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INHERITANCE OF SOME ECONOMIC TRAITS IN MELON (*Cucumis melo* L.)

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ABSTRACT

This research were carried out at the Experimental Farm of EL-Kassassein Hort. Station, Ismailia Governorate, during the seasons of 2000 until 2003, to study the best parent can be reliable for conducting local hybrid. Four exotic genotypes and one local variety were used in this investigation. All possible crosses were made with out reciprocals to raise F_1 seeds in the green house condition, end F_1's selfed to obtain F_2 seeds.

All the parental genotypes and their F_1 and F_2 generations were sown in open field and data were collected on fruits of individual plants. The obtained results show, that variances due to specific combining ability were higher in magnitude than the variances of general combining ability for all studied traits. Dominant gene effects were controlling the economic characteristics of melon, except number of fruits/ plant. This was governed by both dominant and additive gene effects. The general combining ability effects of parents revealed that P_2 (PI 183227) was good combiner for yield components and its quality. The specific combined ability effects of hybrids decleared that the best specific cross combination for total yield/ fed., average fruit weight and flesh thickness was F_1 (P_1 x P_5) and the cross F_1 (P_2 x P_3) was the best combination for number of fruits/ plant and total soluble solids. Heritability estimates in broad sense were found to be higher in magnitude inbreeding depression had a great effect on yield on yield component and its quality, while vegetative growth was not affected by it.

INTRODUCTION

Melon, is one of the important vegetable crops for exportation and consumption in Egypt. So, we try to establishe some hybrids to minimize the introducing of seed melon from foreign countries. For this reason, this investigation was made to discover some genotypes that will used in raising a new hybrid of melon for our country. Therefore, it is necessary to evaluate the potentialities of the available germplasm for its ability to throw out transgressive segregates.

In order to achieve this goal, we must introduce some germplasm from foreign gene banks of genetic resources and cultivate these materials under climate of Egypt and select some of them to obtain hybrids.

Although several reports on the extent of heterosis and combining ability are available in literature (Swamy, 1985; El-Doweny, 1985; Abd El-Raheem *et al.*, (1986 a, b) Awny, 1992; Kim *et al.*, 1996 and Gurav *et al.*, 2000). but, the utilization of this information to raise local hybrid varieties is still very limited in Egypt.

Application of mating design like "Linex tester analysis" was found suitable to select a desirable parents from considerable number of germplasm.

In the present research "Linex tester analysis" was employed to determine the extent of heterosis, dominance, gene effects and general combining ability of parents and specific combining ability among crosses.

MATERIALS AND METHODS

Five parental melon genotypes representing local and genetic materials which obtained from north central (NC7) regional plant introduction station, Iowa state university Ames, Iowa, USA. They are namely, PI 124111 "P_1" and P.I 183227 "P_2" were used as testers (males) and other three commercial varieties were used as lines (females); hearts of gold "P_3" (USA), honey dew orange flesh "P_4" (USA) and Ismaliawi local variety "P_5", these parental genotypes had a wide variation for the fruit characters and yield component.

In 2000 season, the five parents were sown under green-house condition, at El-Kassassein horticulture research station, and all possible crosses without reciprocal were made among these genotypes for raising F_1's seeds.

In the second season of 2001, seeds of six F_1 hybrids were sown in the green house to obtain F_2 seeds.

In the summer season of 2002, all the raised seeds of five parental genotypes and their F_1, F_2 generation were sown in the open field for evaluation, in randomized complete block design with three replicates. The plot area was $20m^2$ (10m. length x 2m. wiolth).

Seeds of all the genotypes were directly sown in hills 20cm. apart respectively, two seeds per hill, for the parental genotypes and their F1 hybrids twenty hills were made, for each plot, while F2 generation sixty hills were made for each plot.

Data were recorded on individual plants, for parents and their F1 hybrids five plants were randomly chosen for each plot, meanwhile, ten plants were chosen for F2 generation at the same manner to collect data on the following characters.

