

SURVEY AND POPULATION DENSITY OF IMPORTANT INSECTS INFESTING *CICHORIUM INTYBUS* L. PLANTS DURING TWO SUCCESSIVE SEASONS AT QALUBIA GOVERNORATE , EGYPT

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Abstract

Survey of dominant insects occurred on *Cichorium intybus* , Asteraceae and their abundance were carried out throughout two successive seasons 2009/2010 and 2010/2011 at Qalubia governorate. The results showed that there are twelve insect species belonging to four orders and nine families were dominant on Chicory plant they were: Order : Diptera { Family Agromyzidae (*Liriomyza trifolii* (Burg) ,and Family Anthomyidae (*Pegomia mixta* (Witt.) , Order: Hemiptera {Family Aleyrodidae (*Bemisia tabaci* (Genn) , Family Aphididae (*Aphis craccivora* (Koch) , *Aphis gossypii* (Glover), and *Myzus persicae* (sulzer) , Family Cicadellidae (*Empoasca spp.*), Family Pentatomidae (*Nezara viridula*) and Family pseudococcidae (*Planococcus sacchara* (Cockerell), Order Lepidoptera { Family Noctuidae (*Agrotis ipsilon* (H.) and *Spodoptera littoralis* (Boisd.) and Order Thysanoptera { Family Thripidae (*Thrips tabaci* (lind) Population density of five insects infesting Chicory plants *C. intybus* L. was estimated during 2009 /2010 in the first season and the second season2010 /2011 , the study was insects studied were : *L.trifolii* ., *B. tabaci* ., *A. gossypii*, *Empoasca spp.*, *Th. tabaci* .The obtained results showed that the white fly *B.tabaci* recorded the highest number (278.5 and 405.9 individuals / 5 leaves) followed by *A. gossypii* (2001and 238.7 individuals/5 leaves), *Thrips tabaci* (117.5 and 165.1 individuals /5 leaves), *Empoasca spp* (83.7 and 114.6 individuals / 5 leaves) and *Liriomyza trifolii* (74.8 and 107.6 individuals |5 leaves) during first and second season, respectively.

INTRODUCTION

Chicory (*Chicorium intybus* L.), a perennial herb of the Asteraceae family , with blue , lavender flowers , also known as a blue sailors , endive , succory and coffeeweed , (New Medical College of Jiangu, India , 1977) is native to the Mediterranean region , mid Asia and northern Africa . Historically, Chicory was grown by the ancient Egyptian as a medicinal plant, coffee substitute, vegetable crop and for animal forage (Plumier 1972 and Munoz, 2004). Today, it is cultivated in Europe and North America with many commercial uses e.g. salads, vegetable dishes , forage , boiled and eaten , dried and roasted and used as a coffee substitute and additive ,

important source of inulin (Herck and Bnert , 1999) and for ethanol production by direct fermentation kyazzeet *et.al.*, 2008.

Many conducted researches reveal that the tumors inhibition of chicory root extracts against Ehelich ascites carcinoma were tested in mice and significant results were reported for doses obtained between 300-700 mg/kg (Hazara *et.al.* 2002) . That plant was introduced newly in Egypt and it is worth to notefy that no areas were cultivated commercially in Egypt except small areas for agricultural experiments, while ten countries around the world cultivate 23058 Hectares yielded 90224 ton rots with 397292 kg./H. during 2012 . Entomological studies on Cichorium plants revealed that many insect attacking the plant such as *Frankliniella occidentalis*, *Agriotes spp.*, *Deroreras reticulatum.*, *Tipula spp.*, *Blaniulus gyttulatus*, *Th. tabaci*, *Clivina fossor*, *Nasonovia ribis nigri*, *Autographa gamma*, *Apodemus sylvaticus*, *Mcrotus arvensis*, *L. trifolii* , *B.tabaci*, *A. gossypii* and *Empoasca spp.*(Proft, 2000, Cosmi,*et al* 2003, Domenico *et al*, 2008, Benigni, 2011, Smith *et al*, 2011, Rodriguez *et al* 2012). So, these study aim to throw light on the insects infesting the Chicory plant and their population density during two successive season 2009 /2010 and 2010 /2011at Qalubia Governorate .

MATERIALS AND METHODS

The present studies were conducted during the period from the 1st of Oct. 2009 to the end of May 2011. 200 Square meters of agricultural land were chosen at Qaha res., station - Qalubia Governorate. In mid September, Chicory seeds were sown in rows of 50 cm Width with 20-25 cm between planting .Plants received the usual agricultural practices and chemical control was entirely avoided, the above mentioned area was divided to 3 equal replicates. This study was conducted by weekly inspections from the last week of Oct. 2009 to 15/5/2010 and from 30/10/2010 to 21/5/2011 through the two experimental years 2009/2010 and 2010/2011respectivly. Two survey methods were applied during the present study. The first was direct counting technique for mature and immature stages of insects harboring the plants, while the second one was by picking 5/ leaves randomly as replicate. Plant samples were put in paper bags and transferred to laboratory for identified and counting them with help by using stereomicroscope .The species by specialists from Classification department of plant protection Research institute, Dokki, Giza. The surveyed insects were recorded. The population density for the most important insect pest was recorded species (from the three replicates). The means calculated form 5 leaves, also

the insect samples started from 24/10/2009 to 15/5/2010 during the first experimental season and from 30/10/2010 to 21/5/2011 in the second exp. Season.

