J. Agric. Sci. Mansoura Univ., 29 (6): 3567 - 3579, 2004

RELATIONSHIP BETWEEIN INFESTATION WITH DIFFERENT STAGES OF THE SPIDER MITE, *Tetranychus urticae* KOCH ON FIFTEEN TOMATO VARIETIES AND PLANT AGE WITH SPECIAL REFERENCE TO VEGETATIVE AND YIELD PHYSICAL CHARACTERS

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ABSTRACT

To study the effect of tomato varieties and age of plants on the infestation with eggs, immature stages and adult stage of the two-spotted spider mite, *Tetranychus urticae* Koch. Two experiments were carried out during summer seasons of 2002 and 2003 at South of Tahreer Province, Beheira Governorate including fifteen tomato varieties.

The results revealed that Wadistar, Ginan, MHX-396 and Karnak tomato varieties were the most resistant varieties during the two seasons where plants attacked with few number of eggs, immature and adult stages of the two spotted spider mite, *T. urticae*; while Saria, King, Master-97 and Mina-97 were the highest infestation varieties with spider mites. Regarding the relation between the plant ages and infestation with the three stages, the plant age after transplanting could be divided into three periods; the first from transplanting till one month later which usually harboured little number of mites, the second from 30 to 50 days from transplanting with the highest number of different stages, and the third period from 50 days after transplanting till the end of growing season in which mite stages decreased steadily.

Also some vegetative and yield characters was measured for the tested varieties, and usually, there was no significant differences for the most tested characters of the fifteen tomato varieties.

Keywords: Tomato, Varieties, Mites, *Tetranychus urticae*, Vegetative, Yield, Physical characters, Plant age.

INTRODUCTION

The tomato plants, *Lycopersicon esculentum* L., is one of the most vegetable crops in Egypt and allover the world being grown in several plantings dates during the year. Area cultivated with tomato increased yearly especially in the new reclimed areas to cover the requirements for fresh local consumprion, exporting to Arab countries and processing purposes. Tomato plants are attacked during their vegetaive growth by various pests, among which the two spotted spider mite, *Tetranychus urticae* Koch is considered one of the important pests during summer plantation causing various degrees of damage and lately yield losses..

Because of the great current concern about the environment indicates a need to limit application of chemicals for lant pests control. Since many of pesticides have posed a serious threat to human health as some of them have already been proved to be either mutagenic or teratogenic. Also, a broad and often over use of pesticides is ecologically harmful, toxic to many

vertebrates, and may lead to a development of pesticide resistance in the targe pests (Ozeretskovskaya, 1995). Hence, the demand on vegetables free from any contamination with pesticides increased year after year. The search about new procedures to minimize the injurious effects of pests infestation and magnify the natural resistance of plants to infestation is increased. The use of vegetable varieties with a lesser extent had some natural resistance to pest infestation is considered a major factor in any breeding programs to improve and increase vegetables production. On the other hand, the development of plant resistant to mite attack by gradual changes in planting of cultivars may alter the intensity of mite, and should be an integral part of strategies for insect management. There were different reasons to plant resistance among which the attracted of moving stages (Dahms, 1972) also resistant plants affect pest feeding and developmen (Painter, 1951) .

The study on the susceptibility of tomato varieties to infestation with spider mites still little and usually the studies on this subject include other pests. On solanaceous plants, Dikii and Voronina (1983) on pepper reported that *S. melongena* varieties Black Beauty, Pusa Purple Long; *Solanum integrifolium* K844 and *S. sisymbrifolium* varieties Ugandan K919 were identified as resistant to *Verticillium albo-atrum* and *Tetranychus urticae*. Kielkewiez and Tomizizyk (1987) studied the susceptibility of tomato and cucumber varieties to *T. urticae* and *T. cinnabarinus* with particular eference to female fecundity and the cropping damaed plants. Noussier, Niema *et al.* (1994), on tomato studied the susceptibility of four tomato varieties with several pests and reported that type of variety and time of growing season play a role in relative susceptibility and the quantity of yield. On the other hand, several studies on the susceptibility of different vegetable crops to mite infestation were reported (East and Edelson, 1990 on watermelon).

In Egypt attention has been focused in the recent years on the possibility of using natural resistant varieties against mite pests of some economic plants (Farrag *et al.*, 1980 on bean; Helaly *et al.*, 1982 on cowpea; Wahba *et al.*, (1986) on bean; Metwally *et al.*, 1991 on cowpea; Megali *et al.*, 1992 on pea; Ahmed (1994) on Sweet Crunch Darwish *et al.*, 1996 on pea; Doss *et al.*, 1997 on strawberry; Megali, 1997 on snap bean; Megali and Faris, 1997 on bean; Iskandar *et al.*, 2002 on pepper and Mohamed, 2003 on cucumber). Therefore, the present work deals with throw some light about the natural varietal resistance of fifteen tomato varieties against the two-spotted spider mites, *T. urticae* under the field conditions of Giza and Kalubia Governorates, during two successive years 2002 and 2003.

