

## Population Dynamics of Insect Pests and their Associated Predators at Different Plantations of Sugar Beet

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### ABSTRACT

Sugar beet, *Beta vulgaris* L. has been introduced into Egypt by late 1970s to share sugar cane in satisfying requirements of sugar consumers. This crop is liable to infestations by several insect pests. The current study was carried out at sugar beet fields at Sidi Salem District, Kafr El-Sheikh Governorate during 2015/16 and 2016/17 seasons to monitor population dynamics of the most abundant insects, predators and parasitoids at sugar beet fields. Kawemira cultivar was sown in three plantations; early (August plantation), medium (September plantation) and late (October plantation). *Cassida vittata*, Vill. was recorded in few numbers in the early and medium plantations, but was relatively more occurring in the late one (12.55 – 16.31 adults/25 sugar beet plants), particularly during April and May. *Pegomyia mixta* Vill. took almost the same trend, but it was more detected during February, March and April. *Aphis* spp. were found with moderate numbers in 2016/17 season (17.58 – 28.30 nymphs and adults/25 plants), but were more occurring in October and November on sugar beet plants of August and September plantations. *Empoasca lybica* (De Berg) nymphs and adults were recorded in considerable numbers during spring. *Ostrinia nubilalis* (Hubner) larvae were obtained in very low numbers, but its population density was relatively higher in December in sugar beet plots of the early plantation. *Spodoptera littoralis* (Boisd) larvae displayed moderate population density (5.48 – 7.74) in the first plantation, particularly in September and October, but its numbers were very low throughout remaining examinations. *Scrobipalpa ocellatella* (Boyd) larvae were found in high numbers in sugar beet plants of October plantation (37.12 – 38.69 per 25 sugar beet plants). The predatory coccinellids were more detected in the first plantation (6.24 – 16.13) than in the second (3.44 – 7.08) and the third plantation (2.00 – 3.21 adults/25 sugar beet plants). Other than coccinellid predators, *Rhizobius litura* (Fabr.), *Paederus alfieri* Koch. and *Orius* sp., were surveyed. In addition, two parasitoids were surveyed; *Pimpla roborator* (Fab) and *Bracon* sp.

### INTRODUCTION

Sugar beet, *Beta vulgaris* L. (Fam. Chenopodiaceae) roots have 12-21% sugar content. So, this crop is grown commercially for producing sugar. Sugar beet has been introduced into Egypt by late 1970s to share sugar cane in fulfilling the increasing requirements of sugar consumers. Sugar beet is grown in temperate regions, while sugar cane is grown exclusively in tropical and subtropical zones. Accordingly, Ministry of Agriculture and Land Reclamation, in Egypt, encourages the growers to grow sugar beet over sugar cane as a water saving measure. Accordingly, sugar beet has become, since 2013, the first source of sugar in Egypt, while the sugar cane ranks second. In 2015/2016 season, total area cultivated with sugar beet reached 545,000 feddans (about 227,000 hectares), from which about 45% has been cultivated at Kafr El-Sheikh Governorate (lower Egypt, near to the Mediterranean sea coast) (Anonymous, 2016).

The key insect pests of sugar beet are *Pegomyia mixta* Vill., *Cassida vittata*, Vill., *Scrobipalpa ocellatella* (Boyd), *Ostrinia nubilalis* (Hubner), *Spodoptera littoralis* Boisd and *S. exigua* (Hubner) (Isakandar, 1982, Bassyouni, 1998, Talha, 2001 and Shalaby *et al.*, 2011).

Sugar beet is cultivated in Egypt, in three plantations; August, September and October. The early plantation may suffer serious infestation by the cotton leafworm, *S. littoralis*, while the late one is subject to high infestations with *C. vittata* and *S. ocellatella* (Abd El-Ghany, 1995; El-Khouly, 2000; Shalaby, 2000 and Bazazo, 2010).

Fortunately, sugar beet ecosystem has enormous natural enemies that should be wisely conserved to keep the insect pests beyond the economic threshold levels. Insect predators are important biological control agents, which can manage insect pest attacks. Mostly surveyed insect predators from sugar beet fields were *Paederus*

*alfieri* (Mesbah, 1991), *Coccinella undecimpunctata* (El-Zoghby, 1999) and *Scymnus* spp. (Bazazo, 2005). As for parasitoids, occurring in sugar beet fields, Shalaby and Hendawy (2007) recorded five egg-parasitoid species of the leafhopper, *Empoasca decipiens*; four of which are belonging to Mymaridae, and one species is belonging to Trichogrammatidae. On the other hand, Bazazo (2010) surveyed 38 parasitoid species from sugar beet fields, belonging to 20 families of Hymenoptera.