RESULTS AND DISSCUSION

I-Survey of dominant insects occurred on *Cichorium intybus* and their abundance were carried out throughout two successive seasons from Oct..2009 to May., 2011 at Qalubia governorate. The obtained results in Table (1) showed that there are twelve insect species belonging to four orders and nine families were dominant on Chicory plant they were:

1.Order : Diptera :1.1 Family Agromyzidae (*Liriomyza trifolii* (Burg) ,and 1.2Family Anthomyidae (*Pegomia mixta* (Witt.)), 2.Order: Hemiptera 2.1 Family Aleyrodidae2.1.1 *Bemisia tabaci* (Genn) ,2.2 Family Aphididae2.2.1 (*Aphis craccivora* (Koch) ,2.2.2 *Aphis gossypii* (Glover), and2.2.3 *Myzus persicae* (sulzer) ,2.3 Family Cicadellidae (*Empoasca spp.*) , 2.4Family Pentatomidae (*Nezara viridula*) (Westw) and 2.5Family pseudococcidae (*Planococcus sacchara* (Cockerell), 3.Order Lepidoptera 3.1 Family Noctuidae 3.1.1*Agrotis ipsilon* (H.) and 3.1.2*Spodoptera littoralis* (Boisd.) and 4.Order Thysanoptera 4.1 Family Thripidae 4.1.1(*Thrips tabaci* (lind).

II- Population density of five insects infested *Cichorium intybus* during two successive seasons 2009/2010 and 2010/2011 in Qalubia Governorate :

1. *Bemisia tabaci* (Genn):

Results in Tables (2 and 3) and Fig. (1) reveal that the white fly infestation was higher in second tested season than the first one recording 13.53 nymphs/ 5 leaves and 9.3 nymphs / 5 leaves, respectively . The infestation started with 15.3 nymphs/5leaves in 24/10/2009 of the first tested season and increased gradually lasting to its highest mean 49.3 nymphs / 5 leaves in 14/11/2009, then decreased gradually lasting to its lower mean number 0.6 nymphs / 5 leaves, and then disappeared for seven weeks from 23 Jan. to 6 Mar. 2010. The insects appeared again during Mar. 2010 recording low numbers 2.3 at 13/3/2010 with light increas to the end of the growing season of Chicory plants recording 7.3 nymphs / 5 leaves at 15/5/2010. The same trend of population fluctuation was observed during the second tested season 2010/2011. The white fly *B. tabaci* was recorded a total numbers of 278.5 nymphs during the first examined season comparing with 405.9 nymphs during the second season 2010/2011.The same results were obtained by

Zanic, et al (2001) the presence of *B. tabaci* was also confirmed in gardens and private plots from July to October. This paper provides a detailed description of the

morphology, biological and ecological characteristics, distribution and damage caused by *B. tabaci*.

2. *Empoasca spp*

The leaf hopper *Empoasca spp* was infestation higher in the second tested season (114.6 insects/5 leaves) than in the first season (83.7 insects/5leaves) . In the first season 2009/2010 the leaf hoppers infested the plants at the first sampling with (7.3 insects/5leaves) in 24/10/2009 then the population fluctuated high and low till 26/12/2009. The *Empoasca spp* insects disappeared three weeks from 2/1/2010, to 16/1/2010, then appeared again by (30/1/2010 till 6/3/2010 except 1.3 insects recorded in the two samples of 8/2 and 13/2/2010. The insects of leaf hopper appear again from 20/3/2010 by (1.6 insects /5 leaves) and increased gradually lasting to its high infestation at the end of the chicory plants growing season recording (9.3 insects/5leaves).

Population density of the leaf hopper insects infesting chicory plants during the two tested seasons was relatively similar and had the same trend with a general mean of infestation (2.92 and 3.82 insects /5 leaves) for the first and the second tested seasons , respectively.

