

STUDIES ON THE MAIN INSECT PESTS ATTACKING PEANUT PLANTS AND THEIR ASSOCIATED NATURAL ENEMIES , IN QALUBIA GOVERNORATE.

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ABSTRACT

This study was conducted to survey the common insect pests that attack peanut plants especially, the cotton leafworm *Spodoptera littoralis* (Boisd.) and the major piercing sucking insect pests. In addition, it included the evaluation of the percentages of parasitism by the larval parasitoid *Microplitis rufiventris* Kok. on *S. littoralis*. The most common associated predators were also surveyed during 2006 and 2007 seasons, in Qalubia Governorate. The maximum total numbers of *S. littoralis* larvae were recorded during the first week of July, 2006 and 2007. While, the peaks of *S. littoralis* parasitism by the parasitoid *M. rufiventris* were found during the third and the last weeks of June, 2006 and 2007, respectively. The highest total numbers of the cowpea aphid *Aphis craccivora* (which was the only recorded aphid species), were found during the second week of July, 2006 and 2007. The jassid *Empoasca* spp. individuals were peaked in the last week of July, in 2006 and 2007 seasons. Aphids were more abundant on peanut plants than jassids. The two predators; *Coccinella undecimpunctata* and syrphids were the highest abundant predatory species surveyed associated with the major insect pests, compared to true spiders. Obtained results proved that, the natural role of the biocontrol agents (parasitoids and predators), against major insect pests attacking peanut plants, must be encouraged and developed. Moreover, it revealed that, the parasitoid *M. rufiventris* and the predator *C. undecimpunctata* could have a promising role against *S. littoralis* and *A. craccivora*, respectively, in peanut fields or other related fields that are liable by their attack. Biological control techniques by using these beneficial agents represent one of the main concepts of Integrated Pest Management (I.P.M.) strategies that help to protect man and his surrounding environment from pollution.

Keywords: Peanut, Pests, *Spodoptera littoralis*, Parasitoids, *Microplitis rufiventris*, *Aphis craccivora*, Predators.

INTRODUCTION

In Egypt, the continuous need to increase the national food supply, particularly oils, is a challenge to agricultural investigators (El- Khawas *et al.*, 2003). Peanut (*Arachis hypogaea* L.), is one of the most important field crops , which is widely cultivated where its seeds are locally consumed. However, peanut production has been seriously threatened by the infestation of several insect pests that cause considerable damage and affect directly or indirectly the crop yield and resulted oils. Of these key pests, the Egyptian cotton leafworm *Spodoptera littoralis* (Boisd.) (Lepidoptera: Noctuidae) was reported as one of the major insect pests, attacking peanut plants (Assal and Kolaib, 1986).

Many natural enemies, such as parasitoids and predators play an important natural role against different insect pest species (El-Khawas and Shoeb, 2006). Of these biocontrol agents, the larval parasitoid *Microplitis*

rufiventris Kok.(Hymenoptera: Braconidae),was recorded parasitizing many lepidopterous species, including *S. littoralis* (Tawfik and El- Hussein, 2002).

The extensive use of synthetic chemical pesticides has caused different hazards to man and his surrounding environment. Insect resistance, harms to beneficial bioagents, soil, water and contaminants were some of these problems (Abdel- Rahman *et al.*, 2005). Accordingly, an efficient and successful I.P.M. strategies, has to be based on using other alternative safe materials (Bekheit, 2005). Recently, selective pesticides that can be used to control pests without adversely affecting natural enemies are needed for modern pest management (Sabir *et al.*, 2000).

Therefore, the purpose of the present work was to study the population dynamics of *S. littoralis* larvae in peanut fields, during the two successive seasons, 2006 and 2007, in Qalubia Governorate and evaluating their percentages of parasitism by the larval parasitoid *M. rufiventris*. Also, it was directed to shed light on the natural relationships that were found between the major piercing sucking insect pests and their common associated predators.

