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STUDY OF SOME TOMATO HYBRIDS UNDER DIFFERENT ENVIRONMENTS.

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ABSTRACT

In this investigation, three parental (Lines) and three varieties (testers) Three lines are [ACVF imp. 55 (P_1), Calace (P_2) and Marglope (P_3)] and Testers are [Floradade (P_4), Castle Rock (P_5) and Edkawy (P_6)] of tomato belonging to *lycopersicon esculentum* Mill were used as parents. All parents were crossed among them to obtain nine F_1 hybrids through line x testers mating design. All six parents and the nine F_1 hybrids were evaluated at two locations. At Dakhlia and Esmailia governorates.

The results indicated the presence of significant variability among all evaluated genotypes, parents and F_1 hybrids. The results also revealed that the parent Edkawy (P_6) was the best parent for most studied traits at two locations and over all two locations. While, the results also cleared that there were no specific F_1 hybrids was the best for all studied traits at locations or from the combined.

The results also reveald that all studied traits showed highly significance values of heterosis versus the mid-parents. On the other hand, all studied traits showed highly significant negative values (undesirable) of heterosis against the better parents.

Concerning genetic parameters, the results illustrated that the additive genetic variances were larger than those the non-additive genetic variances including dominance for most studied traits. Similarly, highly estimates of heritability in broad sense were observed, although heritability in broad sense were larger than their corresponding heritability values in narrow sense. Thus, the genetic materials used in this investigation could be improve through selection progame.

INTRODUCTION

Tomato consider as one of the important vegetable crops in Egypt and all over the world.

The cultivated area of tomato in Egypt according to Ministry of agriculture (2002) was about 454.988 feddans. Thus, many investigators studied the genetic behaviour of economical traits of tomato to improve and increase the productivity of tomato. Many authors studied the magnitudes of heterosis in tomato. Sidhu and Surian singh (1993) evaluted different F_1 hybrids of tomato. They obtained heterosis values ranged from 23.8% to 71.7%. In the same time, Dev *et al* (1994) regarded high estimates of heterosis values ranged from 29.33% to 115.7% for yield/plant and numbers of fruits/plant, respectively. Similar results were obtained by Dod *et al* (1995), Hegazi *et al* (1995), El-Sharkawy *et al* (1997), Makesh *et al* (2003), Dudi and Sanwal (2004). They indicated that most studied F_1 hybrids of tomato, showed highly estimates of heterosis for most studied economical traits.

The nature of gene action was also studied by many authors, among them Omran *et al* (1997), Chadha *et al* (2001), Sharma *et al* (2002) and Cheema *et al* (2003) illustrated that the additive gene action was more important than their other genetic components for the inheritance of tomato triats.

On the other hand, TOMATO alleio and Estrada (1993), Dharmatti *et al* (1999), Thakur and Arun-Joshi (2000) and Arun-Joshi and Thakur (2004) illustrated that the non-additive genetic variances including dominance played a major role in the inheritance of tomato traits.

In this respect, Sherif and Hussein *et al* (1992), Rai *et al* (1997), Dhaliwal *et al* (2002) and Makesh *et al* (2002) cleared the importance of additive and non-additive genetic variances in the inheritance of tomato traits. Heritability was studied by many authors among them: Reddy and Reddy (1990), El-Sharkawy *et al* (1997), Rodriguez *et al* (2000) and Makesh *et al* (2003). They obtained different values of heritability. They also stated the possibilty of selection to improve tomato traits.

MATERIALS AND METHODS

The genetic materials used in this investigation included three lines and three varieties of tomato used as testers. All genotypes belong to *lycopersicon esculentum* Mill

These genotypes were crossed among them to obtain nine F_1 hybrids through (Line x testers) mating design according to Kempthome (1957). The three lines were: ACVF imp. 55 (P_1), Calace (P_2) and Marglope (P_3). While the three varieties (testers) were: flora dade (P_4), Castle Rock (P_5) and Edkawy (P_6). The seeds of all genotypes were obtained from Vegetable Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt.

