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# SUPERIORITY OF LOCAL EGGPLANT HYBRIDS FOR QUANT!TY TRAITS.

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## ABSTRACT

This work was carried out during summer season for two years from 2003-2004 at a private farm located at Orman district, Talka , Dakahlia Governorate , Egypt to produce some local long black eggplant hybrids which show high productivity and high quality to meet the desires of consumer and farmer . On 20 March 2003 half diallel set crosses were made between four parental lines of long black eggplant cultivars namely $S_6$ , $S_9$ , $S_{13}$ and $S_{16}$ giving 6$F_1$ crosses. In 2004 the four parents and 6 $F_1$,s were evaluated during the summer season at the same private farm under drip irrigation system . The obtained results indicated that heterosis over the better parent gave positive values in most crosses for plant height , early yield per plant , number of fruits per plant , total yield per plant and total yield per plot and all $F_1$ hybrids gave negative values of heterosis for number of days to 25% flowering where the negative values indicate that the six crosses were earlier than the better parent to each cross .

Concerning general combining ability , it was found that $S_{16}$ was the best combiner for number of branches , number of days to 25% flowering (earliness) , early yield per plant , number of fruits per plant, total yield per plant and total yield per plot , followed by $S_6$ parental line . Concerning specific combining ability , $S_6xS_{16}$ hybrids was found to be the best cross for number of fruits per plant , total yield per plant and total yield per plot , followed by $S_6xS_{13}$ , $S_6xS_9$ and $S_9xS_{16}$ hybrids which gave positive values of sca for total yield per plot .

Additive gene effects appeared to be more important than non additive gene effects as reflected on the high estimated of gca variances relative to those of sca variances for each of number of branches per plant and number of days to 25% of flowering . While it was found that non additive gene effects appeared to play important roles than additive effects for plant height , early yield per plant , number of fruits per plant , fruit weight , total yield per plant , fruit length , fruit diameter , fruit shape index and total yield per plot.

Positive correlation was found between total yield per plot and each of plant height, number of branches per plant , early yield per plant,number of fruits per plant, fruit weight , total yield per plant , fruit length and fruit diameter . On the other hand , number of days to 25% flowering and fruit shape index reflected negative correlations.

Finally , it can be concluded that the hybrids $S_6xS_{16}$ , $S_6xS_{13}$ , $S_6xS_9$ and $S_9xS_{16}$ had a good specific combination for total yield per plot and fruit quality of local long black eggplant hybrids.

## INTRODUCTION

Eggplant (*Solanum melongena L.*) is an important and popular vegetable crop in Egypt and it is considered as a national diet in many other tropical and sub-tropical countries . The area devoted for production in 2002 was 85971 feddans produced about 826870 tons .

Production of eggplant could be improved through breeding methods such as,pure line selection,mass selection or introducing high yielding hybrids

Evaluation studies of $F_1$ hybrids of eggplant were conducted by several investigators among them Thangamani *et al.* (2004) .

Breeding studies of eggplant were carried out by many breeders Kaur *et al.* (2001) ; Major Singh *et al.* (2002) , Biswajit Panda *et al.* (2004) , Pirinc and Pakyurek (2004) and Melad *et al.* (2005).

Many breeders suggested that both additive and non-additive components were important for fruit diameter , plant height , number of fruits per plant , fruit yield per plant , fruit weight and fruit length (Das and Barua , 2001 ; Vaghasiya et al , 2000 and Melad *et al.* , 2005 ).

Concerning heterosis , the magnitude of heterosis were observed in different eggplant crosses for plant height , number of branches , fruit diameter , fruit yield , number of fruit per plant , fruit weight and fruit length . ( Prasath *et al.* 1998 ; Babu and Thirumurugan , 2001 ; Das and Barua , 2001 and Melad *et al.* , 2005. ).

