

Species composition of piercing-sucking arthropod pests and associated natural enemies inhabiting cucurbit fields at the new valley in Egypt

Gameel S. M. M.

Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza

ABSTRACT

Survey of arthropods associated with cucurbit crops during 2011 and 2012 growing seasons at the New valley in Egypt indicated the existence of 28 insect species belong to 25 genera under 20 families of 9 orders. In addition to the two spotted spider mite, *Tetranychus urticae* Koch and some unidentified species of the true spiders belong to family, Phalangidae.

The important piercing-sucking arthropod pests were the black melon bug, *Coridius (Aspongopus) viduatus* F.; the melon aphid, *Aphis gossypii* Glover; the tomato whitefly *Bemisia tabaci* (Genn.) and *T. urticae*.

The cucurbit fruit flies, *Bactrocera zonata* (Saunders), *Dacus ciliatus* Loew, *D. frontalis* (Becker) and *Dacus* sp. (Tephritidae: Diptera) and *Baris granulipennis* Tour. (Curculionidae: Coleoptera) were recorded as pests on the fruits of cucurbit plants in the New Valley.

The common associated natural enemies inhabiting cucurbit fields were, *Coccinella septempunctata* L.; *Chrysoperla carnea* Steph., and *C. undecimpunctata aegyptiaca* Reiche. *Ooencyrtus* sp. was recorded as a key egg parasitoid of the black melon bug.

Keywords: Piercing-Sucking Arthropod Pests- Cucurbit Fields- Egypt

INTRODUCTION

The New Valley Governorate is located in the southwestern portion of the western desert of Egypt. The area is about 376505 square kilometer, which represent 37.6% of the total area of Egypt and about 56% of western desert area. In recent years, many ambitious and promising agriculture works were started in this area. Cucurbitaceous plants are subjected to be attacked by several major insect pests which cause severe damage directly or indirectly to the crop production (Bohlen and Freidel, 1979; Gameel, 2004; Gallab *et al.*, 2011; and Gameel, 2012).

To overcome the lack of information concerning the species composition of piercing-sucking arthropod pests and associated natural enemies inhabiting cucurbit fields, the present work was undertaken. It is hoped to be guideline for more detailed and prospective studies.

MATERIALS AND METHODS

Field experiments were conducted in the farm near from El-Kharga Oasis - New Valley to survey of arthropods associated with cucurbit crops during 2011 and 2012 growing seasons. The cultivated cucurbit cultivars were squash, (*Cucurbita pepo* L.) Skandarany; cucumber, (*Cucumis sativus* L.) F1-hybrid Beit alpha; snake cucumber, (*Cucumis melo* var. *flexuosus* L.), Balady; cantaloupe, (*Cucumis melo* var. *cantaloupensis* L.) California and watermelon, (*Citrullus lantatus* L.), Giza 1. Each

cultivar was planted in four replicates (each one was 42 m²) during the two planting dates, the first one was at the end of March (summer season) and the second at the end of August (Nili season). Samples were taken when the plants became high enough to permit successful samples.

1. Direct count:

From the whole area about one hundred plants were visually examined weekly. Inspection was started from the beginning of vegetative stage and continued through the flowering and fruiting stages of the plants. Collected specimens were kept in paper bags and transferred to the laboratory for identification. Specimens of unknown species were kept in glass vials containing 75% ethyl alcohol, for later identification.

2. Sweep net:

Twenty five double sweeps (50 net strokes) in five replicates, were taken weekly from the whole area. The collected insects were transferred to the laboratory in paper bags for later identification and counting.

3. Pitfall traps:

Pitfall traps were placed in the center of each plot. The trap was prepared by imbedding a wide - mouth, ½ liter size glass jar in the soil and the top of the jar was even with soil surface. The jars were partially filled with crude commercial alcohol over which a thin layer of kerosene was poured to prevent evaporation, twenty jars were used weekly.

The contents of the traps were generally replaced weekly. Specimens were removed from the liquid by pouring the trap contents through a fine-mesh screen, and then transferred to 95% ethyl alcohol after being washed several times with acetone to remove the kerosene (Khalil *et al.*, 1975). Specimens of recovered species were identified and counted

RESULTS AND DISCUSSION

Table 1 contains a taxonomic list of sucking pests and associated natural enemies inhabiting cucurbit fields by using direct count, sweep net and pitfall traps in the New Valley during 2011 and 2012 seasons.

Data revealed the presence of 28 insect species belonged to 25 genera under 20 families of 9 orders. In addition to spider mite, *T. urticae* and some unidentified species of true spiders belonged to family, Phalangidae.

Data also indicate that, twenty seven insect species were recorded through the direct count which represented 96.42 % of the total collected species, meanwhile 19 insect species were collected using sweep-net technique which represented 67.85 % and 6 insect species were collected using pitfall traps which represented 21.42 %. Spider mite was recorded through direct count, whereas true spiders were recorded directly and / or by pitfall traps.

