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Susceptibility of Cucumber Varieties (Hesham and Newsun) To Three Piercing Sucking Insect Pest Infestations under Greenhouse Conditions.

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Abstract

Cucumber is one of the most wide spreading vegetable crops that grow under greenhouse conditions and attacked by many harmful sucking pests which causing high damage and reduction in yield. This study aimed to determine the susceptibility of two cucumber cultivars to three piercing sucking insect pests, such as; white fly, cotton trips and cotton aphid. This study indicated that there was no significant differences between the mend of infestations with *Bemisia tabaci* . Thrips *tabaci* and *Aphis gossypii* during the two seasons (2016/ 2017 and 2017/2018) of the study on the two cultivars (Hesham and Newsun. Further, the highest mean infestations with *B. tabaci* and *T. tabaci* were recorded during the second season of the study; this means that Hesham var. recorded the highest *B. tabaci* and *T. tabaci* infestations comparing with newsun var. While for *A. gossypii* there was no significant difference between the mean infestations on the two varieties during the two seasons. Overall, results indicated that Hesham var. was less susceptible than Newsun var. against three piercing sucking pests.

Keywords: cucumber – varieties – greenhouse – susceptibility – chemical contents

Introduction

Cucumber (*Cucumis sativus* L. Fam. Cucurbitaceae) is one of the wide spreading vegetable crops that grow under greenhouse conditions worldwide. It is a semi-tropical plant that grows well under warm and humid conditions, with high levels of light. Mediterranean countries prefer implant cucumber because it can be planted two or three times per year **(Tuzel and Leonardi, 2009).** Cucumber plants cultivated in greenhouses in autumn and spring seasons were attacked by many harmful and destructive sap sucking insect and animal pests, which cause qualitative and quantitative reduction in yield **(El-Khayat *et al.* , 2010).**

Piercing sucking pests such as; spider mite, aphids, whitefly, leafhoppers and thrips are widely spread attacking a wide variety of agricultural crops and causing considerable damage, either directly by sucking plant juice or indirectly as vector transmitting plant diseases**.** Vegetable crops are liable to attacking by many insect pests of piercing – sucking mouth parts like white fly (*Bemisia tabaci*), aphid (*Aphis gossypii*) and thrips (*Thrips tabaci*). The protected cultivation system started in Egypt during the 80th of the last decade. Greenhouse area is estimated at present time about 38000 feddan giving high production per unit area, which is usually 10-20 times that of the open field **(Guney and Celik, 1986)**. The protected cultivation types used to produce vegetables and flowers. Plastic covers protect plants from adverse weather condition and increase their resistance to attack **(Benoit and Ceustermans, 1992)** and **(Mohamed, 2001)**.

Many new varieties of cucumber are being introduced by seed companies each year, therefore, variety evaluation is essential in order to recommend these varieties to the industry in Egypt. In particular, varieties that have local adaptability and market acceptance, together with higher yields improved fresh quality and better pest tolerance are needed, **(Ghallab *et al.*, 2011).** But warm and humid conditions are preferred by the sap-sucking insects under greenhouse conditions. The highest population levels force the farmers to use excessive usage of chemicals **(Ghongade and Sangha. 2021)**.

Mansour (2020) reported that whitefly *B. tabaci* and the aphids, *Aphis gossypii*, are highly polyphagous insect pest, infested a wide range of cultivated and wild plants, also reported of 506 plant species from 74 families were infested by the whitefly and cotton aphid infested cucumber plants in the three plant growth stages, seedling, flowering and fruiting. Also**, Ghongade and Sangha (2021)** recorded that *Bemisia tabaci*, is a devastating pest of vegetables, ornamentals, and agricultural crops throughout the tropical and subtropical regions of the world.

The effects of host plant density on the population dynamics of *Bemisia tabaci* and its chemical control were studied in Shanghai, China, in 2008. The results showed that during the growing stage of potato and cucumber, the *B. tabaci* population increased continually. The differences between the population density of adults and fourth instar nymphs during the peak *of B. tabaci* on various planting densities on both potato and cucumber were significant and the order was low density > normal density > high density. Emamectin benzoate and nitenpyram effectively controlled the pest **Hu *et al.*, (2009).**

The aim of this work was to evaluate the susceptibility of different cucumber varieties against three piercing sucking pests and studying the population density of these insects on two verities of cucumber under greenhouse conditions and relationship between phytochemical compounds and anatomy of cucumber leaves and insect infestation.

Materials and Methods

The present work of this study on insect pests attacking cucumber under green house were carried out in regions of El- Shaarawy district, Beheira Governorate during the two successive seasons 2016-2017 and 2017-2018 to evaluate the susceptibility of two different varieties of cucumber for infestation of three main piercing sucking insects.

