Phytophagous Mites and their Natural Enemies Associated with Common Vegetables at Ismailia Governorate

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ABSTRACT

Survey was conducted to identify mite species from three locations at Ismailia governorate: Al-Manayef area (Cairo road), Abo-Balah area (Suez road) and the Faculty of Agriculture farm, Suez Canal University. Phytophagous, predaceous and miscellaneous feeding mite species on vegetables were collected during 2010 and 2011. Taxa reported the occurrence of 26 species representing 19 genera of 10 families. Among the species, 12 belong to Gamasida, 14 to Actinedida, of which two species are recorded for the first time in Egypt. Most of the collected mites are phytophagous (six species) dominated by Tetranychidae. Eighteen species belonging to seven families and two orders are considered predators. Among them, *Neoseiulus enab* El–Badry and *Phytoseiulus persimilis* Athias-Henriot were the most common predators on plants of the study areas.

Key Words: Survey, Mites, New records, Vegetables, Ismailia governorate.

INTRODUCTION

Vegetable plants harboured many harmful and beneficial organisms. The tetranychid mite, *Tetranychus urticae* Koch is the major and worldwide mite pest species on agricultural crops (Alatawi *et al*., 2005). This species is the most common mite widely spread in Egypt on vegetables, especially soybean, cucurbits, squash and okra (Zaher, 1984). It is common in greenhouses where it is an important pest of vegetables (beans, capsicum, cucumbers, egg plant, tomato, melon, strawberries, etc.). Many investigators surveyed several species of phytophagous insects and mites that infest vegetables all over the world (Hassan *et al.*, 1986 and Rai & Indraject, 2011). The objective of the present investigation was to survey mite species infesting vegetables in three locations of Ismailia governorate.

MATERIALS AND METHODS

Survey was conducted on vegetables growing areas at Ismailia governorate during 2010 and 2011.The vegetable samples were collected from three locations, representing Al-Manayef area (Cairo road), Abo-Balah area (Suez road) and Faculty of Agriculture farm, Suez Canal University. The samples included 17 species of vegetables representing foliage and debris. These were collected from strawberry (*Fragaria ananassa*), broccoli (*Brassica oleracea*), eggplant (*Solanum melongena*), watermelon (*Citrullus lanatus*), cucumber (*Cucumis sativus*), okra (*Hibiscus esculentus*), squash (*Cucurbita pepo*), pepper (*Capsicum annum*), cowpea (*Vigna unguiculata*), tomato (*Lycopersicon esculentum*), kidney bean (*Phaseolus vulgaris*), potato **(***Solanum tuberosum* spp.), cabbage (*Brassica oleracea*), peas **(***Pisum sativum*), broad bean (*Vicia faba*), cantaloupes *(Cucumis melo*) and *onion* (*Allium cepa*). The samples were collected and kept in separate polyethylene bags, and brought to the laboratory for examination. The leaf samples were directly examined by stereo–microscope; the debris samples extracted by using modified Tullgren funnel. All mite individuals were mounted in Hoyer's medium. The identification of mites was based on illustrated scientific keys.

RESULTS AND DISCUSSION

The study aimed to survey the different mite species on vegetables in three locations at Ismailia governorate for two years from January 2010 to December 2011. The examined samples proved the occurrence of 26 different mite species belong to 19 genera of 10 families as follows (Table 1).

a) **Phytophagous mites**

The phytophagous mites of this study were represented by two families, Tetranychidae (five species), *Tetranychus urticae* Koch, ***T. cucurbitacearum*** (Sayed), *Oligonychus punicae* (Hirst), ***O. afrasiaticus*** (McGregor), *Eutetranychus africanus* Tücker; and Tenuipalpidae (one species),

Table (1): Survey on mites inhabiting vegetables in three locations at Ismailia governorate

