

Effect of Planting Dates on the Main Pests Attacking Squash Plants in Mansoura Region

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ABSTRACT

The present experiments were conducted at the experimental farm belonging to the faculty of agriculture, Mansoura University. The squash plants (var. Eskandrani) was cultivated in the beginning of the third week of March, the first week of June, and the second week of August during the two successive seasons (2014 and 2015). The cotton aphid, *Aphis gossypii* recorded the highest relative abundance in March plantation during the first and second season of study (53.7 and 55.6 %, respectively) followed by *Thrips tabaci* (21.9 and 19.3 %, respectively). On the other hand, the potato leafhopper ranked the last category during the first and second season and represented by 2.3 and 2.1 %, respectively. While, the snake cucumber beetle *Henosepilachna argus* did not occurred during the two seasons. In June plantation, *A. gossypii* recorded the highest relative abundance during the first and second season (39.4 and 26.6 %, respectively) followed by *H. argus* (20.9 and 24.3 %, respectively). While, in August plantation, *H. argus* ranked the first category during the first and second season and represented by 33.8 and 44.6 %, respectively. Moreover, during the two seasons, June plantation harbored the highest total numbers of the main pests and represented by 4590 and 3673 pests, respectively. The cotton mealybug, *Phenacoccus solenopsis* and the cotton whitefly *Bemisia tabaci* recorded the highest average number in August plantation during the two seasons with non-significant differences for *P. solenopsis* and significant differences for *B. tabaci*. The snake cucumber beetle, *H. argus* recorded the highest average number for all stages in August plantation during the two seasons with non-significant differences during the first season and with significant differences during the second one.

INTRODUCTION

Cucurbit crops are considered one of the most important vegetable crops which used as a food in Egypt. Recently, a large sandy area was reclaimed and cultivated for years ago with different vegetable crops. Cucurbit crops under the present study are subjected to attack by a large range of insect pests such as aphids, thrips, whiteflies, and mealybugs which have a great economic importance and cause a serious damage (Abou El-Saad, 2015; Awadalla *et al.* 2011; Pourian *et al.* 2009; Refaei *et al.* 2016).

The host plant preference and sowing dates are essential components of integrated pest management (IPM) for different insect pests (El-fakharany, 2005; Younes *et al.*, 2010; Zanic *et al.*, 2013; Abdel-Hady *et al.* 2014; Refaei *et al.*, 2016). Also, the snake cucumber beetle or the melon ladybird, *Henosepilachna argus* (*Epilachna chrysomelina*) (Geoffroy) is considered a serious insect pest of cucurbit crops in Egypt (Gameel and Abdel-Gaid, 2007; Awadalla *et al.*, 2011). Moreover, the different cucurbit crops are attacking with the twospotted spider mite, *Tetranychus urticae* Koch. which found as an economic pest infesting cucurbit plants in different planting dates (Foda, 2001; Megali *et al.*, 2003; Al-Ajaln, 2005; Hegab and Hegab, 2009; Awadalla *et al.*, 2011; Gameel, 2013).

Studying the effect of planting dates on the population of insect pests is fundamental basis for planning the integrated pest management programs on a given host plant.

MATERIALS AND METHODS

1. Effect of sowing dates on pest populations:

The present experiments were conducted at the experimental farm belonging to the faculty of agriculture, Mansoura University. The squash plants (var. Eskandrani) was cultivated in the beginning of the third week of March, the first week of June, and the second week of August during the two successive seasons (2014 and 2015). The experimental area was about 400 m² divided into four replicates (each replicate was about 100 m²) for each

sowing date for each season. The normal agricultural treatments of land preparation, irrigation, and mechanical weed control were followed, as recommended and chemical control was neglected during the present study. Samples were taken weekly and started one month after plantation date for each season. Samples consisted of 10 leaves from each replicate and were taken weekly until the end of each growing season. The collected leaves (40 leaves for each sample) were transferred to the laboratory into plastic bags for identification and counting. To evaluate the population density of the main pests 200 square inches from each sample (5 square inches/leaf) were taken.

2. Statistical analysis

The numbers of pest and predator species on different host plants and during different plantation dates were analyzed using one-way ANOVA and means were separated using Fisher LSD test (Sigma Plot, 2012).

