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SUSCEPTIBILITY OF DIFFERENT SOLANACEOUS PLANT VARIETIES TO THE INFESTATION BY CERTAIN PIERCING SUCKING PESTS AT EL-KASASINE DISTRICT, ISMAILIA GOVERNORATE, EGYPT

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ABSTRACT: The present investigation aimed to study the influence of some solanaceous plant varieties of eggplant *Solanum melongena* L. (Blak king, Blak beauty, Rekarda, Taska, Anan and Polsar); pepper *Capsicun annuun* L. (Ayrad, Lamastar Hlo, Fire volcano, PTAH and Saidah) and tomato *Lycopersicum esculentum* Mill (Seren T97301, Taby T98270, Super magic, Nameb RFT671022, Kelel, Nour and VT 60788) to infestation with some piercing sucking pests and the effects of some chemical contents (protein, carbohydrate and pH values) on the infestation of aphid, leafhopper, whitefly and two spotted spider mite pests were also investigated. The obtained results showed pronounced differences in the population density of the tested pests. Eggplant varieties could be arranged descendingly according to the population density of pests as follows: Polsar, Anan, Taska, Rekarda, Blak beauty and Blak king; pepper varieties Saidah, PTAH, Fire volcano, Lamastar Hlo and Ayrad and tomato varieties VT60788, Nour, Kelel, Nameb RFT671022, Super magic, Taby T98270 and Seren T97301. Chemical analysis results showed an increase in protein and carbohydrate contents led to increase the mean number of aphid, leafhopper, whitefly and two spotted spider mite pests infesting these varieties, while the increase of pH values led to decrease the mean number of pests and rate of infestation. Increasing pests infestation led to a decrease in yield. Therefore, the most suitable plant variety must be included in any integrated pest management programs of any pest.

Key words: Eggplant (*Solanum melongena* L.), pepper (*Capsicun annuun* L.), tomato (*Lycopersicum esculentum* Mill), varieties, chemical analysis, leafhopper, aphid, whitefly, two spotted spider mite.

INTRODUCTION

The piercing sucking pests (aphid, leafhopper, whitefly pests and two spotted spider mite) are economic pests of many vegetable crops in Egypt **(Hashem, 2005)**. Some solanaceous plants *i.e.,* eggplant, pepper and tomato are infested by the aforementioned pests which affect the yield as results of their direct feeding on plant, in addition, these pests are responsible for natural spread of several virus diseases to some solanaceous plants (**Neilson, 1968)**. The fauna of these pests on field and vegetable crops has been studied in Egypt (**Herakly, 1970; El-Nahal *et al.*, 1977; Hegab *et al.,* 1987**; **Hashem, 2005; Zhao *et al.,* 2012; Hegab *et al.*, 2014).** Therefore, it was necessary to perform the present work for studying the susceptibility of different varieties to certain piercing sucking pests infesting some solanaceous plants and the relationship between some chemical contents of solanaceous varieties and the population density of aphid, leafhopper, whitefly and two spotted spider mite pests.

MATERIALS AND METHODS

An area about 4200 m^2 was chosen to carry out this investigation at El-Kasasine District, Ismailia Governorate, Egypt. The experimental design was complete randomized plot with three replicates. Each plot consisted of four rows (4

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meters long and 14 meters wide). Each replicate was divided into 18 lines; the spaces between holes were 25 - 30 cm. Planting date of the tested solanaceous plants was during the last week of November, in 2014/2015 and 2015/ 2016 seasons. Sampling was started when the age of the plants reached about 32 days and continued in weekly intervals until the 1st week of March. The normal agricultural practices were followed in due time and all plots were kept free from any insecticide treatment. The varieties of the three Solanaceous plants were: eggplant varieties (Blak king, Blak beauty, Rekarda, Taska, Anan and Polsar), pepper varieties (Ayrad, Lamastar, Fire volcano, PTAH and Saidah) and tomato varieties (Seren T97301, Taby T98270, Super magic, Nameb RFT671022, Kelel, Nour and VT60788).

Sampling Methods

Plant sample

2o leaves per replicate representing different upper, middle and bottom parts were picked out randomly from each variety. These leaves were examined in the laboratory at the same day using a binocular microscope and the total number of existing aphid, whitefly and two spotted spider mite pests on both surfaces of the leaves were recorded.

