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SURVEY OF INSECTS AND MITES INHABITING LEAVES AND SOIL OF *LANTANA CAMARA* L. IN ASSIUT GOVERNORATE

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ABSTRACT:

This study was conducted throughout whole year of 2009 on lantana hedges bordering farms at cultivated land and newly reclaimed area in Assiut Governorate. The survey revealed the presence of four insect species (*Aphis nasturtii* Kaltenbach; *Bemisia tabaci* (Gennadius); *Empoasca decipiens* Paoli; *Scolothrips longicornis* Priesner), and two mite species (*Tetranychus urticae* Koch and *Amblyseius* sp.) on lantana leaves in the two studied areas. Additionally, eleven soil mite species belonging to ten families (*Caloglyphus* sp. Acaridae; *Euphthiracarus* sp. Euphthiracaridae; *Galumna* sp. Galumnidae; *Sterroppia* sp., *Oppiella* sp. Oppiidae; *Ololaelaps bregetovae* Laelapidae; *Lasioseius quinisetosus* Ascidae; *Parasitus* sp. Parasitidae; *Acaropsella notchi* Cheyletidae; *Pediculochelus* sp. Pediculochelidae and *Spinibdella* sp. Bdellidae) were recorded. The population density of *A. nasturtii*, *B. tabaci*, *E. decipiens* and *Amblyseius* sp., was more abundant at newly reclaimed area, while *T. urticae* and *S. longicornis* were more abundant at cultivated land. Also, the newly reclaimed area harbored higher numbers of soil mites than that of cultivated land. The Cryptostigmata species exhibited the higher number followed by Astigmata and Mesostigmata, while low numbers of the Prostigmata were recorded in the cultivated land and newly reclaimed area.

INTRODUCTION:

Many cultivars of *lantana* (Verbenaceae) are used as annuals, herbaceous perennials, hanging baskets, low hedges or as foundation shrubs in urban landscapes. Most cultivated species are native in tropical or subtropical North and South America, but some are native in warmer regions of the old world. As a landscape plant, lantana is valued for its profuse show of color throughout a long season, often every month of the year in frost-free areas, its drought, heat and salt tolerance, aromatic foliage, and attractiveness to butterflies (Welch 1989; Arnold 1999; Reinert *et al*., 2006).

Many investigators surveyed several species of phytophagous insects and mites are known to infest lantana allover the world (Kirk *et al.*, 1993; Palmer and Pullen, 1995 in Mexico and United State; Craemer 1996; Bolland *et al*., 1998; Walter 1999 in Queensland, Australia; Held *et al.*, 2001). In Egypt (Zaher and Elbadry 1962; Wahab *et al.*, 1974; Hanna and Shereef 1981) reported that the ornamental plants are

liable to be attacked by various phytophagous mites.

Moreover, survey of soil mites and their ecological knowledge were studied by several authors all over the world (Nour *et al.*, 1985; Hassan *et al*, 1986; Sanyal and Sarkar 1993; Shoker and Eraky 1994; Walia and Mathur 1994; Mahamoud 1999).

The objective of the present investigation was to identify arthropod species as well as soil mites on the lantana hedges margins adjacent to farms, that can provide ecological refuges and sources of these fauna of insects and mites. Also, to study the population fluctuation of these species all over the year in cultivated land and newly reclaimed area.

MATERIALS AND METHODS:

The present investigation was conducted at two locations in Assiut Governorate during the whole year of 2009. The first one represented a traditional cultivated land (Fac. Agric. Expt. Farm, Assiut Univ.) and the second one represented newly reclaimed area (Arab-Alawamer Agric. Res. Station). In each experimental site, samples including leaves and soil were collected throughout the year to survey the insects and mites associated with lantana hedges margin to the farms.

1-Lantana leaves as arthropods inhabitant:

Weekly samples of 5 leaves per plant, with 5 replicates, were randomly collected early morning. Samples were separately kept in polyethylene bags and transferred to the laboratory for investigation by the aid of stereomicroscope.

