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INHERITANCE OF SOME TOMATO CULTIVARS AND THEIR HYBRIDS FOR YIELD, YILD COMPONENTS AND INFESTATION BY *Bemisia tabaci*.

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ABSTRACT

Thirteen hybrids of tomato and their parents were evaluated to yield and its components as well as to the relative susceptibility *B. tabaci* infestation. The experiments were conducted at EL-Gemmeza Agriculture Research station, Gharbia Governorate during 2001 and 2002 in summer seasons. The results indicated that,

Super Strain B cultivar produced the highest early and total fruit yield. While cherry cultivar produced the lowest early and total fruit weight. F_1 hybrids produced more early and total yield than their parents. Chico Π cultivar was the most susceptible to *B*. *tabaci* infestation. However, Mobil cultivar was the most tolerant cultivar to *B. tabaci* infestation. Hybrid plants were tolerant to *B*. *tabaci* infestation than their parents. GCA and SCA were highly significant for all studied traits, suggesting that both additive and non-additive genetic variances were important. However non-additive gene effects were more important than additive gene effects for the inheritance of all studied traits. The cultivars Tallalakheen, Money Maker and Chico Π were good combiners for early and total fruit yield.

INTRODUCTION

Tomato (*Lycopersicon esculentum*, Mill.) is the most important vegetable crops grown in Egypt for fresh consumption and processing. According to Ministry of Agriculture statistics, the cultivated area of tomato in 2003 was 450, 799 feddans that produced about 6, 273, 755 tons.

The productivity could be improved through either improving the cultural practices or using improved cultivar or F_1 hybrids. Therefore, producing superior local hybrids of tomato are urgently needed, especially that the improted hybrids of tomato are high in price. Many investigators such as EL-Sayed (1997), Youssef (1997) and Bayomy (2002) reported that F_1 tomato hybrids were more vigour in vegetative growth than their parents. Abd-Allah (1995), Dharmatti *et al*., (1997) and Bayomy (2002) mentioned that F_1 crosses produced more total fruit yield than their parents.

The present study conducted to study the extent of hetrosis and to develop promising F_1 hybrids in tomato involing 10 cultivars of tomato.

Whitefly (*Bemisia tabaci*) is wide spread in all tropical countries of the world. The main damage caused by the whitefly on tomato is indirect – by transmitting virus diseases (Cohen and Berlinger, 1986). This is one of the most important limiting factors for tomato cultivation in Egypt. Resistant to the whiteflies are not yet available although a great efforts is devoted in various breeding programmes. Therefore, the present work aimed to evaluate 13 hybrids of tomato and their parents according to the relative susceptibility to *B. tabaci* infestation.

MATERIALS AND METHODS

The experimental materials used in the present study included 10 tomato cultivars namely: Tallalakheen, Money Maker, Chico Π, Super Strain B, Strain B, Mobil, Floradade, Cherry, Super Marmand and Giza 80. All cultivars are belonging to the species *Lycopersicon esculentum* Mill. In the summer season of 2001 crosses were made to produce 13 F_1 hybrids, Viz Tallalakheen x Money Maker, Tallakheen x Chico Π, Tallalakheen x Strain B, Tallalakheen x Giza 80, Money Maker x Chico Π, Money Maker x Giza 80, Chico Π x Giza 80, Super Strain B x Floradade, Mobil x Floradade and Mobil x Cherry.

Therefore, the genetics material used in this study were 10 parents and 13 F_1's. The experimental design used was a randomized complete block design with four replications. Each replicate contained 23 experimental unit or plots. Seed were sown in seedling trays on April 10th of 2001 and 2002. The seedlings were transplanted on May 10th of 2001 and 2002, 40 cm apart. Each plot consisted of three ridge, each one 6m long and 1.25m wide, thus making an area of 15m^2. The experiments were conducted at EL-Gemmeza Agriculture Research Station, Gharbia Governorate. All agricultural practices were conducted according to the non-recommendations. Five plants from each plot were randomly chosen where the flowing data were recorded:

1- Stem length to the first cluster and number of branches /plant.
2- Percentage of insect infestation population density of *B*. *tabaci* was measured by collecting ten random leaves from each plot at weekly interval starting on 3rd week after transplanting. The average numbers of insect larve all over the season were estimated.
3- Early, total yield, number of fruits / plant and fruit weight (ton/fed) were estimated.