1. Preparing green house and planting:

1.1. Preparing the soil of the green house for planting:

The soil of the greenhouse were ploughed twice, then it was lined to terraces; each width was approximately 50 cm, this terraces were wetted by water then the fertilizers were dispersed on it and flipped with the soil of the green house. The greenhouse area was 9m. x 45 m. it divided to five lines between each 40 cm on planting and between each plant and the other about 50 cm. After that the water, sports were in dimidiated on lines as long as the planted lines, then the soil of the greenhouse was mulched with a plastic cover (mulching) for sterilization with methyl bromide gas 105 kg for each line and the greenhouse closed for 15 day after sterilization until planting.

The greenhouse planted with two varieties Hesham var. and Newsun var. on November 2016-2017, in the two seasons of cultivation.

Plate (1): Preparing the soil of the greenhouse before planting cucumber plants.

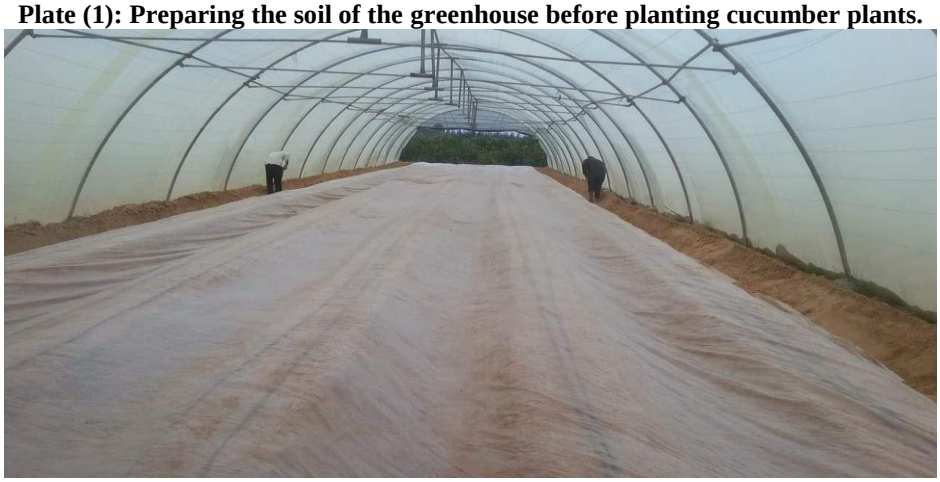


Plate (2): Mulshing of the greenhouse soil for sterilizing it before planting cucumber plants.

1.2. Planting and sapling:

The green house were divided into two isometrically parts the first part were planted with Hesham var., and the second with Newsun var., each part were divided into five treatments (each line was a treatment) each one replicated three times (3 replicates), each replicate planted with 25 cucumber plant (R=25plant), samples were taken randomly from five plants from each replicate . The fifth line was considered the control of the experiment.

Plate (3): Planting of the cucumber seedlings under greenhouse conditions.

3. Susceptibility of the cucumber varieties to infestation by piercing sucking the insect pests under greenhouse conditions.

Two cucumber varieties were chosen and cultivated to determine their susceptibilities to infestation with *Aphis gossypii*, *Thrips tabaci* and *Bemesia tabaci*. The tested varieties were (Hesham and Newsun). All plots received the normal agriculture practices and were kept free from any pesticide treatment. The individual numbers of different insect pests were counted and tabulated to study the susceptibility of two varieties to insect pests.

By the end of the two growing seasons the cucumber production were weighted to reach the best varieties which gave the highest production and lowest infestation by different insect pests.

a. Susceptibility and population density:

Population density of the certain sucking insect pests infesting the two cucumber varieties were carried after two weeks from planting the seedlings on the soil during two successive seasons 2016-17 and 2017-18, then it was carried weekly by direct counting the number of Aphid (*Aphis gossypii)*, thrips (*Thrips tabaci*) and white fly (*Bemisia tabaci*) on plant leaves from the three different levels (3 leaves/plant) as it was the dominated insect pests infested cucumber plants.

b. Percentage of certain phytochemical components in two cucumber varieties leaves and their relation to certain insect pest's infestation.

This study aimed to determine the relationship between the percentages of the different leaves components in the two tested cucumber varieties and their infestation with the studied piercing sucking insect pests during the whole plant growth period. Determination of NPK ratio, carbohydrates, total sugars in case of the two cucumber varieties in relation with pests population and it's relation with layers were carried out as following; leaves samples were collected during the vegetative stages. Leaves of each sample were cleaned and washed with distilled water, then quickly dried by placing gently between filter papers to remove the excess of water. The fresh weight of leaves was determined. The leaves were placed in a drying oven at 60 ºC for one day until constant weight. The dried leaves were crushed by the aid of homogenizer to fine powder and stored in glass bottles to determine carbohydrates and total protein contents according to the methods of **Pregl (1945) and Michel *et al*., (1956).** The percentages of reduced and non-reduced sugars were also estimated in the dry powder using the method of **Forsee (1938).** Also, the phosphorous content was determined according to method of **Troug and Meyer (1939)** and also (nitrogen, potassium and phenols) and also chlorophyll and Enzymes (estrases , phenoloxidase and peroxidase). The chemical analysis was carried out in the central lab of Faculty of agriculture – Moshtohor for the two considered varieties.

c. Anatomical characters of two cucumber cultivar leaves and their effect on infestation rate with certain insect pests.