Sweep net

The dimensions of the used sweep net were 30 cm diameter and 60 cm deep. Each sample consisted of 100 double strokes that were taken from both diagonal directions of the experimental area. Each sample was kept in a tight closed paper bag and transferred to the laboratory for inspection by a binocular microscope at the same day and the collected leafhoppers were killed by using cyanide killing jar, sorted into species and identified according to the work of **Ribaut (1952), Neilson (1968)** and **Hegab *et al*. (1989).** Counts of the captured leafhoppers were recorded for each sample.

Determination of some Chemical Contents

To determine total protein, carbohydrate contents and pH values, leaf samples were taken at random from each variety when there were peaks of pests and oven dried at 60°C until the constant weight. The dried leaves (eggplant, pepper and tomato) were finally ground and digested with a mixture of perchloric acid and nitric acid (2:1).

Determination of protein content

Total nitrogen in eggplant, pepper and tomato plants were estimated according to **Bremner and Mulvaney (1982).** The crude protein content was obtained by multiplying the nitrogen content by the factor 6.25.

Determination of carbohydrate content

Total carbohydrate content in eggplant, pepper and tomato plants were determined colourimetrically using the anthrone reagent and the color intensity was measured at 240 mμ following the method described by **Dubois *et al.* (1956)**.

Determination of pH value

PH value was estimated in the plant sap using pH meters.

Chemical analyses of the used eggplant, pepper and tomato varieties were carried out in Central Laboratory, Faculty of Agriculture, Benha University to determine the total protein, carbohydrate contents and pH value.

Statistical Analysis

The results as regards the relationship between the chemical constituents of different eggplant, pepper and tomato plant varieties on the population density of the aforementioned hemipterous insects and two spotted spider mite were statistically analyzed **(Costat, 1995)** to calculate the simple correlation coefficient. The means were compared according to Duncan's multiple range test (**Snedecor and Cochran, 1981)**.

RESULTS AND DISCUSSION

Susceptibility of Different Varieties on Population Density by Certain Piercing Sucking Pests Infesting some Solanaceous Plants

Eggplant varieties

Cotton Aphid, *Aphis gossypii* (Glov.)

Results in Table 1 reveal the differences between mean numbers of aphid on infested eggplant varieties during the two seasons. The most susceptible variety was Polsar exhibiting 172.64 and 191.80 insects/plant sample for

Table 1. Susceptibility of eggplant varieties to the infestation with aphid, whitefly leafhopper and two spotted spider mite pests along with yield during 2014/2015 and 2015/2016 seasons, at El-Kasasine district, Ismailia Governorate

Variety	Aphid/plant sample		Leafhopper / sweep net		Whitefly/plant sample		Two spotted spider mite/ plant sample		Mean yield (kg/plot)	
	A. gossypii		*E. decipiens*		*B. tabaci*		*T. urticae*			
	2014/ 2015	2015/ 2016	2014/ 2015	2015/ 2016	2014/ 2015	2015/ 2016	2014/ 2015	2015/ 2016	2014/ 2015	2015/ 2016
Taska	138.20^{c}	155.2^{c}	1034.41^{c}	1056.72^{c}	21.17^{ab}	46.14^{b}	42.11^{b}	102.72^{c}	125.48^{c}	118.21^{c}
Blak beauty	111.87^{e}	140.56^{d}	897.35^{e}	950.11^{e}	19.83^{b}	37.51^{c}	37.42^{c}	72.54^{e}	145.52^{b}	138.61^{b}
Rekarda	118.43^{d}	150.72^{c}	992.6^{d}	1050.67^{d}	20.52^{b}	43.76^{b}	39.21^{bc}	88.23^{d}	129.31^{c}	120.82^{c}
Polsar	172.64^{a}	191.8^{a}	1089.01^{a}	1123.28^{a}	23.98^{a}	56.41^{a}	90.63^{a}	145.45^{a}	109.2^{d}	89.02^{e}
Anan	156.52^{b}	180.36^{b}	1065.63^{b}	1098.12^{b}	23.22^{a}	52.32^{a}	42.87^{b}	115.28^{b}	123.67^{c}	103.43^{d}
Blak king	109.1^{e}	120.52^{e}	776.38^{f}	794.08^{f}	19.12^{b}	30.69^{d}	36.34^{c}	55.64^{f}	177.58^{a}	152.17^{a}
LSD 0.05	2.8128	5.625	8.1307	18.0255	2.6186	5.451	3.9335	6.774	7.9669	4.7067

For each season within columns values followed by the same letter are not significantly different.
P values are based on Duncan's multiple range test at 0.05 level of probability.