Out of the 28 collected insect species, *C. viduatus*, *B. tabaci*, *A. gossypii*, *Empoasca* spp., *B. zonata*, *D. ciliatus*, *Epilachna chrysomelina* F. and *T. urticae* in addition, *Ooencyrtus* sp. which recorded as a key egg parasitoid of the black melon bug were the common arthropod species on cucurbit plants.

The cucurbit leaf fly (leaf miner); *Liriomyza bryoniae* (Kalt.) and the honeybee, *Apis mellifera* L. were collected in a moderately numbers.

Table 1: Partial taxonomic list of arthropods recovered from cucurbit plants, New Valley 2011 and 2012 seasons.

Order and Family	Species name		Notes
	Common name	Scientific name	
1-Pests :			
Orthoptera			
Gryllotapidae	The mole crickets	<i>Gryllotalpa gryllotalpa</i> (L.)	D,P
Acridiidae	Grasshoppers	<i>Heteracris littoralis</i> (Ramb.) <i>Acrotylus insubricus</i> (Scopli)	D,P D,P
Thysanoptera			
Thripidae	Cotton or onion thrips	<i>Thrips tabaci</i> Lindeman	D
Hemiptera-			
Heteroptera			
Pentatomidae	The black melon bug	<i>Coridius (Aspongopus) viduatus</i> F.	D,S,P
Hemiptera-			
Homoptera			
Cicadellidae	Leafhoppers	<i>Empoasca</i> spp.	D,S
Aleyrodidae	Cotton or tomato whitefly	<i>Bemisia tabaci</i> (Genn.)	D,S
Aphididae	Melon aphid	<i>Aphis gossypii</i> Glover	D,S
	Green peach aphid	<i>Myzus persicae</i> (Sulzer)	D,S
Coleoptera			
Coccinellidae	The african melon ladybird	<i>Epilachna chrysomelina</i> F.	D,S,P
Curculionidae	Curculionid weevil	<i>Baris granulipennis</i> Tour .	D
Lepidoptera			
Noctuidae	Egyptian cotton leaf worm	<i>Spodoptera littoralis</i> (Boisd.)	D
	Black cutworm	<i>Agrotis ipsilon</i> L.	D
Diptera			
	Peach fruit fly	<i>Bactrocera zonata</i> (Saunders) <i>Dacus ciliatus</i> Loew <i>D. frontalis</i> (Becker) <i>Dacus</i> sp.	D,S D,S D,S D,S
		<i>Liriomyza bryoniae</i> (Kalt.)	D,S
Acari			
Tetranychidae	Two spotted spider mite	<i>Tetranychus urticae</i> Koch	D
2-Pollinators:			
Hymenoptera			
Apidae	Honeybee	<i>Apis mellifera</i> L.	D,S
3- Predators:			
Odonata			
Agrionidae	Damselfies	<i>Ischnura senegalensis</i> (Rambur)	S
Libellulidae	Dragonfiles	<i>Crocothemis erythrea</i> (Brulle)	D,S
Neuroptera			
Chrysopidae	Lacewing	<i>Chrysoperla carnea</i> Steph.	D,S
Coleoptera			
Staphylinidae	Rove beetle	<i>Paederus alfieri</i> Koch	P
Coccinellidae	Ladybird beetles or coccinellid beetles	<i>Coccinella septempunctata</i> L. <i>Coccinella undecimpunctata aegyptiaca</i> Reiche	D,S D,S
Diptera			
Syrphidae	Hover flies	<i>Syrphus corollae</i> F.	DS
Araneida			
Phalangidae	True spiders	Unidentified (true spiders)	D,P
4- Parasitoids:			
Hymenoptera			
Encyrtidae		<i>Ooencyrtus</i> sp	D,S
Diptera		<i>Exorista larvarum</i> L.	D
Tachinidae			

D = Direct count

S = Sweep-net

P = Pitfall trap

The insect pests, *Gryllotalpa gryllotalpa* (L.), *Heteracris* (*Thisioicetrus*) *littoralis* (Rumb.), *Acrotylus insubricus* (Scopli), *Thrips tabaci* Lindeman, *Myzus persicae* (Sulzer), *Baris granulipennis* Tour., *Spodoptera littoralis* (Boisd.), *Agrotis*

ipsilon L., *Dacus frontalis* (Becker), *Dacus* sp. and the parasitoid, *Exorista larvarum* L. were recorded in a scarcely numbers.

The cucurbit fruit flies, *B. zonata*, *D. ciliatus*, *D. frontalis* and *Dacus* sp. (Tephritidae: Diptera) and *B. granulipennis* (Curculionidae: Coleopatra) were recorded as pests on the fruits of cucurbit plants in the New Valley.

