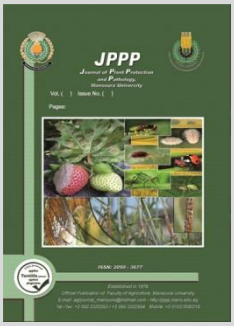
Journal of Plant Protection and Pathology

Journal homepage: www.jppp.mans.edu.eg
Available online at: www.jppp.journals.ekb.eg

Influence of Different Cucumber Varieties on the Occurrence of the Piercing-Sucking Insect Pests in Fayoum Governorate

Awadalla, S. S.[1*]; Hala A. K. El-Serfi[1]; M. A. El-Hariry[2] and A. M. Wahsh[2]

[1] Economic Entomology Department, Faculty of Agriculture, Mansoura University, Egypt
[2] Plant Protection Research Institute, Agricultural Research Center, Giza, Egypt



ABSTRACT

The present experiments were conducted in a private cucumber field in Ibshwai, Fayoum governorate during the two successive years (2018 and 2019) to examine the influence of different cucumber varieties on the occurrence of the piercing-sucking insect pests in Fayoum governorate. Cucumber variety Reda F1 hybrid followed by variety Sweet Cransh F1 hybrid attracted the highest average number of the cotton aphid *Aphis gossypii* followed by the cotton whitefly *Bemisia tabaci*, the leafhopper *Empoasca decedens*, the green peach aphid *Myzus persicae* and the potato leafhopper *Empoasca decipiens* during the two years 2018 and 2019. Cucumber variety Hayel F1 hybrid followed variety Mayadine F1 hybrid hosted the lowest average number of the aforementioned insect pests during the two years. Cucumber variety Hayel F1 hybrid followed by Mayadine F1 hybrid, Reda F1 hybrid and Sweet Cransh F1 hybrid hosted the lowest average number of the green sting bug *Nezara viridula* followed by the cotton mealybug *Planococcus solenopsis* and the onion thrips *Thrips tabaci* during the two years. Cucumber variety Hayel F1 hybrid had the lowest rate of occurrence (23.3 and 23.5 %) followed by Mayadine F1 hybrid (24.6 and 23.9 %) during the two years 2018 and 2019, respectively.

Keywords: aphid, leafhopper, whitefly, hybrid, occurrence

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the cucurbit vegetable crops which consider the most important vegetable crops in Egypt and cultivated in a large area in sandy and reclaimed lands. The piercing-sucking insect pests which attacking cucumber crop such as aphid species, *Aphis gossypii* and *Myzus persicae*, the leafhopper species, *Empoasca decipiens* and *E. decedens*, the cotton whitefly *Bemisia tabaci*, the cotton thrips *Thrips tabaci*, the cotton mealybug *Phenococcus solenopsis*, and the green sting bug *Nezera viridula* (Foda, 2001; Abou- El-Saad, 2006; Abd El-Hady *et al*., 2014; and El-Mesawy, 2018). These insect pests caused economic damage either directly by sucking the juice of plants or indirectly by transmitted the plant viral diseases (Salehi *et al*., 2007; Fereres and Moreno, 2009; Refaei *et al*., 2016).

The host plant and host varieties affect the insect pest populations especially the piercing-sucking insects. The surface of the plant shape is a framework in which a number of insect live, feeding and reproducing. Leaf surface containing hairs which may be impeded the insects from walking, where a smooth plant leaf surface make the insects lose the control and fall on the plant. Also, thickness and length of the leaf veins affected on the oviposition behaviour of the piercing-sucking insects (Sharma and Singh, 2002). Moreover, Bayoumy *et al*. (2017) suggested that the morphological characters as trichome density, thickness and length and chemical constituents as total protein, total carbohydrates and N.P.K elements effected on the population density of the piercing-sucking insects on eggplant, squash, and common beans. Also, Fargalla *et al*. (2019) found that the morphological diversity of the leaf surface and the phytochemical compositions effects on the population abundance and the preference behaviour of the leafhopper and planthopper species on eggplant, tomato and pepper plants. The average number of the main piercing-sucking insect pests attacking cucumber varieties increased gradually by increasing the protein and carbohydrate values and decreasing with pH values and the homopterous insect infestations were correlated with the chemical constituents of their host plants (Awadalla *et al*., 2014; Hegab, 2017).

