EFFECT OF SOWING DATES AND VARIETIES OF STRAWBERRY ON THE INFESTATION WITH THE TWO-SPOTTED SPIDER MITE, *TETRANYCHUS URTICAE* KOCH

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Abstract

This study was conducted to investigate the effect of two sowing dates (first week of September and October) and the three strawberry varieties, *i.e.*, Rosalinda, Camarosa and Selected on infestation with the two-spotted spider mite, *T. urticae* at South of Tahreer Province during the two seasons 2001/2002 and 2002/2003. The relationship between leaf area of the three varieties and mite infestation was also studied.

Results revealed that during the two seasons, plants of the second date harboured the highest number of moving stages for the three tested varieties. In addition, Camarosa followed by Selected varieties were infested with highest numbers of both stages at the two planting dates, while Rosalinda came next in this respect.

On the other hand, results revealed that during plant vegetative stage, strawberry harboured the highest numbers from both eggs and moving stages, while moving stages decreased gradually during both flowering and fruiting stages. The infestation became fewer at the end of growing season. Infestation with mite different stages usually increased with the increase of leaflets area. The leaflets of Camarosa variety which represent the widest leaflets harboured the highest number of both eggs and mite moving stages.

INTRODUCTION

Strawberry (*Fragaria x ananassa* Duch) is one of the most important herbaceous and perennial vegetable crops belonging to the family Rosaceae. Its fruits have become one of the popular and favourite to the Egyptian consumers due to its high nutritional value, reasonable price, availability in the markets and the wide utility either fresh or processed. Moreover, it has become of strong potentiality as an export commodity to foreign markets. Strawberry plantation in Egypt is progressing at a relatively fast rate, especially in newly reclaimed lands. According to the Ministry of Agriculture records of 2002, the total area planted with strawberry reached 5000 feddans.

During its growing season, strawberry plants are liable to damage due to infestation with several pests, among which the two-spotted spider mite, *Tetranychus urticae* Koch is considered one of the most important especially during the period from March to June. In case of high infestation, farmers are obligate to use acaricides several times.

As a result of extensive and unwise use of pesticides against this pest during the last years, several problems appeared, and the announcement increased towards establishing integrated control programs with less need for chemical pesticides. These programs depends mainly on a good knowledge about the agricultural ecosystem.

Although some studies were carried out to investigate the effect of planting dates, varieties and other ecological factors on the infestation of some vegetable crops with spider mite, yet little has been known on strawberry infestation (Farrag *et al.*, 1980 on bean, Helaly *et al.*, 1982 on cowpea, Megali, 1997 on snap bean, Darwish *et al.*, 1996 on pea, Doss *et al.*, 1997 on strawberry El-Khateeb *et al.*, 2001 on some solanaceous plants, and Iskander , *et al* . 2002 on pepper

Therefore, the present work dealt with the effect of two planting dates (1*st* September & October) and three strawberry varieties (Rosalinda, Camarosa & Selected) on the infestation with the two-spotted spider mites, *T. urticae* under field conditions of South Tahreer Province during the two successive seasons 2001/2002 and 2002/2003. Interactions between planting dates and strawberry varieties were also evaluated.

MATERIALS AND METHODS

During 2001/2002 and 2002/2003 strawberry growing seasons, two experiments were conducted at South Tahreer Province to evaluate the effect of two different planting dates and the natural varietal resistance of three strawberry varieties to infestation with different stages of the spider mite, *T. urticae* Koch. The interactions between the two planting dates and the three strawberry varieties on the infestation with different stages of the mites were evaluated.

In every experiment, two areas of half feddan each was divided into two parts, each represented one date of planting (1*st* week of September or October). Each part was divided into twenty equal plots, for the three tested varieties, with 4 replicates arranged in a complete randomized block design (3 variety x 4 replicates). The plot area was about 85 m^2. The tested varieties were Rosalinda, Camarosa and Selected. Healthy transplants of each variety were usually used for planting. Transplants were

always dipped completely in Rizolex-T solution (tolclofos) for a period of 20 minutes, just before planting. No insecticides or acaricides were used on the area.