The common collected predators were *Chrysoperla carnea* Steph., *Coccinella septempunctata* L., *C. undecimpunctata aegyptiaca* Reiche and *Syrphus corollae* F. These predator species were recorded generally in relatively low population densities.

In the present study, two parasitoid species were recorded. *E. larvarum* (Family: Tachinidae) was observed as an endoparasitoid in the larval stage of the peach fruit fly, *B. zonata*. The parasitoid, *Ooencytus* sp. was recorded as an egg parasitoid of the black melon bug, *C. viduatus*.

The previous results show that, *C. viduatus* is considered to be the most important piercing-sucking arthropod pest in cucurbit plant, causing very serious yield losses if no chemical control is applied (Shalaby, 1961; Herakly, 1972; Bohlen and Freidel, 1979; Walker and Pittaway, 1987; Talhouk, 1993; Ben-Yakir *et al.*, 1996 ; Al-Gamal *et al.*, 2001 and Gameel and Sayed, 2008).

The most important sap sucking insects, *B. tabaci*, *A. gossypii* and *Empoasca* spp. were recorded as common pests infesting cucurbit plants in many parts of the world as recorded by Abd El-Kaeim, 1980; Mukhamediev and Akhmedov, 1984; Omar *et al.*, 1988; Hilije *et al.*, 1993; Mineo *et al.*, 1994; Tonhasca *et al.*, 1994 Kamel *et al.*, 2000; Gameel and Sayed, 2008 and Younes *et al.*, 2010. The common spider mite, *T. urticae* was found to be as an economic pest infesting cucurbit plants (Soans *et al.*, 1973; Farrag *et al.*, 1982; Perring, 1987; El-Maghraby *et al.*, 1994; Ali, 1995; Kamel *et al.*, 2000 and Balkema-Boomstra *et al.*, 2003).

It was also found that, the cucurbitaceous plants are subjected to attack by the african melon ladybird beetle, *E. chrysorelina* which cause severe damage to the crop production (Herakly, 1972; Bohlen and Freidel, 1979; Mukhamediev and Akhmedov, 1984; Ali and El-Saeedy, 1986; Mineo *et al.*, 1994 Abdel-Moniem *et al.*, 2004 Gameel and Abdel-Gaid 2007).

The presents results are generally agree with those of El-Maghraby *et al.*, (1994), Ali 1995 and Bachatly and Sedrak (1997) who found that, *C. undecimpunctata*, *Ch. carnea* and *S. corollae* were the most common predator species associated with the cucurbit pests.

The egg parasitoid, *Ooencyrtus* sp. (Fam. Encyrtidae) was found to be as an egg parasitoid of several pentatomids species (Takasu and Hirose, 1985; Nanta ,1988; Higuchi, 1994; Melan, 1994).

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ARABIC ABSTRACT

التركيب النوعي للآفات من مفصليات الأرجل الثاقبة الماصة والأعداء الحيوية المصاحبة المستوطنة حقول المحاصيل القرعية بمحافظة الوادي الجديد

صلاح محمود محمد جميل

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

أوضحت النتائج وجود 28 نوعاً من الحشرات تنتمي إلى 25 جنس تندرج تحت 20 عائلة لتسع رتب حشرية بالإضافة إلى أكاروس العنكبوت الأحمر وكذلك عدة أنواع من العناكب الحقيقية تابعة لعائلة Phalangidae .

كانت حشرة بق أوراق البطيخ *Coridius (Aspongopus) viduatus* F. ومن القطن *Aphis gossypii* Glover وذبابة الطماطم البيضاء (*Bemisia tabaci* (Genn.) وأكاروس العنكبوت الأحمر *Tetranychus urticae* Koch أكثر الآفات الثاقبة الماصة تواجداً في مزارع المحاصيل القرعية. أظهرت نتائج الحصر أن ثمار القرعيات تصاب بأربعة أنواع من الذباب هي *Bactrocera zonata* (Saunders) ؛ *Dacus ciliatus* Loew ؛ *D. frontalis* (Becker) ؛ *Dacus* sp. التابعة لعائلة Tephritidae تحت رتبة ثنائيه الاجنحه Diptera بالإضافة لاجد انواع السوس *Baris granulipennis* Tour التابع لعائلة Curculionidae تحت رتبة غمديه الاجنحه Coleopatra. كما تم حصر نوعين من الطفيليات وهما طفيل *Ooencyrtus* sp. على بيض حشرة بق أوراق البطيخ وكذا طفيل *Exorista larvarum* L. على يرقات ذبابة الخوخ. أهم المفترسات المصاحبة للآفات الثاقبة الماصة كانت ابو العيد ذو السبع نقاط *Coccinella septempunctata* L. و اسد المن *Chrysoperla carnea* Steph و ابو العيد ذو الاحدى عشره نقطه *C. undecimpunctata aegyptiaca* Reiche.