Therefore, the present experiments aim to influence of various cucumber varieties on the occurrence of the piercing-sucking insect pests in Fayoum governorate.

MATERIALS AND METHODS

The present experiments were conducted in a private cucumber field in Ibshwai, Fayoum governorate during the two successive years (2018 and 2019) to influence of various cucumber varieties on the occurrence of the piercing-sucking insect pests in Fayoum governorate.

These experiments were carried out in an area of about 800 m^2. This area was divided to 16 plots or replicates (each plot was about 50 m^2). Four cucumber cultivars namely Hayel F1 hybrid, Mayadine F1 hybrid, Reda F1 hybrid and Sweet Cransh F1 hybrid were chosen. Each variety seeds were sown in four plots or replicates which were arranged in Completely Randomized Design. All agricultural practices were conducted and the insecticide treatments were rejected. Samples took place after two weeks from sowing date and contained until the end of the cucumber sowing date.

To evaluate the influence of different cucumber varieties on the population abundance of the main piercing-sucking insect pests, samples were taken weekly by the two sampling methods (leaf sample and sweeping net) which previously described. Then, the collected insect pests were transferred to the laboratory in polyethylene bags for identification and counting.

* **Corresponding author.**
E-mail address: awadalla28@yahoo.com
DOI: 10.21608/jppp.2020.133258

A leaf sample of twenty-five leaves was randomly chosen from each plot after two weeks from plantation. A total of 100 leaves were picked weekly for the four replicates and transferred in closed plastic bags with a cotton piece saturated by either to anesthetize the collected insect pest. The bags were transferred in the same day to the laboratory for investigation by a stereo-binocular microscope. The target insect pests estimated by the leaf sample method were the aphids in all stages, the cotton whitefly in immature stages, the cotton thirps in nymphal stage, the cotton mealybug in all stages. The insect pests were identified and counted weekly.

The sweep net was used after two weeks from sowing the cucumber. For each plot or replicate, 25 double strokes were taken from the two diagonal directions (100 double strokes for each weekly sample). The collected sample were transferred in a polyethylene sacs contained a cotton piece saturated by either to anesthetized the collected insect pests. The polyethylene sacs were taken to the laboratory to identify and count the catches by stereo-binocular microscope. The target insect pests estimated by the sweeping net method were the leafhopper species in adult stage and the green sting bug in nymphal and adult stages.

The obtained results were analyzed using one-way ANOVA (CoStata software) and means of the insect pest populations were compared using Duncan's Multiple Range Test (Duncan 1955). Further, the simple correlation coefficient between the population density of the insect pests and temperature and relative humidity during each season of the two successive seasons were determined.

RESULTS AND DISCUSSION

Data illustrated in Table (1) show the average number of the major piercing-sucking insect pests infesting the various cucumber varieties during the first year 2018 in Fayoum governorate. Results revealed that cucumber variety Reda F1 hybrid and variety Sweet Cransh F1 hybrid attracted the highest average number of the cotton aphid *A. gossypii* (493.2 ± 89.16 and 489.4 ±99.64 aphids/sample) followed by the cotton whitefly *B. tabaci* (432.6 ± 98.36 and 422.3 ± 99.81 individuals/sample), the leafhopper *E. decedens* (181.2 ±39.42 and 188.5 ±39.64 jassids), the green peach aphid *M. persicae* (176.3 ± 29.17 and 168.4 ± 31.35 aphids) and the potato leafhopper *E. decipiens* (136.2 ± 33.12 and 132.7 ± 31.69 jassids/sample) with non-significant differences during the two years, respectively. Meanwhile, cucumber variety Hayel F1 hybrid and variety Mayadine F1 hybrid hosted the lowest average number of the aforementioned insect pests with significant or non-significant differences. On the other hand, cucumber variety Hayel F1 hybrid followed by Mayadine F1 hybrid, Reda F1 hybrid and Sweet Cransh F1 hybrid harbored the lowest average number of the green sting bug *N. viridula* followed by the cotton mealybug *P. solenopsis* and the onion thrips *T. tabaci* during the second year with non-significant differences.