Early yield was estimated from the first three harvestings, while total yield was estimated from all harvested fruits. Data were obtained on means/plot basis for each trait within each genotype.

Dun can multiple range test was used for the comparison among genotype means. Estimates of combining ability effects were carried out following Griffing (1956) the estimates of GCA and SCA can be expressed in terms of additive dominance and epistatic variance according to Matzinger *et al.,* (1959). The amount of hetrosis was expressed as the deviation percentage of F_1 mean performance from the mid-parent (MP) or better parent (BP) average values.

RESULTS AND DISCUSSION

I. The performance of parents and their F_1 hybrids:

1.1. The interrelationship between stem length and first cluster

Parent which had low values of stem length to first cluster is consider early flowering parent, in contrast parent which had large values of stem length to first cluster is consider late flowering parent. Data in Table (1) show that the first cluster appeared after 8.8 and 10.2cm on main stem for the cultivar Chico Π in the first and second year, respectively. Therefore Chico Π cultivar is considered early flowering parent. In the contrary the first cluster

appeared after 25.4 and 25.2cm on main stem for the cultivars Super Strain B and Floradade in the first and second year, respectively. Therefore the cultivars Super Strain B and Florad
ade are consider late Flowering cultivars. The differences among genotypes (Parents and crosses) were highly significant in both years. In general parents were earlier than their crosses.

In this concern Bayomy (2002) reported that, tomato parents produced the first ripened fruits earlier than F_1 crosses.

1.2. Number of branches / plant

Data in Table (1) show that the differences among genotypes (parents and hybrids) were highly significant. In both years, Money Maker and Cherry cultivars had the largest number of branches per plant, while Super Strain B cultivar had the lowest one. In general F_1 produced more branches than their parents. Many investigators among them EL-Sayed (1997), Youssef (1997) and Bayomy (2002) reported that, tomato F_1 hybrids were more vigours in vegetative traits than their parents.

1.3. *B. tabaci* infestation

Data in Table (1) show the mean number of recorded *B. tabaci* Larvae/Leaf, statistical analysis showed significant difference among different tested genotypes (Parents and crosses) concerning the total population of *B. tabaci* larvae.

Table (1): Stem length of 1st cluster, number of branches/ plant and number of *B. Tabaci* lervae / leaf in the parents and F_1 generation of tomato plants in summer seasons of (2001& 2002).

Genotypes	Stem length to 1st cluster (cm)		No. of branches / plant		Mean No. of *B. tabaci* larvae / leaf
	2001	2002	2001	2002	
Parents					
1- Tallalakheen	12.8 j	15.3 ii	6.33 efg	5.70 hi	1.93 bcd
2- Money Maker	10.2 k	12.1 k	8.33 a-c	7.70 def	2.01 bc
3- Chico Π	8.8 k	10.2 l	9.33 ab	8.03 cd	2.65 a
4- Super Strain B	25.4 a	23.7 b	3.77 h	4.30 j	0.97 ghi
5- Strain B	13.6 ij	15.5 ij	6.3 efg	6.00 hi	1.61 cde
6- Mobil	13.9 ij	16.2 i	7.3 b-g	6.70 fgh	0.56 i
7- Filoradade	22.8 b	25.2 a	7.67 af	7.30 d-g	1.19 efg
8- Cherry	14.9 h	15.7 l	9.3 ab	8.70 bc	1.00 ghi
9- Super Marmand	17.3 ef	20.1 de	5.00 gh	5.30 i	1.31 efg
10- Giza 80	18.3 cde	16.4 hi	8.33 a-e	7.30 d-g	1.52 def
x —	15.7	17.0	7.18	6.73	1.48
F_1's 1- 1 x 2	12.9 ij	15.5 ij	7.10 b-g	6.70 fgh	1.16 efg
2- 1 x 3	13.2 ij	14.4 j	8.20 a-c	7.70 def	0.94 ghi
3- 1 x 5	15.49 gh	17.5 gh	7.70 a-f	7.30 d-f	0.66 hi
4- 1 x 8	15.2 gh	18.3 fg	10.10 a	9.70 a	1.35 efg
5- 1 x 9	16.6 fg	19.3 ef	6.50 d-g	7.30 d-g	1.09 fgh
6- 1 x 10	19.3 cd	21.2 cd	8.00 af	7.70 def	0.98 ghi
7- 2 x 3	18.0 def	22.1 c	8.90 a-d	8.10 cde	1.56 de
8- 2 x 10	17.8 def	19.3 ef	9.10 abc	8.80 abc	1.29 efg
9- 3 x 10	16.9 ef	18.4 fg	9.50 ab	9.30 ab	2.15 b
10- 4 x 5	19.7 c	21.2 cd	5.70 fgh	6.10 hi	0.91 ghi
11- 4 x 7	24.9 a	25.7 a	6.80 c-g	6.30 gh	0.94 ghi
12- 6 x 7	19.2 cd	20.1 df	7.70 af	7.10 cfg	1.35 efg
13- 6 x 8	15.3 gh	17.4 gh	8.70 a-e	8.30 cd	1.21 efg
X —	17.2	19.3	7.31	7.72	1.20

