

UTILIZATION OF HILL SPACING AND CULTIVARS IN SUPPRESSION THE SUCKING PESTS POPULATION AND ENHANCEMENT THE CUCUMBER YIELD

S.H.H. Hamouda

Plant Protection Dept., Fac. of Agric., Minia Univ.

Abstract: Seeds of four cucumber cultivars were sown at two hill spacing in the Experimental Farm of the Faculty of Agriculture, Minia University during 2004 and 2005 successive growing seasons.

Results showed that, *Thrips tabaci* Lind. and *Tetranychus urticae* Koch were more abundant on plants sown at hill spacing (5 cm). Thrips preferred Beit alpha and Amira II cultivars. However, Sweet crunch was the most favourable cultivar for spider mite infestation. The pronounced treatments that could reduce thrips numbers are sowing of Sweet crunch or Celebrity cultivars at the distance of 10 cm between hills, and Celebrity or Beit alpha cultivars at the same distance for reducing the spider mite infestation. There was an increase in the numbers of the other sucking pests (white fly, aphids, and leafhoppers) on plants cultivated at the distance (5 cm). Meanwhile, Amira II cv. sown alone or Celebrity cv. sown at 10 cm between hills also recorded high infestation.

Regarding the plant age for all cultivars, it is evident that thrips infestation was significantly increased on young plants aged 20-34 days. In contrary, the spider mite and other sucking pests were significantly preferred and abundant on the old cucumber plants aged 62-76 days.

The density relation of the predators i.e. *Coccinella undecimpunctata* L.; *Scymnus interruptus* G.; *Chrysoperla carnea* (Stephens), *Orius* spp. and the true spiders with their preys was positively and significantly during both seasons.

Concerning the cucumber fruit yield, results showed such increase in the plants sown at close distance. The great fruit yield was obtained from Amira II followed by Beit alpha cultivars. The most promising treatment to reduce the sucking pests infestation and increase the cucumber fruit yield was Amira II cultivar sown at wide hill spacing (10 cm). The previous for-mentioned results could be serving as ample guide in IPM programs against sucking pests infestation in cucumber cultivations.

Key words: Spacing, Cultivars, Pests, Cucumber yield.

Introduction

Cucumber (*Cucumis sativus* L.) is one of the most popular vegetable crop in Egypt. Nowadays, it is grown all over the year either in the plastic houses or outside in the fields. However, cucumber as one of the cucurbit vegetable is severely attacked by certain sucking pests such as thrips, aphids, whiteflies, leafhoppers and spider mites (Attia and El-Hamaky, 1984-1985; Darshan *et al.*, 1986; Johnson *et al.*, 1988; Aly and Gharib, 1989; Hegab *et al.*, 1989; Lorine and Dunicr, 1990; Hamouda, 1993; Honder *et al.*, 1993; Ahmed, 1994; El-Sayed, 1997 and Rizk *et al.*, 2004). These pests cause serious damage by sucking the plant sap and reduce the leaf nitrogen and chlorophyll contents, consequently reduce the photosynthesis capacity, plant growth and yield (Hassanein *et al.*, 1994; Metwally *et al.*, 1995 and Golam, 2002).

In the last few years, several problems have appeared as a result of the extensive and unwise usage of pesticides against sucking pests in vegetable fields. Recently, the announcement has increased, towards establishing integrated pest management system (IPM) which requires mainly good knowledge about the crop ecosystem. Therefore, the present study aimed to investigate the effect of cultivating four different cucumber cultivars sown at two hill spacing

and their interactions on the population density of these pests and its reflection on the cucumber yield. Also, the relative densities of sucking pests in relation to plant age and predators occurrence were included under the field conditions of Minia region.

Materials and Methods

The present study was conducted during 2004 and 2005 growing seasons at the Research Farm of the Faculty of Agriculture, Minia University. Pre-germinated seeds of four cucumber cultivars, i.e. "Amira II", "Celebrity", "Sweet crunch" and "Beit alpha" were sown on 15th of April in both growing seasons. Seeds were sown within row plants spacing, i.e. 5 and 10 cm apart. Treatments were arranged in a split-plot system in complete randomized blocks design with three replications. The area of each replicate contained 4 rows, 3 m long and 1.2 m wide. Plant spacing were arranged at random in the main plots and cultivars were randomly distributed in the sub plots.