A. gossypii in the first and second seasons, respectively, while the least susceptible variety was Blak king with values of 109.10 and 120.52 insects/plant sample during 2014/ 2015 and 2015/2016 seasons, respectively.

Leafhopper, *Empoasca decipiens* (Paoli)

As shown in Table 1, the differences between the mean numbers of leafhopper on infested eggplant varieties were greatly varied during the two seasons. The most susceptible variety was Polsar indicating 1089.01 and 1123.28 insects/ sweep net for *E. decipiens* in both seasons, respectively, while the least susceptible variety was Blak king (776.38 and 794.08 insects/sweep net) in the two seasons, successively.

Whitefly, *Bemisia tabaci* (Genn.)

Results given in Table 1 indicate the differences between mean numbers of whitefly *B. tabaci* (Genn.) infesting eggplant plant varieties during the two seasons. Blak king variety was the least susceptible host plant for *B. tabaci* infestation showing 19.12 and 30.69 insects/ plant sample, while the variety Polsar appeared to be the most susceptible eggplant variety (23.98 and 56.41 insects/plant sample) during 2014/2015 and 2015/2016 seasons, respectively.

Two spotted spider mite, *Tetranychus urticae* (Koch)

Results in Table 1 show the differences between mean numbers of two spotted spider mite *T. urticae* on infested eggplant varieties during 2014/2015 and 2015/2016 seasons. The most susceptible variety was Polsar (90.63 and 145.45 individuals/ sample) in both seasons, respectively, while the least susceptible variety was Blak king (36.34 and 55.64 individuals/ plant sample) in the first and second seasons, respectively. These results agree with the findings of **Uddin *et al.* (2015)** who stated that these results may lead to finding and screening process of comparatively resistant bean varieties to be used in the management of *T. urticae*.

Mean yield (kg/plot)

With respect to the influence of eggplant varieties on eggplant yield, results presented in Table 1 show that Blak king variety yielded the highest means of 177.58 and 152.17 kg/plot in

the two seasons, respectively. While, Polsar variety yielded the lowest means of 109.2 kg/plot in 2014/2015 season and 89.02 kg/plot in 2015/ 2016 season.

Generally, from the obtained results, Polsar variety was more susceptible to aphid, whitefly, leafhopper and two spotted spider mite pests infestation, whereas Blak king variety was the least susceptible cultivar. The results of **Hewa *et al.* (2017)** clearly indicated that volatile-mediated attraction of greenhouse whitefly *Trialeurodes vaporariorumto* to eggplant.

Pepper varieties

Cotton aphid, *Aphis gossypii* (Glov.)

As shown in Table 2, the differences between mean numbers of aphid infested pepper plant varieties during the two seasons were obviously differed. The most susceptible variety was Saidah (90.61 and 124.53 insects/ plant sample) in the two seasons of the present study, respectively, while the least susceptible variety was Ayrad that recorded mean numbers of 22.51 and 24.05 insects/plant sample for *A. gossypii* in 2014/2015 and 2015/2016 seasons, successively. **Lassaad and Kamel (2016)** studied effects of different varieties of pepper (*Capsicum annum* L.) on the biological parameters of the green peach aphid *M. persicae* Sulzer and reported that these parameters obviously impacted by pepper variety.

Leafhopper, *Empoasca decipiens* (Paoli)

Results in Table 2 appear the differences between the mean numbers of leafhopper infested pepper plant varieties during the two investigated seasons. The most susceptible variety was Saidah showing 71.22 and 60.46 insects / sweep net for *E. decipiens* in both seasons, respectively, while the least susceptible variety was Ayrad, 30.13 and 17.38 insects/ sweep net, in 2014/2015 and 2015/2016 seasons, respectively.