MATERIALS AND METHODS

Two field experiments were carried out at South Tahreer Province, Beheira Governorate during two sucessive summer seasons of 2002 and 2003. In both season, an area of about half feddan was divided into 60 plots each of 35 m² (7 x 5 m). Seeds of the fifteen tomato varieties were sown in 20 g cellstroup on the 20*th* of January, and then transplanting in the permanent area in a rndomized complete block design with four replicates for

each variety on the 1*st* of March in both season. Tomato seedlings were transplanted, 30 cm apart on one side of the row of 1 m wide and 7 m long. All agricultural practices were conducted except using of any pesticides.

Fifteen days after transplanting, and weekly for eight weeks later, samples of ten leaflets representing all plant levels (upper, middle & lower) were weekly picked from each plot (40 leaflets for each variety). The collected leaflets were placed directly into paper bags and transported to the laboratory. All mite stages of *T. urticae* (eggs, immature stages and adult stage) were counted using stereomicroscope per 10 leaflets were tabulated for each variety in the eight inspection dates.

During the growing season, the following data were recorded :

1- Plant height (cm) : average of 10 plants for each variety in each replicate, 30 days after transplanting.
2- Prematurity period : period in days from transplanting till the beginning of maturity of 25 % from the plants/replicate.
3- Early yield : the first and the second picking (ton/fed.) were considered as the early yield.
4- Total fruit yield : the yield of all pickings was considered as total yield.
5- Physical fruit characters : a random sample of 10 fruits from each replicate were randomly chosen at the red ripe stage from the 3*rd* picking to determine :

a) Average fruit weight (g)
b) Average fruit length (cm)
c) Average fruit width (cm)
d) Fruit firmness (using portable pressure tester)
e) Total soluble solids (T.S.S.) contents.

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

RESULTS AND DISCUSSION

The effect of fifteen tomato varieties on the population density of three different stages of *T. urticae*, *i.e.* eggs, immature and adult stages during two successive summer seasons of 2002 and 2003 in South Tahreer Province, Beheira governorate was shown in Tables (1, 2 & 3) and (4, 5 & 6), respectively. All tomato varieties injured with mite different stages during the two seasons but with different levels of infestation. Generally, population number of eggs was the highest, followed with immature stages and then adult stage in all fifteen tomato tested varieties.

During 2002 season, Saria variety harboured the highest number of eggs with mean of 104 54 eggs followed by Faculta-38, King, Chinmy, Sultan, Master-97 with significant differences among them (93.42, 89.25, 82.50, 78.13 & 74.13 eggs); Ginan, MHX-396 and Wadistar were the least infested with mites eggs without significant difference (1.96, 2.33 & 3.21 eggs) (Table 1). During 2003 season, also Saria variety was attacked with the highest number of eggs (107.71 eggs) followed with significant differences by King,

Chinmy, Faculta-38, Sultan, Master-100 and Master-97 (90.04, 89.83, 88.25, 86.83, 77.83 & 63.83 eggs); and also Wadistar, MHX-396 and Ginan were the least infested with mites eggs without significant difference (1.13, 2.63 & 2.67 eggs) (Table 4).

Regarding plant age, it is clear evident that the mean population of eggs start with moderate populations during the first two weeks of inspection (till one month from transplanting) (average of 19.40 & 43.56 eggs) and (50.24 & 50.04) and then increased significantly with advanced in plant age (from 30 days to 50 days from transplanting and then the population decreased significantly till the end of growing season (Tables 1 & 4).

Concerning immature stages, Tables (2 & 5), indicated that, among the fifteen tested tomato varieties, King, Master-97, Faculta-38 and Chinmy had the highest mean number of mite immature stages (80.33, 69.83, 65.71 & 51.71 individuals), while MHX-396, Wadistar, Karnak had the lowest mean number (1.04, 1.54 & 3.50 individuals), respectively, during 2002 summer season; while during 2003 season, Master-97 and King had the highest number (82.33 & 80.17 individuals), and Ginan, Wadistar, MHX-396 & Karnak had the lowest immature stages (0.13, 0.88, 1.79 & 3.21 individuals), respectively.

Regarding plant age, it is clear evident that as in the case of egg stage, the mean population of immatures start with low populations during till one month from transplanting (average of 16.82 & 25.31 individuals) and (24.71 & 30.89 individuals) and then increased significantly with advanced in plant age till 50 days from transplanting and then the population decreased significantly till the end of growing season (Tables 2 & 5).

Regarding adult stages of *T. urticae*, data in Table (3) reveal that, during 2002 summer season, Saria, Mina-97, King and Master-97 harboured the highest mean number of adult stages (14.46, 11.29, 9.96 & 9.63 individuals) and Ginan, MHX-396, Wadistar, Karnak & Nema-1400 had the lowest adult mean number (0.29, 0.42, 0.50, 1.04 & 1.71 adults), respectively. During 2003 season (Table 6), data reveal that Saria, King, Master-97 & Mina-96 harboured the highest mean number of adult stages (15.17, 11.38, 9.46 & 9.46 adults) and Wadistar, Ginan, MHX-396 & Karnak had the lowest adult mean number (0.42, 0.46, 0.54 & 1.33 adults), respectively. Also, adult stages began with lowest number during the two first insoection, then increased during the following three inspections, and then decreased in mean numbers till the end of season during the two successive seasons.

