

EFFECT OF PLANTING DISTANCES, INTERCROPPING WITH ONION AND VARIETIES ON THE POPULATION OF *Thripstabaci* Lindeman ON GARLIC IN ASSIUT

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ABSTRACT

The present studies includes were conducted to study the effect of planting distances (5, 10 and 15 cm.), intercropping with onion plants and garlic varieties on the population of *Thrips tabaci* Lindeman on garlic plants during two successive seasons (2010 /2011 and 2011 / 2012)inAssiut Governorate, Egypt, using the two garlic varieties (Egyptian and Chinese). Results indicated that the three mentioned variables have significant effect on the population of the insect pest. The plant distances were the most significant factor, with the high numbers of thripsclosest spacing (10 cm.) between plants. Intercropped garlic with onion showed that the garlic harbored lowest number of the pest whereas; in garlic solo the density of pest is high compared with intercropped with onion. Egyptian variety is lower infested than the Chinese variety one during the two seasons.

Keywords: Garlic, planting distances, intercropping with onion, garlic varieties, *Thripstabaci* , population.

INTRODUCTION

Garlic (*Allium sativum* L.) is an importantfield crop for both local consumption and exportation. Also, garlic plantations are subject to insect infestation among which dominate *Thripstabaci* Lindeman(Thysanoptera: Thripidae) in fields. According to the statistics of the Ministry of Agriculture and Land Reclamation the total area cultivated with garlic inAssiut Governorate in 2014 exceeded 455 feddans.

During the last few years great attention has been given to increase cultivated area of garlic. Increasing the crop production could be achieved by growing a heavy yielding variety and / or improving the agricultural practices (Nassaret *al.*, 1972and Foda*et al.*, 1977). Onion thrips*Thripstabaci* Lindeman is one of the main pests of garlic and severe damage by it always reduces the yield (El-Sherif, 1971) and (Shoeib and Hosny, 1972) in Egypt reported that *T. tabaci* was the major insect pest attacking garlic plants. Also, Abd-El-Wahab (2004) reported that *Thripstabaci* occurs on all Alliaceae crops. This pest is a worldwide one and has an extensive host range that includes more than 200 plant species in Egypt include the works of Karaman (1970), Khalil *et al.* (1971),Haydar and Sherif (1987), Abd El-Ghany (1997), El-Gendi (1998) , Salman(2000), Massry (2002), Sabra *et al.* (2007), Mahmoud (2008), El-Sherif and Mahmoud (2008), Amro *et al.* (2009) and El-Fakharany *et al.* (2012). Relevant investigations abroad include the studies of El-Serwiy *et al.* (1985)in Iraq, Edelson*et al.* (1986) inUSA, Lu and Lee (1987) in Taiwan, Lorine and Dunicr (1988) in Brazil and Kalafchi *et al.* (2006) in Iran.

Most of these investigations dealing with biology and ecology of *T. tabaci*, while little attention was paid to the effect of some agricultural practices on the thrips infestation. The present studies were undertaken to establish an optimum combination of the garlic varieties, planting distances and intercropping with onion on the infestation level by *T. tabaci* on garlic plants.

MATERIALS AND METHODS

This work was carried out in selected farmer fields planted with the commonly grown garlic cultivar (Egyptian and Chinese) at El-welydia village-Assiut Governorate during the two successive seasons of 2010/2011 and 2011/ 2012. An area of about 1/4 feddan was divided into three experiments. Garlic lobes were sown on late October. Each experiment was designed in a randomized complete blocks with four replications. The first experiment used three planting distances (5, 10 and 15 cm.). The second experiment used for study the effect of intercropping of garlic varieties with onion plants "Giza 6 Mohassan" (1 : 1, garlic : onion alternate rows compared with sole garlic). The third experiment was two varieties of garlic (Egyptian and Chinese varieties). Normal agricultural practices of growing garlic were followed and no insecticides were applied during the study period. One month after planting, five garlic plants were taken from replicate at quarter – monthly intervals, thus making a total sample size of 20 plants from the whole treatment. Samples were taken at 8 a.m. from the beginning of December until the early April. Samples were introduced into clean cloth bags, and then transferred to the laboratory where they were examined for the occurrence and count of thrips larvae and /or adults. The obtained data were statistically analysed for variance according to Sendecor and Cochran (1967). The mean values were compared at 5% levels of least significant differences, for each season.