Mean yield (kg/plot)

As regards the influence of pepper varieties on pepper yield, results presented in Table 2 show that Ayrad variety was the highest the yield of 83.72 and 90.11 kg/plot in the two seasons, respectively. While Saidah was the lowest yield of 41.52 and 49.02 kg/plot in the two studied seasons, respectively. Generally, from the obtained results, it could be concluded that Saidah variety was more susceptible to aphid and leafhopper pests infestation, but, Ayrad variety was the least susceptible. These results agree with the findings of **Hashem (2005)** who mentioned that varieties of vegetable plants had a great effect on the incidence of some homopterous insects.

Tomato varieties

Green peach aphid, *Myzus persicae* (Sulzer)

Results given in Table 3 show significant differences between the mean numbers of aphid on tomato varieties during the two seasons. The most susceptible variety was VT60788 (72.42 and 101.65 insects/plant sample) in both seasons, respectively, while the least susceptible variety was Seren T97301 recording 16.13 and 20.53 insects/ plant sample for *M. persicae* in both seasons, consecutively.

Leafhopper, *Empoasca decipiens* (Paoli)

As shown in Table, 3 the differences between the mean numbers of leafhoppers infested tomato varieties during the two seasons proved to be ststistically significant. The most susceptible variety was VT60788 (82.37 and 98.03 insects/ sweep net) in both seasons, respectively, while the least susceptible variety was Seren T97301 indicating 28.14 and 40.54 insects/sweep net for *E. decipiens* in both seasons, respectively.

Whitefly, *Bemisia tabaci* (Genn.)

Results given in Table, 3 indicate the differences between mean numbers of whitefly *B. tabaci* on tomato varieties during the two seasons of the presnt study. Seren T97301 variety was the least susceptible host plant to infestation (13.46 and 17.06 insects/plant sample), while the variety VT 60788 appeared to be the most susceptible variety (46.13 and 66.22 insects/plant sample) during the two investigated seasons, respectively. The current study, aimed to identify differences in HIPV blends from tomato plants infested with whitefly *B. tabaci* or the tomato borer *Tuta absoluta*, which may allow the predators

to discriminate among the herbivore-infested and infested tomato plants **(Diego *et al.,* 2017)**. Such resistant varieties effectively change *B. tabaci* populations. There is an importance placed on eating fresh tomato products, as cleared by **Masoomeh *et al.* (2013) and Bikash *et al.* (2017)**.

Two spotted spider mite, *Tetranychus urticae* (Koch)

Results given in Table 3 indicate that the differences between mean numbers of two spotted spider mite on tomato varieties were highly significant for the two seasons of study. Seren T97301 variety was the least susceptible

Table 2. Susceptibility of pepper varieties to the infestation with aphid and leafhopper pests along with yield during 2014/2015 and 2015/2016 seasons, at El-Kasasine District, Ismailia Governorate

Variety	Aphid/plant sample		Leafhopper/sweep net		Mean yield (kg/plot)	
	A. gossypii		*E. decipiens*			
	2014/2015	2015/2016	2014/2015	2015/2016	2014/2015	2015/2016
Fire volcano	73.57^{b}	88.23^{c}	55.46^{b}	35.13^{c}	52.39^{c}	63.44^{b}
Lamastar Hlo	40.72^{c}	60.76^{d}	44.69^{c}	26.28^{d}	67.89^{b}	78.21^{a}
Saidah	90.61^{a}	124.53^{a}	71.22^{a}	60.46^{a}	41.52^{d}	49.02^{c}
PTAH	78.32^{b}	110.77^{b}	60.67^{b}	45.69^{b}	49.02^{c}	58.35^{b}
Ayrad	22.51^{d}	24.05^{c}	30.13^{d}	17.38^{e}	83.72^{a}	90.11^{a}
LSD 0.05	11.066	12.966	9.072	6.659	3.8161	8.7753

For each season within columns values, followed by the same letter are not significantly different.
P values are based on Duncan's multiple range test at 0.05 level of probability.