Considering the results of the two years, it is clear that Wadistar, Ginan, MHX-396 and Karnak tomato varieties were the most resistant varieties during the two seasons and they were liable to attack with few number of eggs, immature and adult stages of the two spotted spider mite, *T. urticae*; while Saria, King, Master-97 and Mina-97 were the highest infested tomato varieties. On the other hand, it could be easily to divide the plant age after transplanting to three periods; the first from transplanting till one month where usually harboured little number of mites, the second from 30 to 50 days with the highest numbers, while the third period from 50 days till the end of growing season in which mite stages decreased steadily.

Table (1) : Weekly mean number of the two-spotted spider mites, *T. urticae* eggs on different tomato varieties, during season 2002.

Varieties	Mean no. of mite eggs/10 leaflets at weekly inspections								Mean
	1	2	3	4	5	6	7	8	
Master-97	89.67	62.67	64.00	77.67	77.00	69.33	77.67	75.67	74.13 f
Master-100	56.67	56.67	61.00	54.00	32.67	46.33	93.33	85.00	60.71 g
Acclaim	0.00	14.33	35.00	19.00	7.67	13.00	16.67	15.67	15.17 j
Wadistar	3.33	3.33	3.00	3.33	4.00	2.67	4.33	1.67	3.21 l
Ginan	6.33	2.67	0.00	3.33	1.00	1.33	0.33	0.67	1.96 l
Peto Pride	167.00	80.00	27.67	39.67	45.67	40.67	34.67	32.67	58.50 h
Chinmy	103.67	117.33	188.00	121.67	112.33	12.00	4.00	1.00	82.50 d
Mina-97	24.00	33.67	12.00	41.33	89.33	81.33	78.67	70.67	53.88 i
MHX-396	1.00	1.00	4.00	3.67	5.00	1.67	0.67	1.67	2.33 l
Faculta-38	9.67	22.33	30.33	42.33	152.33	107.33	238.33	144.67	93.42 b
Saria	43.00	42.00	195.67	110.00	94.00	98.33	144.67	108.67	104.54 a
Nema-1400	0.67	9.67	46.00	27.67	16.00	11.00	8.33	2.67	15.25 j
King	160.00	123.00	135.33	106.00	99.33	77.33	5.33	7.67	89.25 c
Sultan	72.33	81.33	90.00	93.33	86.67	87.33	57.33	56.67	78.13 e
Karnak	3.67	3.33	3.33	2.67	17.67	10.67	6.33	2.33	6.25 k
Mean	49.40 D	43.56 E	59.69 A	49.71 D	56.04 B	44.02 E	51.38 C	40.44 F	-
L.S.D. at 5 % for :									
Varieties (V) : 1.61									
Dates (D) : 0.83									
(V) x (D) : 3.19									

Means followed by the same letter are not significantly different.

Table (2) : Weekly mean number of the two-spotted spider mites, *T. urticae* immature stages on different tomato varieties, during season 2002.

Varieties	Mean no. of mite immatures/10 leaflets at weekly inspections								Mean
	1	2	3	4	5	6	7	8	
Master-97	60.00	29.67	129.67	42.00	108.00	45.00	10.00	44.33	69.83 b
Master-100	20.33	27.33	21.67	25.33	8.67	20.67	28.00	44.00	24.50 i
Acclaim	0.00	6.33	16.33	8.67	2.67	4.00	20 67	16.33	9.38 j
Wadistar	0.67	1.33	1.33	1.00	2.00	1.67	2.33	2.00	1.54 m
Ginan	2.33	1.00	1.00	1.00	0.00	0.33	0.00	0.00	0.58 m
Peto Pride	70.67	52.33	12.33	62.00	76.00	39.67	42.00	24.00	47.38 e
Chinmy	14.33	92.00	85.67	119.00	91.67	9.00	0.33	1.67	51.71 d
Mina-97	28.33	28.67	30.67	33.67	21.67	63.33	42.67	23.67	34.08 h
MHX-396	0.67	0.67	2.67	1.67	0.33	1.33	0.67	0.33	1.04 m
Faculta-38	2.67	9.33	11.00	17.33	67.67	126.33	190 00	101.33	65.71 c
Saria	3.33	30.00	29.67	75.33	49.67	65.33	40.00	43.00	42.04 f
Nema-1400	0.00	13.00	13.67	16.67	5.33	7 00	4 33	4 33	8.04 k
King	32.00	43.67	310.67	92.00	85.00	53.33	15.00	11.00	80.33 a
Sultan	17.0	38.67	15.00	70.00	19.67	53.67	35.67	41.67	36.42 g
Karnak	0 00	5.67	1.67	4.67	6 00	2.67	5.67	1.67	3 50 l
Mean	16 82 H	25.31 F	45.47 A	38.02 B	36 29 C	32.89 E	35.16 D	23.96 G	-
L.S.D. at 5 % for :									
Varieties (V) : 1.21									
Dates (D) : 0.89									
(V) x (D) : 3.43									

Means followed by the same letter are not significantly different.

