

## SUSCEPTIBILITY OF CERTAIN SUGAR BEET VARIETIES TO INFESTATION WITH *Pegomyia mixta* VILL. AND *Cassida vittata* VILL. IN RELATION TO THE YIELD CROP AT KAFR EL-SHEIKH GOVERNORATE

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### ABSTRACT

The population density of the beet fly, *Pegomyia mixta* Vill. attacking for seven sugar beet varieties during the two successive seasons (2004/2005 and 2005-2006). It was found *P. mixta* has between one to three peaks on Lola, Carola, Kws<sub>1436</sub>, Hend<sub>9422</sub>, 3S<sub>40</sub>, Anema and Top varieties. Also, the range same trend was observed in the second season (2005-2006). Infestation rates of *P. mixta* were studied on seven varieties (Lola, Carola, Kws<sub>1436</sub>, Hend<sub>9422</sub>, 3S<sub>40</sub>, Anema and Top). Kws<sub>1436</sub> variety was the most susceptible than Top variety to *P. mixta* infestation. The moderate susceptible variety was Hend<sub>9422</sub> during (2004-2005 & 2005-2006). The population density of the tortoise beetle, *Cassida vittata* Vill. attacking for seven sugar beet varieties during the two successive seasons (2004/2005 and 2005-2006). It was found *C. vittata* has between one to two peaks on Lola, Carola, Kws<sub>1436</sub>, Hend<sub>9422</sub>, 3S<sub>40</sub>, Anema and Top varieties. Also, the range same trend was observed in the second season (2005-2006). Infestation rates of *P. mixta* were studied on seven varieties (Lola, Carola, Kws<sub>1436</sub>, Hend<sub>9422</sub>, 3S<sub>40</sub>, Anema and Top). Anema variety was more susceptible than 3S<sub>40</sub> variety to *C. vittata* infestation. The moderate susceptible variety was Hend<sub>9422</sub> during 2004-2005 season. While during 2005-2006 season, found Kws<sub>1436</sub> variety was more susceptible than Top variety to *C. vittata* infestation. The moderate susceptible variety was Lola. The correlation between the infestation rate, root yield and sugar percentages of *P. mixta* and *C. vittata* on some varieties of sugar beet also, studied. 3S<sub>40</sub> and Top varieties had the maximum yield Ton/fed. In addition, the sugar percentage of the two varieties reached the maximum. On the other hand, Anema variety had the minimum yield (Ton/fed.). The other varieties the yield ranged between (Lola to Carola), also, the sugar percentage ranged between (Lola-Kws<sub>1436</sub>). In conclusion, 3S<sub>40</sub> and Top varieties gave the highest root yield and sugar production that we concluded with the lowest infestation rate by the two insect pests, *P. mixta* (larvae) and *C. vittata* (larvae and adults) compared with the other varieties.

### INTRODUCTION

The beet fly, *Pegomyia mixta* Vill. (Anthomyiidae : Diptera) and the tortoise beetle, *Cassida vittata* Vill. (Chrysomelidae : Coleoptera) are the most two economic important insect pests infesting sugar beet in Egypt (Guirguis, 1985, Salouma 1989, Awadalla *et al.*, 1991 and Youssef 1994). Iskander (1982) observed that *P. mixta* was one of the most serious pest threatening sugar beet plantations attacking the plant in all stages of its growth, particularly full-grown mature leaves. The larvae penetrate into the leaves causing the appearance of wide blotch and shaped areas on them and finally dry up. Awadalla *et al.* (2001) found that, the maximum abundance of the egg stage was in mid-March and early-May. The larval populations have

three successive peaks occurred at mid-January, late-March, and early-May. Abou-Said Ahmed (1987) stated that larvae affected the quantity of root yield by this pest, while sugar percentage was not significantly affected. Ebieda (1998) showed that the injury levels of the main properties (quantity and quality) of roots, leaves, sugar grow yield, root: leaves ratio and %root/gross yield were affected by the infestation by *P. mixta*. El-Khouly (1998) illustrated considerable decrement in root weight, root sugar content, weight of foliage and number of plant leaves as infestation levels of both larva or adult increased. Leaf number increased by the increase of infestation rates of *C. vittata*. At infestation levels of 25, 50 and 100 larvae/adults/plat. At the same trend sugar yield crop degraded in quality and quantity. Mousa (2005) indicated that Top variety was less sensitive for *P. mixta*, while Kwsa421 received moderate infestation for the same insect. He recorded Top variety received the lowest number of *C. vittata*.

Thus, the present study was carried out to clarify the correlation between the infestation levels of both insects *Pegomyia mixta* and *Cassida vittata* Vill. On the produced root and sugar yields of seven sugar beet varieties.

