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SURVEY OF CERTAIN ARTHROPODS ASSOCIATED WITH SOME SOLANACEOUS VEGETABLE CROPS AT SOHAG REGION.

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ABSTRACT

The survey of arthropods inhabiting tomato, pepper and eggplant crops was conducted at Sohag region during winter and summer plantations of 2014/2015 and 2015/2016 years of study. Four methods of collection device have been used i.e. yellow sticky traps, situ count, direct count (picking in situ method) and sweeping net. Those methods were used to collect arthropods according to their habit, size and stage. Data revealed the presence of 26 insect species belonging to 24 genera under 20 families of 9 orders. In addition, one species of spider mites belonging to order Acari was recorded. Moreover, order Araneidae was represented by unidentified complex of true spiders. From the arthropods species collected, 10 species were considered pests, 9 predators and 8 visitors and one in rare numbers.

Key words: survey, Arthropods, Solanaceous vegetable crops

INTRODUCTION

The *Solanaceae* family comprises 3000 to 4000 species of flowering plants within about 90 genera (NHM 2008). It is one of the most important families, which are used for human nutrition either fresh or cooked. It is rich in content of elements and minerals that are important to humans. The *Solanaceous* vegetables; tomato, pepper and eggplant are three principal vegetable crops in Egypt. These vegetable crops are subjected to severe infestation by several pests, which affect the quality and quantity of yield resulting from their direct feeding on plants.

Arthropods associated with these crops were studied by Chaudhuri *et al., (*2001) and Radonjic and Hrncic (2012) on tomato; Baloch *et al.*,

*(*1994); Sorensen (2005), and Bulut and Gocmen (2000) on pepper, and Borah (1994) and Mofa (2011) on eggplant. They recorded *Bemisia tabaci*; *Empoasca decipiens*; *Nesidicoris tenuis*; *Tuta absoluta*; *Liriomyza trifolii*; *Myzus pesicae* and *Heliocoverpa armegera* as the most important pests. So, the present study was conducted to survey arthropods associated with tomato, pepper and eggplant at Sohag region.

MATERIAL AND METHODS

For survey of *arthropods* inhabiting tomato, pepper and eggplant, an area of about 400 m^2 was selected for each crop. Each area was divided into four plots (each 100 m^2) as replicates and arranged in a randomized complete block design. The three crops were put under investigation in two plantations, winter and summer of 2014/2015 and 2015/2016 seasons. In the winter and summer, plants were transplanted on 13 September and 13 June, respectively, in both seasons. Tomato hybrids 448 and Nyrose were used in winter and summer, respectively. Pepper hybrid 1515 and eggplant hybrid Galine were adopted in both winter and summer. The normally recommended agricultural practices i.e. irrigation, fertilization and weeding were followed, except for the chemical control of pests, which was completely avoided.

Sampling started from 13 September of 2014 to 31 October of 2016. Four methods have been used to survey arthropods inhabiting tomato, pepper and eggplant throughout the two successive growing seasons. The sampling methods included: yellow sticky traps, in situ count, direct count (picking method) and sweeping net. Mentioned methods were used to collect insects according to their habit, size and stage. These methods in details were:

Yellow sticky traps: Yellow board sticky traps made of 20 by 10 cm of yellow cards, covered with polyisobutene, as strongly diluted, sticky past base. The trap was placed vertically on the top of wooden stalks 15 – 20 cm above the plants. Three yellow board sticky traps were used for winter and summer. Traping started after one week from transplanting until harvesting time at weekly intervals.

In situ count**:** Between 6 – 8 am., direct counting of arthropods that found on their host plants in the field without removing them was carried out. For whitefly, leafhoppers, thrips and tomato bug, 20 leaves were examined for each plot and the numbers of individuals were recorded. However, the associated predators were counted in 20 plants which randomly chosen for each plot. The use of this method began after one week from transplanting of plants and continued to the end of sampling duration.