3. *Thrips tabaci* (lind)

The obtained results recorded in Tables (2 and 3) and illustrated in Fig.(3) during the two tested seasons (2009/2010 and 2010/2011), results indicating that the infestation with thrips insects firstly appeared with (2.6 insects /10 leaves) at the first sample 24/10/2009. then increased and decreased during the following 7 weeks lasting to (2.6 insects /sample). Thrips insects disappeared during the next 6 weeks and again infested plants at the end of Jan. 2010 by 1.3 thrips /sample . The infestation increased gradually during the period of the warm weather lasting to its high level 15.3 and 12.6 thrips /sample at 6/3 and 13/3/2010, respectively. During the remain period of the growing season 9 weeks later the infestation was in high numbers recording 8.6 insects /10leaves of chicory plants, the above mentioned finding were observed during the second tested season 2010/2011 , while the general mean number was 5.5 thrips/sample in the second tested season compared with lower mean 3.9 during the first season. The obtained results are in agree with those obtained by Smith *et al* (2011) and Rodriguez *et al* (2012)

4. *Aphis gossypii* (Glover) :

The cotton aphid was the most damaging insect pest infesting chicory plants with high numbers during the two tested seasons. Results in Tables (2 and 3) and illustrated in Fig. (4) revealed , that the aphid infestation was higher in the second tested season (7.95 insects /sample) than in the first season (6.67/insects per sample),

started with 4.3/sample at 24/10/2009 lasting to 1.6 aphids /sample at 26/12/2009, then the aphids disappeared for about one month and appeared again with (1.0 insect/sample) at 30/1/2010. The infestation increased gradually from 1.6 insects to its high level 19.3 insects /sample at 10/4/2010 lasting 11.3 insects at 15/5/2010 at the end of the growing season. The same trend of infestation was observed during the second tested season. The same result were obtained by Benigni, (2011) and Sanvicente *et al* (2011)

5. *Liriomyza trifolii* (Burg)

The results in Table 2 and Fig. 5 showed that the population density of *L. trifolii* recorded few number during the first weeks where it beginning 5.3 individuals |5 leaves on 24 Oct. then gradually decreased until disappeared during the period from 28Nov. 2009 to 13 Feb. 2010 in the first season , while Table 3 showed that the population started with few number (6.6 individuals | 5 leaves) on 30 Oct. 2010 then gradually decreased until 4 Dec. where it record (1.3 individuals | 5 leaves) and disappeared during the period from 11 Dec. to 5 Feb. In general, the population recovered again on 20 Feb. (2.6 individuals | 5 leaves) and fluctuated in number to reached the highest number in the latest week of first season (11.3 individuals |5 leaves) . The population started on 12 Feb. (1.3 individuals |5 leaves) and fluctuated to reached the peak in the latest week of the second season (13.6 individuals |5 leaves . The mean total was 74.8 and 107.6 individuals' |5 leaves in the first and second seasons, respectively.).

The chicory has been imported to Egypt by the researcher Dr Ahmad Atiah (2010) in Sugar crops Research institute, Agricultural Research center to carry the studies that lead to increase the awareness on the importance of chicory it attacked by many pests namely, *Bemisia tabaci* (Genn), *Aphis gossypii* (Glover), *Empoasca spp*, *Thrips tabaci* (Lend.) and *Liriomyza trifolii* (Burg) which causing heavy injuries to leaves and roots resulting reduced of production in quality and quantity while some of them transmits virus diseases especially tomato spotted wilt virus (TSWV) transmitted by thrips species *frankliniella occidentalis* and *Thrips tabaci* (Cosmi *et.al.* 2003)

Table 1. survey of insect pests infesting *Cichorium intybus* at Qalubia Governorate during 2009/2010 and 2010/2011 seasons.

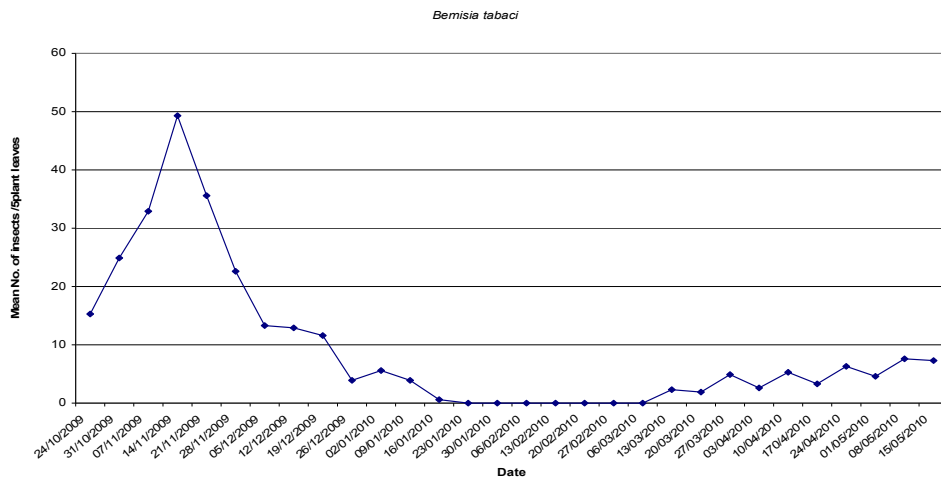
Order	Family	Investigated insects	Abundance degree	Stage	Period of occurrence
Diptera	Agromyzidae	<i>Liriomyza trifolii</i> (Burg)	+++	Larvae	October- November February - June
	Anthomyidae	<i>Pegomia mixta</i> (Witt.)	+	Larvae	April
Hemiptera	Aleyrodidae	<i>Bemisia tabaci</i> (Genn.)	+++	Immature & Adult	October-January March - June
	Aphididae	<i>Aphis craccivora</i> (Koch)	+	Adult & Nymph	October-December April - May
	Aphididae	<i>Aphis gossypii</i> (Glover)	+++	Adult & Nymph	October- December February - June
	Aphididae	<i>Myzus persicae</i> (sulzer)	+	Adult & Nymph	October-November
	Cicadellidae	<i>Empoasca spp</i>	+++	Adult & Nymph	October- May
	Pentatomidae	<i>Nezara viridula</i>	+	Adult	January, April
	pseudococcidae	<i>Planococcus sacchara</i> (Cockerell)	+	Nymph	January
Lepidoptera	Noctuidae	<i>Agrotis ipsilon</i> (H.)	+	Larvae	October-November
	Noctuidae	<i>Spodoptera littoralis</i> (Boisd.)	+	Larvae	November
Thysanoptera	Thripidae	<i>Thrips tabaci</i> (lind)	+++	Adult & Nymph	October- May