RESULTS AND DISCUSSION

The mean numbers of the insect pest *T. tabaci* in each treatment were calculated and recorded in Tables (1, 2, 3, 4 & 5). The effect of the three factors (i. e. planting distances, intercropping and garlic varieties) on the population density of *T. tabaci* on garlic plants during the two successive seasons was shown to be as follows:

1. Effect of planting distances:

Data in Tables (1 & 2) indicate that the planting distance affected significantly the mean numbers of *T. tabaci* infesting garlic plants. The mean numbers of *T. tabaci* per plant in 2010 / 2011 season were 219.1, 273.7 and 163.2 individuals / plant, when planted 5, 10 and 15 cm. apart, respectively. In the second season (2011 / 2012) the corresponding means were high than those of the first season (243.1, 306.0 and 192.0 individuals / plant) in garlic Egyptian variety. On the contrary in garlic Chinese variety, the mean numbers of *T. tabaci* in (2010 / 2011) season were 397.1, 474.3 and 307.7 individuals / plant, when planted 5, 10 and 15 cm. apart, respectively. In the second

season (2011 / 2012) the corresponding means were lower than those of the first season (352.3, 440.3 and 309.0 individuals / plant). Statistical analysis of thrips numbers per garlic plant at the three planting distances produced highly significant differences between the mean numbers of thrips at tested planting distances in the both seasons. The results indicated that the widest distances for planting garlic of 15 cm. led to the lowest infestation levels by *T. tabaci* in both seasons and both varieties (163.2 and 192.0 in garlic Egyptian variety) & (307.7 and 309.0 in garlic Chinese variety) thrips individuals / plant, during two seasons, respectively. Similar results were reported by Abd El-Ghany (1997) and Maksoudet *al.* (1983) found that, increasing the crop production of garlic could be achieved by planting at wider space.

Table (1): Effect of planting distances of garlic (Egyptian variety) on the population of *Thripstabaci*, during two seasons.

Mean number of <i>T. tabaci</i> / plant								
I.D.		P.D. (cm)	5	10	15	5	10	15
			2010 / 2011			2011 / 2012		
Month	Quarter	2010 / 2011			2011 / 2012			
Dec.	1	0.9	1.1	0.7	1.3	1.6	0.6	
	2	1.3	2.3	0.9	1.8	2.0	1.4	
	3	1.2	1.9	1.4	3.2	4.5	2.3	
	4	4.2	4.1	2.9	2.7	3.1	2.4	
Jan.	1	6.5	7.3	4.4	3.7	4.7	3.4	
	2	5.5	5.5	4.2	4.2	6.4	3.7	
	3	8.2	12.3	10.1	9.1	11.1	8.8	
	4	9.7	11.4	6.4	13.0	16.1	7.9	
Feb.	1	15.6	16.0	12.3	16.4	26.4	12.6	
	2	20.8	21.5	20.2	22.0	32.6	16.1	
	3	21.9	25.5	16.0	27.2	30.2	19.7	
	4	20.4	27.5	17.2	35.4	41.4	24.6	
March	1	21.4	39.0	18.1	30.2	36.1	24.9	
	2	32.7	41.1	20.1	32.2	42.2	28.4	
	3	26.8	29.7	14.2	17.2	25.6	18.7	
	4	12.0	11.8	8.4	14.1	14.6	10.8	
April	1	10.0	11.5	6.9	9.6	8.4	5.7	
Total		219.1 b	273.7 a	163.2 c	243.1 b	306.0 a	192.0 c	
F.(0.05) Between treatments		34.67**			18.58**			
L.S.D.(0.05) Between treatments		8.36			11.19			

P.D. = Planting distances. I.D. = Inspection date.

Table (2): Effect of planting distances of garlic (Chinese variety) on the population of *Thrips tabaci*, during two seasons.

Mean number of <i>T. tabaci</i> / plant							
P.D. (cm)		5	10	15	5	10	15
I.D.		2010 / 2011			2011 / 2012		
Month	Quarter	2010 / 2011			2011 / 2012		
Dec.	1	1.0	2.4	1.0	1.3	1.7	1.0
	2	2.0	2.4	1.5	3.0	3.5	2.3
	3	3.1	3.4	3.1	4.8	5.8	4.1
	4	9.4	9.4	4.9	6.8	11.2	5.5
Jan.	1	13.6	12.0	8.8	11.1	15.2	10.4
	2	11.2	19.3	12.1	13.8	20.0	14.2
	3	16.6	27.2	10.9	19.2	19.3	11.9
	4	20.7	27.5	20.6	24.1	30.3	22.8
Feb.	1	43.7	47.6	32.0	28.8	34.2	26.7
	2	43.1	48.1	32.4	27.2	36.5	29.0
	3	57.3	57.7	40.9	39.5	44.7	35.9
	4	56.3	67.2	40.6	43.6	49.0	32.9
March	1	39.3	55.7	38.1	40.2	44.1	34.9
	2	39.6	47.0	29.5	32.1	47.7	28.2
	3	17.4	21.1	13.7	32.1	36.8	28.3
	4	13.0	15.8	10.4	15.8	27.0	13.8
April	1	9.8	12.3	8.2	8.9	13.5	7.1
Total		397.1 b	474.3 a	307.7 c	352.3 b	440.3 a	309.0 c
F.(0.05) Between treatments		51.93**			39.48**		
L.S.D.(0.05) Between treatments		9.89			9.76		

P.D. = Planting distances. I.D. = Inspection date.