The direct count (the picking method): Laboratory count of immovable stages (nymphs and larvae) of pests on different parts of plants

were used to estimate the individuals of aphids, leafhoppers, whiteflies tomato bug and predators that inhabiting leaves, in addition to mines due to leafminers larvae was adopted. Samples of 20 leaves were chosen at random from three levels, i.e., lower, middle and top of tomato, pepper and eggplant plants. Collecting samples started after 7 days of transplanting date and continued until harvest at weekly intervals. Samples were kept in polyethylene bags and transferred to the laboratory for examination by using stereoscopic microscope on both lower and upper surfaces of all the leaves collected for the four mentioned pests and larvae of their associated predators. After tomato fruit setting, samples of 20 plants were chosen randomly, 20 fruits were picked up at 7 – days intervals from each experimental plot and kept in polyethylene bags until examined in the laboratory for later identification of fruit borers.

Sweep net: A sweep net, 30 cm diameter, 60 cm deep of conical, fine muslin and long handle (1.6 meter) was used. Sampling started when the age of *solanacae* crops reached about 21 days and continued at weekly intervals to the end of growing season. Each sample consisted of 20 single strokes taken from each plot. The samples were put in polyethylene bags, transferred to the laboratory and kept inside a refrigerator to anaesthetize the insect species. Later on, the samples were poured onto white paper for counting and identifying the insects. Number of individuals and species composition of sample was determined.

RESULTS AND DISCUSSION

Data in Table (1) represent the arthropods recorded at Sohag region in according to orders, families and species. The results revealed the presence of 26 insect species belonging to 24 genera under 20 families of 9 orders. In addition, one species of spider mites belonging to order *Acari* was recorded. Moreover, order *Araneidae* was represented by unidentified complex of true spiders. From the arthropods species collected, 10 species were considered pests, 9 predators and 8 visitors and one in rare numbers.

Fig (1), graphically illustrated that, order *Diptera* was represented by 7 species, followed by orders *Hemiptera* and *Coleoptera* which were represented by 4 species for each. However, both of *Homoptera* and Hymenoptera orders were represented by 3 species for each, then order Lepidoptera (2 species). Only one species was found belonging to orders *Neuroptera*, *Orthoptera Thysanoptera*, *Acari* and *Araneida*. Order *Coleoptera* included the highest number of predators (4), followed by *Hemiptera* (2). Two pest species were found belonging to *Hemiptera* and three to *Homoptera* orders, followed by 2 species belonging to Lepidoptera (Fig. 1). These findings are in agreement to certain extent with Campos (1976); Gralarza (1984); Hegab *et al.,* (1989);

Bulut and Gocmen (2000); Gomide *et al.,* (2001); Singh and Singh (2002); Urbaneja *et al.,* (2005); Pereyra and Sanchez (2006); Guenaoui (2008); Sancheza and Lacasa (2008); Calvo *et al.,* (2009); Mallia (2009); Viggiani *et al.,* (2009); Valeriya *et al.,* (2010); Hassani (2011); Mochiah *et al.,* (2011); Mohamed and Siam (2011); Temerak (2011); Baniameri and Cheraghian (2012); Megido *et al.,* (2012), Sapsov *et al.,* (2013) and Megido *et al.,* (2014).

However, the most serious pests that infesting the three vegetable crops of the present study are in agreement to certain extent with those fore mentioned others in different areas of the world. These pests are, the onion thrips, *Thrips tabaci* Lindeman (*Thysanoptera*: *Thripidae*); the cotton whitefly, *Bemisia tabaci* (Genn.) (*Homoptera*: *Alyeriodidae*); the green peach aphid, *Myzus persicae* (Sulze) (*Homoptera*: *Aphididae*); the potato leafhopper, *Empoasca desipiens* (Homoptera: Cicadellidae); the tomato bug, *Nesidicoris tenuis* (Reuter) (hemiptera: Miridae); the tomato leafminer, *Tuta absoluta* (Merick) (*Lepidoptera*: *Gelechiidae*) and the faba bean leafminer, *Liriomyaza trifolii* Blanchurd (*Diptera*: *Agromyzidae*).

Meanwhile, it is worth mentioning that Sancheza and Lacasa (2008) have reported that the tomato bug, *N. tenuis* may be considered a useful predator of small pests in tomato crops if kept under the thresholds of these pests. Also, Calvo *et al., (*2009); Sancheza (2009) and Perdikis *et al., (*2009) reported that *N. tenuis* is known to be a predator of whiteflies, thrips and several other pest species.