Three weeks after planting and for eighteen weeks later, samples of ten leaves representing all plant levels (upper, middle & lower) were weekly picked from every plot (tatling 40 leaflets for each variety). The collected leaves were placed directly into paper bags and transported to the laboratory. All mite stages of *T. urticae* eggs and moving stages were counted using stereomicroscope and the average number of mites were recorded for each variety during the two tested dates of planting.

Data were subjected to analysis of variance (ANOVA) and means were separated by Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

1. Effect of planting dates and strawberry varieties on infestation with *T. urticae* eggs :

Data presented in Tables 1 & 2 show the mean of infestation with eggs of *T. urticae* on three strawberry varieties (Rosalinda, Camarosa and Selected) planted at two dates (the 1*st* week of September and October) during 2001/2002 and 2002/2003 seasons, respectively.

The results revealed that all the three tested varieties were liable to be infested with the two spotted-spider mites eggs at both two dates of planting during the two seasons of experiment. During the season, the population of eggs fluctuated ups and downs and tailing-off at the end of sampling dates. Camarosa variety harboured the highest average number of eggs all-over the season, followed by Selected variety and latest came Rosalinda variety with significant differences between the three varieties, with means of (248.0, 174 & 149.3 eggs) and (252.4, 165.6 & 157.1 eggs) at the first and second dates of planting during the first season, respectively. In the second season, the respective means were (264.6, 191.0 & 171.3 eggs) and (221.8, 168.2 & 152.0 eggs) for the three previous varieties, respectively.

Regarding the two dates of planting, there was no significant differences between the two dates in the first season, with mean of 190.5 and 191.7 eggs for the first and second dates of planting, respectively, while during the second season there

was significant difference with mean of 209.0 and 180.7 eggs for the first and second dates of planting, respectively.

The interaction between the tested varieties with the two dates of planting indicate that there were significant differences between the mean of number of eggs. The highest number was (264.6 eggs) on Camarosa variety at the first date of planting in the second season and (252.4 eggs) on in the same variety at the second date in the first season.

Table 1. Effect of sowing dates and strawberry varieties on population of *T. urticae* eggs, during 2001/2002 season in South Tahreer Province.

Growing	First date (1st week of September)					Second date (1st week of October)					Mean of two
stage	Sampling date	Rosalinda	Camarosa	Selected	Mean	Sampling date	Rosalinda	Camarosa	Selected	Mean	dates
Vege	22/9/01	298.0	278.0	247.7	274.6	22/10/01	279.0	347.0	239.0	288.0	281.5
tative	29	175.7	93.0	43.0	103.9	29	113.7	91.3	68.3	91.0	97.5
stage	6/10	228.7	200.7	236.0	221.8	5/11	464.7	188.0	149.3	266.3	244.1
	13	38.7	320.0	280.0	212.9	12	110.3	251.3	92.0	151.2	182.1
	20	26.7	697.3	285.7	336.6	19	128.0	407.0	289.3	274.8	305.7
	27	43.0	239.7	210.0	164.2	26	93.3	527.7	348.0	326.3	245.3
	3/11	116.3	475.3	452.3	347.9	3/12	164.3	405.7	672.3	414.1	381.1
Flower-	10	190.3	293.0	246.0	243.1	10	173.3	388.3	328.3	296.6	269.9
ing	17	179.0	315.3	384.3	292.9	17	200.0	113.	219.0	177.4	235.2
stage	24	265.0	294.3	169.0	242.8	24	236.7	498.0	111.3	282.0	262.4
	1/12	39.3	296.7	172.3	169.4	31	66.3	140.0	25.3	77.2	123.3
	8	246.0	154.7	59.3	153.3	7/1/02	78.3	105.3	84.3	89.3	121.3
	15	272.0	380.3	218.7	290.3	14	243.7	246.3	207.7	265.9	278.1
Fruit-	22	316.3	327.0	54.7	232.7	21	198.7	724.3	119.3	347.4	290.0
ing	29	166.3	21.7	32.0	73.32	28	107.7	43.3	4.7	51.9	62.6
stage	5/1/02	85.0	76.7	44.7	68.8	4/2	64.7	56.0	25.3	48.7	58.7
	12	0.7	0.0	0.0	0.2	11	5.3	0.3	0.7	2.1	1.16
	19	0.3	0.7	0.0	0.3	18	0.0	0.3	0.0	0.1	0.2
	Mean	149.3f	248.0b	174.2c	190.5A	Mean	157.1e	252.4a	165.6a	191.7A	

Grand mean of varieties during two dates =	Rosalinda	Camarosa	Selected
	153.2 C	250.2 A	169.9 B

L.S.D. at 5 % for :

Varieties (V) =	3.044	
Dates (D) =	n.s.	
(V) x (D) =	4.304	

Table 2. Effect of sowing dates and strawberry varieties on population of *T. urticae* eggs, during 2002/2003 season in South Tahreer Province.

