

## Phytophagous and Predatory Mites Inhabiting Citrus Trees in Assiut Governorate, Upper Egypt

Abdelgayed, A.S.<sup>1</sup>; M.W. Negm<sup>2\*</sup>; S.A. Eraky<sup>2</sup>; T.Y. Helal<sup>2</sup> and S.F.M. Moussa<sup>1</sup>

<sup>1</sup>Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.

<sup>2</sup>Department of Plant Protection, Faculty of Agriculture, Assiut University, Assiut, Egypt.

\*Corresponding author ([waleednegm@aun.edu.eg](mailto:waleednegm@aun.edu.eg))

Received on: 14/11/2016

Accepted for publication on: 22/11/2016

### Abstract

Mites play an important role in citrus production whether as pests or beneficial predators. Based on published works, about 149 identified mite species representing 39 families were previously reported from citrus orchards in Egypt. Field surveys were conducted fortnightly from October 2014 to February 2016 in twenty-eight citrus orchards of eight districts in Assiut Governorate, Egypt to determine the species composition of phytophagous and predatory mites. Also, the incidence and distribution of the most important species were reported. Samples were taken from plant leaves, buds and fruits. The citrus brown mite, *Eutetranychus orientalis* (Klein, 1936) (Tetranychidae), the red and black flat mite, *Brevipalpus phoenicis* (Geijskes, 1939) (Tenuipalpidae) and the broad mite, *Polyphagotarsonemus latus* (Banks, 1904) (Tarsonemidae) seemed to be the most common phytophagous species found in citrus orchards. Several predatory mite species of numerous families were also recorded, of these, *Amblyseius swirskii* Athias-Henriot, 1962; *Typhlodromus* (*Typhlodromus*) *pyri* Scheuten, 1857 (Phytoseiidae) and *Agistemus exsertus* González-Rodríguez, 1963 (Stigmaeidae) were found to be the most abundant predatory species inhabiting the leaves of mandarin, lime and orange, while *Cheletogenes ornatus* (Canestrini and Fanzago, 1876) and *Hemichyletia bakeri* (Ehara, 1962) (Cheyletidae) were observed mostly on the fruits. Quantifying the presence of various predatory species inhabiting citrus trees will be an important step for pest mites control. In subsequent studies these predators can be used in biological control programs.

**Keywords:** Mites, citrus, Egypt, diversity, Phytoseiidae.

### Introduction

Citrus is the most popular fruit in Egypt. Egypt is one of the largest citrus-growing countries and remains a leading orange producer and exporter in the world (FAOSTAT, 2008; GAIN-USDA, 2015). Faunistic studies focusing on citrus mites in Egypt are still limited. Few comprehensive surveys were conducted (Zaher *et al.*, 1970; Rasmy *et al.*, 1972; Abo-Korah, 1981; Zaher, 1984a,b,

1986; Kandeel and Nassar, 1986; Rahil and Abd-El-Halim, 2000). A recently published checklist, compiled from previous publications, included 149 mite species pertaining to 39 families extracted from Egyptian citrus orchards (Abdelgayed *et al.*, 2015). This work presents the species composition of phytophagous and predatory mites so far reported from citrus trees in Assiut Governorate and adds information about their inci-

dence and distribution. Such information is needed to support future ecological works on Egyptian citrus mites.

### Materials and Methods

Mite collections were made during the period from October 2014 until February 2016, from eight districts of Assiut Governorate. The plant parts (leaves, fruits and buds) of different citrus trees (orange, mandarin, grapefruit, lemon and lime) were sampled in searching for mites. Mites were collected by direct observation under a stereoscopic microscope of 40-100 times magnification force and the specialized hand-held aspirators (BioQuip<sup>®</sup>, CA, USA) used after modifying the collecting chamber by adding a small piece of light cloth (Negm *et al.*, 2012). After direct examination under the stereomicroscope, the plant materials were put in Tullgren funnels. The extracted mites were cleared in lactic acid, mounted in Hoyer's medium and studied under a phase contrast research microscope (BH-2, Olympus<sup>®</sup>, Japan) of 40-2000 times magnification force. The main classification works followed in the identification of certain mite groups were as follows: Anystidae (Otto, 1999), Bdellidae (Atyeo, 1960; Omukunda *et al.*, 2012; Eghbalian *et al.*, 2016), Blattisociidae (Lindquist and Moraza, 2012; Moraes *et al.*, 2015), Caligonellidae (Swift, 1996), Cheyletidae (Fain *et al.*, 2002; Negm and

