Effect of Some Pesticides, Sugarbeet Cultivars and Their Interaction on Population Density of Tortoise Beetle *Cassida Vittata* Vill and some Characters of Sugarbeet Cultivars at Nubaryia and Damanhour Region

Abo El-Ftooh A.A.;[1] Gohar, I.M.A;[1] M. S. Saleh[2] and Mohamed, Kh. El-Sh[3]

ABSTRACT

The present study was conducted at the experimental farm Nubariya Agricultural Research Station, West Nubariya and Damanhour (Hafs village), Al Behera Governorate during the two successive seasons, 2010/2011 and 2011/2012, to study the susceptibility of seven sugarbeet cultivars three multigerms and four monograms to infestation with tortoise, beetle *Cassida vittata* Vill, and their yield and quality characteristics. The seven sugarbeet cultivars (four monograms Helsinki, Ravel, MK2134 and Sible and three polyograms cultivars Oscar poly, Gazella and Lilly) used in this study. Besides the of the three pesticides (Radiant SC © 12%, Mospilan© 20% SP and Dursban© H 48% EC) for reducing population density of beetle. The population fluctuations of *C.vittata* (larvae and adults) numbers were increasing whenever plants became bigger. Combined analysis over seasons and location demonstrated that the Helsinki cultivar was more resistant to larvae and adults of *C.vittata*. But Sible cultivar was more sensitive to tortoise beetle *C.vittata* (51 larvae and adults /plants). The seven cultivars can be arranged cultivars ascending order at harvest crop, according to attract cultivars of tortoise beetle as follow: Helsinki, Mk 2134 , Gazella, Ravel, Lilly, Oscar poly, and Sibel (49.7, 49.8, 50.3, 50.8, 51.3 , 52.4 and 55.9), respectively. In addition, Helsinki cultivar was superior in most yield characteristics such as root, top, and sugar yields and of sucrose percentage. Radiant SC © 12% exceed when spraying and interact with seven sugarbeet cultivars in all the studied traits except T.S.S. percentage. Radiant SC © 12% was more toxic against tortoise beetle, *Cassida vittata* Vill (Larvae and Adults) in two regions through two seasons.

Key words: *Cassida vittata*. Radiant SC© 12%. Mospilan© 20% SP. Dursban© H 48% EC., Sugar beet cultivars, Helsinki, Mk 2134, Gazella, Ravel, Lilly, Oscar poly, Sibel

INTRODUCTION

Sugarbeet, *Beta vulgaris* L. is considered one of the most important crop that rank next to sugarcane in importance as sugar crop in Egypt and attribute 48.1 % of sugar production (Annual Report of Sugar Crops Council, 2012). In Egypt, sugarbeet is cultivated in 153.8 thousand feddans with an average production of 20.6 tons per Fadden 2011/2012 seasons, Chawdhery (2012). While, cultivated area in Al Beheira governorate was 44.309 feddans produced 682,309 tons with an average of 15.4 tons / fed. The lower yield per feddan is one of the major problem of sugarbeet production in the Al Beheira governorate (Ministry of Agriculture -the Directorate of Agriculture- Management of sugar crops – Damanhour region- Al Beheira governorate). Sugarbeet plants attack by numerous insect species during growing season. Both tortoise beetle larvae and adults feed on the lower side of the sugarbeet leaves, where, they eat the lower epidermis and inner tissue, but the upper epidermis remains intact looking like a glass. In addition, adults feed on leaves tissue, causing regular circular holes (Abo El Ftooh, 1995). Tortoise beetle *C. vittata* cause economic loss in sugar yield. The tortoise beetle, *C. vittata* de Villers (Chrysomelidae-Coleoptera) is among the major insects that caused lot of damage to sugar beet crop (Bassyouny, 1993, Mesbah, 2007 and Abo El Ftooh *et a*l 2007). In Egypt, the tortoise beetle *C. vittata* considered one of the most serious and abundant species causing damage in sugar beet plants Samy *et al* (1992) and Hatem *et a*l (2012). Traditionally, chemical pesticides were used for controlling all insect pests attacking sugarbeet crop in Egypt. In order to minimize the quantitative of chemical pesticides used for crop protection within the frame of the strategies in integrated pest management (IPM), biological control, especially microbial control, of insect pests became an important in such strategies as an effective alternative. (El-Khouly, 1998; Mesbah *et al* 2004). Also resistant varieties against disease and pests are needed. Radiant features an innovative active ingredient called spinetoram, which delivers control of destructive insect pests in fruiting and leafy vegetables, cucurbits and legumes. Like disease, insects are important causal factors of biotic stress in crop plants. Insects attack all the crop plants and lead to considerable losses in yield as well as quality. Insect attack leads to various types of damages. There are two important methods of insect control, biological method and chemical method. The