The current study was carried out for two sugar beet seasons; 2015/2016 and 2016/2017 at Sidi Salem District, Kafr El-Sheikh Governorate to survey insect pest species and their associated predators and parasitoids occurring in sugar beet fields. In addition, population fluctuation of most common arthropods were monitored.

### MATERIALS AND METHODS

The present study was carried out at sugar beet fields at Sidi Salem location, Kafr El-Sheikh Governorate during 2015/16 and 2016/17 seasons. The investigation aimed to survey the occurring insects, as well as the dominant predators and parasitoids. The population fluctuations of the most abundant insects were monitored through visual examination in an area of about three feddans. The sugar beet cultivar, Kawemira was sown in three plantations, each of about one feddan. In 2015/16, sowing dates were 1<sup>st</sup> of August, 1<sup>st</sup> of September and 3<sup>rd</sup> of October for the first, second and third plantations, respectively. The corresponding dates in the second season were 3<sup>rd</sup> of August, 25<sup>th</sup> of September and 15<sup>th</sup> of October. Normal agricultural practices were followed, as recommended, but without any pesticide application.

About one month after sowing of each plantation, 25 sugar beet plants were weekly examined for insect pests, predators and parasitoids.

## RESULTS AND DISCUSSION

### 1. Survey of insects, insect predators and parasitoids occurring in sugar beet plantations:

Data presented in Table (1) show the insects, insect predators and parasitoids surveyed from sugar beet plantations, at Sidi Salem District, Kafr El-Sheikh Governorate for two successive seasons; 2015/16 and 2016/17. Eight major insect pests were surveyed; *Cassida vittata* Vill., *Pegomyia mixta* Vill., *Aphis* spp., *Empoasca lybica* (De Berg), *Spodoptera littoralis* Boisd.; *S. exigua* (Hubner), *Scrobipalpa ocellatella* (Boyd) and *Ostrinia nubilalis* (Hubner). In addition, four insects were surveyed as minor ones; *Lixus junci* Bohman, *Nezara viridula* (L.), *Bemisia tabaci* (Genn.) and *Pseudococcus* spp.

**Table 1. Insects, insect predators and parasitoids surveyed from sugar beet fields, Sidi Salem District, Kafr El-Sheikh Governorate, 2015/16 and 2016/17 seasons.**

Category	Insect species
Major insects	<i>Cassida vittata</i> Vill.
	<i>Pegomyia mixta</i> Vill.
	<i>Aphis</i> spp.
	<i>Empoasca lybica</i> (De Berg)
	<i>Spodoptera littoralis</i> (Boisd)
	<i>Spodoptera exigua</i> (Hubner)
	<i>Scrobipalpa ocellatella</i> (Boyd)
	<i>Ostrinia nubilalis</i> (Hubner)
Minor insects	<i>Lixus junci</i> Boheman
	<i>Nezara viridula</i> , (L.)
	<i>Bemisia tabaci</i> (Genn.)
	<i>Pseudococcus</i> spp.
Casual insects	<i>Hypera brunneipennis</i> (Boheman)
	<i>Sitona lividipes</i> Fahaeus
	<i>Earias insulana</i> (Boisd)
Insect predators	<i>Coccinella undecimpunctata</i> L.
	<i>Scymnus interruptus</i> (Goeze)
	<i>Scymnus syriacus</i> Mars.
	<i>Scymnus</i> spp.
	<i>Rhizobius litura</i> (Fabr.)
	<i>Paederus alfieri</i> Koch.
	<i>Orius</i> sp.
	<i>Chrysoperla carnea</i> (Stephens)
	<i>Monomorium phraonis</i> (Lin.)

However, three casual insect species were surveyed as visitors. Collected insect predators were found belonging mainly to Coccinellidae, in addition to Staphylinidae, Anthocoridae, Chrysopidae and Formicidae. Survey revealed the occurrence of two parasitoids; *Pimpla roborator* (Fab.) and *Bracon* sp.

