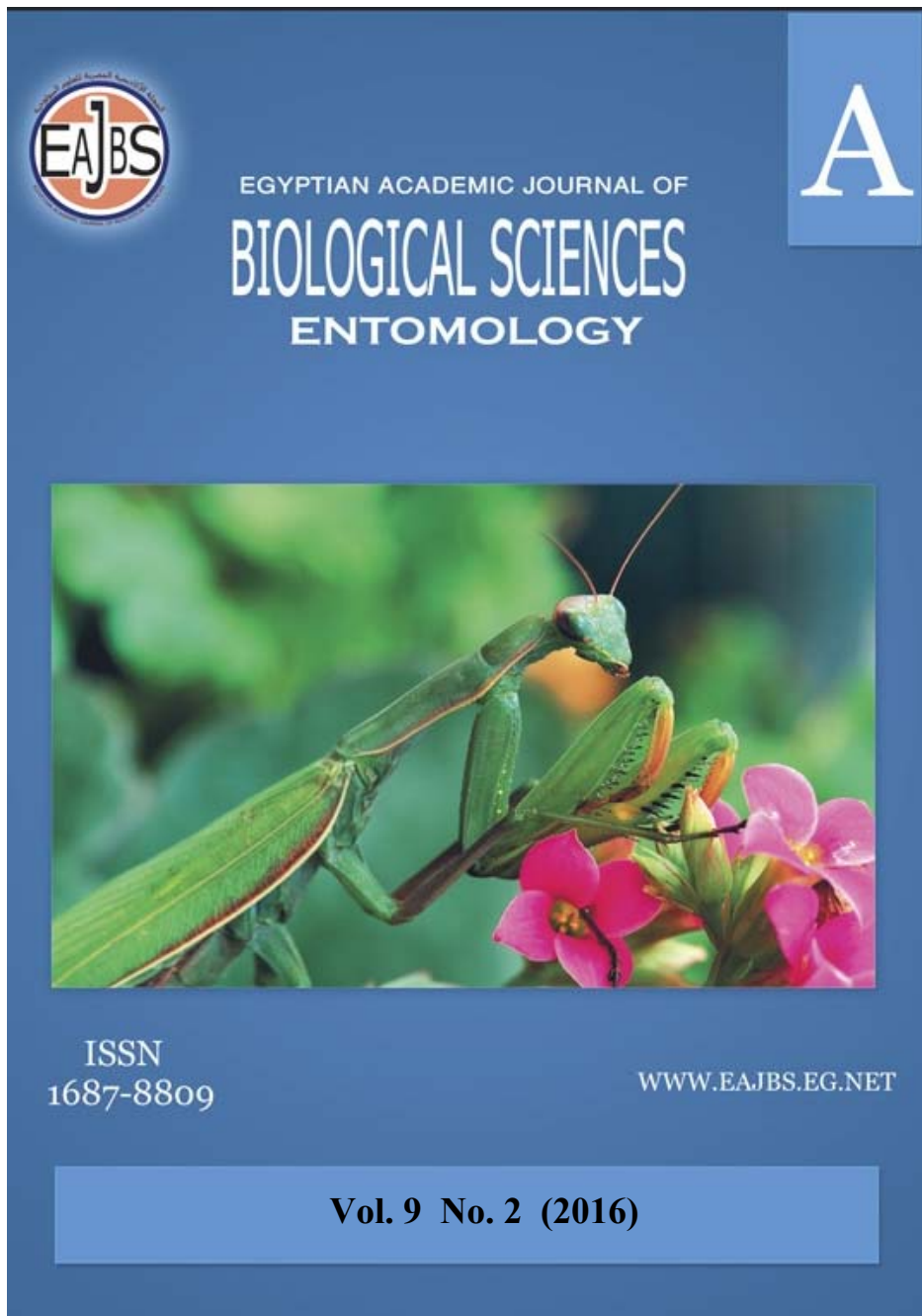
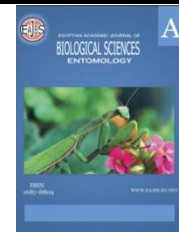


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Effect of Planting Dates on Infestation with Certain Pests and Yield of Cucumber Plants During Fall Plantation in Giza Governorate.

