

ABUNDANCE AND DIVERSITY OF MITES (ACARI) ASSOCIATED WITH THE RED PALM WEEVIL, *RHYNCHOPHORUS FERRUGINEUS* (OLIVER) IN ISMAILIA GOVERNORATE, EGYPT

**EL-KADY, G. A¹, T. A. SALMAN², M. K. ABBAS² and
H. M. EL- SHARABASY¹**

1. Plant Protection Dept., Faculty of Agriculture, Suez Canal University, Ismailia, Egypt.
2. Plant Protection Research Institute. ARC, Dokki, Giza. Egypt.

(Manuscript received 30 August 2016)

Abstract

The red palm weevil, *Rhynchophorus ferrugineus* (Olivier) (RPW) is an economically important pest of palm trees in Egypt especially in Ismailia Governorate. Very few studies have been conducted on mites as natural enemies of red palm weevil. The predaceous and parasitic mites play an important role as biological agents of RPW. The survey of mites with different stages of RPW in Ismailia revealed 1197, 673 and 162 individuals with 120 empty cocoons, 53 larvae and 75 adults of RPW, respectively. A total of eleven mite species belong to 9 families and 4 suborders were found associated with the red palm weevil, *R. ferrugineus*. Family Uropodidae was the most abundant followed by Acaridae. Most of mite species that recorded in this study are parasitic on adults and larvae of RPW. The prevalence of *T. putrescentia* was (17.33 %), (56.60 %) and (25.83 %) with adult, larvae and empty cocoons, respectively.

Key words: Mites, Survey, *Rhynchophorus ferrugineus*, Biological Control, Ismailia.

INTRODUCTION

The red palm weevil *Rhynchophorus ferrugineus* (Oliver) (Coleoptera: Curculionidae) is an important pest of date palm trees in the Middle East and North Africa (EPPO, 2008). Among the known date palm pests, it is the most harmful, because the infestation ate often not detected until the fronds wilt and the crown collapses suddenly (Sivapragasam *et al.*, 2010). The red palm weevil females deposit their eggs in separate holes at the base of the fronds. It spends all immature stages inside the date palm. Larvae burrow through the soft tissues of the crown forming extensive tunnels. These tunnels may cause the crown and trunk to weaken, resulting in death of the tress. The mature larvae develop in a cocoon and emerge as an adult's weevil (Murphy and Briscoe, 1999). A number of species have been recorded as natural enemies of *Rhynchophorus ferrugineus* , including viruses, bacteria, fungi, nematodes, insects and mites. Unfortunately, limited affect by these species was recorded on *Rhynchophorus ferrugineus* (Murphy and Briscoe, 1999). The relationships

between some of these species could have positive, or negative natural influences on the weevil, and the most least study of it are the mites.

Biodiversity of mites associated with the red palm weevil is varying degrees of bio-relationship between each of the associated, ecto-, endoparasitic, predaceous, phoretic and fungivorous mites. Studies on mites associated with RPW have been reported by several authors (Gomaa, 2006; El-Bishlawy and Allam, 2007; Abd-El-Hamed, 2009; El-Sharabasy, 2010; Al-Deeb *et al.*, 2011; Hassan *et al.*, 2011; Al-Dhafar and Al-Qahtani, 2012; Dilipkumer *et al.*, 2015).

The present study aims to throw lights on mite species associated with different stages of RPW in Ismailia Governorate to determine the species composition and their distribution patterns.

MATERIALS AND METHODS

Adults of *Rhyncophorus ferrugineus* (n=75), larval instars (n=53) and empty cocoons (n=120) were collected from damaged trunks of infested date palm trees, *Phoenix dactylifera* L. (Palmaceae), at Tal-Elkeber & Kassasin localities, in Ismailia Governorate, during high months (May-August 2012). Different collected stages of RPW were transferred in plastic boxes to the laboratory and carefully investigated. Different collected stages of (RPW) each groups of mites were separated according to its morphological character were examined individually using dissecting microscope, whereas, detecting mites were removed gently with fine brush then mites were counted, cleared in Nesbitt's solution and mounted in Hoyer's medium for identifications. Mite specimens were identified according to Krantz (1978) & Zaher (1986). Identified mites were deposited in Plant Protection Department, Faculty of Agriculture, Suez Canal University, and Ismailia, Egypt.