Table 2. Weekly mean numbers of insect pests per 5 plant leaves of *Cichorium intybus* at Qalubia governorate during 2009 / 2010 season.

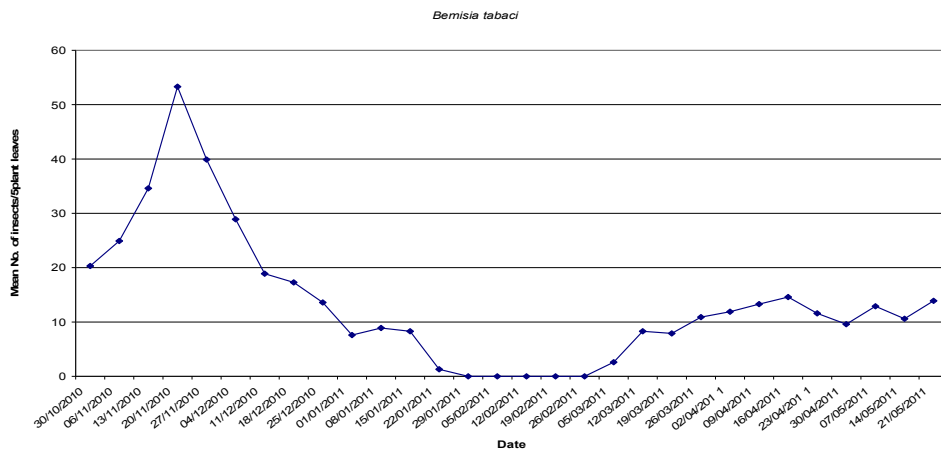
Date	<i>Bemisia tabaci</i>	<i>Empoasca spp,</i>	<i>Thrips tabaci</i>	<i>Aphis gossypii</i>	<i>Liriomyza trifolii</i>
24/10/2009	15.3	7.3	2.6	4.3	5.3
31/10/2009	24.9	8.3	1.6	8.3	3.3
07/11/2009	32.9	2.6	4.3	5.6	2.3
14/11/2009	49.3	1.3	3.3	12.3	2.6
21/11/2009	35.6	2.3	2.3	5.6	1.6
28/11/2009	22.6	3.3	1.6	4.3	0
05/12/2009	13.3	3.6	1.3	3.6	0
12/12/2009	12.9	4.6	2.6	2.6	0
19/12/2009	11.6	3.3	0	1.6	0
26/12/2009	3.9	2.3	0	1.6	0
02/01/2010	5.6	0	0	0	0
09/01/2010	3.9	0	0	0	0
16/01/2010	0.6	0	0	0	0
23/01/2010	0	2.6	0	0	0
30/01/2010	0	0	1.3	1	0
06/02/2010	0	1.3	2.3	1.6	0
13/02/2010	0	1.3	1.3	2.6	0
20/02/2010	0	0	2.6	4.3	2.6
27/02/2010	0	0	3.3	4.3	1.6
06/03/2010	0	0	15.3	3.6	2.3
13/03/2010	2.3	0	12.6	5.6	4.3
20/03/2010	1.9	1.6	7.3	7.6	2.3
27/03/2010	4.9	2.6	8.3	12.3	3.6
03/04/2010	2.6	3.6	9.6	13.3	4.3
10/04/2010	5.3	4.3	5.6	19.3	5.6
17/04/2010	3.3	5.6	3.3	12.6	3.3
24/04/2010	6.3	6.7	3.6	17.3	4.6
01/05/2010	4.6	3.3	7.3	18.3	5.3
08/05/2010	7.6	2.6	5.6	15.3	8.6
15/05/2010	7.3	9.3	8.6	11.3	11.3
Total	278.5	83.7	117.5	200.1	74.8
Mean	9.3	2.790	3.917	6.670	2.493

Table 3. Weekly mean numbers of insect pests per 5 plant leaves of *Cichorium intybus* at Qalubia governorate during 2010 /2011 season.