The results arranged in Table (2) show the average number of the major piercing-sucking insect pests that infest the various cucumber varieties during the second year 2019 in Fayoum governorate. Results revealed that cucumber variety Redo F1 hybrid and variety Sweet Cransh F1 hybrid attracted the highest average number of the cotton aphid *A. gossypii* (643.7 ± 107.42 and 635.8 ± 101.13 aphids/sample) followed by the cotton whitefly *B. tabaci* (499.2 ± 116.87 and 482.3 ± 114.72 individuals), the green peach aphid *M. persicae* (194.4 ± 31.33 and 187.9 ± 29.69 aphids), the leafhopper *E. decedens* (159.7 ± 33.61 and 154.9 ± 31.55 jassids) and the potato leafhopper *E. decipiens* (119.3 ± 32.81 and 115.6 ± 32.15 jassids/sample) with non-significant differences during the two years, respectively. While, cucumber variety Hayel F1 hybrid and variety Mayadine F1 hybrid hosted the lowest average number of the aforementioned insect pests, with non-significant differences. On the other hand, cucumber variety Hayel F1 hybrid followed by variety Mayadine F1 hybrid, Reda F1 hybrid and Sweet Cransh F1 hybrid harbored the lowest average number of the green sting bug *N. viridula* followed by the cotton mealybug *P. solenopsis* and the onion thrips *T. tabaci* during the second year with non-significant differences.

Table 1. The average number of the major piercing-sucking insect pests of the various cucumber varieties during the first year (2018) in Fayoum governorate.

Insect Pests	Cucumber variety			
	Hayel F1 hybrid	Reda F1 hybrid	Mayadine F1 hybrid	Sweet Cransh F1 hybrid
A. gossypii	446.7 ± 86.13 b	493.2 ± 89.16 a	486.4 ± 92.29 a	489.4 ± 99.64 a
M. persicae	146.3 ± 28.35 b	176.3 ± 29.17 a	152.5 ± 26.73 ab	168.4 ± 31.35 a
B. tabaci	374.2 ± 92.22 c	432.6 ± 98.36 a	396.7 ± 99.57 b	422.3 ± 99.81 ab
T. tabaci	118.5 ± 19.97 a	122.6 ± 19.81 a	121.1 ± 21.62 a	121.7 ± 20.73 a
P. solenopsis	50.4 ± 11.96 a	53.7 ± 11.22 a	51.3 ± 12.91 a	53.9 ± 12.05 a
E. decipiens	121.1 ± 30.54 b	136.2 ± 33.12 a	127.4 ± 31.34 ab	132.7 ± 31.69 a
E. decedens	162.9 ± 36.46 b	181.2 ± 39.42 a	167.3 ± 37.13 ab	188.5 ± 39.64 a
N. viridula	33.5 ± 08.29 a	35.6 ± 09.21 a	31.6 ± 08.72 a	34.9 ± 08.35 a

According to the various cucumber varieties, the average number for each insect in a raw followed by the same letters are not-significantly different at 5% probability level.

Table 2. The average number of the major piercing-sucking insect pests of the various cucumber varieties during the second year (2019) in Fayoum governorate.

Insect Pests	Cucumber variety			
	Hayel F1 hybrid	Reda F1 hybrid	Mayadine F1 hybrid	Sweet Cransh F1 hybrid
A. gossypii	575.2 ± 102.64 b	643.7 ± 107.42 a	577.6 ± 102.37 b	635.8 ± 101.13 a
M. persicae	151.1 ± 24.49 b	194.4 ± 31.33 a	159.7 ± 25.14 ab	187.9 ± 29.69 a
B. tabaci	447.2 ± 111.81 b	499.2 ± 116.87 a	456.5 ± 112.92 ab	482.3 ± 114.72 a
T. tabaci	79.6 ± 18.97 a	86.3 ± 18.79 a	77.3 ± 16.13 a	84.9 ± 20.43 a
P. solenopsis	69.5 ± 15.00 a	74.1 ± 16.34 a	70.4 ± 17.51 a	72.6 ± 16.39 a
E. decipiens	106.4 ± 28.89 b	119.3 ± 32.81 a	109.1 ± 30.72 b	115.6 ± 32.15 a
E. decedens	137.8 ± 32.79 b	159.7 ± 33.61 a	139.4 ± 32.96 b	154.9 ± 31.55 a
N. viridula	25.7 ± 06.90 a	27.2 ± 08.41 a	25.9 ± 7.93 a	26.3 ± 07.84 a