The normal recommended agricultural practices were applied and chemical treatment was entirely avoided. Samples were taken weekly, as soon as, the newly vegetative growth completely appeared above the ground (10 days after sowing) till the end of both growing seasons (2nd July). Thirty leaves (ten/replicate) were randomly inspected in site. The whitefly and

thrips adults, aphids and leafhopper adults and nymphs were directly and visually counted in the morning before sunrise (Southwood, 1978).

Then after, the same 30 leaves were collected and kept in paper bags for further laboratory inspection by the aid of stereoscopic microscope searching for the presence of eggs and moving stages of the spider mites and other stages of whitefly and thrips (Karaman *et al.*, 1984 and Habashy and Saweer, 2005). Meanwhile, numbers of any predators stages found associated with the previously mentioned pests were also detected and recorded.

Cucumber fruits were collected twice every week and extended one month/season. The fruits weights were determined and the average yield/ 3.6 m² were calculated.

All obtained data were subjected to the statistical analysis using (F), L.S.D., Qui-square, simple correlation and regression tests according to Gomez and Gomez (1984).

Results and Discussion

I. Effect of hill spacing of cucumber cultivars on the population density of *Thrips tabaci* Lind.:

Data summarized in Table (1) represent the population density of the onion thrips, *T. tabaci* infesting four cucumber cultivars cultivated at two hill spacing during 2004 and 2005 growing seasons.

The results indicated that, the hill spacing insignificantly affected the thrips numbers during 2004 season, however, during 2005 season, the pest densities were significantly varied (17.6 and 12.1 individ. / leaf for 5 and 10 cm of hill spacing). In previous studies, Al-Shannaf (1994) found that the differences between the numbers of *T. tabaci* on cotton plants cultivated at three spaces were only significant in the second season. Also, El-Sayed (1997) stated that the plant distance significantly affected the thrips density on garlic plants, wholly in agreement with the present findings.

The susceptibility of the four cucumber cultivars to *T. tabaci* infestation varied during the two successive seasons. Regardless the hill spacing effect and based on the overall mean numbers, the Beit alpha cultivar harboured 16.9 individ./leaf followed by Amira II cultivar (15.7 individ./leaf), while thrips density did not exceeded 12.9 individ./leaf. on Celebrity and Sweet crunch cultivars. These results reflected that, thrips were infested and preferred Beit alpha plants and this may be due to its leaf juiciness and softness. In this respect, Arif *et al.* (2006) reported that all cotton genotypes significantly differed in their responses toward thrips, as well as, in all morphological plant traits. They added that the length of hair on midrib of upper leaves, midrib and lamina of middle leaves

and midrib veins and lamina of significant role in relation to thrips bottom leaves played a negative and population.

Table(1): Effect of hill spacing of cucumber cultivars on the population density of the onion thrips, *Thrips tabaci* in Minia region during two successive growing seasons of 2004 and 2005.

