

EFFECT OF PLANT VARIETIES AND POTASSIUM FERTILIZATION ON THE POPULATION DENSITIES OF CERTAIN HOMOPTEROUS INSECTS INFESTING CUCUMBER AND SQUASH PLANT VARIETIES

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ABSTRACT

The present investigation aimed to study the effects of some cucumber varieties:- Indian, Japanese and Alpha beta, while squash varieties Holland, Escandarani and Top Kapi on the population density of aphids ,leafhoppers and whitefly insects ,under different potassium fertilization levels(zero,50,100 and 200kg/feddan).The obtained results show pronounced differences in the population density of the aforementioned insects on the tested varieties. The least susceptible variety of cucumber was Indian, while the highest susceptible variety was Alpha beta, The least susceptible squash was Holland variety, while the highest susceptible was Top Kapi variety during 2006and 2007 seasons , respectively .The fourth level of potassium fertilization "200kg.potassium sulphate /feddan" recorded the least number of aphids ,leafhoppers and whitefly insects ,while the first level of potassium fertilization "zero kg.potassium sulphate/feddan" increased the aforementioned insects population density .

Chemical analysis results showed a negatively relationship between protein, carbohydrate contents and pH values and aphids ,leafhoppers and whitefly infestation in all cucumber and squash varieties.

From these results susceptibility of plant variety and potassium fertilization must be considered in the integrated pest management programs as they play very important role in depressing insect population.

INTRODUCTION

Homopterous insects (leafhoppers, aphids and whitefly insects) are great economic pests of *Cucurbitaceous* vegetable plants which cause serious damage directly by sucking plants juice and indirect damage by phytopathogenic viruses transmission (Hegab *et al* 1989b;Hector *et al* ,2008 and Hunter and Gray ,2008). Aforementioned insects infestation also reduce cucumber and squash yields. Host plant varieties exhibited different susceptibility to the aforementioned homopterous insects infestation .So the resistant varieties could be used as an item in integrated pest management programs .On the other hand fertilization had an important role on those insects infestation (Hegab, Ola, 2001 and Hashem,2005).

So the present investigation aimed to survey the aphids ,leafhoppers and whitefly insects on cucurbitaceous vegetable plants (cucumber and squash) and also to study the seasonal abundance of the dominant insect species as well as to estimate the effects of plant varieties ,potassium fertilization and their chemical constituents on the population density of the aforementioned homopterous insects during 2006 and 2007 seasons .

MATERIALS AND METHODS

1) Survey and seasonal abundance of certain homopterous insects infesting cucumber and squash plants.

An area about 3000 m² was chosen to carry out this study in Diarb-Nigm district ,Sharkia Governorate , the experimental design used in all growing seasons of cucumber and squash plants during summer plantation throughout 2006 and 2007 seasons was a split plot design with three replications .Treatments were distributed as plot within replication ,each sub plot consisted (5 meters wide and 7.5 meters length) . The seedling date of cucumber and squash plants was the first week of May .The normal agricultural practices were followed in due time and all plots were kept free of any insecticides treatments.

Sampling started when the age of the plants reached about 21-28 days after seedling and continued at weekly intervals throughout the growing seasons .The following two procedures of sampling were used:

I) Plant samples, three leaves representing different strata, viz. terminal, middle and bottom parts were taken randomly from 10 plants of each variety. These leaves were examined in the laboratory using a binocular microscope and the total number of existing nymphs, aptera, and alate forms of aphids, immature and adult stages of whitefly insects were recorded on both surfaces of the leaves.

II) Sweeping net, 30 cm diameter and 60 cm depth. Each sample consisted of 100 double strokes 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 binocular microscope and the collected leafhoppers were killed by cyanide, sorted into species and identified according to the work of Nielson (1968) and Hegab *et al.* (1989a). Counts of captured leafhoppers were done and recorded for each sample.

Daily records of both maximum and minimum temperatures along with relative humidity were obtained from the Agrometeorological Station at Zagazig city which is located closely to the experimental areas during 2006 and 2007 seasons.

2) Effects of some agricultural practices on the population density of certain homopterous insects infesting cucumber and squash plants

I) Plant varieties

For this purpose three cucumbers plants (*Cucumis sativus*) varieties, namely Indian, Japanese and Alpha beta were used, while squash plants (*Cucurbita pepo* var. *melopepo* L) varieties were Holland, Escandarani and Top Kapi .

II) Potassium fertilization levels

Four potassium fertilization levels (00,50,100 and 200 kg/feddan were applied in these experiments as potassium sulphate 48%K₂O , half of the quantity during preparing the soil and the rest quantity after 30 days from seedling.

The relationships between different plant varieties, potassium fertilization levels and the population density of the aforementioned insects were statistically analyzed according to split design Little and Hills, (1975).

3) Relationship between certain chemical constituents of cucumber and squash plant varieties and infestation with aphids, leafhoppers and whitefly insects

To confirm the relationship between certain chemical constituents of the different varieties of host plants and the infestation with aphids, leafhoppers and whitefly insects, chemical analysis of the cucumber and squash varieties leaves were carried out in central laboratory, Faculty of Agriculture, Moshtohour, Banha Univ. to determine the total protein, carbohydrate, phosphorous, calcium, potassium contents and pH value, according to Dubois *et al.*, 1956; Barrowes and Simpson, 1962 and Bremmer and Mulvaney, 1982.

Each sample from a field plot consists of 30 leaves free of insects or disease. Collected samples taken prior to the fruiting stage.

Effects of different potassium fertilization rates and the chemical constituents of different varieties on the population density of the aforementioned homopterous insects were statistically analyzed according to split design (Little and Hills, 1975).

RESULTS AND DISCUSSION

3.1 Survey of some homopterous insects on cucumber and squash plants.

a) Aphid insects

Survey studies on cucumber and squash plants in Diarb-Nigm district, Sharkia Governorate showed the occurrence of the following aphid species:- *Aphis gossypii* (Glover) and *Myzus persicae* (Sulz.)