Plant height (cm.), number of internodes, on the main stem, plant growth rate, (gm/ cm.2) number of fruits/ plants, fruit yield/ plant (kg.) total fruit yield/ (ton/ fed.), average fruit weight (kg.), total soluble solids (%) and flesh thickness (cm.).

Statistical analysis:

Heterosis for each cross was calculated as the percentage of increase in F1 performance above the mid-parent and the better parent values according to the following formula as described by Bhatt (1971).

$$\text{The mid-parent heterosis (M.P)} = \frac{\overline{F_1}-\overline{MP}}{\overline{MP}} \times 100$$

$$\text{The better-parent heterosis (B.P)} = \frac{F_1-BP}{\overline{BP}} \times 100$$

Meanwhile, the degree of dominance was calculated using the formula adopted by Peter and Fery (1966), for F1 as follow:

$$\text{Degree of dominance (F1)} = \frac{\overline{F_1}-MP}{BP-MP}$$

Data on the progenies of six top crosses and P1 and P2 as testers (male parents) and each of P3, P4 and P5 as lines (female partents), were subjected to further male x female analysis for partitioning the genetic variation due to male, female and male x female interaction to estimate combining ability and gene effects as described by Kempthorne (1957) and adopted by Singh and Chaudhary (1977).

For the F2 generation, inbreeding depression was calculated as described by Liang *et al.*, (1972) as follow:

$$I.D\% = \frac{F_2 - F_1}{F_1} \times 100$$

Significance of means were tested using the "t" test at 5% and (LSD) test criterion at ($P < 0.05$) to evaluate the difference between heterosis mean values and other genetic parameters.

RESULTS AND DISCUSSION

Analysis of combining ability and gene effects for nine quantitative characters:

The analysis of variances for combining ability (Table.1) revealed that the estimates of variances due to specific combining ability (σ^2sca) were positive and considerably higher in magnitude than the variances of general combining ability (σ^2 gca) for all characters. These results indicated that the predominance of non-additive gene action is including dominance in controlling the expression of these characters. Similar findings were reported by Kalb and Davis (1984)., Li and Shu (1985); Dogra *et al.*, (1997) and Matoria and Khandlwal (1999).

The estimates of genetic components of variance and their ratios are also shown in (Table 1). The ratio of $\sigma^2 A / \sigma^2 D$ which was less than unity for all quantitative characters except number of fruits per plant implied that these characters were predominantly under the control of the non additive gene action; dominance or epistasis. (El- Mighawry 1998) in muskmelon. The important role of the non-additive portion of genetic variance for these characters was also observed through the average degree of dominance which was in the range of over dominance (>1).

The ratio of $\sigma^2 A / \sigma^2 D$ which was more than unity for number of fruits per plant, implied that this character was predominantly under the control of additive gene action. The important role of additive portion of genetic variance was observed for number of fruits per plant which assured through the average degree of dominance which was in the range of partial dominance (<1). The $\sigma^2 A / \sigma^2 D$ ratio and the average degree of dominance reveald that both additive and dominance gene effects were important in governing the expression of number of fruits per plant.

Meanwhile, the results indicated that, although most of the differences noted among crosses for the majority of studied characters were due to genes with primarily non - additive effects, the relatively negligible contributions of additive effects cannot be over looked.

Table (1): Analysis of variance and their combining ablity components for nine quantitative characters over seven cucumis melo genotypes.