In the growing season of 2003, the three lines were crossed with the three testers to obtain the seeds of nine F_1 hybrids. In the same time, lines and varieties genotypes were also selfed to obtain more seeds. In 2004 growing summer season, the 15 genotypes (six parents and nine F_1 hybrids) were evaluated at two locations. The first location was Vegetable Research Station at El-Baramon, Dakahlia govemorate, while the seeond location was a privat farm at Ismailia govemorate. Rondomized complete blocks design (RCBD) experiments were conducted with three replications were used.

The data was recorded on the following traits:

- plant height in centimeters (P.H.cm.),
- number of branches per plant (No.B./P.),
- total yield per plant in kilograms (T.Y./P.kg.),
- number of fruits per plant (No.F./P.),
- average fruit weight in grams (A.F.W.g),
- number of locules per fruit (No.L./F.) and
- total soluble solids (T.S.S.).

The analysis of variances for each location and from the combined data over two locations were also made according to Kempthome (1957). Heterosis were determined as the deviation of F_1 hybrids from the mid-parents (M.P) and the better parent (B.P.). The least significant differences (L.S.D) were calculated according to Steel and Torrie (1960) Ref. Addititive genetic variences (σ^2A) and non-additive gentic variences including dominance (σ^2D) were made according to Cochran and Cox (1956).
Heritability values were estimated according to the following equations:

$$\text{heritability in broad sense } (h^2_{b.s}) = \frac{\sigma^2A + \sigma^2D}{\sigma^2A + \sigma^2D + \sigma^2e/r} \times 100$$

$$\text{heritability in narrow sense } (h^2_{n.s}) = \frac{\sigma^2A}{\sigma^2A + \sigma^2D + \sigma^2e/r} \times 100$$

The present investigation was conducted as an attempt to study the nature of gene action and the behaviour of important economical traits of tomato under different environments. All agricultural practices were made as recommended for tomato cultivation.

RESULTS AND DISCUSSION

Plant breeder resquire an informations about the nature of gene action to start the suitable breeding programes to improve tomato traits. Thus, in this imvestigation, three inbred lines (used as lines) and three varieities of tomato (used as testers) were crossed among them according to line x testers mating design to obtaine nine F_1 hybrids.

The three lines, the three varieties and their nine F_1 hybrids were evuated in two different locations to study the genetic behavior of economical traits of tomato under different environments.

The first location at El-Bramoun Horticulture Research Station Dakahlia govemorate (L_1) while the second locations was a private farm at esmailia govermorate (L_2).

The estimation of variability among studied genotypes became a necessity to indicate the nature of variability. Therefore, the analysis of variances were made for each location and for the combined data, the results are presented in Table 1.

The results reveald that the mean squares of genotypes showed highly significance for all studied traits at each location. In the same time, the mean squares of (parents, crosses and parents x crosses) also observed highly significance for all studied traits at two locations. It could be also noticed that the two locations showed similar magnitudes of the mean squares. On the other hand, all studied traits showed insignificant mean squares of parent x location, crosses x location, and parents x crosses x locations for all studied traits expect number of fruits per plant. It could be also noticed that the different variance components were not significantly affected with different locations.

The means of all studied traits at each location and over all two locations for all parents and the F_1 hybrids were calculated and the results are shown in Table 2.

The results revealed that the parental variety Edkawy (P_6) showed the highest mean for all studied traits at two locations and over all two locations except of yield per plant (Y./P.) and total soluble solids (T.S.S.).

Table 1: The results of the analysis of variances and the mean squares for all studied traits at the two locations and over all two locations.

