

## THE INSECT PESTS ATTACKING ONION PLANTS WITH SPECIAL REFERENCES TO THE ONION THRIPS *Thrips tabaci* LIND. AT MANSOURA REGION.

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### ABSTRACT

The main insect pests inhabiting onion plants during the two seasons at Mansoura region were *Thrips tabaci* Lind.(36.3 and 36.9%), *Aphis gossypii* Glov. (28.7 and 28.5%), *Eumerus amoenus* Loew. (19.3 and 18.0%), *Empoasca lybica* de Berg. (11.1 and 11.8%) and *Liriomyza trifolii* Burgess (2.4 and 2.1%) in 2007/08 and 2008/09 seasons, respectively. On the other hand, the main insect pests inhabiting onion plants with low occurrence were *Nezara viridula* (0.4 and 0.4%), *Bemisia tabaci* (0.4 and 0.6%), *Spodoptera littoralis* (0.2 and 0.4%) and *Cryptoblabes gridiella* (0.3 and 0.5%) during the two successive seasons, respectively.

The main predators inhabiting onion plants and associated with the insect pests infesting this crop during the two successive seasons were the coccinellid *Coccinella undecimpunctata* (31.7 and 17.0%) , *Coccinella septempunctata* (32.3 and 38.7%), *Cydonia vicina nilotica* (19.2 and 28.7%) and the chrysopid, *Chrysoperla carnea* (16.8 and 15.6%) during 2007/08 and 2008/09 seasons, respectively.

The maximum number of *T. tabaci* nymphs by using direct count method were 785 and 675 nymphs/ 10 plants in the second week of April 2008 and in the first week of April 2009 in the two successive seasons, respectively. On the other hand, the maximum number of *T. tabaci* adults by using direct count method were 100 and 68 individuals/ 10 plants in the fourth week of March 2008 and in the second week of March 2009 in the two seasons, respectively. The average number of *T. tabaci* nymphs were  $297.2 \pm 82.2$  nymphs/ 10 plants during the first season 2007/08 and  $249.9 \pm 80.9$  nymphs/ 10 plants during the second season 2008/09, while the average number of *T. tabaci* adults were  $41.1 \pm 9.8$  and  $30.2 \pm 8.9$  individuals / 10 plants during two seasons, respectively.

Moreover, by using sticky trap method, the maximum number of *T. tabaci* adults were 218 and 200 individuals/trap in the first week of March 2008 and in the second week of April 2009 in the two seasons, respectively. The average number of *T. tabaci* adults were  $112.0 \pm 14.6$  and  $92.7 \pm 21.2$  individuals/ trap during the two seasons, respectively.

### INTRODUCTION

In Egypt, Onion (*Allium Cepa* L.) is an important field crop for both local consumption or for exportation.

According to statistics of Ministry of Agriculture and Land Reclamation, the total area cultivated with onion crop in 2006 exceeded 80 thousand feddan produced over 950 thousand tons of onion bulbs (Mahmoud, 2008). Onion plantations as well as bulbs during the storage are oftenly subject to considerable insect infestation which effected in the crop quality and quantity. Onion plants usually subject to infestation by different insect pests during

their different stages of growth as the onion thrips *Thrips tabaci* Lind., the onion aphid, *Aphis gossypii* Glov., the cotton leaf hopper, *Empoasca Lybica* de Berg., the cotton white fly *Bemisia tabaci* Genn., the serpentine leaf miner *Liriomyxa trifolii* Burgess and the onion bulb fly *Eumerus amoenus* Loew. Which caused yield losses (El-Sherif, 1971 in Egypt; Johnson and Marshall, 1986 in Hawaii; Haydar and Sherif, 1987 in Egypt; El-Bolok *et al.*, 1990 in Egypt; Gupta *et al.*, 1994 in India; Ciocioal *et al.*, 2002 in Brazil; Szejde, 2005 in Poland; Mahmoud, 2008 in Egypt and Mahaffey and Cranshaw, 2010 in USA).

The present study was carried out during two successive seasons 2007/08 and 2008/09 at Mansoura region to evaluate the following points:-

- Survey of the insect pest, and their associated predators on onion plants during the successive seasons.
- Study the population abundance of the onion thrips *T. tabaci* by direct counting and sticky trap methods.