Table 3. Susceptibility of tomato varieties to the infestation with aphid, whitefly, leafhopper and two spotted spider mite pests along with yield during 2014/2015 and 2015/2016 seasons, at El-Kasasine District, Ismailia Governorate

Variety	Aphid / plant sample		Leafhopper/ sweep net		Whitefly/plant sample		Two spotted spider mite/ plant sample		Mean yield (kg/plot)	
	M. persicae		*E. decipiens*		*B. tabaci*		*T. urticae*			
	2014/ 2015	2015/ 2016	2014/ 2015	2015/ 2016	2014/ 2015	2015/ 2016	2014/ 2015	2015/ 2016	2014/ 2015	2015/ 2016
Super magic	41.71^{e}	60.82^{e}	38.02^{de}	48.14^{d}	18.22^{cd}	38.14^{e}	290.57^{e}	348.12^{e}	273.81^{c}	265.26^{b}
Seren T97301	16.13^{g}	20.53^{g}	28.14^{f}	40.54^{e}	13.46^{d}	17.06^{g}	268.11^{g}	295.46^{g}	308.22^{a}	279.17^{a}
Nour	65.22^{b}	82.46^{b}	70.57^{b}	86.21^{b}	33.73^{b}	58.12^{b}	475.36^{b}	435.39^{b}	198.11^{e}	188.31^{d}
Taby T98270	23.61^{f}	26.24^{f}	33.54^{ef}	42.67^{e}	14.54^{d}	22.75^{f}	277.21^{f}	315.64^{f}	288.21^{b}	267.56^{b}
Kelel	53.02^{c}	76.33^{c}	50.48^{c}	63.42^{c}	30.48^{b}	50.54^{c}	376.18^{c}	415.25^{c}	253.65^{d}	232.78^{c}
Nameb RFT671022	45.31^{d}	66.05^{d}	40.81^{d}	59.11^{c}	22.39^{c}	43.64^{d}	342.54^{d}	367.16^{d}	278.23^{c}	264.34^{b}
VT60788	72.42^{a}	101.65^{a}	82.37^{a}	98.03^{a}	46.13^{a}	66.22^{a}	490.67^{a}	452.34^{a}	176.45^{f}	165.43^{e}
LSD 0.05	3.8023	5.055	5.5772	5.629	6.825	4.34	7.0877	8.1065	8.562	7.0671

For each season within columns, values followed by the same letter are not significantly different.
P values are based on Duncan's multiple range test at 0.05 level of probability.

host plant to infestation showing 268.11 and 295.46 individuals/plant sample, while the variety VT60788 appeared to be the most susceptible tomato variety (490.67 and 452.34 individuals/plant sample) in both seasons, respectively.

Mean yield (kg/plot)

Respecting the influence of tomato varieties on tomato yield, results presented in Table 3 show that Seren T97301 variety was the highest yield of 308.22 and 279.17 kg / plot in 2014/2015 and 2015/2016 seasons, respectively. While, VT60788 yield was the lowest mean of 176.45 and 165.43 kg/plot in the two seasons, respectively.

Generally, from the obtained results, it could be concluded that VT 60788 variety was more susceptible to aphid, leafhopper, whitefly and two spotted spider mite pests infestation, whereas Seren T 97301 variety was the least susceptible one.

The results of **Hewa *et al.* (2017)** revealed that volatile-mediated attraction of greenhouse whitefly *Trialeurodes vaporariorumto* on tomato plants.

Relationship Between Some Chemical Contents of Solanaceous Varieties and Population Density of Certain Piercing Sucking Pests

Eggplant varieties

Results given in Table 4 show significant effects of different chemical contents of eggplant varieties on the aphid, leafhopper, whitefly and two spotted spider mite pests during 2014/2015 season.

Total protein, carbohydrate contents and pH value

Blak king variety showed the mean numbers of aphid, leafhopper, whitefly and two spotted spider mite pests of 109.10, 776.38, 19.12 and 36.34 pests/sample, respectively, with 19.69 µ/ m total protein, 12.67% carbohydrate contents and 7.27 pH. On the other hand, polsar variety harboured the mean numbers of aphid, leafhopper, whitefly and two spotted spider mite pests of 172.64, 1089.01, 23.98 and 90.63 pests/ sample, respectively with 28.42 µ/m total protein, 19.97% carbohydrate contents and 6.11 pH, during 2014/2015 season.