[1]Sugar Crops diseases & Pests, Department Sugar Crops Research Institute, Agricultural Research Center (ARC), 12619, Giza, Egypt
[2]Genetic and Breeding, Department, Sugar Croup Research Institute, Agriculture Research Center (ARC), 12619, Giza,, Egypt.
[3] Physiology and Chemistry, Department, Sugar Crops Research Institute, Agriculture Research Center (ARC), 12619, Giza,, Egypt.
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chemical method includes use of various chemical, insecticides. Use of insecticides has several disadvantages. It increases cost of cultivation, reduces population of predators and parasites of insect pests, leads to environmental pollution and development of pesticides resistant biotypes of insects. In biological method, insects are controlled in three ways, viz, 1) by the use of predators and parasites of insect pests. 2) by using botanical pesticides such as neem, Datura, Ipomea in the form of leaf extracts, and 3) use of resistant varieties. Thus, genetic resistance is the cheapest and the best method of insect control in crop plants. Genetic resistance refers to the ability of some genotypes to give higher yields of good quality than susceptible varieties at the same initial level of insect attack under similar environmental conditions Rossi (1999) and Ferry *et al.* (2006).

The main purpose of the current investigation is select the most suitable pesticides and cultivars resistant to contribute the integrated control operations and interaction with pesticides and their impact on crop characteristics. The large number of sugarbeet cultivars were sown in Egypt Which imported from different parts of the world .These cultivars have different yield characteristics and different sensitivity of tortoise beetle *Cassida vittata.* Therefore, this experiment was designing by planting seven cultivars of sugarbeet in two important regions of sugar beet cultivation to choose the most suitable cultivars for cultivation in these regions In addition, select the practices to improve sugarbeet yield characteristics and to minimize the infestation with the key sugarbeet insects on Nubariya and Damanhour regions.

MATERIALS AND METHODS

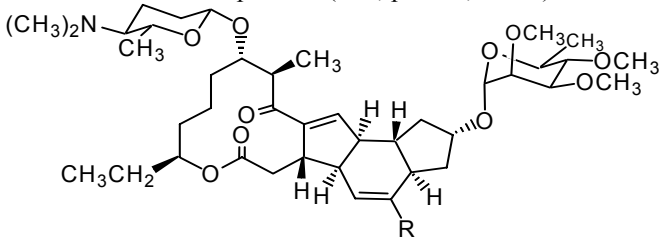
This investigation was conducted at the experimental farm Nubariya Agricultural Research Station, West Nubariya and Damanhour (Hafs village), Al Behera governorate during two successive seasons, 2010/2011 and 2011/2012, to study the susceptible seven sugarbeet cultivars to infestation with tortoise beetle *Cassida vittata* Vill, and their yield and quality characteristics. The three pesticides (Radiant SC © 12%, Dursban© H 48% EC and Mospilan© 20% SP) were tested against *C. vittata.* Also, study of the interaction between cultivars and insecticides and their impact on the quantity and quality of sugarbeet plants

Sugar beet material.

Seven sugarbeet cultivars used in this study introduced from Sugar Croup Research Institute, Agriculture Research Center, Egypt. The seven sugarbeet cultivars were four monograms Helsinki, Ravel, MK2134 and Sible and three polyograms cultivars Oscar poly, Gazella and Lilly).

The tested pesticides

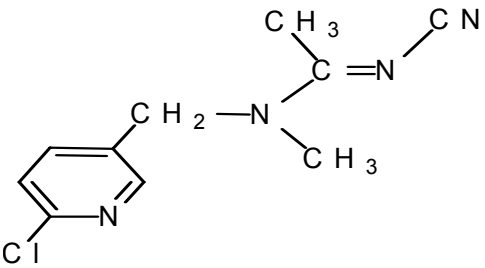
1- Radiant SC © 12% spinosad (BSI, pa ISO, ANSI) 100 cm3 /fed



spinosyn A, R = H-

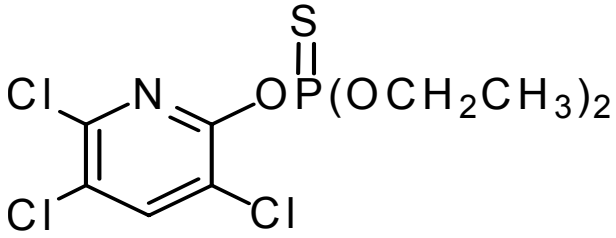
spinosyn D, R = CH_3-

2- **Mospilan© SP 20%**acetamiprid (pa ISO) $C_{10}H_{11}ClN_4$ 25g/100liter



3- **Dursban© EC 48%** O, O-diethyl O-(3, 5,6-trichloro-2-pyridinyl) phosphorothioate

1 litter/fed



The split plot design with three replicates was, used. Seven cultivars, (four monograms Helsinki, Ravel, MK2134 and Sible and three polyograms cultivars Oscar poly, Gazella and Lilly) were randomly distributed in the main plot and the three insecticides were randomly allotted in the sub plot. Each sub plot included 14 ridges, 50 cm apart and 10 m length thus the plot area was 70 m^2. However, the mineral fertilizer, ammonium nitrate (33.5%) added at 80 unit of nitrogen per feddan in three equal portions at 30, 60, and 90 days after sowing. Seven sugarbeet cultivars sown on the November 1st in both seasons at the two locations (Nubariya and Damanhour regions). Seeds sown in hills, 20 cm apart .Thirty days after sowing; thinning to one plant per hill was carried out before fertilization. Mechanical and chemical analysis of the soil by Ministry of Agriculture Authority Public for Agricultural Fund Budget, soil fertility Damanhour lab for used in the present study are shown in Table (1).

