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EFFECT OF SOME AGRONOMIC PRACTICES ON THE INFESTATION WITH THE SUGAR CANE STEM BORER, *Sesamia cretica* LED. (LEPIDOPTERA : NOCTUIDAE).

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ABSTRACT

The present experiments were carried out at the experimental farm of Sakha Agricultural Research Station, Kafr El-Sheikh Governorate during two successive seasons, 2006 and 2007 to study the effects of some cultural practices i.e, planting dates, nitrogen fertilizer levels and planting spaces on the infestation with the sugar cane stem borer, *Sesamia cretica* Led. (Lepidoptera : Noctuidae). Corn plants sown in April plantation received the maximum numbers of the borer larvae with an average number of 23.5±5.5 and 28.7±5.8 larvae / 5 plants, while those sown in June plantation had the least numbers of the insect larvae with an average of 3.7±0.9 and 6.8±1.5 larvae / 5 plants. The plantation sown in July was intermediate with an average of 8.1±2.1 and 9.6±2.8 larvae / 5 plants during two successive seasons, 2006 and 2007 respectively. The statistical analysis revealed that, highly significant differences in the numbers of *S. cretica* larvae in the three planting dates during both seasons.

Increasing nitrogen fertilizer rates from zero to 360 Kg/ fed. Caused a significant increase in rate of infestation with *S. cretica*. When suppling the corn plants with 360, 260, 160 and zero Kg nitrogen / fed., the rate of infestation with *S. cretic* were (26.5±6.4% – 24.6±7.1%), (15.0 ± 3.9%- 17.7±5.0%), (13.5±3.9% – 14.6±4.5%) and (7.7±1.9% – 10.1±3.3 %) to four nitrogen levels during two seasons 2006 and 2007, respectively. The statistical analysis revealed that, in season 2006, there was highly significant differences in infestation with *S. cretica* among four rates of nitrogen fertilizer. On the other hand, there was significant differences between four rates of nitrogen fertilizer in 2007 season.

Increasing planting spaces from 20 to 30 cm between hills caused insignificant decrease in the rates of infestation. The rates of infestation were (16.3±4.9% – 16.3±5.1%), (10.7±3.0% - 12.3±4.0%) and (9.0±2.4% – 9.7±2.9 %) to three planting spaces 20, 25 and 30 cm during two seasons 2006 and 2007 respectively. The statistical analysis revealed insignificant differences among the three planting spaces during both seasons.

INTRODUCTION

The sugar cane stem borer, *Sesamia cretica* is of economic importance on corn plants in Egypt, as well as allover the world. Its larvae attack young plants causing leaf feeding and dead heart symptoms (El-Naggar, 1991).

From the available literature, some authors have studied the relationship between the planting date and the population abundance of *S. cretica*. In Egypt, Abd El-Rahim *et al.* and El-Naggar (1991), Abd El-Gayed (1995), El-Sappagh (1998), Ahmed and El-Saadany *et al.*(2000), Metwally

(2002) and in Pakistan, Atiyeh (1996) found that, the early plantation (April) received high rates of infestation with *S. cretica*.

On the other hand, From the available literature some authors have studied the relationship between nitrogen fertilizer level and *S. cretica* infestation. In Egypt, Nawar *et al.* (1992), Galal *et al.* (1997), Ali *et al.* (2001) and Abazied (2008) found that, increasing nitrogen level causes increase in the infestation rate with this insect pest.

While, a few authors studied the relationship between planting spaces and *S. cretica* infestation. In Egypt, Tantawi *et al.* (1991) and Abazied (2008) found that, crowdness of plants in the field increases the borer infestation.

This work is aimed to study the relationship of certain agricultural practices; planting date, nitrogen fertilizer and planting spaces and *S. cretica* infestation on corn plants at Kafr El-Sheikh Governorate for two successive seasons; 2006 and 2007.

MATERIALS AND METHODS

The present experiments were carried out at the experimental farm of Sakha Agricultural Research station, Kafr El-Sheikh Governorate during two successive seasons, 2006 and 2007 to study the effects of some cultural practices i.e, planting dates, nitrogen fertilizer levels and planting spaces on the sugar cane stem borer, *S. cretica* Led. All treatments received the ordinary cultural practices, and no insecticides were used in the two seasons.

1. Effect of planting dates

Three planting dates were carried out. The first (April plantation) was planted on 20th of April, the second (June plantation or the recommended planting date) was on first of June, and the third (July plantation) was on 20th July. Giza 2 maize cultivar was used in the three planting dates and each date was divided into four replicates. From each corn plantation, twenty plants were sampled weekly for examination starting two weeks after planting until harvesting in the three dates. In each of the weekly samples, five plants were chosen at random from each of the four plots.