MATERIALS AND METHODS

Studies were carried out in Qalubia Governorate, during the two successive seasons, 2006 and 2007, in peanut fields. An area of one fadden (in Shabein El- Kanater district), was annually cultivated and was selected for surveying the most common insect pests, especially the cotton leafworm *Spodoptera. littoralis* and the aphid *Aphis craccivora*. Experimental area received all the regular recommended agricultural practices, except the absence of chemical insecticides. Samples of 500 leaflets (5 leaflets/plantx100 plants), were weekly investigated. The total numbers of *S. littoralis* larvae were weekly counted in the field (early in the morning and on both surfaces of plant leaflets).Larvae were subsequently collected and transferred directly to the laboratory for estimating the percentages of parasitism. Collected larvae were reared in glass jars (17 cm height x 11 cm diameter), with a rate of 5 larvae / jar. The rearing jars were daily provided with filter paper (to absorb any extra moisture), and also with fresh castor bean leaves for larval feeding until pupation or the emergence of adults of *M. rufiventris* parasitoids. Emerged *M. rufiventris* parasitoids were carefully identified in the Biological Control Research Department and counted for estimating the weekly percentages of parasitism of *S. littoralis* larvae. At the same time, the population of the major piercing sucking insect pests; including the aphid *A. craccivora* (adults & nymphs) and the jassids *Empoasca* spp. (adults & nymphs), besides the common observed predators, were also weekly recorded on peanut plants. Inspection of samples lasted from the first week of June (after 14 days from planting), until the last week of August (time of harvesting), in each of the two studied seasons, 2006 and 2007.

The obtained data were statistically analyzed according to the procedure outlined by Snedecor and Cochran (1980). The least significant differences (L.S.D.) test was run to compare the means at 0.05 levels using

SAS program (SAS Institute, 1994).The weather factors including the means of temperature and relative humidity were obtained from the Meteorological station at the Agricultural Research Centre (A.R.C.).

RESULTS AND DISCUSSION

Population abundance of the cotton leafworm larvae.

Results in Tables (1&2) and Figs.(1&2) indicated that, the total numbers of *S. littoralis* larvae were low at the beginning of the two seasons, 2006 and 2007, during the second week of June, 2006 and 2007(11and1 larvae/500 leaflets, respectively).Numbers increased gradually until reaching the highest total numbers of 125 and 79 larvae/500 leaflets, in the first week of July, 2006 and 2007. Their numbers declined until completely disappeared in harvesting time, in the last week of August, 2006 and 2007. The mean total numbers of pest larvae per season were; 31.08 (0-125) and 17.15 (0-79) larvae, respectively. While, it was 24.12 (0-125) larvae, for the two seasons together. Obtained results were similar to those of Assal and Kolaib (1986), who recorded *S. littoralis* as a pest of peanut plants. Their total numbers of larvae was, significantly higher in 1996 than 1997 season (Table, 2).

Table (1): Population abundance of the cotton leafworm larvae, tracking peanut plants and percentages of parasitism by *M. rufiventris* during season, 2006, in Qalubia Governorate.

Date of samples	Total no. of pest larvae	% parasitism	Mean C ^o	Mean R.H. %
4/6/2006	0	0.00	29.80	48.00
11 / 6	11	9.09	24.80	47.00
18 / 6	28	28.57	25.60	48.00
25 / 6	62	13.60	26.40	48.00
2 / 7	125	8.43	25.60	50.00
9 / 7	83	5.08	21.40	55.00
16 / 7	59	0.00	27.20	60.00
23 / 7	21	0.00	28.00	62.00
30 / 7	8	0.00	29.00	65.00
6 / 8	5	0.00	29.00	65.00
13 / 8	2	0.00	30.10	61.00
20 / 8	0	0.00	30.30	64.00
27 / 8	0	0.00	30.00	64.00
Mean / season	31.08 (0-125)	4.98 % (0.00-28.57)	27.48 (21.40-30.30)	56.69 % (47.00-65.00)

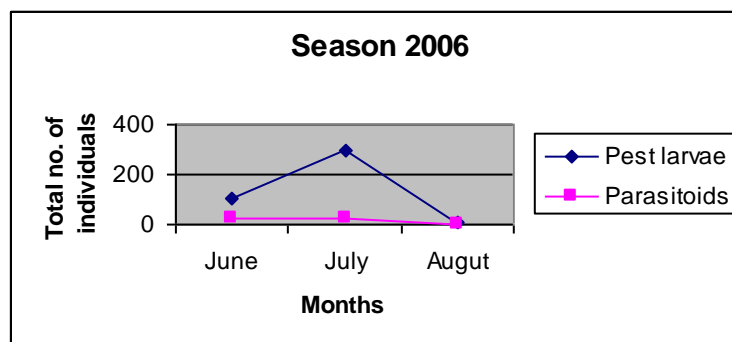


Fig. (1): Monthly total numbers of *S. littoralis* larvae on peanut plants and its common parasitoid *M. rufiventris*, during season, 2006.

