

SURVEY AND POPULATION FLUCTUATION OF THE PIERCING SUCKING PESTS INHABITING SOLANACEOUS CROPS AT ASSIUT GOVERNORATE

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ABSTRACT

Solanaceous crops, potato, *Solanum tuberosum* L.; sweet pepper, *Capsicum annuum* L.; tomato, *Lycopersicon esculentum* Mill. and eggplant, *Solanum melongena* L. were used to survey the insects, mites and natural enemies and to study the population fluctuation of the piercing sucking pests, aphid, *Aphis gossypii* (Glover); whitefly, *Bemisia tabaci* (Genn.); leafhopper, *Empoasca decipiens* (Paoli) and the two-spotted spider mite, *Tetranychus urticae* Koch inhabiting it at Sahel-Saleem district, Assiut Governorate during 2009 and 2010 growing seasons. Fifty five species belonging to thirty five families and nine orders found on Solanaceous crops, were encountered by using the sweeping net method. Data also, revealed that, all the Solanaceous crops infest with the piercing sucking pests, but with a variable degree, eggplant received a higher mean number with the piercing sucking pests, followed by potato, tomato and sweet pepper. A higher infestation with aphid and whitefly to the Solanaceous crops were in March, but the higher infestation with leafhopper and two-spotted spider mite to the Solanaceous crops were in May during the two successive seasons.

Key words: Piercing sucking pests – Solanaceous crops – Survey – Population fluctuation.

INTRODUCTION

Solanaceous crops, potato; sweet pepper; tomato and eggplant are considered the most popular vegetable crops in Egypt. These Solanaceous crops suffer from the infestation of several insect pests e.g. aphid, whitefly, leafhopper and the two-spotted spider mite. Several investigators were concerned with Solanaceous crops such as, **El-Sayed *et al.* (1991)**, **Abd-Allah (2003)** and **Habashy & Faris (2005)**. The present investigation was initiated to survey the insects, mites and natural enemies, and the population fluctuation of the piercing sucking pests inhabiting Solanaceous crops.

MATERIAL AND METHODS

The present investigation was carried out in Sahel-Salem district, Assiut Governorate during two successive Solanaceous growing seasons 2009 and 2010. An area of about one feddan was cultivated with four crops, potato, sweet pepper, tomato and eggplant. Each plot was consisted of 5 ridges 3.5 long and 70 cm (about 1/400 fddan). The experiment was carried out in a completely randomized block design with four replicates. Regular conventional agricultural practices were performed except for the insecticides which were prevented.

I- Survey of insects, mites and natural enemies inhabiting Solanaceous crops:

Weekly samples (in addition to observations) were randomly taken (10 double sweeps/replicate) 35 days after plantation date (13th January 2009 and 14th January 2010) and continued till harvesting. Each collected sample was emptied into a labeled collecting muslin bag and transferred to the laboratory. Collected arthropods were killed by chloroform and examined under a stereomicroscope.

Identification of collected arthropods was made by specialists of insect classification Department, Plant Protec. Res. Inst., Agric. Res. Center.

II- Population fluctuation of the piercing sucking pests inhabiting Solanaceous crops:

Population fluctuation of four piercing sucking pests, aphid, *Aphis gossypii* (Glover); whitefly, *Bemisia tabaci* (Genn.); leafhopper, *Empoasca decipiens* (Paoli) and the two-spotted spider mite, *Tetranychus urticae* Koch was determined. Samples of 10 leaves/replicate were picked up randomly from each crop at 7-day intervals and transferred to the laboratory in the same day for inspection. The numbers of aphid (adults & nymphs), whitefly (nymphs), leafhopper (adults & nymphs) and the two-spotted spider mite (mature & immature) were determined. Obtained data were statistically analyzed by applying the analysis of variance (ANOVA) and the least significant difference (L.S.D.) at probability level of 0.05.

RESULTS AND DISCUSSIONS

I- Survey of insects, mites and natural enemies inhabiting Solanaceous crops:

Data Table (1) indicate the presence of 55 species of arthropods belong to 35 families and 9 orders. From the arthropods species collected, 32 species are considered pests causing damage, 5 visitors and 18 natural enemies.