Source of variation	d.f	Plant height (cm.)	No. of internode main stem	Plant growth rate (gm/cm^2)	No. of fruits plant	Fruit yield plant (kg.)	Total yield (ton/ fed.)	Average fruit weight(kg.)	T.S.S %	Felsh thickness (cm.)
Replications	2	40.09 **	1.84	0.16	0.09	0.07	0.81	0.02	0.52	0.01
Hybrids	5	88.62 **	4.49 *	0.28	1.32	1.43	1.88	0.03	5.23 **	0.17
Male (M)	1	74.88 **	2.88	0.04	2.86	0.45	0.75	0.01	0.69	0.11
Female (F)	2	22.22 **	5.55 *	0.99	0.07	3.14	5.07 *	0.02	5.01 *	0.03
MXF	2	136.05 **	5.55 *	0.17	0.39	1.54	1.41	0.05	9.89 **	0.31
Error	2	33.89	2.95	0.05	0.04	0.08	0.56	0.02	0.19	0.01
σ^2 gca	20	- 3.76	- 0.08	0.01	0.07	- 0.01	0.04	- 0.01	- 0.37	- 0.01
σ^2 sca		34.05	0.87	0.04	0.11	0.49	0.28	0.02	3.23	0.10
$\sigma^2 A/\sigma^2 D$		- 0.22	- 0.18	0.05	1.27	- 0.04	0.29	- 1.00	0.23	0.20
$(\sigma^2 D/\sigma^2 A)0.5$		± num	± num	1.57	0.87	± num	1.94	± num	± num	± num

*,** : Significant at the 0.05 and 0.01 Probability levels, respectively.

The gca effects of parents are presented in Table (2) which reaveled that most of parents possessed significant gca effects for different quantitative traits. However, estimates of gca effects recorded highest values for three out of nine characters for "P_3" i.e.. Plant height, total yield/ (fed.) and total soluble solids. Moreover, "P_4" had the *highest values for three* characters, number of fruits/ plant, fruit yield/ plant and flesh thickness. This mean that, P_1 *(P.I124111) and* P_2 (P.I183227) combined well for most morphological and some economic characters like total yield/ (fed.) and total soluble solids.

Table (2): Estimates of general combining ability effects of five parental *cucumis melo* genotypes for nine quantitative characters.

Genotypes	Plant height (cm.)	No. of internod/ main stem	Plant growth rate (gm/ cm²)	No. of fruits/ plant	Fruit yield plant (k.g)	Total yield (ton/ fed.)	Average fruit weight (kg.)	T.S.S %	Felsh thick-ness (cm.)
Males									
P_1 (1)	- 1.11**	- 0.55*	- 0.23*	- 0.06	- 0.41	- 0.53*	- 0.03	- 0.52**	- 0.04*
P_2 (2)	1.11**	0.55*	0.23*	0.06	0.41	0.53*	0.03	0.52**	0.04*
Females									
P_3 (3)	3.72**	- 0.55**	0.07	0.12	- 0.03	0.38**	- 0.04**	0.37**	0.01
P_4 (4)	- 3.27**	- 0.22*	- 0.01	0.62*	0.29**	- 0.06	- 0.01*	- 0.07**	0.12**
P_5 (5)	- 0.44	0.77 **	- 0.07	- 0.74*	- 0.25	- 0.31	0.05**	- 0.29**	0.13**
SE Males	2.37	0.70	0.09	0.09	0.11	0.31	0.03	0.18	0.03
SE Females	1.94	0.57	0.07	0.07	0.09	0.24	0.02	0.14	0.02

*,** : Significant at the 0.05 and 0.01 Probability levels, respectively.

Moreover, P_2 (P.I183227) had the highest positive gca value for six out of nine *characteristics, plant height, number of internodes*, plant grouth rate, total yield/ (fed.), total soluble solids and flesh thickness. This indicated *that, these parents* seem better suited for a breeding program concerned with commercial production in muskmelon with recurrent selection for raising a new hybrid. Similar these findings were found by (El-Mighawry; 1998) in muskmelon.

The sca effects of the hybrids are presented in (Table 3). None of the crosses exhibited *significant desirable sca effects for all characters*. The best specific cross combination, which exhibited significant desirable Sca effects *for total yied, was* F_1 cross (P_1x P_5). However, no one of these crosses can be considered as the best combination for all characters simulataneously. These crosses therefore, had potential to give desirable transgressive segregates in subsequent generations if the additive genetic system was operating in good combining parent and the complementary epistatic effects in F_1 acted *in the same direction to maximize the desirable plant* characters (Andrus, 1963).

