

INCIDENCE OF MITES INHABITING LEAVES AND SOIL OF SUGAR BEET AT FAYOUM AND BENI-SUEF GOVERNORATES , EGYPT

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ABSTRACT

Mites inhabiting sugar beet (*Beta vulgaris* L.) plants and soil at Fayoum and Beni-suef governorates were surveyed during season 1998 - 1999. The survey revealed the occurrence of 56 mite species which classified into three main groups according to their feeding habits. Of these, three species are phytophagous, 31 species are predaceous and 22 species are omnivorous mites. Also, the population density of aerial and ground mites inhabiting sugar beet leaves and soil were greater in Fayoum (558 indiv./50 leaves & 1550 indiv./500 grams soil) than in Beni-suef (404&470), respectively during season 1998/1999

INTRODUCTION

During recent years, there has been an expansion in sugar beet (*Beta vulgaris* L.) cultivation for sugar industry in Egypt. The cultivated area reached about 350&44 feddans in Fayoum and Beni-suef governorates during 1998 then increased to 1152&1552 feddans in the same previous governorates during 1999 respectively. However no work has been done the concerning survey of mites associated with this crop in that region .Ludecke&Winner(1966)in Germany,Markov & Isakulova (1982) in USSR,Dewer&Haylock (1995) in England,Stevens&Dewer (1996) in Chile,Legrand&Waulters (1997) in Belgium and Szilvasi et al (1998) in France found the phytophagous mite *Tetranychus spp.* on sugar beet plants .

In Egypt, Attiah (1969) recorded the *Caloglyphus betae* Attiah associated with stored sugar beet roots. On the other hands, Zaher & Mohamed (1980) found three mite species, *Tetranychus (Tetranychus) cucurbitacearum* Sayed, *Saniosulus nudus* Summers and *Tydeus californicus* Banks on sugar beet plants at Kafr El-Sheikh governorate ,as well as they recorded sixteen mite species inhabiting sugar beet soil.

Thus, it was felt necessary to undertake an extensive survey of different mite species inhabiting sugar beet plants and soil at Fayoum and Beni-suef governorates.

MATERIALS AND METHODS

During the course of this investigation ,fifty fresh leaves and five soil samples each of about 500 grams were randomly collected every two weeks during the season of 1998/1999 from two locations cultivated with sugar beet (*B. vulgaris*) variety Raspoly. The first site was Sanhor in Fayoum governorate and the second one was Somosta in Beni-suef governorate.

The area under investigation was left to natural infestation without using any pesticides. Leaves sample were directly examined under stereo-microscope, while soil mites were extracted by using modified Tullgren funnels. Unknown individual mites were mounted in Hoyer's medium on glass slides then microscopically examined for identification

Taxonomy system by Zaher (1986) was used as guide in identification ,also Reda et al (1991) for identification the members of Anystidae.

RESULTS AND DISCUSSION

Survey study revealed the occurrence of 56 mite species inhabiting sugar beet plants and soil in the two sites at Fayoum and Beni-suef governorates during the season of 1998/1999. Of these, three species were phytophagous, 31 species predaceous, while the remaining 22 species were omnivorous which feed on different types of food.

Incidence of mites inhabiting sugar beet leaves

Survey revealed the occurrence of 14 mite species belonging to eight different families and two sub-orders associated with sugar beet leaves as listed hereafter:

1- Sub-order: Actinedida

1-Family:Tetranychidae Donnadieu

In the two sites Sanhor (in Fayoum) and Somosta (in Beni- suef), only three tetranychid mite species *Tetranychus urticae* koch, *Bryobia cristata* (Duges) and *Petrobia lycopersici* Zaher, Gomaa&El-Enany were observed inhabiting sugar beet plants .

T. urticae prevailed throughout the season in the two sites. It was observed in great numbers in Fayoum (489 indiv./50 leaves) than Beni-suef (335 indiv./50 leaves) and it reached its peak of 380 and 292 indiv./ 50 leaves) in March 1999.The two latter species appeared only in Fayoum site and recorded with one individual for each species, it might be transferred to sugar beet land from clover land beside it.

In this respect, Markov &Isakulova (1982) in USSR, Legrand et al in Belgium (1997) and Szilvasi et al in France (1998) stated that *T. urticae* was the main pest causing damage of sugar beet. On the other hands, Zaher&Mohamed (1980) in Egypt found *T. cucurbitacearum* on sugar beet plants.