RESULTS AND DISCUSSION

Effect of planting dates on the main pests attacking squash plants

Data arranged in Table (1) show the total number and relative abundance of the main pests attacking squash plants at different planting dates during the first season 2014 in Mansoura University. The cotton aphid, *A. gossypii* recorded the highest total number and relative abundance in March plantation followed by the onion thrips, *T. tabaci* and the cotton mealybug, *P. solenopsis* and represented by 1863 individuals (53.75%), 761 individuals (21.9 %), and 320 individuals (9.2 %), respectively. Moreover, in June plantation, *A. gossypii* came in the first category and recorded the highest total number and relative abundance followed by the snake cucumber beetle, *H. argus* and represented by 1808 individuals (39.4%) and 960 individuals (20.9 %), respectively. Meanwhile, in August plantation, the snake cucumber beetle, *H. argus* ranked the first category followed by the cotton aphid, *A. gossypii* and represented by 1384 individuals (33.8%) and 925 individuals (22.6 %), respectively.

Table 1. Total numbers and relative abundances of the main pests attacking squash plants at different planting dates during the first season 2014 at Mansoura region.

Pest species	March plantation		June Plantation		August Plantation	
	No.	%	No.	%	No.	%
<i>Aphis gossypii</i>	1863	53.7	1808	39.4	925	22.6
<i>Thrips tabaci</i>	761	21.9	434	9.5	137	3.3
<i>Bemisia tabaci</i>	199	5.7	366	8.0	834	20.4
<i>Empoasca dicipiens</i>	79	2.3	341	7.4	154	3.8
<i>Phenococcus solenopsis</i>	320	9.2	258	5.6	403	9.9
<i>Tetranychus urticae</i>	250	7.2	423	9.2	253	6.2
<i>Henosepilachna argus</i>	0	0.0	960	20.9	1384	33.8
Total	3472	100	4590	100	4090	100

The obtained results in Table (2) represent the total number and relative abundance of the main pests attacking squash plants at different planting dates during the second season 2015 in Mansoura University. The cotton aphid, *A. gossypii* also came in the first category and recorded the highest total number and relative abundance in March plantation followed by the onion thrips, *T. tabaci* and represented by 1856 individuals (55.6%) and 643 individuals (19.3 %), respectively. Meanwhile, in June plantation, the cotton aphid, *A. gossypii* ranked the first category and recorded the highest total number and relative abundance followed by the snake cucumber beetle, *H. argus* and represented by 977 individuals (26.6%) and 893 individuals (24.3 %), respectively. While, in August plantation, the snake cucumber beetle, *H. argus* came in the first category and recorded the highest total number and relative abundance followed by the cotton whitefly, *B. tabaci* and the cotton mealybug, *P. solenopsis* and represented by 1475 individuals (46.4%), 562 individuals (17.7 %), and 431 individuals (13.6 %), respectively.

As a conclusion, data in Tables (1 and 2) indicated that, in March plantation, *A. gossypii* recorded the highest relative abundance during the first and second season of study (53.7 and 55.6 %, respectively) followed by *T. tabaci* (21.9 and 19.3 %, respectively). On the other hand, the potato leafhopper ranked the last category during the first

and second season and represented by 2.3 and 2.1 %, respectively. While, the snake cucumber beetle *H. argus* did not occurred during the two seasons in March plantation. In June plantation, *A. gossypii* recorded the highest relative abundance during the first and second season (39.4 and 26.6 %, respectively) followed by *H. argus* (20.9 and 24.3 %, respectively). In August plantation, *H. argus* ranked the first category during the first and second season and represented by 33.8 and 44.6 %, respectively. Moreover, during the two seasons, June plantation harbored the highest total numbers of the main pests and represented by 4590 and 3673 pests, respectively.

The illustrated results in Table (3) show the average number of the main pests attacking squash plants in the three planting dates during the first season (2014). These results revealed that, *A. gossypii* and *T. tabaci* recorded the highest average number in March plantation (155.25 ± 13.92 and 63.41 ± 7.78 individuals, respectively), while *E. dicipiens* and *T. urticae* recorded the highest average number in June plantation (28.42 ± 4.89 and 35.25 ± 5.05 individuals, respectively). Meanwhile, *B. tabaci* and *P. solenopsis* ranked the first category in August plantation (69.50 ± 8.32 and 33.58 ± 5.88 individuals, respectively). Moreover, *H. argus* recorded the highest average numbers for all stages in August plantation.