Mesbah, 2014), Cunaxidae (Skvarla *et al.*, 2014), Eupodidae (Olivier and Theron, 1997), Iolinidae and Tydeidae (Ueckermann and Grout, 2007), Phytoseiidae (Chant and McMurtry, 2007; Abo-Shnaf and Moraes, 2014), Raphignathidae (Fan and Zhang, 2005), Stigmaeidae (Khanjani and Ueckermann, 2002), Tarsonemidae (Zhang, 2003; Nucifora and Vacante, 2004), Tenuipalpidae (Meyer, 1979; Mesa *et al.*, 2009) and Tetranychidae (Jeppson *et al.*, 1975). The voucher material, preserved as slide-mounted specimens, is deposited in the Acari collection of the Department of Plant Protection, Faculty of Agriculture, Assiut University, Egypt.

### Results and Discussion

In the present study, thirty-nine mite species in 19 families have been so far reported from citrus trees in Assiut (Table 1). Of these, nine species belong to phytophagous mite families (Tarsonemidae, Tenuipalpidae and Tetranychidae), twenty-three species pertaining to families composed mostly of predaceous mites (Anystidae, Bdellidae, Blattisociidae, Cheyletidae, Cunaxidae, Melichariidae, Phytoseiidae, Raphignathidae and Stigmaeidae). The remaining species belong to families of different feeding habits (Caligonellidae, Camerobiidae, Ereynetidae, Eupodidae, Iolinidae, Oribatulidae and Tydeidae).

**Table 1. Mite fauna reported from citrus trees during the period from October 2014 to February 2016 in Assiut Governorate, northern Upper Egypt.**

