hemisarcoptidae) and *Phyllotetranychus aegyptiacus* Sayed (Prostigmata: Tenuipalpidae) on Two Varieties of Date Palm Trees at Giza Governorate

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ABSTRACT

Field study was carried out on the predaceous mite, *Hemisarcoptes coccophagus* Meyer and the phytophagous mite, *Phyllotetranychus aegyptiacus* Sayed associated with the diaspidid, *Fiorinia phoenicis* Balachowsky infesting two varieties (Semany and Zaghlol) of date palm trees at Giza governorate during the period from mid April 2012 to mid May 2013.Population of *F. phoenicis* was noted all over the year being low from 1st November. Its population was recorded on Semany and Zaghlol variety averaging 67.0 and 76.3 individuals/sq. inch showing highly significant difference as Zaghlol was favor for the prey.Population of nymphs and adults of *H. coccophagus*, was noted in large numbers from mid April to 1st August. Its means all over the period of study was 10.3 and 11.8 individuals/sq. inch on Semany and Zaghlol with significant difference between records of the two varieties showing Zaghlol to be favor for the prey, *F. phoenicis*. The highest population of nymhs and adults of *P. aegyptiacus* was recorded in mid December; no individuals were recorded during the period from July to mid November. Means of *P. aegyptiacus* nymphs and adults on Semany and Zaghlol to be favored for the phytophagus mite.

Key Words: Hemisar coptes coccophagus, Phyllotetranychus aegyptiacus, Fiorinia phoenicis, date palm.

INTRODUCTION

The date palm *Phoenix dactylifera* L. is infested with many insect pests. Recently the diaspidid, *Ftorinia phoenicis* infested date palm leaflets and became the main scale insect attacking date palm in many Egyptian governorates; North Sinai (Gabbour and Mohammad, 2010), Giza (Elwan, *et al.*, 2011), Qalubyia (Radwan, 2012), Cairo, Beni-Suef and Behira (Attia 2012).

Mites of genus *Hemisarcoptes* have been recognized as effective generalized predators of diaspidids associated with many genera of host scale insects (Shimer, 1868). *Hemisarcoptes coccophagus* acted as a most efficient predator of the date palm scale, *Parlatoria blanchardii* (Targioni Tozzetti) in the hot, dry climate of the Sahel region of Niger (Kaufmann, 1977).

The preferred diaspidid prey for *Hemisarcoptes* mites that recorded on different fruit trees are *Hemiberlesia rapax* (Comstock), *H. latania* (Signort) and *Aspidiotus nerii* Bouché on kiwi fruit and Shelter trees (Hill *et al.*, 1993), *Parlatoria pergandii* Comstock and *P. cinerea* Chou on grape fruit and orange orchards (Izraylevich and Gerson 1993), *Lepedosaphes ulmi* (Linnaeus) on apple trees (Erol and Yasar, 1999), *Aspidiotus nerrii* Bouché *Lepidosaphes ulmi* (Linnaeus) and *Parlatoria oleae* (Colveé) on olive trees (Stathas *et al.*, 2005), *Aonidiella aurantii* (Mask) on citrus orchards (Sorribas and Garcia, 2008), and *Aulacaspis* tubercularis (Newsteasd) on mango trees (Attia et al., 2012).

. In this investigation, *H. coccophagus* was recorded as a predator of the diaspidid, *Fiorinia phoenicis* Balachowsky for the first time and the tenuipalpid mite, *Phyllotetranychus aegyptiacus* Sayed infesting two varieties of date palm trees.

Phyllotetranychus aegyptiacus Sayed was recorded in Cairo, Giza, El-Fayoum and El – Menia governorate, Egypt infesting date palm fronds, preferring the upper leaf surface. In 2011, Al-Atawi, recorded *P. aegyptiacus* infesting vegetable crops (*Ipomoea batatas* and *Solanum melongena*) in three localities of Saudi Arabia.

The present investigation aimed to study the activity of *H. coccophagus* as a predator of *F. phoenicis* on the two varieties of date palm; Semany and Zaghlol as well as the tenuipalpid mite *P. aegyptiacus* as a pests of date palm on the previous varieties.

MATERIALS AND METHODS

Field study was conducted at Giza governorate to study role of *H. coccophagus* as a predator of the diaspidid, *Fiorinia phoenicis* and the tenuipalpid mite *P. aegyptiacus* infested two varieties (Semany and Zaghlol) of date palm trees. The period of study extended from mid April 2012 to mid May 2013. Half monthly samples of twenty five palm leaflets were picked randomly from five date palm trees in each variety of nearly the same age, height and growth vigor. One square inch of the middle portion of leaflet was selected and examined to determine the number of the diaspidid, *F. phoenicis* and the associated eggs, nymphs and adults of both mites during the period of study.