This experiment was conducted to explain the relative susceptibility of the previous two cucumber varieties to infestation with aphids, whitefly and thrips according to the changes in their histological characters. Samples of each cultivar leaves were picked up and fixed in FAA solution. Permanent transverse sections for the leaves of the different cultivars were done according to **Jackson (1976).** Upper epidermal cuticle thickness, Lower epidermal cuticle thickness, Upper epidermal thickness, Lower epidermal cuticle thickness, No. of palisade tissue layers, Palisade tissue thickness, No. of spongy tissue layers, Spongy tissue thickness, Thickness of collenchyma layers below the upper epidermis at midrib, Thickness of upper fibers in vascular bundle, Thickness of lower fibers in vascular bundle,

Thickness of xylem in vascular bundle and Thickness of widest xylem vessel.

Results and Discussions

This study aimed to estimate the susceptibility of two cucumber variety (Hesham and Newsun) to white fly, thrips and cotton aphid infestation during two successive seasons 2016/17 and 2017/18 under greenhouse conditions at Beheira governorate.

a. Density of three insect pests on cucumber varieties

1- ***Bemisia tabaci:***

Data recorded in (**Table, 1**) and graphically illustrated in (**Fig.1**) compare between the infestations level with *B. tabaci* of the tested varieties.

Data in indicated the population density of *B. tabaci* individuals during two seasons 2016/17 and 2017/18. These data reveled that there are no significant differences of the means of *B. tabaci* population were recorded on Hesham and Newsun varieties with seasonal means 8.44 and 8.10 individuals/plant, respectively. In the subsequent season 2017/18, the results took the same trend as in the first season, as there was no significant difference between the infestation on the two varieties Hesham and Newsun with means (10.29 and 9.88 individuals/plant), respectively. Results in the same Table and **Fig., (1)** illustrated that the higher mean population infestations with *B. tabaci* were recorded during the second season 2017/18, being, (10.29 and 9.88 individuals/plant, respectively, for the two cucumber varieties, Hesham and Newsun) than that recorded on the 1st season 2016/17 on the same varieties with means 8.44 and 8.10 individuals/plant. The seasonal averages of white fly individuals counted in 2016/17 and 2017/18 were 9.37 and 8.99, respectively, for the two tested varieties, that indicated that the mean of infestation with *B. tabaci* was slightly higher on Hesham var. than Newsun var.

Table 1. Susceptibility of two cucumber varieties to infestation with *B. tabaci* during 2016-2017 and 2017-2018 seasons in Beheira**,** governorate**.**

Month	Inspection date	Mean number of insects					
		1st season		2nd season		Mean of two season	
		Hesham	Newsun	Hesham	Newsun	Hesham	Newsun
Nov.	21	0.00	0.00	0.00	0.00	0.00	0.00
	28	0.00	0.00	0.00	0.00	0.00	0.00
Dec.	5	1.67	2.00	1.55	2.40	1.61	2.20
	12	4.33	6.00	12.00	12.00	8.17	9.00
	19	3.00	2.33	8.33	7.67	5.67	5.00
	26	9.33	10.33	9.00	8.33	9.17	9.33
Jun.	3	10.33	10.67	8.33	7.67	9.33	9.17
	10	11.66	10.00	9.00	8.33	10.33	9.17
	17	10.00	10.33	10.33	9.33	10.17	9.83
	24	10.00	8.33	10.67	10.67	10.34	9.50
Feb.	2	10.67	11.67	10.33	12.67	10.50	12.17
	9	11.00	10.33	14.00	13.00	12.50	11.67
	16	13.33	14.33	19.00	13.67	16.17	14.00
	23	9.00	8.67	14.00	12.33	11.50	10.50
Mar.	1	10.33	9.00	12.67	12.67	11.50	10.84
	8	14.00	11.00	13.00	16.33	13.50	13.67
	15	11.67	12.00	13.33	14.33	12.50	13.17
	22	10.00	9.00	14.33	12.67	12.17	10.84
	29	10.00	7.83	15.67	13.67	12.84	10.75
Mean		8.44^{A}	8.10^{A}	10.29^{A}	9.88^{A}	9.37^{A}	8.99^{A}
F		0.062		0.066		0.071	
LSD at 0.05		2.26		2.63		2.33	

A & B: There is no significant difference (P>0.05) between any two means, within the same row have the same superscript letter.