As shown in Fig. (1) the occurrence rate for the target insects under study on the various cucumber varieties during the two years (2018 and 2019) in Fayoum governorate. The occurrence rate was the highest for the total insect pests under study on Reda F1 hybrid (26.2 and 26.6 %) followed by Sweet cransh F1 hybrid (25.9 and 26.0 %) during the first and second

year, respectively. Meanwhile, cucumber variety Hayel F1 hybrid had the lowest rate of occurrence (23.3 and 23.5 %) followed by Mayadine F1 hybrid (24.6 and 23.9 %) during the first and second year, respectively.

According to the various cucumber varieties, the average number for each insect in a raw followed by the same letters are not-significantly different at 5% probability level.

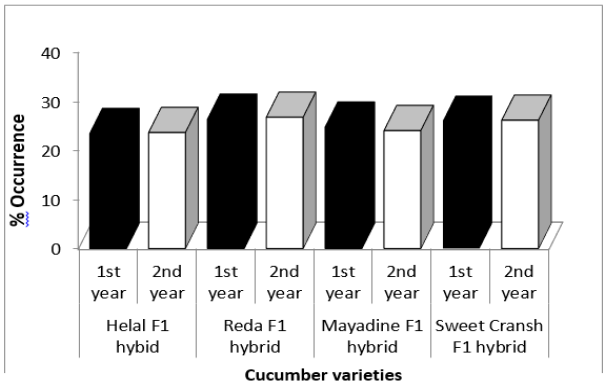


Fig. 1. The Occurrence rate for the major piercing-sucking insect pests on varying cucumber varieties during the first (2018) and second (2019) years in Fayoum governorate.

Awadalla *et al*. (2014) mentioned that, the homopterous insect pest infested faba bean were correlated with chemical constituents of the different host plants. Hegab (2017) mentioned that, the average number of the main insect pests infesting cucumber crop were increased gradually by the increasing of the protein and carbohydrate percentages and decreasing pH values of the tested cucumber varieties. It can be noticed that, the cucumber variety Mayadine F1 hybrid attracted the least number of the piercing-sucking insect pests and produced the highest yield quantity while variety Reda F1 hybrid attracted the highest number of the aforementioned insect pests, while variety Hayel F1 hybrid considered a moderately susceptible to the insect pest infestations and it can be recommended to cultivate Mayadine F1 hybrid in Sharkia governorate. Al-Habshy *et al*. (2019) found that, the chemical analysis for broad bean varieties recorded an increase in carbohydrate and protein contents led to an increase of the piercing-sucking insect pest numbers. She added that, an increase of pH values led to decreasing the insect pest numbers during seasons 2016/17 and 2017/18 in Sharkia governorate.

REFERENCES

Abd El-Hady, A. A.; F. A. Shaheen; S. E. Negm; I. H. M. Heikal and D. F. A. Asharm (2014). Efficacy of natural compound on the whitefly *Bemisia tabaci* bioyype "b" (Hemiptera: Aleyrodidae) and its natural enemies of cucumber crop. J. Plant Prot. Path., Mansoura Univ. 5(12): 1161-1176.

Abou- El-Saad, A. K. (2006). Studies on the phytophagous and predaceous mites associated with certain vegetable crops in Minia governorate. Ph.D Thesis, Fac. Agric. Minia Univ., 147 pp.

Al-Habshy, A. Z. N.; A. A. Abd-Elsamed and S. A. A. Amer (2019). Susceptibility of some broad bean plant varieties to the infestation by certain piercing sucking insects, Egypt. J. Plant Prot. Path. Mansoura Univ. 10(9): 443-449.

Awadalla, S. S.; Abdallah, F. E. and El-Mashaly, Nora R. (2014). Population density of main insect pests attacking faba bean plants as influenced by sowing dates. Glob. J. Agric. food safety Sci. l (2): 169-177.

