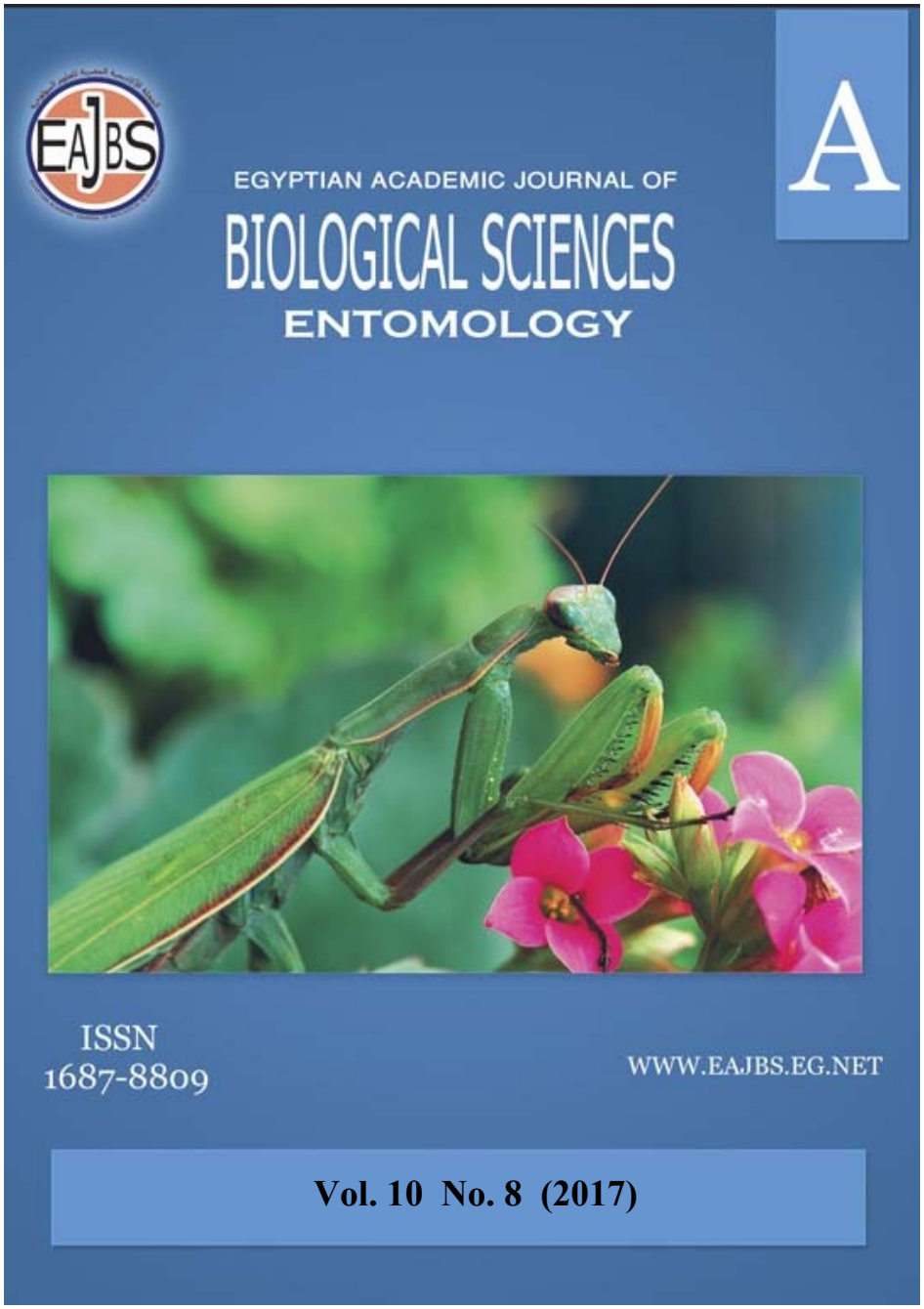

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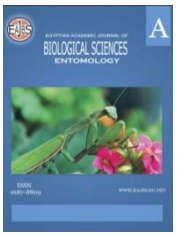

Effect of Planting Dates on Major Insect Pests and Yield of Watermelon Seeds *(Citrullus lanatus.)* in Kafr El - Sheikh Governorate

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the natural enemies
predators,
Coccinella undecimpunctata
Chrysoperla carnea and yield.