For pests, Order Hemiptera ranked first in the number of species inhabiting Solanaceous crops (11 species), followed by Lepidoptera (9 species), Acari (5 species), Coleoptera (3 species), Diptera (2 species), Thysanoptera and Orthoptera (1 species /each).

For natural enemies, the eighteen species were found to belong to orders, Coleoptera (6 species.), Acari & Hemiptera (4 species./each), Thysanoptera, Neuroptera, Hymenoptera & Diptera (1 species./each).

For visitor, the five species were found to belong to orders, Hymenoptera (2 species), Lepidoptera (2 species) and Diptera (1 species) were also recorded.

The present findings agree with that obtained by **Soliman (1987), Salman (1988) and Ali (1995).**

II- Population fluctuation of the piercing sucking pests inhabiting Solanaceous crops:

Mean numbers of the piercing sucking pests inhabiting Solanaceous crops were presented in Table (2 and 3).

a) Aphid:

Data obtained in Table (2 and 3) cleared that the infestation of aphid on potato, sweet pepper, tomato and eggplant started from 3rd week of February and continued until 3rd week of May during 2009 and 2010 successive seasons.

Regardless of Solanaceous crops and seasons, the highest mean numbers was recorded on eggplant (19.27 and 12.95) followed by potato (17.59 and 11.59), tomato (14.45 and 10.07) and sweet pepper (11.82 and 9.09) during 2009 and 2010 seasons, respectively.

Also, the highest mean numbers was recorded during March (106.38 and 70.57) followed by April (75.62 and 62.24), February (20.25 and 16.25) and May (18.69 and 8.12) during 2009 and 2010 growing seasons, respectively. These results are in broad agreement with **Abd El-Fattah et al. (2000), Shoeb et al. (2005) and Abd El-Malak (2007).**

b) Whitefly:

Data Tables (2 and 3) represent the fluctuation of *Bemisia tabaci* on Solanaceous crops during 2009 and 2010 successive seasons.

Results show that for all Solanaceous crops, the highest mean numbers was highly significant during March (103.55 and 64.36) followed by April (63.00 and 46.62), May (38.00 and 16.19) and February (6.00 and 4.25) during 2009 and 2010 growing seasons, respectively.

SURVEY AND POPULATION FLUCTUATION OF THE PIERCING.... 153

Table (1): General list of insects, mites and natural enemies found on Solanaceous crops at Assiut during 2009 and 2010 growing seasons.

