

CO-EXISTENCE OF PESTS AND THEIR ASSOCIATED PREDATORS INHABITING CANTALOUPE PLANTS, *CUCUMIS MELO L.* IN ASSIUT, EGYPT

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ABSTRACT:

The present study was carried out during 2014 and 2015 growing seasons of cantaloupe. Faunistic composition of pests and their associated predators inhabiting cantaloupe plants *Cucumis melo L.* revealed the presence of 22 insect species belonging to 17 families and 10 orders. The serious pest species were represented by 14 species with 7 predaceous species. The most abundant sucking insect pest was whitefly; *Bemisia tabaci* Genn. It was the most abundant and seemed to be the major pest infesting cantaloupe, followed by the two spotted spider mite, *Tetranychus urticae* Koch. and some piercing sucking insects such as cotton aphids, *Aphis gossypii* Glov.; onion thrips, *Thrips tabaci* Lind. and jassids, *Empoasca* spp. *Orius* sp, *Chrysoperla carnea* Steph. and *Coccinella undecimpunctata L.* were the most numerous predators. In all cases the dominance degrees of the pests were higher than those of the predators.

INTRODUCTION:

Cantaloupe, *Cucumis melo L.* (Family: Cucurbitaceae) considered as one of the most important and promising cucurbitaceous vegetable crop planted in the open field as well as under greenhouse conditions (Whitaker & Davis, 1962; Jeffrey, 1980; Kirkbride, 1993; Bates & Robinson, 1995). In Egypt, the cultivated area reached about 45318 feddan in summer season and the total production reached about 461508 tons (Anonymous, 2015).

Cantaloupe plants are liable to infestation by many insect pests such as onion thrips; *Thrips tabaci* Lind., cotton aphid, *Aphis gossypii* (Glover.) and, the whitefly, *Bemisia*

tabaci (Genn.), as well as the red spider mite, which considered the most common and important pests of cantaloupe plants (Duffus, 1987). Heavy infestation of these pests is causing serious damage to plants, leading to a great reduction in the yield (Kamel *et al.*, 2000).

The present study aims to survey the pests and the associated predators inhabiting cantaloupe plants and to determine their abundance and dominance degrees in an attempt of planning successful control programme for these pests under Assiut condition.

MATERIALS AND METHODS

The present study was carried out at the experimental station of Al-Azher University, Assiut throughout two successive cantaloupe seasons, 2014 and 2015. An area of about quarter feddan was divided into plots each 1/100 of feddan. Seeds were normally planted in middle of April during the two seasons. Regular conventional agricultural practices were normally performed and no chemical control was used during the study period. Weeds were removed by hand. In order to survey the pests and the associated natural enemies inhabiting cantaloupe foliage, the direct count and sweep-net technique was used as sampling methods.

- a) **Direct count:** weekly Samples consists of four leaves were randomly picked out from different levels " upper, middle and lower" of the plant in the morning. randomized leaf samples were kept separately in plastic bags and then transferred to the laboratory to examined by stereoscopic binuclear.
- b) **Sweep net:** Sampling started when the plants became high enough to permit successful sweeping. Ten sweeps repeated four times were taken weekly in each plot. Each collected sample was emptied into labeled cage and transferred to the laboratory. Specimens were anaesthetized by cholorophorm and examined under stereomicroscope. Number of species and number of individuals of each species was recorded.

Dominance (%) and abundance (%) degrees of the identified species were

estimated according to the formula of Facylate (1971).

Dominant degrees (D) for the identified species were calculated based on the following formula:

$$D = t/T \times 100, \text{ where}$$

(t) = total number of each species during the collecting period. (T) = total number of all species during the collecting period.

Abundance degrees (A) for species which recorded during the whole sampling period was calculated according to the following formula:

$$A = n/N \times 100, \text{ where,}$$

(n) total number of samples in which each species appeared.

(N) total number of samples taken all over the season.