Parasitism of *S. littoralis* larvae.

Data in Tables (1&2) and Figs.(1&2) demonstrated that, the parasitoid *M. rufiventris* was recorded during the periods extended from the second and third weeks of June, 2006 and 2007, until the second and third weeks of July, 2006 and 2007, respectively. The highest percentages of parasitism by *M. rufiventris* were recorded during the third and last weeks of June, 2006 and 2007 (28.57 and 14.29%, respectively).

Table (2): Population abundance of the cotton leafworm larvae, attacking peanut plants and percentages of parasitism by *M. rufiventris* during season, 2007, in Qalubia Governorate.

Date of samples	Total no. of pest larvae	% parasitism	Mean C ^o	Mean R.H. %
3/6/2007	0	0.00	25.50	49.00
10/6	1	0.00	32.50	48.00
17/6	10	10.00	26.50	50.00
24/6	14	14.29	28.70	49.00
1/7	79	12.66	27.20	48.00
8/7	68	5.88	27.50	50.00
15/7	32	3.13	27.20	49.00
22/7	13	0.00	28.30	50.00
29/7	4	0.00	30.50	51.00
5/8	1	0.00	26.10	51.00
12/8	1	0.00	28.00	52.00
19/8	0	0.00	27.70	50.00
26/8	0	0.00	29.40	52.00
Mean / season	17.15 (0-79)	3.54 % (0.00-14.29)	28.09 (25.50-32.50)	49.92 % (48.00-52.00)
Mean / 2 seasons	24.12 (0-125)	4.26 % (0.00-28.57)	L.S.D. at 5% between 2 seasons (pest larvae)	0.741

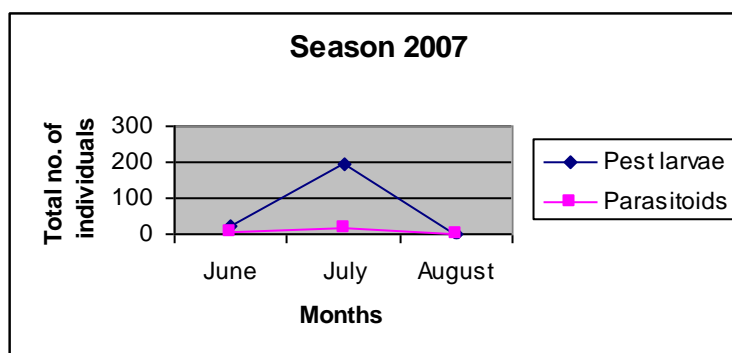


Fig. (2): Monthly total numbers of *S. littoralis* larvae on peanut plants and its common parasitoid *M. rufiventris*, during season, 2007.

Population abundance of the major piercing sucking insect pests.

Data in Table (3) represent the population dynamics of the cowpea aphid, *A. craccivora* which was the only surveyed aphid species attacking peanut plants, during 2006 and 2007 seasons. Their population started to occur with few numbers (17 and 1 individuals/500 leaflets), in the second week of June, 2006 and 2007, respectively. Its population increased gradually until reaching the peaks of abundance (1625 and 1093 individuals/500 leaflets), in the second week of July, 2006 and 2007. The mean total numbers of *A. craccivora* per season were; 444.92 (0-1625) and 257.54 (0-1093) individuals, for 2006 and 2007 seasons, respectively, indicating that, aphid population was significantly higher in the first season (2006), than that of 2007 season (Table, 3).

Table (3): Population abundance of major piercing sucking insect pests, attacking peanut plants, during 2006 and 2007 seasons, in Qalubia Governorate.