With respect to combining ability , Biswajit Panda *et al.* (2004) , found that the analysis of variance for combining ability revealed significant mean square for both gca and sca effects in most of the characters except plant height and weight of marketable fruit per plant for gca . This indicated the importance of both additive and non additive gene action for expression of heterosis . Babu and Thirumurugan (2001) and Melad *et al.* (2005) were also of the same opinion .

Correlation coefficients were estimated between various pairs of traits and what the trait was more effect or related with yield ; Prasath *et al.* (2001) .

This study was carried to produce some local long black eggplant hybrids which show high productivity and high quality to meet the desires of consumer and farmer and to lessen the amount seeds which imported from other countries at high prices .

## MATERIALS AND METHODS

The present investigation was carried out during summer season for two years from 2003-2004 at a private farm located at Orman district, Talkha, Dakahlia Governorate, Egypt. Four eggplant pure lines namely $S_6$, $S_9$, $S_{13}$ and $S_{16}$, (which show high productivity and which reported of the paper No. 9 volume 21, 1996, Journal of Agriculture Science, Mansoura Univ.), were used as parents in this study. On 20 March 2003 half diallel set crosses were made between the four parents giving 6 $F_1$ crosses. The seeds of the parents were sown in the nursery on $10^{th}$ February 2003 in seedling trays. All the recommended practices to obtain egg plant well yield were followed.

Evaluation work was made at the same private farm to evaluate these six crosses and their four parents during the summer season of 2004. Randomized complete blocks design with four replicates was used. Each replicate contained 10 experimental plots. Each experimental plot consisted of four rows of 12.5 meter long and 1.5 meter wide. The plants were spaced at 50 cm apart on one side ridge under drip irrigation system, thus making an area of 75 $m^2$. The plot of each genotype contained 100 plants.

Data were recorded for the different characters as following:- Plant height (cm) , number of branches / plant , number of days to 25% flowering , early yield / plant (kg) , number of fruits / plant , fruit weight (g), total yield / plant (kg) , fruit length (cm) , fruit diameter (cm), fruit shape index , total yield / plot .

Analysis of data was done by IBM computer using ANOVA program for statistical analysis. The differences among means for all traits for significance were measured using methods described by Cochran and Cox (1957). Estimates of heterosis of better parents were determined for each crosses as follows: heterosis over better parent: H ($F_1$, BP) % = ($F_1$ – BP / BP) x 100, where, $F_1$ = the first hybrid generation, BP = better parent.

The values of general combining ability (GCA) and specific combining ability (SCA) effects were estimated according to Griffing (1956) model II of method II. The standard errors of estimated general and specific combining ability effects were obtained.

A correlation study was carried out to determine the relationship between yield and ten other characters.

# RESULTS AND DISCUSSION

**The performance of parents and their $F_1$ hybrids :**

It is clear from Table (1) and Fig (1) , the general traits of four parents and their $F_1$ hybrids . There were significant differences among the genotypes for all studied traits .

Data in Table (1) showed that the parent $S_{16}$ had the highest values among the parents for number of branches , early yield per plant , total yield per plot and had the lowest value for no. of days to 25% flowering (earliness) , and it is hybrid combination $S_6 \times S_{16}$ had highest values for number of branches (13.35) , number of fruits per plant (36.48) , total yield per plot (453.2 k.g) among all genotypes , followed by the hybrid $S_6 \times S_{13}$ (405.6 k.g).

The highest fruit weight was recorded by the hybrid $S_6 \times S_9$ (195.3 g.m). longer fruits were observed in the hybrid $S_9 \times S_{13}$ (16.6 c.m). similar trend of higher number of fruits in $F_1$ hybrids , longer fruits and the higher yield in the hybrids are in line with Jansirani (2000) , Ananthalakshmi (2001) and preneetha (2002).

**Heterosis:**

The exploitation of hybrid vigor is a potent method of enhancing the yield . In any crop the exploitation of hybrid vigor depends on substantial heterosis for yield coupled with an economical and easy method of hybrid seed production . In egg plant , there is a bright scope for heterosis breeding , larger flower bud size and more number of seeds per fruit provide this opportunity .