S.V	d.f	P.H			No.B/P.			No.F./P.			Y./P.			A.F.W.			No.L./P.			TSS%		
		L_1	L_2	Com.	L_1	L_2	Com	L_1	L_2	Com	L_1	L_2	Com.	L_1	L_2	Com	L_1	L_2	Com.	L_1	L_2	Com.
Gen.	14	400.4*	56.0**	852.9*	3 18*	2.42*	5.3	74.1*	172.5*	338	1.32*	1.41*	2.7*	428.7*	33.8*	956 0*	4.88*	4.83*	9.5	0.81*	1.10**	1.8
Par.	5	475.8*	495.2*	968.5	3.57*	1.16	4.4	22.1*	269.5*	590.	2.09*	2.32**	4.4	434.9*	77.0*	907.3	4.5**	2.89*	7 3	1.18**	1.09	2.2
Cros.	8	354.2*	452.5*	807.2	3**	3.04*	5.8	8.98*	93.6**	140.	0.64*	0.68**	1.3	394.3*	18.4*	905.8	4.87*	4.87*	9.4	0.46**	0.96	1.3
P.xC.	1	353.6	288.3	640.3	2.7*	3.79	6.5	349.1	317.9	666.	2.95	2.7	5.7	672.1	940.8	1601	6.84	14.2	20.4	1.70	2.21	3.9
Cros.xL.	8	-	-	4.5	-	-	0.23	-	-	12.4	-	-	0.03	-	-	6.9	-	-	0.32	-	-	0.11
P.xL.	5	-	-	2.4	-	-	0.36	-	-	1.8	-	-	0.04	-	-	4.6	-	-	0.09	-	-	0.03
P.C.L.	1	-	-	1.7	-	-	0.05	-	-	0.36	-	-	0.01	-	-	11.3	-	-	0.67	-	-	0.02
Error	58	2.01	2.08	203.4	0.25	0.18	1.3	1.02	1.82	78.1	0.02	0.02	0.62	1.56	2.39	225.5	0.31	0.19	2.3	0.02	0.02	0.41

Table 2: The mean performances of the parents and their crosses for all studied traits at two locations and over all two locations.

Gen.	P.H			No.B/P.			No.F./P.			Y./P.			A.F.W.			No.L./P.			TSS%		
	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.
P_1	51.3	53	52.15	4	5	4.5	49.6	53.3	51.5	4.3	4.8	4.5	62.3	64.3	63.3	3.3	4	3.6	4.3	4.5	4.5
P_2	48.3	53.3	50.8	4.3	5	4.6	49.6	53	51.3	3.6	4.1	3.8	54	55	54.5	4.6	5	4.8	5.1	5.6	5.3
P_3	51.0	54.6	52.8	4	4.6	4 3	51.6	54.3	53	3.7	3.9	3.8	68	72.6	70.3	4.6	5	4.8	5.6	5.6	5.6
P_4	47.3	52.0	49.7	4.3	5	4.6	39	42	40.5	3.3	3.4	3.3	53	57.6	55.3	3.3	4	3.7	3.9	4.2	4.1
P_5	50.6	53.3	52	3.6	4.6	4.1	28	33	30.5	1.8	2.1	2.0	66.6	67.6	67.2	4.3	4.6	4.5	5.1	5.3	5.2
P_6	80.3	84.6	82.5	6.6	6.3	6.5	56	58	57.2	3.5	3.7	3.6	86	90	88	6.6	6.6	6.6	4.4	4.7	4.6
1x4	52.3	54.6	53.5	5	6	5.5	61	65	63	4.5	4.8	4.7	64	67	65.5	4.3	4.6	4.5	4.9	4.7	4.8
1x5	54.3	56.3	55.3	4.3	5	4.6	49	47	48	3.6	3.6	3.6	58.3	59.6	59	4.3	6	5.2	4.9	4.8	4.9
1x6	50.6	51.6	51.2	4	5	4.5	51.3	52.6	52	3.4	3.8	3.6	81	86	83.5	6	6.6	6.3	5.4	5.7	5.6
2x4	53.0	54	53.5	4.6	4.6	4.6	46	53.6	49.6	4.5	4.7	4.6	64.3	66	65.2	4.3	4.6	4.5	5.1	5.8	5.5
2x5	53.3	57.6	55.5	4	5.3	4.6	46.6	47.3	47	3.3	3.6	3.5	63.3	67	65.2	4	5.3	4.6	5.2	5.6	5.4
2x6	56.3	59.3	57.8	4.3	4.6	4.5	51	52.3	51.6	3.6	3.9	3.8	69	74.6	71.8	4.3	4.6	4.5	5.5	6.1	5.8
3x4	5.65	59	57.3	6.6	7.3	7	54	57.6	55.8	4.2	4.7	4.4	84.6	89.3	87	6.3	7	6.6	5.1	5.4	5.2
3x5	64.6	70.3	67.5	6.3	7	6.6	51.3	57	54.2	3.7	4.1	3.9	80.6	88.6	84.6	7.3	8	7.6	4.6	4.8	4.7
3x6	74.6	80.0	77.5	5.6	6.3	6	52.3	57	54.6	3.9	4.1	4.0	90.6	96.6	93.6	6.6	7.3	7	5.9	6.2	6.0