Season 2006				Season 2007			
Dates of samples	Aphid	Jassids	Total no.	Dates of samples	Aphid	Jassids	Total no.
4/6/2006	0	0	0	3/6/2007	0	0	0
11/6	17	3	20	10/6	1	1	2
18/6	61	14	75	17/6	23	4	27
25/6	167	18	185	24/6	86	9	95
2/7	318	12	330	1/7	217	7	224
9/7	1625	13	1638	8/7	1093	8	1101
16/7	1416	16	1432	15/7	814	9	823
23/7	1147	18	1165	22/7	703	11	714
30/7	614	21	635	29/7	255	14	269
6/8	230	12	242	5/8	101	6	107
13/8	157	5	162	12/8	46	2	48
20/8	32	1	33	19/8	9	0	9
27/8	0	0	0	26/8	0	0	0
Mean/season	444.92A (0-1625)	10.23A (0- 21)	455.15 (0-1638)	Mean/season	257.54B (0-1093)	5.46 B (0- 14)	263.00 (0-1101)
Mean/ 2 seasons	351.23 (0-1625)	7.85 (0-21)	359.08 (0-1638)	L.S.D. at 5%	Aphids 10.744	Jassids 0.245	

N.B.: means of the same letters are not significantly different.

The mean total number of *A. craccivora*, for the two seasons together was 351.23 individuals. However, *A. craccivora* was recorded as a peanut pest by Misari *et al.* (1987). They found that, the peaks of the aphid population were occurred during the fourth and fifth weeks after planting.

Data presented in Table (3) demonstrate the populations of the jassids *Empoasca* spp. on peanut plants, during the period of study. They began to occur and with few numbers (3 and 1 individuals/500 leaflets), in the second week of June, 2006 and 2007. Their populations reached their peaks (21 and 14 individuals/500 leaflets), in the last week of July, 2006 and 2007, respectively. The mean total numbers of jassids per season were; 10.23 and 5.46, in seasons 2006 and 2007, respectively. The mean total number for the two seasons together was 7.85 (0-21) individuals. Statistical analysis indicated a significant difference between the two seasons in comparing the total numbers of *Empoasca* spp. Also, the correlations were recorded between the total numbers of *Empoasca* spp. and means of temperature and relative humidity (the r-values were; 0.354 & 0.063 and 0.063 & 0.063, for 2006 and 2007 seasons, respectively, Table, 6).

However, the highest total numbers of the major piercing sucking insect pests (1638 and 1101 individuals/500 leaflets), were recorded during the second week of July, for seasons 2006 and 2007. The mean total numbers of these pests per season were; 455.15 (0-1638) and 263.00 (0-1101) individuals, respectively. The mean total number of the major piercing sucking insect pests, for the two seasons together was 359.08 (0-1638) individuals.

Survey of predators.

Table (4) summarized the common predators surveyed on peanut plants that were recorded associated with the major insect pests (especially the aphid *A. craccivora*). These predators included; *Coccinella undecimpunctata* L. (Coleoptera: Coccinellidae), Syrphids (Diptera: Syrphidae) and true spiders (unidentified species). Generally, Boraei *et al.* (2005) found that, coccinellid beetles and certain dipterous species were among the common predators observed in most field crops. The obtained data indicated that, the periods of predators' occurrence extended all over the season in both years, except the following periods; the first week of June & the last week of August, 2006 and the first & the second weeks of June & the last weeks of August, 2007. The highest total numbers of predators surveyed were during the first week of August, 2006 and 2007 (35 and 24 individuals/500 leaflets, respectively). Results indicated that, the total number of predators per season was higher in the first season (136 individuals), compared with the second one (82 individuals). The mean total number of predators for the two seasons together was 109.00 (82-136) individuals. Statistical analysis of obtained data revealed the correlations between the total numbers of observed predators on peanut plants and means of temperature and relative humidity. Where, the r- values were; 3.471 & 0.665 in 2006 season and 0.020 & 0.427 in 2007 season (Table, 6).