Growing stage	First date (1st week of September)					Second date (1st week of October)					Mean of two dates
	Sampling date	Rosalinda	Camarosa	Selected	Mean	Sampling date	Rosalinda	Camarosa	Selected	Mean	
Vege-	21/9/02	260.0	242.7	341.0	281.2	23/10/02	272.7	277.0	303.3	284.3	282.8
tative	28	901.3	120.3	59.0	360.2	30	278.7	226.0	36.3	180.3	270.3
stage	5/10	177.3	163.7	148.7	163.2	6/11	289.3	215.0	62.0	188.8	175.9
	12	40.0	392.3	137.0	189.8	13	61.0	242.7	61.3	121.7	155.7
	19	37.3	643.0	581.7	420.7	20	97.0	255.0	380.0	244.0	332.3
	26	78.0	340.7	206.3	208.3	27	69.7	360.3	546.0	325.4	266.9
	2/11	102.7	380.0	435.7	306.1	4/12	191.0	300.7	420.3	303.9	305.1
Flower-	9	115.7	222.7	254.0	197.5	13	238.3	317.3	360.0	305.2	251.3
ing	16	105.3	351.0	313.0	256.4	18	188.7	214.0	319.0	240.7	248.5
stage	23	219.3	584.0	285.7	362.9	25	378.3	396.3	156.0	310.2	336.6
	30	60.7	338.0	185.3	194.6	1/1/03	42.7	163.3	51.0	85.7	140.2
	7/12	334.3	134.3	109.0	192.5	8	143.0	164.0	31.3	112.8	152.7
	14	296.0	390.0	220.0	302.0	15	125.7	396.0	165.0	228.9	265.5
Fruit-	21	150.0	414.3	104.0	222.8	22	203.7	394.0	103.3	233.7	228.2
ing	28	139.3	11.0	15.0	55.1	29	71.0	13.0	9.7	31.2	43.2
stage	4/1/03	64.3	34.3	43.3	47.3	5/2	78.0	56.3	21.7	51.9	49.7
	11	-	-	-	0.0	12	7.3	0.7	0.7	2.9	1.4
	18	1.3	0.7	-	0.7	19	-	0.7	-	0.2	0.4
	Mean	171.3d	264.6a	191.0c	209.0A	Mean	152.0e	221.8b	168.2d	180.7B	

Grand mean of varieties during two dates =	Rosalinda	Camarosa	Selected
	161.6 C	243.2 A	179.6 B

L.S.D. at 5 % for :

Varieties (V) =	4.053
Dates (D) =	2.196
(V) x (D) =	5.731

2. Effect of planting dates and strawberry varieties on infestation with *T. urticae* moving stages :

Data presented in Tables 3 & 4 showed the mean of infestation with *T. urticae* moving stages on three strawberry varieties (Rosalinda, Camarosa and Selected) planted at two dates (the 1*st* week of September and October) during 2001/2002 and 2002/2003 seasons, respectively.

The results revealed that all the three tested varieties were liable to be infested with the two-spotted spider mites eggs at both two dates of planting during the two seasons of experiment. During the first season, the population of moving stages fluctuated ups and downs and tailing off at the end of sampling. Camarosa variety harboured the highest average number of moving stages all-over the season, followed by Rosalinda and Selected at the first planting date, and Selected and Rosalinda at the second planting date with significant differences. The mean of moving stages were 125.6, 108.9 & 108.8 individuals and 147.1, 109.1 & 98.0 individuals at the first and second dates of planting during the first season, respectively. In the second season, the respective means were 133.8, 106.4 & 61.9 individuals and 138.1, 96.9 & 111.1 individuals for Camarosa, Selected and Rosalinda strawberry varieties, respectively.

Regarding the two planting dates, there were significant differences between the two dates with means of 100.7 and 115.4 individuals in the first season and 114.4 and 118.1 individuals in the second season for the first and second dates of planting, respectively.