L_1, L_2 and com.: are the first location, second location and combined data, respectively.

The obtained mean values of P_6 were: (80.3, 84.6 and 82.5); (6.6, 6.3 and 6.5); (56, 58 and 57); (86, 90 and 88) and (6.6, 6.6 and 6.6) at the first location (L_1), The second location (L_2) and over all two locations for plant height (P.H),number of branches per plant (No. B./P.), number of fruits per plant (No. F./P.), average fruit weight (A.F.W.) and number of leaves per plant (No. L./P.), respectively.

In the same time, the parental lines ACVF imp, 55 (P_1), Calace (P_2) and Marglope (P_3) showed the highest means for yield/plant (Y./P.) and total soluble solids (T.S.S.) traits. On the other hand, the results indicated that the parent floradade (P_4) was the lowest for plant height (P.H) (shortest), number of leaves per plant (No. L./P.) and total soluble solids (T.S.S.) traits. Similarly, the parental variety Castle Rock (P_5) showed the lowest magnitudes of the mean values for number of branches per plant (No. B./P.), number of fruits per plant (No. F./P.) and yield per plant (Y./P.) traits. In general, the second location (L_2) showed higher magnitudes than that the other first location (L_1) for most studied traits.

Concerning the means of the F_1 hybrids, the results illustrated that there were no F_1 hybrids showed the highest values for all studied traits at two locations or from the combined data over all two locations.

In this respect, the F_1 hybrid (3x6) was the tallest hybrids and had the heaviest fruits weight with the mean of (74.6, 80.0 and 77.5 cm) and (90.6, 96.6 and 93.6) at L_1,L_2 and over all two locations, respectively. In the same time, the F_1 hybrid (1x4) was the best for No. F./P. (61, 65 and 63) and Y./P. (4.5, 4.8 and 4.7) at L_1, L_2 and from the combined data, respectively. On the other hand, the F_1 hybrid (2x5) was the lowest for No. B./P., No. F./P., Y./P. and No. L./P., traits. It could be also noticed that the F_1 hybrids contained at least one parent showed the highest magnitud which exhibited high magnitudes and vise versa.

The means of parents, ranges, the means of F_1 hybrids and the heterosis values versus the mid-parents (M.P.) and the better parent (B.P.) were estimated and the results are shown in Table 3.

The reuslts indicated that the means of all F_1 hybrids exceeded the means of parents (M.P) for all studied traits. Thus, all studied traits showed significant values of heterosis versus the mid-parents at the two locations and over all two locations. The obtained heterosis values estimated from the combined data were: 9.52, 10.83, 15.73, 11.43, 13.12, 19.15 and 17.8% for P.H, No.B./P., No.F./P., Y./P., A.F/W., No. L./P. and T.S.S., respectively. It could be also noticed that the two locations L_1 and L_2 showed variable magnitudes for observed heterosis values for different studied traits.

On the other hand, the results revealed that the calculated values of heterosis against the better parent (B.P.) were negative in magnitudes undesirable. This finding indicated that there were no F_1 hybrids exceeded the better parent for all studied traits at two locations and over all two locations. In this case, selection programe in the segregated generations of hybrids under different environmental conditions could be suitable to improve the studied economical traits of tomato. Similar results were obtained by many authors among them: Sidhu and Surjan singh (1993), Dev *et al* (1994), Dod *et al* (1995), Makesh *et al* (2003) and Dudi and Sanwall (2004).