## **MATERIALS AND METHODS**

### **Survey of insect pests and associated predators on onion plants:-**

Survey of insect pests associated with onion at both open field and store, was carried out at Experimental research station, faculty of agriculture Masoura University, El-Mansoura region throughout two successive seasons [2007/08 and 2008/09]. Onion variety namely Giza 6 was direct seed in nursery bed on 15<sup>th</sup> November 2007, and 10<sup>th</sup> November 2008. Plants were transplanted 6<sup>th</sup> January 2008 and 5<sup>th</sup> January 2009.

The experimental area was about half faddan divided into four plots for each varieties (Each plot 490m<sup>2</sup>). The normal agriculture treatment of land preparation, Irrigation, mechanical weeds control and fertilization were followed. Chemical control was avoided entirely during the growing since the appearance of seedlings. Ten random plants per plots were cut the base at weekly intervals and placed in plastic bag for inspection in the laboratory. The insect pests which were found were collected and identified. The immature stages of lepidopterous insects were reared till emergence of adults for identification. Berlese tullgren method was used for extraction mite from onion samples and from soil around the plant. Samples kept for 24<sup>hrs</sup> below 60 watt electric lamp, and the mite were received in petri dish was filled with water.

### **The population abundance of the onion thrips *T.tabaci*:-**

During survey studies of the pests associated with onion plant in Experimental research station, Faculty of Agriculture Mansoura University during two successive seasons 2007/08 and 2008/09. These experiments were carried out for the two successive seasons to determine population abundance of the main insect pests and their associated predators. Experimental studies carried out with onion variety namely Giza 6 and the seedlings were transplanted on 6<sup>th</sup> and 5<sup>th</sup> January 2008 and 2009, respectively.

Approximately 1/4 Fadden was divided into four equal plots. Culture methods were followed as commonly practiced and chemical control was avoided. Sampling began in the second week of January 2008 and 2009. Samples were carried out weekly until harvest.

Two methods were used for estimating the population abundance of the insects on onion thrips *T. tabaci*. Field visual counting and yellow sticky traps according to Fourier *et al.*, (1995) were carried out during the two successive seasons. For field direct counting, 10 onion plants randomly selected from each plot were carefully cut at ground level before formed the bulb in the early season. When bulbs were formed, Plant samples were cut from the upper part of the bulb. Plants were carefully handled to avoid disturbing the insects on plants. Plants placed in plastic bags and transported immediately to the laboratory. All leaves of samples were carefully inspected and the number of the insect pests and their associated predator were counted and recorded by using stereoscope binocular. Second methods yellow sticky traps [YST], with 10x20cm constructed from cardboard and coated with thin layer of adhesives were used to evaluate the adult of some insect pests.

The traps were held by small wooden sticks in a vertical position and, five traps per plot were used. The height of the traps was adjusted with growth of plants the traps were placed in the field in the early morning after remaining in the field for one week. The traps were taken into the laboratory and the number of adult of the insects on the entire trap surface were counted with 10x hand lens.

## RESULTS AND DISCUSSION

### Survey of the onion pests:-

Data presented in Table (1) showed that, 10 injurious insect specie's affiliated to five orders were recorded on onion plant during the two successive seasons 2007/08 and 2008/09 at Mansoura region. On the other hand, data in Table (1) represented on mite specie *Eriophes tubipae* Keifer was recorded inhabiting onion plants (Leaf and bulbs) during the two successive seasons. Moreover, data presented in table (1) showed that 4 predatory insects inhabiting onion plants during the two successive seasons.