The interaction between the tested varieties with the two dates of planting indicated that there were significant differences between means of mite individuals. The highest number of moving stages was 147.1 individuals on Camarosa variety at the second date of planting in the first season and 138.1 individuals on the same variety in the second date of the second season.

Table 3. Effect of sowing dates and strawberry varieties on population of *T. urticae* moving stages, during 2001/2002 season in South Tahreer Province.

Growing stage	First date (1st week of September)					Second date (1st week of October)					Mean of two dates
	Samplingdate	Rosalinda	Camarosa	Selected	Mean	Samplingdate	Rosalinda	Camarosa	Selected	Mean	
Vege-	22/9/01	68.3	127.0	245.3	146.9	22/10/01	152.3	167.7	156.4	158.8	152.9
lative	29	155.7	39.0	20.0	71.6	29	152.0	77.6	39.6	89.7	80.7
stage	6/10	82.4	138.3	71.0	97.2	5/11	226.0	62.7	105.3	131.3	114.5
	13	38.0	244.0	206.0	162.6	12	142.0	168.0	60.3	123.4	143.0
	20	72.6	471.0	437.0	326.9	19	286.4	779.7	233.7	433.3	380.1
	27	99.6	362.7	301.0	254.4	26	485.3	278.0	513.7	425.7	340.1
	3/11	91.0	83.7	180.0	118.2	3/12	104.6	134.0	216.9	151.8	135.0
Flower-	10	85.0	119.7	77.0	93.9	10	68.0	122.0	149.0	113.0	103.5
ing	17	77.6	116.7	71.3	88.5	17	46.3	86.6	42.6	58.4	73.5
stage	24	67.7	221.3	30.0	106.3	24	45.6	166.3	19.7	77.2	90.3
	1/12	18.7	77.4	85.0	60.4	31	11.4	64.3	21.6	32.4	46.4
	8	27.3	100.9	74.7	67.6	7/1/02	56.3	53.0	79.3	62.9	65.3
	15	49.3	24.6	26.0	33.3	14	43.3	54.7	35.3	44.4	38.9
Fruit-	22	113.4	243.6	58.0	138.3	21	70.3	208.3	54.0	110.9	124.6
ing	29	33.3	12.3	15.6	20.4	28	36.6	19.7	7.3	21.2	20.8
stage	5/1/02	31.3	24.0	17.6	24.3	4/2	64.3	40.4	8.7	37.8	31.1
	12	1.0	1.3	0.0	0.8	11	7.3	2.7	0.3	3.4	2.1
	19	2.0	0.3	0.0	0.8	18	1.7	0.3	0.0	0.7	0.8
	Mean	61.9f	133.8a	106.4c	100.7B	Mean	111.1c	138.1a	96.9d	115.4A	

Grand mean of varieties during two dates =	Rosalinda	Camarosa	Selected
	86.5 C	135.2 A	101.6 B

L.S.D. at 5 % for :	
Varieties (V) =	2.573
Dates (D) =	1.104
(V) x (D) =	3.582

Table 4. Effect of sowing dates and strawberry varieties on population of *T. urticae* moving stages, during 2002/2003 season in South Tahreer Province.