RESULTS AND DISCUSSION

Mites associated with different stages of the red palm weevil were listed in Table (1). Eleven mite species belong to 9 families and 4 suborders were found. The four suborders and mite families were; suborder Acaridida included two families (Acaridae and Histostomidae), suborder Gamasida included 5 families (Ascidae, Eviphididae, Laelapidae, Parasitidae and Uropodidae). Suborder Actinedida included one family (Scutacaridae), while suborder Oribatida included one family (Oppiidae). Family Acaridae included the most abundant species (*Tyrophagus putrescentiae* (Schrank)).

On the other hand, family Uropodidae was the most abundant that included one species (*Trichouropoda patavina* (Canestrini)) and one genus (*Urobouvella* sp.). Many uropodid mites occur commonly in litters, soil, rotting wood and nests of insects. Mesbah *et al.*, (2008) observed that *Urobouvella varians* Nicol found on all body regions of the adult stage of RPW as a phoretic, while Gomaa (2006) found *U. krantzi* associated with all stages of RPW. Family Laelapidae one species (*Hypoaspis sardoa* Berlese) and one genus (*Cosmolaelaps* sp.). While, Gomaa (2006) found *Hypoaspis queenslandicus* (Womersly) associated with all stages of the red palm weevil in Sharkia Governorate.

Table 1. List of mites associated with different stages of *Rhyncophorus ferrugineus* at Ismailia Governorate.

Sub order Families	Species	Remarks
I-Acaridida		
Acaridae	<i>Tyrophagus putrescentiae</i> (Schrank)	+++
Histostomidae	<i>Histosoma</i> sp.	+
II-Gamasida		
Ascidae	<i>Proctolaelaps striatus</i> Afifi, Hassan and ElBishlawy	++
Eviphididae	<i>Iphidosoma</i> sp.	++
Laelapidae	<i>Hypoaspis sardoa</i> Berlese	++
	<i>Cosmolaelaps</i> sp.	++
Parasitidae	<i>Parasitis zaheri</i> Hafez and Nasr	+
Uropodidae	<i>Trichouropoda patavina</i> (Canestrini)	+++
	<i>Urobouvella</i> sp.	+++
III- Actinedida		
Scutacaridae	<i>Scutacarus</i> sp.	+
IV- Oribatida		
Oppiidae	<i>Oppia</i> sp.	+

+ = Rare (1-2 individuals/RPW) ++ = Moderate (3-4 individuals/RPW)

+++ = High (more than 4 individuals/RPW)

Family Ascidae and family Parasitidae included one species for each (*Proctolaelaps striatus* Afifi, Hassan and El-Bishlawy and *Parasitis zaheri* Hafez and Nasr, respectively). This mite species was recorded for the first time as phoretic on red palm weevil by El-Sharabasy (2010). This species was occurred occasionally in few numbers moving on cocoons fibers and larval stage, but not found on adult stage. Members of family Parasitidae could have some potential for biological control of the

red palm weevil. Family Histostomidae, Eviphididae, Scutacaridae and Oppiidae included one genus for each. El-Sharabasy (2010) found *Scutacarus sp* in very few numbers in cocoon fibers of RPW.

As shown in table (2), 347, 231 and 55 individuals of family Acaridae were found associated with 120 empty cocoons, 53 larvae and 75 adults of *Rhynchophorus ferrugineus*.

Table 2. Abundance and prevalence of mites on different stages of (RPW).

Species	Empty cocoons (n=120)	Larvae (n=53)	Adults (n=75)
<i>T. putrescentiae</i>	347 (25.83%#)	231 (56.60%)	55 (17.33%)
<i>Histostoma sp.</i>	37 (30.83%)	22 (26.41%)	-
<i>P. striatus</i>	21 (10.00%)	17 (20.75%)	2 (14.67%)
<i>Iphidosoma sp.</i>	46 (10.83%)	61 (39.62%)	5 (6.67%)
<i>H. sardoa</i>	12 (14.17%)	15 (16.98%)	2 (12.00%)
<i>Cosmolaelaps sp.</i>	26 (21.67%)	13 (15.09%)	-
<i>P. zaheri</i>	26 (20.00%)	8 (13.21%)	3 (10.67%)
<i>T. patavina</i>	326 (40.83%)	171 (75.47%)	53 (40.00%)
<i>Urobovella sp.</i>	340 (53.33%)	130 (62.26%)	42 (44.00%)
<i>Scutacarus sp.</i>	9 (9.17%)	3 (16.98%)	-
<i>Oppia sp.</i>	7 (5.83%)	2 (22.64%)	-
# prevalence = {proportion of different stages of (RPW) that hosted mites}.			