Date	<i>Bemisia tabaci</i>	<i>Empoasca Spp.</i>	<i>Thrips tabaci</i>	<i>Aphis gossypii</i>	<i>Liriomyza trifolii</i>
30/10/2010	20.3	10.3	5.3	7.3	6.6
06/11/2010	24.9	10.3	4.3	9.6	4.3
13/11/2010	34.6	4.6	5.6	7.6	3.6
20/11/2010	53.3	3.3	7.3	10.3	3.6
27/11/2010	39.9	4.6	2.3	10.6	2.3
04/12/2010	28.9	3.6	3.3	4.6	1.3
11/12/2010	18.9	5.3	4.3	7.6	0
18/12/2010	17.3	7.3	3.6	3.3	0
25/12/2010	13.6	4.6	0	3.6	1.3
01/01/2011	7.6	4.3	0	1.6	0
08/01/2011	8.9	0	2.3	1.3	0
15/01/2011	8.3	1.3	0	0	0
22/01/2011	1.3	0	1.3	0	0
29/01/2011	0	0	0	1.3	0
05/02/2011	0	0	1.6	0	0
12/02/2011	0	0	3.6	0	1.3
19/02/2011	0	0	3.3	2.3	3.3
26/02/2011	0	0	7.3	5.6	1.6
05/03/2011	2.6	0	17.6	5.3	3.3
12/03/2011	8.3	2.3	14.6	4.6	5.3
19/03/2011	7.9	1.6	10.6	8.6	4.6
26/03/2011	10.9	3.6	10.6	9.3	4.3
02/04/201 1	11.9	3.3	9.3	14.3	2.6
09/04/2011	13.3	4.3	8.6	17.3	7.3
16/04/2011	14.6	5.6	3.3	21.6	5.6
23/04/201 1	11.6	4.6	5.3	14.3	5.3
30/04/2011	9.6	9.3	4.6	18.6	7.6
07/05/2011	12.9	5.6	8.3	20.3	7.3
14/05/2011	10.6	4.3	7.6	14.6	11.6
21/05/2011	13.9	10.6	9.3	13.3	13.6
Total	405,9	114,6	165,1	238,7	107,6
Mean	13,53	3,82	5,503	7,957	3,587

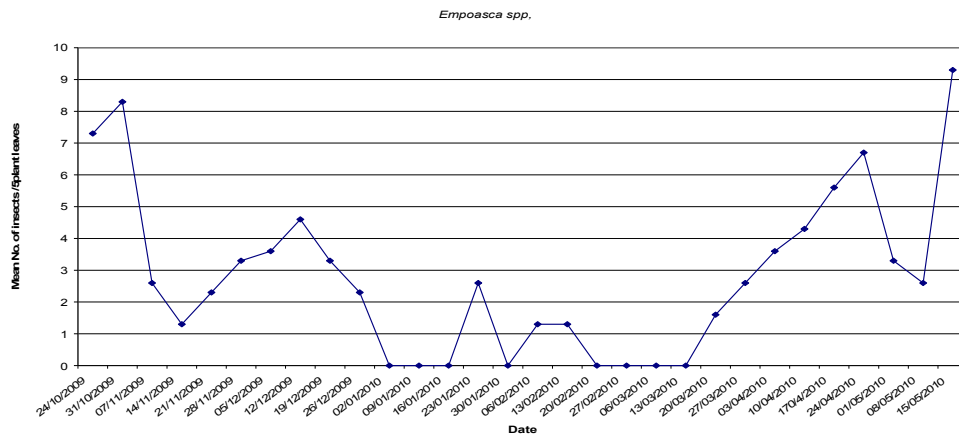


2009/2010

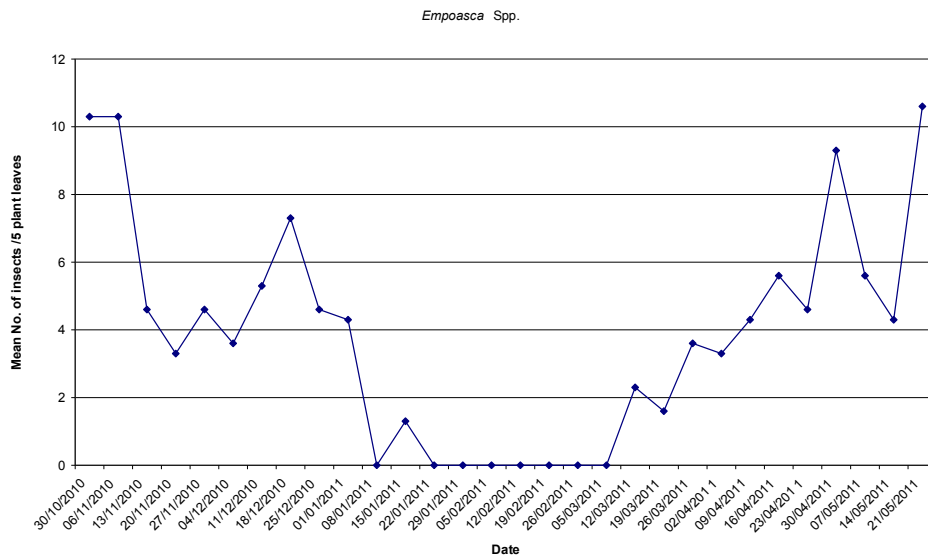


2010/2011

Fig 1. Weekly mean numbers of *Bemisia tabaci* per 5 plant leaves infesting *Cichorium intybus* plants at AL-Qalubia governorate, during the two seasons investigated.