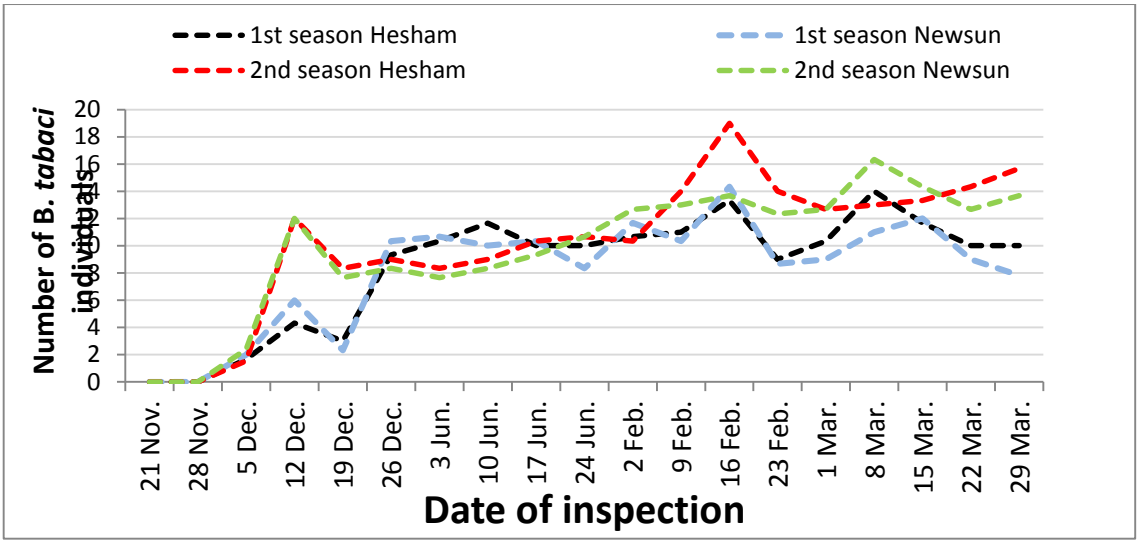


Figure (1): ***B. tabaci*** infestation during two seasons on two cucumber varieties under greenhouse conditions.

2- *Thrips tabaci* :

Data recorded in (**Table, 2**) and illustrated in (**Fig.2**) show the comparison between the infestations with *T. tabaci* on the two tested cucumber varieties. These data indicated the population density of *T. tabaci* individuals during the two seasons 2016/17 and 2017/18, as there was no significant difference between the infestation with *T. tabaci* on Hesham and Newsun varieties with seasonal means 8.58 and 7.75 individuals/plant, for the first season, respectively. While for the subsequent season 2017/18, the results took the same trend as in the first season, with no significant difference between the infestation on the two varieties Hesham and Newsun with means (12.77 and 11.52 individuals/plant), respectively. Generally with comparing between means of infestation it is clear that Hesham var. was higher infested than Newsun Var. during the two successive seasons of the study.

Further, data illustrated in **Fig., (2)** indicated that the higher mean infestations were recorded during the second season 2017/18, being, (12.77 and 11.52 respectively, for the two cucumber varieties/ 5 plants) than that recorded on the 1st season 2016/17 on the same varieties with means 8.58 and 7.75 individuals/5 plants.

The seasonal averages of thrips individuals counted in 2016/17 and 2017/18 were 10.68 and 9.64 individuals/5 plants, respectively, for the two tested varieties and that indicated that Hesham var. was slightly higher infested than Newsun with no significant difference.

Table 2. Susceptibility of two cucumber varieties to infestation with *Thrips tabaci* during 2016/17 and 2017/18 seasons in Beheira**.**

Month	Inspection date	1st season		2nd season		Mean of two season	
		Hesham	Newsun	Hesham	Newsun	Hesham	Newsun
Nov.	21	0.00	0.00	0.00	0.00	0.00	0.00
	28	0.00	0.00	0.00	0.00	0.00	0.00
Dec.	5	1.67	2.33	1.67	2.33	1.67	2.33
	12	4.33	6.67	6.00	7.33	5.17	7.00
	19	2.67	2.33	8.67	8.00	5.67	5.17
	26	11.67	10.00	10.33	9.33	11.00	9.67
Jun.	3	8.00	7.00	12.33	11.67	10.17	9.34
	10	11.67	10.00	13.00	12.00	12.34	11.00
	17	11.33	11.67	14.67	13.00	13.00	12.34
	24	13.33	11.67	14.67	11.67	14.00	11.67
Feb.	2	12.00	10.33	9.33	9.00	10.67	9.67
	9	10.00	9.67	12.00	11.00	11.00	10.34
	16	11.67	9.67	15.67	15.00	13.67	12.34
	23	6.00	8.00	19.66	15.33	12.83	11.67
Mar.	1	4.00	2.00	18.00	16.00	11.00	9.00
	8	8.00	13.33	19.66	19.33	13.83	16.33
	15	17.33	11.67	21.33	18.33	19.33	15.00
	22	16.33	9.33	22.00	19.00	19.17	14.17
	29	13.00	11.67	23.66	20.50	18.33	16.09
Mean		8.58^{A}	7.75^{A}	12.77^{A}	11.52^{A}	10.68^{A}	9.64^{A}
F		0.277		0.330		0.354	
LSD at 0.05		2.57		3.59		2.87	

A & B: There is no significant difference (P>0.05) between any two means, within the same row have the same superscript letter.