The estimates of better parent heterosis for all studied traits are presented in Table (2).Concerning plant height , all obtained hybrids gave positive values of heterosis .

With respect to number of branches , all tested hybrids except $S_6$ x $S_9$ and $S_6$ x $S_{16}$ hybrids gave negative values of heteosis .

Concerning number of days to 25% flowering , it is evident from Table (2) that all $F_1$ hybrids gave negative values of heterosis , the negative values indicate that the six crosses were earlier than the better parent to each cross . The hybrid $S_9$ x $S_{16}$ recorded the highest negative value of heterosis , followed by the cross $S_{13}$ x $S_{16}$.

For early yield per plant , Table (2) cleared that five out six $F_1$ hybrids exhibited positive heterosis over the better parents . The hybrid $S_6$ x $S_{13}$ showed the highest value of heterosis ( 44.21 %) .

Heterosis over the better parent for number of fruits per plant showed positive heterosis for all hybrids . The hybrid $S_6$ x $S_{16}$ gave the highest heterosis value (53.15 %) .

For fruit weight , the heterosis ranged from -15.17 to 5.8 % . These contradictory results could be due to the different genetic constituent of each cultivar used in the study .

For total yield per plant , all the crosses showed positive and significant heterosis over better parent , the heterosis ranged from 6.15 to 51.6 % . All crosses indicated the presence of dominance or over dominance or over dominance gene effect for fruit yield .

With respect to fruit length , fruit diameter and fruit shape index the heterosis ranged from -5.34 to 14.48 , -38.46 to 17.14 and -16.22 to 68.29 respectively .

For total yield per plot all the crosses showed positive and significant heterosis , it ranged from 6.29 ($S_{13}$ x $S_{16}$) to 51.67 % ($S_6$ x $S_{16}$).

Those above finding are accordance with Prakash *et al.* (1993) , Kaur *et al.* (2001-c) and Melad *et al.* (2005).