The sca analysis of the crosses revealed that none of the crosses gave high sca effects for all studied characters. So the sca effects of different crosses indicated that high gca effects of their parents can't guarantee high sca effects in different crosses. These findings were in agreement with those obtained by El-Mighawry (1998).

Table (3): Estimates of specific combining ability effects of six F1 Cucumis melo hybrids in nine quantitative characters.

Geno-types	Plant height (cm.)	No. of intern-ode main stem	Plant growth rate (gm/ cm^2)	No. of fruits plant	Fruit yield plant (kg.)	Total yield (ton/ fed.)	Average fruit weight (kg.)	T.S.S %	Felsh thickness (cm.)
P_1xP_3	- 2.05	0.55**	- 0.14	- 0.28	0.17	- 0.19	- 0.04	- 1.33	- 0.21*
P_1xP_4	- 3.38*	0.55**	0.19	0.19	- 0.57	- 0.36	- 0.07	0.11	- 0.02
P_1xP_5	5.44**	- 1.11	- 0.04	0.09	0.40	0.55*	0.11	1.22	0.23**
P_2xP_3	2.05	- 0.55**	0.14	0.28	- 0.17	0.19	0.04	1.33	0.21*
P_2xP_4	3.38*	- 0.55**	- 0.19	- 0.19	0.57	0.36	0.07	- 0.11	0.02
P_2xP_5	- 5.44**	1.11	0.04	- 0.09	- 0.40	- 0.55	- 0.11	- 1.22	- 0.23**
S.E	3.36	0.99	0.12	0.13	0.16	0.43	0.04	0.25	0.04

*,** : Significant at the 0.05 and 0.01 Probability levels, respectively.

The components of phenotypic variance and heritability estimates in broad and narrow sense are presented in (Table 4). Data in this table showed that genetic variances were considerably larger than those of environmental ones for all studied characters. In addition, dominance variances were larger than additive ones for all characters except No. of fruit per plant and average fruit weight. These findings are in agreement with Mohanty. Bk . *et el* (1999); Gurav *et al.* (2000); and Mohanty Bk. (2000).

Table (4): Components of variance and heritability estimates for nine quantitative characters in cucumis mlo.

Paramter	Plant height (cm.)	No. of internode main stem	Plant growt h rate (gm/c m^2)	No. of fruits plant	Fruit yield plant (kg.)	Toral yield (ton/ fed.)	Average fruit weight (kg.)	T.S.S %	Felsh thichk-nees (cm.)
$\sigma^2 A$	7.52	0.16	0.02	0.14	0.02	0.08	0.03	0.74	0.02
$\sigma^2 D$	34.05	0.87	0.04	0.11	0.49	0.28	0.02	3.23	0.10
$\sigma^2 G$	41.57	1.03	0.06	0.25	0.51	0.36	0.04	3.97	0.12
$\sigma^2 E$	11.29	0.98	0.02	0.16	0.03	0.02	0.02	0.06	0.01
$\sigma^2 P$	52.87	2.02	0.08	0.42	0.52	0.37	0.07	4.02	0.13
$h^2 b$	79.15	51.48	75.00	61.09	94.23	94.59	71.42	98.6	92.31
$h^2 n$	14.24	8.42	25.00	35.71	3.85	18.92	42.85	18.16	15.38

Heritability estimates in broad sense were found to be considerably high for all characters and higher in magnitude than their estimates in narrow sense for all studied traits. Similar results were obtained by Dhiya *et al.*, (1990) and kosba and EL- Diasty (1991).

Data presented in Table (5) reaveled that, female parents recored the highest values for plant growth rate, fruit yield/ plant, total yield/ fed. and total soluble solids. This suggests that, the maternal effects had considerable role in the expression of these characters. Meanwhile, the highest contribution of combined male and female effects in crosses were observed in five out of nine quantitative characters. These results are in harmony with those obtained by Kitroongruang *et al* (1992), Guirgis *et el* (1991) and Gurav *et el.* (2000).