Half-monthly mean, max., min. temperatures and relative humidity were obtained from Meteorological Central Laboratory at Giza.

Statistical analysis: one-way ANOVA was performed to analyze the effect of date palm variety on the population of the prey, *F. phoenicis* and its predator, *H. coccophagus*.

Simple correlation "r" was performed to study the relationship between the population of F. *phoenicis* and H. coccophagus in each variety.

RESULTS AND DISCUSSION

Field study was conducted on the predaceous mite, *H. cocophagus*, its prey *F. phoenicis* and the phytophagous mite, *P. aegyptiacus* on Semany and Zaghlol varieties of date palm trees at Giza governorate.

1- F. phoenicis (as a prey of H. coccophagus) on Semany and Zaghlol:

F. phoenicis population was presented all over the year, but in low population during the period from 1st October to 1st November ranging between 31.4 and 38.2 individuals / sq. inch on Semany and 37.4 and 40.4 individuals / sq. inch on Zaghlol (Fig.1). The associated averages of max., min., mean temperature and relative humidity were 27.8 - 32.0, 18.8 - 21.3, 23.3 - 26.7 °C and 57.7 - 66.1 % R.H. (Fig. 2).

High population of *F. phoenicis* was recorded from December 2012 until May 2013 that ranged between 70 – 98.6, 83.8 – 102.2 individuals / sq. inch on Semany and Zaghlol varieties respectively. The associated averages of max., min., mean temperature and relative humidity during the previous period showed highly differentiation as their records ranged between 19.5 - 37, 7.2 - 21.2, 14.1 - 29.1 °C and 40.1 - 66.1 % R.H. (Fig.2).

2- The hemisarcoptid predacious mite, *H. coccophagus*:

Observations during laboratory investigation revealed that, nymphs and adults of H. coccophagus fed on adult females (Fig.4a) of the prey (F.

phoenicis) and not on the associated phytophagous mite, P. aegyptiacus. H. coccophagus adult deposited an average of 10 - 15 eggs on the prey (Fig. 4b).

H. coccophagus eggs on Semany and Zaghlol:

During the period of study, data showed that, population of the predacious mite eggs, was presented in large numbers during April and May 2012, ranging 20.4- 27.8 eggs /sq. inch and 18.2 - 23.0 eggs / sq. inch on Semany and Zaghlol, respectively (Fig.5). The associated averages of max., min., mean temperature and relative humidity were 29.4 - 34.1, 16.4 - 20.4, 22.9 - 27.3 °C and 44.2 -47.2 % R.H. (Fig.2). While during April and May 2013, population of H. coccophagus eggs ranged 8.6 - 24.2 eggs / sq. inch and 13.0 - 29eggs / sq. inch on the two previous varieties. respectively. The associated averages of max., min., mean temperature and relative humidity were 28.8 -37, 15.2 - 21.2, 22.1 - 29.1 °C and 40.1 - 49.2 % R.H. (Fig.3). On the other hand, no eggs were recorded in October and on 1st of November 2012 (Fig.5).

Total average of *H. coccophagus* eggs during all over the period of study was 7.5 and 8.1 eggs/sq. leaf inch of the two date palm varieties, respectively (Fig.3). No significant difference existed between records of the two varieties (Table 1).

In this concern, Attia *et al.*, 2012b showed that, *H. malus* eggs on the diaspidid, *Aulacaspis tubercularis* increased gradually from January to reach its peak in May 2010 (87.3 eggs/ mango leaf) as the same of *H. coccophagus* on *F. phoenicis* and no eggs were deposited in September, October and November; while no eggs were deposited in October and 1^{st} November with *H. coccophagus* on *F. phoenicis*.

H. coccophagus nymphs and adults on Semany and Zaghlol date palm varieties:

During the period of study, population of nymphs and adults of *H. coccophagus*, was noted in large numbers from mid April to 1st August 2012 as ranged 11.8 – 29 and 15 – 33.4 individuals / sq. inch on Semany and Zaghlol varieties, respectively. While these records ranged 6.4 – 19 and 7.2 – 19.4 individuals / sq. inch during March until May 2013 (Fig. 6).