2-Incidence of mites inhabiting soil:

To study the mites inhabiting lantana soil, 500g of soil with three replicates were fortnightly taken using a metal cylinder of one cubic liter at depth of 20 cm under the plants. The mites were extracted by using a modified Berlese's extractor apparatus and allowed to fall into small jar containing 75% ethyl alcohol + 5% glycerol.

After one week, mites were isolated in small vials using a camel hair brush to avoid destruction of mite individual, then mites were counted using stereomicroscope and transferred into concaved slide containing lactic acid for clearing. The permanent preparations of mites were used before identification. The identification of mites was based on illustrated keys by: Krantz (1978); Zaher (1986a and b) and Evans (1992).

Statistical analysis adopted for this study was the analysis of variance (ANOVA) procedure. The software used was SAS package and StatView SE±graphic software package (Abacus Concept, Inc. Calabasas, CA).

RESULTS AND DISCUSSION:

A-Survey of insects and mites inhabiting leaves and soil of *Lantana*:

In the present study, four insect species belonging to four families (*Empoasca decipiens*, Cicadellidae; *Aphis nasturtii*, Aphididae; *Bemisia tabaci*, Aleyrodidae and *Scolothrips longicornis*, Thripidae) and two mite species

(*Tetranychus urticae*, Tetranychidae and *Amblyseius* sp., Phytoseiidae) were recorded on lantana leaves. While, eleven soil mite species pertaining to ten families (*Caloglyphus* sp., Acaridae; *Euphthiracarus* sp., *Euphthiracaridae*; *Galumna* sp., Galumnidae; *Sterroppia* sp., *Oppiella* sp., Oppiidae; *Ololaelaps bregetovae*, Laelapidae; *Lasioseius quinisetosus*, Ascidae; *Parasitus* sp., Parasitidae; *Acaropsella notchi*, Cheyletidae;*Pediculochelus* sp., *Pediculochelidae* and *Spinibdella* sp., Bdellidae) were observed in both locations of study (Table 1).

Table 1: A partial taxonomic list of insects and mites inhabiting leaves and soil of lantana plants in Assiut Governorate throughout the whole 2009's year

	Order	Family	Scientific name
Leaves	Homoptera	Cicadellidae	*Empoasca decipiens* Paoli
		Aphididae	*Aphis nasturtii* Kaltenbach
		Aleyrodidae	*Bemisia tabaci* (Gennadius)
	Thysanoptera	Thripidae	*Scolothrips longicornis* Priesner
	Prostigmata	Tetranychidae	*Tetranychus urticae* Koch
	Mesostigmata	Phytoseiidae	*Amblyseius* sp.
Soil	Astigmata	Acaridae	*Caloglyphus* sp.
	Cryptostigmata	Euphthiracaridae	*Euphthiracarus* sp.
		Galumnidae	*Galumna* sp.
		Oppiidae	*Sterroppia* sp.
			Oppiella sp.
	Mesostigmata	Laelapidae	*Ololaelaps bregetovae* Shereef & Soliman
		Ascidae	*Lasioseius quinisetosus* Lindquist and Karg
		Parasitidae	*Parasitus* sp.
	Prostigmata	Cheyletidae	*Acaropsella notchi* Leach
		Pediculochelidae	*Pediculochelus* sp.
		Bdellidae	*Spinibdella* sp.

B-Population fluctuation of insects and mites inhabiting leaves and soil of *Lantana*:

1-Insects and mites inhabiting lantana leaves:

Data in Table (2) show the differential response of lantana plants to the incidence of insects and mites at two locations in Assiut Governorate throughout the course of study. The results clearly revealed that the population density, at newly reclaimed area, was more abundant with grand means of (14.08±4.51, 17.16±2.04, 0.75±0.13 and 0.7±0.09 individuals/ leaf) than that of cultivated land (3.79±1.23, 12.43±0.97, 0.61±0.11 and 0.50±0.09 individuals/ leaf) for *A. nasturtii*, *B. tabaci*, *E. decipiens*, and