A similar study was carried out by Boraei *et al.* (1993), at Kafr El-Sheikh Governorate, including Sidi Salem District and revealed the occurrence of 44 insect species at sugar beet fields; from which 20 were harmful, 12 were predators, one parasitoid, as well as 11 insect pests that were found as visitors. Metwally *et al.* (2004) surveyed *Scrobipalpa ocellatella*, *Pegomyia mixta* and *Cassida vittata* as the most abundant sugar beet insects. Also, at Kafr El-Sheikh, Shalaby *et al.* (2011) recorded *Spodoptera littoralis* as a serious insect pest of early sugar beet plantations and *Chrysoperla carnea* was the main associated predator. At Sharkia, Sherief *et al.* (2013) recorded *C. vittata*, *P. mixta* and

*Myzus persicae* as major insect pests of sugar beet. Similar results were obtained by El-Dessouki *et al.* (204) and Hossein (2016).

### 2. Population dynamics:

#### *Cassida vittata* :

Data in Table (2) show that sugar beet plants of August and September plantations suffered very low infestation with *C. vittata*; 4. 50 and 3.17 larvae and adults 125 sugar beet plants respectively in 2015/16 seasons, and 0.58 and 2.33 larvae and adults in 2016/17 seasons. However, the highest insect population density was detected in October plantation; with values of 60.33 and 66.00 larvae and adults 125 plants in the first and second seasons, respectively. It was obvious that *C. vittata* population density was very high during March, April and May in sugar beet plants of October plantation.

**Table 2. *Cassida vittata* population density as affected by sugarbeet planting date, Sidi Salem District, Kafr El-Sheikh Governorate**

Date	Number of larvae and adults / 25 plants					
	2015/16 season			2015/16 season		
	Aug. Plant.	Sept. Plant.	Oct. Plant.	Aug. Plant.	Sept. Plant.	Oct. Plant.
Sept.1	0	-	-	0	-	-
15	0	-	-	0	-	-
Oct.1	0	-	-	0	-	-
15	0	-	-	0	-	-
Nov.1	0	0	-	0	0	-
15	0	0	-	0	0	-
Dec.1	0	0	0	0	0	0
15	0	0	0	0	0	0
Jan.1	12	0	0	0	0	0
15	18	5	5	3	0	4
Feb.1	16	16	15	2	24	11
15	8	3	14	3	4	14
Mar.1	-	6	228	-	1	10
15	-	8	208	-	0	116
April 1	-	0	31	-	0	290
15	-	0	31	-	0	50
May 1	-	-	110	-	-	157
15	-	-	82	-	-	140
Average			60.33	0.58	2.33	66.00

Abdel-Raheem (2000) recorded the first appearance of *C. vittata*, in sugar beet fields by the second week of March, and its population densities increased during May. However, El-Khouly (2006) found that the initial appearance of this beetle occurred early at Kafr El-Sheikh region, as the pest was detected in January, and reached its peak in April. El-Sherief *et al.* (2013) recorded the peaks of *C. vittata* late in the season; April, June or May . At Kafr El-Sheikh region, El-Desouki *et al.* (2014) reported that the beetle occurred from February till May, with a peak by the late March.

#### *Pegomyia mixta*:

Population density of *P. mixta* was low (Table 3) in all sugar beet plantations of both years of study, except in the third (October) plantation of the first season that had 20.58 larvae 125 sugar beet plants. In 2015/ 16 season, the third plantation had the highest *P. mixta* population density during February and March. In

the second season, the third plantation had slight increase in the population density of the fly, by mid-March, and throughout April.

Awadalla (1997) at Kafr El-Sheikh region, indicated that the larval population of *P. mixta* was high beginning from March. Similar results were obtained by Bassyouny (1998), particularly in the late plantation, sown in October, as the sugar beet plants were severely affected by this fly. Earlier *P. mixta* infestations were detected by El-Khouly (2006), beginning from November, with a progressive increase towards the end of the season, forming distinct peaks in March and April. El-Sherief *et al.* (2013) detected peaks of *P. mixta* larvae by late February, late March, late April and late May.