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ABSTRACT

The effect of three planting dates of cucumber seeding during fall plantation (August, 1st, August, 22nd and September, 12th) on levels of infestation with four pests, aphid, *Aphis gossypii* Glover, whitefly, *Bemisia tabaci* (Genn.), thrips, *Thrips tabaci* Lind. And *Tetranychus urticae* (Koch) and on yield of this plant, were studied during two successive seasons (2014 and 2015). The degree of infestation by *A. gossypii* and *B. tabaci* increased significantly by delaying planting date, as cucumber plants cultivated in the earliest planting date (August, 1st) were attacked by the lowest numbers and highest weight of cucumber fruits, while the plants of the latest planting date (September, 12th) were more liable to insects infestation with lowest weight of cucumber fruits. The results showed that, the mean rate of infestation with *A. gossypii* were (5.1, 9.2 and 11.9 individuals/leaf) during 2014 season and (5.5, 10.6 and 12.4 individuals/leaf) during 2015 season for the three tested dates, respectively. So, the mean number of infestation with *B. tabaci* were (8.5, 15.4 and 13.6 nymphs/ leaf) during 2014 season, (7.8, 13.7 and 12.2 nymphs/ leaf) during 2015 season for the three dates, respectively. also, the highest weight of cucumber yield (20.5 and 19.7 kg/ 100m² in the two seasons, respectively) was obtained. On the contrary, the populations of *T. tabaci* and *T. urticae* increased significantly with the early planting date compared with cucumber plants cultivated in the latest planting date during the two seasons. Therefore, it was concluded that, the planting date was effective on the rate of infestation with pests and yield of cucumber plants.

INTRODUCTION

Cucurbits represent an important part of vegetable production and considered one of the most important agricultural crops in Egypt. They are cultivated in wide areas either old lands or newly reclaimed lands. The high production of cucurbit vegetables especially cucumber, *Cucumis sativus* L., of prime important aspect for local consumption and export purpose. This crop is infested by many pests, which are causing a considerable damage in either quantity or quality. They have established attacking by many serious pests such as aphid, *Aphis gossypii* Glover, whitefly, *Bemisia tabaci* (Genn.) and thrips, *Thrips tabaci* Lind. The nymphal and adult stages of these pests feed on phloem sap and excrete honeydew that hamper photosynthesis and render fruits unmarketable. Numerous investigators have studied the effect of planting dates and infestation with certain pests on different crops, Abou-Taka and Zohdy (1990), Yasarakinci and Hincal (1997) El-Habi *et al.* (1999), Koschier *et al.* (2002), Mohamed (2011), Ghallab *et al.* (2011), El-Saeidy *et al.*

(2012), Maklad *et al.* (2012) and Hanafy *et al.* (2014).

The aim of this study is to avoid those injurious pests infesting cucumber depending on the suitable planting date without applying any chemical pesticides, which have some bad side effect on yields.

MATERIAL AND METHODS

Field experiment was carried out at El-Ayaat district in Giza Governorate during the fall plantation seasons, 2013 and 2014. Seeds of cucumber plants, *Cucumis sativus* L Fam. Cucurbitaceae (Medina variety) were used. The three selected planting dates at 21 days intervals were August, 1st, August, 22nd and September, 12th respectively. Normal agricultural practices were followed without insecticides treatments.

The experimental area about 1200m² was divided into 12 plots (each plot was 100 m²). The experimental plots were laid out in a randomized complete block design and each planting date was represented by four plots. Sampling of cucumber plants started 15 days after planting and were taken weekly until the end of plant life. In each sampling date, 30 leaves were picked randomly per plot, and the collected samples were kept in tight closed paper bags and transferred to the laboratory for inspecting by stereomicroscope to count the number of *Aphis gossypii* Glover, insects / leaf, *Bemisia tabaci* (Genn.) nymphs /leaf, *Thrips tabaci* Lind nymphs and adults/leaf and movable stages of *Tetranychus urticae* (Koch)/ leaf. Resulted cucumber of the fruit Production (kg) /100 m² was assessed for 10 inspections started 45 days after planting with 3 days interval.

The statistical analyses of the present data were carried out using SAS program computer including f-test and L.S.D. value (SAS Institute, 2003).

RESULTS AND DISCUSSION

Data in Tables (1 to 5) showed the effect of tested three different planting dates on the infestation of cucumber leaves by some piercing sap sucking pests during the fall plantation seasons, 2014 and 2015 and mean weight of the yield.

1- *Aphis gossypii* Glover (individuals).