## **MATERIALS AND METHODS**

### **1. Experimentation:**

The present study was carried out in Delta Sugar Company Farm in El-Hamoul District, Kafr El-Sheik Governorate, during the two seasons 2004/2005 and 2005/2006.

The experimental area (about ½ Feddan), the mid-October as normal planting date was divided into 28 plots (6X7 = 42 m<sup>2</sup>, 1/100 of fed.). Every sugar beet variety was cultivated in an area (168 m<sup>2</sup>). An area of each sugar beet variety divided to 4 replicates in a complete randomized block design, with a space of 1 m wide belt between plots. An unplanted belt (2 m wide) was left around the experimental area. The seven sugar beet varieties Lola, Carola, KWS1436, Hens9422, 3S40, Anema and Top were cultivated randomly in four plots.

### **2. Agricultural practices and sampling:**

All normal agricultural practices were followed with no insecticides applications.

Starting from early November, a sample of 10 plants/plot was picked up randomly every 10 days intervals continued until the end of May at the harvest time. Recorded the counts of *P. mixta* and *C. vittata*. Leaves were examined for the infestation to both insects, and the counts of them were taken. At harvest times, a hundred sugar beet roots was randomly taken from the middle ridge along 2 m for each plot. The roots were brushed and transferred immediately to laboratory of Delta sugar company immediately where cut off from the roots and weighed. Also, the root sucrose percentage was determined in the cleaned roots by using Saccharometer on a lead basis according to the procedure of Le Docte (1927).

### 3. Determination of technological characteristics:

Were calculated by the following equations of Delta sugar company:

**a. Sugar recovery (SR) (white sugar):**

$$SR = Pol - 0.29 - 0.343 (K + Na) - \alpha NX \cdot 0.94$$

Where :  $Plo = \text{Sucrose\%}$

**b. Percentages of Sugar losses in wastes ©:**

$$D = (K + Na, 34 + \alpha NX \cdot 0.094 - 0.129)$$

**c. Juice purity:**

Obtained according to **Sapronov et al. (1979)**.

$$\text{Purity} = \text{Sucrose\%} \times 100 \text{ (soluble solid\%)}$$

**d. Estimation of *P. mixta* and *C. vittata* damage:**

The damage caused by *P. mixta* and *C. vittata* was estimated by the following equation according to (Delta Sugar Company):

$$\text{Sugar yield (Ton/fed.)} = \text{root yield sucrose} \times \text{purity}/100.$$

The microcomputer program ANOVA was used for statistical analysis and the Duncan's multiple range tests was used for separating means.

## RESULTS AND DISCUSSION

### 1. Population density of the beet fly, *Pegomyia mixta* Vill. for seven sugar beet varieties during the two successive seasons (2004/2005 and 2005-2006):

#### 1.1. During (2004/2005) season:

Data in Fig. (1) shows that the population density of the beet fly, *P. mixta* attacking seven sugar beet varieties during the first season (2004/2005).

It was found *P. mixta* has activity peak during 13<sup>th</sup> February with mean number 99 individuals, then the population where decreased and increased again to make activity broad ranged from 14<sup>th</sup> March, 2005 (92 individuals /40 plants) till 3<sup>rd</sup> April, 2005 (91 individuals) on Lola Variety. On Carola variety, it was found *P. mixta* has two activity peaks during 13<sup>th</sup> February and 14<sup>th</sup> March 2005 with mean number 101 and 109 individuals /40 plants, respectively. While, on Kws<sub>1436</sub> the population density of *P. mixta* has three activity peaks during 4<sup>th</sup> January, 13<sup>th</sup> February and 14<sup>th</sup> March 2005 with mean number 59, 112 and 127 individuals, respectively. On the other hand, on Hend<sub>9422</sub> it was found *P. mixta* has activity peak during 13<sup>th</sup> February with mean number 98 individuals, then the population where decreased and increased again to make activity broad ranged from 14<sup>th</sup> March (100 individuals) till 13<sup>th</sup> April, 2005 (99 individuals). On 3S<sub>40</sub> variety, found *P. mixta* has two activity peaks during 13<sup>th</sup> February and 14<sup>th</sup> March 2005 with mean number 103 and 125 individuals, respectively. On Anema variety has one activity peak on 10<sup>th</sup> February with mean number 115 individuals. On Top, variety has broad ranged between 3<sup>rd</sup> February until 5<sup>th</sup> March with mean number 82 and 82 individuals, respectively.