RESULTS AND DISCUSSION

1-Survey of pests and their associated predators recorded on cantaloupe plants at Assiut

A partial taxonomic list of pests and their predators recorded by sweep net and direct count from cantaloupe plants at Assiut during two successive growing seasons (2014 and 2015) is presented in Table 1. Results indicate the presence of 22 species of arthropods belonged to 17 families and 11 orders. From the species collected, 4 species are considered main pest causing great damage, 6 slightly harmful, and 8 beneficial arthropods as well as unidentified species of true spiders. The identified species that listed in Table 1 were classified to pests and predators.

1.1- Pests

Intensive and extensive observations indicated that collected species can be classified as sucking pests, leaf feeders, and leaf miners. In general of 8 orders (Orthoptera, Thysanoptera, Hemiptera-Heteroptera, Hemiptera- Homoptera, Coleoptera, Lepidoptera, Diptera and Acarina) and 11 families (Gryllotalpidae, Agromyzidae, Cocciniellidae, Pentatomidae, Aleyrodidae, Aphididae, Cicadellidae, Acridiidae, Noctuidae, Thripsidae and Tetranychidae) were recorded inhabiting cantaloupe plantations at Assiut. Species belonging to order Lepidoptera were collected as larvae either by sweeping net or direct observation on the plants and represented by family of Noctuidae. Just two species were belonged to this order *Agrotis ipsilon* (Rott.) and *Spodoptera littoralis* (Boisd.). The African melon ladybird, *Epilachna chrysomelina* Fab. (Cocciniellidae) was the only representative of the Order Coleoptera that collected by sweeping net method. Larvae and adults of this insect are feeding on the cantaloupe racemes. Also, one species of order Orthoptera was recorded during the present study. The species is the mole cricket, *Gryllotalpa gryllotalpa* L., which belongs to family Gryllotalpidae and was collected from under the surface of the soil attacking the cantaloupe seedlings. However, this species was classified as none of cantaloupe pests and have no serious damage to the crop. Collected and recorded species belonging to the group of arthropods, which pierce the tissue and suck the sap of the cantaloupe plants are belonging to order

Hemiptera-Homoptera and Heteroptera, Thysanoptera as well as the red Spider mite of Order Acari. The most important serious pests were the complex of aphid species i.e. *Aphis gossypii* Glover, and *Myzus persicae* (Sulz.). These aphid species (Aphididae) were collected from the plants early during May up to the harvest time, feeding on the leaves and the apical racemes. Whereas, the cotton whiteflies, *Bemisia tabaci* (Genn.) was recorded infesting cantaloupe plants during the whole season in relatively high numbers. However, the leafhopper, *Empoasca disciplines* (Paoli.) (Cicadellidae) and the onion thrips, *Thrips tabaci* (Lind.) (Thripidae) were collected by both the sweep net and direct count in relatively low numbers. Laboratory examination of the randomly collected cantaloupe leaves revealed the presence of the red spider mite *Tetranychus urticae* Koch. (Tetranychidae: Acari) which causes heavy infestation to the cantaloupe leaves throughout the whole growing season.

1.2- Predators

As shown in Table (1), eight of the captured species were identified as entomophagous. They are belonging to 5 orders (Dermaptera, Hemiptera-Heteroptera, Neuroptera, Coleoptera, and Diptera as well as some of the unidentified species of true spiders) and 6 families (Labiduridae, Anthocoridae, Chrysopidae, Coccinellidae, Lygaeidae and Syrphidae). The green lacwing, *Chrysoperla carnea* (Steph.), the hover fly, *Syrphus corolla* F. and the lady beetles, *Coccinella undecimpunctata*

L., were the most abundant predators which recorded and identified. Species such as *Scymnus spp.*, *Labidura riparia Pall.* and some unidentified species of true spiders were collected occasionally in low numbers, comparing with the other species mentioned before. Previous studies in Egypt are in agreement with our findings and reported that cantaloupe plants harbored aphids, whitefly, and thrips as well as the red spider mite (Herakly, 1972; Abou-Aiana and Draz, 1993; El-Desouky *et al.*, 2008; Younes and El-Sebaey, 2013).