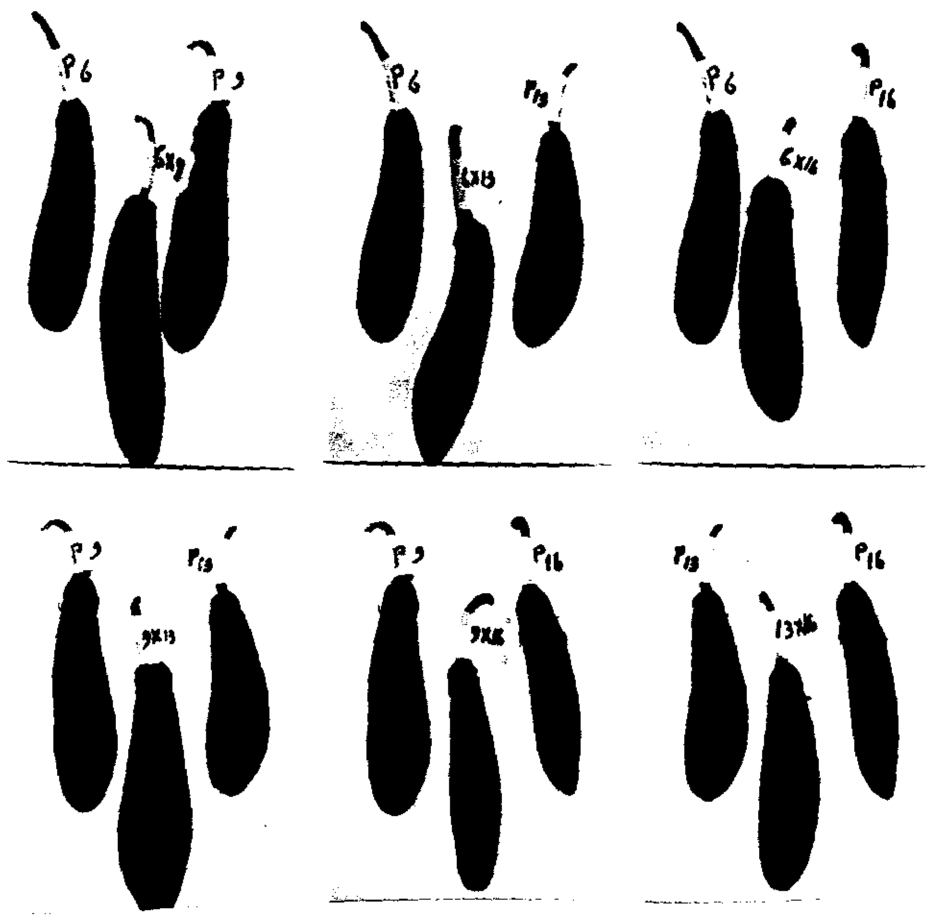

**Fig .1. Fruits of the F1 crosses and their parents**

**General and specific Combining abilities :**

The knowledge of combining ability helps in identifying best combiners, which may hybridized either exploit or to accumulate fixable genes through selection .Such information which froms a backbone of any breeding program limited is for developmental traits in eggplant.

It is clear from Table (3) that the highest estimated positive value of gca effects for plant height was found for the parent $S_{13}$ (14.57),which produced the highest significant value relative to all studied parents . On the other hand the parent $S_9$ showed the highest significant negative gca value . While the highest estimated positive value for sca effects Table (3) was obtained by the cross $S_6$ x $S_{13}$ (15.67) , followed by the crosses $S_{13}$ x $S_{16}$ (11.98) and $S_9$ x $S_{13}$ (11.77).With respect to number of branches , $S_{16}$ parent had the greatest positive gca effect (0.82) . On the contrary , $S_{13}$ parent had the highest negative gca effect value (-1.80). The highest estimated positive value for sca effect was the cross $S_9$ x $S_{13}$ (0.86) , followed by the cross $S_{13}$ x $S_{16}$ (0.57) .

Concerning number of days to 25% flowering (Table 3) , it is clear that the parent $S_{16}$ gave the highest estimated positive value of gca (3.87) effects . The highest estimated positive value for the sca effects was the cross $S_6$ x $S_{13}$ , While the highest negative value was the cross $S_9$ x $S_{16}$ (-2.23). Three crosses $S_9$ x $S_{16}$ , $S_{13}$ x $S_{16}$ and $S_6$ x $S_{16}$ showed negative sca effects for this trait .It is important here that negative values for above character are an indication of earliness . For early yield per plant ( yield from first two harvesting ) which is related to first flowering , parent $S_{16}$ shown positive gca effect while higher sca effects was found in the crosses $S_9$ x $S_{16}$ , $S_6$ x $S_{16}$ and $S_{13}$ x $S_{16}$ . It can be noted here that the parents and crosses showed negative gca and sca respectively for days to 25% flowering give positive effect for early yield ( high early yielder ) .

The best gca effect for number of fruits per plant and fruit weight were noted in $S_{16}$ and $S_9$ respectively, while higher sca was found in the crosses $S_6$ x $S_{16}$ (7.93) and $S_6$ x $S_9$ (26.21) respectively .

The best general combiners for total yield per plant and total yield per plot were $S_{16}$ and $S_6$. Highest sca effect was found in the cross $S_6$ x $S_{16}$ followed by $S_6$ x $S_{13}$ , $S_6$ x $S_9$ and $S_9$ x $S_{16}$ .

The best gca effect for fruit length , fruit diameter and fruit shape index was found in the parent $S_9$ [1.14 , -0.18 and ; 0.58 ] but in negative direction for fruit diameter and this is desirable character . The best sca effect was found in the cross $S_9$ x $S_{13}$ (1.64 , -1.02 and 2.25)for fruit length , fruit diameter and fruit shape index respectively , but in negative direction for fruit diameter also .