**Table 3. *Pegomyia mixta* population density as affected by sugarbeet planting date, Sidi Salem District, Kafr El-Sheikh Governorate**

Date	Number of larvae per 25 plants					
	2015/16 season			2015/16 season		
	Aug. Plant.	Sept. Plant.	Oct. Plant.	Aug. Plant.	Sept. Plant.	Oct. Plant.
Sep.1	0	-	-	0	-	-
15	0	-	-	0	-	-
Oct.1	0	0	-	2	0	-
15	0	0	-	0	3	-
Nov.1	0	0	-	0	4	-
15	0	6	-	0	0	-
Dec.1	0	0	0	0	0	0
15	0	0	0	0	6	0
Jan. 1	0	0	0	0	0	0
15	6	0	2	2	3	5
Feb.1	10	3	10	0	0	0
15	18	6	28	4	0	0
Mar.1	-	8	140	-	0	4
15	-	3	28	-	0	12
April 1	-	-	22	-	-	21
15	-	-	5	-	-	12
May 1	-	-	6	-	-	2
15	-	-	6	-	-	3
Average	2.83	2.17	20.58	0.67	1.33	4.92

**Aphids:**

Data in Table (4) show that the aphid nymphs and adults were detected in the first plantation of 2015/16 season in all samples, except in December and early January, with the highest population density during October. In the second plantation, the aphids population density was relatively high during November and December (8-44 individuals /25 sugar beet plants). In the third plantation, aphid population densities were relatively high during mid-March and early April. Throughout the season, the averages of population density of aphids were 8.00 , 10. 00 and 10.00 nymphs and adults /25 sugar beet plants, in the first, second and third plantations, respectively. In 2016/17 season (Table 4), the aphid population density was higher than that of the first season, with seasonal averages of 26.17, 17.75 and 15.83 nymphs and adults /25 sugar beet plants, in August, September and October plantations, respectively.

**Table 4. *Aphis* spp population density as affected by sugarbeet planting date, Sidi Salem District, Kafr El-Sheikh Governorate**

Date	Number of nymphs and adults / 25 plants					
	2015/16 season			2015/16 season		
	Aug. Plant.	Sept. Plant.	Oct. Plant.	Aug. Plant.	Sept. Plant.	Oct. Plant.
Sept.1	0	-	-	0	-	-
15	6	-	-	26	-	-
Oct.1	31	0	-	44	20	-
15	14	7	-	44	16	-
Nov.1	8	44	-	31	22	-
15	9	10	-	60	36	-
Dec.1	0	26	0	33	38	0
15	0	8	2	6	20	6
Jan.1	0	0	20	20	0	52
15	14	12	0	18	6	0
Feb.1	2	0	6	20	42	0
15	12	10	18	12	13	0
Mar.1	-	3	10	-	0	0
15	-	0	28	-	0	4
Apr. 1	-	-	22	-	-	78
15	-	-	4	-	-	0
May 1	-	-	10	-	-	30
15	-	-	0	-	-	20
Average	8.00	10.00	10.10	26.17	17.75	15.83

***Empoasca lybica*:**

Data in Table (5) show that *E. lybica* nymphs and adults , in 2015/ 16 season, exhibited two peaks in the first plantation with 33 and 41 nymphs and adults /25 sugar beet plants ; on mid-October and first of October, respectively, with a seasonal average, throughout the season, of 17.58 nymphs and adults /25 sugar beet plants. In the second plantation, the first peak (30 nymphs and adults) was detected on mid-November, and the second one (32 individuals) was on first January. The seasonal average of the third plantation was 20.08 nymphs and adults /25 sugar beet plants. In 2016/17 season (Table 5), seasonal population densities of *E. lybica* were 27.08, 18.00 and 22.83 nymphs and adults /25 plants for the first, second and third plantations, respectively. Thus, it could be reported that the nymphs and adults of this leafhopper were found throughout the season in the all plantations.

Shalaby and Hendawey (2007) recorded the initial infestation by *Empoasca* spp by early September, with the first peak by mid-October.

***Spodoptera littoralis*:**

Data in Table (6) show the population dynamics of *Spodoptera littoralis* larvae in sugar beet plantations in both seasons; 2015/16 and 2016/17. The seasonal population densities were only considered on sugar beet plants of August plantation, particularly during September and October. The seasonal averages of the first plantation were 5.75 and 8.42 larvae/25 sugar beet plants in the first and second seasons, respectively.