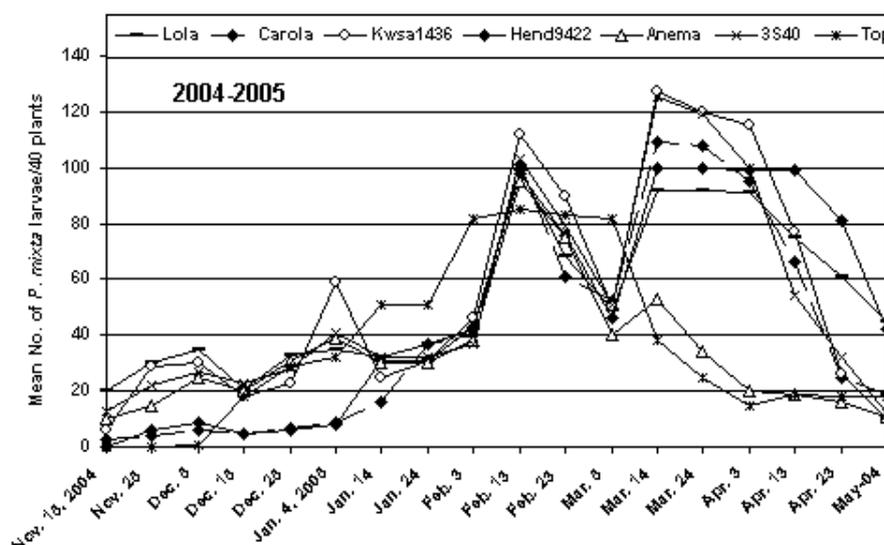
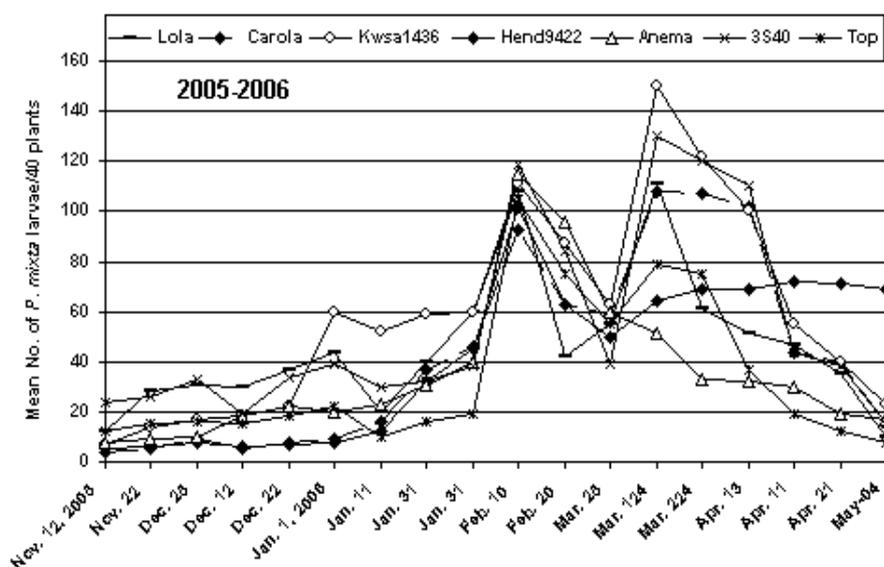


Fig. (1): Mean number of the beet fly, *P. mixta* (larvae) for seven sugar beet varieties during the first season 2004/05.

### 1.2. During (2005/06) season:

Data in Fig. (2) shows that the population density of the beet fly, *P. mixta* attacking for seven sugar beet varieties during the first season (2005/2006).

It was found *P. mixta* has two activity peaks during 10<sup>th</sup> February and 24<sup>th</sup> March with mean number 108 and 111 individuals, respectively on Lola Variety. On Carola variety, it was found *P. mixta* has two activity peaks during 10<sup>th</sup> February and 24<sup>th</sup> March 2005 with mean number 93 and 108 individuals, respectively. While, on Kws<sub>1436</sub> the population density of *P. mixta* has two activity peaks during 10 April, and 24<sup>th</sup> March 2005 with mean number 111 and 150 individuals, respectively. On the other hand, on Hend<sub>9422</sub> variety, found *P. mixta* has activity peak during 10<sup>th</sup> February with mean number 102 individuals. On 3S<sub>40</sub> variety, found *P. mixta* has two activity peaks during 10<sup>th</sup> February and 24<sup>th</sup> March 2005 with mean number 119 and 130 individuals, respectively. On Anema variety, has one activity peak on 10<sup>th</sup> February with mean number 115 individuals. On Top, variety has two activity peaks during 10<sup>th</sup> February and 24<sup>th</sup> March with mean number 105 and 79 individuals, respectively.



**Fig. (2): Mean number of the beet fly, *P. mixta* (larvae) for seven sugar beet varieties during the second season 2005/06.**

**2. Infestation rates of *P. mixta* on some varieties of sugar beet:**

**2.1. During 2004-2005 season:**

The total number of larvae of *P. mixta* were 957, 763, 1004, 866, 599, 924 and 634/18 inspections of seven varieties, Lola, Carola, Kws1436, Hend9422, 3S40, Anema and Top, while the mean number of these varieties were 136.7, 109.0, 143.43, 123.71, 85.57, 132.00 and 90.57/40 plants, respectively.