Generally, from the obtained results, increasing the eggplant total protein and carbohydrate contents led to increase the mean number of insects and mite infesting this variety. But the increased pH value, led to decrease the mean number of insects and mite on eggplant. The least susceptible variety to pests infestation was the highest yield (Blak king var.).

Pepper varieties

Results given in Table 5 show significant effects of different tested chemical contents of pepper varieties on the mean numbers of aphid and leafhopper pests during 2014/2015 season.

Total protein, carbohydrate contents and pH value

In case of Ayrad variety the mean numbers of aphid and leafhopper pests were 22.51 and 30.13 insects/ sample, respectively, with 19.06 µ /m total protein, 12.67% carbohydrate contents and 6.03 pH. In case of Saidah variety the mean numbers of aphid and leafhopper pests were 90.61 and 71.22 insects/sample, respectively with 28.42 µ/m total protein, 13.64% carbohydrate contents and 5.94 pH during 2014/ 2015 season.

Generally, from the obtained results, increased the pepper plant total protein and carbohydrate contents led to increased the mean number of insects infested this variety. But the increased pH value, led to decrease the mean number of insects infested pepper plant, the least susceptible variety to pests infestation was the highest yield.

Tomato varieties

Results given in Table 6 show significant effects of different determined chemical contents of tomato varieties on the aphid, leafhopper, whitefly and two spotted spider mite pests during 2014/2015 season.

Total protein, carbohydrate contents and pH value

Seren T97301 variety harboured the mean numbers of aphid, leafhopper, whitefly and two spotted spider mite pests of 16.13 , 28.14 , 13.46 and 268.11 pests/sample, respectively, with 21.58

Table 4. Relationship between some chemical contents of eggplant varieties and population density of aphid, leafhopper, whitefly and two spotted spider mite pests during 2014/ 2015 season

Variety	Total protein (µ/m)	Carbohydrate content (%)	pH value	*Aphis gossypii*	*E. decipiens*	*B. tabaci*	*T. urticae*
Blak king	19.69	12.67	7.27	109.1^{e}	776.38^{f}	19.12^{b}	36.34^{c}
Blak beauty	21.27	13.42	6.58	111.87^{e}	897.35^{e}	19.83^{b}	37.42^{c}
Rekarda	27.11	14.31	6.58	118.43^{d}	992.6^{d}	20.52^{b}	39.21^{bc}
Taska	27.11	14.57	6.18	138.2^{c}	1034.41^{c}	21.17^{ab}	42.11^{b}
Anan	27.5	14.91	6.18	156.52^{b}	1065.63^{b}	23.22^{a}	42.87^{b}
Polsar	28.42	19.97	6.11	172.64^{a}	1089.01^{a}	23.98^{a}	90.63^{a}
F.	0	0	0	**	**	**	**
LSD 0.05	0	0	0	2.8128	8.1307	2.6186	3.9335

Table 5. Relationship between some chemical contents of pepper varieties and population density of aphid and leafhopper pests during 2014/2015 season

Variety	Total protein (µ/m)	Carbohydrate content (%)	pH value	*A. gossypii*	*E. decipiens*
Ayrad	19.06	12.67	6.03	22.51^{d}	30.13^{d}
Lamostar Hlo	19.06	13.02	6.02	40.72^{c}	44.69^{c}
Fire Volcano	27.5	13.42	6	73.57^{b}	55.46^{b}
PTAH	28.31	13.42	5.95	78.32^{b}	60.67^{b}
Saidah	28.42	13.64	5.94	90.61^{a}	71.22^{a}
F.	-	-	-	**	**
LSD 0.05	-	-	-	11.066	9.072

Table 6. Relationship between some chemical contents of tomato varieties and population density of aphid leafhopper, whitefly and two spotted spider mite pests during 2014/ 2015 season