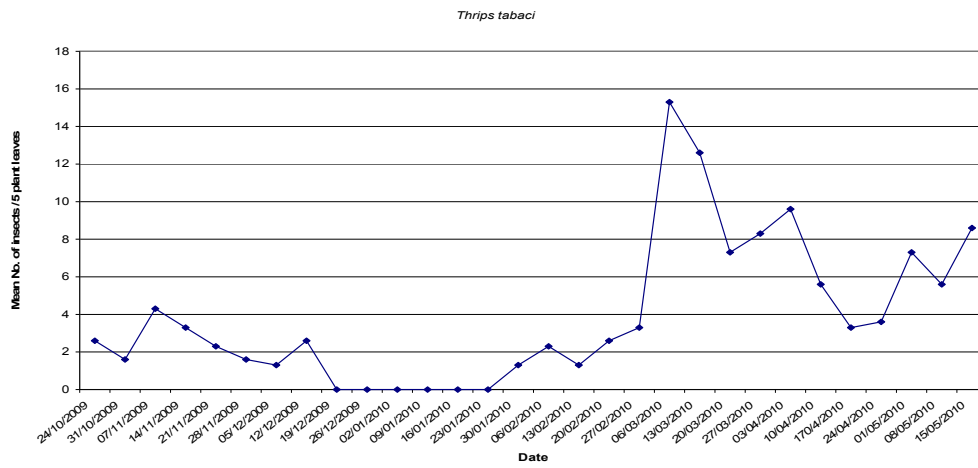


2009/2010



2010/2011

Fig 2. Weekly mean numbers of *Empoasca* spp. per 5 plant leaves infesting *Cichorium intybus* plants at AL-Qalubia governorate during the two seasons investigated.



2009/2010

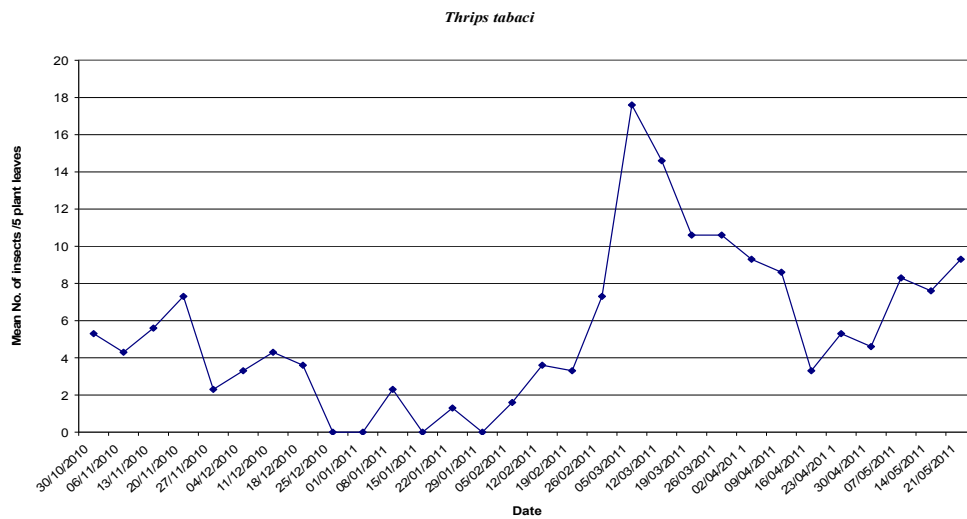


Fig 3. Weekly mean numbers of *Thrips tabaci* per 5 plant leaves infesting *Cichorium intybus* plants at AL-Qalubia governorate during the two seasons investigated