Growing stage	First date (1st week of September)					Second date (1st week of October)					Mean of two dates
	Samplingdate	Rosalinda	Camarosa	Selected	Mean	Samplingdate	Rosalinda	Camarosa	Selected	Mean	
Vege-	21/9/02	50.7	175.6	319.7	182.0	23/10/02	149.6	299.4	124.4	191.1	186.6
tative	28	392.0	67.4	25.3	161.6	30	311.4	138.7	30.0	160.0	160.8
stage	5/10	289.3	89.7	108.6	162.5	6/11	194.3	84.0	43.4	107.2	134.9
	12	86.0	236.7	210.0	177.6	13	112.4	225.3	113.0	150.2	163.9
	19	113.7	456.0	478.7	349.5	20	179.0	718.0	449.7	448.9	399.2
	26	158.7	229.0	221.0	202.9	27	173.7	299.3	548.0	340.3	271.6
	2/11	120.4	58.1	123.3	100.6	4/12	138.3	88.7	234.7	153.9	127.3
Flower-	9	111.0	95.7	74.7	93.8	13	119.3	104.3	102.6	108.7	101.3
ing	16	132.6	117.3	77.7	109.2	18	67.7	107.7	52.4	75.9	93.6
stage	23	158.3	198.7	41.0	132.7	25	40.0	147.0	32.0	73.0	102.9
	30	26.3	68.7	106.0	67.0	1/1/03	15.0	59.4	30.0	34.8	50.9
	7/12	37.7	164.3	71.6	91.2	8	63.4	49.7	93.6	68.9	801
	14	55.3	26.3	34.0	38.5	15	37.3	45.0	43.3	41.9	40.2
Fruit-	21	123.7	231.0	28.9	127.9	22	49.6	202.6	49.3	100.5	114.2
ing	28	64.3	17.4	13.4	31.7	29	61.3	34.0	7.0	34.1	32.9
stage	4/1/03	37.3	27.0	23.3	29.2	5/2	43.3	44.0	9.3	32.2	30.7
	11	1.6	0.6	0.6	0.9	12	7.7	0.3	0.0	2.7	1.8
	18	1.3	1.6	0.7	1.0	19	0.7	0.7	0.5	0.6	0.8
	Mean	108.9b	125.6a	108.8b	114.4B	Mean	98.0d	147.1a	109.1c	118.1A	
Grand mean of varieties during two dates =						Rosalinda		Camarosa		Selected	
						104.4 C		136.4 A		109.2 B	
L.S.D. at 5 % for :											
Varieties (V) =								4.053			
Dates (D) =								2.196			
(V) x (D) =								5.731			

From the above mentioned results, it is clear that the three tested strawberry varieties were infested with all mite stages at both two dates of planting. During the two seasons, plants of the second date harboured the highest number of eggs and moving stages for the three tested varieties except for egg stage of the first planting date in the second season. Camarosa variety harboured the highest number of both eggs and mite moving stages in the two dates of plantation during the two seasons, while Rosalinda variety harboured the lowest numbers.

Considering the plant growing stages, Tables 1, 2, 3 & 4 showed that strawberry plants harboured the highest numbers from both mite stages (eggs and moving) during the vegetative growth stage, then decreased steadily during both flowering and fruiting stages. The infestation became fewer at the end of growing season and plants harboured little numbers of eggs and moving stages.

Previous results of El-Khateeb *et al.* (2001) on the effect of planting dates of some solanaceous plants on the infestation with mite species agreed with the present results. Also, the obtained data agree with the results on the susceptibility of vegetable varieties to spider mite infestation. Farrag *et al.* (1980) reported that Seminole and Giza 3 varieties were most resistant to *T. arabicus*, Helaly *et al.* (1982) reported that Azmerly cowpea variety proved to be more favourable than Fetriat for *T. urticae* infestation, Ahmed (1994) reported that Sweet Crunch Fiti Sakata cucumber variety was most resistant to *T. urticae* and he suggested that the resistance might be attributed to the low protein and amino acid contents of leaves which provided a less nutritive diet for the mite. Darwish *et al.* (1996) reported that Aleppo pea, *Vicia saliva* and *V. marbonsis* were considered very highly resistant to spider mite infestation, Doss *et al.* (1997) on strawberry found that Douglas and Chandler were the least preferable varieties, while Selvae and Sequoia were the most preferable varieties to spider mite, *T. arabicus* infestation. Megali (1997) reported that CIAT-1, CIAT-2 and Giza-6 varieties were tolerant to mites, because of the high density of leaf hairs, also the former two varieties have a folder pods, good dry yield ability, and can be used as tolerant parents to mites and aphids in further breeding programs.

Effect of leaf area on infestation with different stages of *T. urticae*:

During every inspection date, the leaflets area were evaluated with aid of a planimeter, and the relationship between average area of leaflets of the three tested varieties and the mean infestation with the different stages of the mites at the two dates of plantation in the two successive seasons were tabulated in Table 5.