Mites existed in all empty cocoons were in much numbers than larval and adult stages. The total numbers of mites were 1197, 673 and 162 individuals associated with empty cocoons, larvae and adults of RPW, respectively.

The prevalence of *T. putrescentia* with adult weevil (17.33%) was lower than larvae (56.60%) and empty cocoons (25.83%). Family Uropodidae included *Trichouropoda patavina* with highly abundance and the prevalence was (40.83%), (75.47%) and (40%) on empty cocoons, larvae and adults of RPW respectively. *Urobovella sp.* was also highly abundance with prevalence (53.33%), (62.26%) and (44%) associated with empty cocoons, larvae and adults of RPW respectively. In the respect Gomaa (2006) found *Urobovella krantzi*, associated with all stages of the red palm weevil and it was highly abundant on pupal and adult stages. Two mite species, *Hypoaspis sp.* and *Tetrapolypus rhynchophori* Ewing (Pymotidae) have also been recorded with highly abundance infesting the adult beetles of RPW, but the status of these species as parasites is uncertain (Peter, 1989).

The ecological roles of mites associated with *R. ferrugineus* are poorly known, and the abundance of mites in the sampling localities refers mainly to those mite species that were generally rare. However, further field and laboratory studies are required to precisely assess the feeding habits of the mites associated with *R. ferrugineus* and their potential use as bio-control agents.

ACKNOWLEDGEMENTS

The authors are most grateful to Mohamed K. Bohibeh Plant Protection Department, Faculty of Agriculture, Suez Canal University, Ismailia, Egypt, for collected, clearing and mounting some mite specimens from different stages of RPW.

REFERENCES

1. Abdelhamed, D. M. 2009. Taxonomical and Biological studies on mites associated with some insects of agricultural economic importance. M.Sc. Thesis, Fac. of Agric., Ain Shams Univ., 147pp.
2. Al-Deeb, M.A.; Muzaffar, S.; Abuagla, A.M and Sharif, E.M. 2011. Distribution and abundance of phoretic mites (Asitigmata, Mesostigmata) on *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae). Fla. Entomol., 94:748-755.
3. Al-Dhafar, Z. M. and Al-Qahtani, A. M. (2012). Mites associated with the red palm weevil, *Rhynchophorus ferrugineus* Oliver in Saudi Arabia with a description of new species. *Acarines*, 6: 7-13.
4. Al-Dhafar, Z.M., Al-Qahtani, A.M., 2012. Mites associated with the red palm weevil, *Rhynchophorus ferrugineus* Oliver in Saudi Arabia with a description of a new species. *Acarines* 6, 3–6.
5. Dilipkumar, M. ; Ahadiyat, A. ; Masan, P. and Chuah, T. S. (2015). Mites (Acari) associated with *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae) in Malaysia, with a revised list of the mites found on this weevil. *Journal of Asia-Pacific Entomology.*, (18): 169-174.
6. El-Bishlawy, Shahira M.O. and Sally F. Allam. 2007. *Aegyptus rhynchophorus* (Acari:Uropodina:Trachuropodidae) from the red palm weevil *Rhynchophorus ferrugineus* (Oliv.) (Coleoptera: Curculionidae) in Egypt. Proc.2nd Inter. Conf. Ent. Soc.Egypt, Vol., 1:421-433.