*** Volues (Means) within a column followed with the same letter (s) are not significantly different according to LS means test (P=0.05).**

It was found that Chico Π cultivar was the most susceptible since, it harboured the highest number of *B. tabaci* lervae / leaf (2.65). However, Mobil cultivar received the least number of *B*. *tabaci* larvae (0.56). In general hybrid plants had less number of *B. tabaci* larvae on their leaves compared to open pollinated cultivars. Many investigators among them Iskander *et al.,* (1998) and Helal and Iskander (2003) recorded significant difference among the cultivars of different species of plants to *B*. *tabaci* infestation.

1.4. Early yield

Data Presented in Table (2) show that, in both years, the parents Cherry and Mobil produced the highest and the lowest number of fruits/plants, respectively. However, the parents Super Strain B and Cherry produced the highest and the lowest early fruit yield (ton/fed), respectively. Generally, in both years, F_1 hybrids produced more early yield (number and weight of fruits) than their parents.

1.5. Total yield

Data Presented in Table (2) show that in both years the Cherry cultivar had the largest number of fruits / plant while, Mobil culitvar had the lowest number of fruits/ plant. The crosses including Cherry cultivar (8), i.e. 1x8 and 6x8 produced the highest number of fruits / plants. In general F_1 crosses had more fruits /plant than their parents.

Table (2) Early and total yield as number and weight of fruits in the parents and F_1 generation of tomato plants in the two seasons of (2001& 2002).