The first sample of insect pests was taken after eight weeks from sowing. Monthly samples (5 plants / plots), were randomly collected along the period of growing season. Each sample put in plastic bag at different dimensions according to the status of plant growth to transport to the laboratory. The sample plants were carefully examining for counting the larva and adults of tortoise beetle *C. vittata* according to Abo El-Ftooh (2002). Pesticides were applied in both Nubariya and Damanhur regions in the first and second seasons (15th March) on the more sensitive Siebel cultivar (based on the results of the first season) in the second season. Population reductions due to treatments were calculated and compared with the insect numbers in untreated plots (control). Percentage of infestation reduction of such cases was estimated according to the formula of Henderson and Telton (1955).

$$\text{The percentage of reductions} = 1 - \left[\frac{\text{Treatment after} \times \text{Control before}}{\text{Treatment before} \times \text{Control after}} \right] \times 100$$

Where,

Treatment after = The number of collected alive insects from the plot after treatment

Treatment before= The number of collected alive insects from the plot before treatment

Control after= the number of collected alive insects from the check plot after the date of treatment

Control before = the number of collected alive insects from the check plot before the date of treatment. The relative population densities of *C. vittata* (larvae and adults) were recorded for seven times, i.e., 1, 3, 5, 7, 14 and 21 days.

At harvest (210 days from sowing), Sample each plot was used to estimate roots, top and sugar yields (ton/fed). In addition, the quality characteristic in sugarbeet roots included sucrose percentage, total soluble solids (T.S.S) and juice purity percentages were recorded in laboratory of Nile Sugar Company, Egypt.The insecticides were applied at Nubariya and Damanhour regions at 15th March, through two seasons.

RESULTS AND DISCUSSIONS

1- Population density of, *Cassida vittata* Vill

Data in table (2) identified the population fluctuation of *C.vittata* (larvae and adults) which attacked seven cultivars at two regions through 2010/11 and 2011/12 seasons. In January, the Sible cultivar was recorded as the highest number of tortoise beetle *C.vittata* in to seasons (9, 7, 15 and 8 larvae and adults/ 5plants) at two regions and two seasons. While the Helsinki cultivar recorded in the same period (2, 0, 9 and 8 larvae and adults/ plants) at two regions, respectively. In the mid season (March) the Helsinki variety surpassed in resistant to tortoise beetle and recorded the lowest numbers of *C.vittata* (32, 38, 39 and 49 larvae and adults 5/plants) respectively. These results were harmony with Salama and Elnagar (1993).They reported that an apparent outbreak of the tortoise beetle *Cassida vittata* was observed in 1988/89 season. On the other side, the Sible cultivar was recorded the highest numbers of larvae and adults of *C.vittata* in the same period on investigation (36, 34, 44

Table 1. Chemical and physical properties of the experimental Soil in Damanhour and Nubariya regions during 2010/2011and 2010/ 2011 seasons

Nutrients P.P.M					Sodium dissolved in water (1:5)	Total dissolved salts (1:5)			
Boron	Potassium	Phosphor	Nitrogen	Calcium carbonate%	Sodium (Mlamkavie / L)	%Salts	(EC) Mellimosz / cm	PH١): (°	season
Damanhour region (Soil type: clay)									
0.3	23	4	70	2.9	5.21	0.32	1.02	8.4	1st
0.48	34	6	80	4.2	7.5	0.4	1.24	8.3	2nd
Nubariya region (Soil type: sandy loam)									
0.4	45	10	70	5.4	2.3	0.17	0.52	8.3	1st
0.48	58	8	40	2.5	6.3	0.31	0.98	8.5	2nd

Soil depth (cm): 0- 40 cm

and 55 larvae and adults /plants). On the day of harvest showed both cultivars Helsinki and Sible cultivars gave the same direction which Helsinki cultivar was more resistant(44, 51,47 and 53 larvae and adults /plants) while Sible cultivar was more susceptible to infection by tortoise beetle *C.vittata*,(53, 54,49 and 56 larvae and adults /plants) in two region and two seasons , respectively. Results took the a straight line form rising during the experience period during seasons and locations under the study

Data in Table (2) explained that the population fluctuation of *C.vittata* (numbers of larvae and adults) were increasing whenever plants became larger in a lifetime.

In the end of both seasons and in the two regions, the combined analysis demonstrated that the Helsinki cultivar was more resistant to larvae and adults of *C.vittata*. Conversely, Sible cultivar was more sensitive to tortoise beetle *C.vittata* (51 and larvae and adults /plants).Cultivars can be arranged ascending order at harvest crop, according to attract cultivars of tortoise beetle as follow: Helsinki, Mk 2134 , Gazella, Ravel, Lilly, Oscar poly, and Sibel (48.8, 49.8, 50.3, 50.8, 51.3 , 52.4 and 55.9), respectively. These results are in agreement with those obtained by Zarif, and Hegazi (1990) and Abo El Ftooh(1995). They reported that, there are differences the degree of resistance on cultivars tested to beet fly *Pegomyia mixta* Vill (Diptera Anthomyidae) and *Cassida vittata* Vill.