As shown in Table (1) *Myzus persicae* (Sulz.) proved to be the most dominant aphid species on cucumber and squash plants followed by *Aphis gossypii* (Glover) during 2006 and 2007 seasons.

b) Leafhopper insects

The data presented in Table (1) show the incidence of eight leafhopper species belonging to family Cicadellidae on cucumber and squash plants at Diarb – Nigm district, Sharkia Governorate during 2006 and 2007 seasons.

The collected leafhopper species were arranged descendingly according to their abundance as follows, *Empoasca decedens* (Paoli), *E. decipiens* (Paoli), *Cicadulina china* (Ghauri), *Balclutha hortensis* (Lindb.), *Nephotettix apicalis* (Matsch), *Circulifera tenellus* (Baker), *E. distinguend* (Paoli) and *E. lybica* (de Berg).

E. decedens, *E. decipiens* and *C. chinai* were the most abundant leafhoppers species on cucumber and squash plants during the whole period of study. While the rest leafhopper species were found in low number.

In both seasons, it seems that the number of all species collected from cucumber plants were higher than those collected from squash plants. These results are in agreement with those of Hegab *et al.* (1989b) who recorded the aforementioned species on cucurbitaceous vegetable plants in Salhia district, Sharkia Governorate.

c) Whitefly insects

The total number of whitefly *Bemisia tabaci* (Genn.) individuals infesting cucumber and squash plants during 2006 and 2007 seasons are shown in Table (1) .

In both seasons, it seems that the total number of *B. tabaci* collected from cucumber were higher than those collected from squash plants. Also the total number of collected whitefly insects during 2007 season was higher than those recorded in 2006 season.

3.2 Seasonal abundance of the dominant homopterous insects

a) Aphid insects

i) *Myzus persicae*

Tables (2-5) showed that the population density of *M. persicae* recorded one peak on cucumber and squash plants at the 4th week of August (137,195 insects/sample on cucumber and 240,317 insects/sample) on squash at 30.4 C°, 31.2C° with 65.4% and 65.5% %R.H. in 2006 and 2007season ,respectively .

ii) *Aphis gossypii*

One peak of *A. gossypii* population density occurred on cucumber plants and squash plants, it was observed in the 4th week of August (112, 288 insects/sample on cucumber plants and 190,270 insects/sample on squash plants) at 30.4 C°, 31.2C° with 65.4% and 65.5%R.H. in 2006 and 2007seasons ,respectively .

This result agree with Berlandir, *et al*,1997, Berry,1998,Kozma *et al*,2001 and Webb ,2007 who recorded that the melon aphid, *Aphis gossypii*, and the green peach aphid, *Myzus persicae*, are common on squash and cucumber plants.

b) Leafhopper insects

Empoasca decedens , *E. decipiens* and *Cicadulina chinai* were the most abundant leafhopper species on cucumber and squash plants during 2006 and 2007 seasons .

i) *Empoasca decedens* and *E. decipiens*

The weekly numbers of *E. decedens* and *E. decipiens* collected from cucumber and squash plants in 2006 and 2007seasons are recorded in Tables (2-5) .One peak of the aforementioned species population density were recorded on both cucumber and squash plants. It occurred at 4th week of August with a total number of 27,43 insects/sample for *E. decedens* and 26,38 insects/sample for *E. decipiens* on cucumber plants ,while on squash plants it was 49,56 insects/sample for *E. decedens* and 38,47 insects /sample for *E. decipiens* at a mean temperature of 30.4 C°, 31.2C° with 65.4% and 65.5 %R.H. in 2006 and 2007seasons ,respectively.

ii) *Cicadulina chinai*

The population density of *C. chinai* showed one peak of abundance during the summer plantation of cucumber and squash Tables(2-5) ,The peak occurred in 4th week of August with a mean number of 21,35 insects/sample on cucumber plants and 37,52 insects/sample on squash plants at 30.4 C°, 31.2C° with 65.4% and 65.5% R.H. in 2006 and 2007seasons ,respectively .This result agree with Hashem,2005 who recorded that *E. decedens* and *E. decipiens* are the most leafhopper species abundant on squash plantations.

c) Whitefly insects *Bemisia tabaci*

The total number of *B. tabaci* specimens collected from cucumber and squash plants during 2006 and 2007 seasons are shown in Tables (2-5)

The obtained results show that the number of *B.tabaci* individuals fluctuated with general tendency to increase throughout the successive samples until reaching the peak of population density .Careful view of Tables (2-5) indicated that one peak representing high population density of whitefly individuals on cucumber and squash plants was recorded during the 1st week of September with a total number of 441,548 insects/sample on cucumber plants and 297,358 insects/sample on squash plants at 28.0 C°,32.3C° with 62.5% and 67.1%RH. for the two seasons, respectively. This results agree with those of Raupach *et al*, 2002 and Hector *et al.*, 2008 who recorded that whitefly insects are the principal insect pests in greenhouse production of cucumbers in Florida and it can build up to high numbers in cucumber and squash.

