

## Influence of Different Plantations on the Main Piercing-Sucking Insect Pests Attacking Faba Bean and Soybean Plants

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### ABSTRACT

The present investigation was conducted in the farm of Sakha Agricultural Research Station, Kafr El-Sheikh Governorate during 2015/ 16 and 2016/ 17 to determine the influence of sowing dates on the major piercing-sucking insect pests which infested faba bean and soybean plants. On faba bean plants, *Emposca* spp. ranked in the first category with the highest average number in October cultivated ( $60.35 \pm 12.08$  and  $89.55 \pm 11.29$  indiv.) followed by *M. persicae* ( $37.30 \pm 12.08$  and  $61.85 \pm 12.74$  indiv.) in both seasons, respectively. Meanwhile, in November implanted *A. craccoivora* was recorded the highest average number ( $72.85 \pm 23.86$  and  $270.45 \pm 80.49$  indiv.) followed by *Emposca* spp. ( $51.15 \pm 7.76$  and  $69.25 \pm 12.73$  indiv.) in the two successive seasons, respectively. While, in December grown *Emposca* spp. came in the first category ( $53.30 \pm 10.90$  indiv.) in the first season and *M. persicae* observed the first category ( $63.35 \pm 10.95$  indiv.) during the second season. *P. solenopsis* was found the lowest average number in the different planting dates at the two successive seasons. On the other side, on soybean plants, *A. gossypii* arranged in the first category in the three plantations and observed the highest average number in the June plantation with values ( $248.80 \pm 48.58$  and  $332.45 \pm 67.77$  indiv.) followed by April plantation ( $149.05 \pm 36.08$  and  $172.10 \pm 38.93$  indiv.) and May plantation ( $117.35 \pm 26.67$  and  $167.4 \pm 34.44$  indiv.) in both seasons, respectively. Number of *B. tabaci* came in the second category in the three cultivated with the highest values in the June plantation with ( $216.50 \pm 45.11$  and  $232.5 \pm 53.36$  indiv.) followed by April plantation ( $143.85 \pm 30.77$  and  $172.00 \pm 32.97$  indiv.) and May plantation ( $63.05 \pm 15.69$  and  $87.05 \pm 19.10$  indiv.) during the two successive seasons, respectively.

**Keywords:** plantation dates, piercing-sucking pests, faba bean, soybean.

### INTRODUCTION

Leguminous plants are considered an important agricultural crop which used as human feed among these plants faba bean and soybean. The faba bean, (*Vicia faba*L.) it is the most important commercial crop grown worldwide. It is one of the promising pulse crops, which can play an important role in increasing legume production in Egypt. Seeds are used for people nutrition as seeds have 28% protein, 58% carbohydrate and 2%fat (Köpke and Nemecek2010). It can be used as vegetables, green or dried, fresh or canned. Faba bean has been comes on the main menu as a meat extender or substitute (Ebadahet *et al.*, 2006). It has also useful the new reclaimed land (Al-Antaryet *et al.*, 2007). Plants faba bean are infestation by many from insect pests which cause serious damage, e.g. *Aphis craccivora* (Koch.), *Emposaca* spp. and *Nezara viridula*L. Which cause economic losses to the crop (Abdallah *et al.*, 2000 Mohamed and Slman, 2001 and Awadalla *et al.*,2014).

Soybean, *Glycine max* (L.) is one of the bulk important leguminous food crop in many countries. It plays a major role in many food industries for people and animals. It is source of major plant protein sources, has a good nutritional quality and considers as one of the richest sources of vegetable oils (18-22%). (Badenhopf and Kackler, 1971).Soybean plants attract numerous insect species during their growing seasons. These insects cause economic damage as a result of feeding (Shataa. 2010).The most serious insect pests are the whiteflies, (*Bemisia* spp.), Aphids (*Aphis gossypii* Glover), Jassids (*Empoasca lybica*), the green stink bug (*Nezara viridula* L.) which cause significant losses in Soybean yield, quality and germination percentage (Salem 1999).However, the whiteflies, *Bemisia tabaci*,(Genn) causes serious damage on Soybean plant juice or indirectly by viral diseases transition (Gamieh and El-Basuony. 2001, Salman *et al.*, 2002, Magouzetal., 2006 and El-Samahy and Saad,2010). The preferred host plants and planting dates are achieves