ABSTRACT

The effect of four planting dates of watermelon to produce the (*Citrullus lanatus*) seeds during summer plantation in both seasons 2011 & 2012 (April,1st, April, 15th, May, 1st , and May, 15th) by the levels of infestation with four pests, whitefly, *Bemisia tabaci* (Genn.), aphid, *Aphis gossypii* Glover, jassid , *Empoa-scadecipiens* (Paoli) and armyworm, *Spodoptera littoralis* (Boisd) in addition the natural enemies two predators *Coccinella undecimpunctata* Reiche and *Chrysoperla carnea* Stephens. The yield of this plants, were weighted during two successive seasons (2011 and 2012). The degree of infestation of*B. tabaci, A. gossypii, E. decipiens* and *S. littoralis* increased significantly by delaying sowing date, while watermelon plants cultivated in the earliest planting date (April, 1st and April, 15th) which were attacked by the lowest numbers and gave highest weight of watermelon seeds, the plants of the latest sowing date (May, 1st and May, 15th) harboured more insects infestation with lowest weight of watermelon seeds. Statistical analysis for the effect of the two selected predators factors *C. undecimpunctata* and *C. carnea* on the population density of *B. tabaci*,*A. gossypii* and *E. decipiens* during both seasons. gave significant positive effects of *C. undecimpunctata* and *C. carnea* on the seasonal fluctuations of *B. tabaci* nymph and *A. gossypii*in both seasons. The combined effect (explained variance (E.V) of these natural enemies factors showed that *B. tabaci*and *A. gossypii* these factors were responsible as a group for 99 % and 99% effects throughout both seasons, respectively. The results revealed insignificant positive effects of *C. undecimpunctata* and *C. carnea* on the seasonal fluctuations of *E. decipiens* individual in both seasons. The combined effect explained variance (E.V) of these predators factors on *B. tabaci* nymph showed that these factors were responsible as a group for 40 % and 37 % effects throughout both seasons, respectively. Therefore, it was concluded that, the planting date was effective on the rate of insect infestation and watermelon seeds yield.

Recommendation: The first and second planting dates (April 1st and April, 15th) were effective on the rate of insect infestation and increases yield of watermelon.

INTRODUCTION

The Cucurbitaceae family is the most food used for human consumption. cucurbits represent an important part of vegetable production and considered very important in agricultural crops in Egypt. They are cultivated in wide areas either old lands or newly reclaimed lands. The high production of cucurbit vegetables for product seeds especial watermelon (*Citrullus lanatus*) is of prime important aspect for local consumption and for export purposes.

Most of cultivated areas of watermelon seeds are concentrated in new reclaimed areas. The governorates; Ismailia, Kafr El- Sheikh and Beheira were the most heavily cultivated areas of watermelon seeds in Egypt. The crop is infested by many pests, which are causing a considerable damage in either quantity or quality. They have established attacking by many important insect pests such whitefly, *Bemisia tabaci* (Genn.), aphid, *Aphid gossypii* Glover, jassid, *Empoasca decipiens* (Paoli), armyworm, *Spodoptera littoralis* (Boisd). The nymph and adult stages of these pests feed on phloem sap and excrete honeydew that hamper photosynthesis and render fruits unmarketable. In addition the important common predators in the district were studied as: *Coccinella undecimpunctata* Reiche and *Chrysoperla carnea* Stephens. 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 watermelon for seeds depending on the suitable planting date without applying any chemical pesticides، which have some bad side effect on yields.

MATERIALS AND METHODS

This study was conducted in Sidisalem district, Kafr El-Sheikh Governorate during the summer plantation season (2011 and 2012). Seeds of watermelon (*Citrullus lanatus*) were sown in four different planting dates at 15 days intervals, April, 1st, April, 15th, May, 1st and May, 15threspectively. Normal agricultural practices were followed without insecticides treatments.

The experimental area about 960m^2 was divided into 16 plots (each plot was 60 m2). The experimental plots were laid out in a randomized complete block design and each planting date was represented by four plots. Sampling of watermelon plants started 15 days after sowing and were taken weekly until the end of experiment (12 inspections). In each sampling date, 25 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 whitefly, *Bemisia tabaci* (Genn.) nymphs /inch^2. Only while other insects were examined the leaves on stand plants in the field as follow: aphid, *Aphid gossypii* Glover insects / leaf, jassid, *Empoasca decipiens* (Paoli) insects / leaf, armyworm, *Spodoptera littoralis* (Boisd) larvae/ leaf, *Coccinella undecimpunctata* Reichelarvae and adult / leaf and *Chrysoperla carnea* Stephens larvae / leaf. Watermelon seeds were taken from watermelon seeds Production (kg) /60 m2 was assessed for 1inspection in each plot and weighted at the end of the season.