As shown in Table (1) Kws1436 variety was more susceptible (143.43) than Top variety (90.57) to *P. mixta* infestation. The moderate susceptible variety was Hend9422 (123.71).

Statistical analysis of the data, showed highly significant differences between seven sugar beet varieties as the infestation with *P. mixta*, ( $F = 714.44$  on  $P < 0.05$ ) and  $LSD = 2.57$ .

**2.2. During 2005-2006 season:**

The total number of larvae of *P. mixta* were 852, 770, 1060, 758, 634, 974 and 608/18 inspections of seven varieties, Lola, Carola, Kws1436, Hend9422, 3S40, Anema and Top, while the mean number of these varieties were 121.71, 110.00, 151.43, 108.29, 90.57, 139.14 and 86.86/40 plants, respectively.

As shown in Table (2) Kws1436 variety was more susceptible (151.433) than Top variety (90.57) to *P. mixta* infestation. The moderate susceptible variety was Hend9422 (108.29).

Statistical analysis of the data, showed highly significant differences between seven sugar beet varieties as the infestation with *P. mixta*, ( $F = 1428.69$  on  $P < 0.05$ ) and  $LSD = 1.91$ .

Table (1): Mean numbers of the beet fly, *P. mixta* Larvae for seven sugar beet varieties during 2004/2005 season.

Inspection date	Varieties						
	Lola	Carola	Kws <sub>1436</sub>	Hend <sub>9422</sub>	3S <sub>40</sub>	Anema	Top
Nov. 2004	50	7	45	6	25	35	0
Dec.	89	18	71	20	76	78	48
Jan. 2005	104	62	115	56	97	99	121
Feb.	209	202	248	217	208	219	240
March	233	269	297	246	127	295	155
April	227	186	218	279	55	186	52
May	45	19	10	42	11	12	18
<b>Total</b>	<b>957</b>	<b>763</b>	<b>1004</b>	<b>866</b>	<b>599</b>	<b>924</b>	<b>634</b>
<b>Mean</b>	<b>136.7<sup>a</sup></b>	<b>109.0<sup>e</sup></b>	<b>143.43<sup>a</sup></b>	<b>123.71<sup>d</sup></b>	<b>85.58<sup>g</sup></b>	<b>132.00<sup>c</sup></b>	<b>90.57<sup>f</sup></b>
<b>F</b>	*** 714.44						
<b>LSD</b>	9.57						

Table (2): Mean numbers of the beet fly, *Pegomyia mixta* larvae for seven sugar beet varieties during 2005/2006 seasons.

Inspection date	Varieties						
	Lola	Carola	Kws <sub>1436</sub>	Hend <sub>9422</sub>	3S <sub>40</sub>	Anema	Top
Nov. 2005	40	9	21	11	17	50	27
Dec.	98	22	57	21	50	86	49
Jan. 2006	164	108	231	97	114	139	67
Feb.	180	156	198	165	211	203	180
March	227	274	335	183	144	289	209
April	133	186	195	212	81	192	68
May	10	15	23	69	17	15	8
<b>Total</b>	<b>852</b>	<b>770</b>	<b>1060</b>	<b>758</b>	<b>634</b>	<b>974</b>	<b>608</b>
<b>Mean</b>	<b>121.71<sup>c</sup></b>	<b>110.00<sup>d</sup></b>	<b>151.43<sup>a</sup></b>	<b>108.29<sup>d</sup></b>	<b>90.57<sup>e</sup></b>	<b>139.14<sup>b</sup></b>	<b>86.86<sup>f</sup></b>
<b>F</b>	*** 1428.69						
<b>LSD</b>	1.91						

3. Population density of *Cassida vittata* (larvae & adults) for seven sugar beet varieties during the two successive seasons (2004/2005 and 2005-2006):

3.1. During (2004/2005) season:

Data in Fig. (3) shows that the population density of the tortoise beetle, *C. vittata* attacking for seven sugar beet varieties during the first season (2004/2005).