Treatment	Avg. No. of individ./leaf						Overall mean for both seasons
	2004			2005			
	Min.	Max.	Mean \pm SE	Min.	Max.	Mean \pm SE	
Hill spacing (a)							
5 cm.	11.9	17.1	14.0 \pm 0.5	10.1	26.2	17.6 \pm 1.4	15.8
10 cm.	11.2	21.6	14.6 \pm 0.9	7.2	20.1	12.1 \pm 1.1	13.4
Cultivars (b)							
Sweet crunch	13.2	15.9	14.1 \pm 0.4	7.2	18.8	11.4 \pm 1.6	12.8
Amira II	11.2	21.6	14.8 \pm 1.7	11.0	23.7	16.6 \pm 1.7	15.7
Beit alpha	11.8	17.1	15.0 \pm 0.8	12.5	26.2	18.8 \pm 2.1	16.9
Celebrity	11.5	15.3	13.3 \pm 0.6	7.8	16.9	12.4 \pm 1.4	12.9
Hill spacing X Cultivar (ab)							
5 cm * Sweet crunch	13.8	15.9	14.8 \pm 0.6	10.1	18.8	13.6 \pm 2.7	14.2
5 cm * Amira II	11.9	12.9	12.5 \pm 0.3	16.7	23.7	19.2 \pm 2.3	15.9
5 cm * Beit alpha	14.2	17.1	15.6 \pm 0.8	19.6	26.2	22.4 \pm 2.0	19.0
5 cm * Celebrity	12.5	14.4	13.2 \pm 0.6	12.4	16.9	15.1 \pm 1.4	14.2
10 cm * Sweet crunch	13.2	13.7	13.5 \pm 0.2	7.2	11.6	9.2 \pm 1.3	11.4
10 cm * Amira II	11.2	21.6	17.1 \pm 3.1	11.0	17.2	14.1 \pm 1.8	15.6
10 cm * Beit alpha	11.8	16.0	14.3 \pm 1.3	12.5	20.1	15.3 \pm 2.4	14.8
10 cm * Celebrity	11.5	15.3	13.3 \pm 1.1	7.8	11.3	9.8 \pm 1.0	11.6
L.S.D. 0.05	a: 1.4	b: 1.9	ab: 2.7	a: 1.0	b: 1.5	ab: 2.1	

Regarding the interaction between hill spacing via cucumber cultivars, statistical analysis revealed significant differences in both seasons. Based on the overall means for the two growing seasons, it is clearly obvious that, the highest thrips number was 19.0 individ/leaf occurred on Beit alpha cultivar planted at 5 cm hill spacing, while Sweet crunch and Celebrity cultivars planted at 10 cm hill spacing harboured the lowest numbers of thrips (11.4 and 11.6 individ./leaf, respectively). These results were

similar with those reported on thrips infestation on garlic plants (El-Sayed, 1997); roselle plants (Fouad *et al.*, 2000) and black cumin and coriander plants (Hamouda *et al.*, 2001).

II. Effect of hill spacing of cucumber cultivars on the population density of *Tetranychus urticae* Koch:

The average numbers of the two spotted spider mite were summarized in Table (2). Results indicated that the mite population

density was more abundant on the cucumber plants cultivated at the narrow distance (5 cm) during 2004 and 2005 seasons (55.0 and 72.5 individ./leaf, respectively). However, the mean numbers mite were significantly decreased in plants sown at wide plant distance (32.0 and 41.9 individ./leaf, in both seasons). Statistical analysis showed significant differences between the tested hill spacing in both seasons. These results are in agreement with those obtained by Metwally *et al.* (2005), who found that *Tetranychus* spp. infesting guar and peppermint plants significantly varied according to the sowing spaces in both growing seasons.

Concerning the cucumber cultivars, data in Table (2) clearly showed that, the tested cultivars were liable to be infested with the two spotted-spider mite at both hill spacing of planting during the two experimental seasons. Sweet crunch cultivar harboured the highest mite numbers with slight differences in both 2004 and 2005 growing seasons. The lowest population density of *T. urticae* was recorded on Beit alpha and Celebrity cultivars in both seasons. Values of L.S.D. revealed significant difference among the susceptibility of cucumber cultivars to mites infestation.

Table(2): Effect of hill spacing of cucumber cultivars on the population density of the two spotted spider mite, *Tetranychus urticae* in Minia region during two successive growing seasons of 2004 and 2005.