High gca effect of a parent is a function of breeding value and hence due to additive gene effect or additive X additive interaction effect which represent the fixable genetic components of variation . According to Gilbert (1967) the additive parental effects as measured by gcs are of more practical use than non allelic interactions , for their exploitation in conventional

breeding . There for, it can be suggested that it is possible to predict the best hybrid for yield from the gca of the parental lines, at least in this population.

Those above finding are in agreement with Biswajit panda *et al.* (2004)

**Table 1. Mean performance of four eggplant lines and their $F_1$ hybrids for the yield components.**

| Genotypes | Plant height (cm) | No. of branches/plant | No. of days to 25% flowering | Early yield / plant (kg) | No. of fruits / plant | Fruit weight (g) | Total yield / plant (kg) | Fruit length (cm) | Fruit diameter (cm) | Fruit shape index | Total yield / plot (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $S_6$ | 81.16 | 12.63 | 45.54 | 0.94 | 20.52 | 123.2 | 2.53 | 12.8 | 3.5 | 3.7 | 201.6 |
| $S_9$ | 79.12 | 11.67 | 44.45 | 1.31 | 18.46 | 184.6 | 3.41 | 14.5 | 3.6 | 4.1 | 272.8 |
| $S_{13}$ | 111.32 | 7.49 | 43.15 | 0.95 | 18.27 | 183.8 | 3.39 | 13.1 | 3.9 | 3.4 | 271.0 |
| $S_{16}$ | 83.21 | 12.66 | 36.18 | 2.27 | 23.82 | 156.8 | 3.74 | 11.9 | 3.3 | 3.7 | 298.8 |
| $S_6$ x $S_9$ | 98.03 | 12.70 | 45.03 | 1.74 | 25.15 | 195.3 | 4.92 | 15.8 | 3.3 | 4.9 | 393.2 |
| $S_6$ x $S_{13}$ | 128.28 | 9.43 | 45.23 | 1.37 | 27.63 | 183.3 | 5.07 | 13.9 | 3.7 | 3.7 | 405.6 |
| $S_6$ x $S_{16}$ | 97.10 | 13.35 | 38.90 | 2.53 | 36.48 | 157.4 | 5.67 | 12.8 | 4.1 | 3.2 | 453.2 |
| $S_9$ x $S_{13}$ | 122.10 | 10.83 | 43.53 | 1.04 | 21.18 | 185.2 | 3.90 | 16.6 | 2.4 | 6.9 | 311.6 |
| $S_9$ x $S_{16}$ | 94.30 | 12.30 | 36.45 | 2.79 | 30.60 | 156.6 | 4.75 | 15.1 | 4.1 | 3.7 | 380.2 |
| $S_{13}$ x $S_{16}$ | 123.80 | 11.0 | 36.33 | 2.31 | 25.18 | 157.7 | 3.97 | 12.4 | 4.0 | 3.1 | 317.6 |
| LSD 5% | 6.82 | 1.23 | 2.19 | 0.23 | 2.85 | 15.38 | 0.88 | 0.92 | 0.45 | 0.57 | 61.66 |