2-Dominance and abundance degrees of sucking pests and the associated predators on cantaloupe plants

Field studies through the period extended from 2014 to 2015 seasons, revealed that the pests infesting cantaloupe plants were *A. gossypii*, *M. persicae*, *B. tabaci*, *E. disciplines* and *T. tabaci* as well as the red spider mite *Tetranychus urticae Koch.*

In 2014 season, data in Table 2 show that *B. tabaci* seems to be the most important economic pests as indicated by the highest value of dominance and abundance degrees (97.10 and 100%). However, *A. gossypii* and *T. urticae* had the high abundance degrees (100.00 and 90.00%) with low dominance degrees (0.254 and 2.391%) indicating that these species could be of economic importance if the environmental conditions changed in their favor. Mean while, the species of *Empoasca spp.* which had low values of abundance and dominance degrees (30.00 and 0.009%, respectively) is expected to be of little

economic importance as it may cause a minor role as a pest in cantaloupe plantations.

As for dominance and abundance degrees of aphid species infesting cantaloupe plants during 2015 season. Data in Table 3 show that also *B. tabaci* seem to be the most important economic pests as indicated by the highest value of dominance and abundance degrees (98.73 and 100%). However, both *A. gossypii* and *M. persicae* had moderately abundance degrees (70.00%) with also low dominance degrees (0.194 and 0.012%) indicating that these species could be of economic importance if the environmental conditions changed in their favor. Meanwhile, the species of *Empoasca spp.* and *T. tabaci* had low values of abundance and dominance (50.00 and 30.0% and 0.004 and 0.189%, respectively) are expected to be of little economic importance as they may cause a minor role as pests in cantaloupe plantations.

In general, from the above mentioned results it could be concluded that *B. tabaci* and *T. urticae* seem to be the most important economic pests infesting cantaloupe as indicated by the highest value of dominance and abundance degrees. However, the high abundance degrees of *M. persicae* and *A. gossypii* which had low dominance degrees indicate that these species could be of economic importance if the environmental conditions changed in their favor. Meanwhile, the species of *Empoasca spp.* and *T. tabaci* which had low values of abundance and dominance are expected to be of little economic

importance as they may cause a minor role as pests in cantaloupe plantations in Assiut.

It's evident that the whitefly nymphs and adults commonly intermixed or resided together at the same location on cantaloupe plants. Previous studies in Egypt showed that cantaloupe plants are attacked by this pest (Metwally *et al.*, 2013). Also, data show that the cotton whitefly, *B. tabaci* in addition to red spider mite was the most prevailing pests of cantaloupe at Assiut. These results in general agreement with those of Abd-Rabou (2001), Abdel-Khalek (2005), and Hegab and Hegab (2009) who found that the cotton whitefly and the red spider mite were the most common and dominance pests of cantaloupe crop. Although the predators, *Ch. carnea* and *C. undecimpunctata* seem to be the most numerous predators recovered in this survey, the lower dominance degrees of predators than those of pests indicate that the natural enemies may be subjected to unfavorable conditions, which affect their efficiency in managing pests existed in the experimental area. Modifying the environment in favor to natural enemies should be studied.

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Table (1): A partial taxonomic list of pests and the associated predators recovered from cantaloupe plants during 2014 and 2015 growing seasons, Assiut.

Order	Family	Scientific name	Common name
Pests			
Coleoptera	Cocciniellidae	<i>Epilachna chrysomelina Fab.</i>	African melon lady bird
Diptera	Agromyzidae	<i>Agromyza pussilla Meig</i>	Leaf miners
Hemiptera-Heteroptera	Pentatomidae	<i>Nezara veridula L.</i>	Green bug
Hemiptera-Homoptera	Aleyrodidae	<i>Bemisia tabaci (Genn.)</i>	Whitefly
	Aphidadae	<i>Aphis gossypii Glover.</i>	Melon aphid (cotton aphid)
		<i>Myzus persicae Sulzer.</i>	Green peach aphid
	Cicadellidae	<i>Empoasca spp.</i>	Leaf hoppers
Orthoptera	Acridiidae	<i>Heteraacris (Thisoicetrus) littoralis (Rumb.)</i>	Grass hopper
		<i>Acrotylus insubricus (Scopli)</i>	
Lepidoptera	Noctuidae	<i>Agrotis ipsilon (Rott.)</i>	Egyptian cotton leaf worm
		<i>Spodoptera littoralis (Boisd.)</i>	
Orthoptera	Gryllotalpidae	<i>Gryllotalpa gryllotalpa (L.)</i>	Mole cricket
Thysanoptera	Thripsidae	<i>Thrips tabaci Lind.</i>	Onion thrips
Acarina	Tetranychidae	<i>Tetranychus urticae Koch</i>	Two spotted mite
Predators			
Coleoptera	Coccinellidae	<i>Coccinella undecimpunctata L.</i>	Lady bird beetle
		<i>Scymnus spp.</i>	
Diptera	Syrphidae	<i>Syrphus corolla F.</i>	Hover fly
Dermaptera	Labiduridae	<i>Labidura riparia Pall.</i>	
Hemiptera-Heteroptera	Anthrocoridae	<i>Orius sp</i>	Flower bug
	Lygaeidae	<i>Geocoris sp.</i>	Big eyed bug
	Nabidae	<i>Nabis spp</i>	
Neuroptera	Chrysopidae	<i>Chrysoperll a carnea (Steph.)</i>	Lace wing
True spider		Unidentified	