Treatment	Avg. No. of individ./leaf						Overall mean for both seasons
	2004			2005			
	Min.	Max.	Mean ± SE	Min.	Max.	Mean ± SE	
Hill spacing (a)							
5 cm.	20.1	121.6	55.0 ± 10.0	27.5	116.7	72.5 ± 7.9	63.8
10 cm.	12.7	71.9	32.0 ± 5.0	24.9	73.3	41.9 ± 4.1	37.0
Cultivars (b)							
Sweet crunch	40.1	121.6	79.4 ± 13.0	28.3	116.7	79.6 ± 14.2	79.5
Amira II	28.9	68.0	47.9 ± 7.4	31.2	95.2	61.2 ± 9.6	54.6
Beit alpha	12.7	32.1	23.7 ± 2.9	32.2	60.5	49.6 ± 3.9	36.7
Celebrity	16.4	29.3	23.7 ± 2.2	24.9	66.5	38.4 ± 6.4	31.1
Hill spacing X Cultivar (ab)							
5 cm * Sweet crunch	74.7	121.6	102.8 ± 14.3	91.1	116.7	107.5 ± 8.2	105.2
5 cm * Amira II	61.6	68.0	64.0 ± 2.0	64.3	95.2	79.5 ± 8.9	71.8
5 cm * Beit alpha	26.5	32.1	29.1 ± 1.6	52.5	60.5	56.0 ± 2.4	42.6
5 cm * Celebrity	20.1	28.1	25.2 ± 2.6	27.5	66.5	47.0 ± 11.3	36.1
10 cm * Sweet crunch	40.1	71.9	55.9 ± 9.2	28.3	73.3	51.8 ± 13.0	53.9
10 cm * Amira II	28.9	36.2	31.7 ± 2.3	31.2	54.8	42.9 ± 6.8	37.3
10 cm * Beit alpha	12.7	24.1	18.3 ± 3.3	32.6	50.6	43.2 ± 5.4	30.8
10 cm * Celebrity	16.4	29.3	22.1 ± 3.8	24.9	33.9	29.9 ± 2.6	26.0
L.S.D. 0.05	a: 8.5	b: 12.0	ab: 17.0	a: 9.4	b: 13.3	ab: 18.7	

The interaction between hill spacing and cucumber cultivars was significantly affected the mite density during the two growing seasons. The highest mean numbers of spider mite was observed on Sweet crunch cultivar planted at the narrow hill space (5 cm) in both experimental seasons. Meanwhile, Celebrity and Beit alpha cultivars planted at the wide hill space (10 cm) were the least preferable cultivars to *T. urticae* infestation. These results disagree with those obtained by Ahmed (1994), who reported that Sweet crunch Fiti Sakata cucumber variety was most resistant to *T. urticae*. The author suggested that the resistance might be attributed to the low protein and amino acid contents of leaves which provided a less nutritive diet for the mite. On the other hand, the present findings agree with that reported by Van den Boom *et al.* (2003), who mentioned that the spider mite, *T. urticae* did not accept all plants to the same degree because of differences in nutritive and toxic constituents. They added that other factors such as the induction of secondary metabolites, the morphology of the leaf surface and the presence of natural enemies, might play an important role in plant acceptance.

III. Effect of hill spacing of cucumber cultivars on the population density of the other sucking pests:

Table (3) presents the mean numbers of the other sucking pests namely; the melon aphid, *Aphis gossypii* (Glover), the white fly, *Bemisia tabaci* (Gennadius) and the leafhoppers, *Empoasca* spp. during 2004 and 2005 growing seasons. The obtained results showed that these insects were appeared on cucumber in low density if compared with the other cucumber key pests (thrips and mite) during both experimental seasons. The mean numbers of these sucking insects were significantly increased on cucumber plants sown at close hill space than that inspected at the wide one. In this respect, similar results were obtained by Aly and Hassan (1990), who mentioned that the numbers of *A. gossypii* were increased on Sweet melon plants sown at close hill spacing.

Statistical analysis of the mean numbers of the other sucking insects occurred on the four cucumber cultivars indicated that there was no significant differences during both seasons, except significant reduction was obtained with Celebrity cultivar during 2005 season.

Table(3): Effect of hill spacing of cucumber cultivars on the population density of other sucking pests in Minia region during two successive growing seasons of 2004 and 2005.