Table (3) : Weekly mean number of the two-spotted spider mites, *T. urticae* adult stage on different tomato varieties, during season 2002.

Varieties	Mean no. of mite adult stage/10 leaflets at weekly inspections								Mean
	1	2	3	4	5	6	7	8	
Master-97	10.33	10.67	7.33	8.33	10.67	8.67	12.00	9.00	9.63 c
Master-100	11.00	12.00	17.67	10.00	5.67	4.67	6.00	2.67	8.71 d
Acclaim	0.00	1.67	3.67	2.33	1.33	1.33	4.33	4.00	2.33 h
Wadistar	0.00	0.67	0.33	0.33	0.67	0.67	0.67	0.67	0.50 k
Ginan	0.00	0.67	0.00	0.33	0.33	0.33	0.33	0.33	0.29 k
Peto Pride	14.00	9.67	3.67	7.67	8.00	3.67	3.67	2.67	6.63 f
Chinmy	10.67	9.33	8.33	21.67	3.00	1.00	0.33	6.67	6.88 f
Mina-97	4.33	4.00	3.67	9.33	13.67	18.33	22.00	15.00	11.29 b
MHX-396	0.00	0.33	1.00	0.33	0.67	0.33	0.33	0.33	0.42 k
Faculta-38	1.00	3.33	4.00	5.33	8.00	12.33	18.67	11.00	7.96 e
Saria	5.00	10.33	27.33	19.33	11.00	10.33	19.33	13.00	14.46 a
Nema-1400	0.33	1.00	3.67	2.67	1.33	2.00	1.67	1.00	1.71 i
King	17.00	14.67	14.33	13.00	9.00	6.00	2.33	3.33	9.96 c
Sultan	6.67	6.00	7.00	5.00	6.33	2.00	6.33	4.00	5.42 g
Karnak	0.33	0.67	1.00	0.33	2.67	1.00	2.00	0.33	1.04 j
Mean	5.38 B	5.67 B	6.87 A	7.07 A	5.49 B	4.84 C	6.67 A	4.53 C	-
L.S.D. at 5 % for :									
Varieties (V) :			0.44						
Dates (D) :			0.42						
(V) x (D) :			1.61						

Means followed by the same letter are not significantly different.

Table (4):Weekly mean number of the two-spotted spider mites, *T. urticae* eggs on different tomato varieties, during season 2003.

Varieties	Mean no. of mite eggs/10 leaflets at weekly inspections								Mean
	1	2	3	4	5	6	7	8	
Master-97	67.33	65.33	70.67	55.00	60.00	73.33	67.00	52.33	63.83 e
Master-100	83.33	72.33	54.67	47.00	34.33	83.33	126.67	117.33	77.38 d
Acclaim	0.00	1.67	34.00	24.67	4.00	2.67	13.33	11.00	11.42 i
Wadistar	2.00	1.33	0.00	0.67	1.00	1.33	1.67	1.00	1.13 k
Ginan	8.00	3.33	0.00	4.00	1.33	2.33	1.00	1.33	2.67 k
Peto Pride	123.67	126.00	33.67	37.00	43.00	42.67	40.33	44.67	61.38 f
Chinmy	105.33	131.67	194.33	142.33	130.33	12.00	1.67	1.00	89.83 b
Mina-97	11.33	16.33	10.67	38.33	101.00	118.67	77.00	53.67	53.38 g
MHX-396	0.67	2.33	4.67	2.00	6.33	2.33	0.67	2.00	2.63 k
Faculta-38	16.00	15.00	25.00	28.33	155.67	136.33	198.00	131.67	88.25 bc
Saria	39.00	41.00	148.67	140.00	126.67	113.00	138.67	114.67	107.71 a
Nema-1400	1.67	15.33	48.00	55.67	20.67	17.67	19.00	2.00	22.50 h
King	202.67	163.67	111.00	91.00	84.33	56.67	4.33	6.67	90.04 b
Sultan	91.33	94.33	111.33	103.67	88.67	72.00	72.33	61.00	86.83 c
Karnak	1.33	1.00	1.00	6.33	16.67	15.00	3.33	1.33	5.75 j
Mean	50.24 DE	50.04 DE	56.51 B	51.73 C	58.27 A	49.93 E	51.00 CD	40.11 F	-
L.S.D. at 5 % for :									
Varieties (V) :			2.23						
Dates (D) :			1.04						
(V) x (D) :			4.00						

Means followed by the same letter are not significantly different.

Table (5) : Weekly mean number of the two-spotted spider mites, *T. urticae* immature stages on different tomato varieties, during season 2003.