S. O. V.	Early yield				Total yield			
	No. of fruit / plant		Fruit weight (ton/fed)		No. of fruit / plant		Fruit weight (ton/fed)	
	2001	2002	2001	2002	2001	2002	2001	2002
Parents								
1- Tallalakheen	5.00 fg	4.67 gh	4.48 m	4.03 h	18.17 l	16.13 k	16.20 lm	14.21 o
2- Money Maker	6.54 e	6.54 ef	5.81 j	5.17 h	21.23 fgh	21.07 h	18.68 k	18.22 l
3- Chico Π	6.95 e	5.45 fg	4.76 l	4.24 mn	21.10 fgh	20.60 h	14.25	16.20 n
4- Super Strain B	4.51 fg	4.68 gh	6.08 i	5.79 fg	19.50 hi	18.47 j	26.35 gh	26.43 ef
5- Strain B	4.24 gh	4.68 gh	6.62 lm	5.04 hi	15.60 j	16.27 k	17.14 l	17.11 m
6- Mobil	2.00 j	2.13 k	2.10 g	2.74 b	14.50 j	11.00 m	15.5 m	14.18 o
7- Filoradade	3.42 hi	3.33 h-k	5.04 k	5.53 g	18.53 l	16.47 k	27.44 efg	22.30 j
8- Cherry	8.33 d	10.27 c	1.33 r	1.61 g	44.03 b	41.43	6.90 o	6.12 p
9-Super Marmand	2.52 ij	3.24 ijk	3.36 o	4.34 lm	20.63 gh	18.97 ij	27.58 ef	25.36 g
10- Giza 80	2.00 j	2.70 jk	2.52 b	3.29 o	15.17 j	13.13 l	19.17 k	18.59 l
X	4.55	4.71	4.01	4.17	20.85	19.35	18.92	17.87
F_1's 1- 1 x 2	7.17 e	5.63 fg	6.65 g	5.04 ef	21.90 fg	20.73 h	20.46 j	81.51 k
2- 1 x 3	16.12 a	13.33 b	12.10 a	9.69 a	44.13 b	40.97 c	33.14 b	29.95 b
3- 1 x 5	9.18 d	6.37 ef	9.02 c	6.65 d	31.83 c	26.77 d	31.31 c	28.54 c
4- 1 x 8	11.96 a	14.65 a	3.85 h	4.40 lm	50.53 a	42.47 b	16.25 lm	18.04 l
5- 1 x 9	4.57 fg	4.54 ghi	5.04 k	4.55 kl	24.80 de	23.20 g	27.61 e	23.25 l
6-1 x 10	6.81 e	4.37 ghi	6.97 f	4.89 ij	22.17 fg	20.90 h	22.70 l	24.10 h
7- 2 x 3	10.66 c	6.72 ef	8.16 d	5.98 ef	30.10 c	26.03 e	25.63 h	23.11 l
8- 2 x10	9.12 d	7.16 e	11.13 b	7.95 c	25.40 d	24.40 f	31.07 c	26.93 de
9- 3 x10	8.87 d	6.31 ef	11.90 a	9.18 b	26.67 d	26.50 de	35.66 a	31.13 a
10- 4x 5	7.02 e	5.69 fg	8.12 d	6.09 c	23.20 ef	23.40 g	26.44 fgh	24.94 g
11- 4 x 7	5.50 f	4.34 ghi	7.77 e	5.81 f	21.00 fgh	20.53 h	29.92 d	27.44 d
12- 6 x 7	2.73 ij	3.469 hij	3.92 h	4.69 ik	21.20 fgh	19.43 l	30.81 cd	26.04 f
13- 6 x 8	10.13 c	8.89 d	6.34 h	5.04 hi	43.80 b	45.53	27.25 efg	25.46
X	8.45	7.04	7.77	6.21	29.75	27.76	27.56	25.43

*** Volues (Means) within a column followed with the same letter (s) are not significantly different according to LS means test (P=0.05).**

Concerning total yield (ton/fed.) data show that, in both years, Super Starin B, Floradade and Super Marmand culitvars produced the highest total yield (ton/fed.). while, Cherry cultivar produced the lowest total yield (ton/fed.). Total yield ranged from 6.12 ton/fed. for Cherry cultivar in the second year to 27.58 ton/fed. for Super Marmand cultivar in the first year. However, total yield ranged from 16.25 for the cross 1x8 in the first year to 35.66 ton/fed. for the cross 3x10 (Chico x Giza 80) in the first. In general F_1 crosses produced more total fruit yield than their parents. These results agree with many investigators among them Abd-Allah (1995), Dhermatti**,** *et al.* (1997) and Bayomy (2002).

2. Heterosis

Heterosis was expressed as percent increase or decrease of F_1 performance over the mid-parents (MP) value and better parent (BP) value for the following characters.

2.1. Stem length to first cluster:

Data presented in Table (3) show that 9 and 12 crosses from 13 ones exhibited significant or highly significant positive heterotic values over mid-parents in the first and second year, respectively. Such estimates varied from 10.30% for the cross 1x9 to 89.47% for the cross 2x3 in the first year, while in the second year it is varied from 5.11% for the cross 4x7 to 98.21% for the cross 2x3. Average heterosis over the mid-parents for all crosses were significant (9.55%) and highly significant (13.53%) in the first and second year respectively.

As regard to heterosis over the better parent, from 13 crosses only two ones showed significant and highly significant positive values of heterosis over the better parent in the first year, in the second year 7 crosses showed significant and highly significant for this trait. Average heterosis over the better parent had a negative values in both years. These results were in agreement with those of Abd EL-Rahman (1983), Sherif and Hussein (1992), Dev *et al.* (1994) and Kumar *et al.* (1995), indicated that means for F_1 hybrids were always greater than the mean for all parents for this trait.