Treatment	Avg. No. of individ./leaf						Overall mean for both seasons
	2004			2005			
	Min.	Max.	Mean \pm SE	Min.	Max.	Mean \pm SE	
Hill spacing (a)							
5 cm.	0.6	2.1	1.2 \pm 0.1	1.5	4.4	3.1 \pm 0.3	2.2
10 cm.	0.7	3.1	1.4 \pm 0.2	0.8	2.8	1.8 \pm 0.2	1.6
Cultivars (b)							
Sweet crunch	0.9	2.1	1.5 \pm 0.5	1.0	4.4	2.7 \pm 0.5	2.1
Amira II	0.6	3.1	1.5 \pm 0.4	1.9	4.1	3.0 \pm 0.4	2.3
Beit alpha	0.7	2.1	1.0 \pm 0.2	0.8	4.0	2.6 \pm 0.5	1.8
Celebrity	0.8	1.3	1.0 \pm 0.2	1.0	2.7	1.7 \pm 0.2	1.4
Hill spacing X Cultivar (ab)							
5 cm * Sweet crunch	0.9	1.8	1.4 \pm 0.3	1.9	4.4	3.4 \pm 0.8	2.4
5 cm * Amira II	0.6	1.2	0.9 \pm 0.2	3.6	4.1	3.8 \pm 0.2	2.4
5 cm * Beit alpha	0.7	2.1	1.3 \pm 0.4	1.9	4.0	3.3 \pm 0.7	2.3
5 cm * Celebrity	0.8	1.1	1.0 \pm 0.1	1.5	2.7	2.0 \pm 0.4	1.5
10 cm * Sweet crunch	0.9	2.1	1.6 \pm 0.4	1.0	2.5	2.0 \pm 0.5	1.8
10 cm * Amira II	1.2	3.1	2.0 \pm 0.6	1.9	2.4	2.2 \pm 0.2	2.1
10 cm * Beit alpha	0.7	0.8	0.7 \pm 0.03	0.8	2.8	1.8 \pm 0.6	1.3
10 cm * Celebrity	1.0	1.3	1.1 \pm 0.1	1.0	1.5	1.3 \pm 0.9	1.2
L.S.D. 0.05	a: 0.4	b: 0.6	ab: 0.9	a: 0.3	b: 0.4	ab: 0.6	

As for the effect of interaction between hill spacing and cucumber cultivars on the densities of the other sucking insects, all tested cucumber cultivars planted at 10 cm hill spacing were harboured the lowest numbers of the other sucking insects especially Celebrity cultivar that sown at 10 cm plant distance. The present results are in harmony with those obtained by Metwally *et al.* (2005), who found that *B. tabaci* infesting guar plants significantly varied according to the sowing spaces in both seasons whereas, *A. gossypii* differently responded and varied from one season to another.

E. lybica insignificantly influenced by changing sowing spaces. Moreover, El-Sayed (1997) reported that the interaction between planting distance and garlic variety had no significant effect on the population density of *T. tabaci* infesting garlic plants.

IV. Intensity rate of certain sucking pests infesting four cucumber cultivars in relation to the plants age:

Results in Table (4) exhibited the intensity rate of sucking pests in relation to plant age of certain cucumber cultivars. It is obvious

Table(4): Intensity rate of certain sucking pests in relation to the plant age of four cucumber cultivars in Minia region during 2004 and 2005 growing seasons.