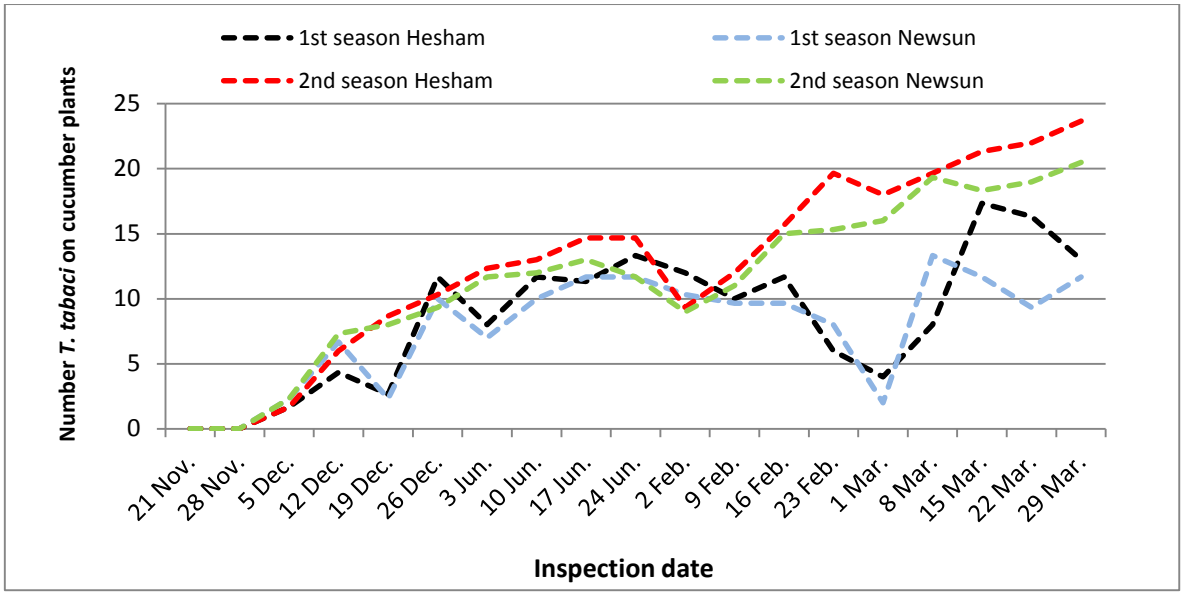


Figure (2):*Thirps tabaci* infestations during two seasons on two cucumber varieties under greenhouse conditions.

3- *Aphis gossypii* :

Data recorded in (**Table, 3**) and illustrated in (**Fig. 3**) compare between the infestations level with *Aphis gossypii* on the two tested varieties Hesham and Newsun. Data indicated that population density of *A. gossypii* individuals during the two seasons 2016/17 and 2017/18, was no significant difference between the infestation with *A. gossypii* on Hesham and Newsun varieties with seasonal means 3.18 and 3.33 individuals/5 plant, for the first season, respectively. Also, for the 2nd season, 2017/18, the results took the same path as in the first season, as there was no significant difference between the infestation on the two varieties Hesham and Newsun with means (3.70 and 3.00 individuals/5 plant), respectively.

While with comparing between means of infestation it is clear that Hesham var. was higher than Newsun Var. during the two successive seasons of the study. Also, data illustrated in **Fig., (2)** indicated that the higher mean infestations were recorded during the second season 2017/18 on Hesham Var., being, (3.70 individuals/5 plants), while the 1st season infestation was higher on Newsun (3.33 individuals/5 plants) .

The seasonal averages of cotton aphid individuals counted in 2016/17 and 2017/18 were 3.44 and 3.17, respectively, for the two tested varieties. The previous results indicated that there was no difference between infestations recorded on the two cucumber varieties during the two seasons of the study.

Table 3. Susceptibility of two cucumber varieties to infestation with *A. gossypii* during 2016/17 and 2017/18 seasons in Buheira **.**

Month	Inspection date	Mean number of insects					
		1st season		2nd season		Mean of two season	
		Hesham	Newsun	Hesham	Newsun	Hesham	Newsun
Feb.	2	0.00	0.00	0.00	0.00	0.00	0.00
	9	0.00	0.00	0.00	0.00	0.00	0.00
	16	1.33	3.00	2.33	2.67	1.83	2.84
	23	1.33	2.66	3.33	3.00	2.33	2.83
Mar.	1	3.67	2.00	3.33	3.33	3.50	2.67
	8	6.33	6.67	4.67	3.67	5.50	5.17
	15	6.33	7.00	8.00	4.00	7.17	5.50
	22	5.33	5.33	5.33	5.00	5.33	5.17
	29	4.33	3.33	6.33	5.33	5.33	4.33
Mean		3.18^{A}	3.33^{A}	3.70^{A}	3.00^{A}	3.44^{A}	3.17^{A}
F		0.015		0.405		0.062	
LSD at 0.05		1.43		1.30		1.31	

A & B: There is no significant difference (P>0.05) between any two means, within the same row have the same superscript letter.