Date in Table (1) clearly showed that the population density of *Aphis gossypii* individuals on cucumber plants varied according to the planting date in the two studied seasons. Regarding the obtained data in the two seasons, the infestation levels with the studied pest/ leaf on cucumber increased successively by delaying planting date, as the highest infestation level (17.4 & 19.9 individuals) were observed during the latest planting date (September, 12th) in the two seasons, respectively. While the lowest infestation occurred on cucumber plants planted in the first planting date (August, 1st) as the whole average of *Aphis gossypii* individuals in the two seasons were 5.1 and 5.5 individuals/ leaf, respectively. The intermediate planting date (August, 22nd) occupied intermediate level of infestation, as the corresponding seasonal mean numbers were 9.2 and 10.6 individuals/ leaf in the two seasons, respectively.

These results agree with Shalaby, *et al.* (2013) on cucumber and Salman *et al* (2015) on faba been showed that were planted in the late planting date harbored the highest infestation rate with *A. gossypii*, while on contrary those planted in the early planting date harbored the lowest individuals numbers. While, other studies by Mohamed (2004) and Esmail (2013) in Egypt recorded the highest population of *A.*

gossypii on cucumber leaves in November. Also, El-Khayat *et al.* (2010) and Mohamed (2011) concluded that the different planting date during year effect on the development of numerous pests including *A. gossypii*, as soon as in the present study.

Table 1: Mean number of *Aphis gossypii* Glover individuals/leaf on cucumber plants at different planting dates during the fall plantation seasons, 2014 and 2015.

Sampling Schedule Dates	Mean no. of <i>Aphis gossypii</i> individuals/leaf					
	2014			2015		
	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th
August,15	0.0	-----	----	0.0	-----	----
22	0.2	-----	----	0.0	-----	----
29	0.9	-----	----	1.7	-----	----
September,5	1.8	1.8	----	5.3	4.6	----
12	7.6	3.8	----	5.2	7.3	----
19	13.9	7.6	-----	10.8	10.6	----
26	11.3	7.9	8.2	11.3	12.5	11.8
October,3	8.1	11.3	15.7	11.8	18.8	18.3
10	4.3	16.5	25.3	5.3	17.5	26.8
17	2.5	17	28.9	3.5	15.6	32.3
24	----	12.3	26.6	----	10.4	23.8
31	-----	8.5	19.6	----	6.6	24.2
November,7	-----	5.6	17.2	----	2.5	20.3
14	-----	----	12.2	----	----	19.6
21	----	----	11.6	----	----	15.3
28	-----	-----	8.6	----	-----	6.2
Mean ± SE	5.1±1.5 ^c	9.2±1.6 ^b	17.4±2.3 ^a	5.5±1.4 ^c	10.6±1.7 ^b	19.9±2.4 ^a
L.S.D.	2.9			3.8		

2- *Bemisia tabaci* (Genn.) nymphs.

Results in Table (2) revealed that the population density of *Bemisia tabaci* nymphs on cucumber plants differed significantly according to the planting date during the two successive seasons 2014 and 2015. In the first season, the population density of *B. tabaci* nymphs increased by delaying planting date. The cucumber plants were sown in the earliest planting date (August, 1st) infested significantly by the lowest mean number of *B. tabaci* (8.5 nymphs/leaf). On the contrary, the plants of the second and third planting dates (August, 22nd & September, 12th) harbored highest numbers of *B. tabaci* (15.4 & 13.6 nymphs/ leaf), respectively.

In the second season, results took the same trend as obtained in the first season. The seasonal mean numbers of *B. tabaci* found in this season were (7.8 , 13.7 and 12.2 nymphs/ leaf) for the three tested planting dates, respectively. The obtained data in the two studied seasons and their statistical analysis showed clearly that planting of cucumber seeds in the earliest planting date (August, 1st) escaped significantly from the infestation of *B. tabaci*.

These results agree with Mohamed (2011) who found that heaviest population of *B. tabaci* on squash was recorded on plants of the latest planting, while the lowest infestation occurred in the 1st planting date. In other investigation, Abd El-Gawad (2008) indicated that were significant differences between the different planting dates on the infestation by *B. tabaci* during nili season 2005/2006. While, Ali (1993), El-Khayat *et al.* (1994), Zaki *et al.* (2002) and Esmail (2013). They mentioned that the infestation by *B. tabaci* occurred on autumn cucumber in September then increased to reach the high level of population in October and November, then declined towards the end of cucumber growing season. Also, Seham *et al.* (1997),

Emam *et al.* (2006) and Mohamed (2011) concluded that the different planting date during year effect on the development of numerous pests including *B. tabaci*, as soon as in the present study.