Total average of *H. coccophagus* nymphs and adults during the whole period of study was 10.3 and 11.8 on Semany and Zaghlol, respectively (Fig.3). Significant difference existed between records of the two varieties (Table1).



Fig. (1): Mean no. of *F. phoenicis* population infested Semany and Zaghlol varieties of date palm during the period of study at Giza governorate.



Fig. (2): Half monthly means of temperature and relative humidity during the period of study at Giza governorate.



Fig.(3): Comparison between total average population of *F. phoenicis* and *H. coccophagus* on Semany and Zaghlol varieties of date palm at Giza governorate.



Fig.(4a): Ovipositing adult female of *F. phoenicis* containing adult female of *H. coccophagus*.



Fig.(4b): Adult and eggs of *H. coccophagus* deposited on *F.phoenicis* ovipositing adult female.



Fig. (5): Mean no. of *H. coccophagus eggs* on Semany and Zaghlol date palm varieties during the period of study at Giza governorate.



Fig.(6): Mean no. of *H. coccophagus* nymphs and adults on Semany and Zaghlol varieties of date palm during the period of study at Giza governorate.



Fig. (7): Mean no. of *P. aegyptiacus* eggs on Semany and Zaghlol varieties of date palm during the period of study at Giza governorate.



Fig.(8): Comparison between total average population of *P. aegyptiacus* on Semany and Zaghlol varieties of date palm at Giza governorate.



Fig. (9): Mean no. of *P.aegyptiacus* nymphs and adults on Semany and Zaghlol varieties of date palm at Giza Governorate.

Table (1): Analysis of records reported for mean number of the prey F. phoenicis and its predator H.coccophagus eggs, nymphs and adults during the period of study.

Occurren	ce period	F r	hoenicis and	Variable			_
From	to	H A	socconhamin	variable	Mean + SE	E volue	LSD
			coccopnagus	date palm variety	Mean \pm SEF. valueLSD 5%76.3 \pm 0.8 A47.76**2.3 67.0 ± 1.1 B47.76**2.3 8.05 ± 0.2 A38.041.11 11.83 ± 0.3 A62.27*0.78		
		The prey	F. phoenicis	Zaghlol	$76.3 \pm 0.8 \text{ A}$		
	· · ·		1	Semany	67.0 ± 1.1 B	- 47.76**	2.3
15/4/2012	15/5/2013	The predacious - mite	H. coccophagus	Zaghlol	8.05 ± 0.2 A		1.11
			eggs	Semany	7.50 ± 0.2 A	38.04	
			H. coccophagus	Zaghlol	11.83 ± 0.3 A		÷,
Maana with the 1			nymphs and adults	Semany	10.26 ± 0.3 B	<u> </u>	
Willans Will	i ule same le	tter are not sign	ificantly different				

not significantly different.

Table (2): Monthly means of F. phoenicis and H. coccophagus populations in each variety of date palm . associated with temperature and relative humidity at Giza governorate.

Sampling	Semany Variety		Zaghlol variety		Max	Min		
dates	F. phoenicis	H. coccophagus	F. phoenicis	H. cocconhagus	Temp	Temp	Mean	Mean
May 2012	73.2	22.3	85.5	26.0	22.6	Temp.	Temp.	RH%
June 2012	56.6	18.0	61.0	20.9	33.6	19.7	26.7	45.7
July 2012	59.4	17.7	01.9	20.9	36.8	23.2	30.0	49.9
Aug 2012		1/./	67.5	22.3	37.4	25.0	31.2	557
Aug. 2012	42.8	10.2	51.7	10.9	37.3	24.8	21.1	53.0
Sep. 2012	55.8	9.4	62.7	91 .	34.1	24.0	<u> </u>	53.8
Oct. 2012	34.8	0	38.9	0	21.6		28.4	56.6
Nov. 2012	43.9	27	51.7	0	31.6	21.0	26.3	59.5
Dec. 2012	78.0	5.0	31.7	3.7	26.2	16.4	21.3	66.5
Ian 2012	10.3	5.2	88.3	6.7	22.1	7.5	14.8	60.0
	82.3	6.9	90.9	8	20.7	9.1	14.0	(1.0
Feb. 2013	78.4	4.3	92.7	46	23.0	10.4	14.9	61.2
March 2013	94.9	9.8	96.0	0.6	23.0	10.4	16.7	56.5
April 2013	90.8	10	100.5	9.0	27.3	13.8	20.6	47.7
May 2013	72.4	10	100.5	12	29.1	15.3	22.2	44.8
	13.4	14.7	75	11.6	351	20.2	277	47.5

Table (3): Analysis of records reported for mean number of eggs and nymphs with adults of P. aegyptiacus during the period of study.