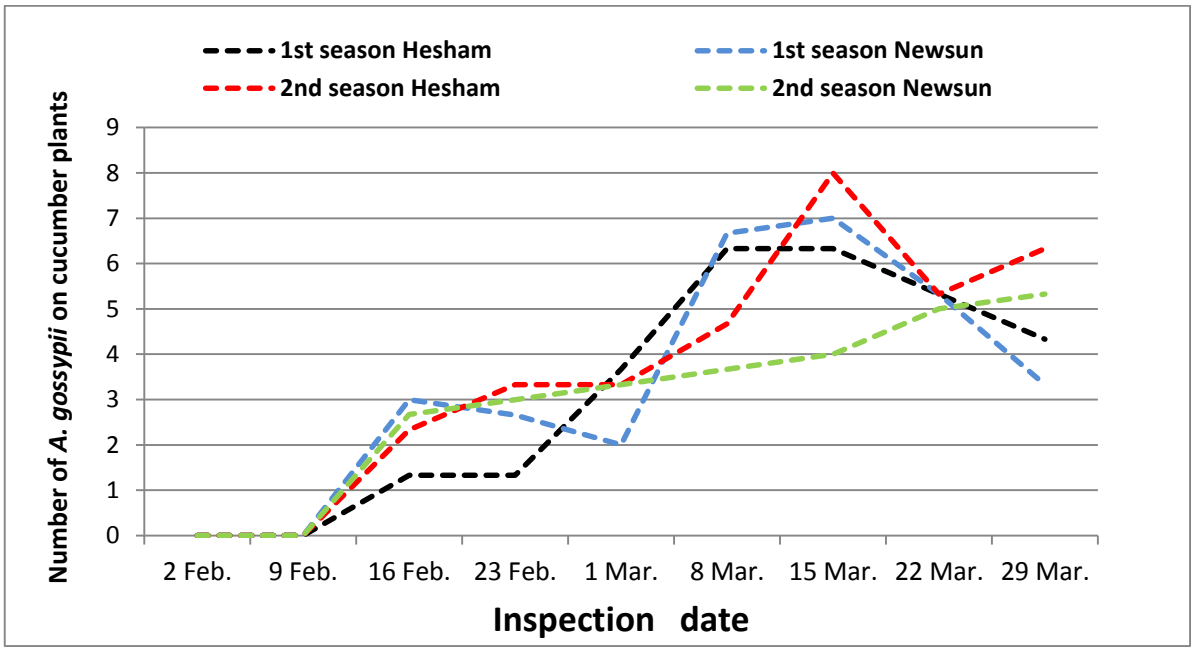


Figure (3): *Aphis gossypii* infestations during two seasons on two cucumber varieties under greenhouse conditions.

b. The relationship between phytochemical components and the infestation with *B. tabaci, T. tabaci and A. gossypii*.

Percentages of each of (carbohydrates, total sugar, reducing sugar, Non-reducing sugar, N, P, K (ppm)) were determined (**Table 4**). Data showed that there were significant differences in Carbohydrates between the most infested variety (Hesham) (10.62%) and the lowest infested one (Newsun) (10.47%). While there was no significant difference between the two varieties on the total sugar percentage (8.48 and 8.61, respectively). Potassium amount was more in Newsun cultivar (1.35) than that in Hesham cultivar (1.17), Potassium helps in the formation of solid tissues in leaves which make it difficult to the mouth parts of white fly, cotton thrips and cotton aphid to absorb plant guise .

Table 4. Chemical composition of the leaves of the two cucumber varieties (mean±SE).

Parameters	Variety		LSD at 0.05
	Hesham	Newsun	
***B. tabaci* mean counts**	8.44^{A}	8.10^{A}	2.26
***T.tabaci* mean counts**	8.58^{A}	7.75^{A}	2.57
***A.gossypii* mean counts**	3.18^{A}	3.33^{A}	1.43
Carbohy-rates (%)	10.62 ± 1.02^{A}	10.47 ± 0.41^{B}	2.69
Total sugar (%)	8.48 ± 0.19^{A}	8.61 ± 0.19^{A}	0.66
Reducing sugar (%)	4.05 ± 0.12^{B}	4.85 ± 0.15^{A}	0.46
Non-reducing sugar (%)	4.43 ± 0.08^{A}	3.76 ± 0.04^{B}	0.22
N (%)	0.24 ± 0.01^{A}	0.28 ± 0.02^{A}	0.05
P (%)	1.17 ± 0.01^{B}	1.35 ± 0.02^{A}	0.07
K (ppm)	67.25 ± 14.72^{A}	83.50 ± 22.7^{A}	66.20

A, B & C: There is no significant difference (P>0.05) between any two means for the same attribute, within the same row have the same superscript letter.