Data illustrated in table (2) showed that, the main insect pests attacking onion plants were ten insect species affiliated to five orders and one mite specie were recorded in onion leafs and bulbs during the two seasons. The onion thrips *T. tabaci* recorded the most abundant specie during the two successive seasons with the total numbers and ratio 7428=36.3% and 7499=36.9% followed by onion aphids *A. gossypii* 5882=28.7% and 5795=28.5%; onion bulb fly *E. amoenus* 3947= 19.3% and 3680= 18.0% and the cotton leaf hopper *E. lybica* 2287= 11.1% and 2393 =11.8% during seasons 2007/08 and 2008/09, respectively. On the other hand, the lowest abundant insect pests attacking onion plants were the cotton leaf worm *S. littoralis* with the total numbers and ratio 50= 0.2% and 85= 0.4% followed by onion maggot *D. alliria* 60= 0.3% and 75= 0.4% and the garlic moth *C. gnidiella* 70= 0.3% and 93= 0.5% during the two successive seasons 2007/08

and 2008/09 respectively. Only one specie, the dry bulb mite, *Eriophes tulipae* keifer was recorded attacking onion leaves and bulbs during the two seasons with percentage 0.5% (Table 2).

**Table (1):- systematic list of the pest and natural enemies associated with onion plant in field during two successive seasons 2007/08 and 2008/09 at Mansoura region.**

Common mane	Scientific name	Period of occurrence	Status	stages	site	Frequently Occurred
Onion thrips	<i>Thrips tabaci</i>	From Jan.	Pest	N. & A.	Leaf	Abundance
Onion aphid	<i>Aphis gossypii</i>	From Mar.	Pest	N. & A.	Leaf	Frequently
Cotton leaf hopper	<i>Empoasca lybica de Berg.</i>	From Feb.	Pest	N. & A.	Leaf	Frequently
Leaf miner	<i>Liriomyza trifolii</i>	From Nov.	Pest	L. & A.	Leaf	Frequently
Onion maggot	<i>Eumerus amoenus</i>	From Apr.	Pest	L.	Bulb	Abundance
Green bug	<i>Nezara viridula</i>	From Mar.	Pest	N. & A.	Leaf	Rare
Tomato White fly	<i>Bemisia tabaci Genneadius</i>	From Nov.	pests	N. & A.	Leaf	Rare
Onion Maggot	<i>Dalia alliria Fonseca</i>	From Nov.	pests	L.	Leaf	Rare
The dry bulb mite	<i>Eriophes talipae</i>	From Feb.	Pests	A.	Leaf & Bulb	Rare
Cotton leaf worm	<i>Sopdoptera littoralis Bios.</i>	From Mar.	Pests	L.	leaf	Frequently
Garlic moth	<i>Cryptoblabes gnidiella Mill</i>	From Jun.	pests	L.	Bulb	Rare
Eleven spot beetle	<i>Coccinella undecimpunctata</i>	From Mar.	Predator	L. & A.	Leaf	Abundance s
Seven spot beetle	<i>Coccinella septempunctateea</i>	From Mar.	predator	L. & A.	Leaf	Abundance s
Lady beetle,	<i>Vicina nilitica Muls.</i>	From Mar.	Predator	L. & A.	Leaf	Abundance
Green lacewing	<i>Chrysonillo carnea Steph</i>	From Mar.	Predator	N. & A or L. & A.	Leaf	Rare

A: Adult

N: Nymph

L: Larva

**Table (2):- The main insect pests attacked onion crop during seasons 2007/08 and 2008/09 at Mansoura region.**

Common name	Scientific name	Number and the percentage of The insect pest			
		2007/ 08		2008/ 09	
		No.	%	No.	%
Onion thrips	<i>T. tabaci.</i>	7428	36.3%	7499	36.9%
Onion aphid	<i>A. gossypii</i>	5882	28.7%	5795	28.5%
Cotton leaf hopper	<i>E. lybica</i>	2287	11.1%	2393	11.8%
Leaf miner	<i>L. trifolii</i>	500	2.4%	430	2.1%
Onion bulb fly	<i>E. amoenus</i>	3947	19.3%	3680	18%
Green bug	<i>N. viridula</i>	80	0.4%	75	0.4%
Tomato white fly	<i>B. tabaci.</i>	85	0.4%	120	0.6%
Onion Maggot	<i>D. alliria</i>	60	0.3%	75	0.4
Cotton leaf worm	<i>S. littoralis</i>	50	0.2%	85	0.4%
Garlic moth	<i>C. gnidiella</i>	70	0.3%	93	0.5%
Dry bulb mite	<i>E. tulipae</i>	100	0.5%	105	0.5%
<b>Total</b>		<b>20389</b>	<b>100%</b>	<b>20350</b>	<b>100%</b>

