BIOSCIENCES BIOTECHNOLOGY RESEARCH ASIA, December 2019. Vol. **16**(4), p. 811-815

Susceptibility of Certain Cucumber Hybrids (Cucumis Sativus L.) Through Different Planting Dates for Main Pest Infestation Under Field Conditions

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http://dx.doi.org/10.13005/bbra/2798

(Received: 06 December 2019; accepted: 23 December 2019)

The present study was carried out in experimental farm of the Plant Protection Research Institute, Qaha, Qalyubiya Governorate during Nile seasons. The study was carried out to evaluate the susceptibility of three cucumber hybrids, Hayel, Ashrak and Bahi, to infestation rate of main destructive pests during two successive seasons 2015 and 2016, whitefly, Bemisia tabaci (Genn.) and Tetranychus urticae. The statistical analysis of the mean number showed significant differences during the two seasons. During the second season hybrids showed significant differentiation. The hybrids (Bahi and Hayel) recorded highest mean number of B. tabaci, followed by hybrid Ashrak with lowest mean number of B. tabaci. The seasonal abundance of the movable stage T. urticae was higher during 2016 than 2015. The statistical analysis of the mean number of movable stage of T. urticae showed significant differentiation for the two successive seasons. On the other hand, population fluctuation of movable stage of T. urticae for the three tested hybrids showed significant differences in the both seasons during three sowing plantation dates indicated significant too.

Keywords: Ashrek; Bahi; Cucumber Cultivars; Hayel; Nili Cultivations; Red Spider Mite; White Fly Nymphs.

Cucumber (Cucumis sativus L.) is one of the most important vegetable crops grown in Egypt and cultivated in both open field and greenhouse. Cucumber plant is one of the annual plants of the Cucurbitaceous family. Cucumber is source of vitamins A, C, K, and B6, potassium, pantothenic acid, magnesium, phosphorus, copper and manganese1. The cultivated area was increased especially for exportation. The production of cucumber was 11,750 tons from the cultivated area of 1,726 Egyptian feddans (1 feddan = 4,200 square meters).

Cucumber plants were subjected to infestation by many pests which reduce productivity and quality such as: the whitefly, Bemisia tabaci Genn., the aphid, Aphis craccivora Koch, the thrips, Thrips tabaci Lindquist, the leaf miner, Liriomyza trifolii (Burgess), in addition to the two spotted red spider mite, Tetranychus urticae Koch.

In Egypt, whitefly, Bemisia tabaci (Genn.) and the two spotted red spider mite Tetranychus urticae are the main economically important pest on cucumber (Cucumis sativus L.). These pests are commonly encountered as serious pests of various

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crops both in the open field and greenhouses[2, 3]. Causing direct and indirect damage[4]. Direct damage start-ups by sucking plant sap from the plant foliage, while indirect damage is due to the accumulation of honeydew that is considered as a good medium for sooty mould growth, and play as vector of plant viruses, a few numbers of these pests is sufficient to cause considerable damage[5]. However, intensive use of synthetic insecticides to control insect pests had led to many problems such as pest resistance and resurgence, adverse effects on non-target organisms including humans, natural enemies and negative environmental impacts.

Many investigators were studied the effect of planting dates on the infestation with certain pests on different crops5. The aim of the present study is to test the susceptibility of three hybrids of cucumber cultivated in three different date on the infestation by each of whitefly and red spider mite.

MATERIALS AND METHODS

This work was conducted in the experimental farm of the Plant Protection Research Institute, Qaha town (30°17' N, 31° 12' E), Qalyubiya Governorate, Egypt, during the nili (Nile planting season) plantation seasons of 2015 and 2016. The experiment was designed in a randomized complete block design. All the experimental plots received the normal agricultural practices for cucumber plants.