| Mite taxa  | Plant part and host   | Locality*              | Incidence** |
|--|---|------------------------|-------------|
| <b>Anystidae</b>   |   |                        |             |
| <i>Anystis</i> sp.                                       | Leaves of grapefruit, <i>Citrus × paradisi</i> Macfadyen  | 1, 2                   | +           |
| <i>Paratarsotomus</i> sp.                                | Leaves of mandarin, <i>Citrus reticulata</i> Blanco   | 1                      | +           |
| <b>Bdellidae</b>   |   |                        |             |
| <i>Cyta</i> sp.  | Leaves of mandarin  | 1                      | ++          |
| <i>Spinibdella</i> sp.                                   | Leaves of mandarin  | 2                      | +           |
| <b>Blattisociidae</b>                                    |   |                        |             |
| <i>Lasioseius parberlesei</i> Bhattacharyya              | Leaves of mandarin  | 3                      | +           |
| <b>Caligonellidae</b>                                    |   |                        |             |
| <i>Molothroglyphus</i> sp.                               | Leaves of sweet orange, <i>Citrus × sinensis</i> (L.) Osbeck  | 2                      | +           |
| <b>Camerobiidae</b>                                      |   |                        |             |
| <i>Neophyllobius</i> sp.                                 | Leaves of mandarin and orange   | 1                      | ++          |
| <b>Cheyletidae</b>                                       |   |                        |             |
| <i>Acaropsella volgini</i> (Gerson)                      | Fruits of mandarin  | 5                      | +           |
| <i>Cheletogenes ornatus</i> (Canestrini and Fanzago)     | Fruits of orange and mandarin   | 1, 2, 3, 5             | +++         |
| <i>Hemichyletia bakeri</i> Ehara                         | Leaves and fruits of mandarin; leaves of grapefruit   | 1, 2, 5, 6             | +++         |
| <b>Cunaxidae</b>   |   |                        |             |
| <i>Cunaxa capreolus</i> (Berlese)                        | Leaf litter under lime trees, <i>Citrus aurantifolia</i> (Christm.) Swingle                                     | 4                      | +           |
| <i>Dactyloscirus</i> sp.                                 | Leaf litter under orange and grapefruit   | 1                      | +           |
| <i>Neocunaxoides ovatus</i> ? Lin, Zhang and Ji          | Leaf litter under grapefruit  | 1                      | +           |
| <b>Ereynetidae</b>                                       |   |                        |             |
| <i>Ereynetes</i> sp.                                     | Leaves of orange  | 6                      | +           |
| <b>Eupodidae</b>   |   |                        |             |
| <i>Eupodes</i> sp.                                       | Leaves of orange  | 1, 2                   | +           |
| <b>Iolinidae</b>   |   |                        |             |
| <i>Pronematus</i> sp.                                    | Leaves of lime; fruits of orange and mandarin   | 1, 5, 6                | +++         |
| <b>Melicharidae</b>                                      |   |                        |             |
| <i>Proctolaelaps aegyptiacus</i> Nasr                    | Leaves of mandarin  | 3                      | +           |
| <i>P. holovertris</i> Moraes, Britto, Mineiro & Halliday | Leaves of mandarin  | 1, 2, 5, 6             | +++         |
| <i>Proctolaelaps pygmaeus</i> (Müller)                   | Leaves of lemon, <i>Citrus limon</i> (L.) Burm.f.; fruits of mandarin   | 1, 2, 5                | +++         |
| <b>Oribatulidae</b>                                      |   |                        |             |
| <i>Zygoribatula tadrosi</i> ? Popp                       | Fruits of grapefruit  | 1                      | +           |
| <b>Phytoseiidae</b>                                      |   |                        |             |
| <i>Amblyseius swirskii</i> Athias-Henriot                | Leaves of mandarin and grapefruit; leaves and fruits of orange  | 1, 2, 3                | +++         |
| <i>Euseius scutalis</i> (Athias-Henriot)                 | Leaves of orange  | 1                      | ++          |
| <i>Neoseiulus barkeri</i> Hughes                         | Lower leaves of orange and on bermuda grass, <i>Cynodon dactylon</i> (L.) Pers., associated with thrips         | 1, 2, 3, 4, 6          | +++         |
| <i>Proprioseiopsis messor</i> (Wainstein)                | Fruits of mandarin  | 1                      | +           |
| <i>P. ovatus</i>   | Lower leaves of grapefruit and orange   | 1, 2                   | +           |
| <i>Typhlodromus (Typhlodromus) pyri</i> Scheuten         | Leaves of mandarin and orange, associated with <i>E. orientalis</i> and tenuipalpid mites                       | 2, 3, 6                | +++         |
| <b>Raphignathidae</b>                                    |   |                        |             |
| <i>Raphignathus</i> sp.                                  | Leaves of mandarin  | 6                      | +           |
| <b>Stigmaeidae</b>                                       |   |                        |             |
| <i>Agistemus exsertus</i> González-Rodríguez             | Leaves of lime and mandarin   | 4                      | +++         |
| <i>Stigmaeus</i> sp.                                     | Lower leaves of mandarin  | 2                      | +           |
| <b>Tarsonemidae</b>                                      |   |                        |             |
| <i>Polyphagotarsonemus latus</i> (Banks) <sup>1</sup>    | Leaves of orange and mandarin; fruits of orange   | 1, 2, 3, 6             | +++         |
| <b>Tenuipalpidae</b>                                     |   |                        |             |
| <i>Brevipalpus phoenicis</i> (Geijskes)                  | Leaves and fruits of mandarin; leaves of lemon and lime   | 1, 2, 3, 4, 5, 6       | +++         |
| <i>Cenopalpus pulcher</i> (Canestrini and Fanzago)       | Leaves of mandarin and lemon  | 4                      | ++          |
| <i>Tenuipalpus eriophyoides</i> Baker                    | Leaves of lemon   | 1                      | ++          |
| <i>Tenuipalpus</i> sp.                                   | Leaves of lemon   | 1                      | +           |
| <b>Tetranychidae</b>                                     |   |                        |             |
| <i>Eutetranychus orientalis</i> (Klein)                  | Leaves of orange, mandarin, grapefruit, lime and lemon; fruits of mandarin, grapefruit and orange; buds of lime | 1, 2, 3, 4, 5, 6, 7, 8 | +++         |
| <i>Oligonychus</i> sp.                                   | Leaves of mandarin  | 1, 2, 8                | ++          |
| <i>Tetranychus urticae</i> Koch                          | Leaves of orange, grape fruit and lime  | 1, 2, 7                | ++          |
| <i>Tetranychus</i> sp.                                   | Leaves of orange  | 6                      | +           |
| <b>Tydeidae</b>  |   |                        |             |
| <i>Tydeus</i> sp.  | Fruits of orange  | 1                      | +           |