As a conclusion, the main insect pests inhabiting onion plants during the two seasons at Mansoura region were *T. tabaci* (36.3 and 36.9%), *A. gossypii* (28.7 and 28.5%), *E. amoenus* (19.3 and 18.0%), *E. lybica* (11.1 and 11.8%) and *L. trifolii* (2.4 and 2.1%) in 2007/08 and 2008/09 seasons, respectively. On the other hand, the main insect pests inhabiting onion plants with low occurrence were *N. viridula* (0.4 and 0.4%), *B. tabaci* (0.4 and 0.6%), *S. littoralis* (0.2 and 0.4%) and *C. gnidiella* (0.3 and 0.5%) during the two successive seasons, respectively.

These results are in Agreement with those of El-Bolok *et al.*, (1990) in Egypt, Gupta *et al.*, (1994) in India, Ciocioal *et al.*, (2002) in Brazil and Duchovski (2003) in Poland, they mentioned that, *T. tabaci*, *A. gossypii*, *L. trifolii* and *N. viridula* were the most harmful pests attacking onion plants.

Data presented in Table (3) showed that, the coccinellid predators were the most abundant predators associated with the insect pests infesting onion plants during the two successive seasons at Mansoura Region it can noticed that, *C. septempunctata* more abundant predator with total number and ratio 202= 3.23% and 347= 38.7% followed by *C. undecimpunctata* 198= 31.7% and 153= 17.0% and *C. vicina nilotica* 120= 19.2% and 238 = 28.7% during the two seasons 2007/08 and 2008/09, respectively. On the other hand, the lowest abundant predator was *C. carnea* with total number and ratio 105= 16.8% and 140= 15.6% during the two seasons, respectively.

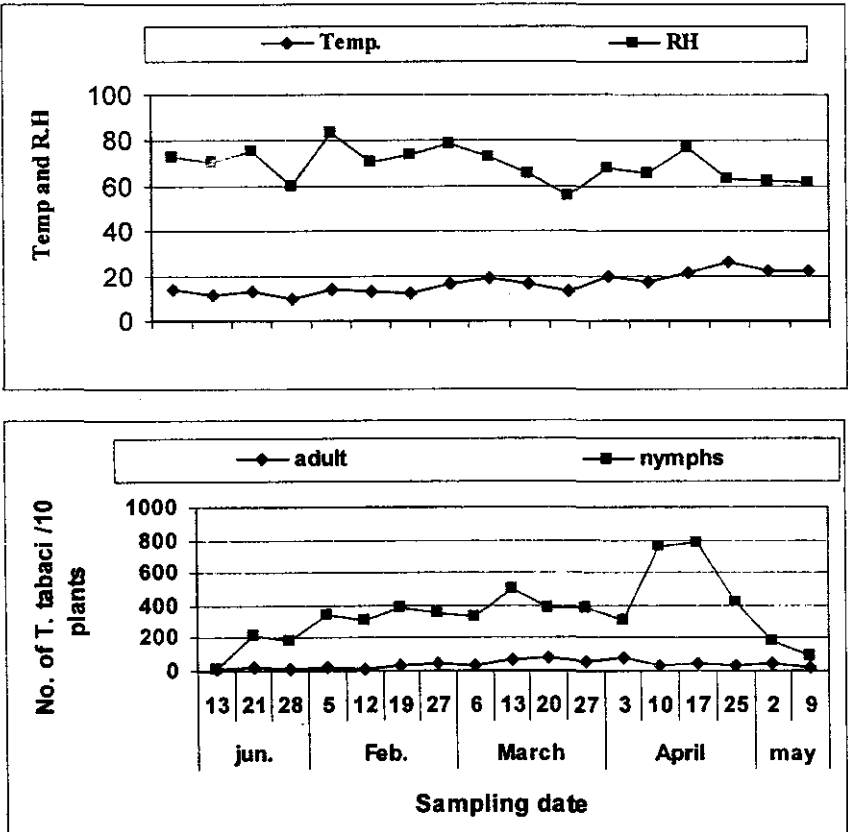
As a conclusion, data illustrated in Table (3) indicated that, the main predators inhabiting onion plants and associated with the insect pests infesting this crop during the two successive seasons were the coccinellid *C. undecimpunctata* (31.7 and 17.0%), *C. septempunctata* (32.3 and 38.7%), *C. vicina nilotica* (19.2 and 28.7%) and the chrysopid, *C. carnea* (16.8 and 15.6%) during 2007/08 and 2008/09 seasons, respectively. These results are in agreement with those of Abd El-Fattah (1980) and El-Bolok *et al.*, (1990). They stated that, the coccinellid predators associated with the insect pests on onion plant, were *C. undecimpunctata*, *C. septempunctata* and *C. vicina nilotica*.