3.3 Effects of some agricultural practices on the population density of certain homopterous insects infesting cucumber and squash plants

3.3.1 Plant varieties

The influence of different plant varieties on the occurrence of aphids, leafhoppers and whitefly insects attacking cucumber and squash plants under field conditions at Diarb-Nigm district, Sharkia Governorate were studied during 2006 and 2007seasons and the results are shown in Tables (6-7).

l) Cucumber plants

a) Aphid insects

Results given in Tables (6 and 7) indicated that the tested three cucumber varieties could be arranged in descending order to the population density of aphid insects as follows : Alpha beta variety infested with a mean number of 65.125and 114.075 insects/sample for *A.gossypii* , 79.825and 103.875 insects /sample for *M. persicae* ,Japanese (50.95 and 89.05 insects/sample for *A.gossypii*, 67.125 and 83.775 insects /sample for *M. persicae* and Indian variety (42.025 and 69.1 insects/sample for *A.gossypii* , 47.475and 69.575 insects /sample for *M. persicae*)in 2006 and 2007 seasons , respectively .

b) Leafhopper insects

As shown in Tables (6 and 7) it could be noticed that the most susceptible variety was Alpha beta variety (19.975 and 24.475 insects/sample for *E. decedens*,16.75and 23.025 insects /sample for *E. decipiens* and 11.70 and 21.025 insects/sample for *C. china*), followed by Japanese variety (15.725 and 20.925 insects/sample for *E. decedens*

,13.625 and 18.45 insects /sample for *E. decedens* and 10.05 and 16.2 insects/sample for *C. china* during 2006 and 2007 seasons, respectively), whereas the lowest population density was recorded on Indian variety (11.65 and 17.2 insects/sample for *E. decedens*, 8.675 and 13.8 insects /sample for *E. decipiens* and 8.1 and 12.05 insects/sample for *C. china*) in both seasons ,respectively .

c) Whitefly insects

As obvious in Tables (6 and 7) the lowest mean number of whitefly insects *B. tabaci* was recorded on Indian variety infested with a mean number of 187.775 and 229.05 insects/sample, followed by Japanese variety (233.125 and 272.025 insects/sample), whereas the highest population density was observed on Alpha beta variety infested by 279.4 and 334.475 insects/sample for 2006 and 2007 seasons, respectively.

Generally, from the obtained results, it could be concluded that Alpha beta variety was more susceptible to aphids, leafhoppers and whitefly insects infestation, whereas Indian variety was the least susceptible variety.

II) Squash plants

a) Aphid insects

Results given in Tables (6 and 7) indicated that the population density of aphid insects on the tested three squash varieties could be arranged in descending order as follows : Top Kapi variety infested with a mean number of 137.825 and 185.15 insects/sample for *A. gossypii* , 157.475 and 189.275 insects /sample for *M. persicae* for 2006 and 2007 seasons , respectively , Escandarani variety (103.4 and 150.625 insects/sample for *A. gossypii*, 142.4 and 176.175 insects /sample for *M. persicae* and Holland variety (90.775 and 118.25 insects/sample for *A. gossypii* , 118.325 and 147.65 insects /sample for *M. persicae* during 2006 and 2007 seasons ,respectively.

b) Leafhopper insects

As shown in Tables (6 and 7) it could be mentioned that the least susceptible variety was Holland (19.675 and 21.725 insects/sample for *E. decedens* ,14.65 and 18.275 insects /sample for *E. decipiens* ; 13.725 and 20.6 insects/sample for *C. china*), followed by Escandarani variety (23.75 and 27.225 insects/sample for *E. decedens* ,18.5 and 21.4 insects /sample for *E. decipiens* ; 17.3 and 27.2 insects/sample for *C. china* during 2006 and 2007 seasons, respectively, whereas the highest population density was recorded on Top Kapi variety (26.225 and 30.975 insects/sample for *E. decedens* ,21.425 and 26.45 insects /sample for *E. decipiens* and 20.275 and 35.5 insects/sample for *C. china* during 2006 and 2007 seasons, respectively).

c) Whitefly insects

As seen in Tables (6 and 7) the lowest mean number of whitefly insects *B. tabaci* was recorded on Holland variety (112.775 and 140.525 insects/sample), followed by Escandarani variety (148.35 and 181.45 insects/sample), whereas the highest population density was recorded on Top Kapi variety (154.45 and 214.0 insects/sample) for 2006 and 2007 seasons, respectively.

Generally, from the obtained results, it could be concluded that Top Kapi variety was more susceptible to aphids, leafhoppers and whitefly insects infestation, whereas Holland variety was the least susceptible variety.

Statistical analysis indicated that the differences between the mean number of aphids, leafhoppers and whitefly insects infesting the different varieties of cucumber and squash plants were significant during 2006 and 2007 seasons. These results agreed with the findings of Hector *et al*, 2008 who found that there are differences between cucumber and squash varieties for homopterous insect infestation and their resistance for plant diseases

3.3.2. Effect of potassium fertilization.

Effect of different potassium fertilization levels on the population density of aphids, leafhoppers and whitefly insects infesting cucumber and squash plants was studied and the results are shown in Tables (8 and 9)

I) Cucumber plants

a) Aphid insects

Results in Tables (8 and 9) show indicated that the highest mean number of aphid insects infesting cucumber plants (60.266 and 99.966 insects/sample for *A. gossypii* 71.566 and 93.933 insects/sample for *M. persicae*) recorded with "zero potassium fertilization /feddan" during 2006 and 2007 seasons, respectively, while the lowest mean number of aphid insects (45.633 and 81.933 insects /sample for *A. gossypii*, 58.466 and 77.766 insects/sample for *M. persicae*) occurred with " 200 kg potassium sulphate /feddan" during the both seasons, respectively.

b) Leafhopper insects

According to data in Tables (8 and 9) the highest mean number of leafhopper insects infesting cucumber plants (19.366 and 25.366 insects/sample for *E. decedens*, 16.4 and 23.5 insects/sample for *E. decipiens* and 12.066 and 20.60 insects/sample for *C. china*) occurred with "zero potassium fertilization /feddan" during 2006 and 2007 seasons, respectively, while the lowest mean number of leafhopper insects (12.133 and 16.4 insects/sample for *E. decedens*, 9.566 and 13.766 insects/sample for *E. decipiens* and 8.1 and 12.366 insects/sample for *C. china*) was recorded with "200 kg potassium sulphate /feddan" during the both seasons, respectively.

c) Whitefly insects

As seen in Tables (8 and 9), the highest mean number of whitefly insects infesting cucumber plants (250.881 and 316.287 insects/sample) was recorded with " zero potassium fertilization /feddan" during 2006 and 2007 seasons, respectively, while the lowest mean number of whitefly insects (179.296 and 218.502 insects/sample) occurred with " 200 kg potassium sulphate /feddan "during the both seasons, respectively.