2: Yield and quality parameters for seven sugarbeet cultivars at Nubariya region and Damanhour region.

2.1 Root yield parameter

Data recorded in Table (3) identified the yield and quality for seven cultivars of sugar beet crop during two seasons in each of Nubariya and Damanhur regions.In the first and second seasons Helsinki cultivar was distinguished on the other cultivars for root yields parameter which recorded the (22. 3 and 22.8 ton/fed). On the other hand, Sibel cultivar was the lowest productivity of root yield (18.8 ton/fed) in the first season, while Mk 2134 cultivar had less produced root yield (19.4 ton/fed) in the second season. There were significant differences between seven cultivars in the first and the second seasons. Combined analysis of root yield parameter illustrated in Table (3) that Helsinki cultivar was recorded the highest value of root yield (22.6 ton/fed) while, the Mk 2134 and Lilly were equaled on productive the less root yield (19.8 tons /fed). There were significant differences between all cultivars under study. These results are in harmony with those obtained by Korayem (2006) which he found that sugarbeet cultivars were influencing in severity of root-knot nematode resistance and these characteristics were affected to varying degrees seven cultivars can be arranging by the productivity of crop roots descending order as follows: Helsinki, Oscar poly, Gazella, Sibel, Ravel**,** Mk 2134 and Lilly.

2.2 Leaves yield parameter:

Data in Table (3) observed that, Helsinki cultivar recorded the highest values of top yield (8.9, 10.0 ton/fed) during (2010/11 and 2011/12) seasons. On the other hand, Lilly cultivar recorded the lowest top yield (7.1 ton/fed) in the first season but Gazella and Sibel cultivars were produced the lowest value (8.6 ton/fed) of

Table 2. Effect of the seven-sugarbeet cultivars on population density to tortoise beetles *Cassida vittata* Vill on two successive seasons at Nubaryia and Damanhur region

Date / Cultivars	January					February					March					April					May				
	N		D		C. a	N		D		C. a	N		D		C. a	N		D		C. a	N		D		C. a
	1st	2nd	1st	2nd		1st	2nd	1st	2nd		1st	2nd	1st	2nd		1st	2nd	1st	2nd		1st	2nd	1st	2nd	
Helsinki	2	0	9	8	4.8	18	20	24	20	20.5	32	39	38	49	39.5	38	45	41	50	43.5	44	51	47	53	48.8
Ravel	4	0	12	2	4.5	22	23	29	20	23.5	28	46	42	38	38.5	43	47	45	52	46.8	52	48	46	58	51.0
Mk2134	1	4	9	3	4.3	17	19	34	26	24.0	36	41	38	47	40.5	37	43	39	45	41.0	50	53	45	52	50.0
Lilly	5	6	12	6	7.3	20	25	26	32	25.8	36	46	39	40	40.3	41	48	45	56	47.5	57	52	56	58	55.8
Oscar poly	5	6	10	6	6.8	25	27	30	30	28.0	36	42	43	41	40.5	37	52	49	52	47.5	49	52	50	59	52.5
Gazella	6	5	9	5	6.3	23	23	25	26	24.3	34	45	37	42	39.5	36	49	41	44	42.5	48	46	49	58	50.3
Sibel	9	7	15	8	9.8	29	21	24	31	26.3	36	44	34	55	42.3	39	48	50	46	45.8	53	49	54	56	53.0
Average year	5	4	11	5	5	22	23	24	26	25	34	43	39	45	40	39	47	44	49	45	50	50	50	56	51
Average locations	4.5		8			22.5		26.5			38.5		42			43		46.5			50		53		
LSD 0.05	**0.21**					**0.26**					**0.22**					**0.23**					**0.28**				

1st = First season 2nd = second season N= Nubaryia region D = Damanhur region C. a= combined analysis

Table 3. Combined analysis to seven sugarbeet cultivars as yield and quality characters at Nubaryia and Damanhur region, in two successive seasons

Sugarbeet Cultivars	Root yield (ton/fed)			Top yield (ton/fed)			Sugar yield (ton/fed)		
	1st	2nd	C. a	1st	2nd	C. a	1st	2nd	C. a
Helsinki	22.3	22.8	22.6	8.9	10.0	9.4	3.5	3.6	3.5
Ravel	20.5	21.5	20.1	7.4	8.7	8.1	3.1	3.4	3.3
Mk2134	20.2	19.4	19.8	7.6	9.1	8.3	2.7	3.1	2.9
Lilly	19.5	20.1	19.8	7.1	9.2	8.1	3.1	3.2	3.15
Oscar poly	20.8	19.6	21.2	7.5	8.9	8.2	3.2	3.4	3.3
Gazella	21.0	21.1	21.1	7.7	8.6	8.2	3.1	3.3	3.2
Sibel	18.8	21.6	20.2	7.9	8.6	8.3	3.4	3.4	3.4
Average	20.6	20.7	20.5	7.7	9.0	8.3	2.5	2. 9	2.7
$LSD_{0.05}$ cultivars	0.14		029	0.08		0.75	0.03		0.06

top yield parameter. In addition, combined analysis revealed that Helsinki cultivar was higher produced of leave yield (9.4 ton/fed) while the lowest top yield values was produces by Ravel and Lilly cultivar (8.1 ton/fed).