Varieties	Mean no. of mite immatures/10 leaflets at weekly inspections								Mean
	1	2	3	4	5	6	7	8	
Master-97	85.00	37.00	177.67	39.00	109.00	39.00	124.00	48.00	82.33 a
Master-100	19.33	25.67	23.67	24.00	18.00	34.00	25.67	46.67	27.13 h
Acclaim	0.00	4.33	18.67	11.00	2.33	2.00	14.00	7.33	7.46 j
Wadistar	0.67	0.67	0.00	1.67	1.00	0.33	0.67	2.00	0.88 lm
Ginan	0.33	0.33	0.00	0.33	0.00	0.00	0.00	0.00	0.13 m
Peto Pride	75.33	83.33	10.33	59.67	100.33	36.33	45.00	35.33	55.71 c
Chinmy	30.33	100.33	57.33	104.67	85.33	7.00	0.00	0.67	48.21 d
Mina-97	21.33	11.33	24.00	17.67	37.33	81.33	51.67	32.67	34.58 g
MHX-396	0.00	2.00	1.67	0.67	7.33	1.33	0.33	1.00	1.79 l
Faculta-38	0.67	3.00	6.33	13.67	51.67	80.67	109.00	92.33	44.67 e
Saria	6.33	28.33	37.00	56.33	51.67	83.00	44.33	79.33	48.29 d
Nema-1400	0.33	4.00	19.67	34.67	14.00	3.33	7.33	2.33	10.71 i
King	111.33	100.67	203.67	69.67	92.00	39.33	13.33	11.33	80.17 b
Sultan	19.33	61.33	3.67	80.33	34.00	48.33	28.33	37.33	39.08 f
Karnak	0.33	1.00	0.33	2.33	12.00	5.33	3.67	0.67	3.21 k
Mean	24.71 F	30.89 D	38.89 B	34.38 C	41.07 A	30.76 D	31.16 D	26.47 E	-
L.S.D. at 5 % for :									
Varieties (V) :			0.92						
Dates (D) :			0.80						
(V) x (D) :			3.07						

Means followed by the same letter are not significantly different.

Table (6) : Weekly mean number of the two-spotted spider mites, *T. urticae* adult stage on different tomato varieties, during season 2003.

Varieties	Mean no. of mite adult stage/10 leaflets at weekly inspections								Mean
	1	2	3	4	5	6	7	8	
Master-97	9.67	7.67	12.33	10.00	8.67	7.33	11.0	9.00	9.46 c
Master-100	9.33	8.00	15.67	11.33	5.67	3.33	10.33	4.67	8.54 d
Acclaim	0.00	2.67	3.67	2.00	0.67	1.33	4.00	3.00	2.17 g
Wadistar	0.33	0.67	0.00	0.33	0.33	1.00	0.33	0.33	0.42 i
Ginan	1.00	0.67	0.00	0.67	0.33	0.33	0.33	0.33	0.46 i
Peto Pride	11.67	7.33	5.67	6.33	9.67	5.67	6.00	4.00	7.04 e
Chinmy	10.00	6.00	7.67	17.67	4.33	0.67	0.67	0.33	5.92 f
Mina-97	5.00	4.33	3.67	7.33	15.33	14.00	17.00	9.00	9.46 v
MHX-396	0.33	0.33	0.67	0.67	1.00	0.67	0.33	0.33	0.54 i
Faculta-38	0.67	2.00	2.00	2.00	9.00	11.67	13.33	10.00	6.33 f
Saria	7.67	15.67	19.00	16.33	15.00	13.33	17.33	17.00	15.17 a
Nema-1400	0.00	1.00	3.67	3.67	3.00	2.00	3.67	0.33	2.17 g
King	19.67	17.33	11.33	14.00	13.67	9.67	2.67	2.67	11.38 b
Sultan	8.33	4.00	5.33	4.00	8.33	7.33	6.33	4.67	6.04 f
Karnak	0.33	0.33	0.33	1.00	3.67	3.00	1.67	0.33	1.33 h
Mean	5.60 C	5.20 D	6.07 B	6.49 A	6.58 A	5.42 CD	6.33 AB	4.40 E	-
L.S.D. at 5 % for :									
Varieties (V) :			0.63						
Dates (D) :			0.40						
(V) x (D) :			1.54						

Means followed by the same letter are not significantly different.