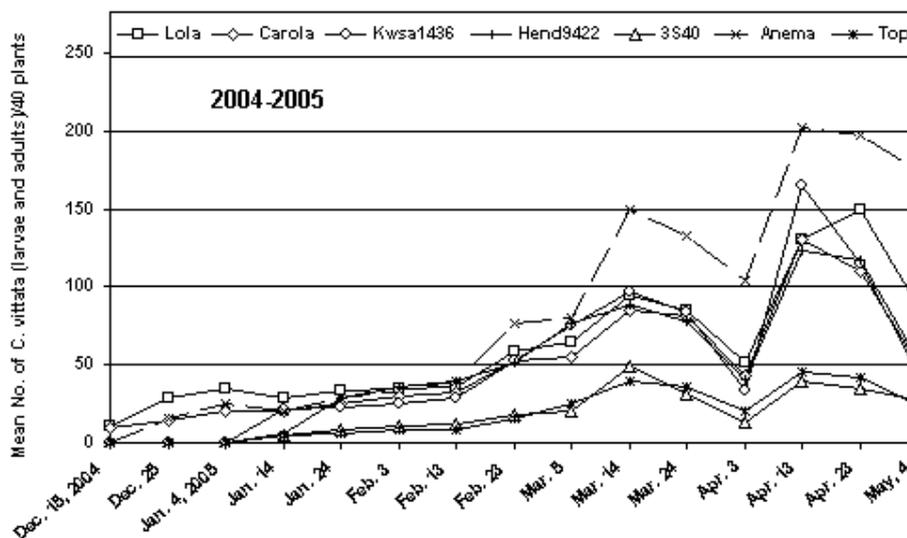
It was found *C. vittata* has two activity peak during 14<sup>th</sup> March and 23<sup>rd</sup> April with mean number 95 and 150 individuals on Lola Variety. On Carola variety, it was found *C. vittata* has two activity peaks during 14<sup>th</sup> May and 13<sup>th</sup> April 2005 with mean number 85 and 130 individuals, respectively. In addition, on Kws<sub>1436</sub> the population density of *C. vittata* has two activity peaks

during 14<sup>th</sup> March and 13 April with mean number 97 and 165 individuals, respectively. On the other hand, on Hend<sup>9422</sup> it was found *C. vittata* has two activity peaks during 14 March and 13<sup>th</sup> April with mean number 89 and 123 individuals, respectively. On 3S<sub>40</sub> variety, found *C. vittata* has two activity peaks during 14 March and 13<sup>th</sup> April 2005 with mean number 97 and 165 individuals, respectively. On Anema variety, has two activity peaks during 14 March and 13<sup>th</sup> April 2005 with mean number 150 and 202 individuals, respectively. On Top variety, found two activity peaks during 14 March and 13<sup>th</sup> April 2005 with mean number 39 and 45 individuals, respectively.

**3.2. During (2005/2006) season:**

Data in Fig. (4) shows that the population density of *C. vittata* Vill. attacking for seven sugar beet varieties during the first season (2005/2006).

It was found *C. vittata* has one activity peak during 12 March with mean number 155 individuals, respectively on Lola Variety. On Carola variety, found *C. vittata* has one activity peak during 2<sup>nd</sup> March with mean number 83 individuals. While, on Kws<sup>1436</sup> the population density of *C. vittata* has one activity peak during 12<sup>th</sup> March with mean number 103 individuals. On the other hand, on Hend<sup>9422</sup> variety, found *C. vittata* has activity peak during 12 March with mean number 141 individuals. On 3S<sub>40</sub> variety, found *C. vittata* has activity peak during 12 March with mean number 37 individuals. On Anema variety, has one activity peak on 12<sup>th</sup> March with mean number 148 individuals. On Top, variety has two activity peaks during 12 March and 11<sup>th</sup> April with mean number 39 and 45 individuals, respectively.



**Fig. (3):** Mean number of the tortoise beetle, *C. vittata* (larvae & adults) for seven sugar beet varieties during the first seasons 2004/05 .

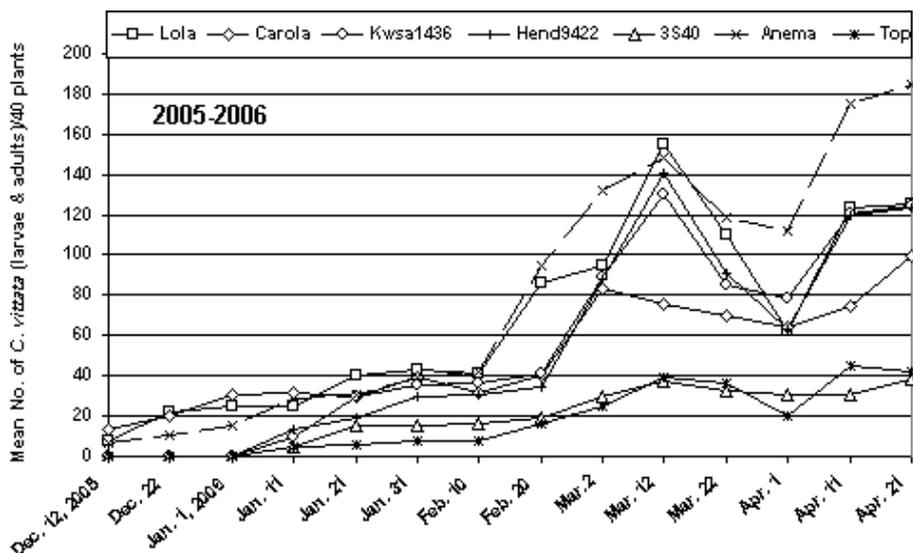


Fig. (4): Mean number of the tortoise beetle, *C. vittata* (larvae & adults) for seven sugar beet varieties during the second seasons 2005/06.