2.2. Number of branches / plant

The result in Table (3) show that only one cross from 13 ones had highly significant with positive value of heterosis over the mid-parents in the first year. While in the second year, 7 crosses from 13 ones exhibeted significant or highly significant with positive values of heterosis over the mid-parents. Average heterosis over the mid-parents for all crosses were significant in the first season and highly significant in the second one.

Meanwhile, the same Table (3) show that all crosses did not exhibited heterosis over the better parent in the first year, while, in the second year 5 crosses from 13 ones exhibited significant or highly significant with positive values of heterosis over the better parent for number of branches per plant. The significant of the average heterosis over the better parent was absent in both years. These results are in conformity with those of Singh and Singh (1993), Hegazi *et al*. (1995), Youssef (1997) and Salib (1999).

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2.3. Early yield (number of fruits/ plant)

Data presented in Table (4) show that the average heterosis over the mid-parents was highly significant with positive values 85.71% and 49.47% in the first and second year, respectively. From 13 crosses 12 and 7 ones revealed significant or highly significant positive values in each year for early fruit numbers.

Results in the same Table show that 9 and 3 crosses form 13 ones had positive significant or highly significant heterosis values over the better parent in each year. In the first year the values, varied from 21.61% to 131.94% for the crosses 6x8 and 1x3, respectively. While in the second year it varied from 36.11% to 145.49% for the crosses 1x5 and 1x3 respectively. The significance of average heterosis over the better parent was absent in the first season but significant in the second one.

2.4. Early yield (fruit weight).

Data presented in Table (4) show that most crosses exhibited highly significant of heterosis over the mid-parents for early fruits weight in both years. Average heterosis over the mid-parents for this trait were highly significant in both years with positive values 93.77% and 48.92% respectively.

From data in Table (4) 11 and 10 crosses out of 13 ones had highly significant positive values of heterosis over the better parent in the first and second years respectively. Average heterosis over the better parent were highly significant and significant in the first and second years respectively. In this concern, Farid (1981) found that heterosis values from mid-parents and high- parent were in Nili season 9.06 and –22.65%, respectively.

2.5. Total yield (number of fruits per plant).

Data presented in Table (5) show that all crosses in both years exhibited highly significant values of heterosis over the mid-parents for total fruit number per plant, this indicate that, these crosses produce more fruits than the average of their parents. Therefore, average heterosis over the mid-parents was highly significant in both years for this trait.

In both years, most crosses produced more fruits than the better parent moreover, most crosses had positive with highly significant values of heterosis over the better parent. However, heterosis over the better parent as an average was negative in both years, this indicated that the better parent produced more fruits than the average of all F_1 crosses. The absence of positive significant heterosis over the better parent did not imply the absence of F_1 hybirds superiority. These results are in conformity with those of Farid (1981), Abd EL-Rahman (1983) Sherif and Hussein (1992) and Youssef (1997).

2.6. Total yield (ton/fed)

Data presented in Table (5) show that the estimated of heterosis as deviation of mid-parents were positive with highly significantly values for all crosses in both year. In the first year, the values ranged from 11.25% to 143.30% for the crosses 4x7 and 6x8, respectively. In the second year, these values ranged from 12.62% to 150.84% for the crosses 4x7 and 6x8, respectively. However, heterosis over the mid-parents as an average was highly significant in both years.

Concerning heterosis over the better parent, it is evident from Table (5) that the significance for average herosis over the better parent was absent in both years. From 13 crosses 10 and 11 crosses revealed highly significant positive value for this trait in the first and second years, respectively. These results are in conformity with those of Abd EL-Rahman (1983), Abd-Allah (1995), Dhermatti *et al*. (1997), Youssef (1997) and Salib (1999).

2.7. Number of *B. tabaci* larvae.

This trait was evaluated only in the second year. Data in Table (3) show that only two crosses (6x7 and 6x8) exhibited high significance and significant values of heterosis over the mid-parents respectively. The significance for average heterosis the mid-parents was absent for this trait.

As for heterosis over the better parent, it is evident that no crosses exhibited heterosis. Therefore, average heterosis over the better parent was unsignificant.