2.3 Sugar yield parameters:

Consequently, data signaled in Table (3) showed that, Helsinki cultivar was continuing in outweigh of sugar yield parameter under this part of study. In 2010/11and 2011/12 seasons the Helsinki cultivar recorded the highest values (3.5 and 3.6 tons/yield) respectively. From, the combined analysis data cleared that Helsinki cultivar was more produced sugar yield (3.5 ton/fed) than other cultivars under investigation. Whereas, Mk 2134 cultivar exhibited the lowest values (2.7 and 3.1 tons /fed) during the two seasons. Nevertheless in the combined analysis data reported that Mk 2134 cultivar was less productivity (2.9 ton/fed) than sugarbeet cultivars. There were significant differences between the cultivars under examination for this character through the two seasons, as well as data for combined analysis gave significant differences between cultivars.

2.4. Tatal Soluble Solid (T.S.S %):

Data in Table (4) noticed that sugarbeet cultivars Oscar poly (20.1%) recorded the highest value of Total Soluble Solid (T.S.S %) in the second season. While, cultivars Helsinki and Mk2134 equaled in T.S.S percentage (20.4%) values through in the second season. However, Lilly cultivar was recorded the lowest value of T.S.S. % parameter (19.0%) in the first season, but Gazella cultivar was recorded the least value of T.S.S.% (18.9%) during the second season2011/2012. The combined analysis illustrated that, Helsinki cultivar was recorded the highest value of T.S.S. % (20.1%). In contrast, the Ravel and Gazella cultivars recorded the lowest values of T.S.S. % values (19.2%) in the second seasons. From previous data, it can be observed that there were no significant differences among the cultivars cultivated except Ravel and Gazella cultivars and Mk 2134 and Oscar poly. Addition, cultivars can be arranged in ascending order according to the values of T.S.S % as follow: Gazella**,** Ravel, Lilly, Sibel, Mk 2134, Oscar poly and Helsinki cultivars.

2.5. Sucrose percentage:

Data in Table (4) Indicated that Helsinki cultivar gave the highest values of sucrose percentage (16.1%) in combined analysis for two years while the Lilly cultivars recorded less values of sucrose percentage (15%) for the same period. On the other side, Oscar poly cultivar recorded the highest sucrose percentage (16.1%) on the first season. While, in the second season the Gazelle cultivar was recorded the lowest value of sucrose (15%).

2.6 Purity percentage:

Data in Table (4) indicated that Helsinki and Oscar poly cultivars recorded the highest values of purity% in the first season (79.9%). In addition, Helsinki cultivar recorded the highest values of purity percentage in the second season and there was no significant difference between Helsinki and Oscar Poly cultivars (80.1 and 80%) respectively. The combined variation analysis observed that Helsinki cultivar (80%) exceed the other cultivars in this study at two regions and in two seasons as well. In the other the trend, Mk2134 was recorded the lowest values of purity percentage (78.1 and 78.8 %) in two growing seasons,, respectavily. As well as, combined analysis data reported that Mk2134 cultivar was less purity percentage value (78.5%) than anther cultivars

Table 4. Combined analysis to seven sugarbeet cultivars as quality characters at Nubaryia and Damanhur region, in two successive seasons

Sugarbeet Cultivars	T.S.S %			Sucrose %			Purity %		
	1st	2nd	C. a	1st	2nd	C. a	1st	2nd	C. a
Helsinki	19.8	20.4	20.1	15.8	16.3	16.1	79.9	80.1	80.0
Ravel	19.6	18.8	19.2	15.6	14.8	15.2	79.4	78.9	79.1
Mk2134	19.6	20.4	19.9	15.3	16.1	15.6	78.1	78.8	78. 5
Lilly	19.0	20.2	19.6	15.0	16.2	15.6	78.9	80.2	79.6
Oscar poly	20.1	19.7	19.9	16.1	15.8	15.9	79.9	80.0	79.9
Gazella	19.5	18.9	19.2	15.4	15.0	15.2	79.1	79.3	79.2
Sibel	19.9	19.7	19.8	15.8	15.7	15.7	79.2	79.5	79.4
Average	19.6	19.7	19.7	15.5	15.7	15.7	79.2	79.5	79.5
$LSD_{0.05}$ cultivars	0.12		0.27	0. 12		0.30	0.19		0.35