**Table 2. Heterosis (%) in six $F_1$ hybrids of eggplant relative to their better parent for the yield components.**

| Hybrids | Plant height (cm) | No. of branches /plant | No. of days to 25% flowering | Early yield / plant (kg) | No. of fruits / plant | Fruit weight (g) | Total yield / plant (kg) | Fruit length (cm) | Fruit diameter (cm) | Fruit shape index | Total yield / plot (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $S_6$ x $S_9$ | 20.79 * | 0.55 | -1.12 | 32.82 * | 22.56 * | 5.80 | 44.28 * | 8.97 * | -8.33 | 19.51 * | 44.14 * |
| $S_6$ x $S_{13}$ | 15.24 * | -25.34 * | -0.68 | 44.21 * | 34.65 * | -0.27 | 49.56 * | 6.11 | -5.13 | 0.00 | 49.67 * |
| $S_6$ x $S_{16}$ | 16.69 * | 5.45 | -14.58 * | 11.45 * | 53.15 * | 0.38 | 51.60 * | 0.00 | 17.14 * | -13.51 | 51.67 * |
| $S_9$ x $S_{13}$ | 9.68 * | -7.20 | -2.07 | -20.61 * | 14.73 | 0.33 | 14.37 | 14.48 * | -38.46 * | 68.29 * | 14.22 |
| $S_9$ x $S_{16}$ | 13.33 * | -2.84 | -18.0 * | 22.91 * | 28.46 * | -15.17 * | 27.01 * | 4.14 | 13.89 * | -9.76 | 27.24 * |
| $S_{13}$ x $S_{16}$ | 11.21 * | -13.11 * | -15.81 * | 1.76 | 5.71 | -14.20 * | 6.15 | -5.34 | 2.56 | -16.22 * | 6.29 |

* Significant differences at 0.05 level of probability , respectively .

Table 3. Estimates of GCA* and SCA** of four eggplant lines and their $F_1$ hybrids for the yield components.

| Genotypes | Plant height (cm) | No. of branches/ plant | No. of days to 25% flowering | Early yield / plant (kg) | No. of fruits / plant | Fruit weight (g) | Total yield / plant (kg) | Fruit length (cm) | Fruit diameter (cm) | Fruit shape index | Total yield / plot (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| G.C.A | | | | | | | | | | | |
| $S_6$ | -3.84 | 0.62 | 2.13 | -0.20 | 1.11 | -9.92 | 0.03 | -0.18 | 0.01 | -0.17 | 0.40 |
| $S_9$ | -6.11 | 0.36 | 1.07 | -0.06 | -1.63 | 10.67 | -0.07 | 1.14 | -0.18 | 0.58 | -3.70 |
| $S_{13}$ | 14.57 | -1.80 | 0.67 | -0.35 | -2.19 | 8.66 | -0.14 | -0.04 | 0.01 | 0.07 | -12.67 |
| $S_{16}$ | -4.62 | 0.82 | 3.87 | 0.60 | 2.71 | -9.42 | 0.18 | -0.93 | 0.16 | -0.48 | 15.97 |
| SE gi | 0.35 | 0.01 | 0.04 | 0.0004 | 0.06 | 1.76 | 0.01 | 0.01 | 0.002 | 0.003 | 0.27 |
| S.C.A | | | | | | | | | | | |
| $S_6 \times S_9$ | 6.11 | 0.32 | 0.25 | 0.26 | 0.94 | 26.21 | 0.85 | 1.08 | -0.16 | 0.44 | 65.94 |
| $S_6 \times S_{13}$ | 15.67 | -0.80 | 0.96 | 0.17 | 3.98 | 16.19 | 1.08 | 0.31 | 0.23 | -0.27 | 87.31 |
| $S_6 \times S_{16}$ | 3.69 | 0.50 | -0.83 | 0.39 | 7.93 | 8.37 | 1.35 | 0.02 | 0.22 | -0.20 | 106.27 |
| $S_9 \times S_{13}$ | 11.77 | 0.86 | 0.31 | -0.29 | 0.27 | -2.55 | -0.01 | 1.64 | -1.02 | 2.25 | -2.59 |
| $S_9 \times S_{16}$ | 3.16 | -0.29 | -2.23 | 0.64 | 4.80 | -12.99 | 0.28 | 0.61 | 0.55 | -0.45 | 37.37 |
| $S_{13} \times S_{16}$ | 11.98 | 0.57 | -1.95 | 0.32 | -0.07 | -9.91 | -0.18 | -0.52 | 0.24 | -0.51 | -16.26 |
| SE sij | 2.03 | 0.07 | 0.21 | 0.002 | 0.35 | 10.32 | 0.03 | 0.04 | 0.01 | 0.02 | 0.83 |

*GCA = general combining ability.
*SCA = specific combining ability.