Key to collected species:

- 1-Empodium with tenent hairs, female with three pairs of anal setae and male with five pairs of genito-anal setae.....2
- Empodium absent, or if present, without tenent hairs, female with one or two pairs of anal setae and male with four pairs of genito anal setae
.....*Tetranychus urticae*

- 2-True claws uncinata, or if padlike, propodosoma with four well developed lobes, empodium padlike.....*Bryobia cristata*
- True claws pad like, empodium uncinata.....*Petrobia lycopersici*

2- Family: Stigmaeidae Oudemans

Agistemus exsertus Gonzalez was recorded with one individual in each site.

3- Family: Anystidae Oudemans

Neoaegyptocus chelicifurcata Reda&Gomaa was observed only in Fayoum site and recorded with 13 individuals. Thornhill&Heathcote (1987) in England observed the anystid mite *Anystis* sp on most count dates during 1978-1981 and they stated that it feeds on *Aphis fabae* Scopoli

4-Family: Eupodidae Koch

Only two individuals of the eupodid species *Eupodes niloticus* AbouAwad&El-Bagoury were found only in Fayoum site.

5- Family: Tydeidae Kramer

Data showed that only two tydeid species *Tydeus californicus* (Banks) and *Paralorryia gizai* El-Bagoury were found on plants with greater numbers in Beni-suef (60 indiv.) than in Fayoum (4 indiv.).

Key to collected mites:

- Striae transverse between second pair of hysterosomal dorsocentral setae*Tydeus californicus*
- Striae longitudinal between second pair of hysterosomal dorsocentral setae*Paralorryia gizai*

11- Sub-order: Gamasida

1 - Family: Phytoseiidae Berlese

Three phytoseiid species *Euseius scutalis* (Athias-Henriot), *Typhlodromus egypticus* El-Badry and *T. balanites* El-Badry were found on sugar beet plants only in Fayoum site. The former species was recorded with 35 individuals followed by the second (six individuals) and only one individual for the third one.

Key to collected species:

- 1- Dorsal shield with four pairs of prolateral setae.....*Euseius scutalis*
- Dorsal shield with five or six pairs of prolateral setae.....2
- 2- Setae s4, s5 and S5 short, seta j4 not reaching base of j5*Typhlodromus egypticus*
- Setae s4, s5 and S5 long, seta j4 reaching base of j5.....*T. balanites*

2- Family: Laelapidae Berlese

Ololaelaps bregetovae Shereef&Soliman and *Hypoaspis zachvatkinae* Shereef&Afifi were found to inhabit plants. The former species was recorded with the same rate (5 individuals) in Fayoum and Beni-suef sites, while the

second species was only observed in Beni-suef site with the rate of only one individual

Key to collected species:

- Female with anal shield fused with genitoventral shield, metasternal setae on sternal shield.....*Ololaelaps bregetovae*
- Female with anal shield free , metasternal setae not on sternal shield
.....*Hypoaspis zachvatkinae*

3- Family: Ameroseiidae Evans

Only three individuals of the ameroseiid mite *Kleemannia plumosus* (Oud.) were found on plants in Beni-suef site.

Occurrence of mites inhabiting soil underneath sugar beet

The total number of mites collected from soil underneath sugar beet from the two sites in Fayoum and Beni-suef governorates was 45 species in 25 families and four sub-orders. Most of the surveyed mites, 18 species in eleven families, belong to sub-order Actinedida followed by 17 species in nine families belong to Gamasida. Sub-order Oribatida includes eight species in four families, whereas only two species in one family belong to Acaridida as listed hereafter:

1-Sub-order:Actinedida

1-Family: Anystidae Oudemans

The anystid mite species *Neoagropytocus chelicifurcata* Reda&Gomaa was recorded with five individuals, only in Fayoum site associated with sugar beet soil.

2- Family: Bdellidae Duges

Two species of this family were observed in association with sugar beet soil in Fayoum and Beni-suef sites. *Cyta latirostris* (Hermann) was usually found in slightly greater number (12&7 indiv.) than *Spinibdella bifurcata* Atyeo (6&5 indiv.) in Fayoum and Beni-suef, respectively.