The analysis of variances for line x tester mating design were made for all studied traits for two locations and over all two locations and the results are presented in Table 4.

The results illustrated that the mean squares of lines showed highly significance for all studied traits at each location and from the combined analyses. In the same time, the mean squares of testers were also significant or highly signifcant for No. F./P., Y./P. and A.F.W. traits, respectively. Similarly, the results indicated that the mean squares of line x testers showed significant for No.F./P., Y./P., and .S.S. traits at two locations. On the other hand, the mean squares of Line x Tester, line x location, tester x location, and line x teser x location were insignificant for all studied traits. It could be also regarded that the magnitudes of the mean squares of lines were larger than those the mean squares of testers, line x tester and the other components for all studied traits. The variance components of line x tester analysis of variances were translated to genetic parameters (GCA and VA), (SCA and VD), (GCA x L.), (SCA x L.), (VA x L.) and (VD x L.) and the results are presented in Table 5.

The values of heritability in broad and narrow senses were estimated and the results are shown in the same table. The results cleared that the magnitudes of general combining ability GCA and cosequently (VA) were larger than that specific combining ability SCA and cosequently non-additive gentic vareances including dominance (VD) for all studied traits at each location and from the combined data. This finding cleared that the obtained values of heterosis against the mid-parents which were obtained and described earlier mainly due to additive x additive epistatic effects. The results also indicated that the interaction of VA x L. and VD x L. were negative in mangitudes for all studied traits. Many investigators observed similar results among them: Omara *et al* (1997), Chadha *et al* (2001), Sharma *et al* (2002) and Cheema *et al* (2003).

Concerning heritability, the results cleared that the magnitudes of heritability values in broad sense (h^2_b) were alwayes larger than those heritability values in narrow sense (h^2_n) for all studied traits at the two locations. The combined data showed (h^2_n) values larger than those (h^2_b) due to the negative values of SCA and then VD. The obeserved values of h^2_n were: (0.94, 0.94 and 0.82); (0.75, 0.63 and 0.74); (0.15, 0.21 and 0.06); (0.56, 0.74 and 0.32); (0.76, 0.76 and 0.61); (0.55, 0.67 and 0.52) and (0.45, 0.65 and 0.35) for P.H., No.B./P., No.F./P., Y./P., A.F.W., No.L./P. and T.S.S. at L_1,L_2 and from the combined data, respectively. In the same time, the calculated values of h^2_n ranged from: (0.15, 0.29 and 0.06) to (0.94, and 0.82) for No. F./P. and P.H. traits, respectively. These results were in completely agreement with the results which were obtained by Reddy and Reddy (1992), El-Sharkawy *et al* (1997), Rodriguez *et al* (2000) and Makesh *et al* (2003).

In conclusion, the results illustrated that the genetic materials of tomato used in this investgation could be improve through selection programmes in the segregated generations to obtain improved new genotypes.

The results revealed that the parental variety Edkawy (P_6) showed the highest mean for all studied traits at two locations and over all two locations except of yield per plant (Y./P.) and total soluble solids (T.S.S.).

Table 3: The mid-parents (M.P.), the mean of F_1 hybrids, the values of heterosis from the mid-parents and the better parent (B.P.) from two location and over all two locations.