Shalaby and El-Samahy (2010) showed that the infestation by *S. littoralis* in the early (August) sugar beet plantation was highest during September and October with 81.00 -183.50 larvae /10 sugar beet plants. They added that the insect infestation was higher in September and October compared to November and December, and attributed that to the effect of relatively higher temperature in September and October.

**Table 5. *Empoasca lybica* population density as affected by sugar beet planting date, Sidi Salem District, Kafr El-Sheikh Governorate**

Date	Number of nymphs and adults / 25 plants					
	2015/16 season			2015/16 season		
	Aug. Plant.	Sept. Plant.	Oct. Plant.	Aug. Plant.	Sept. Plant.	Oct. Plant.
Sept.1	8	-	-	30	-	-
15	16	-	-	36	-	-
Oct.1	14	0	-	42	5	-
15	33	4	-	36	18	-
Nov.1	24	11	-	16	26	-
15	28	30	-	26	28	-
Dec.1	41	20	10	15	12	2
15	22	18	10	10	25	17
Jan.1	0	32	18	8	20	22
15	11	8	20	42	19	20
Feb.1	4	4	16	28	34	32
15	0	0	18	36	22	40
Mar.1	-	5	18	-	7	32
15	-	10	31	-	0	22
Apr. 1	-	-	27	-	-	17
15	-	-	23	-	-	18
May 1	-	-	30	-	-	31
15	-	-	20	-	-	21
Average	17.58	11.83	20.08	27.08	18.00	22.83

**Table 6. *Spodoptera littoralis* population density as affected by sugarbeet planting date, Sidi Salem District, Kafr El-Sheikh Governorate**

Date	Number of larvae / 25 plants					
	2015/16 season			2015/16 season		
	Aug. Plant.	Sept. Plant.	Oct. Plant.	Aug. Plant.	Sept. Plant.	Oct. Plant.
Sept.1	8	-	-	30	-	-
15	14	-	-	38	-	-
Oct.1	13	0	-	6	2	-
15	28	0	-	25	8	-
Nov.1	0	1	-	0	11	-
15	0	0	-	0	3	-
Dec.1	3	0	0	0	0	0
15	0	0	0	0	2	7
Jan.1	0	0	0	0	2	4
15	0	0	0	0	0	6
Feb.1	0	0	0	0	4	0
15	3	0	11	2	0	0
Mar.1	-	0	0	-	0	0
15	-	4	0	-	2	6
Apr. 1	-	-	3	-	-	0
15	-	-	0	-	-	0
May 1	-	-	0	-	-	0
15	-	-	0	-	-	0
Average	5.75	0.42	1.17	27.08	18.00	1.92

***Scrobipalpa ocellatella*:**

Data in Table (7) show that August plantation had the lowest *S. ocellatella* larval population densities (6.17 and 5.58 larvae/25 sugarbeet plants), September plantation had moderate density (11.33 and 6.17), while October plantation had a high drastic density (75.75 and 51.17) for the first and second seasons, respectively. In August plantation, the highest *S. ocellatella* larval population density occurred in December, while that of September plantation occurred on mid-December, and early February. In both September and October plantations, the highest *S. ocellatella* larval population densities were found in April and May.

**Table 7. *Scrobipalpa ocellatella* population density as affected by sugarbeet planting date, Sidi Salem District, Kafr El-Sheikh Governorate**

Date	Number of larvae / 25 plants					
	2015/16 season			2015/16 season		
	Aug. Plant.	Sept. Plant.	Oct. Plant.	Aug. Plant.	Sept. Plant.	Oct. Plant.
Sept.1	0	-	-	0	-	-
15	2	-	-	0	-	-
Oct.1	7	0	-	8	0	-
15	3	0	-	0	0	-
Nov.1	0	0	-	0	0	-
15	0	6	-	16	2	-
Dec.1	18	3	19	14	4	0
15	24	15	3	8	16	8
Jan.1	0	18	8	4	8	4
15	0	12	6	5	2	18
Feb.1	8	36	24	10	18	17
15	12	28	28	2	8	18
Mar.1	-	16	25	-	12	20
15	-	2	33	-	4	21
Apr. 1	-	-	52	-	-	20
15	-	-	70	-	-	52
May 1	-	-	125	-	-	226
15	-	-	156	-	-	210
Average	6.17	11.33	75.75	5.58	6.17	51.17

***Scymnus spp*:**

Adults of *Scymnus spp* were highest in August plantation; 13.08 and 6.75 individuals/25 plants, in the first and second seasons, respectively (Table 8). Both September and October plantations had low numbers of the coccinellid. The population density of *Scymnus spp* was high during September and October, particularly in August plantation.