4. Infestation rates of the tortoise beetle, *Cassida vittata* on some varieties of sugar beet:

4.1. During 2004-2005 season:

The total number of larvae of *C. vittata* were 933, 758, 765, 740, 268, 1279 and 274/18 inspections of seven varieties, Lola, Carola, Kws<sub>1436</sub>, Hend<sub>9422</sub>, 3S<sub>40</sub>, Anema and Top, while the mean number of these varieties were 155.5, 126.33, 127.5, 123.33, 44.67, 213.17 and 45.67/40 plants, respectively.

As shown in Table (3) Anema variety was more susceptible (213.17) than 3S<sub>40</sub> variety (44.67) to *C. vittata* infestation. The moderate susceptible variety was Hend<sub>9422</sub> (123.33).

Statistical analysis of the data, showed highly significant differences between seven sugar beet varieties as the infestation with *C. vittata*, ( $F = 1459.92$  on  $P < 0.05$ ) and  $LSD = 4.72$ .

4.2. During 2005-2006 season:

The total number of larvae of *C. vittata* were 1100, 820, 929, 928, 311, 1339 and 274/18 inspections of seven varieties, Lola, Carola, Kws<sub>1436</sub>, Hend<sub>9422</sub>, 3S<sub>40</sub>, Anema and Top, while the mean number of these varieties were 103.33, 136.67, 154.83, 154.67, 51.83, 223.17 and 45.67/40 plants, respectively.

As shown in Table (4) Kws<sub>1436</sub> variety was more susceptible (154.83) than Top variety (45.67) to *C. vittata* infestation. The moderate susceptible variety was Lola (103.33).

Statistical analysis of the data, showed highly significant differences between seven sugar beet varieties as the infestation with *P. mixta*, ( $F = 9032.75$  on  $P < 0.05$ ) and  $LSD = 2.003$ .

The obtained results are agreement with those obtained by Mousa (2005), who proved that Top variety is lowest, reaccepted with infestation by *C. vittata*.

**Table (3): Mean number of the tortoise beetle, *C. vittata* (larvae & adults) for seven sugar beet varieties during 2004/2005 season.**

Inspection date	Varieties						
	Lola	Carola	Kws <sub>1436</sub>	Hend <sub>9422</sub>	3S <sub>40</sub>	Anema	Top
Dec. 2004	40	23	0	0	0	16	0
Jan. 2005	97	65	44	35	13	74	11
Feb.	130	115	107	126	41	148	32
March	245	221	256	244	100	363	100
April	332	283	313	281	87	503	107
May	89	51	45	54	27	175	24
<b>Total</b>	<b>933</b>	<b>758</b>	<b>765</b>	<b>740</b>	<b>268</b>	<b>1279</b>	<b>274</b>
Mean	155.5 <sup>b</sup>	126.33 <sup>c</sup>	127.5 <sup>c</sup>	123.33 <sup>c</sup>	44.67 <sup>e</sup>	213.17 <sup>a</sup>	45.67 <sup>d</sup>
F	*** 1459.92						
LSD	4.72						

**Table (4): Mean number of the tortoise beetle, *C. vittata* (larvae & adults) for seven sugar beet varieties during 2005/2006 season.**

Inspection date	Varieties						
	Lola	Carola	Kws <sub>1436</sub>	Hend <sub>9422</sub>	3S <sub>40</sub>	Anema	Top
Dec. 2005	30	33	0	0	0	18	0
Jan. 2006	133	132	75	62	35	114	19
Feb.	127	72	77	65	35	137	24
March	360	229	304	320	100	399	100
April	310	239	323	306	100	472	107
May	140	115	150	175	41	199	24
<b>Total</b>	<b>1100</b>	<b>820</b>	<b>929</b>	<b>928</b>	<b>311</b>	<b>1339</b>	<b>274</b>
Mean	103.33 <sup>d</sup>	136.67 <sup>c</sup>	154.83 <sup>b</sup>	154.67 <sup>b</sup>	51.83 <sup>e</sup>	223.17 <sup>a</sup>	45.67 <sup>f</sup>
F	*** 9032.75						
LSD	2.003						

**2. The relationship between the infestation rate, root yield and sugar percentages of *Pegomyia mixta* and *Cassida vittata* on some varieties of sugar beet:**

The relation between the infestation rates of *P. mixta* (larvae) and *C. vittata* (larvae and adults) and root yield of some varieties of sugar beet and their percentages were studies.