3. The reduction population of tortoise beetle *Cassida vittata* Vill on sugarbeet crop by used three pesticides.

Three Pesticides were tested against tortoise beetle *C.vittata* (larvae and adults) which infested plots cultivated by Sibel cultivar showed more susceptible to infection beetle in the two seasons at two regions Nubariya and Damanhur. From, Table (5 and6) in the fist day at Nubariya region Radiant SC © 12% reduction percentage was (12and 9.5) for larvae and adults with mean reduction percentage (10.75 % larvae &adults) .While the same pesticide Radiant SC © at Damanhur region the reduction percentage in the first day was (17 and 13 %) for larvae and adults with mean reduction % (15%). In 7th day the Radiant SC © 12% recorded (56 and 40) for larvae and adults with mean reduction percentage (48 %) and (58 and 50) for larvae and adults with mean (54 %) at Nubariya and Damanhur regions, respectively. In the end period the reduction percentage resulting to applied by day Radiant SC © 12% (87 and 85%) for larvae and adults with mean (86%) at Nubariya regions. In the corresponding period at Damanhur region the reduction percentages were (92 and87 %) for larvae and adults with mean (89.5%). These results were corresponded with Nehad *et al* (2008) which stated that Radiant SC © 12%was more toxic on *Spodoptera littoralis.* The second efficacy of pesticides was Mospilan©20% SP pesticide, in 1st day was recorded (10 and 4) for larvae and adults with mean reduction %(7%) at Nubariya region while at Damanhur region in the first day recorded (9and 5%) for larvae and adults with mean reduction % (7%). In the 7th day Nubariya region Mospilan© SP 20% was more toxic in larvae stage (30%) of *C.vittata* than adults (20%) with mean reduction (31%).Also in at Damanhur region, the reduction percentage was (25 %) for larvae instars and (20%) adults stage with mean reduction (23%). This result were compatible with these obtained by Ali *et al* (2012) who found that acetamiprid (Mospilan© SP) is a new generation from neonicotinoid insecticides and highly active to protect the various vegetable crops, by controlling mites and insect pests. At the end period application the Mospilan©20% SP was more killing for larvae than adults (80 and73%e) for larvae and for adults (76 and 60%) at Nubariya and Damanhur regions, respectively. As well as, the mean reduction was recorded higher reduction percentage in Damanhur region (67%) than Nubariya region (78%). The third pesticides Dursban© EC 48% was less reduction percentage against tortoise beetle *C. vittata* (larvae and adults) at Nubariya region during applying period. But the Dursban© EC 48% was superiority during some periods of experiment .These results are in accordance with EL-Kholy and Omar (2002) and Asmahan and Qasem (2004).They reported that the efficiency of chlorfenapyr was evaluated against eggs, larvae, pupae and adults of the tortoise beetle *Cassida vittata* chlorfenapyr demonstrates highly toxic effect.

4. The interaction between seven cultivars and three pesticides

4.1. Root yield parameter.

Data resulted in Table (7) determined that Helsinki cultivar with Radiant SC © 12% found to be the most productive (25.06 ton/fed) in root yield than interaction between the same cultivar and two other pesticides (22.28 and 21.32 ton/fed). Also, the interaction between Radiant SC © pesticide and the rest of cultivars was recorded the highest productivity in root yield except pesticide interaction with two cultivars Oscar Poly (23.28 tons/ fed) and Gazella (21.90 tons /fed), respectively. While, Mospilan©20% SP pesticide

Table 5.Average of reduction percentage of larvae and adults of *cassida vittata* vill after applied by three pesticides (Radiant SC © 12%, Mospilan©20% SP and Dursban©48% EC) on sugarbeet plant at Nubaryia region through two seasons

Period		1day			3 days			5 days			7 days			14 days			21 days		
pesticides	Stage	L	A	M	L	A	M	L	A	M	L	A	M	L	A	M	L	A	M
Radiant SC © 12%		12	9.5	10.8	24.	19	22	40	29	35	56	40	48	80	62	71	87	85	86
Mospilan©20% SP		10	4	7	15	16	16	30	20	25	30	32	31	55	48	52	80	76	78
Dursban©48% EC		21	18	20	36	28	32	64	47	56	71	57	64	85	74	80	71	79	75

. L= Larvae A= Adults M= means of larvae and adults

Table 6. Average of reduction percentage of larvae and adults of *cassida vittata* vill after applied by three pesticides ((Radiant SC © 12%, Mospilan©20% SP and Dursban©48% EC)) on sugarbeet plant at Damanhur region through two seasons

Period		1day			3days			5 days			7 days			14 days			21 days		
pesticides	Stages	L	A	M	L	A	M	L	A	M	L	A	M	L	A	M	L	A	M
Radiant SC©12%		17	13	15	21	24	23	42	34	38	58	50	54	68	79	74	92	87	89.5
Mospilan©20% SP		9	5	7	25	17	21	17	12	15	25	20	23	38	33	36	73	60	67
Dursban©48% EC		17	10	14	29	21	25	43	42	43	54	52	53	83	77	80	88	86	87

Table 7. Effect of interaction between seven cultivars and three pesticides, on sugarbeet yield and quality characters