<sup>1</sup> New host record in Egypt.

\* (1) Assiut; (2) Abuteeg; (3) Elbadary; (4) Sahel Seleim; (5) Sedfa; (6) Manfalout; (7) Elghanayem; (8) Elfatah.

\*\* (+) few numbers; (++) moderate numbers; (+++) high numbers.

The citrus brown mite, *Eutetranychus orientalis* (Klein, 1936) is a primarily pest of citrus and was reported from many parts of the world. *E. orientalis* was firstly reported from Egypt by Sayed (1942). It feeds on the upper side of the leaves close to the midrib. It is widespread on citrus trees in Assiut Governorate (Salman *et al.*, 1975; Darwish, 1976). This species can be observed by its egg shells' numbers and exuviae on the leaves. *E. orientalis* seems to reach very high population levels causing extensive yellowish discoloration of the citrus leaves in the studied areas. On the other hand, the red and black flat mite, *Brevipalpus phoenicis* (Geijskes, 1939) is a harmful species on citrus in many parts of the world including Egypt (Zaher *et al.*, 1970; Rasmy *et al.*, 1972; Salman *et al.*, 1975; Rahil and Abd-El-Halim, 2000; Halawa and Fawzy, 2014). Certain citrus species are liable to be severely attacked by this pest mite. Further observations will provide better insight into this. The broad mite, *Polyphagotarsonemus latus* (Banks, 1904), firstly recorded from citrus in Egypt, was extensively found on leaves of orange and seems to be an important pest of this crop especially in Manfalout district, based on its high densities and subsequent discoloration of leaves. The phytophagous flat mites, *Cenopalpus pulcher* (Canestrini and Fanzago, 1876) and *Tenuipalpus eriophyoides* Baker, 1948 were found in moderate numbers infesting the leaves of lemon and mandarin in Sahel Seleim and Assiut districts. Although the citrus bud mite, *Aceria sheldoni* (Ewing, 1937) and the citrus

rust mite, *Phyllocoptruta oleivora* (Ashmead, 1879) (Eriophyidae) were commonly reported from the northern parts of Egypt, they were missed in the present survey. This maybe mainly due to their adaptability to high humidity conditions (Jeppson *et al.*, 1975) which is not available in central and southern parts of Egypt.

Predatory species mostly belong to the families Phytoseiidae, Stigmaeidae and Cheyletidae. *Amblyseius swirskii* Athias-Henriot, 1962 and *Typhlodromus (Typhlodromus) pyri* Scheuten, 1857 were the most numerous phytoseiid species. They were commonly found on mandarin and orange leaves mostly in association with *E. orientalis* and tenuipalpid species. *Neoseiulus barkeri* Hughes, 1948 was found on lower leaves of orange and on bermuda grass, *Cynodon dactylon* (L.) Pers. (Poaceae) directly in association with thrips. Among other predatory species recorded, *Cheletogenes ornatus* (Canestrini and Fanzago, 1876) and *Hemicheyletia bakeri* (Ehara, 1962) were reported in high numbers especially on leaves and fruits of mandarin. It is good to note that *H. bakeri* was found preying on citrus red mite, *Panonychus citri* (McGregor) in Ehime prefecture of Japan (Razaq *et al.*, 2001), which indicates that it may work well against *E. orientalis*.