The previous results are generally in agreement with Farrag *et al.* (1980) who reported that Seminole and Giza 3 varieties were most resistant to *T. arabicus*, while Processor, Harvestor and Contender varieties were highest infestation; Helaly *et al.* (1982) reported that Azmerly cowpea variety proved more favourable than Fetriat for *T. urticae* infestation; Wahba *et al.* (1986) found that mite infestation was high in Giza 5 cv. and light in both Giza 4 and Giza 6 cvs. of bean varieties; Zatyko and Martinovich (1986) reported that pepper line TH282 showed tolerance similar to that of Feherozon variety, and Taltos Synthetic and U178 showed acceptable tolerance. Kielkewiez and Tomizizyk (1987) reported that fecundity of *T. cinnabarinus* on Poland was similar on all tomato tested varieties. East and Edelson (1990) found significant differences among the tested watermelon cultivars to mite infestation; Metwally *et al.* (1991) found that IT82D-716 and IT83D-340-S were the most tolerant cowpea cultivars to mite infestation than the other cultivars tested, and life cycle, generation and pre-oviposition period were prolonged on tolerant cultivars, while longevity and oviposition periods and fecundity were longer and fecundity was higher on the susceptible cultivars; Megali *et al.* (1992) stated that among the 16 pea cultivars Danue, Norvist and Helka were the most tolerant cultivars to mite infestation; Ahmed (1994) reported that Sweet Crunch Fiti Sakata cucumber variety was most resistant to *T. urticae* and she suggested that the resistance might be attributed to the low protein and amino acid contents of leaves which provided a less nutritive diet for mites. Reddy and Baskaran (1995), in India, reported that there was an obvious preference among four tested eggplant varieties to *Tetranychus ludeni* Zacher infestation; Darwish *et al.* (1996) reported that among thirty-five pea cultivars Aleppo, *Vicia saliva* and *V. marbonsis* were considered very highly resistant to spider mite infestation; Doss *et al.* (1997) found that Douglas and Chandler strawberry varieties are the least preferable, while Selvae and Sequoia were the most preferable to mite 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; and Megali and Faris (1997) reported that bean cultivars HAB459, Kentucky-Blue and Flex were tolerant to mites infestation compared to the cultivars BARC-RR-3, Tavera RS and Flexo. Iskandar *et al.* (2002) reported that sweet pepper and hot pepper varieties were subjected to mite infestation, while the sweet pepper varieties, Gedeon F_1 and Pant F_1 were the least infested varieties and Anahiem-M and Anahiem-T.M.R.23 became the least infested hot pepper varieties. Mohamed (2003) found that among four cucumber varieties Bablyion was the least infested with *T. urticae* while Thamine harboured the highest number and found a relationship between mite infestation and phytochemical analysis of some elements in leaves during the three vegetation period (seedlings, flowering and yielding).

Effect of tomato varieties on some vegetative and fruit characters and yield :

a) Plant growth characters :

Table (7) show that there was no significant differences between the tested tomato varieties on plant height, King, Faculta-38, MHX-396, Master-100 and Master-97 were the tallest varieties, while wadustar was the shortest one during the two seasons. As for maturity date (days to 1*st* picking), also there was no significant differences among the tested tomato varieties, and this day ranged about 79.3-69.1 days There was no significant differences among the tested tomato varieties for the early yield (ton/feddan) in the second season, while there was significant differences in the first season, Faculta-38, Saria and Nema-1400 gave the highest yield in both seasons while Wadistar in the first season and Karnak in the second one have the lowest early yield. Regarding the totl yield, there was significant differences among the tested varieties in the two seasons, Faculta-38, Nema-1400 and Saria gave the highest total yield, while Mina-97 gave the lowest yield in both seasons.

a) Fruit physical characters :

Data in Table (8) show some fruit physical characters. It is obvious that there was significant differences among the tested tomato varieties in fruit weight (g), and fruit weight of Acclaim and Karnak varieties were the highest one while Peto Pride variety had the least fruit weight in both seasons. Concerning fruit height (cm) there was no significant differences among the tested varieties in both seasons, Ginan and Acclaim varieies had the highest fruit height. For fruit width parameter (cm) there was no significant differences among the tested varieties in both seasons, Acclaim and Karnak had the highest fruit width while Sultan and Neema-1400 had the lowest width. Regarding the fruit firmness (%) Wadistar and Ginan varieties had the highest firmness percentage while Karnak, Neema-1400 and King varieties had the lowest percentages. Total soluble solids (T.S.S.) in the tested varieties ranged between 4.0 to 5.5 % and there was no significant differences among the tested varieties in both seasons. This results agree with that obtained by El-Bogdady *et al.* (1993) and Zhang *et al.* (1996) who reported that tomato varieties differed in its physical charscters.

Table (7) : Average of plant height, days to first picking, early yield and total yield of different tomato varieties, during two successive seasons 2002 and 2003.