Data in Table (5) showed that 3S<sub>40</sub> and Top varieties had the maximum yield (20.5 & 19.5) Ton/fed. with rate in infestation by the two insect pests, *P. mixta* and *C. vittata*, (113.05 & 58.0) and (103.6 & 66.7), respectively, also, the sugar percentage of the two varieties reached 19.8 and 19.4, respectively.

On the other hand, the data indicated that Anema variety had the minimum yield (15.7 Ton/fed.) with rate in infestation by the two insect pests, *P. mixta* and *C. vittata*, (158.65 & 295.4), respectively, also, the sugar percentage of the Anema variety reached 17.7.(Table 5).

The other varieties the yield ranged between (Lola 18.9 to Carola 20.1 Ton/fed.), respectively, also, the sugar percentage ranged between (Lola 17.8- **Kws**<sub>1436</sub> 19.3).

Statistical analysis of the data, showed highly significant differences between the infestation with *P. mixta* and *C. vittata* on seven sugar beet varieties and weight (Ton/fed.) (F = 8.37 on P < 0.05) and LSD = 1.69 and also give significant differences between the infestation with *P. mixta* and *C. vittata* on seven sugar beet varieties and % of sucrose (F = 3.635 on P < 0.05) and LSD = 1.29.

High quality and quantity of sugar beet crop are obtained with reduce pests attack.

In Egypt **Ali (1988)**, pointed out that the number of pests of which attack sugar beet plants differs according to the crop rotation.

**Table (5): Mean weight and % of sucrose for seven sugar beet varieties combined as infestation with *P. mixta* and *C. vittata* from 2 seasons (2004/2005 and 2005/2006).**

Variety	Mean	
	Ton/fed.	Sucrose%
Lola	18.9 <sup>a</sup>	17.8 <sup>c</sup>
Carola	20.1 <sup>a</sup>	18.4 <sup>ab</sup>
<b>Kws</b> <sub>1436</sub>	19.6 <sup>a</sup>	19.3 <sup>a</sup>
<b>Hend</b> <sub>9422</sub>	19.9 <sup>a</sup>	18.8 <sup>ab</sup>
Anema	20.5 <sup>a</sup>	19.8 <sup>a</sup>
<b>3S</b> <sub>40</sub>	15.7 <sup>b</sup>	17.7 <sup>c</sup>
Top	19.5 <sup>a</sup>	19.4 <sup>a</sup>
F	***	*
	<b>8.37</b>	<b>3.635</b>
LSD	<b>1.69</b>	<b>1.29</b>

In general, it was observed that when the infestation rates increased the sugar percentage decreased. The maximum sugar percentages were attained by all varieties after planting on the recommended date.

In conclusion, 3S<sub>40</sub> and Top varieties gave the highest root yield and sugar production that we concluded with the lowest infestation rate by the two insect pests, *P. mixta* (larvae) and *C. vittata* (larvae and adults) compared with the other varieties.

The effects of *P. mixta* (larvae) and *C. vittata* on root yields and sugar percentages were observed by several studies such as, Abou-Said Ahmed (1987), El-Khouly (1992 & 1998), Ebieda (1998).