In seasons, 2006 and 2007, the *C. undecimpunctata* beetles began to appear in the third week of July, 2006 and 2007 (3 and 2 individuals/500 leaflets, respectively). No adult was found during the periods extended from

the first week of June until the second week of July and in the last week of August, 2006. While, it disappeared during the period extended from the first week of June until the second week of July and from the third week of August to the last week of the same month (in season, 2007). Results showed that, the first week of August 2006 and 2007, was the periods of the highest abundance of this predator (the total numbers per season were 62 and 39 individuals). It represented 45.59 and 47.56%, among the total predators on peanut plants (for 2006 and 2007 seasons, respectively), with a mean percentage of 46.58%, for the two seasons together (Table, 4). The important role of the ladybeetles as effective predators were previously shown by many investigators. Several species of coccinellids represented a significant component of the natural enemy complex inhibiting and / or frequently many agro-ecosystems in Egypt (Abdel-Rahman, 2005). In addition, Al-Allan *et al.* (2004) found that, the aphidophagous coccinellids were of particular importance and usually play an important role in regulating and / or suppressing populations of their potential preys, principally aphid species.

As for syrphids (Table, 4), larvae (the predatory stage) were firstly observed in the first and second weeks of July, 2006 and 2007 (2 and 2 larvae/500 leaflets, respectively). The larval count was recorded with maximum numbers of 14 and 10 larvae/500 leaflets, during the last week of July, 2006 and 2007, respectively. Larvae disappeared during the period extended from the first week of June until the first week of July and in the last week of the same month (in season, 2006). But, in season 2007, they disappeared during the period extended from the first week of June until the first week of July and in the third and last weeks of August, 2007. This predator represented 41.91 and 37.81%, among the total predators (for seasons, 2006 and 2007, respectively), with a mean percentage of 39.86% for the two seasons together (Table, 4). Misari *et al.* (1987) surveyed the natural enemies of family Coccinellidae and Syrphidae in relation to *A. craccivora*. They stated that, the natural enemy populations reached a peak one week after the aphid population.

Concerning the true spiders (unidentified species), they began to be found on peanut plants in the second and third weeks of June, 2006 and 2007 (1 and 1 individual /500 leaflets, respectively). These predators existed all over the two seasons, except the following periods; the first week of June and the last week of August, 2006 and the first & the second weeks of June and the last week of August, 2007. Their peaks of 4 and 3 individuals/500 leaflets were recorded during the last week of June, 2006 and 2007 (for seasons, 2006 and 2007, respectively). The total numbers of these predators that were reported in seasons 2006 and 2007 were 17 and 12 individuals, respectively. The total seasonal count of true spiders represented 12.50 and 14.63% , among the total predators (for 2006 and 2007 seasons, respectively). The mean percentage of the two studied seasons together was 13.56% (Table, 4). Araneids were shown as predators of major insect pests on peanut plants by Funderburk *et al.* (1990). Besides, it was stated that, identification of spider prey revealed a preference

for Hemiptera (32.70%), with Lepidoptera and other Araneidae constituting 17.30 % each, in peanut agro-ecosystem (Agnew and Smith, 1989).

Table (4): Total numbers of the common predators recorded on peanut and their percentages of occurrence to total predators during seasons, 2006 and 2007, in Qalubia Governorate.

Dates of samples	Season 2006				Season 2007				
	Lady-bird beetle (A,L)	Syrphus sp. (L.)	True spiders	Total no.	Dates of samples	Lady-bird beetle (A,L)	Syrphus sp. (L.)	True spiders	Total no.
4/ 6/2006	0	0	0	0	3/ 6/ 2007	0	0	0	0
11/ 6	0	0	1	1	10/ 6	0	0	0	0
18/ 6	0	0	1	1	17/ 6	0	0	1	1
25/ 6	0	0	4	4	24/ 6	0	0	3	3
2/ 7	0	2	2	4	1/ 7	0	0	1	1
9/ 7	0	4	1	5	8/ 7	0	2	1	3
16/ 7	3	6	2	11	15/ 7	2	3	2	7
23/ 7	10	11	1	22	22/ 7	6	6	1	13
30/ 7	17	14	1	32	29/ 7	10	10	1	21
6/ 8	22	13	1	35	5/ 8	17	7	0	24
13/ 8	9	5	1	15	12/ 8	4	3	1	8
20/ 8	1	2	2	5	19/ 8	0	0	1	1
27/ 8	0	0	0	0	26/ 8	0	0	0	0
Total / season (range)	62 (0-22)	57 (0-14)	17 (0-4)	136 (0-35)	Total / season	39 (0-17)	31 (0-10)	12 (0-3)	82 (0-24)
% (season)	45.59%	41.91%	12.50%	100.00%	% (season)	47.56%	37.81%	14.63%	100.00 %
% (for 2 seasons)	46.58%	39.86%	13.56%	100.00 %	Mean / 2 seasons	50.50 (39-62)	44.00 (31-57)	14.50 (12-17)	109.00 (82 - 136)