Varieties	Plant height (cm)			Days to 1*st* picking			Early yield (t/fed.)			Total yield (t/fed.)		
	2002	2003	Avg.	2002	2003	Avg.	2002	2003	Avg.	2002	2003	Avg.
Master-97	51	49	50.0	71.2	69.1	70.2	2.80	3.10	2.95	17.22	15.10	16.16
Master-100	50	55	52.5	73.3	70.3	71.8	2.80	2.90	2.85	18.10	17.55	17.87
Acclaim	50	48	49.0	78.4	75.2	76.8	3.40	3.71	3.55	15.10	15.70	15.40
Wadistar	38	35	36.5	72.2	71.1	71.6	2.55	2.90	2.72	14.85	13.22	14.03
Ginan	55	54	54.5	78.1	77.2	77.6	2.50	3.10	2.80	17.22	18.22	17.72
Peto Pride	42	59	50.5	71.1	79.2	75.2	4.15	4.20	2.17	15.80	14.11	14.95
Chinmy	51	50	50.5	72.3	77.4	74.8	3.10	3.10	3.10	8.83	7.20	8.02
Mina-97	42	44	43.0	79.4	79.2	79.3	2.73	2.80	2.76	18.40	15.10	16.75
MHX-396	51	53	52.0	78.5	77.3	77.9	3.65	3.10	3.87	10.10	8.91	9.50
Faculta-38	51	55	53.0	72.3	77.9	75.1	4.92	4.90	4.91	20.40	21.33	20.86
Saria	53	51	52.0	78.1	71.1	74.6	4.12	4.40	4.26	19.79	20.11	19.95
Nema-1400	41	42	41.0	71.2	72.3	71.7	4.52	4.10	4.31	20.31	20.80	20.55
King	55	59	57.0	78.1	74.1	76.1	3.45	3.32	3.38	15.44	17.11	16.27
Sultan	47	48	47.5	70.9	70.2	70.6	3.30	3.10	3.20	15.81	14.33	15.07
Karnak	44	45	44.5	79.3	79.2	79.3	2.80	2.70	2.25	12.41	14.11	13.26
L.S.D. at 5 %	NS	NS		NS	NS		1.51	NS		5.31	7.20	

Table (8) : Average of fruit weight, fruit length, fruit width, fruit firmness (%) and total soluble solids of fruits of different tomato varieties, during two successive seasons 2002 and 2003.

Varieties	Fruit weight (g)			Fruit height (cm)			Fruit width (cm)			Fruit firmness (%)			Total soluble solids (T.S.S. %)		
	2002	2003	Avg,	2002	2003	Avg,	2002	2003	Avg,	2002	2003	Avg,	2002	2003	Avg,
Master-97	150	148	149.0	5.4	5.3	5.35	5.1	5.1	5.10	7.0	7.0	7.0	5.5	5.4	5.45
Master-100	155	150	152.5	5.2	5.2	5.20	5.3	5.2	5.25	7.0	6.9	6.95	5.5	5.1	5.30
Acclaim	180	183	181.5	5.8	5.8	5.80	7.0	6.6	6.80	7.0	6.7	6.85	5.5	5.4	5.45
Wadistar	135	137	136.0	5.2	5.1	5.15	5.0	5.4	5.20	7.1	7.1	7.10	5.0	5.2	5.10
Ginan	150	144	147.0	6.0	6.1	6.05	5.6	5.4	5.50	7.0	7.2	7.15	5.5	5.3	5.40
Peto Pride	95	99	97.0	5.1	5.4	5.25	5.1	5.2	5.15	6.2	6.1	6.15	5.0	5.1	5.05
Chinmy	100	105	102.5	5.1	5.2	5.15	5.2	5.1	5.15	6.1	6.3	6.20	4.9	4.8	4.85
Mina-97	165	168	166.5	5.7	5.3	5.50	6.1	6.2	6.15	6.0	6.1	6.05	4.0	4.1	4.05
MHX-396	100	101	100.5	4.9	5.9	5.40	5.2	5.2	5.20	5.5	5.4	5.45	4.5	4.9	4.70
Faculta-38	140	142	141.0	5.3	5.4	5.35	5.1	5.1	5.10	5.6	5.7	5.65	5.5	5.9	5.70
Saria	110	105	108.0	5.2	5.1	5.15	4.9	4.9	4.90	5.4	5.4	5.40	5.1	5.2	5.15
Nema-1400	115	118	116.5	5.1	5.0	5.05	4.3	4.3	4.30	5.3	5.1	5.20	5.1	5.2	5.15
King	130	132	131.0	5.1	5.0	5.05	4.9	4.9	4.90	5.2	5.3	5.25	5.1	5.1	5.10
Sultan	119	120	119.5	5.2	5.1	5.15	4.3	4.3	4.30	6.5	6.6	6.55	5.5	5.5	5.50
Karnak	175	177	176.5	5.4	5.2	5.30	6.6	6.7	6.65	5.0	5.1	5.05	5.5	5.4	5.45
L.S.D. at 5 %	22.4	20.8		NS	NS		NS	NS		1.22	NS		NS	NS	

REFERENCES

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.

El-Bogdady, A.E.; A.R. Hewedy and U.A. El-Zeiny (1993). Evaluation of some tomato cultivars in early summer trials. Minia J. Agric Res & Dev., 15 : 53-70.

Dahms, R.G. (1972). Techniques in the evaluation and development of host plant resistance. J. Environ. Qual., 1 : 254-259.

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.

Dikii, S.P. and M.V. Voronina (1983). Using the eggplant bank in breeding. Trudy po Prikladnoi Botanike Genetike i Selektsii, 81 : 71-75.

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.