2. Effect of intercropping:

Table (3) shows the effect of intercropping of garlic with onion plants on *T. tabaci* population. The obtained results showed high significant differences were observed in garlic characters in mono and maxed cultures during 2010 / 2011 and 2011 / 2012, seasons. Similar results were recorder in both varieties (garlic Egyptian and garlic Chinese) during both seasons. Also, data illustrated in Table (3) showed that, the rate of infestation was higher on the sole garlic Egyptian plants [(273.5&306.8) and (64.3&94.0) individuals / plant] compared with intercropping garlic Egyptian, respectively in both seasons. The same trend was noticed throughout the garlic Chinese variety. The results indicated that the rate of infestation was higher on the sole garlic Chinese plants than on these intercropped with onion plants [(474.7&440.0) and (245.1&166.2) individuals / plant] compared with intercropping garlic

Chinese, respectively in both seasons. Generally the obtained data indicated that the lowest mean of *T. tabaci* infestation to the intercropped garlic plants of the two garlic varieties and in both seasons.

Table(3): Effect of intercropping of garlic varieties (Egyptian and Chinese) with onion plants on the population of *Thripstabaci* compare with the solely garlic plants, during two seasons.

Mean number of <i>T. tabaci</i> / plant									
I.S.		Garlic Egyptian				Garlic Chinese			
		Intercropping		Solely		Intercropping		Solely	
Month	Quarter	2010 / 2011	2011 / 2012	2010 / 2011	2011 / 2012	2010 / 2011	2011 / 2012	2010 / 2011	2011 / 2012
Dec.	1	0.4	0.6	1.1	1.6	0.4	0.4	1.4	1.7
	2	1.0	1.0	1.7	2.0	0.7	0.7	2.4	3.5
	3	0.7	0.9	1.9	4.5	1.3	1.0	3.4	5.8
	4	0.9	1.8	4.1	3.1	2.6	2.7	9.4	11.2
Jan.	1	2.3	1.6	7.3	4.7	2.8	4.1	12.0	15.2
	2	2.8	2.2	5.5	6.4	4.1	6.6	19.3	20.0
	3	4.3	2.6	12.3	11.1	7.4	7.0	27.2	19.3
	4	4.5	4.7	11.4	16.1	6.6	17.1	27.5	30.3
Feb.	1	4.5	7.2	16.0	26.4	11.2	12.2	47.6	34.2
	2	4.3	7.9	21.5	32.6	20.1	16.0	48.1	36.5
	3	4.9	11.8	25.5	30.2	23.6	12.0	57.7	44.7
	4	9.0	8.9	32.5	41.4	32.5	17.8	67.2	49.0
March	1	8.7	18.5	39.0	36.1	34.2	27.0	55.7	44.1
	2	5.5	7.6	41.1	42.2	16.5	15.7	47.0	47.7
	3	5.5	8.4	29.7	25.6	11.7	10.0	21.1	36.8
	4	3.6	6.0	11.8	14.6	8.2	11.4	15.8	27.0
April	1	1.9	2.5	11.5	8.5	4.5	5.1	12.3	13.5
Total		64.3	94.0	273.5	306.8	245.1	166.2	474.7	440.0
F.(0.05) Between treatments		370.1**				331.9**			
L.S.D.(0.05) Between treatments		6.38				8.59			

I.S. = Intercropping system . I.D. = Inspection date .

3.Effect of garlic varieties:

Data in Table (4) indicated that the susceptibility of the two garlic varieties for *T. tabaci* infestation varied during the two successive seasons. It was found that all garlic varieties were high susceptibility to the infestation by *Thripstabaci*. Also, showed the data at the beginning of the season, counts of thrips individuals on garlic plants started with few numbers ranged from 1.1-1.6 individuals / plant of Egyptian variety and 1.4 - 1.7 on Chinese variety.