2. Effect of Nitrogen fertilizer levels

An experiment was conducted on corn plants sown on 20th April during two successive seasons 2006 and 2007. This plantation was selected as the observations indicated that it had the highest borer damage. The infestation of corn plants with the pest was compared in plots treated with urea (46% nitrogen) and other plots having no nitrogen fertilizer. The experiment was divided into 16 plots arranged in a Completely Randomized Design. Three nitrogen fertilizer levels with four replicates each were used. Urea was used at three levels 360, 260 and 160 kg (166, 120 and 74 units) urea /feddan, respectively. Four plots were left without fertilizer as a control. The quantity of fertilizers was added to plants as two equal splits, the first was added three weeks after planting date, and the second was added two weeks later (after

36 days from planting). No pesticides were applied. The weekly examinations started two weeks after sowing. Samples were taken from each treatment (nitrogen fertilizer level) and the percentage of infestation was calculated according to the following formula:

$$\% \text{ of infestation} = \frac{\text{No. of infested plants}}{\text{Total no. of inspected plants}} \times 100$$

3. Effect of planting spaces

Corn plants were sown on 20th of April in 2006 and 2007 seasons. The spaces between hills were 20, 25 and 30 cm (the spaces between rows were 70 cm). The weekly examinations started two weeks after sowing. Samples were taken from each treatment to calculate the percentage of infestation according to the following formula.

$$\% \text{ of infestation} = \frac{\text{No. of infested plants}}{\text{Total no. of inspected plants}} \times 100$$

RESULTS AND DISCUSSION

1. Effect of planting dates

Data represented in Fig (1) shows the population abundance of *S. cretica* larvae in three planting dates in season 2006 and it was observed that, in April plantation, after two weeks from planting, one larva / 5 plants was recorded on May 4th, then the population tended to increase reaching its peak of 16 larvae / 5 plants on May 25th,2006. In June plantation (recommended date), *S. cretica* larvae were detected on corn plants after three weeks from planting and 0.3 larvae / 5plants were recorded on June 22nd. The average number of larvae reached a maximum with an average of 2.8 larvae / 5 plants on June 29th, and then the numbers declined till the end of the season. In July plantation, larvae of *S. cretica* began to appear on corn plants on August 3rd with an average of 1.8 larvae / 5 plants . A peak of 6.8 larvae / 5 plants was recorded on August 17th, then the population decreased until the end of the season.

The data illustrated in Fig (2) shows the population abundance of *S. cretica* larvae in three planting dates in season 2007 and it was noticed that, in April plantation, larvae of *S. cretica* appeared on May 11th with an average of 1.8 larvae /5 plants. Two peaks of 18.8 and 15.5 larvae / 5 plants were obtained on May 25th and June 22nd, respectively. In June plantation, the mean number of *S. cretica* Larvae appeared on June 22nd as one larva / 5 plants and reached a peak of 5.3 larvae / 5 plants on July 6th. In July plantation, larvae began to attack the plants in the beginning of August till the end of the season. The highest population density (8.8 larvae / 5 plants) was recorded on August 17th.

Data presented in table (1) show the monthly average numbers of larvae in the different planting dates during two successive seasons of study 2006 and 2007. It can be noticed that, the highest average numbers of larvae during April plantation were in June recording 38.2±6.3 and 48.0±4.6 larvae / 5 plants in the two successive seasons 2006 and 2007 respectively. In June plantation, the highest average numbers of larvae were 4.8±2.3 larvae / 5 plants recorded in August, 2006. while it was 13.5±2.6 larvae / 5 plants recorded in July, 2007. In July plantation, the highest average numbers of larvae was recorded in August reaching 17.0±4.4 and 16.8±7.1 larvae / 5 plants during 2006 and 2007 respectively.

As a conclusion, data represented in Fig. (1and 2) and table (1) indicated that, corn plants sown in April plantation received the maximum numbers of the sugar cane stem borer, *S. cretica* with an average number of 23.5±5.5 and 28.7±5.8 larvae / 5 plants, while those sown in June plantation were subjected to the least numbers of the insect larvae with an average of 3.7±0.9 and 6.8±1.5 larvae / 5 plants. The plantation sown in July was intermediate with an average of 8.1±2.1 and 9.6±2.8 larvae / 5 plants during two successive seasons, 2006 and 2007 respectively. The statistical analysis revealed highly significant differences in the numbers of *S. cretica* larvae in the three planting dates during both seasons.