Gen.	P.H			No.B/P.			No.F./P.			Y./P.			A.F.W.			No.L./P.			TSS%		
	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.
M.P	54.8	58.5	56.7	4.5	5.1	4.8	45	48.8	46.4	3.3	3.6	3.5	64.8	67.8	66.3	4.5	4.8	4.7	4.7	4.2	4.5
Rang	47.3	52.3	49.7	3.7	4.7	4.2	28	33	30.5	1.8	2.2	2.0	54	55	54.5	3.3	4.0	3.7	4.0	4.2	4.1
	80.3	84.6	82.5	6.7	6.3	6.5	56.0	58	57.2	4.3	4.8	4.5	86	90	88.0	6.7	6.7	6.7	5.7	5.7	5.7
F_1	60.5**	63.6**	62.1	5	5	5.32	53	54.3	53.7	3.8	4.1	3.9	72.8	77.2	75	5.2	6.0	5.6	5.1	5.4	5.3
H.M.P	10.4**	8.72**	9.52**	11.11	1.76	4.2	7.17**	1.27**	15.23	15.2**	13.89*	11.43	12.35*	3.86**	13.12	5.60	25.0*	19.15	8.51**	28.6**	17.8
H.B.P	24.7*	24.8*	-24.7	-25.4	20.6*	18.15*	-5.9**	-6.4	-6.1	-11.	-14.6	-12.2	-15.3	-14.2	-14.8	22.4	-10.4	-16.4	-10.5	-5.3	-7.0
SD0.05%M.P	3.18	3.24	32.02	1.03	0.96	2.52	2.28	3.03	19.86	0.33	0.33	1.76	2.81	3.47	33.72	1.25	0.98	3.40	0.33	0.33	1.44
SD0.01%M.P	4.28	3.11	1.38	1.38	1.29	3.39	3.06	4.08	26.74	0.44	0.44	2.37	3.78	4.67	45.4	1.68	1.33	4.58	0.44	0.44	1.93
SD0.05%B.P	2.38	2.42	23.88	0.76	0.72	1.89	1.70	2.26	14.80	0.25	0.25	1.31	2.09	2.58	25.13	0.94	0.74	2.54	0.25	0.25	1.07
SD0.01%B.P	3.20	3.26	32.15	1.02	0.97	2.54	2.29	3.04	19.93	0.33	0.33	1.77	2.82	3.48	33.84	1.27	1.77	3.42	0.33	0.33	1.44

Table 4: The results of the analysis of variances for line x tester mating design for all studied traits at two location and over all two locations.

Gen.	P.H			No.B/P.			No.F./P.			Y./P.			A.F.W.			No.L./P.			TSS%		
	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.
Line	1415.	1769.4	6348.8	10	9.93	19.91	86.	88.9	161.6	0.0	0.11	0.14	1056.	1393	2437	15.8	15.1	30.89	0.08	1.28	1.00
Tester	0.44	11.1	16	1.4	1.04	2.8	49.	153.1	187.1	2.1	2.41	4.15	391.4	506.	891.1	1.03	2.5	2.72	1.40	2.12	3.49
L.T	10.4	14.7	92.89	0.2	0.59	0.49	49.	66.3	106.1	0.1	0.10	0.24	64.7	87.2	147.6	0.31	0.93	2.03	0.18	0.22	0.34
L.Loc.	-	-	10.5	-	-	0.13	-	-	14.3	-	-	0.01	-	-	12.39	-	-	0.07	-	-	0.39
T.Loc.	-	-	3.56	-	-	0.13	-	-	15.1	-	-	0.01	-	-	6.72	-	-	0.80	-	-	0.04
L.T.Loc.	-	-	1.89	-	-	0.33	-	-	10.1	-	-	0.06	-	-	4.28	-	-	0.21	-	-	0.03
Error	2.01	2.08	203.4	0.2	0.18	1.26	1.0	1.82	78.2	0.0	0.02	0.62	1.56	2.39	225.5	0.31	0.19	2.29	0.02	0.02	0.41

Table 5: The calculated values of general and specific combining ability in addition to heritability values in broad and narrow senses for all studied traits at two locations and from the combined data.