In conclusion, this preliminary survey of citrus mites in Assiut has shown a diverse mite fauna, characterized by high numbers of predatory species. The high abundance of predatory phytoseiid species may be related to the extensive use of pesticides, hopefully to have some resis-

tant strains of predators. Care should be taken for such control tactic.

### Acknowledgements

The authors would like to thank citrus farmers for permission to visit their orchards and sample their trees. We appreciate the cooperation of Prof. Abdelrady K. Nasr (National Research Center, Giza) in the identification of the blattisociid and oribatid species and Dr. Reham Abo-Shnaf (Agriculture Research Center, Giza) for the melicharids. Many thanks for Prof. Farouk Mostafa and Dr. Rashad Abdelwahab (Department of Pomology, Assiut University) for providing valuable information about citrus trees in Assiut.

### References

- Abdelgayed, S.A., Negm, M.W., Eraky, S.A. and Helal, T.Y. 2015. Checklist of citrus mites (Acari) of Egypt. *Acarines*, 9: 85-94.
- Abo-Korah, S.M. 1981. Survey and population density of the tarsonemine mites under citrus trees in Monoufeia Governorate, Egypt. *Bulletin de la Société Entomologique d'Égypte*, 63: 13-18.
- Abo-Shnaf, R.I.A. and Moraes, G.J. de. 2014. Phytoseiid mites (Acari: Phytoseiidae) from Egypt, with new records, descriptions of new species, and a key to species. *Zootaxa*, 3865(1): 1-71.
- Ashmead, W.H. 1879. Injurious and beneficial insects found on the orange trees of Florida. *Canadian Entomologist*, 11(8): 159-160.
- Athias-Henriot, C. 1962. *Amblyseius swirskii*, un nouveau phytoseiidae voisin d'*A. Andersoni* (Acariens: anactinotriches). *Annales de l'École Nationale d'Agriculture d'Alger*, 3(5): 1-7.
- Atyeo, W.T. 1960. A revision of the mite family Bdellidae in North and Central America (Acarina, Prostigmata). *University of Kansas Science Bulletin*, 40: 345-499.
- Baker, E.W. 1948. A new tetranychid mite which further indicates a phylogenetic relationship between the Tetranychidae and Eriophyidae. *Proceedings of the Entomological Society of Washington*, 50(3): 59-60.
- Banks, N. 1904. Four new species of injurious mites. *Journal of the New York Entomological Society*, 12: 53-56.
- Canestrini, G. and Fanzago, F. 1876. Nuovi Acari Italiani (sec. ser.). *Atti Accademia di Scienze Veneto Trentina Istriana*, 5: 130-142.
- Chant, D.A. and McMurtry, J.A. 2007. Illustrated keys and diagnoses for the genera and subgenera of the Phytoseiidae of the world (Acari: Mesostigmata). *West Bloomfield, Michigan: Indira Publishing House*. pp. 219.
- Darwish, Y.A. 1976. Interrelationship between the scale insects and the mites on citrus orchards. *MSc. Thesis, Fac. Agric. Assiut Univ.*, pp. 138.
- Eghbalian, A.H., Khanjani, M., Safaralizadeh, M.H. and Ueckermann, E.A. 2016. New species of *Hexabdella* and *Neomolgus* (Acari: Prostigmata: Bdellidae) from Iran. *Zootaxa*, 4072: 291-300.
- Ehara, S. 1962. Mites of greenhouse plants in Hokkaido, with a new species of Cheyletidae. *Annotationes Zoologicae Japonenses*, 35(2): 106-111.
- Ewing, H.E. 1937. A new eriophyid mite from lemon trees (Acarina: Eriophyidae). *Proceedings of the Entomological Society of Washington*, 39: 193-194.
- Fain, A., Bochkov, A.V. and Corpuz-Raros, L.A. 2002. A revision of the *Hemicheyletia* generic group