**Table (3): The main insect predators associated with the insect pests infesting onion crop during seasons 2007/08 and 2008/09 at Mansoura region.**

Common name	Scientific name	Number and the percentage of The predator			
		2008		2009	
		No.	%	No.	%
Eleven spot beetle	<i>C. unde cimpuncatata</i>	198	31.7 %	153	17.0
Seven spot beetle	<i>C. septempuncatata.</i>	200	32.3 %	347	38.7 %
Lady beetle	<i>C. Vicina niloitica</i>	120	19.2%	258	28.7%
Green lacewing	<i>Ch. carnea</i>	105	16.8%	140	15.6%
<b>Total</b>		<b>625</b>	<b>100%</b>	<b>898</b>	<b>100%</b>

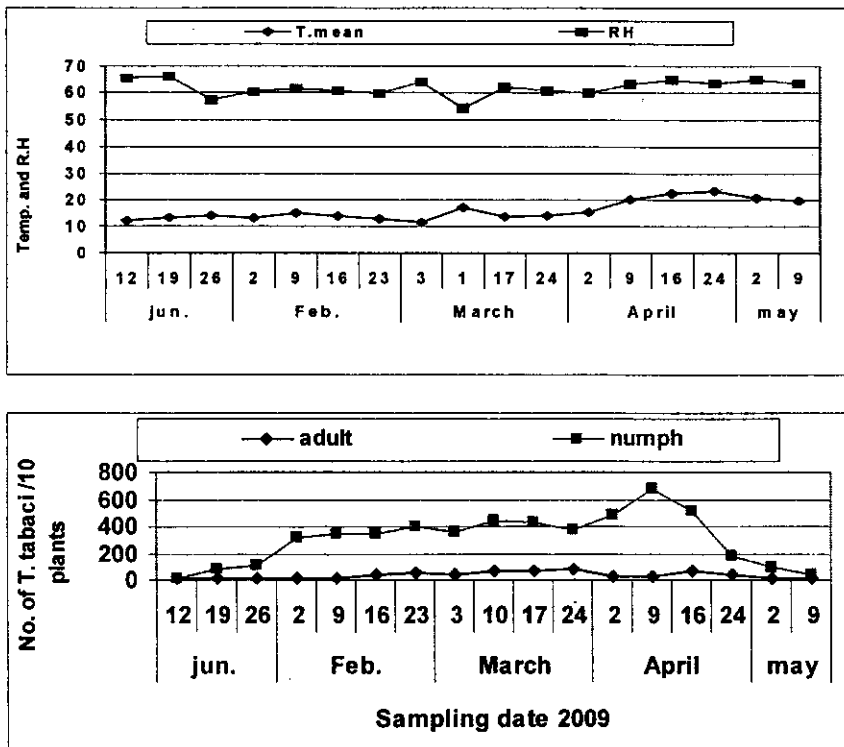
**Population abundance of the onion thrips *T. tabaci*:-**

The data presented in Fig. (1) indicated that, during the first season 2007/08, the number of onion thrips, *T. tabaci* began with 7 nymphs/10 plants (13.8°C and 72.8% R.H) in the second week of January 2008 and then increased gradually to reached its maximum of 785 nymphs/10 plants (21.0 °C and 77% R.H) in the second week of April 2008. On the other hand, data illustrated in Fig. (1) showed that, during the first season, the numbers of *T. tabaci* adults began with 11 individuals /10 plants (13.8 °C and 72.8% R.H) in the second week of January 2008 and then increased to reached the maximum number of 100 individuals /10 plants (13.5 °C and 55.6 R.H) in the fourth week of March 2008.