From 13 crosses, only 3 ones showed significant or highly significant positive values of inbreeding depression for this trait. Average inbreeding depression for this traits was unsignificant.

3. Combining ability:

3.1. Stem length to first cluster and number of branches / plant

Data presented in Table (6) show that, in both years, both of GCA and SCA were highly significant. These results suggested that both additive and non-additive genetic variances were important. SCA were more larger than those of GCA, indicating that non-additive gene effects were more important than additive gene effects for the inheritance of stem length to first cluster and number of branches /plant. In this respect Hatem (1994), Metwally *et al*. (1996) and Bayomy (2002) mentioned that both GCA and SCA effects were involved in the inheritance of stem length to first cluster (earliness) and number of branches/ plant.

Table (6) Means squares for GCA and SCA for stem length to 1st cluster, number of branches / plant and number of *B. tabaci* larvea / leaf in parents and F_1 generation in tomato plants (2001& 2002).

S. O. V.	D.F.	Stem length to 1st cluster		No. of branches / plant		Mean No. of *B. tabaci* larvae / leaf
		2001	2002	2001	2002	2002
G.C.A	9	44.184	49.723	17.236	13.964	0.655
S.C.A	13	206.394	244.328	36.409	33.523	1.282
Error	44	0.006	0.004	0.0118	0.002	0.0004

The estimates of GCA (gi) and SCA (Sij) effects for stem length to first cluster (earliness of flowering) are given in Table (7), the parent which had less value of stem length to the first cluster is considered early flowering parent (better parent), therefore, the parent which had negative and significant value of GCA effects considered a good combiner. In contrast, the parent which had positive and significant value of GCA effects is consider a late flowering parent (poor combiner). In both years, Super Marmand culivar had the greatest GCA effects, however Tallalakheen culitvar had the poorest

GCA effects. The crosses 1x3 and 4x5 had negative with highly significant values of SCA effects. However, the other crosses had positive or non-significant values of SCA effects.

Table (7): General and specific combining ability effect for stem length, number of branches / plant and number of *B. Tabaci* larvea / leaf in the generation and parents in tomato at summer season (2001& 2002).

Genotypes	Stem length to 1st cluster (cm)		No. of branches / plant		Mean No. of *B. tabaci* larvae / leaf
	2001	2002	2001	2002	2002
1- Tallalakheen	3.50**	4.39**	2.09**	2.02**	0.33**
2- Money Maker	- 0.59**	- 0.26**	0.55**	0.46**	0.16**
3- Chico Π	- 0.87**	- 0.74**	0.84**	0.68**	0.32**
4- Super Strain B	1.56**	0.85**	-1.26**	-1.05**	-0.19**
5- Strain B	- 1.16**	- 1.21**	-0.76**	0.68**	-0.11**
6- Mobil	- 1.24**	- 1.19**	-0.34**	-0.40**	-0.20**
7- Filoradade	1.09**	1.00**	-0.44**	-0.46**	-0.12**
8- Cherry	- 1.41**	- 1.42**	0.19**	0.16**	-0.13**
9- Super Marmand	- 2.08**	- 2.06**	-1.55**	-1.30**	-0.20**
10- Giza 80	1.20**	0.63**	0.68**	0.57**	0.12**
1- 1 x 2	- 0.06	0.09	-0.44**	-0.44**	-0.19**
2- 1 x 3	0.58**	- 0.43**	0.31**	0.29**	-0.60**
3- 1 x 5	3.12**	3.23**	1.73**	1.52**	-0.36**
4- 1 x 8	3.22**	4.29**	2.99**	2.92**	-0.35**
5- 1 x 9	5.43**	6.05**	1.49**	2.27**	0.18**
6-1 x 10	4.19**	4.73**	0.31**	0.42**	-0.31**
7- 2 x 3	10.29**	12.84**	2.86**	2.57**	0.22**
8- 2 x10	7.60**	8.40**	3.26**	3.40**	0.20**
9- 3 x10	7.04**	8.08**	3.31**	3.63**	0.87**
10- 4x 5	- 9.65**	- 9.76**	-3.09**	-3.10**	-0.38**
11- 4 x 7	11.76**	13.03**	4.48**	3.94**	0.55**
12- 6 x 7	9.92**	9.87**	4.27**	3.96**	0.98**
13- 6 x 8	9.01**	10.08**	4.51**	4.42**	0.85**
S. E. (gi)	0.020	0.016	0.030	0.013	0.005
S. E. (Sij)	0.062	0.049	0.090	0.039	0.017