**Table 8. *Scymnus spp* population density as affected by sugarbeet planting date, Sidi Salem District, Kafr El-Sheikh Governorate**

Date	Number of adults / 25 plants					
	2015/16 season			2015/16 season		
	Aug. Plant.	Sept. Plant.	Oct. Plant.	Aug. Plant.	Sept. Plant.	Oct. Plant.
Sept.1	0	-	-	0	-	-
15	30	-	-	4	-	-
Oct.1	50	2	-	11	1	-
15	26	4	-	13	3	-
Nov.1	4	14	-	6	9	-
15	28	12	-	6	3	-
Dec.1	0	16	0	4	0	1
15	4	18	0	0	1	0
Jan.1	4	0	8	0	11	4
15	8	5	0	4	4	0
Feb.1	2	12	0	20	1	5
15	1	4	0	13	1	7
Mar.1	-	0	0	-	1	0
15	-	0	0	-	0	1
Apr. 1	-	-	0	-	-	5
15	-	-	2	-	-	3
May 1	-	-	5	-	-	21
15	-	-	9	-	-	0
Average	13.08	7.25	2.00	6.75	2.92	3.92

**3. Predator-prey ratio:**

Data presented in Table (9) show the ratio between the predatory *Scymnus* spp and both aphids and leafhopper, *Empoasca lybica* in the first season. The ratios were 1:3.80, 1:6.72 and 1:6.69 in September, September and October plantations, respectively. This

means that the predator was relatively higher occurring in the first plantation, compared to each of September and October plantations. In the second season (Table 10), the corresponding ratios were 1:4.07, 1:4.60 and 1:17.85. Thus, the predator was scarcely occurring in October plantation.

**Table 9. Predator-prey ratio in 2015/16 sugarbeet season, , Sidi Salem District, Kafr El-Sheikh Governorate**

Sampling No	No of individuals/300 sugarbeet plants								
	August Plantation			September Plantation			October Plantation		
	<i>Scymnus</i> spp	Aphids & LH	Ratio	<i>Scymnus</i> spp	Aphids & LH	Ratio	<i>Scymnus</i> spp	Aphids & LH	Ratio
1	0	18	-	1	0	-	0	10	-
2	4	22	1:5.50	3	11	1:3.67	0	12	-
3	11	45	1:4.09	9	55	1:6.11	1	38	1:38.00
4	13	44	1:3.88	3	40	1:13.33	0	20	-
5	6	32	1:5.33	0	46	-	4	22	1:5.50
6	6	37	1:6.17	1	26	1:26.00	0	36	-
7	4	41	1:10.25	11	32	1:2.91	5	28	1:5.60
8	0	22	-	4	20	1:5.00	1	59	1:59.00
9	0	0	-	1	4	1:4.00	0	49	-
10	3	25	1:8.33	1	10	1:10.00	1	27	1:27.00
11	20	6	1:0.30	1	8	1:8.00	21	40	1:1.90
12	13	12	1:0.92	4	10	1:2.50	21	20	1:0.95
Total	80	304	-	39	262	-	54	361	-
Overall ratio		1:3.80			1:6.72			1:6.69	

**Table 10. Predator-prey ratio in 2016/17sugarbeet season, , Sidi Salem District, Kafr El-Sheikh Governorate**

Sampling No	No of individuals/300 sugarbeet plants								
	August Plantation			September Plantation			October Plantation		
	<i>Scymnus</i> spp	Aphids & LH	Ratio	<i>Scymnus</i> spp	Aphids & LH	Ratio	<i>Scymnus</i> spp	Aphids & LH	Ratio
1	0	30	-	2	25	1:12.50	0	2	-
2	30	62	1:2.07	4	34	1:8.80	0	23	-
3	50	86	1:1.72	14	48	1:3.43	0	74	-
4	26	80	1:3.08	12	64	1:5.33	8	20	1:2.50
5	4	47	1:11.75	16	50	1:3.13	0	32	-
6	28	86	1:3.07	18	45	1:2.50	0	40	-
7	0	48	-	0	20	-	0	32	-
8	4	16	1:4.00	5	25	1:5.00	0	26	-
9	4	28	1:7.00	12	56	1:4.67	1	95	1:95.00
10	8	60	1:7.50	4	35	1:8.75	2	18	1:9.00
11	2	48	1:24.00	2	7	1:3.50	6	61	1:10.17
12	1	48	1:48.00	0	0	-	9	41	1:4.65
Total	157	639		89	409		26	464	
Overall ratio		1:4.07			1:4.06			1:17.85	