**Fig (1): Population abundance of *T. tabaci* on onion crop during season 2007/08 at Mansoura region.**

Data represented in Fig. (2) indicated that, during the second season 2008/09 the number of the onion thrips, *T. tabaci* nymphs began with a few number of 16 nymphs /10 plants (12.0°C and 65.4% R.H) in the second week of January 2009 and then increased gradually to reached its maximum number of 675 nymphs /10 plants (20.1 °C and 64.7% R.H) in the first week of April 2009. On the other hand, data presented in Fig. (2) showed that, during the second season, the number of *T. tabaci* adults began with small number of 11 individuals /10 plants (12.0 °C and 65.4% R.H) in the second week of January 2009 and increased gradually to reached the maximum 68 individuals (17.0 °C and 16.9% R.H) in the second week of March, 2009.



**Fig (2): Population abundance of *T. tabaci* on onion crop during season 2008/09 at Mansoura region.**

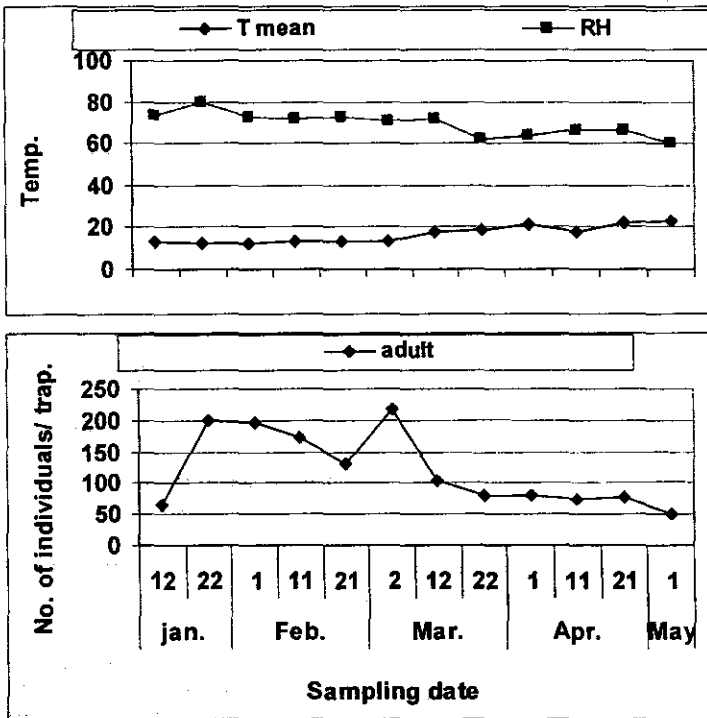
The data arranged in Table (4) showed the monthly average number of *T. tabaci* on onion plants during the two successive seasons 2007/08 and 2008/09 at Mansoura region. It can noticed that, the highest average numbers of *T. tabaci* nymphs were 536.8 and 368.3 nymphs /10 plants in April in both seasons 2007/08 and 2008/09, respectively. On the other hand,

the highest average number of *T. tabaci* adults were 72.4 and 59.8 individuals /10 plants in March in the two seasons, respectively.

**Table (4): Monthly average number of *T. Tabaci* on onion crop during seasons 2007/08 and 2008/09 at Mansoura region.**

Months	2007/08		2008/09	
	Nymph	Adult	Nymph	Adult
January	136.0	16.3	71.3	14.33
February	344.8	50	355.78	32.0
March	378.8	72.4	412.4	59.8
April	536.3	39.8	368.38	35.0
May	90.0	27.0	42.0	10.0
Total	1485.9	205.5	1249.8	151.1
Meant±S.E	297.2 ±82.2	41.1 ±9.8	249.9 ±80.9	30.2 ±8.9

Data illustrated in Fig. (3) showed that, the population abundance of *T. tabaci* adults by using sticky traps method in the first season 2007/08 began with number of 64 individuals/trap (13.8°C and 72.8% R.H.) in the second week of January 2008 and then increased gradually reaching its maximum number of 218 individuals/ trap (13.6°C and 70.3% R.H.) in the first week of March 2008.