N.B.: A= Adults, L= Larvae.

From the obtained data, it was shown that the ladybird *C. undecimpunctata* beetles had the highest total numbers of individuals among all the predatory species in peanut fields. Moreover, from Tables (3&4), it could be mentioned that, the predators' occurrence was synchronized with that of the major piercing sucking insect pests recorded including the cowpea aphid *A. craccivora*. The ratio between such major piercing sucking insect pests and all surveyed predators were; 44.13:1 (in season, 2006) and 41.13:1 (in season, 2007). The general ratio of the two seasons together was 43.22:1 (Table, 5). Moreover, results indicated a positive density dependence between these pests and their common observed predators. This relationship is of a great value for biological control purpose and must be taken into consideration when promoting and planning for Integrated Pest Management (I.P.M.) strategies, against the major piercing sucking insect pests attacking peanut fields or other related fields. Similar to obtained results, Misari *et al.* (1987) suggested that, the relationship between the natural enemies and *A. craccivora* on peanut was density dependent. Also, El- Heneidy and Abdel- Samad (2001) stated that, it is important to

recognize both positive and negative interactions that occur between the two primary components of a management system, plant cultivars and natural enemies, when developing I.P.M. systems.

Table (5): Monthly relationships between major piercing sucking insect pests and associated predators on peanut plants, during 2006 and 2007 seasons, in Qalubia Governorate.

Months	Season 2006	Season 2007	Ratio/ 2 seasons
June	46.67:1	31.00:1	40.40:1
July	71.42:1	69.58:1	70.72:1
August	7.80:1	4.97:1	6.75:1
General/ season	44.13:1	41.13:1	General ratio/ 2seasons 43.22:1

Tale (6): Correlation coefficient (r) between weather factors (means of temperature and relative humidity) and means of *S. littoralis* larvae, percentages of their parasitism, aphid , jassids and common observed predators.

Tested factors	Temperature (2006)	Temperature (2007)	Relative humidity (2006)	Relative humidity (2007)
<i>S. littoralis</i>	Y= 315.36-10.33X r = 0.693	Y= 21.23-0.06 X r = 0.020	Y= 153.01-2.15 X r = 0.407	Y= 451.04-8.69 X r = 0.430
% parasitism	Y= 50.71-1.67 X r = 0.519	Y= 19.78-0.58 X r = 0.203	Y= 49.07-0.78 X r = 0.686	Y= 97.11-1.88 X r = 0.462
Aphid	Y= 3332.10-105.08 X r = 0.483	Y= 1237.62- 28.50X r = 0.093	Y= -737.41- 20.69 X r = 0.283	Y=1747.41+ 29.62 X r = 0.200
assids	Y= 37.75-1.00 X r = 0.354	Y= 0.258+0.02 X r = 0.063	Y= 6.69+0.06 X r = 0.063	Y= 16.29-0.22 X r = 0.063
Predators	Y= -28.00+1.40 X r = 3.471	Y= 8.77-0.09 X r = 0.020	Y= -50.68+2.64 X r = 0.665	Y= -125.66+ 2.64 X r = 0.427

Also, Table (6) shows the correlations between the total numbers of pest larvae and means of temperature and relative humidity (where, the r-values were; 0.693 & 0.407 in 2006 season and 0.020 & 0.430 in 2007 season).

The correlations between the percentages of parasitism and means of temperature and relative humidity are shown in Table (6).The r-values were; 0.519 & 0.686 in 2006 season and 0.203 & 0.462 in 2007 season.