II) Squash plants

a) Aphid insects

According to data in Tables (8 and 9), the highest mean number of aphid insects infesting squash plants (127.3 and 172.3 insects/sample for *A. gossypii*, 155.666 and 192.266 insects/sample for *M. persicae*) were recorded with " zero potassium fertilization /feddan" during 2006 and 2007 seasons,

respectively, while the lowest mean number of aphid insects (93.9 and 130.866 insects/sample for *A. gossypii*, 123.533 and 146.633 insects/sample for *M. persicae*) occurred with "200 kg potassium sulphate /feddan" during the both seasons, respectively.

b) Leafhopper insects

Results in Tables (8 and 9) showed that the highest mean number of leafhopper insects infesting squash plants (29.266 and 32.766 insects/sample for *E. decedens*, 23.6 and 27.9 insects/sample for *E. decipiens* and 22.1 and 34.466 insects/sample for *C. china*) occurred with "zero potassium fertilization /feddan" during 2006 and 2007 seasons, respectively, while the lowest mean number of leafhopper insects (17.8 and 20.466 insects/sample for *E. decedens*, 13.266 and 16.2 insects/sample for *E. decipiens* and 12.633 and 21.6 insects/sample for *C. china*) was recorded with "200 kg potassium sulphate /feddan" during the both seasons, respectively.

c) Whitefly insects

As shown in Tables (8 and 9), it could be mentioned that the highest mean number of whitefly insects infesting squash plants (164.639 and 207.005 insects/sample) was recorded with "zero potassium fertilization /feddan" during 2006 and 2007 seasons, respectively, while the lowest mean number of whitefly insects (104.906 and 137.087 insects/sample) occurred with "200 kg potassium sulphate /feddan" during the both seasons, respectively.

Statistical analysis indicated that the effect of the different potassium fertilization levels on the population density of aphids, leafhoppers and whitefly insects infesting cucumber and squash plants were significant during 2006 and 2007 seasons.

In general, it could be concluded that the potassium fertilization levels influenced pronouncedly on the population density of the aforementioned homopterous insects infesting cucumber and squash plants as the results show, that the highest mean number of insects was recorded with the least level of potassium fertilization treatment (zero kg potassium sulphate /feddan), while increasing this level to 200 kg potassium fertilization /feddan reduced markedly the insect infestation. Therefore it could be recommended that fertilization with 200 kg potassium fertilization /feddan is very suitable to decrease the aforementioned insects infestation. These results are in agreement with the finding of Hashem, 2005 and Youssef, 2006.

3.4 Relationship between certain chemical constituents of cucumber and squash varieties and infestation with aphids, leafhoppers and whitefly insects

Data given in Tables (10 and 11) indicated that the effects of different chemical constituents of cucumber and squash varieties on the population density of aphids, leafhoppers and whitefly insects were significant.

3.4.1. Cucumber plants

1) Protein "P.C.", Carbohydrates contents "C.C." and pH values

The results showed negatively relationship between protein, carbohydrate contents and pH values with aphids, leafhoppers and whitefly insects infestation in all three cucumber varieties.

8+9

Data in Table (10) showed that in case of Indian variety the mean number of aphids, leafhoppers and whitefly/ sample was 155, 54.7 and 260.77 with control zero potassium fertilization (0.50% p.c., 2.4 C.C and 5.8pH, respectively) and it decreased to 122.8, 32.4 and 179.0 insects / sample for aphids, leafhoppers and whitefly, respectively by increasing the protein, carbohydrate content and pH value to 0.80, 3.7 and 7.0, respectively with 200kg potassium fertilization/feddan. The same trend was recorded on Japanese and Alpha beta varieties.

II) Phosphorous, Potassium and Calcium:

Statistical analysis of obtained data showed that effect of phosphorous, potassium and calcium percentages in cucumber plant varieties on insect infestation was not significant (Table 10).

From the obtained results Indian variety was the lowest in total protein, carbohydrate contents and the highest pH value, was also the least susceptible to the aforementioned insect's infestation.

It is worth to mention that aphids, leafhoppers and whitefly insects infestation was correlated with the chemical constituents of the used cucumber varieties.

3.4.2. Squash plants

I) Protein "P.C.", Carbohydrates contents "C.C." and pH values

The results showed negatively relationship between protein, carbohydrate contents and pH values with aphids, leafhoppers and whitefly insects infestation in all three squash varieties.

As seen in Table (11), the lowest mean number of insects was recorded on Holland variety (277.54, 77.7 and 168.35 insects/sample, for aphids, leafhoppers and whitefly insects respectively with 0.51 total protein, 2.4 C.C. and 5.4 pH. in control treatment (without potassium fertilization), followed by Escandarani variety (333.9, 95.6 and 209.87 insects/sample, for aphids, leafhoppers and whitefly insects, respectively with 0.54 total protein, 2.7 C.C. and 5.6 pH. with control treatment, while the highest mean number of the aforementioned insects was observed in Top Kapi variety with 0.58 total protein, 2.8 C.C. and 5.9 pH. (382.81, 112.1 and 242.79 insects/sample, for aphids, leafhoppers and whitefly insects, respectively).

It is worth to mention that the mean number of the aforementioned insects was decreased gradually by increasing the rate of potassium fertilization for the three tested squash varieties, whereas the mean number of insects occurred on Holland variety was 223.45, 45.3 and 104.92 for aphids, leafhoppers and whitefly insects, respectively with 0.76 P.C., 3.9 C.C. and 6.8 pH at 200 kg potassium fertilization/feddan, followed by Escandarani and Top Kapi varieties at 200 kg potassium fertilization/feddan 260.44, 293.18 for aphids, 56.1, 73.4 for leafhoppers and 138.92, 167.4 for whitefly with 0.78 P.C., 0.81 P.C., 4.0 C.C., 4.1 C.C. and 6.9 pH, 7.0 pH on Escandarani variety and Top Kapi variety, respectively.