benefit in the field of pest insects control especially in IPM programs for different insect pests infesting faba bean or soybean plants (Awadalla *et al.*, 2011, Awadalla *et al.*, 2014). So, the objective of this experimental was for known the effectiveness of cultivation dates on the population numbers of the major piercing-sucking insect pests infestation faba bean and soybean plants.

### MATERIALS AND METHODS

#### Effect of sowing dates on the main piercing-sucking insect pests

##### 1. On faba bean crop

The present experiments were conducted in the farm of Sakha Agriculture Research Station, Kafr El-Sheikh region to study impact of sowing dates on the major insect pests and their associated predatory insects. Seeds of sakha 4 faba bean variety were implanted in three consecutive dates at 30 days intervals i.e. the first of September, the first week of October and the first week of December in the two grown seasons (2015/2016 and 2016/17). The area was about 1600 m<sup>2</sup> divided to three parts (each part 400 m<sup>2</sup>) divided to four replicates, each replicate was 100 m<sup>2</sup>. Samples were taken weekly after sowing dates about one month until the harvesting time:

The impact of sowing dates on dinestey of aphids , leafhoppers and the cotton mealybug on the involved varieties, weekly sample of 100 leaflets (25 leaflets from each replicate) of each variety were chosen at random and number of this insect were directly recorded in the field.

The impact of sowing dates on number of the green stink bug and predators on all of varieties weekly sample of 100 plants (25 plants from each replicate) of each variety were chosen at random and number of this insect were directly recorded in the field. Numbers of pests and predators were identified, recorded, and counted.

##### 2. on soybean crop

Seeds of Giza11 soybean variety grown in three different times at 30 days intervals i.e. the first of April, the first week of May, the first of June in the two successive

seasons (2016 and 2017). The area was about 1600 m<sup>2</sup> divided to three parts (each part 400 m<sup>2</sup>) divided to four replicates, each replicate was 100 m<sup>2</sup>. The agricultural practices were without any insecticidal treatments in both seasons. Samples were taken weekly from sowing dates about one month until the harvesting time:

The population numbers of aphids and leafhoppers on the involved varieties, weekly sample of 100 leaflets (25 leaflets from each replicate) of each variety were chosen at random and number of this insect were directly recorded in the field.

Impact of sowing dates on density of the green stink bug and predators on the involved varieties weekly sample of 100 plants (25 plants from each replicate) of each variety were collected randomly and number of this insect were directly recorded in the field. Numbers of pests and predators were identified, recorded, and counted.

## RESULTS AND DISCUSSION

### 1. Effect of different plantation on the main piercing -sucking insect pests attacking sakha 4 faba bean variety

Results illustrated in Table (1) indicated that the average numbers of the major piercing -sucking insect pests infestation sakha 4 faba bean variety in different sowing dates in the first season 2015/16. Data showed that, *Empoasca spp.* and *M. persicae* observed with highest numerical intensity in October cultivated and represented by (60.35 ± 12.08 and 37.30 ± 12.37 indiv., respectively). While, *A. craccivora* and *Empoasca spp.* observed the highest number in November plantation (72.85 ± 23.86 and 51.15 ± 7.76 indiv., respectively). Meanwhile, *Empoasca spp.* and *M. persicae* come in the first category in December plantation (53.30 ± 10.90 and 38.65 ± 6.94 indiv., respectively). Statistical analysis indicated that there were significant differences between the different sowing dates in the first season.