- (Acari: Cheyletidae). *Bulletin de L'institut Royal des Sciences Naturelles de Belgique, Entomologie*, 72: 27-66.
- Fan, Q-H. and Zhang, Z-Q. 2005. Raphignathoidea (Acari: Prostigmata), vol 52, Fauna of New Zealand. *Manaaki Whenua Press, Lincoln/Canterbury*, pp. 396.
- FAOSTAT. 2008. FAO Statistics Division, 2008.
- GAIN-USDA. 2015. Egypt, Citrus Annual. Global Agricultural Information Network, *USDA Foreign Agricultural Service*. pp. 8.
- Geijskes, D.C. 1939. Beiträge zur kenntnis der europäischen spinnmilben (Acari: Tetranychoida), mit besonderer berücksichtigung der Niederländischen arten. *Mededeelingen van de Landbouwoogeschool-Wageningen*, 42: 1-68.
- González-Rodríguez, R.H. 1963. Four new mites of the genus *Agistemus* Summers, 1960 (Acarina: Stigmaeidae). *Acarologia*, 5(3): 342-350.
- Halawa, A.M. and Fawzy, M. 2014. A new species of *Brevipalpus* Donnadieu (Acari: Tenuipalpidae) and key to the Egyptian species. *Zootaxa*, 3755(1): 87-95.
- Jeppson, L.R., Keifer, H.H. and Baker, E.W. 1975. Mites injurious to economic plants. *Berkely (USA): University of California Press*. pp. 614.
- Kandeel, M.M.H. and Nassar, O.A. 1986. Field observations on the predatory mites of citrus pests along with a key to the Egyptian species (Acari). *Bulletin de la Société Entomologique d'Égypte*, 66: 169-176.
- Khanjani, M. and Ueckermann, E.A. 2002. The stigmaeid mites of Iran (Acari: Stigmaeidae). *International journal of Acarology*, 28: 317-339.
- Klein, H.Z. 1936. Contributions to the knowledge of the red spiders in palestine. 1. The Oriental red spider, *Anychus orientalis* Zacher. *Hadar*, 9: 107-112.
- Lindquist, E.E. and Moraza, M.L. 2012. A new genus of fungus-inhabiting mites of the family Blattisociidae (Acari Mesostigmata Phytoseioidea) from Costa Rica, with an updated key to genera of the subfamily Blattisociinae. *Redia*, 95: 9-19.
- Mesa, N.C., Ochoa, R., Welbourn, W.C., Evans, G.A. and Moraes, G.J. de. 2009. A catalog of the Tenuipalpidae (Acari) of the world with a key to genera. *Zootaxa*, 2098: 1-185.
- Meyer, M.K.P. (Smith). 1979. The Tenuipalpidae (Acari) of Africa With keys to the world fauna. *Entomology Memoir. Department of Agriculture Technical Service, Republic of South Africa*, 50. pp. 135.
- Moraes, G.J. de., Abo-Shnaf, R.I.A., Perez-Madruga, Y., Sanchez, L., Karmakar, K. and Ho, C.C. 2015. The *Lasioseius* phytoseioides species group (Acari: Blattisociidae): new characterisation, description of a new species, complementary notes on seven described species and a taxonomic key for the group. *Zootaxa*, 3980: 1-41.
- Negm, M.W. and Mesbah, A.E. 2014. Review of the mite family Cheyletidae (Acari: Trombidiformes: Cheyletoidea) of Egypt. *International Journal of Acarology*, 40(5): 390-396.
- Negm, M.W., Alatawi, F.J. and Aldryhim, Y.N. 2012. A new species of *Neoseiulus* Hughes, with records of seven species of predatory mites associated with date palm in Saudi Arabia (Acari: Phytoseiidae). *Zootaxa*, 3356: 57-64.
- Nucifora, A. and Vacante, V. 2004. Citrus mites in Italy. VII. The family