II) Phosphorous, Potassium and Calcium:

Statistical analysis of obtained data showed that effect of phosphorous, potassium and calcium percentages in squash plant varieties was not significant (Table 11).

From the obtained results Top Kapi variety was the highest total protein, carbohydrate contents and the highest pH value, the least susceptible to the aforementioned insect's infestation.

Generally, chemical analysis of the used cucumber and squash varieties with different levels of potassium fertilization confirmed that aphids ,leafhoppers and whitefly insects infestation was negatively related with protein, carbohydrate contents and pH values.

It is worth to mention that under field condition with zero potassium fertilization/feddan insects infestation positively correlated with P.C. and C.C. in different cucumber and squash varieties , while negative correlation was recorded in case of pH values and insects infestation .

These results agreed with those recorded by Moran and Schultz ,(1998); Fredric *et al.*, (2006); El Gindy, 2006 and Hegab ,(2008) who mentioned similar trends on other plants.

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تأثير بعض أصناف الخيار والكوسة و التسميد البوتاسي على الإصابة ببعض الحشرات متشابهة الأجنحة

علا ابراهيم محمد حجاب و على مرسى سليمان حجاب
قسم وقاية النبات كلية الزراعة جامعة الزقازيق , الزقازيق، مصر

أجري هذا البحث في منطقة ديرب نجم بمحافظة الشرقية خلال موسمي الدراسة ٢٠٠٦، ٢٠٠٧ في هذه الدراسة تم اختبار تأثير ثلاثة أصناف من الخيار (هندي، ياباني، ألبايتا) وثلاثة أصناف من الكوسة هي (هولاندي، اسكندراني، توب كابي) للإصابة ببعض حشرات متشابهة الأجنحة وهي المن ونطاطات الأوراق والذبابة البيضاء. وقد سجلت النتائج الآتية:

- ١- تواجد نوعين من حشرات المن وهما من القطن ومن الخوخ وقد سجلت كثافة المجموع لكل منهما قمة تعداد واحدة على كل من الخيار والكوسة في الأسبوع الرابع من أغسطس خلال موسمي الدراسة.
- ٢- تواجد ثمانية أنواع من نطاطات الأوراق على كل من الخيار والكوسة وأن أكثر الأنواع السائدة من حشرات نطاطات الأوراق هي *E. decedens*، *E. decipiens*، *C. china* و سجلت كثافة المجموع لهذه الحشرات قمة تعداد واحدة في الأسبوع الرابع من أغسطس على كل من الخيار والكوسة خلال موسمي الدراسة.
- ٣- تواجد حشرة ذبابة القطن البيضاء بأعداد كبيرة وقد سجلت قمة نشاط واحدة في الأسبوع الأول من سبتمبر على كلا من الخيار والكوسة خلال موسمي الدراسة.
- ٤- وقد أظهرت النتائج أن الصنف هندي في الخيار أقل أصناف الخيار حساسية للإصابة بالحشرات السابقة بينما كان الصنف ألبايتا أكثر الأصناف حساسية للإصابة كما أوضحت النتائج أن صنف الكوسة هولاندي كان أقل الأصناف حساسية للإصابة بهذه الحشرات وكان الصنف توب كابي أكثر أصناف الكوسة حساسية للإصابة بهذه الآفات.
- ٥- وقد صاحب مستوي التسميد البوتاسي (٢٠٠ كجم سلفات بوتاسيوم/فدان) أقل تعداد للإصابة بالحشرات السابق ذكرها بينما صاحب المستوى (صفر كجم سلفات بوتاسيوم/فدان) أكثر تعداد للإصابة بهذه الحشرات.
- ٦- كذلك درست العلاقة بين المحتوى الكيميائي للأصناف المختبرة لكل من نباتات الخيار والكوسة وبين درجة الإصابة بالحشرات السابقة الذكر وقد ثبت وجود انه يوجد علاقة سالبة بين نسبة البروتين ونسبة الكربوهيدرات وقيمة pH في الأصناف المختبرة وبين تعداد حشرات المن ونطاطات الأوراق والذبابة البيضاء التي تصيب تلك الأصناف.

Table(1):Total number of aphids ,leafhoppers and whitefly insects species collected from some cucumber and squash plant varieties at Diarb-Nigm district,Sharkia Governorate during 2006 and 2007 seasons.

Insects species	Seasons	Total number of insects					
		Cucumber			Squash		
		Indian	Japanese	Alpha beta	Holland	Escandarani	Top Kapi
<i>Aphis gossypii</i>	2006	5043	6114	7815	10893	12408	16539
	2007	8292	10686	13689	14190	18075	22218
<i>Myzus persicae</i>	2006	5697	8139	9579	14199	17088	18897
	2007	8349	10053	12465	17718	21141	22713
<i>Empoasca decedens</i>	2006	1398	1887	2397	2361	2850	3147
	2007	2064	2511	2937	2607	3267	3717
<i>E.deci piens</i>	2006	1041	1635	2010	1758	2220	2571
	2007	1656	2214	2763	2193	2568	3170
<i>Cicadulina chinai</i>	2006	972	1206	1404	1647	2076	2433
	2007	1446	1944	2523	2472	3264	4260
<i>E. distinguend</i>	2006	8	11	14	7	10	13
	2007	10	13	16	9	12	17
<i>Nephotettix apicalis</i>	2006	13	18	21	15	18	20
	2007	17	22	25	19	23	25
<i>Balclutha hortensis</i>	2006	16	22	25	14	17	18
	2007	20	25	28	19	20	22
<i>E. lybica</i>	2006	7	9	14	8	10	13
	2007	10	13	15	11	13	17
<i>Circulifora tenellus</i>	2006	9	12	14	10	12	15
	2007	11	15	16	11	15	17
<i>Bemisia tabaci</i>	2006	22533	27975	33528	13533	17802	18534
	2007	27486	32643	40137	16863	21774	25680

Table(2):Total numbers of aphids *Aphis gossypii*(Glov.),*Myzus persicae* (Sulzer), leafhoppers *Empoasca decedens* (Paoli), *E. decipiens* (Paoli) , *Cicadulina chinai*(Ghauri)and whitefly*Bemisia tabaci* (Genn.) infesting cucumber plants at Diarb-Nigm district , Sharkia Governorate, Egypt during 2006 season.