**Table 1. Effect of planting dates on the average numbers of the main Piercing -sucking insect pests attacking sakha 4 faba bean variety during the first season 2015/16.**

insect pests	Average number of pests ± SEM		
	October plantation	November plantation	December plantation
<i>A. craccivora</i>	20.15 ± 4.16 b	72.85 ± 23.86 a	15.45 ± 5.78 b
<i>M. persicae</i>	37.30 ± 12.37 a	36.80 ± 10.63 a	38.65 ± 6.94 a
<i>Empoasca spp.</i>	60.35 ± 12.08 a	51.15 ± 7.76 b	53.30 ± 10.90 b
<i>N. viridula</i>	10.10 ± 2.14 b	19.5 ± 2.69 a	10.50 ± 2.18 b
<i>p. solenopsis</i>	5.15 ± 1.09 a	1.55 ± 0.51 b	4.30 ± 0.85 a

Values bearing the same small letters in a row are not significantly different, according to Dauncan's Multiple Rang Test at 0.05 probability level.

The data arranged in Table (2) mentioned the average numbers of the main piercing -sucking insect pests attacking sakha 4 faba bean variety in different plantation dates at the first season 2016/17. These results indicated that, *Empoasca spp.* and *M. persicae* found the highest average number in October grown with values (79.55 ± 11.29 and 61.85 ± 12.74 indiv., respectively). While, *A. craccivora* and *Empoasca spp.* observed the highest average number in November plantation (270.45 ± 80.49 and 69.25 ± 12.73 indiv., respectively). Meanwhile, *M.*

*persicae* and *Empoasca spp.* ranked the first category in December sowing (63.35 ± 10.95 and 61.25 ± 12.45 indiv., respectively). Data analysis indicated that there were significant differences between the different sowing dates in the second season.

**Table 2. Effect of planting dates on the population numbers of the main piercing -sucking insect pests infestation sakha 4 faba bean variety at the second season 2016/17.**

insect pests	Average number of pests ± SEM		
	October plantation	November plantation	December plantation
<i>A. craccivora</i>	21.85 ± 5.33 b	270.45 ± 80.49 a	20.70 ± 7.05 b
<i>M. persicae</i>	61.85 ± 12.74 a	62.95 ± 19.57 a	63.35 ± 10.95 a
<i>Empoasca spp.</i>	79.55 ± 11.29 a	69.25 ± 12.73 ab	61.25 ± 12.45 b
<i>N. viridula</i>	13.20 ± 2.78 b	21.15 ± 4.01 a	16.80 ± 3.03 b
<i>p. solenopsis</i>	5.65 ± 1.23 a	2.50 ± 0.69 a	4.60 ± 0.91 a

Values bearing the same small letters in a row are not significantly different according to Dauncan's Multiple Rang Test at 0.05 probability level.

As a conclusion, the obtained data ranked in Tables (1 and 2) refers to, *Empoasca spp.* ranked in the first category and observed the highest average number in October grown (60.35 ± 12.08 and 89.55 ± 11.29 indiv.) followed by *M. persicae* (37.30 ± 12.08 and 61.85 ± 12.74 indiv.) during the two seasons, respectively. Meanwhile, in November plantation *A. craccivora* came in the first category and recorded the highest average number (72.85 ± 23.86 and 270.45 ± 80.49 indiv.) followed by *Empoasca spp.* (51.15 ± 7.76 and 69.25 ± 12.73 indiv.) in the two successive seasons, respectively. While, in December sowing *Empoasca spp.* observed in the first category (53.30 ± 10.90 indiv.) in the first season and *M. persicae* recorded the first category (63.35 ± 10.95 indiv.) in the second season. *p. solenopsis* showed in the last category and recorded the lowest average number in the different planting dates in both the seasons. Statistical analysis indicated that there were significant differences between the different sowing dates in the two successive seasons.

These results are in consistent with those of Awadalla et al. (2011) who indicated the population density of *E. discipiens* (46.57 ± 2.21 and 59.07 ± 3.72 nymphs / 50 leaflets) was highest in the summer cultivated. in the two seasons of study, respectively. Beside that there are significant differences among plantation dates and the population fluctuation of *A. craccivora* and *Empoasca spp.* while non-significant differences were found among sowing dates and the average number of *N. viridula*. El-Mashaly (2013) in Egypt who mentioned that in the second season the maximum average number of *A. craccivora* was observed in first of November implanted. Beside, *N. viridula* observed the highest population number in the mid of November at two seasons. The maximum average number of *Empoasca spp.* was showed in the first of October plantation in the first season.