7. El-Sharabasy, H.M. 2010. A Survey of mite species associated with the red palm weevil *Rhynchophorus ferrugineus* (Olivier) in Egypt. Egypt J. Biol. Control, 20:67-70.
8. Eppo (European and Mediterranean Plant Protection Organization) 2008. Data sheets on quarantine pests. *Rhynchophorus ferrugineus*. Eppo Bull., 38:55-59.
9. Gomaa, W.O. 2006. Three mite species associated with the red palm weevil, *Rhynchophorus ferrugineus* (Oliv.) in Egypt. Bull. Fac. Agric., Cairo Univ., 57(3): 543-548.
10. Hassan, M.F., Nasr, A.K., Allam, S.F., Taha, H.A., Mahmoud, R.A., 2011. Biodiversity and seasonal fluctuation of mite families associated with the red palm weevil, *Rhynchophorus ferrugineus* Oliver (Coleoptera: Curculionidae) in Egypt. Egypt J. Biol. Pest. Control 21, 317–323.
11. Krantz, G.W. 1978. A Manual of Acarology. Oregon State University Book Stores, Corvallis, USA, 509 p.
12. Mesbah, H.A.; Darwish, E.T.E; Salem, S.E. and Zayed, T.M. 2008. Associations of three gamasid mite species with the red palm weevil, *Rhynchophorus ferrugineus* (Oliv.) in infested date palm farms in Beheira, Egypt. Minufiya J. Agric. Res., 33(6):1543-1551.
13. Murphy, S.T. and Briscoe, B.R. 1999. The red palm weevil as an alien invasive: biology and the prospects for biological control as a component of IPM. Biocontrol News Inf. 20:35-46.
14. Peter, C. 1989. A note on the mites associated with the red palm weevil, *Rhynchophorus ferrugineus* (Oliv.) in Tamil Nadu. J. Insect Sci., 2,160-161.
15. Zaher, M. A. 1986. Survey and ecological studies of phytophagous, predaceous and soil mites in Egypt. Final report PL 480, Programme USA Project No. EG. ARS-30, grant No.FG-139. Faculty of Agriculture, Cairo University.

تنوع وانتشار الأكاروسات المصاحبة لسوسة النخيل الحمراء في محافظة الاسماعيلية - مصر

جمال عبد الستار القاضي^١ ، طارق أحمد عبده سالماني^٢ ، محمد كمال عبد اللطيف عباس^٢ ،
حمدي محمود الشرباصي^١

١. قسم وقاية النبات- كلية الزراعة- جامعة قناة السويس- الاسماعيلية - مصر.

٢. معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - الجيزة.

تعتبر سوسة النخيل الحمراء واحدة من أهم الآفات الاقتصادية التي تصيب نخيل البلح في مصر وخاصةً في محافظة الاسماعيلية. أجريت دراسات قليلة جداً على بعض الأكاروسات باعتبارها أحد الأعداء الطبيعية لسوسة النخيل الحمراء ، حيث تلعب الأكاروسات المفترسة والمتطفلة دوراً هاماً كعنصر من عناصر المكافحة الحيوية لسوسة النخيل الحمراء. في هذه الدراسة تم حصر عدد الأكاروسات المصاحبة للأطوار المختلفة لسوسة النخيل الحمراء كما يلي : ١١٩٧ أكاروس ، ٦٧٣ أكاروس ، و ١٦٢ أكاروس مصاحبين لكلاً من : الشرانق الفارغة ، اليرقات ، والحشرات الكاملة لسوسة النخيل الحمراء بالترتيب. من خلال هذه الدراسة تم حصر أحد عشر نوعاً من الأكاروسات تنتمي الى تسعة عائلات وأربعة تحت رتب مصاحبةً للأطوار المختلفة لسوسة النخيل الحمراء، حيث كانت عائلة Uropodidae من أكثر العائلات تواجداً في هذا الحصر ثم يليها عائلة Acaridae. معظم أنواع الأكاروسات التي تم تسجيلها في هذه الدراسة كانت تأخذ سلوكاً متطفلاً على اليرقات والحشرات الكاملة لسوسة النخيل الحمراء. وقد تبين من هذه الدراسة أيضاً أن نسبة انتشار النوع الأكاروسي *T. putrescentia* كانت كما يلي : (17.33 %) ، (56.60 %) ، و(25.83 %) على كلاً من الحشرات الكاملة ، اليرقات ، والشرانق الفارغة لسوسة النخيل الحمراء بالترتيب.