Date of inspection (weekly)	Number of insects/sample									
	<i>A. gossypii</i>	<i>M. persicae</i>	<i>E. decedens</i>	<i>E. decipiens</i>	<i>C. chinai</i>	Whitefly <i>B.tabaci</i>		Total	Means	
						adult	immature		Temp.C°	R.H.%
July 1 st	0	0	0	0	0	0	0	0	31.4	65.0
2 nd	0	0	0	0	0	0	0	0	30.6	65.7
3 rd	2	1	1	1	1	14	9	23	30.4	67.7
4 th	15	12	6	4	2	33	21	54	29.9	67.0
Aug. 1 st	23	41	15	7	6	77	44	121	30.2	67.5
2 nd	40	84	19	10	14	95	95	190	30.2	66.2
3 rd	67	102	21	17	16	116	178	294	30.9	66.8
4 th	112	137	27	26	21	171	205	376	30.4	65.4
Sep. 1 st	83	83	22	21	17	161	281	441	28.0	62.5
2 nd	71	43	17	16	12	114	227	341	29.8	64.2
3 rd	55	22	12	8	7	74	176	250	29.1	64.0
4 th	21	9	4	2	1	39	88	127	28.7	61.5
Total	489	534	144	112	97	894	1324	2220		

Table(3):Total numbers of aphids *A. gossypii*(Glov.),*Myzus persicae* (Sulzer), leafhoppers *Empoasca decedens* (Paoli), *E. decipiens* (Paoli) , *C. chinai*(Ghauri)and whitefly*Bemisia tabaci* (Genn.) infesting cucumber plants at Diarb-Nigm district , Sharkia Governorate, Egypt during 2007 season.

Date of inspection (weekly)	Number of insects/sample									
	<i>A. gossypii</i>	<i>M. persicae</i>	<i>E. decedens</i>	<i>E. decipiens</i>	<i>C. chinai</i>	Whitefly <i>B.tabaci</i>		Total	Means	
						adult	immature		Temp.C°	R.H.%
July 1 st	0	0	0	0	0	0	0	0	30.9	65.2
2 nd	0	0	0	0	0	0	0	0	31.2	64.7
3 rd	4	1	1	1	1	13	9	22	31.5	63.5
4 th	33	18	9	7	3	29	54	83	33.2	67.1
Aug. 1 st	65	58	19	15	10	68	97	165	31.9	67.4
2 nd	126	95	28	22	20	95	148	243	31.7	69.5
3 rd	210	123	36	30	30	169	214	383	31.8	67.0
4 th	288	195	43	38	35	217	276	493	31.2	65.5
Sep. 1 st	210	151	29	30	22	185	363	548	32.3	67.1
2 nd	153	82	20	21	18	152	270	422	29.5	64.5
3 rd	97	31	15	15	11	75	157	232	29.6	64.7
4 th	58	17	5	7	6	31	77	108	28.9	65.0
Total	1244	771	205	186	156	1034	1665	2699		

Table(4): Total numbers of aphids *A. gossypii*(Glov.), *Myzus persicae* (Sulzer), leafhoppers *Empoasca decedens* (Paoli), *E. decipiens* (Paoli) , *C. chinai* (Ghauri)and whitefly *Bemisia tabaci* (Genn.) infesting squash plants at Diarb-Nigm district , Sharkia Governorate, Egypt during 2006 season.

Date of inspection (weekly)	Number of insects/sample								Temp.C°	R.H.%
	A. gossypii	M. persicae	E. decedens	E. decipiens	C. chinai	Whitefly B.tabaci		Total		
						adult	immature			
July 1 st	0	0	0	0	0	0	0	0	31.4	65.0
2 nd	0	0	0	0	0	0	0	0	30.6	65.7
3 rd	15	16	1	1	1	7	2	9	30.4	67.7
4 th	45	55	9	8	8	11	9	20	29.9	67.0
Aug. 1 st	80	92	19	17	13	23	28	51	30.2	67.5
2 nd	120	140	29	23	21	53	52	105	30.2	66.2
3 rd	150	205	38	30	29	87	84	171	30.9	66.8
4 th	190	240	49	38	37	123	135	258	30.4	65.4
Sep. 1 st	170	193	40	31	29	113	184	297	28.0	62.5
2 nd	140	175	32	21	19	72	163	235	29.8	64.2
3 rd	90	140	22	14	14	24	115	139	29.1	64.0
4 th	35	79	13	7	8	12	81	93	28.7	61.5
Total	1035	1335	252	190	179	525	853	1378		

Table(5): Total numbers of aphids *A. gossypii*(Glov.), *Myzus persicae* (Sulzer), leafhoppers *Empoasca decedens* (Paoli), *E.decipiens* (Paoli) , *C. chinai*(Ghauri)and whitefly *Bemisia tabaci* (Genn.) infesting squash plants at Diarb-Nigm district , Sharkia Governorate, Egypt during 2007 season.