Fig. (2) illustrate that yellow board sticky traps method collected 11, 12 and 11 species when used on tomato, pepper and eggplant crops, respectively. However, a number of 15, 12 and 11 species were found on the three crops, respectively, using direct count method. Meanwhile the method of in situ count has showed 11, 11 and 10 species on tomato, pepper and eggplant crops, respectively. Finally, tomato, pepper and eggplant recorded 21, 20 and 19 species, respectively, by sweeping net method.

Table (1): Arthropods associated with tomato, pepper and eggplant plantations, Sohag Region, 2014/ 2015 and 2015/ 2016 seasons.

Order	Family	Scientific name	Economic value	Collecting device				Host plant
				Yellow sticky trap	Direct count	In situ count	Sweep net	
Orthoptera	Acarididae	*Schistocerca gregaria* Forsk.	Rare No.	-	-	-	A & N	T, P & E
Thysanoptera	Thripidae	*Thrips tabaci* Lindeman	Pest	A	A & N	A & N	A & N	T, P & E
Hemiptera	Anthocoridae	*Orius albidipennis* (Rossi)	Predator	A	A & N	A & N	A & N	T, P & E
		Orius laevigatus Fieb.	Predator	A	A & N	A & N	A & N	T, P & E
	Miridae	*Nesidicoris tenuis* Reuter.	Pest	-	A & N	A & N	A & N	T
	Pentatomidae	*Nezara viridula* (L.)	Pest	-	-	A & N	A & N	T, P & E
Homoptera	Alyerodidae	*Bemisia tabaci* (Genn.)	Pest	A	N	A	-	T, P & E
	Aphididae	*Myzus percicae* (Sulz.)	Pest	A	A & N	A & N	A & N	P
	Cicadellidae	*Empoasca decipiens* (Paoli)	Pest	A	A & N	A & N	A & N	T, P & E
Neuroptera	Chrysopidae	*Chrysoperla carnea* Stephens	Predator	A	L	A & L	A & L	T, P & E
Lepidoptera	Gelechiidae	*Tuta absoluta* Meyrick	Pest	-	L	-	-	T
	Noctuidae	*Heliocoverpa armigera* (Hübner)	Pest	-	L	-	-	T
Coleoptera	Coccinellidae	*Coccinella undecimpunctata* L.	Predator	A	L	A & L	A & L	T, P & E
		Scymnus interruptus Mars	Predator	A	L	A & L	A & L	T, P & E
		Scymnus punctillum Weise	Predator	A	L	A & L	A & L	T, P & E
		Cydonia vicina Muls.	Predator	-	-	-	A	T, P & E

Table 1 (continued)

Hymenoptera	Apidae	*Apis mellifera* (L.)	Visitor	-	-	-	A	T, P & E
	Formicidae	*Cataglyphus bicolor* (Fab.)	Visitor	-	-	-	A	T, P & E
		Monomorium Pharaonis (L.)	Visitor	-	-	-	A	T, P & E
Diptera	Agromyzidae	*Liriomyza trifolii* Blanchurd	Pest	A	L	-	A	T
	Syrphidae	*Syrphus corollae* (F.)	Predator	A	L	-	A	T, P & E
	Culicidae	*Culex pipines* (L.)	Visitor		-	-	A	T, P & E
	Muscidae	*Musca domestica* L.	Visitor		-	-	A	T, P & E
	Tephritidae	*Ceratitis capitata* L.	Visitor		-	-	A	T, P & E
		Bactrocera zonata (Saunders)	Visitor					T, P & E
	Sarchophagidae	*Sarcophaga carnaria* (Meig)	Visitor	A	-	-	A	T, P & E
Acari	Tetranychidae	*Tetranychus urticae* (Koch.)	Pest	-	A & N	-	-	T, P & E
Araneida	----	Unidentified (True spiders)	Predators	-	-	A	A	T, P & E