Cucumber seeds were cultivated in an area of about 1000 m² by the three hybrids Hayel, Ashrak and Bahi. The area of each hybrid was 111 m2 divided into 3 replicates and sown in the three different planting dates at 15 days intervals; July, 21st; August, 5th (normal planting date) and August, 19th. Population study of the pests started after emergence of seedlings 15 days continued until the end of the season. Each sample consisted of 15 leaves picked randomly from each replicate representing the three plant levels, upper, middle and lower. Samples were put in a paper bag and transferred to the laboratory to be examined by the aid of stereomicroscope in the same day for examination and identification, in order to study the seasonal abundance of the most destructive pests, Bemisia tabaci Genn. (nymphs), and Tetranychus urticae Koch (egg and movable stages). The statistical analyses of the present data were carried out using SAS computer program6 including F-test and LSD value at p=0.05.

RESULTS AND DISCUSSION

Susceptibility of different cucumber hybrids, under different planting dates

One of the efficient control strategy and ecological acceptable tactic is searching for the resistant cultivars could passes different physiological or morphological characters which may play a role in plant defence. The present study was carried out to evaluate the susceptibility of three cucumber hybrids: Hayel, Ashrak and Bahi, to infestation rate of the main destructive cucumber pests during two successive growing seasons 2015 and 2016 at Qaha region, Qalyubiya Governorate.

Susceptibility of cultivars of cucumber for infestation by Bimisia tabaci nymphs during 2015 and 2016 growing seasons

Data in Table (1) represent the mean weekly numbers of B. tabaci in the field on three different cucumber hybrids (Hayel, Ashrak and Bahi) during two successive seasons 2015 and 2016 and three planting dates. The mean number of the nymph pests for the three tested hybrids were insignificant during the first season 2015. On the other hand, the three planting dates gave statistical significant differences, the first planting date recorded the highest mean of the B. tabaci population, while during the second season 2016, there were highly significant difference between the three hybrids for the mean number of B. tabaci, when Hayel and Bahi recorded high mean of B. tabaci population. As for the plant dates the third planting date gave a high population of the pest.

Data revealed that the mean number nymphs of B. tabaci were higher during 2016 (240.74 individual/180 leaves) than 2015 (58.17 individual/180 leaves), irrespective of planting dates and hybrids. The statistical analysis of the mean number B. tabaci nymphs showed significant difference (F value = 7.15, LSD is 38.7) for the two successive seasons. On the other hand, population fluctuation of B. tabaci individuals on the three tested hybrids were not significant (F value = 1.09) during the first season, but in the second season was significant (F value = 2.67 LSD is 30.8). The hybrids (Hayel and Bahi) recorded highest mean

Table 1. Mean number of the white fly, *Bemisiatabaci*, on the three hybrids of cucumber plants *Cucumissativus* L. sown on three planting dates during 2015 and 2016 seasons, (LSD at $P \leq 0.05$).

Date	First Season (2015)						Second Season (2016)					
	Hayel	Ashrek	Bahi	Mean	F-value	LSD	Hayel	Ashrek	Bahi	Mean	F-value	LSD
First	33.50	22.58	29.92	28.67[a]	4.21*	11.39	56.33	40.33	47.16	47.94[c]	7.58*	35.89
Second	11.50	20.67	18.50	16.89[b]			52.83	46.33	101.50	66.87[b]		
Third	3.00	10.83	24.50	12.61[b]			145.75	85.58	146.42	125.91[a]		
Mean	16.00	18.02	24.14				84.97[a]	57.41[b]	98.36[a]			
F-value		ns						2.67*				
LSD		1.09						30.80				
Between years			Mean	F-value	LSD							
		2015	58.17[b]	7.15*	38.70							
		2016	240.74[a]									

Table 2. Mean number of the movable stage of the red spider mite, *Tetranychusurticae*Koch, on the three hybrids of cucumber plants *Cucumissativus* L. sown on three planting dates during 2015 and 2016 seasons, (LSD at $P \leq 0.05$)