Plant age (days)	Avg. No. of individ./leaf infesting different cucumber cultivars															
	Sweet crunch				Amira II				Beit alpha				Celebrity			
	2004	2005	Overall mean	%Intensity rate	2004	2005	Overall mean	%Intensity rate	2004	2005	Overall mean	%Intensity rate	2004	2005	Overall mean	%Intensity rate
	<i>Thrips tabaci</i>															
20-34	26.7	15.1	20.9	53.7 a	28.8	15.9	22.4	47.5 a	28.1	18.2	23.2	45.7 a	25.2	9.8	17.5	45.3 a
41.55	10.7	8.8	9.8	25.2 b	9.8	12.3	11.1	23.5 b	10.1	16.4	13.3	26.2 b	8.5	14.2	11.4	29.5 b
62-76	6.1	10.3	8.2	21.1 b	5.7	21.7	13.7	29.0 b	6.6	21.9	14.3	28.1 b	6.1	13.3	9.7	25.2 b
	<i>Tetranychus urticae</i>															
20-34	0.1	0.2	0.2	0.1 b	0.4	0.1	0.3	0.2 b	0.1	0.1	0.1	0.1 b	0.1	0.1	0.1	0.1 b
41.55	4.6	3.4	4.0	1.7 b	3.3	3.3	3.3	2.0 b	2.6	1.3	2.0	1.3 b	3.5	1.5	2.5	2.6 b
62-76	223.4	235.4	234.4	98.2 a	140.0	180.1	160.1	97.8 a	164.7	147.6	156.2	98.7 a	71.8	113.8	92.8	97.3 a
	<i>Other sucking pests</i>															
20-34	0.9	2.0	1.5	23.8 b	0.6	2.1	1.4	20.6 b	0.5	1.1	0.5	10.9 c	0.3	0.2	0.3	7.3 c
41.55	0.5	2.0	1.3	20.6 b	0.3	2.5	1.4	20.6 b	0.7	2.8	1.2	26.1 b	0.6	1.5	1.1	26.8 b
62-76	2.9	4.1	3.5	55.6 a	3.6	4.4	4.0	58.8 a	1.9	3.8	2.9	63.0 a	2.1	3.3	2.7	65.9 a

% Intensity rate in each column for each pest and cultivar marked by different letter are significant at 0.05 (Qui-squar test).

that *T. tabaci* is preferring the young cucumber plants aged 20-32 days, where the overall mean number ranged between 17.5-23.2 individ./leaf on all cultivars throughout the studying periods. In contrast, *T. urticae* was highly infested the old cucumber plants aged 62-76 days and showed mean numbers of 234.4 individ./leaf on Sweet crunch cultivar. The other sucking pests (whitefly, aphids and leafhoppers) were also prevailed on all plants of the tested cultivars.

Statistical analysis showed significant increase in the intensity rate percentages of *T. urticae* (45.3 - 57.3 %) on all cultivar plants aged 20 - 34 days as compared with plants aged over 41 days (% intensity rate not exceeded 25.2%). Opposite infestation behaviour was detected with *T. urticae* and other sucking insects, where their intensity rate % were significantly increased on plants aged 62-76 days of all cucumber cultivars during both seasons (92.8-98.7% and 58.8-65.9%, respectively). In general, cucumber plants were highly infested with *T. urticae* during one month post sowing and the great prevalence of *T. urticae* appeared after two months of cultivation. These results could serve as a guide for the control of these pests. In this respect, Johnson *et al.* (1988) mentioned that the leaf position and plant age of potatoes affect the

population density of *Empoasca fabae*. Also, Aly and Gharib (1989) stated that the whitefly population density was decreased with an increase of squash plant age and may be due to mainly the amount and quality of sap embedded by this sucking pest at certain age of the plants. Moreover, Abdel-Alim (1994) reported that *Empoasca* spp. and *Aphis craccivora* showed their maximum numbers on cowpea aged 56-98 days.

Relationship between sucking pests and their predators:

Field observations showed that *Coccinella undecimpunctata* L.; *Scymnus interruptus* G.; *Chrysoperla carnea* (Stephens), *Orius* spp. and the true spiders were the most common predators recorded on the different cucumber cultivars during 2004 and 2005 growing seasons.

Data in Table (5) indicated the average numbers/week of these predators were 2.91 individ./leaf during 2005 season. Meanwhile, this density was decreased during 2004 season (0.93 individ./leaf) and coincided with their preys density. Statistical analysis showed significant positive correlation coefficient values between the total sucking pests and their associated predators ($r = +0.8510$ and 0.9728 during 2004 and 2005 seasons, respectively).

Table(5): Relationship between total sucking pests and their associated predators on cucumber plants during two growing seasons of 2004 and 2005.