Family	Species	Plants	Locality
Tetranychidae DONNADIE	*Tetranychus cucurbitacearum* (Sayed)	Eggplant, Kidney bean, Tomato, Cucumber, Potato, Pepper, Squash, Strawberry, Cowpea, Peas	Al-Manayef area (Cairo road) and Faculty of Agriculture farm, Suez Canal
	T. urticae Koch	Eggplant, Kidney bean, Tomato, Cucumber, Potato, Squash, Cabbage, Water melon, Cantaloupes, Strawberry, Cowpea, Peas	Al-Manayef area(Cairo road), Abo-Balah area (Suez road) and Faculty of Agriculture Farm, Suez Canal
	Oligonychus punicae (Hirst)	Kidney bean, Tomato, Cucumber, Squash, Water melon, Cantaloupes, Eggplant, Broccoli	Abo-Balah area (Suez road) and Faculty of Agriculture Farm, Suez Canal
	O. afrasiaticus McGregor	Broccoli	Fac. of Agriculture Farm, Suez Canal
	Eutetranychus africanus(Tücker)	Squash, Cucumber, Eggplant, Strawberry	Faculty of Agriculture Farm, Suez Canal
Tenuipalpidae BERLESE	*Brevipalpus obovatus* Donnadieu	Kidney bean, Tomato, Cucumber, Squash	Abo-Balah area (Suez road)
Tydeidae KRAMER	*Tydeus californicus* (Banks)	Cabbage , Squash, Onion	Al-Manayef area(Cairo road) and Abo-Balah area (Suez road)
	T. costensis Baker	Onion, Water melon, Cantaloupes, Eggplant	Abo-Balah area (Suez road)
Cheyletidae LEACH	*Cheyletus trouessarti** Oudemans	Kidney bean (debris)	Al-Manayef area (Cairo road)
	C. malaccensis Oudemans	Strawberry (debris)	Abo-Balah area (Suez road)
Cunaxidae THOR	*Cunaxa vestus** (Den Heyer)	Eggplant, Cowpea, peas	Faculty of Agriculture Farm, Suez Canal
Stigmaeidae OUDEMANS	*Agistemus exsertus* Gonzalez	Onion	Abo-Balah area (Suez road)
	A. vulgaris Soliman & Gomaa	Eggplant, Cowpea, peas	Faculty of Agriculture Farm, Suez Canal
Raphignathidae KRAMER	*Raphignathus niloticus* Rakha & Mohamed	Cucumber, Squash, Eggplant, Strawberry (debris)	Faculty of Agriculture Farm, Suez Canal
Phytoseiidae BERLESE	*Euseius scutalis* (Athias-Henriot)	Eggplant, Kidney bean, Tomato, Cucumber, Potato	Al-Manayef area (Cairo road)
	E. plumerii Abo-Shnaf & Romeih	Eggplant, Kidney bean, Tomato, Cucumber, Squash, Peas, Water melon, Cantaloupes, Strawberry, Cowpea	Abo-Balah area (Suez road)and Faculty of Agriculture Farm , Suez Canal
	Neoseiulella schusteri (Yousef &El-Brollosy)	Eggplant, Kidney bean, Tomato, Cucumber, Potato, Squash, Strawberry	Al-Manayef area (Cairo road), Abo-Balah area (Suez road) and Faculty of Agriculture Farm, Suez Canal
	Neoseiulus enab El–Badry	Eggplant, Kidney bean, Tomato, Cucumber, Potato, Squash, Cabbage, Strawberry, Okra , Water melon, Cantaloupes	Al-Manayef area (Cairo road), Abo-Balah area (Suez road) and Faculty of Agriculture Farm, Suez Canal
	Phytoseiulus persimilis Athias-Henriot	Eggplant, Kidney bean, Tomato, Cucumber, Potato, Squash, Water melon, Cantaloupes, Strawberry	Al-Manayef area (Cairo road), Abo-Balah area (Suez road) and Faculty of Agriculture Farm, Suez Canal
	Phytoseius finitimus Ribaga	Cabbage, Squash	Al-Manayef area (Cairo road)
	Typhlodromus athiasae Porath & Swirski	Cabbage, Squash, Eggplant, Kidney bean, Tomato, Cucumber, Potato, Strawberry	Al-Manayef area (Cairo road) and Faculty of Agriculture Farm, Suez Canal
	T. pyri Scheuten	Cucumber	Abo-Balah area (Suez road)

Table (1) continued:

Family	Species	Plants	Locality
Phytoseiidae BERLESE	*Amblyseius zaheri* Yousef & El-Brollosy	Peas, Eggplant, Cowpea	Abo-Balah area (Suez road) and Faculty of Agriculture Farm, Suez Canal
	Tphlodromips swirski Athias-Henriot	Kidney bean, Tomato, Strawberry, Cucumber, Squash, Eggplant, Cowpea, Peas	Abo-Balah area (Suez road) and Faculty of Agriculture Farm, Suez Canal
Ascidae VOIGTS AND OUDEMANS	*Protogamasellus bifurcalis* Genis, Loots & Ryke	Broad bean (foliage and debris)	Faculty of Agriculture Farm, Suez Canal
Ologamasidae RYKE	*Gamasiphis denticus* Hafez & Nasr	Broccoli (foliage and debris)	Faculty of Agriculture Farm, Suez Canal

*= Fristly recorded

Brevipalpus obovatus Donnadieu.

All of these species were found on the lower surface of leaves.

b) **Predaceous mites**

The predaceous mites in this study were represented as seven different families namely; Phytoseiidae**,** ten species**:** *Phytoseiulus persimilis* Athias-Henriot**,** *Euseius scutalis* (Athias-Henriot)**,** *Neoseiulus enab* El–Badry**,** *Typhlodromus athiasae* Porath & Swirski**,** *Neoseiulella schusteri* (Yousef & El–Brollosy)**,** *Phytoseius finitimus* Ribaga**,** *Typhlodromips swirski* Athias-Henriot**,** *Euseius plumerii* Abo-Shnaf & Romeih**,** *Amblyseius zaheri* Yousef & El Brollosy and *Typhlodromus pyri* Scheuten; Cheyletidae, two species (*Cheyletus trouessarti* Oudemans and *Cheyletus malaccensis* Oudemans**);** Stigmaeidae, two species (*Agistemus exsertus* Gonzalez, *A. vulgaris* Soliman & Gomaa); Raphignathidae, one species (*Raphignathus niloticus* Rakha & Mohamed)**;** Ologamasidae, one species (*Gamasiphis denticus* Hafez & Nasr); Cunaxidae, (one species): *Cunaxa vestus* (Den Heyer); and Ascidae, one species (*Protogamasellus bifurcalis* Genis Loots & Ryke) (Table 1).

C) **Miscellaneous feeding mites**

Two members of the family Tydeidae were recorded. These are (*Tydeus californicus* Banks and *Tydeus costensis* Baker) which considered of miscellaneous feeding habits (Zaher, 1984) (Table1).

Studying the mites associated with vegetables at Ismailia governorate is very rare compared with fruits. This may be due that cultivated fruit area is larger than that of vegetables. In this study, the different mites inhabiting vegtables leaves, twigs and debris were conducted during the two consecutive seasons 2010 and 2011. Some of these species were collected by Hassan *et al*. (1986) who surveyed mites inhabiting desert plants and newly reclaimed lands in Sinai Peninsula; and documented the occurrence of 110 species belonging to 68 genera and 34 families. In addition, other species were reported by Zaher et *al*. (1982) who collected twelve genera and thirty-three species of the family Tetranychidae from Egypt. Farrag (1975) studied the distribution of *T. urticae* and *T. cucurbitacearum* and their population densites on cotton, eggplant and associated weeds at Damiette, Qalyobia and Assiut regions. He reported that, *T. urticae* was the most prevalent species in Egypt, whereas *T. cucurbitacearum* is confined to Delta and few areas in Upper Egypt. He also recorded twenty-three host plants for *T. urticae* and nine hosts for *T. cucurbitacearum*. Abo El-Ghar and Osman (1973) surveyed mites on onion leaves, stem and seed stalks; and reported that, *Petrobia latens* (Müller) was the most serious mite. The second phytophagous mite *T. cucurbitacearurn* and the predaceous mites *Typhlodromus* sp. and *Cheyletia wellsei* (Baker) were collected in very few numbers. Al-Atawi (2011) investigated phytophagous and predatory mites associated with vegetable plants in Riyadh, Saudi Arabia. Eight phytophagous and 10 predacious mites were collected from 14 species of vegetable crops covering five major production localities.