### 2. Impact of different plantation on the main piercing -sucking insect pests attacking Giza 111 soybean variety:

Results illustrated in Table (3) indicated that the population numbers of the important piercing -sucking insect pests attacking Giza 111 soybean variety in different

plantation dates in the first season 2016. These results indicated that, *A. craccivora* and *B. tabaci* observed the highest population number in the three sowing dates (April & May & June) and represented by (149.05 ± 36.08 and 143.85 ± 30.77 indiv. & 117.35 ± 26.67 and 63.05 ± 15.69 & 248.80 ± 48.58 and 216.50 ± 45.11 indiv., respectively). There were significant differences between the different sowing dates at the first season.

**Table 3. Impact of planting dates on the average numbers of the main piercing -sucking insect pests attacking Giza111 soybean variety during the first season 2016.**

insect pests	Average number of pests ± SE		
	April plantation	May plantation	June plantation
<i>Aphis gossypii</i>	149.05 ± 36.08 b	117.35 ± 26.67 b	248.80 ± 48.58 a
<i>Bemisia tabaci</i>	143.85 ± 30.77 b	63.05 ± 15.69 c	216.50 ± 45.11 a
<i>Empoasca spp.</i>	25.30 ± 5.21 a	43.45 ± 8.06 a	36.35 ± 8.05 a
<i>Nezara viridula</i>	12.65 ± 2.72 a	14.15 ± 3.11 a	12.45 ± 2.73 a

Values bearing the same small letters in a row are not significantly different according to Dauncan's Multiple Rang Test at 0.05 probability level.

Data arranged in Table (4) showed the population numbers of the main piercing -sucking insect pests attacking Giza111 soybean variety in different plantation dates at the second season 2017. These results revealed that, *A. craccivora* and *B. tabaci* observed the highest population density in the three planting dates (April & May & June) and represented by (172.10 ± 38.93 and 172.00 ± 32.97 indiv. & 167.4 ± 34.44 and 87.05 ± 19.10 & 332.45 ± 67.77 and 232.5 ± 53.36 indiv., respectively). There were significant differences between the different sowing dates in the second season.

**Table 4. Impact of planting dates on the average numbers of the main piercing -sucking insect pests attacking Giza111 soybean variety during the second season 2017.**

insect pests	Average number of pests ± SE		
	April plantation	May plantation	June plantation
<i>Aphis gossypii</i>	172.10 ± 38.93 b	167.4 ± 34.44 b	332.45 ± 67.77 a
<i>Bemisia tabaci</i>	172.00 ± 32.97 b	87.05 ± 19.10 c	232.5 ± 53.36 a
<i>Empoasca spp.</i>	23.86 ± 5.34 a	38.10 ± 7.05 a	31.50 ± 7.10 a
<i>Nezara viridula</i>	12.75 ± 2.86 ab	16.35 ± 3.50 a	9.5 ± 1.59 b

Values bearing the same small letters in a row are not significantly different according to Dauncan's Multiple Rang Test at 0.05 probability level.

As a conclusion, the obtained results arranged in Tables (2 and 4) showed that, *A. gossypii* arranged in the first category and observed the highest average density in the June sowing and represented by (248.80 ± 48.58 indiv. and 332.45 ± 67.77 indiv.) followed by April plantation (149.05 ± 36.08 and 172.10 ± 38.93 indiv.) and May plantation (117.35 ± 26.67 and 167.4 ± 34.44 indiv.) in the two successive seasons, respectively. While, *B. tabaci* observed in the second category and recorded the highest average number in the June plantation and represented by (216.50 ± 45.11 and 232.5 ± 53.36 indiv.) followed by April plantation (143.85 ± 30.77 and 172.00 ± 32.97) and May plantation (63.05 ± 15.69 and 87.05 ± 19.10 indiv.) at the two successive seasons, respectively. Data analysis

revealed that there were significant differences between the different sowing dates at both seasons.