Sampling date		Avg./ No. of individuals/leaf				Overall mean for both seasons	
Month	week	2004		2005		Pest	Predator
May	1 st	75.91	1.35	19.98	0.36	47.95	0.86
	2 nd	64.97	0.68	42.09	0.95	53.53	0.82
	3 rd	26.01	0.54	34.61	0.64	30.33	0.59
	4 th	19.25	0.30	23.13	0.46	21.19	0.38
June	1 st	27.41	0.57	28.00	0.56	27.71	0.57
	2 nd	36.11	0.57	58.34	1.00	44.73	0.79
	3 rd	88.95	0.85	126.83	2.54	107.89	1.70
	4 th	303.16	1.93	345.22	6.76	324.19	4.35
July	1 st	424.97	1.62	657.19	12.88	546.08	7.25
Average		118.53	0.93	148.94	2.91	133.73	1.92
		"r" = 0.8510		"r" = 0.9728			
		"by.x" = 0.0033		"by.x" = 0.0188			
		Significant at 0.01 probability level					

In general, the total predators were slightly abundant on cucumber plants during the experimental periods, except somewhat abundance was observed during the last week of June and the first week of July during 2005 season (6.76-12.88 individ./leaf). Regression coefficient values, reflected that an increase of pest density by one individ./leaf leads to an increase the predator numbers by 0.003 and 0.018 individ./leaf. during 2004 and 2005 seasons. Similar findings were obtained by Aly and Gharib (1989) on squash plants. Also, Hamouda *et al.* (2001) found positive and significant relationships between predators and sucking insects infesting black cumin and coriander plants.

Cucumber fruit yield:

Results in Table (6) summarized the fruit yield of the four cucumber cultivars sown at the two different hill spacing and their interactions during 2004 and 2005 seasons. The wide plant distance (10 cm) showed such increase in the fruit weight parallel with the decrease of total sucking pest numbers during both seasons.

Concerning the cucumber cultivars, results clearly obvious that Amira II cultivar was the most pronounced one which yielded 21.9 - 19.5 kg fruits / 3.6 m² followed by Beit alpha cultivar (18.6 - 19.5 kg fruits / 3.6 m²). However, Sweet crunch cultivar suffered more infestation by the sucking pests (93.7-95 individ./leaf) and yielded 15.7-16.5 kg/ replicate.

Regarding the effect of interaction between cucumber cultivars and hill spacing, results showed that Amira II cultivar sown at wide distance gave the highest fruit yield 23.5-24.4 kg/replicate followed by Beit alpha cultivar sown

at close distance (5 cm). It could be noticed that several cucumber cultivars exhibit rapid plant growth that provided some tolerant against pest infestation and consequently did not affect their yield.

Table(6): Effect of hill spacing of cucumber cultivars on the total number of sucking pests infesting the plants and its reflection on the yield during 2004 and 2005 growing seasons.

Treatment	2004		2005			
	Total sucking pests	Avg. yield	Total sucking pests	Avg. yield		
	No. individ. / leaf	Kg / replicate (3.6 m ²)	No. individ. / leaf	Kg / replicate (3.6 m ²)		
Hill spacing (a)						
5 cm.	70.2	17.4	93.2	18.2		
10 cm.	48.0	18.2	55.8	19.0		
Cultivars (b)						
Sweet crunch	95.0	15.7	93.7	16.5		
Amira II	64.2	21.9	80.0	22.8		
Beit alpha	39.7	18.6	71.0	19.5		
Celebrity	38.0	14.9	52.5	15.7		
Hill spacing X Cultivar (ab)						
5 cm * Sweet crunch	119.0	15.9	124.5	16.7 cd		
5 cm * Amira II	77.4	20.3	102.5	21.1 ab		
5 cm * Beit alpha	46.0	21.4	81.7	22.3 ab		
5 cm * Celebrity	39.4	11.8	64.1	12.7 de		
10 cm * Sweet crunch	71.0	15.5	63.0	16.3 cde		
10 cm * Amira II	50.8	23.5	59.2	24.4 a		
10 cm * Beit alpha	33.3	15.8	60.3	16.7 cd		
10 cm * Celebrity	36.5	17.9	41.0	18.7 bc		
L.S.D. 0.05	a: 0.9	b: 3.4	ab: 5.2	a: 1.2	b: 3.2	ab: 4.9

Similar results were reported by Aly and Hassan (1990), who mentioned that the fruit weight of sweet melon was increased on plants sown at wider hill spacing (30 cm).