The statistical analyses of the present data were carried out using SAS program computer including f-test and L.S.D. value (SAS Institute, 1999).

RESULTS AND DISCUSSION

Data in Table (1) and Fig. (1), showed the effect of tested four different sowing dates on the infestation of watermelon of seeds leaves by some insect pests during two seasons, 2011 and 2012 and mean weight of the seed yield.

***Bemisia tabaci* (Genn.) nymphs:**

Results in Table (1) and Fig. (1), revealed that the population density of *Bemisia tabaci* nymphs on watermelon plants differed significantly according to the

sowing date during the two successive seasons 2011 and 2012. In the first season, the population density of *B. tabaci* nymphs increased by delaying sowing date. The watermelon plants were sown in the earliest planting date (April, 1st) infested significantly by the lowest mean number of *B. tabaci* (74.5 nymphs/ 25 leaves). On the contrary, the plants of the second and third sowing dates (April, 15th& May, 1st) the mean number of *B. tabaci* (139.5 and 272.75/ 25 leaves) the fourth was the highest numbers of *B. tabaci* (413.25 nymphs/ 25 leaves), respectively.

Table 1: Effect of planting dates on major insect pests and yield of watermelon seeds (*Citrullus lanatus*) during 2011&2012 seasons at Kafr El - Sheikh Governorate.

Sampling Dates	2011					2012				
	B. tabaci	*A. gossypii*	*E. decipiens*	*S. littoralis*	Means of Yield Kg	*B. tabaci*	*A. gossypii*	*E. decipiens*	*S. littoralis*	Means of Yield kg
1st sowing April, 1st	74.5 D	158.25 D	80.5 C	30 B	6.180 A	71.5 d	164.5 D	78.5 c	35.75 D	6.700 B
2nd sowing April, 15th	139.5 C	264.75c	143.5 B	49.75 B	6.670 A	131 c	278.25 C	142.5 b	60.0 C	7.000 A
3rd sowing May, 1st	272.75 B	509 B	268.5 A	100.5 A	5.600 B	261.2 b	485.5 B	255.25 a	96.25 B	5.900 C
4th sowing May, 15th	413.25 A	649.75 A	157.5 B	119 A	5.380 B	430 a	625.5 A	162.75 b	129 A	4.700 C
F value	251.62 ***	347.80 **	182.09 ***	34.97 ***	12.99 *	202.42 **	330.85 **	78.15 ***	73.54 ***	14.23 *
L.S.D.	29.17	37.34	17.85	21.79	1.2	34.41	34.40	25.47	14.87	1.3

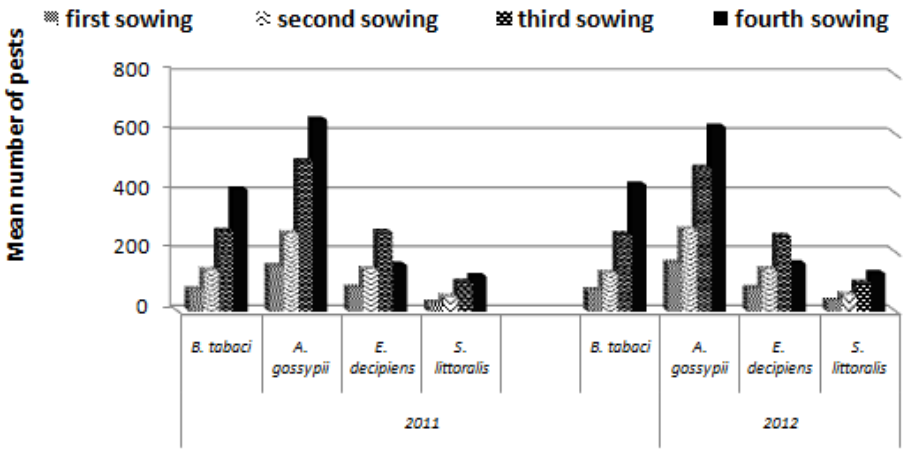

Fig. 1: Effect planting dates on major insect pests infesting watermelon seeds (*Citrulluslanatus*) during 2011&2012 seasons at Kafr El - Sheikh Governorate.

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 (71.5 ,131, 261.25 and 430 nymphs/ 25 leaves) for the four tested sowing dates, respectively.

The obtained data in the two studied seasons and their statistical analysis showed clearly that planting watermelon seeds in the earliest planting date (April, 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 the 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 el*. (2006), Mohamed (2011) and Shaalan H. S. (2016) 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.