Table 2: Mean number of *Bemisia tabaci* (Genn.) nymphs / leaf on cucumber plants at different planting dates during the fall plantation seasons, 2014 and 2015.

Sampling Schedule Dates	Mean no. of <i>Bemisia tabaci</i> nymphs /leaf					
	2014			2015		
	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th
August,15	0.0	-----	----	0.0	-----	----
22	0.0	-----	----	0.0	-----	----
29	2.7	----	----	0.7	----	----
September,5	2.2	0.0	----	1.2	0.0	----
12	5.8	3.6	----	4.6	2.7	----
19	9.6	18.8	----	11.7	12.5	----
26	19.3	18.3	5.6	15.2	16.3	4.2
October,3	19.3	22.5	18.8	16.8	25.6	12.5
10	16.2	21.8	17.3	16.3	19.2	15.3
17	9.8	19.8	20.2	11.5	16.5	18.7
24	----	22.6	22.3	----	18.4	24.6
31	----	18.5	22.7	----	15.8	20.2
November,7	----	8.2	12.2	----	10.2	12.2
14	----	----	9.5	----	----	5.5
21	----	----	4.2	----	----	3.5
28	----	-----	3.6	----	-----	2.2
Mean ± SE	8.5±2.4 ^b	15.4±2.6 ^a	13.6±2.4 ^a	7.8±2.2 ^b	13.7±2.4 ^a	12.2±2.5 ^a
L.S.D.		3.3			2.9	

3- *Thrips tabaci* Lind nymphs and adults.

Data in Table (3) indicated that, the rate of infestation by *T. tabaci* (nymphs and adults) on cucumber plants during the two successive fall seasons (2014 and 2015), increased with the early planting date. As for the third planting date (September, 12th), cucumber leaves harbored the lowest seasonal mean number of *T. tabaci* (1.6 and 1.5 individuals/leaf, respectively).

Table 3: Mean number of *Thrips tabaci* Lind individuals/ leaf on cucumber plants at different planting dates during the fall plantation seasons, 2014 and 2015.

Sampling Schedule Dates	Mean no. of <i>Thrips tabaci</i> individuals/leaf					
	2014			2015		
	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th
August,15	8.8	-----	----	5.5	-----	----
22	15.2	-----	----	13.3	-----	----
29	20.9	----	----	11.2	----	----
September,5	17.8	5.6	----	15.2	8.3	----
12	4.6	8.5	----	7.7	6.5	----
19	2.2	6.2	----	5.2	7.2	----
26	3.3	4.8	3.5	4.5	2.4	4.1
October,3	1.8	2.3	3.3	2.3	1.3	2.3
10	0.8	1.9	1.6	2.2	1.2	2.2
17	0.2	1.5	2.9	1.6	1.8	2.0
24	----	1.6	2.2	----	1.2	1.8
31	----	0.0	2.6	----	0.3	0.8
November,7	----	0.0	0.0	----	0.0	0.9
14	----	----	0.0	----	----	0.8
21	----	----	0.0	----	----	0.0
28	----	----	0.0	----	----	0.0
Mean ± SE	7.5±2.2 ^a	3.2±0.9 ^b	1.6±0.46 ^b	6.9±1.5 ^a	3.0±0.97 ^b	1.5±0.4 ^b
L.S.D.		2.5			1.8	

On the contrary, the earliest date (August, 1st) recorded the highest infestation rate (7.5 and 6.9 individuals/ leaf, respectively). The intermediate planting date (August, 22nd) occupied intermediate level of infestation, as the corresponding seasonal mean numbers were 9.2 and 10.6 individuals/ leaf in the two seasons, respectively. The cucumber plants were sown in the earliest planting date (August, 1st) significantly infested by the highest mean number of *T. tabaci* individuals.

Emam *et al.* (2006) and Mohamed (2011) concluded that the different planting date during year effect on the development of numerous pests including *T. tabaci*, as soon as in the present study. While, Abd El-Gawad (2008) indicated that there were no significant differences between the different planting dates on the infestation by *T. tabaci* during two nili seasons. In other investigation, El- Fakharany (2010) studied the population fluctuations reached maximal abundance in September and October in both seasons, temperature had highly significant effect on thrips infestations, velocity had a highly significant positive correlation with thrips. However, can reduce thrips damage on the cabbage heads by delay planting date was reported by kimberly *et al.* (1988).