- Tarsonemidae. Species collected and notes on ecology. *Acarologia*, 44(1-2): 49-67.
- Olivier, P.A.S. and Theron, P.D. 1997. The genus *Eupodes* Koch, 1835 (Acari: Prostigmata: Eupodidae) from southern African soil and vegetation. Part I: Characterisation of the genus, designation of the type species and descriptions of three new species. *Koedoe*, 40: 1-17.
- Omukunda, E., Theron, P.D. and Ueckermann, E.A. 2012. *Spinibdella* Thor (Acari: Bdellidae) from southern Africa: descriptions of five new species and the redescription of *S. thori* (Meyer and Ryke). *Zootaxa*, 3304: 1-24.
- Otto, J.C. 1999. The taxonomy of *Tarso-tomus* Berlese and *Paratarsotomus* Kuznetsov (Acarina: Anystidae: Erythracarinae) with observations on the natural history of *Tarsotomus*. *Invertebrate Taxonomy*, 13: 749-803.
- Rahil, A.A.R. and Abd-El-Halim, S.M. 2000. Survey and population studies of dominant mites associated with three citrus species at Fayoum Governorate. *Menofia Journal of Agricultural Research*, 25(5): 1241-1253.
- Rasmy, A.H., Zaher, M.A. and Al-bagoury, M.E. 1972. Mites associated with citrus in the Nile Delta (U.A.R.). *Zeitschrift für Angewandte Entomologie*, 70: 183-186.
- Razaq, A., Shiraishi, M., Manabe, T. and Ohbayashi, N. 2001. External features of cheyletid predatory mite, *Hemicheyletia bakeri* (Ehara) found in citrus orchards of Japan. *Pakistan Journal of Biological Sciences*, 4(5): 597-601.
- Salman, A.G.A., Negm, A.A., Abou-Ghadir, M.F., Ali, A.M. and Darwesh, A.Y. 1975. Seasonal trends of citrus mites, *Eutetranychus orientalis* (Klein) and *Brevipalpus phoenicis* (Geijskes), and the role of predaceous mites, total nitrogen and total carbohydrates in relation to degree of infestation of citrus trees. *Assiut Journal of Agricultural Sciences*, 6(4): 127-140.
- Sayed, M.T. 1942. Contribution to the knowledge of Acarina of Egypt. IV. The Genus *Anychus* McGregor [Tetranychidae]. *Bulletin de la Societe Fouad I<sup>er</sup> Entomologique*, 26: 125-131.
- Scheuten, A. 1857. Einiges über Milben. *Archiv für Naturgeschichte*, 23: 104-112.
- Skvarla, M.J., Fisher, J.R. and Dowling, A.P.G. 2014. A review of Cunaxidae (Acariformes, Trombidiformes): Histories and diagnoses of subfamilies and genera, keys to world species, and some new locality records. *ZooKeys*, 418: 1-103.
- Swift, S.F. 1996. Hawaiian Raphignathoidea: Family Caligonellidae (Acari: Prostigmata), with description of five new taxa and a key to genera and species. *Annals of the Entomological Society of America*, 89: 313-327.
- Ueckermann, E.A. and Grout, T.G. 2007. Tydeoid mites (Acari: Tydeidae, Edbakerellidae, Iolinidae) occurring on *Citrus* in southern Africa. *Journal of Natural History*, 41: 2351-2378.
- Zaher, M.A. 1984a. Survey and Ecological Studies on Phytophagous, Predaceous and Soil Mites in Egypt. 1. Phytophagous mites in Egypt (Nile Valley and Delta). PL. 480 Programme U.S.A., Project No. EG\_ARS\_30. Grant No. FG\_EG\_139. pp. 228.
- Zaher, M.A. 1984b. Survey and Ecological Studies on Phytophagous, Predaceous and Soil Mites in Egypt. III. Mites of Sinai. PL. 480 Pro-