- 1-Chelicerae elongate, chela needle –like*Spinibdella bifurcata*
- Chelicerae and chela massive; unpaired median eye between the anterior pair of sensilla..... *Cyta latirostris*

3- Family: Cheyletidae Leach

Only one individual of *Ker bakeri* Zaher&Soliman was found in Fayoum site.

4- Family: Cunaxidae Thor

The three cunaxid species *Cunaxa capreolus* (Berlese), *C. setirostris* (Hermann) and *Pseudocunaxa simplex* (Ewing) were recorded in sugar beet soil. The first one was a dominant and recorded with (14 &17 indiv.) in both

Fayoum and Beni-suef sites. The other two species were found only in Fayoum. On the other hand, the second species was observed in greater numbers (14 indiv.) than the third one (2 indiv.) in the same site .

Key to collected species

- 1-Second dorsolateral seta (DI2) off dorsal shield,
.....*Pseudocunaxa simplex*
- Second dorsolateral seta (DI2) on dorsal shield..... 2
- 2-Idiosoma with dorsal shield divided into two parts, propodosomal and hysterosomal.....*Cunaxa capreolus*
- Idiosoma without hysterosomal shield
.....*Cunaxa setirostris*

5- Family: Eupodidae Koch

Eupodes voxencollinus Sig Thor was recorded in Beni-suef with higher numbers (138 indiv.) than in Fayoum site (26 indiv.).

6- Family: Raphignathidae Kramer

Eleven individuals of *Raphignathus niloticus* Rakha&Mohamed were collected from soil of sugar beet in only Fayoum site.

7- Family: Rhagidiidae Oudemans

Two species of this family were observed in association with sugar beet soil. *Robustrocheles*(R.) *mucronata*(Willmann) was usually found in both sites with greater numbers (16 indiv.) in Fayoum than Beni-suef (5 indiv.). *Coccorhagidia clavifrons* (Canestrini) was recorded only in Beni-suef site with four individuals.

Key to collected species:

- Trichobothria filiform; inner margin of digitus fixus reduced to sharp prebasal thorn, rhagidial organs I and II four and three rhagidial setae respectively.....
.....*Rhbustocheles mucronata*
- Trichobothria clavate, inner margin of digitus fixus without prebasal thorn; both rhagidial organs 1 and 11 four separate rhagidial setae
..... *Coccorhagidia clavifrons*

8- Family: Scutacaridae Oudemans

Two individuals of *Heterodispus chanti* Soliman&Kandeel were found only in Beni-suef site.

9- Family:Siteroptida Mahunka

Data showed that only the three siteroptid mite species *Siteroptes manurei* Soliman&Kandeel, *S. posterotruncata* Yousef&Kandeel and *S. serratesetae* Soliman&Kandeel were found in sugar beet soil. However, the former species prevailed throughout the season in the two sites with higher

numbers in February (150 indiv.) in Fayoum than Beni-suef site (4 indiv.). While the two latter species were appeared only in Fayoum site and recorded with six and three individuals for the second and third species, respectively.

Key to collected species:

- 1- Propodosomal dorsal setae simple.....*Siteroptes manurei*
- Propodosomal dorsal setae serrate.....2
- 2- Anterior sternal apodema reaching sejugal apodema, two pairs of caudal setae*S. serratesetae*
- Anterior sternal plate not reaching sejugal apodema, one pair of caudal setae.....*S. posterotruncata*

10 - Family: Tarsonemidae Kramer

Tarsonemus meyerus Soliman&Kandeel was found only in sugar beet soil at Fayoum site and recorded with 120 individuals in February.

11 - Family: Tydeidae Kramer

The two species belonging to this family; *Pronematus rykei* Meyer&Rodriguez and *P. ubiquitous* McGregor were found only in Beni-suef site and recorded with five and two individuals for the former and latter species, respectively.