Gen.	P.H			No.B/P.			No.F./P.			Y./P.			A.F.W.			No.L./P.			TSS%		
	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.	L_1	L_2	Com.
GCA	19.38	24.32	21.78	0.15	0.14	0.15	0.50	1.5	0.9	0.02	0.03	0.03	18.3	24.0	21.06	0.20	0.22	0.21	0.02	0.04	0.07
VA	77.51	97.3	87.11	0.62	0.54	0.59	2.01	6.1	3.8	0.09	0.13	0.12	73.2	95.8	84.25	0.79	0.88	0.82	0.06	0.16	0.10
SCA	2.79	4.22	-30.03	0.01	0.14	-0.13	16.3	21.5	4.7	0.06	0.03	-0.06	21.06	28.3	-12.98	0.34	0.25	-0.044	0.5	0.07	-0.07
VD	2.79	4.22	-30.03	0.01	0.14	-0.13	16.3	21.5	4.7	0.06	0.03	-0.06	21.06	28.3	-12.98	0.34	0.25	-0.044	0.05	0.07	-0.01
GCA x L	-	-	-21.63	-	-	-0.15	-	-	-0.8	-	-	-0.3	-	-	-20.9	-	-	-0.20	-	-	-0.02
VA x L	-	-	-86.54	-	-	-0.61	-	-	-3.3	-	-	-0.12	-	-	-83.7	-	-	-0.80	-	-	-0.09
SCA x L	-	-	-67.18	-	-	-0.31	-	-	-22.7	-	-	-0.19	-	-	-73.7	-	-	-0.69	-	-	-0.13
VD x L	-	-	-67.18	-	-	-0.31	-	-	-22.7	-	-	-0.19	-	-	-73.7	-	-	-0.69	-	-	-0.13
h^2_n	0.94	0.94	0.82	0.75	0.63	0.74	0.15	0.21	0.06	0.56	0.74	0.32	0.76	0.76	0.61	0.55	0.67	0.52	0.45	0.65	0.35
h^2_b	0.98	0.98	0.54	0.75	0.79	0.58	0.95	0.94	0.14	0.89	0.91	0.15	0.98	0.98	0.51	0.79	0.86	0.50	0.84	0.92	0.32

GCA: general combining ability
VA: variance due to additive
SCA: specific combining ability
VD: variance due to dominance
GCA x L: general combining ability x location interaction
VA x L: variance due to additive x Location interaction
SCA x L: specific combining ability x location interaction
VD x L.: variance due to dominance x Location Interation
h^2_n: heritability in narrow sense h^2_b: heritability in broad sense.

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دراسة بعض هجن الطماطم تحت ظروف بيئية مختلفة

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استخدم فى هذه الدراسة ثلاثة سلالات (Lines) هى: [ACVF imp. 55 (P_1), Calace (P_2) and Marglope (P_3)] و ثلاثة اصناف استخدمت(Testers) هى [Floradade (P_4), Castle Rock (P_5) and Edkawy (P_6)] وجميعيا تتبع النوع (*Lycopersicon esculentum* Mill) تم التهجين بين هذه الأباء للحصول على تسعة هجن جيل اول وذلك طبقا لنظام السلالة x الكشاف. كل الهجن التسعة وآبائها الستة تم تقييمها فى موقعين مختلفين أحدهما فى محافظة الدقهلية والأخر فى محافظة الاسماعيلية فى العروه الصيفى.

وقد أوضحت النتائج وجود اختلافات معنوية بين التراكيب الوراثية والأباء وكذلك فيما بين الهجن. وقد أظهرت النتائج أيضا أن الأب Edkawy(P_6) كان أفضل الأباء بالنسبة للمتوسط لغالبية الصفات التى تمت دراستها سواء فى كل موقع أو من البيانات المجمعه فى كلا الموقعين وعلى الجانب الأخر لم يكن هناك جيل أول يتفوق فى كل الصفات بل كانت الهجن تتباين فى تعبيراتها بالنسبة للصفات المختلفة فى المواقع المختلفة.

وقد أوضحت النتائج أيضا وجود قيم عالية المعنوية من قوة الهجين قياسا على متوسط الأباء ، وعلى لجانب الأخر فإن قيم قوة الهجين المتحصل عليها قياسا من أفضل الأباء فقد كانت سالبة (وأن كانت معنوية) ولكنها غير مفيدة فى الصفات التى درست.

وفيما يخص القياسات الوراثية المختلفة فقد أظهرت النتائج أن التباينات التجمعيه كانت أعلى من التباينات الغير تجمعيه والتى تشمل التباين السيادى. وكذلك كانت قيم معامل التوريث فى المدى الواسع أكبر من مثيلتها فى المدى الضيق لكل الصفات التى درست.

ومن هنا فإن هذه الدراسة تبين إمكانية تحسين التراكيب الوراثية المستخدمة من خلال برنامج انتخابى فى نسل هذه الهجن.