Results proved that the three different varieties differed significantly in the area of their leaflets at the two dates of planting and during the two seasons of 2001/2002 and 2002/2003. Camarosa cultivar had the largest leaflet area (92.77±5.94 & 84.16±6.17) and 83.61±6.50 & 81.93±3.64 cm^2) at the 1*st* and 2*nd* planting dates during the two seasons, respectively. Selected variety came next as regard to their leaflet area with average of (87.38±4.83 & 79.49±2.17) and (77.52±3.79 &

77.47±3.41 cm²), respectively. Rosalinda variety had the smallest leaflet area (77.27±2.84 & 74.40±3.07 cm²) and (73.69±2.57 & 69.53± 2.98 cm²), respectively. Regarding mite infestation, data clearly showed that the infestation with different stages usually increased with the increase of the leaflets area. The leaflet of Camarosa variety which represented the widest harboured the highest numbers of the mite stages at the two dates of plantation during the two seasons. On the other hand, the leaflets of Rosalinda variety represented the narrowest leaflet and harboured the lowest numbers of the mite stages.

Regarding the infestation percentages of mite moving stages per one cm² of strawberry leaflets for the tested varieties, Table 5 showed that, percentages of infestation were (0.80, 1.43 & 1.22) and (1.49, 1.64 & 1.22) individuals/cm² for Rosalinda, Camarosa and Selected varieties at the first and second planting date during the first season, while during the second season the percentages were (1.48, 1.50 & 1.41) and (1.41, 1.79 & 1.41 individuals/cm²) for the same varieties, respectively.

Table 5. Average area of the leaflets of the three strawberry varieties and the mean number of mites different stages on the same leaflets during 2001/2002 and 2002/2003 seasons.

Planting date	Varieties	Average leaflets area (cm²)	Mean number of mites		% infestation (individuals/cm²)
			Eggs	Moving stages	
2001/2002					
1*st* date	Camarosa	92.77±5.94	248.01±41.73	133.20±31.3	1.43
	Selected	87.38±4.83	174.20±31.58	106.40±29.46	1.22
	Rosalinda	77.27±2.84	149.29±25.43	61.89±10.13	0.80
2*nd* date	Camarosa	84.16±6.17	252.41±48.92	138.09±43.23	1.64
	Selected	79.49±2.17	165.62±39.96	96.86±30.44	1.22
	Rosalinda	77.27±2.84	149.29±25.43	61.89±10.13	0.80
2002/2003					
1*st* date	Camarosa	83.61±6.50	264.60±45.69	125.58±28.12	1.50
	Selected	77.52±3.79	191.03±37.32	109.35±30.61	1.41
	Rosalinda	73.69±2.57	171.26±48.67	108.88±24.40	1.48
2*nd* date	Camarosa	81.93±3.64	221.79±31.58	147.09±42.93	1.79
	Selected	77.47±3.41	168.17±40.79	109.04±36.50	1.41
	Rosalinda	69.53±2.98	151.99±25.61	97.97±20.19	1.41

REFERENCES

1. Ahmed, M.A. 1994. Differences in susceptibility of six cucumber culivars to infestation by*Aphis gossypii* Glov., *Tetranychus urticae* and *Bemisia tabaci* as correlated to protein and amino acid contents of leaves. Ann. Agric. Sc., Moshtohor, 32 (4) : 2189-2194.

2. Darwish, M.A., M.K. Megali, A.M. Gabr and A.K.F. Iskandar 1996. Evaluation of certain pea varieties for susceptibility to natural infestation with the two spotted spider mite, *Tetranychus urticae* Koch in Egypt. Al-Azhar J. Agric. Res., 23 : 233-238.

3. Doss, S.A., S.M. Ibrahim, and M.M. Nour El-Din, 1997. Relative susceptibility of strawberry cultivars to *Tetranychus arabicus* Attiah and whitefly *Bemisia tabaci* (Gennadius) infestation. Fayoum J. Agric. Res. & Dev., 11 (2) :119-125.

4. Duncan, D.B. 1955. Multiple range and multiple F-test. Biometrics, 11 : 1-42.

5. El-Khateeb, H.M., A.E. Abdel-Aziz, and A.K.F. Iskandar, 2001. Effect of planting date of some solanaceous vegetable crops on the two spotted spider mite, *Tetranychus urticae* Koch population. Fayoum J. Agric. Res. & Dev., 15 (2) : 7-15.

6. Farrag, A.M.I., A.S. Abdel-Salam, M.A. El-Guindy, G.N. El-Sayed, and M.L. Wahba, 1980. The spider mite (*Tetranychus arabicus* Attiah) infestation in relation to varieties and plantation date of bean and its control. Proc. 1*st* Conf., Plant Prot. Res. Inst., Vol. 3 : 17-29.