T = Tomato, P = Pepper, E = Eggplant, A = adults, N = nymphs and L = larvae

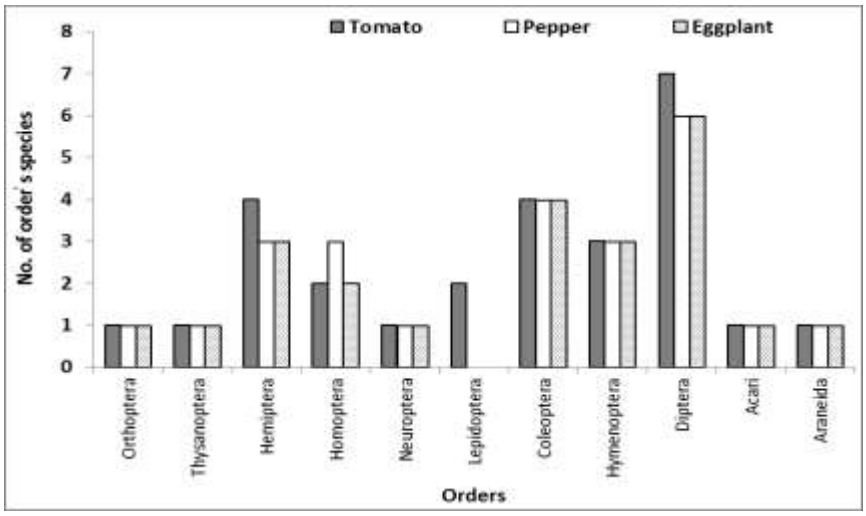

Fig. (1): Number of arthropods orders species associated with tomato, pepper and eggplant plantations, Sohag Region, 2014/ 2015 and 2015/ 2016 seasons.

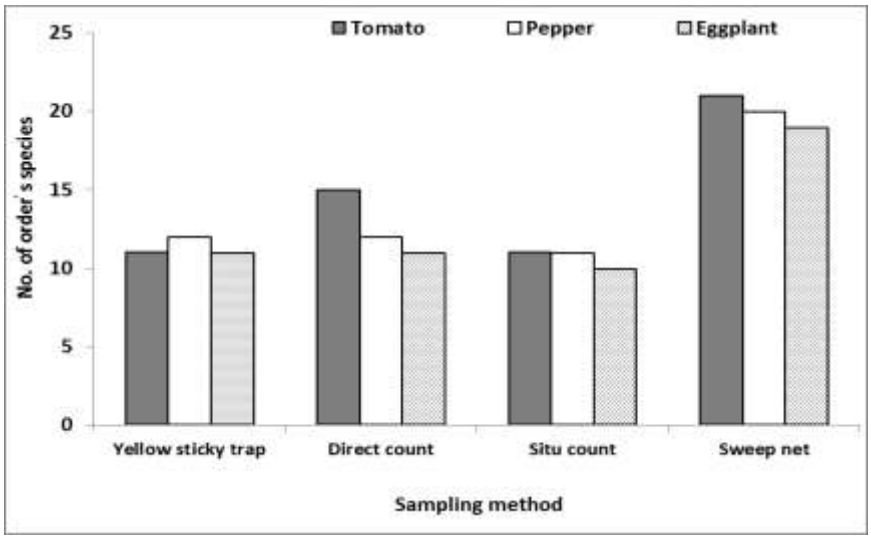

Fig. (2): Number of arthropods surveyed by different methods on tomato, pepper and eggplant plantations, Sohag Region, 2014/ 2015 and 2015/ 2016 seasons.

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حصر لمفصليات الأرجل المصاحبة لبعض محاصيل خضر العائلة الباذنجانية في منطقة سوهاج

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تم اجراء حصر لمفصليات الأرجل المصاحبة لبعض من خضر العائلة الباذنجانية (الطماطم، الفلفل، الباذنجان) في منطقة سوهاج لكل من الزراعتين الشتوية والصيفية لعامي الدراسة 2015/2014 و 2016/2015. تمت عملية الحصر باستخدام أربعة طرق لجمع العينات (المصائد الصفراء اللاصقة، العد المباشر، المصيدة الشبكية، الفحص المعملي) وذلك وفقا لعاداتها وحجمها وأطوار نموها. سجلت نواتج الحصر 26 نوع حشري تنتمي الي 24 جنس تابعة الي 20 عائلة منبثقة من 9 رتب حشرية. ذلك بالاضافة الي نوع واحد من الأكاروس تابع لرتبة الحلم وأنواع غير معروفة من العناكب الحقيقية. وقد خلصت نتائج الحصر الي تواجد 10 أنواع آفات حشرية بالاضافة الي 9 أنواع مفترسة و 8 زائرة وواحدة نادرة في تواجدها.

كلمات مفتاحية : حصر، مفصليات الأرجل، خضر العائلة الباذنجانية