***Aphis gossypii* Glover (individuals)**:

Results in Table (1) and Fig. (1), clearly showed that the population density of *Aphis gossypii* individuals on watermelon plants varied according to the sowing date in the two studied seasons 2011 &2012. Regarding the obtained data in the two seasons, the infestation levels with the studied insects/ leaves on watermelon seeds increased successively by delaying sowing date, as the highest infestation level (649.75 & 625.5 individuals) were observed during the latest planting date (May, 15th) in the two seasons, respectively. While the lowest infestation occurred on watermelon plants sowed in the first sowing date (April, 1st) as the whole average of *Aphis gossypii* individuals in the two seasons were (158.25 and 164.5 individuals/ 25 leaves), respectively. The intermediate sowing date (April, 15th and May 1st) occupied intermediate level of infestation, as the corresponding seasonal mean numbers were (264.75 and 278.25 individuals/ 25 leaves) and (509 and 485.5 individuals/ 25 leaves) 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 harboured 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), Mohamed (2011) and Shaalan H. S. (2016) 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.

***Empoasca decipiens* (Paoli) (individuals)**:

Results in Table (1) and Fig. (1), clearly showed that the population density of *Empoasca decipiens* individuals on watermelon plants varied according to the sowing date in the two studied seasons 2011 &2012. Regarding the obtained data in the two seasons, the infestation levels with the studied insects/ leaves on watermelon of seeds increased successively by delaying sowing date, as the highest infestation level (268.5&255.25 individuals) were observed during the sowing date (May, 1st) in the two seasons, respectively. While the lowest infestation occurred on watermelon plants sowed in the first sowing date (April, 1st) as the whole average of *E. decipiens* individuals in the two seasons were (80.5 and 78.5 individuals/ 25 leaves), respectively. The intermediate sowing date (April, 15th and May 1st) occupied intermediate level of infestation, as the corresponding seasonal mean numbers were (143.5 and 142.5 individuals/ 25 leaves) and (157.5 and 162.25 individuals/ 25 leaves) in the two seasons, respectively.

These results agree with Shalaby, *et al*. (2013), Salman *et al*. (2015), Mohamed (2004), Esmail (2013), El-Khayat *et al*. (2010) Mohamed (2011) and Shaalan H. S. (2016).

***Spodoptera littoralis* (Boisd) larvae:**

Results in Table (1) and Fig. (1), showed that the population density of *Spodoptera littoralis* larvae on watermelon plants varied according to the sowing date in the two studied seasons 2011 &2012. Regarding the obtained data in the two seasons, the infestation levels with the studied larvae/ leaves on watermelon of seedes increased successively by delaying sowing date, as the highest infestation level (119&129 larvae/ 25 leaves) and (100.5 & 96.25 larvae/ 25 leaves) were observed during the sowing date (May,1st and 15th) in the two seasons, respectively. While the lowest infestation occurred on watermelon plants sowed in the first sowing date (April, 1stand 15th) as the whole average of *S. littoralis* larvae in the two seasons were (30 and 35.75 larvae/ 25 leaves) and (49.75 & 60 larvae/ 25 leaves), respectively.

In both studied seasons (2011 and 2012), as shown in Table (1), data indicated that the watermelon seeds yield increased by the earliest sowing date. The highest seasonal mean weight of watermelon seeds obtained from watermelon plants cultivated in the first and second planting date recording (6,670 and 7) kg (6.180 and 6.700) kg. / 60m2 in the two seasons, respectively. On the contrary, watermelon plants cultivated in the latest planting date produced the lowest weight of watermelon seeds of (5.380 and 4.700 kg) and the third plantation date weight of watermelon seeds of (5.380 and 4.700 kg),of production/60m2 during the two seasons, respectively. But there were no significant difference between first and second planting date. 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) Mohamed (2011) and Shaalan H. S. (2016) 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 watermelon for seeds.

The combined effect of natural enemies (predator) factors:

Statistical analysis for the effect of the two selected natural enemies factors (*Coccinella undecimpunctata* Reiche larvae/ leaf and *Chrysoperla carnea* Stephens larvae/ leaf.) on the population density of whitefly *Bemisia tabaci* (Genn.) nymphs /leaf, aphid, *Aphid gossypii* Glover insects / leaf, jassid , *Empoasca decipiens* (Paoli) insects / leaf during both seasons inKafr El Sheikh Governorate are given in Table (2).

***Bemisia tabaci* (Genn.) :**

These results revealed significant positive effects of *C. undecimpunctata* and *C. carnea* on the seasonal fluctuations of *B. tabaci* nymph in both seasons where "r" values were (0.994 and 0.99) and (0.999 and 0.998), respectively. The combined effect (explained variance (E.V) of these predators' factors on *B. tabaci* nymph showed that these factors were responsible as a group for 99 % and 99 % effects throughout both seasons, respectively.