Date of inspection (weekly)	Number of insects/sample								Temp.C°	R.H.%
	<i>A gossypii</i>	<i>M persicae</i>	<i>E decedens</i>	<i>E decipiens</i>	C. chinai	Whitefly <i>B.tabaci</i>				
						adult	immature	Total		
July 1 st	0	0	0	0	0	0	0	0	30.9	65.2
2 nd	0	0	0	0	0	0	0	0	31.2	64.7
3 rd	20	20	2	1	1	9	2	11	31.5	63.5
4 th	80	66	11	9	12	16	16	32	33.2	67.1
Aug. 1 st	150	142	22	19	22	33	54	87	31.9	67.4
2 nd	180	189	31	26	32	64	87	151	31.7	69.5
3 rd	220	256	41	36	41	96	136	232	31.8	67.0
4 th	270	317	56	47	52	144	182	326	31.2	65.5
Sep. 1 st	200	275	46	40	40	122	236	358	32.3	67.1
2 nd	120	208	32	29	30	87	191	278	29.5	64.5
3 rd	85	125	22	18	20	58	105	163	29.6	64.7
4 th	39	84	15	9	17	23	80	103	28.9	65.0
Total	1364	1682	278	234	267	652	1089	1741		

Table (6): Mean number of aphids, leafhoppers and whitefly insects infesting different varieties of cucumber and squash plants at Diarb-Nigm district, Sharkia Governorate during 2006 season.

plant	Varieties	Mean number of insects/sample							
	Insects	<i>A. gossypii</i>	<i>M. persicae</i>	<i>E. decedens</i>	<i>E. decipiens</i>	<i>C. chinai</i>	<i>B. tabaci</i>		<i>Total</i>
							<i>Adult</i>	<i>immature</i>	
Cucumber	Indian	42.025	47.475	11.65	8.675	8.1	76.375	111.4	187.775
	Japanese	50.95	67.125	15.725	13.625	10.05	86.5	146.625	233.125
	Alph beta	65.125	79.825	19.975	16.75	11.7	99.45	179.95	279.4
Squash	Holland	90.775	118.325	19.675	14.65	13.725	44.275	68.5	112.775
	Escandarani	103.4	142.4	23.75	18.5	17.3	61.925	86.425	148.35
	Top Kapi	137.825	157.475	26.225	21.425	20.275	63.35	91.1	154.45
F		*	*	*	*	*			*

N.B. *F value is significant at $p > 0.05$

Table (7): Mean number of aphids, leafhoppers and whitefly insects infesting different varieties of cucumber and squash plants at Diarb-Nigm district, Sharkia Governorate during 2007 season.

Squash plants at Diani High district,Kenia during 2003 season									
plant	varieties	Mean number of insects/sample							
	insects	<i>A gossypii</i>	<i>M. persicae</i>	<i>E. decedens</i>	<i>E. decipiens</i>	<i>C chinai</i>	<i>B. tabaci</i>		Total
							Adult	immature	
Cucumber	Indian	69.1	69.575	17.2	13.8	12.05	84.925	144.125	229.05
	Japanese	89.05	83.775	20.925	18.45	16.2	100.475	171.55	272.025
	Alph beta	114.075	103.875	24.475	23.025	21.025	121.925	212.55	334.475
Squash	Holland	118.25	147.65	21.725	18.275	20.6	52.375	88.15	140.525
	Escandarani	150.625	176.175	27.225	21.4	27.2	72.2	109.25	181.45
	Top Kapi	185.15	189.275	30.975	26.45	35.5	79.55	134.45	214.0
F		*	*	*	*	*			*

N.B. *F value is significant at $p > 0.05$

Table (8): Effect of different potassium fertilization levels on the mean number of aphids, leafhoppers and whitefly insects infesting cucumber plants and squash plants during 2006 season.

Insects infesting cucumber plants and squash plants during 2000 season									
plant	Insects	Mean number of insects/sample							
	Fertilization	<i>A. gossypii</i>	<i>M. persicae</i>	<i>E. decedens</i>	<i>E. decipiens</i>	<i>C chinai</i>	<i>B. tabaci</i>		Total
							Adult	immature	
Cucumber	F1	60.266	71.566	19.366	16.4	12.066	107.633	171.033	250.881
	F2	54.8	66.8	16.833	14.233	10.366	93.566	156.133	241.193
	F3	50.1	62.4	14.8	11.866	9.266	81.1	138.833	212.560
	F4	45.633	58.466	12.133	9.566	8.1	67.466	117.966	179.296
Squash	F1	127.3	155.666	29.266	23.6	22.1	70.333	100.7	164.639
	F2	115.6	144.6	24.866	19.866	18.4	62.7	89.033	146.033
	F3	105.866	133.8	20.933	16.033	15.266	55.066	77.0	127.06
	F4	93.9	123.533	17.8	13.266	12.633	47.966	61.3	104.906
F		*	*	*	*	*			*

N .B. *F value is significant at $p > 0.05$

F1=zero kg potassium sulphate /feddan

F2= 50kg potassium sulphate/feddan

F3=100 kg potassium sulphate /feddan

F4=200 kg potassium sulphate /feddan

Table (9): Effect of different potassium fertilization levels on the mean number of aphids, leafhoppers and whitefly insects infesting cucumber plants and squash plants during 2007 season.

plant	Insects	Mean number of insects/sample							
	Fertilization	<i>A. gossypii</i>	<i>M. persicae</i>	<i>E. decedens</i>	<i>E. decipiens</i>	<i>C. chinai</i>	<i>B. tabaci</i>		Total
							Adult	immature	
Cucumber	F1	99.966	93.933	25.366	23.5	20.6	123.7	203.833	316.287
	F2	93.766	88.566	22.266	19.9	17.666	109.8	188.466	288.284
	F3	87.3	82.7	19.433	16.533	15.066	96.0	166.133	253.405
	F4	81.933	77.766	16.4	13.766	12.366	80.266	145.533	218.502
Squash	F1	172.3	192.266	32.766	27.9	34.466	81.33	133.066	207.005
	F2	157.6	179.2	28.933	24.0	29.7	72.466	119.133	185.011
	F3	144.6	166.033	24.4	20.066	25.3	62.866	103.633	160.784
	F4	130.866	146.633	20.466	16.2	21.6	55.5	86.633	137.087
	F	*	*	*	*	*			*