Date	First Season (2015)						Second Season (2016)					
	Hayel	Ashrek	Bahi	Mean	F-value	LSD	Hayel	Ashrek	Bahi	Mean	F-value	LSD
First	5.00	10.42	6.33	7.25	ns	-	6.00	2.08	7.17	5.08[b]	2.10	7.31
Second	3.33	6.92	1.42	3.89			1.92	8.25	8.08	6.08[b]		
Third	2.83	7.92	6.67	5.81			4.67	30.75	4.17	13.19[a]		
Mean	3.72[b]	8.42[a]	4.81[ab]				4.19[b]	13.69[a]	6.47[b]			
F-value		3.38*						3.63*				
LSD		4.1						5.75				
Between years			Mean	F-value	LSD							
		2015	16.95[b]	7.22	3.11							
		2016	24.35[a]									

number of B. tabaci (98.36 and 84.97 nymphs/180 leaves), Ashrak harbored the lowest mean number of B. tabaci (57.41 nymphs/180 leaves). Three sowing plantation dates indicated highly significant (F value = 4.21 and 7.58, L.S.D. 11.39 and 35.89, respectively) for two successive seasons. Results in Table (1), revealed that the population density of B. tabaci nymphs on cucumber plants differed significantly according to the sowing date during the two successive seasons 2015 and 2016. In the first season, the population density of B. tabaci nymphs increased by delaying sowing date (July; 21st, August; 5th and 19th). The cucumber plants were significantly sown in the earliest planting date (July, 21st) received highest mean numbers of B. tabaci (28.67 nymphs/180 leaves) on the contrary, the plants of the third and second sowing dates (August; 5th and 19th) showed lowest mean number of B. tabaci (12.61 and 16.89 nymphs/ 180 leaves), respectively. In the second season, 2016, the population density of B. tabaci nymphs during the first planting date gave the lowest mean numbers of B. tabaci (47.94 nymphs/180 leaves) on the contrary, the plants at the third sowing dates (August 19th) reached highest mean number of B. tabaci (125.91/180 leaves) and the second sowing date recorded moderate mean number of infestation (66.87 nymphs/180 leaves).

These results agree with other results7, which found that heaviest population of B. tabaci on squash was recorded on plants of the latest planting, while the lowest infestation occurred in the 1stplanting date. Other investigation8, indicated that there were significant differences between the different planting dates on the infestation by B. tabaci during nili (Nile) season 2005/2006. In such studies[9, 10, 11, 12], were found that the infestation by B. tabaci occurred on autumn cucumber in September, and increased to reach the high level of population in October and November, and then declined towards the end of cucumber growing season. Also, other studies[7, 13, 14, 15], concluded that the different planting dates during year had effect on the development of numerous pests including B. tabaci, as in the present study.

Susceptibility of cultivars of cucumber for infestation by Tetranycus uriticae movable stage during 2015 and 2016 growing seasons

Data presented in Table (2), the seasonal abundance of the movable stage T. urticae were higher during 2016 (24.35 movable stage/180 leaves) than 2015 (16.93 movable stage/180 leaves), irrespective of planting dates and hybrids. The statistical analysis of the mean number of movable stage T. urticae showed significant differentiation (F value = 7.22, L.S.D = 3.11) for two successive seasons. On the other hand, population fluctuation of movable stage T. urticae on the three tested hybrids showed significant differentiation in the both seasons (F value = 3.38 and 3.63, L.S.D 4.1 and 5.75, respectively). Three sowing plantation dates indicated significant (F value =3.36 and 2.60, L.S.D. 1.17 and 8.17, respectively) in the both seasons.

In the first season, the population density of movable stage T. urticae increased by delaying sowing date (July; 21st, August; 5th and 19th). The cucumber plants were insignificantly in the first season. While in the second season, the data indicated significantly the third sowing date august 5th highest mean numbers of infested (13.19 movable stage/180 leaves) on the contrary, followed by second sowing date August 19th (6.08 movable stage/180 leaves)and the earliest planting date (July, 21st) was the lowest mean number (5.08 movable stage/180 leaves), respectively.

In Egypt the highest mean abundance of T urticae movable stage was observed on cucumber leaves of Thamin variety[16], followed by leaves of Prince and Super-Delila varieties. Also, cucumber varieties that had more quantity of total protein were more susceptible to T urticae moving stages infestation than resistant varieties[16].