## REFERENCES

- Abo-Aiana, R. A. D. (1991): Studies on pests of sugar beet in Kafr El-Sheikh. Ph. D. Thesis, Fac. Agric. Tanta Univ.
- Abou-Said Ahmed, A. M. B. (1987): Studies on the insects of sugar beet in Kafr El-Sheikh Governorate, Egypt. Ph. D. Thesis, Fac. Agric. Tanta Univ.
- Aly, F. A. C. (1988): Population density of the beet fly, *Pegomyia mixta* Vill. On sugar beet and chard weed, *Beta vulgaris* as an alternative host. *J. Agric. Sci., Mansoura Univ.*, 19 (1): 201-205.
- Awadalla, S. S.; Ragab, M. E. and Fathy, H. M. (1991): Interaction between injurious and predatory insects inhabiting sugar beet plants in relation to varieties and planting dates. *J. Biol. P. Cont.*, 1(2): 25-32.
- Awadalla, S. S.; Shanab, L. M.; Fathy, H. M. and Zawrah, M. E. (2001): Ecological studies on the sugar beet fly, *Pegomyia mixta* Vill. and its internal larval parasitoid, *Opius nitidulator* (Nees) in Mansoura District. Assuit Univ. Proceeding of the Conf. October, 28-29, 2001.
- Ebieda, A. M. M. (1998): Studies on sugar beet pests. VI. Effect of beet fly, *Pegomyia mixta* Vill. on sugar beet with special reference to the determination of its injury levels and economic threshold. *Egypt, J. Agric. Res.*, 76 (2): 681-694.
- El-Khouly, M. I. (1992): Biological studies on the tortoise beetle, *Cassida vittata* Vill. attacking sugar beet. M. Sc. Thesis, Fac. Agric. Al-Azhar Univ.
- El-Khouly, M. I. (1998): Ecological studies and control of the tortoise beetle, *Cassida vittata* Vill. in sugar beet ecosystem. Ph. D. Thesis, Fac. Agric. Al-Azhar Univ.
- El-Saeedy, A. A. and Shabaan, A. I. (1988): Seasonal abundance of *Pegomyia mixta* Vill. (Diptera : Anthomyiidae) on sugar beet at Giza region. *J. Agric. Sci., Mansoura Univ.*, 13 (4): 1843-1946.
- Guirguis, G. Z. (1985): Studies on certain insects attacking sugar beet in Western Desert, Egypt. Ph. D. Thesis, Fac. Agric., Menoufia Univ. 105 pp.
- Iskander, A. K. (1982): Studies on certain sugar beet insects. M. Sc. Thesis, Fac. Agric., Cairo Univ.
- Le Docte, A. (1927): Commercial determination of sugar in beet root using the socks. *Sugar J.*, 29: 488-492.
- Mousa, E. A. M. (2005): Studies on sugar beet main insects and their safety control methods. Ph. D. Thesis, Fac. Agric. Mansoura Univ.
- Salouma, A. G. (1989): Biological and ecological studies on some insect pests of sugar beet and their natural enemies. Ph. D. Thesis, Fac. Agric. Alex. Univ., Egypt.
- Sapronov, A. R.; Joshman, A. E. and Loseava, V. A. (1979): General technology of sugar and sugar substances. *Phischevaya Promyshlennost* Pub. Moscow, 464 p.
- Youssef, A. E. (1994): Studies on certain insects attacking sugar beet. Ph. D. Thesis, Fac. Agric. Kafr El-Sheikh, Tanta Univ.

## حساسية بعض أصناف بنجر السكر للإصابة بحشرتي ذبابة أوراق البنجر وخنفساء البنجر السلحفائية وعلاقتها بالمحصول

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تم دراسة تذبذبات تعداد حشرتي ذبابة أوراق البنجر وخنفساء البنجر السلحفائية علي سبعة أصناف من بنجر السكر وهي ( Lola, Carola, Kws<sup>1436</sup>, Hend<sup>9422</sup>, 3S<sup>40</sup>, Anema and Top ) حيث وجد أن حشرة ذبابة أوراق البنجر لها من قمتين الي ثلاثة قمم في الموسم علي الأصناف المختلفة بينما حشرة وخنفساء البنجر السلحفائية لها من قمة الي قمتين وذلك خلال سنتي الدراسة. كما درست حساسية السبعة أصناف من بنجر السكر (Lola, Carola, Kws<sup>1436</sup>, Hend<sup>9422</sup>, 3S<sup>40</sup>, Anema and Top) للإصابة بحشرتي ذبابة أوراق البنجر وخنفساء البنجر السلحفائية.

حيث وجد أن الصنف Kws<sup>1436</sup> كان أكثر حساسية من الصنف Top للإصابة بذبابة أوراق البنجر في حين كان الصنف Hend<sup>9422</sup> متوسط الإصابة بينما كان أكثر الأصناف حساسية لهذه الذبابة كان الصنف Kws<sup>1436</sup>.

علي الجانب الآخر كان الصنف Anema أكثر الأصناف حساسية للإصابة بخنفساء البنجر السلحفائية بينما كان أكثرهم تحملا للإصابة هما الصنفان Top ، 3S<sup>40</sup> .

وكذلك ظهرت العلاقة بين معدل الإصابة بحشرتي ذبابة أوراق البنجر وخنفساء البنجر السلحفائية وكذلك محصول الجذور الناتج ونسبة السكر حيث أظهرت النتائج أن صنف 3S<sup>40</sup> ، Top هما أكثر الأصناف إنتاجا للسكر وأكثرهم نسبة سكر في حين جاء الصنف Anema أقل الأصناف إنتاجا للسكر كما جاءت الأصناف الأخرى في الوسط بينهما من حيث كمية السكر المستخرجة ونسبتها.

من ذلك يمكن أن نستنتج أن صنف Top ، 3S<sup>40</sup> هما أكثر الأصناف إنتاجا للمحصول وكذلك أعلاهم كنسبة سكر مما يتضح أيضا أنه عند انخفاض نسبة الإصابة بهاتين الحشرتين يزيد المحصول وتزيد تبعا له نسبة السكر مقارنة ببقية الأصناف.

وفي النهاية نقترح التوسع في زراعة الصنف 3S<sup>40</sup> جنبا الي جنب الي الصنف Top لتفوقه علي بقية الأصناف المختبرة كما ونوعاً.