**Fig. (3): Population abundance of adult of *T. tabaci* by sticky trap during season 2007/08 at Mansoura region.**



Data represented in Fig. (4) showed that, during the second season 2008/09 the number of *T. tabaci* adults by using sticky trap methods began with new few number of 25 individuals/trap (11.7°C and 64.9% R.H.) in the second week of January 2009, then increased to reached the maximum number of 200 individuals/ trap (16.1°C and 57.1% R.H.) in the second week of April 2009.

As shown in Table (5) the highest average number of *T. tabaci* adults by using sticky trap method were 166.7 individuals/ trap in February 2008 in the first season and 179.7 individuals/ trap in March 2009 in the second season.

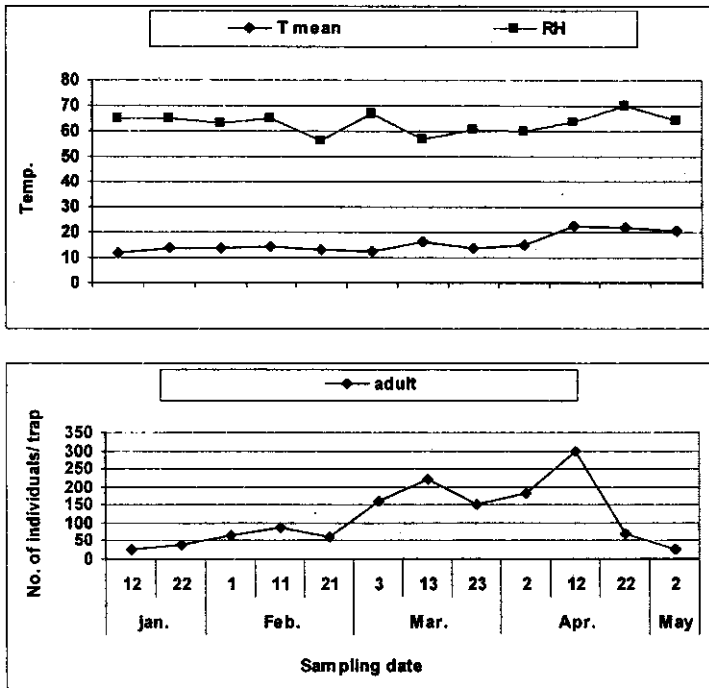


Fig. (4): Population abundance of adult of *T. tabaci* by sticky trap during season 2008/ 09 at Mansoura region.

Table (5): Monthly average number of *T. tabaci* on onion crop by sticky trap during seasons 2007/08 and 2008/09 at Mansoura region

Months	2007/08	2008/09
January	132.0	32.5
February	166.7	69.7
March	134.7	179.7
April	76.7	131.7
May	50.0	50.0
Total	560.01	483.6
Meant±S.E.	112.0 ± 14.6	92.7 ± 21.2

As a conclusion, data represented in Fig. 1, 2, 3, 4 and Tables 4 and 5 indicated that, the maximum number of *T. tabaci* nymphs by using direct count method were 785 and 675 nymphs/ 10 plants in the second week of April 2008 and in the first week of April 2009 in the two successive seasons, respectively. On the other hand, the maximum number of *T. tabaci* adults by using direct count method were 100 and 68 individuals/ 10 plants in the fourth week of March 2008 and in the second week of March 2009 in the two seasons, respectively. The average number of *T. tabaci* nymphs were  $297.2 \pm 82.2$  nymphs/ 10 plants during the first season 2007/08 and  $249.9 \pm 80.9$  nymphs/ 10 plants during the second season 2008/09, while the average number of *T. tabaci* adults were  $41.1 \pm 9.8$  and  $30.2 \pm 8.9$  individuals / 10 plants during two seasons, respectively.