***Amblyseius* sp., respectively. While for *T. urticae* and *S. longicornis*, were more abundant at cultivated area with grand means of (3.78±0.76 and 0.21±0.04 individuals/leaf) than at newly reclaimed area (0.45±0.11 and 0.16±0.04 individuals/leaf).**

See Research Tables

At newly reclaimed area, *A. nasturtii* started with low levels of abundance (0.05±0.05 individuals/leaf) during January, then increased to moderate levels of abundance during February and March (17.0±3.24 and 18.25±2.29 individuals/leaf). The maximum number was recorded during April with monthly average of (124.9±10.58 individuals/leaf). Then, the number rapidly declined during the two next successive months, and completely disappeared from July to December. While at cultivated land, *A. nasturtii* was recorded a moderate monthly average during January (5.9±2.49 individuals/leaf). Then, the population increased rapidly to reach the highest monthly average of (33.5±3.27 individuals/leaf) during February. Through March, April and May, the monthly average gradually decreased, and the pest completely disappeared in June, July, August, October and November. In Poland, Jaskiewicz (1995a) recorded the maximum numbers of aphid fauna on shrubs in July. The same author (1995b) indicated that the aphids appeared in spring between the middle and end of May and were at maximum between mid-June and mid-July. He also studied the aphid's fauna of shrubs, *Spiraea salicifolia* and its dynamic (1995c) and reported that all species disappeared in August or September.

Also, the number of *B. tabaci* at newly reclaimed area was fluctuated throughout the year to record the highest number in December with monthly average of 62.04±3.51 individuals/ leaf, while the lowest number (2.9±0.46 individuals/leaf) was recorded in February. At cultivated land, *B. tabaci* reached the highest monthly average (30.9±2.84 individuals/leaf) in July, and recorded the lowest one in January (4.05±0.62 individuals/leaf). In concurrence, Gerling (1984) found that *B. tabaci* was developed on numerous host species throughout the winter with high levels on lantana. The population was declined during late winter and spring.

The incidence of *E. decipiens* showed the minimum monthly average of 0.16±0.08 individuals/leaf in April and fluctuated through the next months to reach the maximum monthly average(3.28±0.70 individuals/leaf) in December at newly reclaimed area. The minimum and maximum monthly average (0.05±0.05 and 1.5±0.16 individuals/leaf) were recorded at cultivated land in February and September. In general, these results are in partial agreement with those obtained by El-Khouly (1974) who found that *E.decipiens* attacked chrysanthemum plants during May-August in Kanater area Egypt, but the infestation was still existing in Giza region during winter period. Baloch and Soomro (1980) recorded greatest population of *Empoasca devastans* Distant on ornamental plants from early June to late August. Hegab *et al.* (1988) observed three peaks of the leafhopper, *E. decipiens* in May, July and September on peach and apricot trees.

Regarding *T. urticae* the lowest and highest monthly average (0.1±0.06 and 15.68±1.41 individuals/leaf) were recorded during January and March at cultivated land earlier than at newly reclaimed area (0.08±0.05 and 2.2±0.46

individuals/leaf) during April and August. Walter (1999) reported that 31% of mite species associated with the invasive shrub *lantana camara* were phytophagous.

The predacious thrips, *S. lonicornis* and the predacious mite, *Amblyseius* sp. observed in relatively low numbers at the two locations. *S. lonicornis* recorded the highest numbers (0.76±0.17 and 0.65±0.17 individuals/leaf) during August for cultivated land and newly reclaimed area. While, the lowest numbers (0.05±0.05 and 0.25±0.14 individuals/leaf) were recorded in January and July at newly reclaimed area and cultivated land. *Amblyseius* sp. at cultivated land showed the lowest and highest monthly average of 0.04±0.04 and 1.6±0.44 individuals/leaf in March and June, while at newly reclaimed area the highest monthly average (1.35±0.30 individuals/leaf) was obtained in May and the lowest one (0.08±0.05 individuals/leaf) was occurred in July.

