

**FIELD STUDIES ON THE MAIN PESTS INFESTING SOYBEAN PLANTS AND
 ASSOCIATED NATURAL ENEMIES AT NUBARIA REGION
 BY**

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ABSTRACT

The present work was carried out to record the major insect and mite pests attacking soybean plants and their associated predators at Nubaria region during two successive seasons 2005 and 2006. The results indicated that eleven insect and four mite pests were infesting soybean plants during the various growth stages. These pests are *Agrotis ipsilon*, *Heliothis armigera* and *Spodoptera littoralis* (Noctuidae); *Etiella zinckenella* (Pyralidae); *Thrips tabaci* (Thripidae); *Bemisia tabaci* (Aleyrodidae); *Aphis scraccivora*, *Aphis gossypii* and *A. fabae* (Aphididae); *Emoasca discipiens* and *E. tybica* (Cicadellidae). In addition, 16 predators were associated with the different pests, six insect predators, *Coccinella undecimpunctata*, *C. septempunctata*, *Cydonia vicina nolitica*, *C. vicina* *ists* and *Sycmus punctellum* (Coccinellidae); five predatory mites, *Amblyseius gossypii*, *A. cydnodactylon* (Phytoseiidae); *Agistemus exertus* (Stigmaeidae); *Hypoaspis miles* (Ascidae) and *Pronematus ubiquitous* (Tydeidae); and five spiders, *Argiope trifasciata* and *Cyrtophora citricola* (Araneidae); *Cheiracanthum* sp. and *C. isiacum* (Miturigidae) and *Oecobius* sp. (Linyphidae). Also, the population dynamics of the main pests on soybean plants were recorded.

INTRODUCTION

Soybean (*Glycin max* (L.)) is one of the most important leguminous crops in the world, it is a relatively new crop introduced into the Egyptian Agriculture which contributes in reducing food gap for high quality ratio of protein and oil of seeds containing around 40 % protein and 20 % oil. In Egypt, soybean is infested by many insects and mites. Soybean plants are a good shelter for many mite species during adverse environmental conditions, (Saweries 1983). The increase in soybean cultivation during the last decade in Egypt has drawn attention to its pests and other associated predators. Spider mites (family: Tetranychidae) cause great damage to leaf surfaces, the stomata, and the palsied and

spongy parenchyma, and they may inject toxic substances into the leaf and interferer with vital processes, (Baker and Connel, 1983). Calcareous soils are represented a new reclaimed land which characterized by poor fertility soils. Regarding the very low nutrition in sandy soil, and easy percolation of nutrients with access water, it demands to applying potassium and micronutrients in foliar application and other nutrients in many times which in turn affect the abundances of pests and natural enemies. The present study was carried out to record the major insect pests and their associated predators on soybean plants during two successive seasons (2005 and 2006) at Nubaria region.

MATERIALS AND METHODS

Experimental design:

An experiment was carried out at Village No. 5, Ahmed Bahaa farm, Nubaria

region during the two growing soybean seasons (2005 and 2006) to record the different insects, mite pests and their related

natural enemies of predator insects, mites and spiders. An area of about 1.5 feddan (6300 m²) (210 x 30 m) was chosen, prepared and seeded on May 15th. Survey of pests and predators was carried out from May till September during the two seasons. This area was divided into four plots each of 10 ridges each of 210 m. long and 70 cm side, 15 cm. between hills, the ridge had 100 hills, two plants for each hill and 5600 plants for each ridge by two sides. The field was planted with Giza 111 soybean variety. Normal agricultural practices were followed. The survey of pests and their related natural enemies was carried as follows; the immature stages of insect pests and predators were picked up by hand, whereas the adults were captured using double strikes of sweeping net. The collected pests were transferred in muslin bags to the laboratory of Nubaria Agricultural Research Station and put in refrigerator to anaesthetize the individuals prior to their classification. Mite samples were examined using stereo-microscope at laboratory of Cotton and Field

Crops Research Mite Dept., (PPRI) the identification was conducted. The population fluctuation of some sucking pests (spider mites, aphid insects, whitefly and green stink bug) was also recorded

The mite and insect pests and their natural enemies were counted on 20 plants chosen randomly from the area for counting aphid nymphs, sting bug and nymphs of whitefly. While the spider mites were counted in two square inches at the lower surfaces of 40 leaflets of soybean which weekly collected from the three levels of plants and transfer to the laboratory in paper bags. Samples were examined using a stereo-microscope. To determine the population density of aphids, five plants were chosen randomly from each plot and five litters from these selected plants were trapped and put in muslin bags. In the laboratory the collected aphids were placed in a pan containing 75 % ethyl alcohol for counting.