Moreover, by using sticky trap method, the maximum number of *T. tabaci* adults were 218 and 200 individuals/trap in the first week of March 2008 and in the second week of April 2009 in the two seasons, respectively. The average number of *T. tabaci* adults were  $112.0 \pm 14.6$  and  $92.7 \pm 21.2$  individuals/ trap during the two seasons, respectively. These results are in agreement with those of El-Sherif (1971) in Egypt, Edlson *et al.*, (1986) in USA, Hamdy and Salem (1994) in Egypt and Shahnawaz and Goud (2005) in India.

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## الآفات الحشرية التي تهاجم نباتات البصل مع اهتمام خاص بحشره تريبس البصل بمنطقة المنصورة

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أهم الآفات الحشرية المتواجدة على نباتات البصل خلال موسمي الدراسة المتتالية بمنطقة المنصورة كانت تريبس القطن أو البصل (٣٦.٣، ٣٦.٩%) من القطن أو البصل (٢٨.٧، ٢٨.٥%) ذبابة البصل الكبيرة (١٩.٣، ١٨.٠%) ونطاط أوراق القطن (١١.١، ١١.٨%) وذبابة أوراق الفول (٢.٤، ٢.١%) خلال ٢٠٠٧/٢٠٠٨، ٢٠٠٨/٢٠٠٩ على التوالي. من جهة أخرى أهم الآفات الحشرية المتواجدة بحقول البصل بتعداد قليل كانت البقصة الخضراء (٠.٤، ٠.٤%) والذبابة البيضاء (٠.٤، ٠.٦%) ودودة ورق القطن (٠.٢، ٠.٤%) وقراشة الكرتوبلابس (٠.٣، ٠.٥%) خلال موسمي الدراسة المتتاليتين على التوالي.

وجد أن أهم المقترسات الحشرية المتواجدة فى حقول البصل والمصاحبة للآفات الحشرية التي تصيب المحصول خلال موسمي الدراسة المتتاليتين كانت مقترسات أبو العيد ذو الإحدى عشر نقطة (٣٦.٧، ١٧.٠%) وأبو العيد ذو السبع نقاط (٣٢.٣، ٣٨.٧%) وأبو العيد الأسود (١٩.٢، ٢٨.٧%) وأسد المن (١٦.٨، ١٥.٦%) خلال موسمي الدراسة على التوالي.

وجد أن أعلى تعداد لحوريات تريبس القطن باستخدام طريقة العد المباشر كانت ٧٨٥ و ٦٧٥ حورية/١٠ نباتات وذلك فى الأسبوع الثانى من إبريل ٢٠٠٨ والأسبوع الأول من إبريل ٢٠٠٩ خلال سنتي الدراسة على التوالي.

ومن جهة أخرى وجد أن أعلى تعداد للحشرات الكاملة لتربس القطن بطريقة العد المباشر كانت ١٠٠، ٦٨، فرد/١٠ نباتات في الأسبوع الرابع من مارس ٢٠٠٨ والأسبوع الثاني من مارس ٢٠٠٩ خلال موسمي الدراسة على التوالي .

متوسط تعداد الحوريات كان  $297.2 \pm 82.2$  حورية/١٠ نباتات خلال الموسم الأول ٢٠٠٨/٢٠٠٧ وكان  $249.9 \pm 80.9$  حورية/١٠ نباتات خلال الموسم الثاني . بينما كان متوسط تعداد الحشرات الكاملة لتربس القطن  $41.1 \pm 9.8$  ،  $30.2 \pm 8.9$  فرد/١٠ نباتات خلال سنتي الدراسة على التوالي .

علاوة على ذلك وجد أن أعلى تعداد للحشرات الكاملة لتربس القطن باستخدام المصائد الصفراء كان ٢١٨، ٢٠٠ فرد/ مصيدة في الأسبوع الأول من مارس ٢٠٠٨ والأسبوع الثاني من إبريل ٢٠٠٩ في موسمي الدراسة على التوالي . وكان متوسط التعداد  $112.0 \pm 14.6$  ،  $92.7 \pm 21.2$  فرد/ مصيدة خلال موسمي الدراسة على التوالي .

قام بتحكيم البحث

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