2-Mites inhabiting soil:

Data in Table (3), regardless soil mite orders, indicate that the newly reclaimed area was significantly harbored higher average number of mites than that of cultivated land. The recorded grand averages at newly reclaimed area and cultivated land were (5.86 and 4.04 individuals/500 g of lantana soil). Mahmoud (1999) observed that the population density of soil mites was different from crop to another in the same land and from land to another of the same crop and these results match with the present findings.

Concerning the soil mite orders, regardless locations, data also indicate that the higher average number was manifested with Cryptostigmata order (11.23 individuals/500 g of soil) followed with significant differences by the two orders of Astigmata and Mesostigmata (4.37 and 3.39 individuals/500 g of soil), while the lower average number was accomplished for Prostigmata order (0.81 individuals/500g of soil) with significant differences than the previous three orders (Table 3). The obtained results are in agreement with those of Walia and Mathur (1994) who stated that Cryptostignatid mites were the most frequent and abundant followed by Mesostigmatid, Prostigmatid and Astigmatid mites in survey of soil samples under field crops, vegetable plants, fruit trees and forest plantations.

Data in Table (3) represent the monthly average numbers of soil mites under lantana plants at cultivated land and newly reclaimed area through all over 2009's years. The majority of the extracted soil mites (27.14 and 10.13 individuals/500g of soil) were recorded in September and February, with significant differences, at newly reclaimed area and (10.79 and 7.97 individuals/500g of soil) in April and August, with insignificant differences, at cultivated land. While, the minority of soil mites (0.04, 0.76, 1.21 and 2.71 individuals/500 g of soil) were recorded in June, May, July and December with insignificant differences at newly reclaimed area, respectively. Whereas, (0.54, 0.88, 1.42 and 2.21 individuals/500 g of soil) in February, December, June and May with insignificant differences at cultivated land, respectively. Many

authors have been studied the population fluctuation of soil mites (Nour *et al.*, 1985; Sanyal and Sarkar, 1993; Shoker and Eraky, 1994). The obtained results are in agreement with those of Mahmoud (1999) who found that the highest population density of soil mites was recorded during spring and autumn while the lowest one was occurred during summer and winter.

Table (3): Monthly mean numbers of the soil mites under *lantana* plants at two locations in Assiut Governorate throughout the whole 2009's year

Location	Month	Orders				Monthly mean number	Location
		Astigmata	Cryptostigmata	Mesostigmata	Prostigmata		
Newly reclaimed area	Jan.	*0.00	30.17	1.00	0.00	7.79 bc	5.86 A
	Feb.	3.50	34.33	2.17	0.50	10.13 b	
	Mar.	0.83	8.67	4.50	0.67	3.66 bcd	
	Apr.	0.00	9.89	0.89	0.55	2.83 cd	
	May	0.17	0.39	1.67	0.83	0.76 cd	
	Jun.	0.00	0.00	0.00	0.17	0.04 d	
	Jul.	1.17	2.17	0.50	1.00	1.21 cd	
	Aug.	6.67	7.33	1.17	1.17	4.08 bcd	
	Sept.	52.89	41.00	10.45	4.22	27.14 a	
	Oct.	1.83	7.67	4.17	0.67	3.58 bcd	
	Nov.	5.000	17.33	2.50	0.83	6.42 bcd	
	Dec.	0.33	10.00	0.50	0.00	2.71 cd	
	Mean	6.03 *B*	14.08 *A*	2.46 *BC*	0.88 *C*		
Cultivated land	Jan.	4.67	4.50	3.33	0.83	3.33 bcd	4.04 B
	Feb.	0.50	0.67	1.00	0.00	0.54 d	
	Mar.	3.56	7.43	3.33	0.78	3.78 bcd	
	Apr.	10.83	15.00	11.33	6.00	10.79 a	
	May	0.17	7.00	1.67	0.00	2.21 d	
	Jun.	0.00	5.33	0.00	0.33	1.42 d	
	Jul.	2.83	6.83	2.83	0.17	3.17 cd	
	Aug.	1.00	14.22	16.67	0.00	7.97 ab	
	Sept.	0.00	11.83	0.00	0.00	2.96 cd	
	Oct.	2.17	16.17	10.00	0.33	7.17 abc	
	Nov.	6.50	8.83	1.17	0.33	4.21 bcd	
	Dec.	0.33	2.67	0.50	0.00	0.88 d	
	Mean	2.71 *BC*	8.37 *A*	4.32 *B*	0.73 *C*		
Order mean number		4.37 B	11.23 A	3.39 B	0.81 C		