CONCLUSION

Based on the results obtained, it was concluded that the infestation rate of both white fly nymphs and the red spider mite movable stage was higher in the second year of cultivation than the first one. Regarding planting dates, it was found that high infestation rate of each of whitefly nymphs and movable stage of the red spider mite, were recorded in the first and third planting dates, while the second planting (the normal one) infestation was low. The Ashrek cultivar of cucumber has high infestation rate by whitefly nymphs and movable stage of the red spider mite, in the first season of cultivation, while the Bahi cultivar has high infestation by whitefly nymphs in the second season.

ACKNOWLEDGMENT

The writer would thank all participants and their parents.

REFERENCES

1. Vimala, P.; C.C. Ting; H. Salbiah; B. Ibrahim and L. Ismail. Biomass production and nutrient yields of four green manures and their effects on the yield of cucumber. *Journal of Tropical Agric and Food Science*, 1999; **27**: 47-55.
2. Roll, D. (2004). Greenhouse Pest Control Study Guide.Oct 2004 – Ohio Department of Agriculture – Pesticide Regulation – Certification and Training Section, 74 pp.
3. Alston, D. (2007). Insect Pests in Greenhouse and Nursery Crops.Utah State University Extension Utah Green Conference January 22, 2007, 55 PP.
4. Berlinger M.J. Host plant resistance to Bemisiatabaci. *Agric. Ecosystems Enveiro.* 1986; **17**:69-82.
5. Hanafy, A. R. I.; Baiomy, F. and Tantawy, M. A. M. Comparison between the infestation rate of certain pests on cucumber and kidney bean and its relation with abiotic factors and anatomical characters. *Egyptian Academic J. of Biological Sci.,* 2014; **7**(2): 63- 76.
6. SAS Institute. SAS version 9.1.SAS Institute Inc, Cary, NC, USA 1999.
7. Mohamed, Mona A. Effect of planting dates on infestation with certain pests and yield parameters of squash plants." *Egyp. J. Agric. Res.,* 2011; **89**(4): 1353-1362.
8. Abd El-Gawad A. Samia (2008) Study of integrated pest management on some pests of common bean plant. PhD. Thesis, Fac. of Sci. (girls) of Al-Azhar Univ., 409pp.
9. Ali, F. A. Integrated pest management of some sucking insects attacking cucumber plants under protected cultivation in Egypt. *J. Agric. Sci. Mansoura Univ.,* 1993; **18**(6): 1867-1877.
10. El-Khayat, E. F., El-Sayed, A. M., Shalaby, F. F. and Hady, S.A. Infestation rates with *Bemisiatabaci* (Genn) to different summer and winter vegetable crop plants. *Annals of Agricultural Science Moshtohor,* 1994; **32**(1): 577-594.
11. Zaki, F. N., M. F. El-Shaarawy and N. A. Farag. Population of aphids, whiteflies and associated predators and parasites on different vegetables cultivated in plastic greenhouses. *J. Pest Science,* 2002; **75**: 128-131.
12. Esmail, S.S.G. (2013). Performance of some control elements for sap-sucking insect pests under protected cultivation. M.Sc. Thesis, Fca. of Agri., Ain Shams Univ 130 pp.
13. Seham, S. El. G.; K. M. Adam and M. A. Bachatly. Effect of the planting date of tomato on the population density of *Bemisiatabaci*(Genn.) and *Heliothisarmigera* (Hb.), viral infection and yield. J. Agric. Sci., Ain-Shams Univ., Cairo, 1997; **5**(1): 135-144.
14. Emam, A. Z., M. F. A. H. Hegab and M. A. M. Tantawy. Effect of planting space and date on the population densities of certain insect pests infesting sweet pea plants at Qalyoubia Governorate. *Annl. Agric. Sci. Moshtohor,* 2006; **44**(1): 299-308.
15. Shaalan, H. S. Effect of planting dates on infestation with certain pests and yield of cucumber plants during fall plantation in giza Governorate. Egypt. *Acad. J. Biolog. Sci.,* 2016; **9**(2): 23– 31.
16. Ahmed, M. A. Differences in susceptibility of six cucumber cultivars to infestation by *Aphis gossypii*Glov.,*Tetranychusurticae* and *Bemisiatabaci* as correlated to protein and amino acid contents of leaves. *Annals of Agricultural Science, Moshtohor,* 1994; **32**(4):2189-2194.