The above mentioned results are in agreement with those obtained by Abdalla and Bleih (1994) who recorded two peaks of *S. cretica* during the third week of May and the second in the third week of September at Kafr El-Sheikh region. Abd El-Gayed (1995) found that the infestation with *S. cretica* began after one week of sowing. Abd El-Rahman *et al.*(1984) reported that *S. cretica* had two annual generations; The first was the major one and heavily infested April plantation. Ahmed (2000) reported that April plantations received the maximum infestation with *S. cretica*, perhaps May and June plantations received very slight infestation and increased again in July plantation. Metwally (2002) found that maize plants sown in April received the maximum infestation with this borer. Maize plants sown in July received slight infestation by this borer.

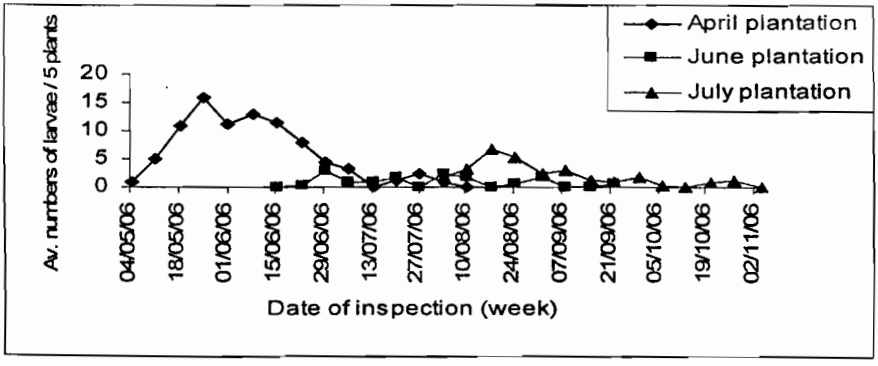

Fig (1) : Population abundance of the sugar cane stem borer, *S. cretica* larvae / 5 plants in three planting dates during 2006 season.

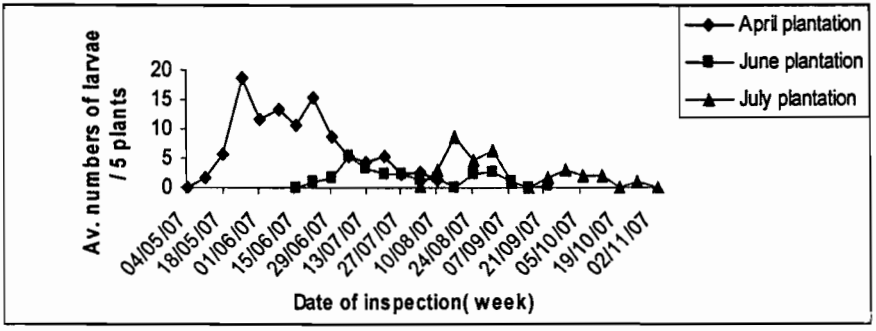

Fig (2) : Population abundance of the sugar cane stem borer, *S. cretica* larvae / 5 plants in three planting dates during 2007season.

Table (1): Monthly average numbers of the sugar cane stem borer, *S. cretica* larvae in three planting dates during 2006 and 2007 seasons .

Months	2006			2007		
	April plantation	June plantation	July plantation	April plantation	June plantation	July plantation
May	32.8±13.2	-	-	26.3±16.9	-	-
Jun.	38.2±6.3	4±3.6	-	48±4.6	3.7±2.1	-
Jul.	6.8±2.8	3.8±1.5	-	17.5±2.9	13.5±2.6	-
Aug.	1.5±1.5	4.8±2.3	17±4.4	8.0±3.0	5.3±1.9	16.8±7.1
Sep.	-	2.3±1.7	7.4±1.5	-	4.0±2.5	9.6±4.4
Oct.	-	-	2.3±1.1	-	-	5±1.9
Nov.	-	-	0.0	-	-	0.0
Mean±SE	23.5±5.5	3.7±0.9	8.1±2.1	28.7±5.8	6.8±1.5	9.6±2.8
LSD 0.05		1.3			1.4	
0.01		1.7			1.9	
0.001		2.2			2.4	

2. Effect of nitrogen fertilizer

Data presented in table (2) show the effect of nitrogen fertilizer rates on the rate of infestation with *S. cretica* during 2006 and 2007 seasons. It was observed that, increase of nitrogen fertilizer rates led to an increase in the infestation with *S. cretica*. In season 2006, at the beginning of inspection, the rates of infestation were 20, 20, 15 and 10 % on May 18th with four nitrogen levels 360, 260, 160 and control (zero) Kg/ Fed., respectively. The rate of infestation increased to reach the maximum in the beginning of June recording 65, 45, 45 and 20 % for nitrogen levels 360, 260, 160 and control, respectively. In season 2007, at the beginning of inspection, the rates of infestation were 25, 15, 20 and 10 % on May 18th with four nitrogen levels 360, 260, 160 and control (zero) Kg/ Fed., respectively. The rate of infestation increased to reach the maximum at the beginning of June recording 75, 50, 50 and 35% for nitrogen levels 360, 260, 160 and control, respectively.