N .B. *F value is significant at $p > 0.05$

F1=zero kg potassium sulphate /feddan

F2= 50kg potassium sulphate/feddan

F3=100 kg potassium sulphate /feddan

F4=200 kg potassium sulphate /feddan

Table(10):Effect of potassium fertilization on protein %,carbohydrate %,Ca%,pH,P% and K% of the three cucumber varieties and its relation with certain homopterous insects infestation during 2007 season

variety	Treatments	P.C	C.C	Ca%	pH	P%	K%	A. gossypii	M. persicae	Total	E. decedens	E. decipiens	C. china	Total	whitefly		Total
															Adult	immature	
Indian	zero	0.50	2.4	0.032	5.8	0.16	0.2	77.9	77.1	155	20.5	18.6	15.6	54.7	94.27	166.5	260.77
	50	0.61	2.9	0.034	6.3	0.15	0.22	71.6	72.4	144	18.2	14.9	13.1	46.2	82.54	155.2	237.74
	100	0.72	3.1	0.038	6.8	0.22	0.31	66.0	66.9	132.9	16.3	11.9	10.7	38.9	72.0	135.8	207.8
	200	0.80	3.7	0.036	7.0	0.10	0.2	60.9	61.9	122.8	13.8	9.8	8.8	32.4	60.0	119.0	179
Japanese	zero	0.54	2.52	0.035	6.0	0.14	0.25	98.6	92.3	190.9	25.2	23.2	20.3	68.7	112.36	199.4	311.76
	50	0.65	3.1	0.037	6.4	0.08	0.24	91.8	86.8	178.6	22.1	19.8	17.3	59.2	99.0	185.2	284.2
	100	0.75	3.5	0.032	7.1	0.09	0.26	85.6	80.6	166.2	19.5	16.7	15.2	51.4	83.63	163.3	246.93
	200	0.82	3.9	0.034	7.3	0.10	0.23	80.2	75.4	155.6	16.9	14.1	12.0	43	70.36	138.3	208.66
Alpha beta	zero	0.56	2.8	0.035	6.2	0.12	0.24	123.4	112.4	235.8	30.4	28.7	25.9	85	130.72	246.6	377.32
	50	0.69	3.4	0.037	6.7	0.15	0.26	117.9	106.5	224.4	26.5	25.0	22.6	74.1	117.9	225.0	342.9
	100	0.80	3.8	0.038	7.4	0.17	0.28	110.3	100.6	210.9	22.5	21.0	19.3	62.8	106.18	199.3	305.48
	200	0.88	4.1	0.035	7.6	0.18	0.27	104.7	96.0	200.7	18.5	17.4	16.3	52.2	88.54	179.3	267.84
	F									*				*			*

N.B.:

*F value is significant at P>0.05

Pc. =Protein content

C.C. = carbohydrate content

Ca = Calcium percentage

P= phosphorus percentage

K = potassium percentage

Table(11): Effect of potassium fertilization on Protein %,carbohydrate %,ca%,pH,P% and K% of three squash varieties and its relation with certain homopterous insects infestation during 2007 season

variety	Treatments	P.C	C.C	Ca%	pH	P%	K%	A. <i>gossypii</i>	M. <i>persicae</i>	Total	E. <i>decedens</i>	E. <i>decipiens</i>	C. <i>chinai</i>	Total	whitefly		Total
															Adult	immature	
Holland	zero	0.51	2.4	0.049	5.4	0.1	0.20	124.27	153.27	277.54	27.6	23.4	26.7	77.7	59.45	108.9	168.35
	50	0.58	3.2	0.035	6.2	0.89	0.23	112.09	141.0	253.09	23.6	19.7	21.8	65.1	51.72	95.9	147.62
	100	0.69	3.6	0.04	6.5	0.09	0.25	101.63	135.27	236.90	19.3	16.6	18.4	54.3	42.54	79.6	122.14
	200	0.76	3.9	0.037	6.8	0.85	0.24	92.0	131.45	223.45	16.4	13.4	15.5	45.3	36.72	68.2	104.92
Escandarwani	zero	0.54	2.7	0.032	5.6	0.17	0.23	154.54	179.36	333.9	34.1	27.3	34.2	95.6	77.27	132.6	209.87
	50	0.64	3.5	0.034	6.4	0.18	0.26	142.18	166.90	309.08	29.8	23.3	29.3	82.4	69.45	117.4	186.85
	100	0.72	3.8	0.047	6.6	0.19	0.25	130.18	154.72	284.9	25.1	19.5	24.6	69.2	61.09	102.8	163.89
	200	0.78	4.0	0.036	6.9	0.16	0.24	120.81	139.63	260.44	19.9	15.5	20.7	56.1	54.72	84.2	138.92
Top Kapi	zero	0.58	2.8	0.033	5.9	0.18	0.25	191.09	191.72	382.81	36.6	33.0	42.5	112.1	85.09	157.7	242.79
	50	0.66	3.6	0.044	6.5	0.10	0.23	175.54	180.81	356.35	33.4	29.0	38.0	100.4	76.45	144.1	220.55
	100	0.75	3.9	0.036	6.7	0.09	0.24	162.54	166.63	329.17	28.8	24.1	32.9	85.8	67.81	128.5	196.31
	200	0.81	4.1	0.041	7.0	0.08	0.25	144.09	149.09	293.18	25.1	19.7	28.6	73.4	59.90	107.5	167.4
	F									*				*			*

N.B.: *F is significant at $P>0.05$

Pc. =Protein content C.C. = carbohydrate content

Ca = calcium percentage P= phosphorus percentage

K= potassium percentage