**Estimates of gene effects :**

The estimated values of total variance components of the various studied characters are presented in Table (4) . It is clear from the Table that gca variances were higher than sca variances for each of number of branches per plant and number of days to 25% of flowering , indicating that the additive gene effects appeared to be relatively more important than non additive gene effects for both traits .

Concerning another characters , it was found that non additive gene effects appeared to play important roles than additive effects for these traits, as reflected on the high estimates of sca variances than gca variances.

There for , it is suggested that both additive and non additive gene effects may be used to exploit genetic components of variations in eggplant . These finding were reported by vaghasiya *et al.* (2000) and Melad *et al.* (2005).

**Table 4: Estimates of total variance components for the studied characters of four parents and their hybrids.**

| Characters | $\sigma^2$ GCA | $\sigma^2$ SCA | $\sigma^2$ E |
|---|---|---|---|
| Plant height | 58.068 | 220.360 | 11.071. |
| No. of branches / plant | 1.404 | 0.346 | 355 |
| No. of days to 25% of flowering | 6.528 | 2.662 | 1.142 |
| Early yield / plant | 0.131 | 0.256 | 0.013 |
| No. of fruits / plant | -0.145 | 32.419 | 1.922 |
| Fruit weight | 138.313 | 430.442 | 14.067 |
| Total yield / plant | -0.382 | 1.618 | 0.045 |
| Fruit length | 0.498 | 1.342 | 0.198 |
| Fruit diameter | -0.036 | 0.319 | 0.047 |
| Fruit shape index | -0.020 | 1.307 | 0.080 |
| Total yield / plot | -1232.887 | 8029.640 | 904.515 |

**Where :**

**$\sigma^2$ gca = general combining ability variance .**
**$\sigma^2$ sca = specific combining ability variance.**
**$\sigma^2$ e = environmental variance .**

**Correlation :**

The correlation coefficient (r) was carried out to determine the relationship between total yield per plot and other characters (Table 5). These results indicated that the existence of high positive correlations between total yield per plot and each of plant height , number of branches per plant , early yield per plant , number of fruits per plant , fruit weight , total yield per plant , fruit length , and fruit diameter . On the other hand , number of days to 25% flowering and fruit shape index reflected negative correlations . These results indicating that the increase in total yield of eggplant would be associated with increasing of these characters ( positive correlation ) and decreasing some characters (negative correlation). These results coincide with those of Prasath *et al.* (2001) and Melad et al (2005).

Generally , it can be concluded that the hybrids ($S_6xS_{16}$) , ($S_6xS_{13}$) , ($S_6xS_9$) and ($S_9xS_{16}$) had a good specific combination for total yield per plot and fruit quality of local long black eggplant hybrids .

**Table 5: Estimates of correlation coefficient values between pairs of the eleven studied characters for various 10 eggplant genotypes.**

| Characters | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Plant height (1) | -- | -0.58 | 0.03 | -0.12 | 0.11 | 0.40 | 0.34 | 0.19 | -0.03 | 0.20 | 0.33 |
| No. of branches / plant (2) | | -- | -0.27 | 0.49 | 0.44 | -0.38 | 0.20 | 0.01 | -0.09 | 0.02 | 0.21 |
| No. of days to 25% of flowering (3) | | | -- | -0.84 | -0.47 | 0.29 | -0.25 | 0.44 | -0.37 | 0.36 | -0.27 |
| Early yield / plant (4) | | | | -- | 0.74 | -0.21 | 0.51 | -0.23 | 0.47 | -0.39 | 0.56 |
| No. of fruits / plant (5) | | | | | -- | -0.16 | 0.82 | -0.13 | 0.43 | -0.30 | 0.85 |
| Fruit weight (6) | | | | | | -- | 0.40 | 0.58 | -0.26 | 0.43 | 0.37 |
| Total yield / plant (7) | | | | | | | -- | 0.15 | 0.24 | -0.05 | 0.99 |
| Fruit length (8) | | | | | | | | -- | -0.56 | 0.81 | 0.18 |
| Fruit diameter (9) | | | | | | | | | -- | -0.90 | 0.27 |
| Fruit shape index (10) | | | | | | | | | | -- | -0.06 |
| Total yield / plot (11) | | | | | | | | | | | -- |