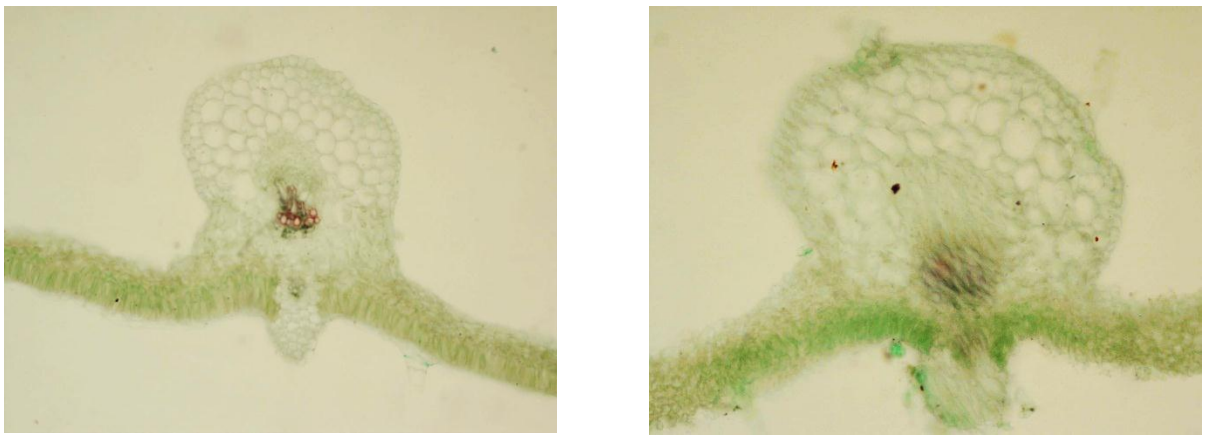
c. Anatomical characters of two cucumber cultivar leaves and their effect on infestation rate with certain insect pests.

One of the main factors which explained the susceptibility degree of the previously mentioned two cucumber cultivars (Hesham and Newsun) to infestation of each of *B. tabaci*, *T. tabaci* and *A. gossypii* is the effect of anatomical characters, This part of study was done to explain the correlation between the layers of tested varieties and the population density of the three insects at season 2016-2017. The relation between the thickness of each layer and the population density of certain insect pests can be explained as follows:

Table 5. Relation between leaf layers thickness of two cucumber varieties and *B. tabaci* infestation throughout 2016/2017 Buhiera governorate (mean±SE**).**

Parameters	Variety		LSD at
	Hesham	Newsun	0.05
***B. tabaci* mean counts**	8.44^{A}	8.10^{A}	2.26
***T.tabaci* mean counts**	8.58^{A}	7.75^{A}	2.57
***A.gossypii* mean counts**	3.18^{A}	3.33^{A}	1.43
Thickness of midrib of leaf	816.06 ± 4.00^{B}	1148.13 ± 27.56^{A}	68.15
Thickness of blade	167.55 ± 4.87^{A}	176.39 ± 0.72^{A}	12.05
Upper epidermal cuticle thickness	8.94 ± 0.21^{B}	10.75 ± 0.05^{A}	0.54
Lower epidermal cuticle thickness	7.63 ± 0.20^{B}	8.56 ± 0.18^{A}	0.67
Upper epidermal thickness	12.11 ± 0.19^{B}	14.96 ± 0.22^{A}	0.72
Lower epidermal thickness	9.93 ± 0.02^{B}	12.11 ± 0.19^{A}	0.46
No. of palisade tissue layers	1.00 ± 0.00^{A}	1.00 ± 0.00^{A}	0.00
Palisade tissue thickness	62.50 ± 3.71^{A}	54.25 ± 1.85^{A}	10.14
No. of spongy tissue layers	4.50 ± 0.20^{A}	4.98 ± 0.02^{A}	0.50
Spongy tissue thickness	65.25 ± 0.85^{B}	76.63 ± 1.84^{A}	4.97
Thickness of collenchyma layers below the upper epidermis at midrib	96.13 ± 4.71^{A}	102.13 ± 5.68^{A}	18.06
Thickness of fibers in vascular bundle	49.88 ± 1.88^{B}	85.88 ± 1.88^{A}	6.49
Thickness of phloem in vascular bundle	64.94 ± 4.60^{B}	81.25 ± 3.68^{A}	14.43
Thickness of xylem in vascular bundle	150.81 ± 10.1^{A}	171.5 ± 3.71^{A}	26.34
Thickness of widest xylem vessel in vascular bundle	27.25 ± 3.68^{B}	45.06 ± 1.96^{A}	10.21

A, B & C: There is no significant difference (P>0.05) between any two means for the same attribute, within the same row have the same superscript letter.



(A) **(B)**

Plate (4): A cross section of two cucumber leaves from to different varieties; Hesham (A) and newsun (B).