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استخدام المسافات بين الجور والأصناف في السيطرة على مجموع الآفات الثاقبة الماصة وزيادة محصول الخيار

سيد حسن حسين حمودة

قسم وقاية النبات - كلية الزراعة - جامعة المنيا

أجرى هذا البحث لدراسة تأثير المسافات بين الجور (٥ سم، ١٠ سم) وأربعة أصناف من الخيار (سويت كراتش، أميرة II، بيتا ألفا، سليبريتي) على الإصابة بالآفات الثاقبة الماصة وذلك بالمزرعة التجريبية بكلية الزراعة جامعة المنيا خلال موسمين متتاليين هما ٢٠٠٤ و ٢٠٠٥م.

أوضحت النتائج المتحصل عليها أن تربية البصل وأكاروس العنكبوت الأحمر كانا أكثر الآفات الثاقبة الماصة تواجداً على النباتات التي زرعت على مسافة ٥ سم. وقد كان صنف أميرة II وبيتا ألفا هي أكثر الأصناف تفضيلاً بالنسبة للإصابة بالتربس، في حين كان صنف سويت كراتش هو الصنف المفضل للإصابة بأكاروس العنكبوت الأحمر.

أظهرت النتائج أيضاً أن زراعة صنف سويت كراتش أو صنف سليبريتي على مسافة ١٠ سم بين الجور هي المعاملة الأفضل لخفض تعداد التربس، بينما زراعة صنف سليبريتي أو صنف بيتا ألفا على نفس المسافة قد أدت إلى خفض الإصابة بالأكاروس. كما سجلت النتائج زيادة أعداد الحشرات الثاقبة الماصة الأخرى (الذبابة البيضاء، المن، نطاطات الأوراق) على النباتات التي زرعت على المسافة القريبة (٥ سم). بينما زراعة صنف أميرة II على أي من المسافتين أو صنف سليبريتي على مسافة ١٠ سم قد أدى إلى ارتفاع الإصابة بهذه المجموعة من الحشرات.

فيما يتعلق بعمر النبات لكل الأصناف المختبرة، كان من الواضح أن الإصابة بالتربس قد زادت بطريقة معنوية على النباتات الصغيرة والتي تراوح عمرها بين ٢٠-٣٤ يوم. على العكس من ذلك بالنسبة لأكاروس العنكبوت الأحمر والحشرات الثاقبة الماصة الأخرى والتي فضلت وتواجدت بكثافات معنوية على نباتات الخيار الكبيرة العمر (٦٢ - ٧٦ يوم).

كما أشارت النتائج إلى أن العلاقة بين الكثافة العددية للمفترسات المصاحبة (أبو العيد ١١ نقطة، أبو العيد البني، أسد المن، بق الأوريس وبعض أنواع العناكب الحقيقية) وفرانسها كانت علاقة مؤكدة وموجبة خلال موسمي الدراسة.

بالنسبة لمحصول الخيار، سجلت النتائج المتحصل عليها زيادة المحصول بالنسبة للنباتات التي زرعت على المسافة القريبة (٥ سم).

وقد تم الحصول على أعلى محصول من الثمار عند زراعة صنف أميرة II ثم تلاها صنف بيتا ألفا. وقد كانت أكثر المعاملات تأثيراً في خفض الإصابة بالآفات الثاقبة الماصة وزيادة محصول الخيار هو زراعة صنف أميرة II على مسافة ١٠ سم بين الجور.

وتعتبر النتائج المتحصل عليها ذات أهمية عند وضع برامج مكافحة متكاملة لمكافحة الآفات الثاقبة الماصة في زراعات الخيار خلال هذه الفترة من العام.