7. Helaly, M.M., A.E. Ibrahim, and M.R.A. Saleh, 1982. Fluctuations of population densities of *Empoasca* sp., *Aphis craccivora* Koch and *Tetranychus arabicus* Attiah attacking cowpea plants at Zagazig, Egypt. Bull. Soc. ent. Egypté, 64 : 35-43.

8. Iskandar, A.K.F., H.M. El-Khateeb, and N.H. Habashy, 2002. Relative susceptibility of some pepper varieties to the two spotted spider mite, *Tetranychus arabicus* Attiah infestation under natural field conditions. Proc. 2*nd* International Conference, Plant Prot. Res. Inst., Cairo, Egypt, Vol. 1 : 27-32.

9. Megali, M.K. 1997. Relative susceptibility of some snap bean cultivars to infestation by mites and aphid with reference to yield, yield components and hairs density. Egypt. J. Appl. Sci., 12 (11) : 267-277.

تأثير ميعاد الزراعة وأصناف الفراولة على الإصابة بالعنكبوت الأحمر *Tetranychus urticae* Koch

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أجرى هذا البحث لدراسة تأثير موعدين لزراعة شتلات الفراولة وهما (الأسبوع الأول من سبتمبر، والأسبوع الأول من أكتوبر) وثلاثة أصناف من الفراولة (روزالندا، كماروزا، منتخب) على الإصابة بالأطوار المختلفة للعنكبوت الأحمر العادى *Tetranychus urticae* Koch (البيض والأطوار المتحركة) وذلك بقطاع جنوب التحرير خلال موسمين متتاليين ٢٠٠١/٢٠٠٢ و ٢٠٠٢/٢٠٠٣. أيضا درست العلاقة بين مساحة الوريقات للأصناف الثلاثة والإصابة بالأطوار المختلفة للعنكبوت الأحمر.

أوضحت النتائج المتحصل عليها أن أصناف الفراولة الثلاثة قد تعرضت للإصابة بالأطوار المختلفة للعنكبوت الأحمر فى ميعادى الزراعة المختبرين بمجرد زراعة الشتلات فى الحقل وإن اختلفت درجة الإصابة بين الأصناف الثلاثة، وأن أعداد كلا من البيض والأطوار المتحركة قد تذبذبت ارتفاعا وإنخفاضا خلال الفحصات المختلفة وإن قل تعدادها بدرجة كبيرة أو اختفت نهائيا فى الفحصتين الأخيرتين.

كما أوضحت النباتات أنه فى الموسم الأول للزراعة (٢٠٠١/٢٠٠٢) فإن نباتات الصنفين روزالندا و كماروزا فى ميعاد الزراعة الثانى (الأسبوع الأول من أكتوبر) قد تعرضت للإصابة بأعلى تعداد من البيض والأطوار المتحركة للعنكبوت، على العكس من نباتات الصنف منتخب والتى تعرضت لأعلى تعداد من هذه الأطوار فى ميعاد الزراعة الأول. بينما فى السنة الثانية (٢٠٠٢/٢٠٠٣) كانت النتائج مختلفة حيث تعرضت نباتات ميعاد الزراعة المبكر (الأسبوع الأول من سبتمبر) للصنف روزالندا لأعلى تعداد من البيض والأطوار المتحركة، كما تعرضت نباتات الصنف كماروزا لأعلى تعداد من البيض ونباتات الصنف منتخب لأعلى تعداد من البيض والأطوار المتحركة فى نفس ميعاد الزراعة، بينما تعرضت نباتات الميعاد الثانى للزراعة للصنف كماروزا لأكبر تعداد من الأطوار المتحركة.

أوضحت النتائج أيضا أن هناك تناسب طردى بين مساحة الوريقات فى الأصناف الثلاثة المختبرة والإصابة بالأطوار الأكاروسية المختلفة، حيث كانت وريقات الصنف كماروزا أكبرها مساحة وأكثرها فى تعداد الأطوار المختلفة وعلى العكس من الصنف روزالندا أصغرها فى مساحة الوريقات وأقلها فى تعداد الأطوار المختلفة للأكاروس.