The seasonal mean counts of aphids infesting leaves of the two cucumber varieties were tabulated in Table (5) with the mean thickness of leaf layers of these cultivars and their correlation. The mean count of white fly, cotton thrips and cotton aphid were recorded on leaves of the two tested varieties, the heaviest infestation of white fly, *B. tabaci* was recorded on leaves of Hesham variety (8.44 individuals/5 plants) and followed with Newsun variety (8.10 individuals/5 plants) and also for *T. tabaci*, the highest mean infestation (8.58 individuals/5 plants) was recorded on Hesham variety followed with infestation on Newsun being (7.75 individuals/5 plants) while for *A. gossypii* infestation was semi equal in case of the two verities being (3.18 and3.33 individuals/5 plants, respectively), these data were in relation to the leaf thickness, as Hesham variety which recorded the highest infestation with *B. tabaci* and *T. tabaci* had the thinnest layers of the upper and lower epidermal cuticle thickness, upper and lower epidermal thickness (8.94, 7.63, 12.11 and 9.93, respectively),

spongy tissue thickness, thickness of collenchyma layers below the upper epidermis at midrib, thickness of fibers in vascular bundle, thickness of phloem in vascular bundle, thickness of xylem in vascular bundle and thickness of widest xylem vessel in vascular bundle were also, lower in case of Hesham variety, being, (84.50, 65.25, 96.13, 49.88, 64.94, 150.81 and 27.25, respectively). That indicated that Newsun variety was highly resistant for infestation with *B. tabaci* and *T. tabaci* than Hesham variety under greenhouse conditions and that is back to its leave thickness characteristics which were more thick that Hesham variety, **Table (5) and plate (4) .**

References

Benoit, F. and N. Ceustermans .1992. Ecological vegetable growing with plastics. Plasticuture, 95: 11-50.

El-Khayat, E.F., F. A. El-Lakwah, G. H. H. Rady, M. A. Mona, B.S. Wahba. 2010. Impact of planting dates on infestation of cowpea plants with some pests, Egyp. J. Agric. Res., 88 (4): 1107-1120.

Forsee, W.T. 1938. Determination of sugar in plant material a photocolometeric method. Inds. Eng. Chem. Annal. 10th ed: 411-418.

Ghallab, M., N. H. Habashi, A. K. F. Iskandar and M. A. Rizk. 2011. Sensitivity of four cucumber to some piercing sap sucking pests infestation and their impact on yield. Egypt. J. Agric. Res., 89 (4), 1363.

Ghongade D. S. and K. S. Sangha. 2021. Efficacy of biopesticides against the whitefly, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae), on parthenocarpic cucumber grown under protected environment in India. Ghongade and Sangha Egyptian Journal of Biological Pest Control. 31:19.

Guney, D. and Celik S. 1986. Early cucumber production under plastic covered high tunnels in Takat region Koy Hizmetleri: Tpkat Arastirma Enstitusu Mudurlugu Yoyinalari, Turkey, 13: 99 pp.

Hu Y.; Y. Yun; P. Hong; Z. J. Liang; S. Jing. 2009. Effects of host plant density on the population dynamics of Bemisia tabaci and its chemical control. Journal of Shanghai Jiaotong University - Agricultural Science. 27(6):627-630.

Mansour, M. H. 2020. Relationship between insect infestations and certain cucumber cultivars. Doctor of Philosophy, Faculty of Agriculture, Cairo University, Egypt.

Michel DuBois , E. Gilles K. A., J.K. Hamilton, P. A. J. Rebers .1956. Calorimetric Dubois Method for Determination of Sugar and Related Substances.Analytical Chemistry 28(3):350-356.

Mohamed, B. 2001. Ecological studies on some pests of protected cultivation in Northern Africa. M.Sc. Thesis, African Studies Institute, Cairo,157 pp.

Pregl, F. 1945. Quantitave organic microanalysis. 4 th ed j and A. Chundril London, 94-101.

Troug ,E.;and Meyer .A.H. 1939. Improvement in deiness colorimetric for phosphorus and arsenic .Ind. Eng. Chen.Ann.Ed.,1:136-139.

Tuzel, Y. and C. Leonardi, 2009. Protected cultivation in Mediterranean region: trends and needs. J. Ege Univ. Fac. Agric. 46(3): 215–223.

حساسية أصناف الخيار (هشام ونيوسن) لثلاث آفات من الحشرات الثاقبة الماصة تحت ظروف الصوب الزراعية.

يعتبر الخيار من أكثر محاصيل الخضروات انتشارًا والتي تنمو في ظروف الصوب الزراعية ويهاجمها العديد من الآفات **الثاقبة** الماصة الضارة والتي تسبب أضرارًا عالية للمحصول كما ونوعا. هدفت هذه الدراسة إلى تحديد مدى قابلية صنفين من الخيار للإصابة بثلاث آفات حشرية ثاقبة ماصة وهي: الذبابة البيضاء وتربس القطن ومن القطن. أوضحت هذه الدراسة عدم وجود فروق معنوية بين معدلات الإصابة خلال موسمي الدراسة (2017/2016 و 2018/2017) بكل من الذبابة البيضاء وتربس القطن ومن القطن على الصنفين (هشام ونيوصن). علاوة على ذلك ، سجلت أعلى متوسطات الإصابة بالذبابة البيضاء وتربس القطن خلال الموسم الثاني من الدراسةعلي الصنف هشام الذي سجل أعلى نسبة إصابة بالذبابة البيضاء وتربس القطن ولم يكن هناك فرق معنوي بين متوسط الإصابة على الصنفين خلال الموسمين، وعموماً ، أشارت النتائج إلى أن الصنف هشام كان أقل حساسية من الصنف نيوصن بالإصابة بالثلاثة آفات الثاقبة الماصة.