Regarding number of branches/plant, the cultivar tallalakheen, Money Maker, Chico Π, Cherry and Giza 80 had highly significant values of GCA effects in both years. So, it is suggested that these cultivars were good general combiners for this trait. However, the other cultivars had negative or non-significant values of GCA effects, indicating that these cultivars were poor combiners in this trait. All crosses except two (1x2 and 4x5) had positive with significant or highly significant values of SCA effects.

3.2- Early and total yield

Data presented in Table (8) show that, in both years, GCA and SCA were highly significant for early and total yield as number and weight of fruits these results suggested that both additive and non-additive genetic variances were important. SCA were larger than those of GCA, indication that non-additive gene effect appeared to be more important than additive, gene effects for the inheritance of yield and its component in tomato crop. These results are agreement with these of Metwally *et al.* (1996) and Bayomy

(2002) who found, on tomato, that both additive and non-additive genetic variances were important.

The estimates, of GCA and SCA effects for early yield, data in Table (9) show that, in both years, Tallalakheen, Money Maker, Chico Π and Cherry cultivars were good combiners for early yield as number of fruits / plant. While, Tallalakheen, Money Maker and Chico Π cultivars were good combiners for early yield (Fruit weight). However, the other cultivars were poor combiners for early yield as number and weight of fruits. Most crosses had positive and highly significant values of SCA effect for early yield as number and weight of fruits.

The estimates of GCA and SCA effects for total yield, data show that, in both years, Tallalakheen, Money Maker, Chico Π and Cherry cultivars were good combiners for total yield (number of fruits/plant). While, Tallalakheen, Money Maker and Chico Π cultivars were good combiners for total fruits weight. However, the other cultivars were poor combiners for total yield as number and weight of fruits. Most crosses had positive and significant or highly significant values of SCA effect in both years for total yield as number and weight of fruits.

3.3. Number of *B. Tabaci* larvea / leaf

Data presented in Table (9) show that, both GCA and SCA were highly significant. These results indicated that both additive and non-additive genetic variances were important in the inheritance of this trait.

Table (9): General and specific combining ability effect for early and total yield, in the generation and parents in tomato summer season (2001& 2002).