Variety	Total protein (µ/m)	Carbohydrate content (%)	pH value	*M. persicae*	*E. decipiens*	*B. tabaci*	*T. urticae*
Seren T 97301	21.58	21.04	6.95	16.13^{g}	28.14^{f}	13.46^{d}	268.11^{g}
Taby T 98270	21.96	21.42	6.42	23.61^{f}	33.54^{ef}	14.54^{d}	277.21^{f}
Super magic	22.35	22.24	6.42	41.71^{e}	38.02^{de}	18.22^{cd}	290.57^{e}
Nameb RFT671022	24.74	22.68	6.39	45.31^{d}	40.81^{d}	22.39^{c}	342.54^{d}
Kelel	24.85	23.51	6.29	53.02^{c}	50.48^{c}	30.48^{b}	376.18^{c}
Nour	25.3	24.03	6.21	65.22^{b}	70.57^{b}	33.73^{b}	475.36^{b}
VT60788	25.91	24.76	6.11	72.42^{a}	82.37^{a}	46.13^{a}	490.67^{a}
F.	-	-	-	**	**	**	**
LSD 0.05	-	-	-	3.8023	5.5772	6.825	7.0877

µ/m total protein, 21.04% carbohydrate contents and 6.95 pH., while VT60788 variety was highly infested with the mean numbers of aphid, leafhopper, whitefly and two spotted spider mite pests showing 72.42, 82.37, 46.13 and 490.67 pests/sample, respectively with 25.91 µ/m total protein, 24.76% carbohydrate contents and 6.11 pH during 2014/2015 season. Generally, from the obtained results the increased tomato plant total protein and carbohydrate contents led to increase the mean number of insects and mite infesting this variety. But the increased pH value, led to decrease the mean number of insects and mite on the infested tomato plants, the least susceptible to pests infestation was the highest yield. **Baghour *et al.* (2001), El - Gindy (2002), Hashem (2005), Al-Habshy *et al.* (2011), Hegab *et al.* (2014)** and **Amer (2016)** pointed out that the chemical constituents of some graminaceous, leguminous, eggplant and pepper plants varieties were effective on the population density of aphid, leafhopper ,whitefly and planthopper insects.

Correlation Coefficient that was Calculated for Each Constituent in All the Tested Varieties and Population Density of Certain Piercing Sucking Pests Infestation

Eggplant plants

A. gossypii

The results (Table 7) obtained appeared that the correlation coefficient between *A. gossypii* and total protein was insignificant $r_1 = 0.7868$, the number of *A. gossypii* showed significant correlation with carbohydrate content $r_2 = 0.8719$*, while that concerning pH value was insignificant $r_3 = -0.8043$ during 2014/2015 season.

E. decipiens

The correlation coefficient between *E. decipiens* and total protein was highly significant ($r_1 = 0.9637$**), the number of *E. decipiens* showed insignificant correlation with carbohydrate content ($r_2 = 0.7220$), while that respecting pH value was highly significant ($r_3 = -0.9608$**) during 2014/2015 season.

B. tabaci

The correlation coefficient found between whitefly *B. tabaci* population and total protein was significant ($r_1 = 0.9008$*), the number of whitefly showed insignificant correlation with carbohydrate content ($r_2 = 0.8073$), while that of pH value was highly significant ($r_3 = -0.9320$**) during 2014/2015 season.

T. urticae

The correlation coefficient between the mite *T. urticae* and total protein was insignificant ($r_1 = 0.5222$), the number of *T. urticae* showed highly significant correlation with carbohydrate content ($r_2 = 0.9777$**), while pH value was insignificantly correlated ($r_3 = -0.5132$) during 2014/2015 season.

Pepper plants

A. gossypii

The results (Table 7) obtained appeared that the correlation coefficient between *A. gossypii* and total protein was highly significant ($r_1 = 0.9589$**), the number of *A. gossypii* showed highly significant correlation with carbohydrate content ($r_2 = 0.9931$**), while pH value was significantly correlated ($r_3 = -0.9033$*), during 2014/2015 season.

E. decipiens

The correlation coefficient between *E. decipiens* and total protein was significant ($r_1 = 0.8920$*). The number of *E. decipiens* showed highly significant correlation with carbohydrate content ($r_2 = 0.9861$**), while pH value was significantly correlated ($r_3 = -0.9201$*) during 2014/2015 season.