Order	Family	Common name	Scientific name	Status
Orthoptera	Gryllotalpidae	European mole cricket	<i>Gryllotalpa gryllotalpa</i> L.	Pest
Thysanoptera	Thripidae	Onion thrips	<i>Thrips tabaci</i> (Lindeman)	Pest
		Predatory thrips	<i>Scolothrips langicornis</i> Priesnex	Natural enemy
Hemiptera-Homoptera	Aphididae	Melon or cotton aphid	<i>Aphis gossypii</i> (Glover)	Pest
		Green peach aphid	<i>Myzus persicae</i> (Sulzer)	Pest
		Rose aphid	<i>Macrosiphum euphorbiae</i> Thomas	Pest
	Aleyrodidae	Sweet potato whitefly	<i>Bemisia tabaci</i> (Genn.)	Pest
	Cicadellidae	Green leafhopper	<i>Empoasca decipiens</i> (Paoli)	Pest
		Cotton jassid	<i>Empoasca lybica</i> (de Berg)	Pest
	Margarodidae	Mealybug	<i>Icerya aegyptiaca</i> (Douglas)	Pest
Hemiptera-Heteroptera	Anthorcoridae	Predatory bug	<i>Orius laevigatus</i> Fieber	Natural enemy
		Predatory bug	<i>Orius albidipennis</i> (Rossi)	Natural enemy
	Lygaeidae	Pentatomomorpha	<i>Geocoris megacephalus</i> (Rossi)	Natural enemy
		False chinch bug	<i>Nysius cymoides</i> Spinola	Pest
	Nabidae	Pale damsel bug	<i>Nabis capsiformis</i> (Grmer)	Natural enemy
	Miridae	Plant or leaf bug	<i>Campylomma impicta</i> (Wagner)	Pest
		British bug	<i>Phytocoris ulmi</i> (L.)	Pest
	Pentatomidae	Stink bug	<i>Nezara viridula</i> (L.)	Pest
Neuropteran	Chrysopidae	Green lacewings	<i>Chrysopa carnea</i> (Steph.)	Natural enemy
Lepidoptera	Noctuidae	Black cutworm	<i>Agrotis ipsilon</i> (Huf.)	Pest
		Cotton bollworm	<i>Earias insulana</i> (Boisd.)	Pest
		Tomato fruitworm	<i>Heliothis armigera</i> (Hb.)	Pest
		Cotton leafworm	<i>Spodoptera littoralis</i> (Boisd.)	Pest
		Beet armyworm	<i>Spodoptera exigua</i> (Hb.)	Pest
	Gelechiidae	Potato tuber moth	<i>Phthorimaea operculella</i> (Zeller)	Pest
	Pieridae	Cabbage white butterfly	<i>Pieris rapae</i> L.	Visitor
	Nymphalidae	Painted lady butterfly	<i>Vanessa cardui</i> L.	Visitor
	Geometridae	Measurement worm	<i>Scopula coenosaria</i> Lederer	Pest
	Pyralidae	Eggplant stem borer	<i>Euzophera osseatella</i> Treitschke	Pest
		European corn borer	<i>Ostrinia nubilalis</i> (Hubner)	Pest
Coleopteran	Coccinellidae	Ladybird beetle	<i>Coccinella undecimpunctata</i> (L.)	Natural enemy
		Ladybird beetle	<i>Coccinella septempunctata</i> (L.)	Natural enemy
		Lady beetle	<i>Scymnus interruptus</i> Goeze	Natural enemy
		Black lady beetle	<i>Stethorus gilvifrons</i> Mulsant	Natural enemy
	Stephylinidae	Rove beetle	<i>Paederus alfieri</i> (Koch)	Natural enemy
	Scarabaeidae	White grubs	<i>Pentodon bispinosus</i> Kust.	Natural enemy
	Elateridae	Click beetle	<i>Agrypnus notodonta</i> Latr.	Pest
	Chrysomelidae	Colorado potato beetle	<i>Leptinotarsa decimelinaea</i> (Say)	Pest
		Turnip flea beetle	<i>Phyllotreta atra</i> Fabricius	Pest
Hymenoptera	Syrphidae	The syrphid	<i>Syrphus corolla</i> (F.)	Natural enemy
	Apidae	Honey bee	<i>Apis mellifera</i> L.	Visitor
	Vespidae	Oriental hornet	<i>Vespa orientalis</i> L.	Visitor
Diptera	Muscidae	Housefly	<i>Musca domestica</i> L.	Visitor
	Agromyzidae	American serpentine leafminer	<i>Liriomyza trifolii</i> Burgess	Pest
		Broad bean leafminer	<i>Liriomyza congesta</i> Becker	Pest
	Cecidomyiidae	Midge	<i>Aphidoletes meridionalis</i> Felt	Natural enemy
Acari	Tetranychidae	Two-spotted spider mite	<i>Tetranychus urticae</i> Koch	Pest
		Carmine spider mite	<i>Tetranychus cinnabarinus</i> (Boisd.)	Pest
	Phytoseiidae	Spider mite predatory	<i>Phytoseiulus persimilis</i> (A.-H.)	Natural enemy
		Predatory mite	<i>Amblyseius</i> sp.	Natural enemy
		Predatory mite	<i>Euseius scutalis</i> (A.-H.)	Natural enemy
	Eriophyidae	Tomato erineum	<i>Eriophyes lycopersici</i> (Massee)	Pest
	Tarsonemidae	Tarsonemid mite	<i>Tarsonemus</i> spp.	Pest
	Stigmaeidae	Predaceous mite	<i>Agistemus exsertus</i> Gonzalez	Natural enemy
	Tydeidae	Mite	<i>Tydeus</i> sp.	pest

Table 2

Table 3

Also, eggplant received the significantly highest mean numbers of *B. tabaci* (18.40 and 12.57) followed by potato (16.50 and 9.71), tomato (14.36 and 8.13) and sweet pepper (11.16 and 7.14) through 2009 and 2010, respectively. The present findings agree with that obtained by **Hafez (2002) and Ajlan (2005)**.

c) Leafhopper:

Data in Tables (2 and 3) represent the fluctuation of *Empoasca decipiens* on Solanaceous crops during 2009 and 2010 growing seasons.