***Value is the mean of weekly samples/month.**

At newly reclaimed area, Cryptostigmata order harbored the highest average number of 14.08 individuals/500g of soil, while the Prostigmata order was recorded the lowest one (0.88 individuals/500g of soil) with significant difference. The other two orders (Astigmata and Mesostigmata) were found to be in between (6.03 and 2.46 individuals/500 g of soil) with insignificant differences between them. These orders took similar sequence at cultivated land, so Cryptostigmata order gave the higher average number of 8.37 individuals/500 g of soil, while Prostigmata order represented the lower average number of 0.73 individuals/500 g of soil with significant difference, the other two orders exhibited moderate average number of 4.32 and 2.71 individuals/500 g of soil with insignificant differences between them. In harmony with

these results, Banerjee (1986) reported that the Cryptostigmatid mites, in the soil of uncultivated and well vegetated plots, were found to be predominated over other groups of mites such as Mesostigmata, Prostigmata and Astigmata.

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حصر للحشرات والحلم التي تتواجد على أوراق وبتربة اللانتانا في محافظة أسيوط

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أجريت هذه الدراسة بهدف حصر الحشرات والحلم المتواجدة على أوراق نبات اللانتانا وكذلك الحلم المتواجدة بالتربة، وذلك في الأراضي الزراعية القديمة والمناطق حديثة الاستصلاح بمحافظة أسيوط على مدار عام 2009 بالكامل.

كان أهم النتائج المتحصل عليها هو وجود 4 أنواع حشرية وهي *A. nasturtii*, *B. tabaci*, *E. decipiens*, *S. longicornis* ونوعين من الحلم وهما *T. urticae*, *Amblyseius* sp. على الأوراق، بينما سجل 11 نوعا من الحلم المتواجدة بالتربة أسفل نبات اللانتانا وهي:

***Caloglyphus* sp.; *Euphthiracarus* sp.; *Galumna* sp.; *Sterroppia* sp.; *Oppiella* sp.; *O. bregetovae*; *L. quinisetosus*; *Parasitus* sp.; *A. notchi*; *Pediculochelus* sp.; *Spinibdella* sp.**

أوضحت النتائج أن تعداد *A. nasturtii, B. tabaci, E. decipiens, Amblyseius* sp. كان أعلى في المناطق الحديثة الاستصلاح عن الأراضي الزراعية القديمة، بينما العكس سجل لكل من *T. urticae , S. longicornis* حيث كان تعدادهما أعلى في الأراضي الزراعية القديمة عن المناطق الحديثة الاستصلاح.

وبالنسبة لأنواع الحلم المتواجدة بالتربة فقد سجلت بأعداد أعلى في المناطق الحديثة الاستصلاح عن الأراضي الزراعية القديمة. وقد احتلت رتبة Cryptostigmata أعلى تعداد متبوعة بكل من رتبتي Astigmata, Mesostigmata بينما سجلت رتبة Prostigmata أقل تعداد وذلك في كل من المناطق الحديثة الاستصلاح والأراضي الزراعية القديمة. وقد سجل أعلى تعداد للحلم في التربة خلال شهري سبتمبر وفبراير في المناطق حديثة الاستصلاح وخلال شهري ابريل وأغسطس في الأراضي الزراعية القديمة. بينما كان أقل تعداد قد سجل في يونيو ومايو ويوليو وديسمبر على التوالي في المناطق الحديثة الاستصلاح، وفي فبراير وديسمبر ويونيو ومايو على التوالي في الأراضي الزراعية القديمة.