RESULTS AND DISCUSSION

1- Survey of the main insects, mites and spiders associated with soybean plants at Nubaria region during 2005 and 2006 seasons.

As shown in Table (1), eleven insect pests and four mite pests were collected during this study, the eleven insects belonging to 6 families as follows: Noctuidae (three species), Pyralidae (one species), Thripidae (one species), Aleyrodidae (one species), Aphididae (three species), Cicadellidae (two species) while five coccinellid predators were recorded associated with different pests. On the other hand, the four mite pests belonging to family Tetranychidae, and Tarsonemidae. The mite predators belonging to Stigmaeidae, Ascidae and Tydeidae. However, three different spider families were collected as follows Araneidae (two species), Miturigidae (two species) and Linyphiidae (one species).

Population fluctuation of main pests and their natural enemies on soybean plants at Nubaria region:-

The population fluctuation of main pests infesting soybean plants and their related

predators was carried out during 2005 and 2006. The available literature revealed that little work has been done on the population density of spider mites, aphid insects, whitefly and the green sting bug infesting soybean plants at Nubaria region. Moreover, no similar studies have been done on Giza 111 variety. The spider mite, *T. urticae* infestation started with a few number after seedling plants appear, then the population increased till reached its peak during the third week of July 2005 (688 mites/ 80 squar inches) and first week of July 2006 (781 mites 80 sq. inches), then decreased slowly till the harvest crop, reaching to 248 different mites during early September 2005 and 95 mites during the late of August 2006, (Tables 2 and 3). The aphid insects, *Aphis gossypii* beginning appear in rarely numbers after a month of sowing date, whereas the level infestation increased slowly till reached its peak in the first week of August 2005 (63 aphid insects) and during the third week of July 2006 (180 insects) and decreased till harvest. The whitefly, *B. tabaci* was appeared during the end week of July 2005 with a few numbers and then increased

gradually and reaching to their highest level of abundance during early of September 164 individuals. The same trend was observed during 2006 but the peak of population was recorded during the end of August with 185 insects, (Tables 2 and 3). The green vegetable bug *Nizara viridula* noticed in few numbers during the study seasons 2005 and 2006. The highest population number was recorded after the third week of August 2005 (36 insects) while the peak of this insect was more during mid of August 2006 (50 insect), (Tables 2 and 3). However, the natural enemies which were

represented by predacious insects, predacious mites and true spiders, as shown in Tables (4 and 5), the populations of them were recorded with few numbers at early seasons and gradually increased till reaching the highest peak of abundance after the first week of August 2005 (139, 140 and 50 predacious insects, mites and spider, respectively). Also, the same trend of population increased gradually during 2006 season 135, 130 and 55 for the predacious insects, mites and true spider, respectively

Table (1): Survey of the main pests and their natural enemies associated with soybean plants at Nubaria region during 2005 and 2006 seasons.

Family	Species	Behavior
Insects		
Noctuidae	<i>Agrotis ipsilon</i> (Huf.), <i>Heliothis armegra</i> (Hb.) and <i>Spodoptera littoralis</i> (Boids.)	Pests
Pyralidae	<i>Etiella zinckenella</i> Tre.	
Thripidae	<i>Thrips tabaci</i> L.	
Aleyrodidae	<i>Bemisia tabaci</i> (Genn.)	
Aphididae	<i>Aphis scraccivora</i> Koch, <i>Aphis gossypii</i> Glover and <i>Aphis fabae</i> Scopoli	
Cicadellidae	<i>Empoasca discipiens</i> Paoli & <i>E. lybica</i>	Predators
Coccinellidae	<i>Coccinella undecimpunctata</i> L., <i>C. septempunctata</i> L., <i>Cydonia vicina nolitica</i> Mul., <i>Cydonia vicina isis</i> , <i>Sycmnus punctellum</i> Welse	
Mites		
Tetranychidae	<i>Tetranychus urticae</i> Koch, <i>T. cucurbitacearum</i> Sayed	Pests
Tarsonemidae	<i>Polyphagotarsonemus latus</i> , <i>Tarsonemus confuses</i> Ewing	Predators
Phytoseiidae	<i>Amblyseius gossypii</i> , <i>A. cydnodactylon</i> Shehata & Zaher	
Stigmaeidae	<i>Agistemus exertus</i> Gonzales	
Ascidae	<i>Hypoaspis miles</i> Berlese	
Tydeidae	<i>Pronematus ubuiquitus</i> McGregor	
Spiders		
Araneidae Simon	<i>Argiope trifasciata</i> Forskal, <i>Cyrtophora citricola</i> (Forskal)	Predators
Miturigidae Simon	<i>Cheiracanthium</i> sp. <i>C. isiacum</i> Cambridge	
Linyphiidae Blackwall	<i>Oecobius</i> sp.	