Results show that for all Solanaceous crops, the highest mean numbers was highly significant during May month (73.25 and 39.62) followed by April (45.50 and 28.50), March (22.94 and 15.12) and February (5.25 and 4.12) in the two seasons 2009 and 2010, respectively.

Also, potato received the significantly highest mean numbers of *E. decipiens* (14.56 and 8.80) followed by eggplant (11.57 and 6.62), tomato (8.98 and 5.30) and sweet pepper (6.87 and 4.23) during 2009 and 2010, respectively. These results agree with **Metwally et al. (1995) and Hegab et al. (2005)**.

d) The two-spotted spider mite:

Data obtained in Tables (2 and 3) represent the fluctuation of *Tetranychus urticae* on Solanaceous crops through 2009 and 2010 growing seasons. Results show that for all Solanaceous crops, the May month (50.13 and 31.93) followed by April (32.88 and 24.68), March (18.25 and 12.12) and February (3.19 and 2.37) during 2009 and 2010 growing seasons respectively.

Also, eggplant received the significantly highest mean numbers of *T. urticae* (11.03 and 7.61) followed by tomato (7.46 and 4.96), potato (6.07 and 4.28) and sweet pepper (5.27 and 3.46) during 2009 and 2010 growing seasons, respectively. These findings are in broad agreement with **Omar et al. (2000), Tag El-Din et al. (2002), Zein et al. (2002), Abou-Attia et al. (2004) and Faris et al. (2004)**.

All in all, the piercing sucking pests recorded in the present study infest Solanaceous crops with variable degree. The Solanaceous crops showed significant variation in their susceptibility to the infestation with piercing sucking pests. The variation in the population density depends on the plant age and the physiological & morphological character rather than the climatic condition. The population density of the piercing sucking pests on all Solanaceous crops was much higher in 2009 than in 2010. For all piercing sucking pests in the study, the sweet pepper was the most resistant to the pests infestation, while tomato, potato and eggplant were the least resistant ones.

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SURVEY AND POPULATION FLUCTUATION OF THE PIERCING.... 157

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حصر وتقلبات تعداد الآفات الثاقبة الماصة على محاصيل العائلة الباذنجانية
بمحافظة أسيوط

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معهد بحوث وقاية النبات – مركز البحوث الزراعية – الدقى - القاهرة

أجريت هذه الدراسة على محاصيل العائلة الباذنجانية (البطاطس – الفلفل – الطماطم – الباذنجان) في مركز ساحل سليم، محافظة أسيوط خلال عامي ٢٠٠٩، ٢٠١٠ بغرض حصر أهم الآفات الحشرية والأكاروسات والأعداء الحيوية المرتبطة بها، وكذلك لدراسة تقلبات تعداد الآفات الثاقبة الماصة (المنّ – الذبابة البيضاء – الجاسيد – العنكبوت الأحمر العادى) على محاصيل العائلة الباذنجانية. وأوضحت النتائج المتحصل عليها، أنه من خلال الحصر أمكن تسجيل ٥٥ نوعاً متواجداً بمحاصيل العائلة الباذنجانية تتبع بدورها ٣٥ عائلة تتبع 9 رتب. كما أظهرت الدراسة أن جميع محاصيل العائل الباذنجانية تصاب بدرجات متفاوتة بالآفات الثاقبة الماصة، فوجد أن الباذنجان من أكثر المحاصيل إصابة ثم البطاطس والطماطم وكان الفلفل أقلهم إصابة بالآفات الثاقبة الماصة. كما وجد أن أعلى الشهور إصابة بالمنّ والذبابة البيضاء خلال شهر مارس بينما كان شهر مايو أعلى الشهور إصابة لمحاصيل العائل الباذنجانية بالجاسيد والعنكبوت الأحمر العادى خلال عامي الدراسة. كما لوحظ أن الكثافة العددية للآفات الثاقبة الماصة على محاصيل العائلة الباذنجانية أعلى في عام ٢٠٠٩ عن عام ٢٠١٠.