4-Tetranychus urticae (Koch) mobile stages.

Results in Table (4) revealed that the population density of *Tetranychus urticae* individuals infesting cucumber leaves significantly differed according to the planting date during the two successive seasons, 2014 and 2015.

During the first season, the population density of *T. urticae* individuals increased by the earliest planting date. The cucumber plants were sown in the last planting date (September, 12th) significantly infested by the lowest mean number of *T. urticae* (5.2 individuals/ leaf).

Table 4: Mean number of *Tetranychus urticae* (Koch) individuals/leaf on cucumber plants at different planting dates during the fall plantation seasons, 2014 and 2015

Sampling Schedule Dates	Mean no. of <i>Tetranychus urticae</i> individuals/leaf					
	2014			2015		
	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th
August,15	7.8	-----	----	4.8	-----	----
22	20.5	-----	----	19.6	-----	----
29	26.7	----	----	22.2	----	----
September,5	22.2	8.3	----	24.2	5.9	----
12	18.6	20.2	----	17.7	16.2	----
19	18.2	22.2	----	16.9	17.6	----
26	19.3	19.8	10.4	12.3	22.1	9.2
October,3	10.8	12.3	16.2	16.5	11.5	15.3
10	15.8	10.9	7.6	9.7	11.3	12.1
17	8.2	6.5	9.3	9.3	10.3	8.6
24	----	3.6	5.3	----	8.6	5.3
31	----	4.3	3.4	----	2.2	1.8
November,7	----	3.7	0.0	----	0.0	0.9
14	----	----	0.0	----	----	0.8
21	----	----	0.0	----	----	0.0
28	----	----	0.0	----	----	0.0
Mean ± SE	16.8±1.9 ^a	11.2±2.3 ^b	5.2±1.7 ^c	15.3±1.9 ^a	10.6±2.1 ^b	5.4±1.7 ^c
L.S.D.	3.3			2.8		

On the contrary, the plants of the earliest planting date (August, 1st) harbored the highest number of *T. urticae* (16.8 individuals/ leaf). During the second season,

results took the same trend as obtained in the first season.

The seasonal mean numbers of *T. urticae* found in this season were (15.3, 10.6 and 5.4 individuals/ leaf) on August, 1st; August, 22nd and September, 12th planting date respectively.

Abd El-Gawad (2008) indicated that there were significant differences between the different planting dates on the infestation by *T. urticae* during the second nili season. While, Abd-El Gawad (2004) reported that *T. urticae* appeared during the period from October until February. Baiomy (2008) recorded the highest infestation by the spider mites on cucumber leaves were found in November. Also, El-khayat *et al.* (2010) they revealed that the numbers of different stages of *T. urticae* were increased by delaying the planting date. In other investigation, Mohamed (2004) found that the population of spider mites were low during September and October. The difference between results compared to those of the present investigation may be attributed to differences in the environmental condition between locations of experiments.

5-Effect of planting dates on yield:

In both studied fall plantation seasons (2014 and 2015), as shown in Table (5), data indicated that the cucumber yield increased by the earliest sowing date. The highest seasonal mean weight of cucumber fruits obtained from cucumber plants cultivated in the first planting date recording 205 and 197 kg. / 100m² in the two seasons, respectively. On the contrary, cucumber plants cultivated in the latest planting date produced the lowest weight of cucumber fruits of 151 and 144 kg. no. of production/100m² during the two fall plantation seasons, respectively. The second planting date (August, 22nd) produced weight of cucumber fruits being 193 and 175 kg./100m² in the two seasons, respectively. But there were no significant difference between first and second planting date.