The number of *T.tabaci* individuals increased gradually throughout the growing period of the two varieties. The highest population of thrips was detected during the period from February till harvesting. These results may be confirmed those previously reported by Lorine and Dunicr (1988), in Brazil, who indicated that with low *T. tabaci* infestation rate to garlic plants (less than 1.0 individual / plant) occurred at early time, then infestation increased to reach 174.6 individuals / plant when temperature was 18.2 C⁰ in average. Similar results were reported by Abd El-Ghany (1997), Massry (2002) and El-Fakharanyet *al.* (2012) in Egypt, who indicated that the population of *T. tabaci* at beginning of few numbers and increased throughout the growing period (extending from February to end of the season).

From the results, it is clear that the tested garlic varieties differed significantly in their susceptibility to the pest. The whole season mean numbers of thrips on Egyptian variety were 273.5 and 306.7 individuals per plant in 2010 / 2011 and 2011 / 2012 seasons, respectively. The corresponding counts on the Chinese variety were 474.7 and 440.0 individuals per plant. The differences of these counts on plants of the two varieties were shown to be significant. Generally the obtained data indicated that the lowest mean of *T. tabaci* infestation on Egyptian variety, while the Chinese variety was the most susceptibility to the pest. The present results are in agreement with the findings of Abd El-Ghany (1997) and Amroet *al.* (2009) in Egypt, mentioned that the differences of these counts of thrips on plants of the two garlic varieties were shown to be significant. In this regard Darshanet *al.* (1986) found that the varieties of onion and garlic, in the field in Punjab, showed great differences in their natural infestation by *Thripstabaci*.

Table (4): Effect of garlic varieties on the population of *Thripstabaci*, during two seasons.

Mean number of <i>T. tabaci</i> / plant					
G.V.		Garlic Egyptian	Garlic Chinese	Garlic Egyptian	Garlic Chinese
I.D.					
Month	Quarter	2010 / 2011		2011 / 2012	
Dec.	1	1.1	1.4	1.6	1.7
	2	1.7	2.4	2.0	3.5
	3	1.9	3.4	4.5	5.8
	4	4.1	9.4	3.1	11.2
Jan.	1	7.3	12.0	4.7	15.2
	2	5.5	19.3	6.4	20.0
	3	12.3	27.2	11.1	19.3
	4	11.4	27.5	16.1	30.3
Feb.	1	16.0	47.6	26.4	34.2
	2	21.5	48.1	32.6	36.5
	3	25.5	57.7	30.2	44.7
	4	32.5	67.2	41.4	49.0
March	1	39.0	55.7	36.1	44.1
	2	41.1	47.0	42.2	47.7
	3	29.7	21.1	25.6	36.8
	4	11.8	15.8	14.6	27.0
April	1	11.5	12.3	8.5	13.5
Total		273.5	474.7	306.7	440.0
F.(0.05) Between treatments		119.8**		57.46**	
L.S.D.(0.05) Between treatments		9.54		10.0	

G.V. = Garlic varieties. I.D. = Inspection date.

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تأثير مسافات الزراعة ، التحميل مع البصل ، والأصناف على تعداد حشرات تريبس البصل على الثوم باسيوط

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تضمنت هذه الدراسة تأثير بعض العمليات الزراعية مثل مسافات الزراعة (5 ، 10 و 15 سم) وتحميل الثوم على البصل وكذلك تأثير أصناف الثوم على تعداد حشرات التريبس ذلك خلال موسمين متعاقبين (2010 - 2011 ، 2011 - 2012) في محافظة أسيوط باستخدام صنف الثوم (المصرى والصينى). أوضحت النتائج أن جميع العوامل المختبرة كانت مؤثرة بدرجة معنوية على تعداد حشرة التريبس في حقول الثوم. كما أوضحت النتائج أن مسافات الزراعة كان لها تأثير معنوي جدا على تعداد التريبس حيث سجل أعلى تعداد للتريبس عند الزراعة على مسافة 10 سم بين النباتات. كما أظهرت نتائج تحميل الثوم على البصل أن لة تأثير واضح ومعنوي على تعداد التريبس حيث وجد أن متوسط أعداد اهدة الافة أنخفضت على نباتات الثوم المحملة على البصل عن المنزرعة منفردا. أيضا وجد أن حشرة تريبس البصل لها القدرة على اصابة جميع أصناف الثوم المختبرة ولكن تتفاوت شدة الاصابة من صنف لآخر حيث أظهرت النتائج أن صنف الثوم الصينى سجل أعلى اصابة بالتريبس عن الصنف المصرى وذلك خلال موسمي الدراسة.

قام بتحكيم البحث

كلية الزراعة - جامعة المنصورة

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