Key to collected species:

- Sensory setae about 1/3 longer and anterior to p1. L3 the longest and D3 very short*Pronematus ubiquitous*
- Sensory setae slightly longer than other propodosomals and between p1 and p2 L3 the longest and D5 very short.....*P. rykei*

11-Sub-order: Gamasida

1- Family:Ameroseiidae Evans

K. plumosus was found in slightly greater number in Fayoum (9 indiv.) than Beni-suef (6 indiv.).

2- Family:Ascidae Voigts and Oudemans

Three species of this family *Protogamasellus denticus* Nasr, *Proctolaelaps pygmaeus* Muller and *P. orientalis* Nasr were recorded in sugar beet soil. The first was found with greater numbers in Fayoum (39 indiv.) than Beni-suef site (3 indiv.),while the other two species were found only in Fayoum. On the other hand, the second species was observed in greater number (9 indiv.) than the third one (4 indiv.) in the same site.

Key to collected species:

- 1- Adult with two dorsal shields.....*Protogamasellus denticus*

- Adult with holodorsal shield2
- 2- Dorsal shield heavily sclerotized, covering the dorsum except end of opisthogaster ; all dorsal setae weak, thin and short
.....*Proctolaelaps orientalis*
- Dorsal shield weakly sclerotized, not completely covering the dorsum, all dorsal setae strong and simple.....*P. pygamaeus*

3- Family: Laelapidae Berlese

The three laelapid species *Androlaelaps aegypticus* Hafez, EL-Badry and Nasr, *Laelaspis astronomicus* (Koch) and *Ololaelaps bregetovae* Shreef&Soliman were recorded in sugar beet soil. The first species was recorded with three individuals only in Fayoum site, while the other two species were found in great number in Fayoum (18 & 13 indiv.) than Beni-suef (42 & 17 indiv.), respectively.

Key to collected species:

- 1- Female with anal shield fused with genitoventral shield, metasternal setae on sternal shield, apotele with three unequal prongs.....*Ololaelaps bregetovae*
- Female with anal shield free, metasternal setae not on sternal shield.....2
- 2- Genu 1v with 10 setae (pl2 present), pilus dentilis long, slender or inflated.....*Androlaelaps aegypticus*
- Genu 1v with nine setae (PI2 absent), if with 10 setae pilus dentilis short, setiform.....*Laelaspis astronomicus*

4 - Family: Ologamasidae Ryke

Two species of this family were observed in associated with sugar beet soil only in Fayoum site. *Gamasiphis denticus* Hafez&Nasr was found in great number (19 indiv.) than *G. pulchellus* (Berlese) (7 indiv.).

Key to collected species:

- Holonotal shield heavily reticulate, post-anal seta slightly longer than para-anal seta*Gamasiphis denticus*
- Holonotal shield smooth, post-anal seta very long, more than five time as long as para-anals.....*Gamasiphis pulchellus*

5-Family: Pachylaelapidae Berlese

Pachylaelaps reticulatus Hafez&Nasr was found in Fayoum (25 indiv.) and Beni-suef sites (2 indiv.).

6 - Family: Parasitidae Oudemans

Parasitus badrii Hafez&Nasr was recorded in Beni-suef with great numbers (81 indiv.) than in Fayoum site (11 indiv.).

7- Family: Phytoseiidae Berlese

The three species belonging to this family; *Neoseiulus cydnodactylon* (Shehata&Zaher), *Amblyseius longispinosus* (Evans) and *Phytoseius finittimus* Ribaga were found only in Fayoum site and recorded with nine, four and three individuals for the first ,second and third species, respectively.

Key to collected species:

- 1-Dorsal shield with five or six pairs of prolateral seta.....*Phytoseius finittimus*
- Dorsal shield with four pairs of prolateral setae.....2
- 2-Lateral stae longer than distance between their bases.....*Amblyseius longispinosus*
- Lateral setae shorter than distance between their bases..... *Amblyseius cydnodactylon*

8- Family: Rhodacaridae Oudemans

The two species of this family; *Rhodacarus roseus* Oudemans and *Rhodacarillus tabeenus* Hafez&Nasr were observed in association with sugar beet soil. The first species was found slightly greater number in Fayoum (16 indiv.) than Beni-suef (13 indiv.), while only two individuals of the second species was found in Beni-suef site .

Key to collected species:

- Leg I without ambulacrum, four pairs of setae on anterior margin of podonotal shield ; 3 light refractive structures between j5 and j6*Rhodacarus roseus*
- Leg I with ambulacrum; three pairs of setae on anterior margin of podonotal shield; 4 light refractive structures between j5 and j6*Rhodacarellus tebeenus*

9- Family: Uropodidae Berlese

Urobovella krantzi Zaher& Afifi was recorded with fourteen individuals only in Fayoum site .