***Aphid gossypii* Glover**:

These results revealed significant positive effects of *C. undecimpunctata* and *C. carnea* on the seasonal fluctuations of *A. gossypii* individual in both seasons where "r" values were (0.981 and 0.990) and (0.990 and 0.991), respectively. The combined effect explained variance (E.V) of these predators factors on *B. tabaci*

nymph showed that these factors were responsible as a group for 99 % and 98 % effects throughout both seasons, respectively.

***Empoasca decipiens* (Paoli)**:

These results revealed insignificant positive effects of *C. undecimpunctata* and *C. carnea* on the seasonal fluctuations of *E. decipiens* individual in both seasons where "r" values were (0.493and 0.572) and (0.520 and 0.560), respectively. The combined effect explained variance (E.V) of these natural enemies factors on *B. tabaci* nymph showed that these factors were responsible as a group for 40 % and 37 % effects throughout both seasons, respectively.

Table 2: Simple correlation and partial regression values of the two natural enemies (predators) factors on insect pest and corresponding percentages of explained variance on watermelon of seeds during 2011 & 2012 seasons at Kafr El Sheikh Governorate.

Pests	Variables	2011					2012				
		Correlation		Regression coefficient		E.V%	Correlation		Regression coefficient		E.V%
B. Tabaci	*C. undecimpunctata*	0.994	0.005	-3.28	0.40	99%	0.99	0.0063	-6.386	0.358	99%
	C. carnea	0.999	0.0008	16.22	0.15		0.9	0.001	21.76	0.1870	
A. gossypii	*C. undecimpunctata*	0.981	0.01	-14.89	0.48	99%	0.990	0.009	3.219	0.903	98%
	C. carnea	0.990	0.009	40.09	0.32		0.991	0.008	9.37	0.831	
E.decipiens	*C. undecimpunctata*	0.493	0.50	-19.30	0.71	40%	0.572	0.427	13.17	0.820	37%
	C. carnea	0.520	0.47	33.60	0.69		0.560	0.439	-18.581	0.843	

r = simple correlation coefficient, p = probity of correlation,
b= the regression coefficient, p = probity of regression,
E.V= explained variance

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ARABIC SUMMARY

تأثير مواعيد زراعة بطيخ اللب الجورمة على الإصابة بالآفات الرئيسية على النبات والمحصول الناتج في محافظة كفر الشيخ

عصام على محمد موسى
معهد بحوث وقاية النباتات، مركز البحوث الزراعية، الدقى ، الجيزة

استهدفت الدراسة دراسه تاثير اربع مواعيد زراعة لنباتات بطيخ اللب المعد لانتاج اللب السوبر خلال العروة الصيفية فى موسمى زراعه (٢٠١١ و ٢٠١٢) وكانت المواعيد (١ابريل، ١٥ ابريل، ١ مايو و ١٥ مايو) وتم عداهم الافات حشرية الرئيسية وهى (الذبابة البيضاء – المن – نطاطات الاوراق (جاسيد) و دودة ورق القطن) وايضا الاعداء الطبيعه (المفترسات) المصاحبة له الشائعة وهى ابو العيد ذو الاحدى عشر نقطه و اسد المن وكذلك معرفه انتاجيه كل ميعاد وارتباطه بمقدار الضرر التى تحدثه الافات. واشارت النتائج الى وجود علاقة معنويه بين الاربع الافات الرئيسية وهى الذبابه البيضاء ، المن، الجاسيد و دودة ورق القطن وبين مواعيد زراعه بطيخ اللب وكان افضل ميعاد زراعه (١ ابريل و ١٥ ابريل) حيث كانتا اقل تعداد للافات في هذين الميعادين وافضلهما انتاجيه لمحصول بطيخ اللب بينما كان الميعادان الاخران (١ مايو و ١٥ مايو) اكثر اصابه بالافات و اقل انتاجيه للمحصول. أوضح التحليل الاحصائى ان تاثير كل من ابو العيد و اسد المن على تعداد الذبابه و المن تاثير معنوى وكان تاثيرهما يصل ٩٩% خلال الموسمين بينما على الجاسيد كان التاثير غير معنوى ويصل تاثير الاعداء الطبيعية (المفترسات) الى ٤٠ % و ٣٧% خلال موسمى الدراسه. نستخلص ان مواعيد الزراعة تؤثر على الاصابة بالافات وعلى الانتاجيه محصول بطيخ اللب.