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## تفوق الهجن المحلية للباذنجان في الصفات الكمية

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أجريت هذة الدراسة بهدف إنتاج بعض الهجن المحلية للباذنجان الأسود الطويل ذات جودة وإنتاجية عالية وذلك في مزرعة خاصة في أورمان– طلخا – محافظة الدقهلية – وذلك خلال الموسم الصيفي عامي ٢٠٠٣، ٢٠٠٤ واستخدام في هذه الدراسة أربعة سلالات من الباذنجان مستنبطة من قبل بالانتخاب من الصنف البلدي للباذنجان الأسود الطويل وهذه السلالات هي: $S_6$ , $S_9$ , $S_{13}$ and $S_{16}$ وتم إجراء التهجين في اتجاه واحد بين هذه السلالات وتم الحصول على ستة هجن تم تقييمهم في نفس المزرعة تحت نظام الري بالتنقيط مع آبائها في تجربة ذات قطاعات كاملة العشوائية من أربعة مكررات واحتوت كل مكررة على عشرة قطع تجريبية وكانت أهم النتائج المتحصل عليها هي :-

١- كانت الاختلافات بين التراكيب الوراثيه معنوية لمعظم الصفات تحت الدراسة .
٢- كانت قوة الهجين عند حسابها على أساس الأب الأفضل موجبة لمعظم الهجين لصفات ارتفاع النبات ، والإنتاج المبكر للنبات ، وعدد الثمار للنبات والإنتاج الكلي للنبات والإنتاج الكلي للقطعة التجريبية بينما كانت قوة الهجين سالبة لكل الهجن لصفة عدد الأيام حتى إزهار ٢٥% من عدد النباتات لكل هجين وهي تشير إلى أن كل هجين من الهجن الستة أبكر من الأب الأفضل لكل منها .
٣- أظهرت النتائج إن السلالة $S_{16}$ تميزت بأفضل قدرة عامة على التآلف بالنسبة لصفات عدد الأفرع ، عدد الأيام حتى إزهار ٢٥% من عدد النباتات ، المحصول المبكر ، عدد الثمار للنبات ، المحصول الكلي للنبات ، والمحصول الكلي للقطعة التجريبية – تليها السلالة $S_6$ .
٤- بالنسبة للقدرة الخاصة على التآلف تميز الهجين $S_6xS_{16}$ بأفضل قدرة خاصة على التآلف بالنسبة لصفات عدد الثمار للنبات، المحصول الكلي للنبات والمحصول الكلي للقطعة التجريبية . تليها الهجن $S_6xS_9$ , $S_6xS_{13}$ and $S_9xS_{16}$ التي أعطت قيم موجبة للقدرة الخاصة على التآلف بالنسبة للمحصول الكلي للقطعة التجريبية .
٥- أظهرت الدراسة أيضا أن التأثير الغير مضيف كان أكبر من التأثير المضيف لكل الصفات المدروسة ما عدا صفتي عدد الأفرع للنبات وعدد الأيام حتى ازهار٢٥% من عدد النباتات .
٦- أظهرت النتائج وجود ارتباط موجب بين المحصول الكلي للقطعة التجريبية وبين كل من ارتفاع النبات، عدد الأفرع للنبات، الإنتاج المبكر للنبات ، عدد الثمار للنبات ، وزن الثمرة ، والمحصول الكلي للنبات ، طول الثمرة وقطر الثمرة .
٧- لذلك نوصي باستخدام الهجن $S_6xS_{16}$ , $S_6xS_{13}$ , $S_6xS_9$ , $S_9xS_{16}$ في الزراعة وهي من أفضل الهجن للمحصول الكلي وصفات الثمار للباذنجان الأسود الطويل .