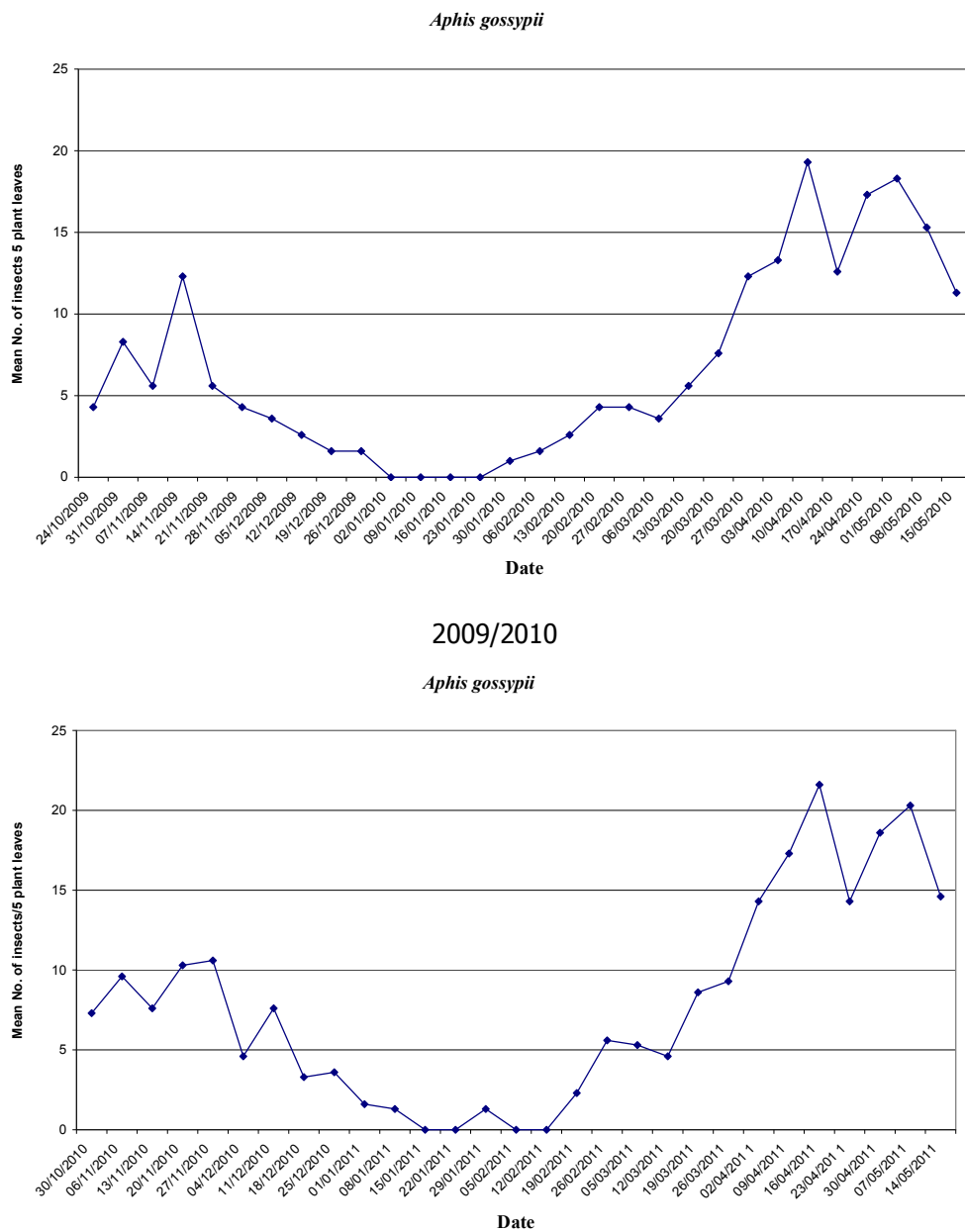


Fig 4. Weekly mean numbers of *Aphis gossypii* per 5 plant leaves infesting *Cichorium intybus* plants at AL-Qalubia governorate during the two seasons investigated.