These results are in similar with those of Meena and Sharma (2006) in India found that the population numbers of pod borers increased in late soybean cultivation. Helalia *et al.* (2011) observed that cowpea cultivation late on April 15 had the lowest population numbers and infestation rate with *Etiella zinckenella* (Tr.); while recorded the highest infestation rate in late plantation (May 15). Abdallah (2012) in Egypt who found that soybean grown late on April 15 had the lowest population abundance and infestation percentage with *B. tabacia* and aphid while the highest infestation percentage recorded in late plantation (June 1) during the two seasons 2007 and 2008.

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**تأثير مواعيد الزراعة المختلفة علي أهم الافات الحشرية الثاقبة الماصة التي تهاجم نباتات الفول البلدي وفول الصويا  
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أجريت هذه الدراسة في المزرعة البحثية لمحطة بحوث سخا محافظة كفر الشيخ خلال موسمي الدراسة 2015/16 و 2016/17 بهدف دراسة تأثير مواعيد الزراعة علي أهم الافات الحشرية الثاقبة الماصة التي تصيب نباتات الفول البلدي وفول الصويا. اظهرت النتائج أن حشرة نطاطات الاوراق إحتلت المرتبة الاولى وسجلت أعلى متوسط للتعداد علي نباتات الفول البلدي في ميعاد اكتوبر بمتوسط تعداد (12,08 ± 37,30 و 12,74 ± 61,85 فردا ) خلال موسمي 2015/16 و 2016/17 علي التوالي. بينما في ميعاد نوفمبر إحتلت حشرة من البقوليات المرتبة الاولى وسجلت أعلى متوسط للتعداد (23,86 ± 72,85 و 80,49 ± 270,45 فردا) يليها حشرة نطاطات الاوراق بمتوسط تعداد (51,15 ± 7,76 و 12,73 ± 69,25 فردا) خلال موسمي الزراعة علي التوالي. بينما في ميعاد ديسمبر تصدرت حشرة نطاطات الاوراق المرتبة الاولى بمتوسط تعداد (10,90 ± 53,30 فردا) خلال الموسم الاول و جاءت حشرة من الخوخ الأخضر في المرتبة الاولى خلال الموسم الثاني بمتوسط تعداد (10,95 ± 63,35 فردا). وعلي الجانب الاخر تصدرت حشرة بق الفطن الدقيقي المرتبة الاخيرة وسجلت اقل متوسط للتعداد في مواعيد الزراعة المختلفة خلال موسمي الزراعة. وأظهر التحليل الإحصائي وجود فروق معنوية بين مواعيد الزراعة المختلفة خلال الموسمين. علي الجانب الاخر علي نباتات فول الصويا إحتلت حشرة من البقوليات المرتبة الاولى في الثلاث مواعيد وسجل أعلى متوسط للتعداد في ميعاد زراعة يونيو (48,58 ± 248,80 و 67,77 ± 332,45 فردا) يليها ميعاد ابريل بمتوسط تعداد (36,08 ± 149,05 و 38,93 ± 172,10 فردا) ثم في ميعاد مايو سجلت بمتوسط تعداد (26,67 ± 117,35 و 34,44 ± 167,4 فردا) خلال موسمي الزراعة علي التوالي. بينما إحتلت حشرة الذبابة البيضاء المرتبة الثانية في الثلاثة مواعيد وسجل أعلى متوسط للتعداد في ميعاد زراعة يونيو (45,11 ± 232,5 و 53,36 ± 232,5 فردا) يليها ميعاد ابريل بمتوسط تعداد (30,77 ± 143,85 و 32,97 ± 172,00 فردا) ثم في ميعاد مايو سجلت بمتوسط تعداد (15,69 ± 63,05 و 19,10 ± 87,05 فردا) خلال موسمي الزراعة علي التوالي. وأظهر التحليل الإحصائي وجود فروق معنوية بين مواعيد الزراعة المختلفة خلال الموسمين.