Table (2): Dominance and abundance degrees of the pests and associated predators that inhabiting cantaloupe during 2014 season, Assiut.

Species	Dominance (%)	Abundance (%)
Total pests	99.99	100
<i>A. gossypii</i>	0.254	100.00
<i>B. tabaci</i>	97.105	100.00
<i>M. persicae</i>	0.141	70.00
<i>Empoasca</i>	0.009	30.00
<i>T. tabaci</i>	0.089	60.00
<i>T. urticae</i>	2.391	90.00
Total Predators	0.05	100.00
<i>Coccinella undecimpunctata</i>	34.529	70.00
<i>Chrysoperla carnea</i>	15.947	60.00
<i>Orius spp</i>	22.084	70.00
<i>Gecoris spp</i>	4.994	40.00
<i>Scymnus spp</i>	22.439	70.00

Table (3): Dominance and abundance degrees of pests and the associated predators that inhabiting cantaloupe during 2015 season, Assiut.

Species	Dominance (%)	Abundance (%)
Total pests	98.66	100.00
<i>A. gossypii</i>	0.194	70.00
<i>B. tabaci</i>	98.728	100.00
<i>M. persicae</i>	0.012	70.00
<i>Empoasca</i>	0.004	50.00
<i>T. tabaci</i>	0.189	30.00
<i>T. urticae</i>	0.871	60.00
Total Predators	0.065	100.00
<i>Coccinella undecimpunctata</i>	48.387	100.00
<i>Chrysoperla carnea</i>	7.527	40.00
<i>Orius spp</i>	17.204	60.00
<i>Gecoris spp</i>	3.226	20.00
<i>Scymnus spp</i>	23.656	60.00

تواجد الآفات والمفترسات المصاحبة لها على نباتات الكانتالوب بأسسيوط.

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□ الملخص العربي :

أجريت الدراسة الحالية خلال موسمي ٢٠١٤، ٢٠١٥م من مواسم زراعة الكانتالوب بأسسيوط. استهدفت الدراسة معرفة التركيب النوعي للآفات ومصاحباتها من المفترسات على نباتات الكانتالوب. تم حصر عدد اثنان وعشرون نوعا تنتمي إلى ١٧ عائلة تقع فى عشرة رتب حشرية من مفصليات الأرجل ومتواجدة على نباتات الكانتالوب بأسسيوط. اتضح أيضا أن أهم الآفات التي تقطن نباتات الكانتالوب كانت ممثلة في ١٤ نوعا من أنواع الحشرات بينما المفترسات كانت ممثلة بسبعة أنواع. تعتبر حشرات الذبابة البيضاء من أهم هذه الآفات الحشرية التي تصيب الكانتالوب بأسسيوط يليها اكاروس العنكبوت الأحمر ذو البقعتين ، هذا بالإضافة إلى حشرات من القطن والتريس وحشرات الجاسيدز. أظهرت الدراسة أيضا أن حشرات أبو العيد ذو الإحدى عشرة نقطة والاوريس وأسد المن من أهم المفترسات تواجدا على هذا المحصول ، وكانت الآفات أكثر سيادة من المفترسات.