Table 2. Total numbers and relative abundances of the main pests attacking squash plants at different planting dates during the second season 2015 at Mansoura region.

Pest species	March plantation		June Plantation		August Plantation	
	No.	%	No.	%	No.	%
<i>Aphis gossypii</i>	1856	55.6	977	26.6	225	7.1
<i>Thrips tabaci</i>	643	19.3	176	4.8	109	3.4
<i>Bemisia tabaci</i>	292	8.7	451	12.3	562	17.7
<i>Empoasca dicipiens</i>	69	2.1	311	8.5	116	3.7
<i>Phenococcus solenopsis</i>	224	6.7	407	11.1	431	13.6
<i>Tetranychus urticae</i>	256	7.7	458	12.5	259	8.2
<i>Henosepilachna argus</i>	0	0.0	893	24.3	1475	46.4
Total	3340	100	3673	100	3177	100

The results in Table (4) show the average number of the main pests attacking squash plants in the three planting dates during the second season (2015). The results revealed that, *A. gossypii* and *T. tabaci* recorded the highest average number in March plantation (154.67 ± 16.08 and 53.58 ± 10.73 individuals, respectively), while *E. dicipiens* and *T. urticae* recorded the highest average number in June

plantation (25.92 ± 3.67 and 38.17 ± 3.50 individuals, respectively). Meanwhile, *B. tabaci* and *P. solenopsis* ranked the first category in August plantation (46.83 ± 6.93 and 35.92 ± 5.41 individuals, respectively). Moreover, *H. argus* recorded the highest average numbers for all stages in August plantation.

Table 3. Effect of planting dates on the average numbers of the main pests attacking squash plants during the first season 2014 in Mansoura region.

Pest species	Average number of pest ± SE		
	March plantation	June plantation	August plantation
<i>Aphis gossypii</i>	155.25 ± 13.92 a	150.67 ± 15.72 a	77.08 ± 15.86 b
<i>Thrips tabaci</i>	63.41 ± 7.78 a	36.17 ± 5.79 b	11.42 ± 1.98 c
<i>Bemisia tabaci</i>	16.58 ± 3.49 b	30.50 ± 3.23 b	69.50 ± 8.32 a
<i>Empoasca decipiens</i>	6.58 ± 2.07 b	28.42 ± 4.89 a	12.83 ± 1.94 b
<i>Phenococcus solenopsis</i>	26.67 ± 6.09 a	21.50 ± 6.66 a	33.58 ± 5.88 a
<i>Tetranychus urticae</i>	20.83 ± 4.57 b	35.25 ± 5.05 a	21.08 ± 3.30 b
<i>Henosepilachna argus</i>	Eggs	29.92 ± 5.21 a	41.92 ± 7.74 a
	Larvae	25.75 ± 6.83 a	33.75 ± 5.77 a
	Pupae	12.00 ± 3.11 a	21.83 ± 5.43 a
	Adults	12.33 ± 4.64 a	17.83 ± 5.98 a

Values bearing the same small letters in a row for pests except *H. argus* are not significantly different (ANOVA, Fisher LSD Test), while those of *E. chrysolina* are separated with *t*-test.

As a conclusion, the obtained results in Tables (3 and 4) revealed that, in March plantation, *A. gossypii* ranked the first category and recorded the highest average number during the two successive seasons followed by *T. tabaci* with significant differences. While in June plantation, *E. decipiens* and *T. urticae* recorded the highest average number during the two seasons with significant differences. Meanwhile, *P. solenopsis* and *B. tabaci*

recorded the highest average number in August plantation during the two seasons with non-significant differences for *P. solenopsis* and significant differences for *B. tabaci*. The snake cucumber beetle, *H. argus* recorded the highest average number for all stages in August plantation during the two seasons with non-significant differences during the first season and with significant differences during the second one.

Table 4. Influence of planting dates on the average numbers of the main pests attacking squash plants during the first season 2015 in Mansoura region.