Effect of different factors on the abundance of the commonest phytophagous pests associated with soybean plants at Nubaria region during the two successive seasons 2005 and 2006

A carefully examination of the date, Table (6) indicated that all tested factors

(predacious insects, predacious mites, true spiders and whitefly) had negative correlating with the population of *T. urticae* during the two seasons and this effect was noticed as positive effect when aphid was taken in consideration. On the other hand and case of aphid, the different tested factors except

whitefly and green bug (had positive affect on the population during the experiment periods) but these two factors had shown a negative effect on the population of these insects. However, the presence of aphids and spider mites negatively affected the population of the whitefly *B. tabaci* on soybean plants, while

other of factors especially the natural enemies showed a negative interaction (Table 6). Also, the obtained analyzed data indicated that all predaceous organisms had positive effect on whitefly and *N. viridula* population but a negative reaction was recorded when the aphids and spider mites were present.

Table (2): Population fluctuation of the main pests infesting soybean plants at Nubaria region during 2005 season.

Inspection date	<i>T. urticae</i> / 80 sq.inches	<i>Aphis gossypii</i> / 20 plants	<i>Bemisia tabaci</i> / 20 plants	<i>Nizara viridula</i> / 20 plants
21/6	354	0	0	0
28/6	486	0	0	0
5/7	620	15	0	0
12/7	662	24	0	0
19/7	688	45	0	3
26/7	605	58	18	9
2/8	582	63	45	16
9/8	518	48	72	19
16/8	406	32	98	30
23/8	385	26	114	36
30/8	320	25	125	7
6/9	248	12	164	6

Table (3): Population fluctuation of the main pests infesting soybean plants at Nubaria region during 2006 season.

Inspection date	<i>T. urticae</i> / 80 sq.inches	<i>Aphis gossypii</i> / 20 plants	<i>Bemisia tabaci</i> / 20 plants	<i>Nizara viridula</i> / 20 plants
13/6/2006	125	21	0	0
20/6	222	25	0	0
27/6	645	138	0	0
4/7	781	142	0	0
11/7	509	165	24	5
18/7	423	184	32	12
25/7	312	160	55	21
1/8	153	98	78	13
8/8	138	85	99	42
15/8	135	49	125	50
22/8	118	28	162	14
29/8	95	12	185	10

Similar results were obtained by Taha *et al.* (2001) whom they mentioned that there was significant relationship among soybean cultivars, infestation of soybean with sucking pests and climatic factors. Also Younes, Ahlam *et al.* (2001) studied the population density of sucking insects and mites on ten soybean cultivars. The results showed that, the

infestation of the tested cultivars with mites and certain sucking insects through the two seasons, commenced in July sharply in August and first of September then decreased in the second week of September. The role of fertilization as a factor affecting the population of different mites and true spiders inhabiting soybean plants. Ostlie (2007) in USA

mentioned that the prolonged drought always raises the specter of two-spotted spider mite (*Tetranychus urticae*) infestations in soybean. While minor, local outbreaks have occurred in recent years, the last statewide spider mite outbreak occurred in 1988. The scope of 2007 problem has not yet reached 1988 levels but spider mite infestations have reached treatable

levels in soybeans in scattered droughty areas throughout Minnesota. Conservation of the above mentioned natural enemies is necessary to keep the natural balance in soybean as well as in other ecosystem, (Hendawy and Abul-Fadl 2004). This could be mainly done by minimizing the application of any chemicals, Sallam (2002).

Table (4): Population fluctuation of the natural enemies associated with pests infesting soybean plants at Nubaria region during 2005 season.