Cultivars	Dates / Treatments	Root Yield (ton/fed)	Top yield (ton/fed)	Sugar yield (ton/fed)	T.S.S %	Sucrose %	Purity%
Helsinki	Radiant SC © 12%	25.06	9.53	4.00	20.93	17.0	81.00
	Mospilan©20%SP	21.32	8.53	3.85	20.71	16.5	79.54
	Dursban© EC48%	22.28	9.36	3.64	20.67	16.5	79.75
	Control	17.61	7.73	2.66	17.93	14.0	78.04
Ravel	Radiant SC © 12%	24.60	9.31	3.00	19.52	15.5	79.50
	Mospilan©20%SP	18.85	8.27	3.15	20.20	16.1	79.50
	Dursban© EC48%	23.21	8.60	3.18	19.32	15.3	79.08
	Control	17.28	7.61	2.18	17.79	14.0	78.63
Mk2134	Radiant SC © 12%	24.04	8.88	3.54	19.92	15.7	79.04
	Dursban© EC48%	21.27	8.57	3.78	20.83	16.5	79.29
	Mospilan©20%SP	18.23	8.99	3.68	21.00	16.6	78.88
	Control	16.05	6.91	2.20	18.04	13.8	76.63
Lilly	Radiant SC © 12%	22.53	8.48	3.23	19.92	15.9	79.71
	Mospilan©20%SP	19.12	8.02	2.91	20.03	16.1	80.25
	Dursban© EC48%	20.94	8.47	3.19	19.72	15.9	80.58
	Control	16.67	7.59	2.19	18.48	14.4	77.67
Oscar poly	Radiant SC © 12%	23.28	8.60	3.61	20.46	16.3	79.63
	Mospilan©20%SP	20.13	8.24	3.59	20.29	16.5	81.11
	Dursban© EC48%	23.50	8.56	3.68	20.26	16.3	80.46
	Control	18.03	7.28	2.23	18.43	14.2	77.08
Gazella	Radiant SC © 12%	21.90	8.10	3.31	20.00	16.0	80.20
	Mospilan©20%SP	21.00	8.30	3.45	21.33	17.2	80.50
	Dursban© EC48%	22.30	7.90	3.32	19.30	15.3	79.53
	Control	18.03	6.58	2.33	18.55	14.5	78.08
Sibel	Radiant SC © 12%	22.31	8.23	3.55	20.59	16.7	81.04
	Mospilan©20%SP	19.43	8.18	3.80	19.98	15.9	79.58
	Dursban© EC48%	21.67	8.30	3.85	21.04	16.9	80.13
	Control	17.39	7.33	2.53	17.67	13.6	76.79
$LSD_{0.05\ btween}$ cultivars and treatments		0.29	0.75	0.06	0.27	0.25	0.35

recorded the lowest interaction values with seven cultivars. The lowest value of interaction recorded by Mk2134 cultivar (18.25tos /fed). Dursban© EC 48% pesticide was the second productive of sugarbeet root yield as a result of its interaction with the seven cultivars tested. Interaction between Dursban© EC 48% and Oscar poly cultivar produced the highest root yield (23.50 tons /fed), also, the interaction between Ravel cultivar and Dursban© EC 48% gave the second order in root yield (23.21 tons /fed) and there were no significant differences among the two interaction. On the other hand, the lowest value was obtained by the interaction between Dursban© EC 48 pesticide and Lilly cultivar (20.94 ton/fed).

4.2. Top yield parameters:

Data in Table (7) reported that Helsinki and Ravel cultivars which interacted with Radiant SC © 12% gave the highest top yield (9.53 and 9.31 ton/fed) respectively. Possible arrangement pesticide Radiant SC © 12% interaction of with items descending in accordance with the values of top yield as follow: Helsinki cultivar (9.53 ton/fed), Ravel (9.31ton/fed), Mk2134 (8.88 ton/fed), Oscar poly (8.60 ton/fed), Lilly (8.48 ton/fed), Sibel (8.23 ton/fed) and Gazella (8.10 ton/fed). With regard to interaction between insecticides and cultivars the lowest value was obtained (7.90 tons/ fed). On the other hand, Mospilan© SP 20% recorded the highest value of interaction between this pesticide and Mk2134 cultivar (8.99 ton/fed). While the lowest value of interaction between the same insecticides and Lilly cultivar (8.02 tons /fed).There were significantly affected between interaction for all pesticides and cultivars to this parameter under study.

4.3. Sugar yield parameter:

Data in Table (7) revealed that, interaction between Helsinki cultivar and their pesticides confirmed that reaction of Radiant SC © 12% pesticide and Helsinki cultivar produced highest sugar yield value (4.00 ton/fed). While, less value of interaction between Helsinki cultivar and two other pesticides recorded by Dursban© EC 48% pesticide (3.65 ton/fed) where preceded by the pesticide Mospilan© SP 20% (3.85 ton/fed). In contrast, data in Table (7) cleared that, interaction between other cultivars under investigation and the three pesticides recorded the lowest values of sugar yield produced by Mospilan© SP 20% Lilly cultivar (2.91 tons /fed). In addition, there were significant differences for values of sugar yield character which effected by interaction between the cultivated seven cultivars and pesticides, which applied on field.