As a conclusion, increasing nitrogen fertilizer rates from zero to 360 Kg/ fed. caused a significant increase in rate of infestation with *S. cretica*. When the corn plants supplied with 360, 260, 160 and zero Kg nitrogen /

fed., the rate of infestation with *S. cretic* were (26.5±6.4% – 24.6±7.1%), (15.0 ± 3.9%- 17.7±5.0%), (13.5±3.9% – 14.6±4.5%) and (7.7±1.9% – 10.1±3.3 %) to four nitrogen levels during two seasons 2006 and 2007, respectively. The statistical analysis revealed, in season 2006, highly significant differences in infestation with *S. cretica* between four rates of nitrogen fertilizer. On the other hand, there was significant differences between four rates of nitrogen fertilizer.

These results agree with those obtained by Nawar *et al.*(1992) who found that increasing nitrogen level from 60 to 120 kg N / fed. caused a significant increase of infestation rate with corn borer, *S. cretica*. Galal *et al.*(1997) found that the natural infestation varied considerably and significantly from one year to another and increased with the increase in nitrogen rates . Ali *et al.* (2001) found that the increasing of N fertilizer rate favoured borer infestation . Abazied (2008) reported that the infestation was affected with the dose of nitrogen fertilizer, the high dose of nitrogen fertilizer (310 kg / fed) increased the borer infestation more than the recommended dose (230 kg / fed).

Table (2): **Effect of nitrogen fertilizer rates on rates of infestation with the sugar cane stem borer, *S. cretica* during seasons 2006 and 2007.**

Date of inspection		2006				2007			
		360 Kg/Fed.	260 Kg/Fed.	160 Kg/Fed.	control	360 Kg/Fed.	260 Kg/Fed.	160 Kg/Fed.	control
May,	18	20	20	15	10	25	15	20	10
	25	35	25	15	15	45	30	25	25
Jun.	1	65	45	45	20	75	50	50	35
	8	55	25	15	10	60	30	25	10
	15	45	20	30	10	35	40	35	25
	22	50	30	25	15	45	40	20	15
	29	35	15	20	5	20	15	10	5
Jul.	6	30	10	5	10	15	5	5	5
	13	5	5	5	5	0	5	0	0
	20	5	0	0	0	0	0	0	0
	27	0	0	0	0	0	0	0	0
Aug.	3	0	0	0	0	0	0	0	0
	10	0	0	0	0	0	0	0	0
Mean±SE		26.5± 6.4	15.0± 3.9	13.5± 3.9	7.7± 1.9	24.6± 7.1	17.7± 5.0	14.6± 4.5	10.0± 3.3
LSD	0.05	0.6				0.4			
	0.01	0.7				0.6			
	0.001	0.9				0.7			

3. Effect of planting spaces

Data presented in table (3) show effect of planting spaces on the rate of infestation with *S. cretica* during 2006 and 2007 seasons. The obtained results showed that, increase of planting spaces between hills led to a decrease in *S. cretica* infestation. In season 2006, The infestation began in the first week of May and reached its maximum in the last week of May in the three spaces (20, 25 and 30 cm between hills). Whereas, the highest rate of infestation was recorded in the planting space, 20 cm reaching 65% and the lowest infestation was recorded in space, 30 cm reaching 25%. In season

2007, The infestation began in the first week of May and reached its maximum in the third week of May in both planting spaces 20 and 25 while, 30 cm reached its maximum in the last week of May. The highest rate of infestation was recorded in the planting space, 20 cm reaching 60% and the lowest infestation was 35% recorded in space, 30 cm.

As a conclusion , increasing planting spaces from 20 to 30 cm between hills caused insignificant decrease in the rates of infestation. The rates of infestation were (16.3±4.9% – 16.3±5.1%), (10.7±3.0% - 12.3±4.0%) and (9.0±2.4% – 9.7±2.9 %) to three planting spaces 20, 25 and 30 cm during two seasons 2006 and 2007 respectively. The statistical analysis revealed insignificant differences between the three planting spaces during both seasons.