111- Sub order: Oribatida

1- Family: Galumnidae Jacote

Galumna flabillifera Hammer found in Fayoum site only with 295 individuals and reached its peak in December (170 indiv./500gm soil).

2- Family: Haplozetidae Grandjean

Xylobates souchnaiensis Abdel-Hamid was found only in sugar beet soil of Fayoum site and recorded with 50 individuals in January.

3- Family: Oppiidae Grandjean

The three species belonging to this family; *Oppia bayoumi* Shreef & Zaher, *O. concolor* Koch and *O. sticta* were found in sugar beet soil. The first one was recorded in great number in Beni-suef site (32 indiv.) than Fayoum (7 indiv.). The second species was recorded only in Beni-suef site with eleven individuals, while the third one was found in Fayoum with great numbers (52 indiv.) than Beni-suef (7 indiv.)

Key to collected species:

- 1-Sensillus long , serrate . Notogaster oval, elliptical..... *Oppia sticta*
- Sensillus not as above. Notogaster round2
- 2-Sensillus elongate , fusiform .Notogaster with seven pairs of setae.....
.....*Oppia bayoumi*
- Sensillus smooth and capitulate . Notogaster with 10 pairs of smooth long setae*Oppia concolor*

4- Family: Oribatulidae Thor

Data showed that the three oribated mite species *Schelorbates laevigatus* (Koch) and *Zygoribatula tritici* El-Badry & Nasr were found in great numbers in Fayoum site than Beni-suef, while *Z. sayedi* EL Badry & Nasr was recorded only in Fayoum site with high numbers (148 indiv.)

Key to collected species:

- 1-Translamella absent, notogaster with 10 pairs of setae.....
.....*Schelorbates laevigatus*.
- Translamella present and distinct, notogaster with 13 pairs of setae.....2
- 2-Lamellae distinct along its length. Sensillus with clavate heat
.....*Zygoribatula sayedi*
- Lamellae distinct anteriorly, reduced posteviorly . Sensillus with spherical or subcircular head.....*Zygoribatula tritici*

Iv-Sub-order: Acaridida

Family: Acaridae Leach

The two acarid species *Tyrophagous putrescentia* (Shrank) and *Rhizoglyphus robini* (Calaparede) were recorded in sugar beet soil. The first one was a dominant in both sites with higher numbers (183 indiv.) in Fayoum than Beni-suef site (83 indiv.) and reached its peak in January (115&50 indiv. /500gm soil), respectively,while the second species was found in great number (40 indiv.) in Fayoum than Beni-suef (26 indiv.).

- Internal vertical setae less than twice as long as external vertical
.....*Tyrophagous putrescentiae*
- External vertical seta absent or short fine seta at posterior level to internal vertical seta.....*Rhizoglyphus robini*

In this respect, Zaher & Mohamed (1980) recorded nine predaceous species of nine families in soil. These species were *Hypoaspis* sp. (Laelapidae), *Rhodacarus* sp. (Rhodacaridae), *Neognathus spectabilis* Summers (Caligonellidae), *Grallacheles bakeri* Deleon (Cheyletidae), *Cunaxa*

capreolus Berlese (Cunaxidae), *Saniosulus nudus* Summers (Eupalopsellidae), *Rhagidia gelida* Thorell (Rhagidiidae), *Agistemus exsertus* Gonzalez (Stigmaeidae) and *Eupodes sp.* (Eupodidae).

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الأكاروسات المصاحبة لنباتات وتربة بنجر السكر
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تم اجراء حصر للأكاروسات المصاحبة لنباتات بنجر السكر فى سنهور بمحافظة الفيوم، سمسطا بمحافظة بنى سويف خلال الموسم الزراعى 1999/1998 وقد أسفرت الدراسة عن تواجد 56 نوعا مصاحبة لنباتات وتربة بنجر السكر منها ثلاثة أنواع نباتية التغذية ، 31 نوعا مفترسة ، 23 نوعا متنوعا التغذية. كما لوحظ زيادة الكثافة العددية

للأكاروسات المختلفة على النباتات كذلك الموجودة فى التربة بالنسبة لموقع الفيوم عن موقع
بنسويف .