Tomato plants

M. persicae

The results (Table 7) obtained appeared that the correlation coefficient between *M. persicae* and total protein was highly significant ($r_1 = 0.9335$**), the number of *M. persicae* showed highly significant correlation with carbohydrate content ($r_2 = 0.9899$**), while that of pH value was highly significant ($r_3 = -0.8755$**) during 2014/ 2015 season.

E. decipiens

The correlation coefficient between *E. decipiens* and total protein was significant ($r_1 = 0.8669$*). The number of *E. decipiens* showed highly significant correlation with carbohydrate content

Table 7. Simple correlation coefficient between total protein, carbohydrate contents and pH value and the population densities of certain pests infesting eggplant, pepper and tomato varieties during 2014/2015 season

The pests	Simple correlation coefficient								
	Eggplant			Pepper			Tomato		
	r_1	r_2	r_3	r_1	r_2	r_3	r_1	r_2	r_3
A. gossypii	0.7868	0.8719*	-0.8043	0.9589**	0.9931**	-0.9033*	0	0	0
E. decipiens	0.9637**	0.7220	-0.9608**	0.8920*	0.9861**	-0.9201*	0.8669*	0.9567**	-0.7926*
B. tabaci	0.9008*	0.8073	-0.9320**	0	0	0	0.9169**	0.9920**	-0.8287*
T. urticae	0.5222	0.9777**	-0.5132	0	0	0	0.9176**	0.9611**	-0.7709*
M. persicae	0	0	0	0	0	0	0.9335**	0.9899**	-0.8755**

r_1= Correlation coefficient between total protein and the mean number of pests.
r_2 = Correlation coefficient between carbohydrate content and the mean number of pests.
r_3 = Correlation coefficient between pH value and the mean number of pests.

(r_2 = 0.9567**), while that regarding pH value was significant (r_3 = - 0.7926*) during 2014/ 2015 season.

B. tabaci

The correlation coefficient found between whitefly *B. tabaci* and total protein was highly significant (r_1 = 0.9169**), the number of whitefly showed highly significant correlation with carbohydrate content (r_2 = 0.9920**), while pH value was significantly correlated (r_3 = - 0.8287*) during 2014/2015 season.

T. urticae

The correlation coefficient between the mite *T. urticae* and total protein was highly significant (r_1 = 0.9176**), the number of *T. urticae* showed highly significant correlation with carbohydrate content (r_2 = 0.9611**), while pH value was significant (r_3 = - 0.7709*) during 2014/2015 season.

These results agree with the findings of **Hegab *et al.* (2014)** who stated that chemical analyses results showed a positive relationship between protein, carbohydrate contents and aphids, leafhoppers and whitefly insects infestation in all tested eggplant and pepper varieties and also a reverse relationship was recorded between pH values and insects infestation.

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قابلية أصناف مختلفة من نباتات العائلة الباذنجانية للإصابة ببعض الآفات الثاقبة الماصة في منطقة القصاصين - محافظة الإسماعيلية - مصر

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أُجريت هذه الدراسة في منطقة القصاصين - محافظة الإسماعيلية وذلك خلال موسمي ٢٠١٤/ ٢٠١٥ و٢٠١٥/٢٠١٦ وذلك لتقييم قابلية أصناف مختلفة لثلاثة أنواع من نباتات العائلة الباذنجانية للإصابة بآفات المّنْ ونطاطات الأوراق والذبابة البيضاء وأكاروس العنكبوت ذو البقعتين، أوضحت النتائج أن بولسار هو أكثر أصناف الباذنجان حساسية وأن بلاك كنج هو أقل الأصناف إصابة كما أوضحت النتائج أن سايداح هو أكثر أصناف الفلفل حساسية وأن أيراد هو أقلها حساسية للإصابة، أوضحت النتائج أن VT 60788 هو أكثر أصناف الطماطم حساسية وأن Seren T97301 هو أقلها إصابة بهذه الآفات، وقد أكدت نتائج التحليل الكيميائي لأوراق أصناف الباذنجان والفلفل والطماطم أنه كلما ازداد محتوى النبات من البروتين والكربوهيدرات أزداد مستوى الإصابة بالآفات التي تم دراستها كما وجد أن الزيادة في قيمة pH يقابلها انخفاضا في تعداد الآفات.

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