4.4 .Total Soluble Solid percentage T. S.S. %:

Data recorded in Table (7) stated that T.S.S. % influenced by interaction between the pesticide and cultivars. The highest value of T.S.S. resulted in interaction between Gazella cultivar and Mospilan© SP 20% (21.33%). The similar cultivar recorded the lowest value with at the spraying Dursban© EC 48% (19.30%). From the General point of consideration of T.S.S% value obtained from the interaction of cultivars and pesticides found other cultivars (Sibel) with Dursban© EC 48% pesticide (21.04%).As well as, the Gazella cultivar and Dursban© EC 48% recorded (19.30%). From previous data for Total Soluble Solids percentage values resulted interaction with Mospilan© SP pesticide gave the highest values by interaction with all cultivars except Siebel product (19.98%). There were significant differences for values of the interaction between seven cultivars and pesticides.

4.5 Sucrose percentage

From the combined analysis data recorded in Table (7) showed that the interaction between pesticides and cultivars were recorded the highest value of the sucrose percentage after the application of a pesticide Mospilan© SP 20% with Gazelle (17.2%). On other hand, pesticide Dursban© EC 48% was recorded the lowest value of sucrose % after applied with Ravel and Gazelle cultivars (15.3%).

4.6 Purity percentage

Data obtained from Table (7) between pesticides and cultivars recorded that the highest values of purity percentage resulted by applied Mospilan© SP 20% pesticide with Oscar poly cultivar (81.11%) and then Radiant SC © 12% with Sibel cultivar (81.04%) and finally Radiant SC © 12%with Helsinki cultivar (81.00). However, the data showed the lowest value of purity percentage by spraying Mospilan© SP 20% on MK2134 cultivar (78.88%) than all treatments. There were significant differences between the interaction which the application of pesticides with tested cultivar to study this variable.

CONCLUSION

Helsinki Cultivar was surpassed resistance to tortoise beetle, *Cassida vittata.* In addition, the same cultivar was superiority in most yield attributes such as root, top, and sugar yields and sucrose and purity percentage. As well as Radiant SC © 12% exceed all cultivars when spraying and interaction with seven cultivars in all the attributes except T.S.S. Radiant SC © 12% pesticide was more toxic against tortoise beetle *Cassida vittata* Vill (Larvae and Adults) in two regions through two seasons.

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الملخص العربي

تأثير بعض المبيدات الحشرية وأصناف بنجر السكر والتفاعل بينهما على كثافة تعداد الخنفساء السلحفائية وعلى خصائص بعض الصفات المحصولية فى بنجر السكر فى منطقتى النوبارية ودمنهور

عادل أبو المعاطي أبو الفتوح، إبراهيم محمد عبده جوهر، مجدى سعد صالح، خليل الشناوى محمد

أجريت هذه الدراسة في المزرعة التجريبية بمحطة البحوث الزراعية بالنوبارية ومركز دمنهور (قرية حفص)، فى محافظة البحيرة خلال موسمين متتاليين ٢٠١٠/٢٠١١ و ٢٠١١/ ٢٠١٢ ، وذلك لدراسة حساسية سبعة من اصناف بنجر السكر اربعة أصناف منها وحيدة الأجنة وهي هلسنكي ورافيل م ك ٢١٣٤وسيبل وثلاثة اصناف عديدة الأجنة هي اوسكار بولي وجزال وليلي وهذا للاصابة بالخنفساء السلحفائية *Cassida vittata VILL* وتم أيضاً دراسة الصفات المحصولية لهذه الاصناف، كما تم دراسة تأثير المبيدات الثلاثة (١٢٪، Radiant © SC و٢٠٪ SP Mospilan© و © EC Dursban ٤٨٪) وذلك للحد من تعداد الخنفساء السلحفائية وتأثير هذه المبيدات على خصائص محصول بنجر السكر.

وجد ان التذبذب العددى (يرقات وحشرة كاملة) للخنفساء السلحفائية قد زاد كلما تقدمت النباتات في العمر. في نهاية الموسمين في كلا المنطقتين وجد ان التحليل التجميعي قد اظهر ان الصنف هلسنكي كان اكثر مقاومة للاصابة بخنفساء البنجر السلحفائية وكان الصنف سيبل اكثر الاصناف حساسية للاصابة بالخنفساء كما يمكن ترتيب الاصناف طبقا لمقاومة الاصابة كما يلي: الصنف هلسنكي ثم MK2134 ثم الصنف جزيلا ثم الصنف رافيل ثم الصنف ليلي ثم الصنف اوسكار بولي و اخيرا الصنف سيبل (الأكثر حساسية). بالاضافة لذلك تفوق الصنف هلسنكي في معظم الصفات المحصولية مثل محصول الجذور و الاوراق ومحصول السكر والنسبة المئوية للسكر. كما كان المبيد ١٢٪ Radiant © SC متفوقا علي جميع المبيدات المختبرة وعند تفاعله مع الاصناف المختبرة لكل الصفات ماعدا النسبة المئوية للمواد الصلبة الذائبة الكلية.