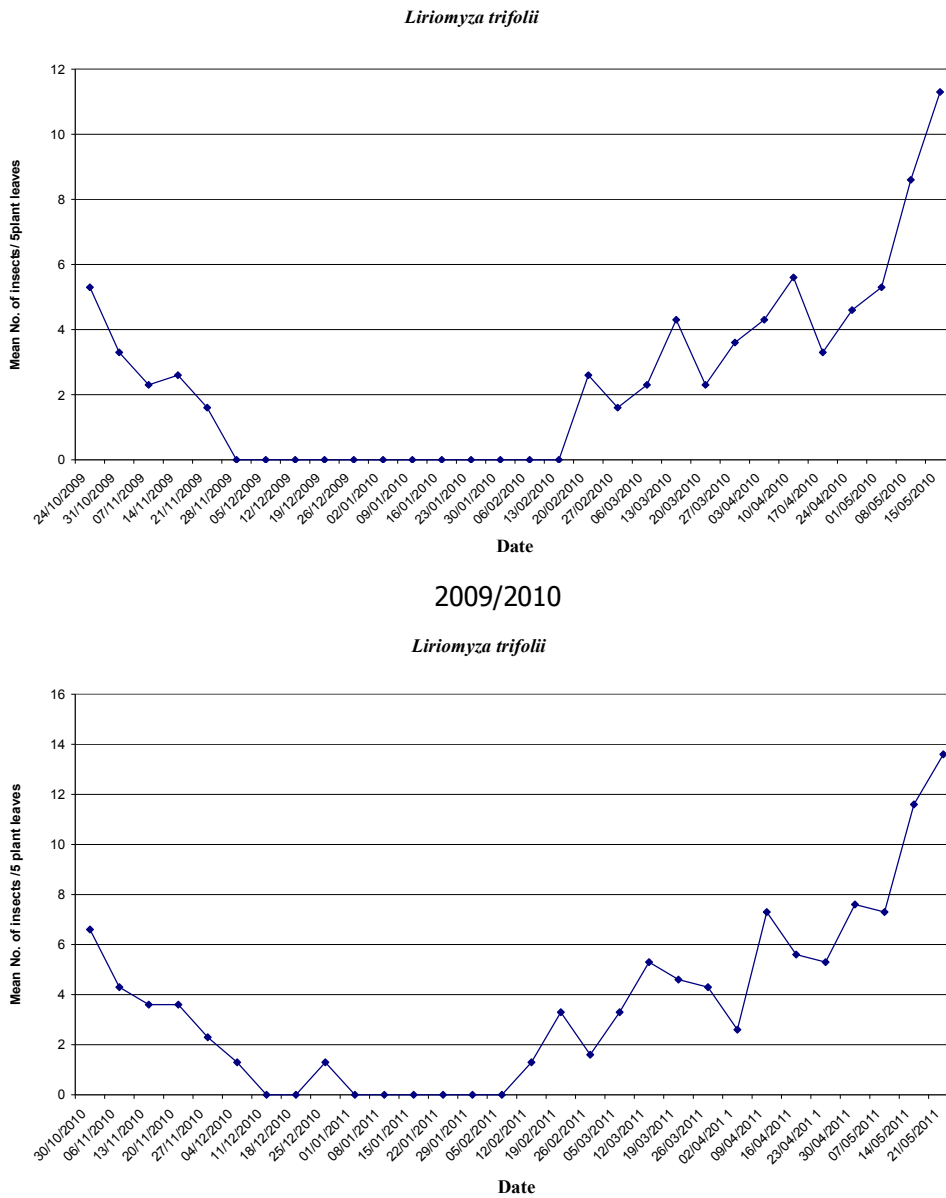


Fig 5. Weekly mean numbers of *Liriomyza trifolii* per 5 plant leaves infesting *Cichorium intybus* plants at AL-Qalubia governorate during the two seasons investigated.

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حصر وكثافة التعداد لأهم الحشرات التي تصيب نبات الشكوريا
خلال موسمين متتاليين في محافظة القليوبية - مصر

بدران عبد الفتاح بدران - سامي أحمد الدسوقي - عبد المنعم سليمان الخولى -
محمد فهمي حجاب

١. كلية الزراعة - جامعة الأزهر - القاهرة

٢. معهد بحوث وقاية النبات - مركز البحوث الزراعية - الدقي - الجيزة

١- حصر للحشرات السائدة لنبات الشكوريا لسنتين متتاليتين ٢٠٠٩/٢٠١٠ و ٢٠١٠/٢٠١١ في محافظة القليوبية.

أظهرت النتائج ٤ رتبة حشرية و ٩ فصيلة و ١٢ نوع الاتي:-

١- رتبة Diptera

١٠١ فصيلة Agromyzidae *Liriomyza trifolii* (Burg)

٢٠١ فصيلة Anthomyida *Pegomia mixta* (Witt.)

٢- رتبة Hemiptera

١٠٢ فصيلة Aleyrodidae *Bemisia tabaci* (Genn.)

٢٠٢ فصيلة Aphididae *Aphis carccivora* (Koch)

Aphis gossypii (Glover)

Myzus persicae (Sulzer)

٣٠٢ فصيلة Cicadehhidae *Empoasca* spp.

٤٠٢ فصيلة Pentatomidae *Nezara viridula*

٥٠٢ فصيلة Pseudococidae *Planococcus sacchara* (Cockerell) (Cockerell)

٢- رتبة Lepidoptera

١٠٣ فصيلة Noctuidae *Agrotis ipsilon* (H)

Spodoptera littoralis (Boisd)

٤- رتبة Thysanoptera

١٠٤ فصيلة Thripidae *Thrips tabaci* (Lind)

٢- تقييم الكثافة العددية للحشرات التي تصيب نبات الشكوريا خلال سنتين متتاليتين ٢٠٠٩/٢٠١٠ و ٢٠١١/٢٠١٠ ذبابة الفول، من القطن، الذبابة البيضاء، الجاسيد والتربس.

النتائج عرضت أعلى تعداد ٤٠٥,٩ و ٢٧٨,٥ فرد/٥ أوراق يليه المن ٢٠٠ و ٢٣٨,٧ فرد/٥ أوراق و التربس ١١٧,٥ و ١٦٥,١ فرد /٥ أوراق و الجاسيد ٨٣,٧ و ١١٤,٦ فرد /٥ أوراق و ذبابة الفاصوليا ٧٤,٨ و ١٠٧,٦ فرد/٥ أوراق خلال السنة الاولى والثانية على التوالي.