Inspection date	Predacious insects	Predacious mites	True spiders
13/6	0	0	0
20/6	0	0	3
27/6	18	0	11
4/7	20	19	16
11/7	46	17	10
18/7	76	35	16
25/7	81	59	36
1/8	99	132	51
8/8	139	140	50
15/8	122	80	32
22/8	66	67	19
29/8	40	19	3

Table (5): Population fluctuation of the natural enemies associated with pests infesting soybean plants at Nubaria region during 2006 season.s

Inspection date	Predacious insects	Predacious mites	True spiders
13/6	0	0	0
20/6	4	0	2
27/6	13	2	9
4/7	25	10	13
11/7	38	16	12
18/7	94	28	18
25/7	101	54	23
1/8	114	121	42
8/8	135	125	55
15/8	112	92	28
22/8	88	49	11
29/8	45	33	5

Table (6): Effect of different factors on the population of the main pests associated with soybean at Nobarria during 2005 and 2006 seasons.

Pest	Biotic factor	Correlation (r)	Slope (b)
<i>T. urticae</i> Koch	Pred. insects	-0.189	-0.042
	Pred. mites	-0.332	-0.071
	True spiders	-0.119	-0.016
	Aphid	0.260	0.063
	Whitefly	-0.555	-0.393
	<i>N. viridula</i>	-0.302	-0.025
Aphid insects	Pred. insects	0.225	0.202
	Pred. mites	0.031	0.028
	True spiders	0.168	0.051
	<i>T. urticae</i>	0.260	1.060
	Whitefly	-0.234	-0.675
	<i>N. viridula</i>	-0.050	-0.016
Whitefly <i>B. tabaci</i>	Pred. insects	0.134	0.042
	Pred. mites	0.186	0.056
	True spiders	0.410	0.118
	Aphid	-0.234	-0.081
	<i>T. urticae</i>	-0.555	-0.783
	<i>N. viridula</i>	0.180	0.021
<i>Nezara viridula</i> (L.)	Pred. insects	0.785	1.910
	Pred. mites	0.793	2.0983
	True spiders	0.669	0.605
	Aphid	-0.045	-0.150
	<i>T. urticae</i>	-0.305	-3.725
	<i>B. tabaci</i> (Gennadius)	0.180	1.566

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دراسات حقلية على أهم الآفات التي تصيب نباتات فول الصويا والأعداء الطبيعية المصاحبة له
في منطقة النوبارية

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أجريت هذه الدراسة الحقلية لمعرفة الآفات الحشرية والأكاروسية وأعدائها الطبيعية المصاحبة لها على نباتات فول الصويا في منطقة النوبارية خلال موسمي ٢٠٠٥ و ٢٠٠٦. حيث تبين من الدراسة وجود ١١ نوع من الحشرات تنتمي الى ٦ عائلات مختلفة وهي Noctuidae (٣ أنواع) وهي *Agrotis ipsilon* و *Heliothis armegra* و *Spodoptera littoralis* و Pyralidae (نوع واحد) وهو *Etiella zinckenella* و Thripidae (نوع واحد) وهو *Thrips tabaci* و Aleyrodidae (نوع واحد) وهو *Bemisia tabaci* و Aphididae (٣ أنواع) وهم *Aphis scraccivora* و *A. gossypii* و *A. fabae* و Cicadellidae (نوع واحد) وهو *Empoasca discipiens* و *E. lybica* ومن المفترسات الحشرية خمسة أنواع تابعة لعائلة و Coccinellidae وهي *Coccinella undecimpunctata* و *C. septempunctata* و *Cydonia vicina* و *noliticus* و *C. vicina isis* و *Sycmus punctellum*. بالإضافة الى اربعة انواع من الحلم النباتي التغذية وهي Tetranychidae (نوعان) وهما *Tetranychus urticae* و *T. cucurbitacearum* و Tarsonemidae (نوعان) وهما *Polyphagotarsonemus latus* و *Tarsonemus confuses* ومن المفترسات الاكاروسية خمسة انواع وهي Phytoseiidae (نوعان) وهما *Amblyseius gossypii* و *A. cydnodactylon* و Stigmaeidae (نوع واحد) وهو *Agistemus exertus* و Ascidae (نوع واحد) وهو *Hypoaspis miles* و Tydeidae (نوع واحد) وهو النوع *Pronematus ubiquitous* وخمسة انواع من العناكب الحقيقية وهي Araneidae (نوعان) وهما *Argiope trifasciata* و *Cyrtophora citricola* و Miturigidae (نوعان) وهما *Cheiracanthum sp.* و *C. isiacum* و Linyphidae (نوع واحد) وهو *Oecobius sp.* . كما تمت دراسة ديناميكية التعداد للعنكبوت الاحمر العادي ومن القطن والذبابة البيضاء والبقعة الخضراء خلال الموسمين على نباتات فول الصويا.