These results agree with those obtained by Tantawi *et al.* (1991) who found that, crowdness of sorghum hills in the field increased the borer infestation and disagree with those of Abdallah and Badawi (1990) who found that, the degree of the purple lined borer, *Chilo agamemnon* Bles. infestation in rice field was relatively lower at 20×10 cm spacing than with wider spaces of 20×20 cm or 20×30 cm.

Table (3): Effect of planting spaces on the rates of infestation with the sugar cane stem borer, *S. cretica* during seasons 2006 and 2007.

Date of inspection		2006			2007		
		20 cm	25 cm	30 cm	20 cm	25 cm	30 cm
May,	4	5	5	5	15	10	0
	11	20	20	10	35	35	20
	18	45	25	20	60	45	25
	25	65	35	25	50	35	35
Jun.	1	30	20	25	35	20	20
	8	20	25	5	20	35	15
	15	25	15	20	15	10	15
	22	20	10	10	0	5	5
	29	5	0	10	10	0	10
Jul.	6	0	5	5	0	0	0
	13	0	0	0	5	0	0
	20	0	0	0	0	0	0
	27	0	0	0	0	0	0
Aug.	3	0	0	0	0	0	0
	10	0	0	0	0	0	0
Mean ±SE		16.3±4.9	10.7±3.0	9.0±2.4	16.3±5.1	12.3±4.0	9.7±2.9
LSD		ns			ns		

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تأثير بعض العمليات الزراعية علي الإصابة بدودة القصب الكبيرة

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أجريت هذه التجربة في المزرعة البحثية بمحطة البحوث الزراعية بسخا محافظة كفر الشيخ خلال موسمي الزراعة ٢٠٠٦ و ٢٠٠٧ بهدف دراسة ميعاد الزراعة ومستوي التسميد النيتروجيني وكذلك مسافات الزراعة (بين الجور) علي دودة القصب الكبيرة. ولقد أوضحت النتائج الأتي:

تعرضت نباتات الذرة المنزرعة في عروة أبريل لأقصي إصابة بهذه الحشرة وذلك بمتوسط أعداد ٢٣,٥±٥,٥ و ٢٨,٧±٥,٨ يرقة / ٥ نباتات بينما تعرضت عروة يونيه لأقل إصابة بيرقات هذه الحشرة وذلك بمتوسط ٣,٧±٠,٩ و ٦,٨±١,٥ يرقة / ٥ نباتات. أما عروة يوليه فكانت متوسطة الإصابة حيث بلغ متوسط أعداد اليرقات في هذه العروة ٨,١±٢,١ و ٩,٦±٢,٨ يرقة / ٥ نباتات وذلك خلال موسمي الدراسة ٢٠٠٦ و ٢٠٠٧ علي التوالي. أظهر التحليل الإحصائي وجود فروق عالية المعنوية بين متوسط أعداد اليرقات في مواعيد الزراعة الثلاثة خلال عامي الدراسة.

أدت زيادة معدلات التسميد النتروجيني من صفر إلي ٣٦٠كجم / فدان إلي زيادة معنوية في معدل الإصابة بدودة القصب الكبيرة. حيث بلغت نسبة الإصابة عند تسميد نباتات الذرة بـ ٣٦٠و٢٦٠و١٦٠وصفر كجم / فدان (٢٦,٥±٦,٤ - ٢٤,٦±٧,١ %) و (١٥±٣,٩ - ١٧,٧±٥%) و (١٣,٥±٣,٩ - ١٤,٦±٤,٥%) و (٧,٧±١,٩- ١٠±٣,٣%) وذلك خلال موسمي الدراسة ٢٠٠٦و ٢٠٠٧ علي التوالي. ولقد أظهرت النتائج وجود فروق عالية المعنوية بين معدلات التسميد النتروجيني في موسم ٢٠٠٦ بينما كانت معنوية في موسم ٢٠٠٧.

أدت زيادة مسافة الزراعة بين الجور من ٢٠ إلي ٣٠سم إلي خفض غير معنوي في نسبة الإصابة بدودة القصب الكبيرة. حيث بلغت معدلات الإصابة لمسافات الزراعة الثلاثة ٢٠و ٢٥و ٣٠ سم (١٦,٣±٤,٩-١٦,٣±٥,١%) و (١٠,٧±٣- ١٢,٣±٤%)و (٩±٢,٤-٩,٧±٢,٩%) خلال موسمي الدراسة ٢٠٠٦و ٢٠٠٧ علي التوالي. وقد أظهر التحليل الإحصائي وجود فروق غير معنوية بين مسافات الزراعة الثلاثة أثناء موسمي الدراسة ٢٠٠٦ و٢٠٠٧.