- gramme U.S.A., Project No. EG\_ARS\_30. Grant No. FG\_EG\_139. pp. 36.
- Zaher, M.A. 1986. Survey and Ecological Studies on Phytophagous, Predaceous and Soil Mites in Egypt. II-A: Predaceous and Nonphytophagous Mites (Nile Valley and Delta). Text. PL. 480 Programme U.S.A., Project No. EG\_ARS\_30, Grant No. FG\_EG\_139. pp. 567.
- Zaher, M.A., Wafa A.K., Ali M.M. and Rasmy, A.H. 1970. Survey of mites associated with citrus trees in Egypt and Gaza Strip. *Bulletin de la Société Entomologique d’Egypte*, 54: 73-79.
- Zhang, Z.-Q. 2003. Mites of Greenhouses: Identification, Biology and Control. *CAB International*. pp. 244.

الحلم الضار والمفترس القاطن لأشجار الموالح في محافظة أسيوط، مصر العليا  
عبد الجيد صلاح عبد الجيد<sup>١</sup>، محمد وليد نجم<sup>٢</sup>، السيد على العراقي<sup>٢</sup>، طه يوسف هلال<sup>٢</sup>،  
صابر فهيم محمود موسى<sup>١</sup>

<sup>١</sup> معهد بحوث وقاية النباتات، مركز البحوث الزراعية، الدقي، الجيزة، مصر  
<sup>٢</sup> قسم وقاية النبات، كلية الزراعة، جامعة أسيوط، ٧١٥٢٦ أسيوط، مصر

### الملخص

تلعب الأكاروسات دوراً هاماً في إنتاج الموالح سواء كآفات ضارة أو مفترسات نافعة. وبناءً على الأعمال البحثية المنشورة، تم تسجيل ١٤٩ نوع من الحلم ضمن ٣٩ فصيلة من بساتين الموالح في مصر. تم إجراء دراسة حصرية في الفترة من أكتوبر ٢٠١٤م إلى فبراير ٢٠١٦م في ٢٨ مزرعة من ثمانية مراكز تابعة لمحافظة أسيوط، مصر، لتحديد التركيب النوعي للحلم الضار والمفترس. تم أيضاً تسجيل التواجد والتوزيع للأنواع ذات الأهمية الإقتصادية. أخذت العينات كل اسبوعين من الأوراق النباتية والبراعم والثمار، وقد سجلت كل من هذه الأنواع الضارة، حلم الموالح البني (*Eutetranychus orientalis* (Klein, 1936)، الحلم المبطن الأحمر والأسود (*Brevipalpus phoenicis* (Geijskes, 1939) والحلم العريض (*Polyphagotarsonemus latus* (Banks, 1904) بكثافة عالية باعتبارها الأكثر شيوعاً. كما سجلت العديد من الأنواع المفترسة التابعة لأكثر من فصيلة مثل: *Amblyseius swirskii* Athias-Henriot, 1962 و *Typhlodromus (Typhlodromus) pyri* Scheuten, 1857 من فصيلة Phytoseiidae، والحلم *Agistemus exsertus* Gonzalez-Rodrigues, 1963 من فصيلة Stigmaeidae، واعتبرت هذه الأنواع الثلاثة هي الأكثر وفرة على أوراق اليوسفي والليمون والبرتقال، في حين أن الأنواع *Cheletogenes ornatus* (Canestrini & Fanzago, 1876) و *Hemicheyletia bakeri* (Ehara, 1962) من فصيلة Cheyletidae لوحظ أغلبها على الثمار. يعتبر تسجيل العديد من الأنواع الأكاروسية المفترسة على أشجار الموالح خطوة هامة نحو كيفية تفعيل الإستفادة منها مستقبلياً في برامج مكافحة البيولوجية.