Pest species	Average number of pest ± SE		
	March plantation	June plantation	August plantation
<i>Aphis gossypii</i>	154.67 ± 16.08 a	81.42 ± 8.17 b	18.75 ± 1.93 c
<i>Thrips tabaci</i>	53.58 ± 10.73 a	14.67 ± 2.23 b	9.08 ± 2.17 c
<i>Bemisia tabaci</i>	24.33 ± 2.81 b	37.58 ± 3.65 a	46.83 ± 6.93 a
<i>Empoasca decipiens</i>	5.75 ± 1.39 b	25.92 ± 3.67 a	9.67 ± 2.26 b
<i>Phenococcus solenopsis</i>	18.67 ± 5.76 a	33.92 ± 4.51 a	35.92 ± 5.41 a
<i>Tetranychus urticae</i>	21.33 ± 3.28 b	38.17 ± 3.50 a	21.58 ± 3.04 b
<i>Henosepilachna argus</i>	Eggs	36.75 ± 5.06 a	40.17 ± 8.06 a
	Larvae	17.58 ± 5.46 b	37.17 ± 9.46 a
	Pupae	11.25 ± 5.96 b	24.00 ± 5.30 a
	Adults	8.83 ± 3.22 b	21.58 ± 3.40 a

Values bearing the same small letters in a row for pests except *E. chrysolina* are not significantly different (ANOVA, Fisher LSD Test), while those of *E. chrysolina* are separated with *t*-test.

These results are in consistent with those of Pan *et al.* (2015) in China who evaluated the ecological information for *B. tabaci* and concluded that the population increased in autumn compared to spring season. Sayed and Gameel (2008) in Egypt found that the higher numbers of the melon ladybird *E. chrysolina* on cucurbit plants which cultivated in the nili plantation, while the cucurbit plants of the summer plantation suffered the lowest numbers of the insect pest. El-Sayed *et al.* (1991) suggested that in all plantations, cucumber appeared to be the most infested crop with immature stages of *B. tabaci*. Awadalla *et al.* (2011) found that late summer plantation suffered the highest average number of eggs, larvae, and adults of the melon ladybird *E. chrysolina* on all tested cucurbit host plants.

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تأثير مواعيد الزراعة على الآفات الرئيسية التي تهاجم نباتات الكوسة في منطقة المنصورة
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أجريت التجارب الحقلية بالمزرعة البحثية لكلية الزراعة جامعة المنصورة ، حيث تم زراعة نباتات الكوسة صنف اسكندراني في بداية الإسيوع الثالث من شهر مارس والإسيوع الأول من شهر يونيو والإسيوع الثاني من شهر أغسطس خلال سنتي الدراسة ٢٠١٤ و ٢٠١٥ . سجلت حشرة من القطن أعلى وفرة نسبية في عروة مارس خلال سنتي الدراسة بنسبة ٥٣,٧ – ٥٥,٦ % على التوالي ، يليه تربس البصل بنسبة ٢١,٩ – ١٩,٣ % على التوالي. من ناحية أخرى جاء نطاط أوراق البطاطس في المرتبة الأخيرة خلال موسمي الدراسة حيث سجل ٢,٣ – ٢,١ % على التوالي. بينما أختفت خنفساء القثاء خلال عروة مارس في سنتي الدراسة. سجل من القطن أعلى وفرة نسبية في عروة يونيو خلال سنتي الدراسة بنسبة ٣٩,٤ – ٢٦,٦ % على التوالي. يليه خنفساء القثاء بنسبة ٢٠,٩ – ٢٤,٣ % على التوالي . بينما في عروة أغسطس إحتلت خنفساء القثاء المرتبة الأولى خلال موسمي الدراسة بنسبة ٣٣,٨ – ٤٤,٦ % على التوالي. علاوة على ذلك تواجد بعروة يونيو خلال موسمي الدراسة أعلى تعداد لأهم الآفات حيث سجلت ٤٥٩٠ – ٣٦٧٤ آفة على التوالي. سجل بق القطن الدقيقي وذبابة القطن البيضاء أعلى متوسط تعداد في عروة أغسطس خلال موسمي الدراسة مع عدم وجود فروق معنوية لبق القطن الدقيقي و وجود فروق معنوية لذبابة القطن البيضاء. سجلت خنفساء القثاء أعلى تعداد لجميع أطوارها في عروة أغسطس خلال موسمي الدراسة مع عدم وجود فروق معنوية في الموسم الأول و وجود فروق معنوية في الموسم الثاني.