Correlation values recorded between the total numbers of *A. craccivora* and means of temperature and relative humidity were; 0.483 & 0.283 and 0.093 & 0.200, for 2006 and 2007 seasons, respectively (Table, 6).

In conclusion, obtained results revealed the important natural role of the parasitoid *M. rufiventris* and the three surveyed predators; *C. undecimpunctata*, syrphids and true spiders as natural biological agents against the major insect pests (particularly, the cotton leafworm *S. littoralis* and the cowpea aphid *A. craccivora*, respectively), attacking peanut plants. Magnifying this natural role became necessary for future mass rearing and releases of *M. rufiventris* against *S. littoralis* and *C. undecimpunctata* against *A. craccivora*, in peanut fields and other related fields that are attacked by these two key pests. The two natural enemies could be laboratory mass reared and released in the field and could be used side by side with other

available safe control methods, representing one of the main concepts of I.P.M. strategies, to protect man and his surrounding environment from pollution.

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دراسات على أهم الآفات الحشرية التي تهاجم نباتات الفول السوداني و أعدائها الحيوية المرتبطة بها ، في محافظة القليوبية. مصطفى أحمد محمد الخواص

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تهدف هذه الدراسة لحصر الأنواع الحشرية التي تهاجم نباتات الفول السوداني ، وخصوصا دودة ورق القطن وكذلك الآفات الثاقبة الماصة الهامه. وبالإضافة على ذلك ، فهي تشمل تقدير نسب التطفل لدودة ورق القطن بالطفيل ميكروبلينيس روفيفنترس (*Microplitis rufiventris*) . اشتمل الحصر ايضا على تسجيل الأنواع الشائعة للمفترسات و المصاحبه للآفات الهامه خلال موسمى الدراسة المتتابعين 2006 و 2007 ، فى محافظة القليوبية. سجل أعلى تعداد ليرقات دودة ورق القطن خلال الأسبوع الأول من يولييه 2006 و 2007 ، على التوالي (125 و 79 يرقة / 500 و ريقه ، على التوالي). بينما وجد أن قمة التطفل بالطفيل ميكروبلينيس روفيفنترس ليرقات دودة ورق القطن قد بلغت مداها فى الأسبوع الأخير من يونيه 2006 و 2007 (28,57 و 29,14 % للموسمين 2006 و 2007 ، على التوالي) . وكان أعلى تعداد لأفراد من البقوليات (وهو النوع الوحيد المسجل خلال الدراسة) ، خلال الأسبوع الثانى من يولييه 2006 و 2007 (1625 و 1093 فردا / 500 و ريقه ، على التوالي). وكانت أفراد الجاسيدات فى قمة تعدادها فى الأسبوع الأخير من يولييه 2006 و 2007 (21 و 14 فردا / 500 و ريقه على التوالي). وتواجدت أفراد المن بأعداد أعلى جدا بالمقارنه بتعداد الجاسيدات على نباتات الفول السودانى كما تبين من النتائج أن حشرات أبى العيد ويرقات ذباب السرفس هما أكثر أنواع المفترسات تواجدا بالمقارنه بالعناكب الحقيقية.

وبذلك يتبين من هذه الدراسة مدى الدور الطبيعى الذى تؤديه هذه الكائنات الحية النافعة من طفيليات و مفترسات ، ضد الآفات الهامه التي تهاجم نباتات الفول السوداني، ولذا يجب المحافظة بقدر الأمكان على تواجد تلك الأعداء الطبيعية. وعلى ذلك يمكن أن يستخدم الطفيل ميكروبلينيس روفيفنترس لمكافحة دودة ورق القطن ، وحشرات أبى العيد 11 نقطة لمكافحة من البقوليات فى حقول الفول السوداني او الحقول الأخرى المشابهه التي تهاجم بتلك الآفات . حيث تمثل تطبيقات مكافحة الحيووية باستخدام تلك الكائنات النافعه ، أحد المفاهيم الرئيسية للمكافحة المتكاملة للآفات ، جنب الى جنب مع الوسائل الأخرى الآمنه والتي تساهم معا فى الحفاظ على الإنسان و بيئته خاليه من التلوث.