Also some investigations were carried out in many countries, Özsisli and Çobanoğlu (2011) collected phytophagous and predatory mite species on vegetables during 1997–2000 in Kahramanmaras, Turkey. These included the phytophagous mites, *Tetranychus turkestani* (Ugarov & Nikolski) and *T. cinnabarinus* Boisduval and the predatory mites, *Phytoseius finitimus* Ribaga and *Amblyseius andersoni* (Chant) from eggplant and cucumber, respectively. Rai and Indraject (2011) recorded ten

mite species on 15 commonly grown vegetables in Varanasi and Azamgarh districts India. Out of these, six species belonged to Tetranychidae, two of Tenuipalpidae and one species each to Eriophyidae and Tarsonemidae. Fiaboe *et al*. (2007) reported that, a total of 56,445 mites and insects were found on 20 different species of solanaceous plants. *Tetranychus evansi* Baker & Pritchard was found on *Solanum americanum* Mill. and *Lycopersicon esculentum* Mill.. Rosa *et al*. (2005) reported that, a total of 27 species were found in coastal Pernambuco, Brazil; of which the most common were the phytophagous species, *T. evansi* and *Brevipalpus phoenicis* (Geijskes), and the predaceous species, *Asca* sp., *Phytoseius guianensis* De Leon and *Paraphytoseius orientalis* (Narayanan, Kaur & Ghai) of the most abundant native solanaceous plants.

Among the collected species, two are firstly recorded on plants or in debris. One species blongs to the family Cunaxidae: *Cunaxa vestus* (Den Heyer); and the other one belongs to the family Cheyletidae: *Cheyletus trouessarti* Oudemans. These findings are parallel to those presented by Hassan (1979) who reported three mite species of the genus *Cheyletus* for the first time in Egypt, as fellows: *C. baloghi* Volgin, *C aversor* Rohdendorf and *C. cacahuamilpensis* Baker.

REFERENCES

Abo El-Ghar, M. R. and Osman, A. A. 1973. Ecological and control studies on mites associated with onion in Egypt. J. Appl. Entomol., 73 (1-4): 439–442.

Al-Atawi, F. A. 2011. Phytophagous and predaceous mites associated with vegetable crops from Riyadh, Saudi Arabia. Saudi J. Biol. Sci., 18: 239–246.

Alatawi, F. J; Opit, G. P.; Margolies, D. C. and Nechols, J. R. 2005. Within-Plant Distribution of Two-spotted Spider Mite (Acari: Tetranychidae) on Impatiens: Development of a Presence–Absence Sampling Plan. J. Econ. Entomol., 98(3): 1040-1047.

Farrag, A. M. I. 1975. Biological and Ecological studies on family Tetranychidae. Ph. D. Thesis, Fac. Agric., Cairo Univ., Egypt. 152 pp.

Fiaboe, K. M; Gondim, M. C; Moraes, G. J. De; Ogol, C. P. O. and Knapp, M. 2007. Surveys for natural enemies of the tomato red spider mite *Tetranychus evansi* (Acari: Tetranychidae) in northeastern and southeastern Brazil. Zootaxa, 1395: 33–58.

Hassan, M. F. 1979. Studies on soil prostigmatid mites. Ph. D Thesis, Fac. Agric., Cairo Univ., Egypt. 172 pp.

Hassan, M. F.; Afifi, A. M. and Nawar, M. S. 1986. Mites inhabiting plants and soil in Sinai and newly reclaimed lands. Bull. Soc. Ent. Egypte, 66: 211-225.

Özsisli, T. and Çobanoğlu, S. 2011. Mite (Acari) fauna of some cultivated plants from Kahramanmaraş, Turkey. Afr. J. Biotechnol.,10 (11): 2149-2155.

Rai, S. N. and Indrajeet. 2011. Note on phytophagous mites associated with common vegetables in Varanasi and Azamgarh districts of Eastern Uttar Pradesh India. J. Insect Sci., 24(2): 199-200.

Rosa, A. A.; Gondim Jr., M. G. C.; Fiaboe, K. K. M.; Moraes, G. J. de and Knapp, M. 2005. Predatory mites associated with *Tetranychus evansi* Baker & Pritchard (Acari: Tetranychidae) on native solanaceous plants of Coastal Pernambuco State, Brazil. Neotropical Entomol., 34(4): 689-692.

Zaher, M. A. 1984. 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, 228pp.

Zaher, M. A.; Gomaa, E. A. and El-Enany, M. A. 1982. Spider mites of Egypt (Acari: Tetranychidae). Internat. J. Acarol., 8 (2): 91-114.