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

East, D.A. and J.V. Edelson (1990). Evaluation of watermelon cultivars for resistance to spider mites. research report, Agric. Exp. Sta., Div. of Agric., Oklahoma State Univ., 4 pp.

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.

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.

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.

Kielkewiez, M. and A. Tomizizyk (1987). Susceptibility of cucumber and tomato varieties to spider mites. Materialy-Sesji, Institutu, Ochrony, Roslin, 72 (2) : 17-22.

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.

Megali, M.K. and F.S. Faris (1997). Evaluation of some snap bean cultivars for yield and yield component and infestation by spider mites, *Tetranychus arabicus* Attiah. Egypt. J. Appl. Sci., 12 (11) : 257-266.

Megali, M.K.; S.A.G. Metwally and F.S. Faris (1992). Evaluation of some pea cultivars to leaf miner, thrips and two spotted spider mite with reference to yield and yield components. Zagazig J. Agric. Res., 19 (4) : 1897-1905.

Metwally, S.A.G.; M.K. Megali and F.S Faris (1991). Evaluation of some cowpea cultivars to the infestation of some pests. Fourth Arab Congress of Plant Protection, : 403-413.

Mohamed, Aziza M.M. (2003). Studies on some mites associated with some vegetable crops. M.Sc. Thesis (Zoology), Fac. of Science (Girls), Al-Azhar Univ., Cairo, Egypt.

Ozeretskovskaya, O.L. (1995). Induced resistance in the Solanaceae. In : Induced resistance to disease in plants. pp. 31-36. Eds. R. Hammerschmidt & J. Kuc. "Development in Plant Pathology" (4). Kluwer Academic Publishers.

Painter,R.H.(1951).Insect Resistance in Crop Plants. McMillan Co.,New York.

Reddy, G.V.P. and P. Baslaran (1995). Biology and varietal preference of *Tetranychus ludeni* Zacher (Acari : Tetranychidae) on four varieties of eggplant (ubergine), *Solanum melongena* L. Mysore J. Sci., 25 (3) : 331-334.

Wahba, M.L.; S.A. Doss; F.S. Faris and M.K. Nakhla (1986). Evaluation of some *Phaseolus vulgaris* cultivars to infestation with aphids and mites. Agric. Res. Rev., 64 (1) : 163-170.

Zatyko, L. and V. Martinovich (1986). Resistance to the red spider mite, *Tetranychus urticae* Koch in the Feheroson Synthetic pepper variety. Proc. VIth Meeting on Genetics and Breeding on Capsicum and Eggplant, Zaragoza (Spain), pp. 125-128.

Zhang, H.; L. Zhang and M. Chat (1996). Jiafen 15, a new tomato variety for protected cultivation. China Vegetables, No. 2 : 4-6. (c.f. Hort. Abst., Vol. 67, No. 43159, 1997).

العلاقة بين الإصابة بالأطوار المختلفة للعنكبوت الأحمر العادى *Tetranychus urticae* Koch على خمس عشر صنفا من الطماطم وعلاقتها بعمر النبات وكذلك بعض الصفات الخضرية والطبيعية للمحصول

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تم دراسة تأثير أصناف الطماطم وعمر النبات على الإصابة بكل من بيض والاطوار غير الكاملة والأفراد الكاملة للعنكبوت الأحمر العادى *Tetranychus urticae* Koch وذلك من خلال تجربتين حقليتين فى موسم الزراعة الصيفية خلال عامين متتاليين ٢٠٠٢، ٢٠٠٣ فى حوض النحرير (محافظة البحيرة) وذلك على ١٥ صنف من اصناف الطماطم.

أوضحت النتائج أن الأصناف Wadistar, Ginan, MHX-396, Karnak كانت أكثر الأصناف مقاومة خلال الموسمين حيث اصيبت بأقل عدد من البيض والاطوار غير الكاملة والأفراد الكاملة للعنكبوت الأحمر؛ بينما الأصناف Sana, King, Master-97, Mina-97 كان أعلى الأصناف إصابة بالأطوار الثلاثة. ودراسة العلاقة بين عمر النبات والإصابة بالأطوار الثلاثة وجد انه يمكن تقسيم عمر النبات منذ نقل الشتلات الى الأرض المستديمة وحتى نهاية موسم النمو إلى ثلاث فترات، الأولى منذ الشتل ولمدة شهر وفيها تبدأ الإصابة بأعداد قليلة من الأطوار الثلاثة للعنكبوت، والثانية تمتد من ٣٠ إلى ٥٠ يوم بعد الشتل وفيها تكون الإصابة أعلاها بالأطوار الثلاثة، والثالثة من ٥٠ يوم بعد الشتل وحتى نهاية موسم النمو وفيها يبدأ التعداد فى التناقص التدريجى.

كما درست بعض الصفات الخضرية والصفات الطبيعية للمحصول لاصناف الطماطم المختبرة، حيث لم توجد فروق معنوية بين معظم هذه الصفات فى الاصناف المختبرة خلال الموسمين.