Genotypes	Early yield (No.)		Early yield (Wt.)		Total yield (No.)		Total yield (Wt.)	
	2001	2002	2001	2002	2001	2002	2001	2002
1- Tallalakheen	2.90**	2.54**	2.03**	1.63**	9.39**	8.04**	6.20**	6.01**
2- Money Maker	0.75**	0.41**	0.78**	0.47**	0.07**	0.20**	0.42**	0.52**
3- Chico Π	1.54**	0.79**	1.22**	0.74**	2.01**	1.99**	1.12**	1.23**
4- Super Strain B	-0.79**	-0.80**	-0.01**	-0.09**	- 2.99**	- 2.50**	- 0.04*	0.28**
5- Strain B	-0.53**	-0.52**	-0.15**	-0.14**	- 2.73**	- 2.35**	- 1.46**	- 1.18**
6- Mobil	-1.18**	-0.92**	-1.15**	-0.77**	- 2.09**	- 1.99**	- 1.70**	- 1.83**
7- Filoradade	-1.33**	-1.10**	-0.54**	-0.25**	- 3.32**	- 3.17**	- 0.51**	- 0.31**
8- Cherry	0.64**	1.37**	-1.28**	-0.79**	5.28**	5.00**	- 4.35**	- 3.84**
9- Super Marmand	-1.79**	-1.39**	-1.37**	-0.94**	- 4.42**	- 4.15**	- 2.23**	- 2.32**
10- Giza 80	-0.19**	-0.37**	0.57**	0.34**	- 1.21**	- 1.07**	1.52**	1.46**
1- 1 x 2	-1.06**	-1.35**	-0.23**	0.28**	- 4.24**	- 2.93**	- 1.08**	1.13**
2- 1 x 3	6.94**	5.88**	4.81**	3.80**	15.67**	15.17**	10.76**	8.62**
3- 1 x 5	2.49**	0.50**	3.26**	1.82**	9.06**	6.17**	12.02**	10.10**
4- 1 x 8	3.86**	6.52**	-0.56**	0.58**	18.14**	13.05**	0.43**	2.79**
5- 1 x 9	-0.62**	-0.29**	0.74**	0.67**	4.04**	4.76**	9.24**	6.18**
6-1 x 10	-0.30**	-1.68**	0.34**	-0.52**	- 2.44**	- 1.24**	- 0.17**	2.49**
7- 2 x 3	4.06**	1.84**	2.37**	1.49**	12.82**	9.63**	10.18**	8.36**
8- 2 x10	4.59**	3.68**	6.01**	3.94**	11.97**	11.66**	15.14**	11.90**
9- 3 x10	3.39**	2.36**	6.38**	4.84**	10.92**	11.62**	18.89**	15.25**
10- 4x 5	2.64**	-4.12**	-1.95**	-1.75**	-17.54**	-16.77**	- 8.34**	- 8.39**
11- 4 x 7	-3.68**	3.18**	4.93**	3.17**	13.77**	13.55**	15.75**	14.82**
12- 6 x 7	1.89**	2.45**	2.43**	2.87**	12.89**	11.84**	18.64**	15.96**
13- 6 x 8	6.92	4.92**	5.75**	4.11**	25.18**	28.15**	20.91**	19.62**
S. E. (gi)	0.014	0.017	0.003	0.003	0.028	0.008	0.015	0.007
S. E. (Sij)	0.041	0.051	0.011	0.011	0.085	0.024	0.046	0.023

Concerning this trait, the parent which had less number of *B tabaci* larvea / leaf is considered a resistant parent, better parent, therefore, the parent which had negative and significant value of GCA effects is considered a susceptible parent good combiner. Therefore, data presented in Table (7) show that, Super strain B, Mobil, Floradate, Cherry and Super Marmand cultivars were good combiners. In contrary, Tallalakheen, Money Maker, Chico Π and Giza 80 were poor combiners. Concerning crosses 5 and 8 crosses had negative and positive highly significant values of SCA effect, respectively.

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وراثة المحصول ومكوناته والإصابة بالذبابة البيضاء لبعض أصناف وهجن الطماطم

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تم دراسة السلوك الوراثية لموسمين زراعيين بالمزرعة البحثية بمحطة بحوث الجميزة بمحافظة الغربية وذلك لدراسة النظم الوراثية لعشرة أصناف من الطماطم والهجن الناتجة منها (١٣ هجيناً) وذلك لصفات المحصول ومكوناته وكذلك لمدى تحمل هذه الأصناف والهجن للإصابة بالذبابة البيضاء. وكانت أهم النتائج المتحصل عليها هى:-

١- تفوق الصنف سوبر استرين بى عن باقى الأصناف فى كمية المحصول المبكر والكلى بينما كان الصنف شيرى أقل الأصناف محصولاً.

٢- تفوقت الهجن عن آبائها فى كمية المحصول المبكر والكلى.

٣- كان الصنف شيرى أكثر الأصناف حساسية للإصابة بالذبابة البيضاء بينما كان الصنف موبل أكثر الأصناف تحملاً للإصابة بالذبابة البيضاء. وعموماً كانت الهجن أكثر تحملاً للإصابة بالذبابة البيضاء عن الآباء الناتجة منها.

٤- كانت كلا من القدرة العامة والخاصة على الائتلاف عالية المعنوية لكل الصفات التى درست مما يدل على أهمية كل من الفعل الجينى المضيف وغير المضيف فى وراثة هذه الصفات إلا أن الفعل الجينى غير المضيف كان أكثر أهمية من الفعل الجينى المضيف فى وراثة هذه الصفات.

٥- كانت الأصناف تالا لاخين، مونى ميكر، وشيكو، ذات قدرة عامة كبيرة على الائتلاف لصفات المحصول المبكر والكلى.