El-Desouky *et al* (2014) suggested that *Scymnus* spp may have preyed upon aphids and lepidopterous larvae, and later on, on *P. mixta* and *S. ocellatella* larvae. However, Kindimann *et al* (2015) indicated that ladybirds are not effective in controlling aphids in the field, and indicated that long-lived predators (e.g. coccinellids) can not be, theoretically, efficient in controlling the short-lived prey (e.g. aphids). Riddick (2017) obtained good aphid control when ladybird beetle adults were released in the greenhouse.

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## التذبذبات العددية لحشرات بنجر السكر الرئيسية والمفترسات المصاحبة لها في العروات المختلفة أماني عبد الحكيم خليفة قسم بحوث مكافحة الحويية – معهد بحوث وقاية النباتات – مركز البحوث الزراعية

بنجر السكر من المحاصيل الهامة ، والتي بدأت زراعتها في مصر منذ أواخر السبعينات، وذلك للوفاء – بالإضافة إلى قصب السكر- بحاجة السوق المحلي من السكر. أجري البحث الحالي في حقول بنجر السكر بمركز سيدى سالم بمحافظة كفر الشيخ خلال موسم 2016/2015 ، 2017/2016 بهدف داسة تقلبات تعدادات أهم الآفات الحشرية التي تصيب المحصول المنزرع في ثلاث عروات: مبكرة (أغسطس) ومتوسطة (سبتمبر) ومتأخرة (أكتوبر) ، وكذا المفترسات المصاحبة لها. وجدت اليرقات والحشرات الكاملة لخنفساء البنجر *Cassida vittata* بأعداد قليلة على نباتات عروتي أغسطس وسبتمبر ، وزادت الأعداد كثيرا في عروة أكتوبر (60.33 and 66.00) ، في الموسم الأول والموسم الثاني على التوالي. كما وجدت يرقات ذبابة البنجر *Pegomyia mixta* ، بأعداد قليلة نباتات عروتي أغسطس وسبتمبر ، وزادت الأعداد في عروة أكتوبر ، خصوصا في الموسم الأول ( 20.58 يرقة) . وكانت الكثافة العددية أعلى ما يمكن خلال مارس وإبريل ومايو. وبخصوص حشرات المن *Aphis spp* ، تم تسجيلها طوال الموسم ، وكانت الأعداد أعلى في الموسم الثاني عنها في الموسم الأول. وكان نشاط نطاط الأوراق *Empoasca lybica* مشابها للمن. كانت الكثافة العددية ليرقات دودة ورق القطن 5.57 and 8.42 يرقة لكل 25 نبات في نباتات عروة أغسطس في الموسمين على التوالي ، بينما كانت الأعداد منخفضة جدا في عروتي سبتمبر وأكتوبر. وعلى العكس من ذلك كانت يرقات فراشة البنجر *Scrobipalpa ocellatella* أعلى كثيرا في نباتات عروة أكتوبر ، مقارنة بعروتي أغسطس وسبتمبر. وبالنسبة للمفترس *Scymnus spp* ، كانت الكثافة العددية أعلى في عروة أغسطس عنها في عروتي سبتمبر وأكتوبر. عند حساب نسبة المفترس إلى الفريسة Predator-prey ratio ، وجد أن النسبة بين المفترس *Scymnus spp* ، وفائسه المتاحة (المن ونطاط الأوراق) كانت 1:3.80 في عروة أغسطس في السنة الأولى ، وانخفضت إلى 1:6.69 and 1:6.72 في عروتي سبتمبر وأكتوبر على التوالي. وفي السنة الثانية كانت نسبة المفترس إلى الفريسة متشابهة في عروتي أغسطس وسبتمبر . وفي السنة الثانية كانت النسبة منخفضة جدا في عروة أكتوبر 1:17.85.