Bayoumy, M. H.; Awadalla, S. S.; El-Gendy, M. A. and El-Lawatay, N. E. (2017). Comparative morphology and chemical composition of plant leaf and their relation with population density of certain piercing- sucking insect pests. J. Plant Prot. and Path., Mansoura Univ., 8 (2): 31-37.

El-Mesawy, Marwa G. E. (2018). Studies on the main insect and mite pests infesting some cucurbit crops and their natural enemies. Ph. D. Thesis, Fac. Agric., Mansoura. Univ., 168pp.

Fargalla, F. H.; S. S. Awadalla, L. A. El-Batran and A. A. El-Shayeb (2019). Effect of the morphological diversity of leaf surface and phytochemical composition on preference behavior of leafhopper and planthoppers on some solanceous crop. J. Plant Prot. Path., Mansoura Univ. 10(12): 573-579.

Fereres A., and Moreno, A. (2009). Behavioural aspects influencing plant virus transmission by homopteran insects. Virus Res 141: 158–168.

Foda, M. E. (2001). Population dynamics, host preference and seasonal distribution patterns of whitefly, *Bemisia tabaci* (Genn.) in middle Egypt. Proceedings Beltwide Cotton Conference, San Antonio, USA 4-8: 1380-1382.

Hegab, M. A. M. (2017). Effect of different varieties of cucumber plant on the attractive of some Homopterous insect pests. J. Plant Prot. Path., Mansoura Univ. 8(12): 641-645.

Refaei, E.A.; E.A. El-Sarand and A.A. Khalifa (2016). Population fluctuation of certain sucking insects and their natural enemies associated with seed watermelon, citrullus lanatus at rasheed region, Beheira governorate, Egypt. Egy. J. Plant Pro. Res. 4 (4): 61-69.

Salehi, M.; K. Izadpanah and M. Siampour (2007). Characterization of a phytoplasma associated with cabbage yellow in Iran. Am. Phytopath. Soc. 91(5): 625-630.

Sharma, A. and R. Singh (2002). Oviposition preference of cotton leafhopper in relation to leaf-vein morphology. J. Appl. Ent. 126: 538-544.

تأثير اصناف الخيار المختلفة علي ظهور الافات الحشرية الثاقبة الماصة في محافظة الفيوم

سمير صالح عوض الله[1]*، هالة احمد كامل الصيرفي[1]، مجدي عبد الحميد الحريري[2] و أحمد محمد وحش[2]

[1] قسم الحشرات الاقتصادية- كلية الزراعة- جامعة المنصورة- مصر

[2] معهد بحوث وقاية النباتات- مركز البحوث الزراعية- الجيزة- مصر

أجريت التجارب الحالية في مزرعة خيار خاصة في مركز أبشواي-محافظة الفيوم وذلك خلال سنتين متتاليتين 2018، 2019 وذلك لتقدير تأثير الأصناف المختلفة من الخيار علي تواجد الآفات الحشرية الثاقبة الماصة في محافظة الفيوم. وجد أن صنف خيار رضا هجين أول يليه صنف خيار سويت كرانش هجين أول جذبت اعلي متوسط تعداد لمن القطن يليه الذبابة البيضاء ونطاط الأوراق *Empoasca decedens* ومن الخوخ الأخضر ونطاط أوراق البطاطس خلال سنتي الدراسة 2018 و 2019 . وجد أن خيار صنف هايل هجين أول يليه صنف خيار مدينة هجين أول جذبت أقل متوسط تعداد للآفات الحشرية السابق ذكرها خلال سنتي الدراسة. وجد أن خيار صنف هايل هجين أول يليه خيار صنف مدينة هجين أول وخيار صنف رضا هجين أول وخيار صنف سويت كرانش هجين أول جذبت اقل متوسط تعداد لحشرة البقة الخضراء يليها بق القطن الدقيقي وتربس البصل خلال سنتي الدراسة. وجد أن خيار صنف هايل هجين أول سجل اقل نسبة تواجد للآفات الحشرية الثاقبة الماصة (23.3 و 23.5 %) يليه خيار صنف مدينة هجين أول (24.6 و 23.9 %) خلال سنتي الدراسة 2018 و 2019 علي التوالي.