Occurrence	period		Variable			
From	to	 Phytophagus mite 	date palm variety	- Mean \pm SE	F. value	LSD 5%
	15/5/2013	P. aegyptiacus	Zaghlol	2.95 ± 0.06 A	— 11.87	1.18
15/4/2012		eggs	Semany	2.59 ± 0.06 A		
		P. aegyptiacus	Zaghlol	5.05 ± 0.06 A	— 8.13**	1.25
eans with the		nymphs and adults	Semany	$2.75 \pm 0.08 \text{ B}$		

Ν are not significantly different. In this concern, Attia *et al.*, 2012b showed that, the largest population of *H. malus* nymphs and adults on *A. tubercularis* occurred from April to June and peaked in May; while Ji *et al.*, 1991 mentoined that, the largest population of the predator, *Hemisarcoptes* sp. on *Lepidosaphus salicina* occurred from mid June to late August; this difference might be due to prey, locality and condition differences.

Generally, the population of F. phoenicis and its associated predator H. coccophagus was affected by the variety of date palm as Zaghlol variety was the favourate.

Relationship between population of the predaceous mite and its prey on each variety of date palm:

Obtained monthly data (Table 2) showed that, the highest population of *H. coccophagus* was 22.3, 26.9 individuals / sq. inch when prey population was 73.2, 85.5 individuals / sq. inch in May 2012 on date palm Semany and Zaghlol varieties, respectively. The associated averages of max., min., mean temperature and relative humidity were 33.6, 19.7, 26.7 °C and 45.7 % R.H.

Thereafter the population of the mite decreased gradually until Sep. 2012 to 9.4 and 9.1 individuals / sq. inch when its prey population recorded 55.8, 62.7 individuals / sq. inch on the two previous varieties, respectively. In September 2012 the associated averages of max., min., mean temperature and relative humidity were 34.1, 22.7, 28.4 °C and 56.6% R.H.

In October 2012, no individuals of the predacious mite was recorded when the population of the prey was 34.8 and 38.9 individuals / sq. inch on Semany and Zaghlol varieties. The associated averages of max., min., mean temperature and relative humidity were 31.6, 21.0, 26.3 °C and 59.5% R.H. After that, the mite population increased gradually from November 2012 (2.7, 3.7 individuals / sq. inch in the two respective varieties) and reached its highest population in May 2013 (14.7 individuals / sq. inch) when its prey population was 73.4 individuals / sq. inch on Semany variety; while was in April 2013 (12.0 individuals / sq inch) when its prey population was 100.5 individuals / sq. inch on Zaghlol variety.

Generally the temperature and relative humidity did not show correlation with population of the mite.

Correlation coefficients analysis between records of *F. phoenicis* and *H. coccophagus* population in

each variety showed no significant correlation when the value of (r) was 0.180 and 0.219 in Semany and Zaghlol, respectively.

3- The tenuipalpid mite, *Phyllotetranychus* aegyptiacus

P. aegyptiacus eggs on Semany and Zaghlol varieties

During the period of study, the largest number of eggs were presented on 1st of December on Semany and Zaghlol (25.8 and 29.2 eggs / sq. inch, respectively); while no eggs were presented during the period from 1st of July until 1st of November (Fig. 7). Total average of *P. aegyptiacus* eggs during the whole period of study was 2.5 and 2.9 eggs / sq. inch on the two varieties respectively (Fig. 8). No significant differences existed between such records as the value of LSD 5% was 1.18 (Table 3).

P. aegyptiacus nymphs and adults on Semany and Zaghlol varieties:

During the period of study, the largest number of nymhs and adults of *P. aegyptiacus* was recorded in mid – December on Semany and Zaghlol (19.8 and 21.6 individuals / sq. inch, respectively. Population of nymphs and adults of *P. aegyptiacus* ranged from 1.4 - 8.4 to 3 - 13.2 individuals / sq. inch during the period from January to May 2013. On the other hand no individuals were recorded during the period from July to mid – November (Fig. 11). Total average of *P. aegyptiacus* nymphs and adults during all period of study was 2.7 and 5.1 individuals / sq. inch on Semany and Zaghlol, respectively (Fig.10). Highly significant difference existed between records of the two varieties when the value of LSD 5% was 1.25 (Table 3).

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