Table 5: Comparison between planting dates and cucumber yields during the fall plantation seasons, 2014 and 2015.

number of harvest	Production (kg) /100 m ²					
	2014			2015		
	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th	1 st planting Aug.,1 st	2 nd planting Aug.,22 nd	3 rd planting Sept.,12 th
1	8.5	10.3	7.3	9.5	8.3	6.7
2	18.3	17.5	15.7	16.3	18.7	13.5
3	24	25.3	20.3	26.5	26	16.5
4	28.5	25.5	20.7	27.3	25.5	19.3
5	27.8	23.3	19.5	25.5	21.5	21.0
6	24.5	22.7	18.3	24.7	19.7	17.4
7	25.3	20.5	16.5	22.7	18.5	14.5
8	21.5	20.7	13.7	20.3	16.5	16.7
9	16.5	18.5	10.5	15.5	12.7	11.3
10	10.5	9.0	8.5	9.3	7.7	7.3
Total kg/100m ²)	205.4	193.3	151	197.6	174.6	144.2
Overall mean± SE	20.5±2.2 ^a	19.3±1.8 ^a	15.1±1.6 ^b	19.7±2.1 ^a	17.5±2.0 ^a	14.4±1.5 ^b
L.S.D.	3.1			2.7		

The present results agree with those of Saglan and Yasgan (1999), on cucumber recorded that the highest yield (17.53 t/ha) was obtained from the first sowing date in July and from the 3 days harvesting interval. Ekesi *et al.* (1996) and Helalia *et al.* (2011), on cowpea, they stated that the earliest planting date in July produced significantly high weight of yield. Also, Seham *et al.* (1997) and Mohamed (2011) concluded that the different planting date during year effect on the yield, as

soon as in the present study.

It could be concluded that the first and second planting dates in the present study gave higher yield than the delay planting date and this may be related to the convenience of dominated climatic factors during this planting date for growth of cucumber plants.

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ARABIC SUMMERY

تأثير مواعيد زراعة الخيار على الإصابة ببعض الآفات والمحصول الناتج خلال العروة النيلية في محافظة الجيزة.

هشام صالح شعلان

معهد بحوث وقاية النباتات – مركز البحوث الزراعية- دقي –جيزة

استهدفت التجربة دراسة تأثير ثلاثة مواعيد لزراعة الخيار أثناء العروة النيلية (1 ، 22 أغسطس و12 سبتمبر) على معدلات الإصابة لأربعة آفات (المن والذبابة البيضاء و التريبس و أكاروس العنكبوت الاحمر) و كذلك تأثيرها على المحصول الناتج من نبات الخيار خلال موسمي الدراسة (2014 و 2015).
واوضحت النتائج ان تاخير مواعيد الزراعة كان له تأثير معنوي على الإصابة بحشرات المن والذبابة البيضاء حيث كان متوسط الإصابة بالمن (5.1 و 9.2 و 11.9 فرد / ورقة) خلال موسم 2014 وكانت (5.5 و 10.6 و 12.4 فرد / ورقة) خلال موسم 2015 لمواعيد الزراعة الثلاثة المختبرة على التوالي و كذلك كان متوسط الإصابة بالذبابة البيضاء (8.5 و 15.4 و 13.6 حورية/ ورقة) خلال موسم 2014 و (7.8، 13.7 و 12.2 فرد/ ورقة) خلال موسم 2015 لمواعيد الزراعة الثلاثة على التوالي. وبذلك اظهرت النتائج ان زراعة نبات الخيار مبكرا في العروة النيلية (1 أغسطس) أدى لاقلة اصابة معنوية بحشرات المن والذبابة البيضاء وفي نفس الوقت انتجت اعلى محصول من ثمار الخيار حيث كان متوسط الانتاج (20.5 و 19.7 كجم / 100م² خلال الموسمين 2014 و 2015 على التوالي). وعلى العكس من ذلك كان تكبير موعد الزراعة له تأثير معنوي لزيادة الإصابة بحشرة التريبس و اكاروس العنكبوت الاحمر خلال موسمي الدراسة حيث كان متوسط الإصابة بالتريبس (7.5 و 3.2 و 1.6 فرد / ورقة) خلال موسم 2014 و (6.9 و 3.0 و 1.5 فرد / ورقة) خلال موسم 2015 لمواعيد الزراعة الثلاثة المختبرة على التوالي و كذلك متوسط الإصابة باكاروس العنكبوت الاحمر (16.8 و 11.2 و 5.2 فرد/ ورقة) خلال موسم 2014 و (15.3 و 10.6 و 5.6 فرد/ ورقة) خلال موسم 2015 لمواعيد الزراعة الثلاثة على التوالي.
وعموما أوضحت النتائج المتحصل عليها ان مواعيد الزراعة تلعب دورا كبيرا في معدل اصابة نبات الخيار بالآفات المختلفة محل الدراسة وكذلك المحصول الناتج.