Table (5): Percentage of contribution of lines (L), tester (T) and L x T combination in for quantitative characters in 3x2 line-tester analysis.

Characters / Contribution	Plant height (cm.)	No. of inter-node main stem	Plant growth rate (gm/ cm^2)	No. of fruits plant	Fruit yield plant (kg.)	Toral yield (ton/ fed.)	Average fruit weight (kg.)	T.S.S %	Felsh thichkness (cm.)
Female (line)(L)	0.05	0.24	0.70	0.01	0.44	0.54	0.10	0.1	0.03
Male (Tester)(T)	0.33	0.26	0.05	0.86	0.13	0.16	1.90	0.05	0.25
(LXT)	0.61	0.49	0.24	0.11	0.43	0.29	0.70	0.75	0.71

Data in Table (6) illustraled that, most of F_1 hybrids tended to be higher mean values than mid-parents or better parents for all crosses for all studied traits. The F_1 hybried (P_2xP_5) showed plant height and number of internodes maximum magnitude, while the cross (P_2xP_3) ranked first in the plant growth rate (2.16), at the same time the cross (P_2xP_4) surpassed the other crosses in number of fruits/ plant and fruit yield/ plant.

Moreover, the cross F_1 (P_2xP_3) exhibited maximum values for total yield (ton/ fed) and flesh thickness, while the highest values of average fruit weight and total soluble solids was recorded by the F_1 corss (P_1xP_5). This clearly indicated that, there were a level of variability in the distribution of both dominant and recessive genes in the five parents and comparable amount of non-additive genes in most loci controlling these characters. These results are inharmony with those obtained by Kalb and Davis (1984); Abd EL-Raheem *et al.* (1986 a,b); Awny (1992) EL-Adl *et al.* (1996). in melon.

Concerning F_2 generation, data in Table (6) indicated that, there was a reduction in F_2 generation versus F_1 hybrids due to inbreeding depression for most of studied traits. In spite of the cross (P_1x P_5) which gave the highest plant growth rate. Meanwhile, the (P_2 x P_3) produced the highest values for fruit yield/ plant total soluble solids and flesh thickness, respectively. The F_2 cross (P_2xP_4) ranked first in number of fruits/ plant and total fruit value of average fruit weight. This indicated that, over domance were controlled these characters and selection become necessary and useful tool to improve these traits. These results were in agreement with EL-Doweny (1985) Vijay (1986); Awny (1992) they indicated that over dominance exists for flesh thickness, total soluble solids and total yield.

Heterosis:

Heterosis over mid-parent was observed for most of the studied characters (Table 6). Most of heterotic values, were positive but not significant except the heterotic values of number of internodes belong cross (P_1xP_4), total fruit yield/ fed for cross (P_2xP_3) and (P_2xP_4), also, the cross of (P_2xP_3) for flesh thickness. These results clearly indicated that, these character were goverened by dominant genes. Similar results were obtained by Kalb and Davis (1984); Abd El-Raheem *et al* .(1986 a,b) and EL-Adl *et al* . (1996).

Table (6): Means, heterosis values, (M.P.) heterosis (B.P), degree of dominance and inbreeding depression (I.D) for nine studied traits.

Gener	Crosses	Plant height (cm)	No. of inter-nodes	Plant growth rate (gm/cm²)	No. of fruits/ plant	Fruit yield/ Plant (kg.)	Total yield (ton/fed)	Average fruit weight (kg.)	T.S.S. (%)	Flesh thickness (cm)
M.P	I	144.16	22.83	1.71	2.023	1.215	4.45	0.485	10.23	2.16
	II	14466	20.5	1.79	2.37	1.03	4.27	0.495	10.20	2.04
	III	150.66	23.83	1.82	1.88	1.48	5.31	0.652	10.45	2.47
	IV	137.16	23.99	1.51	2.27	1.355	4.89	0.475	11.11	2.50
	VI	138.5	22.99	1.42	2.28	1 19	4.54	0.479	11.09	2.25
	V	144.16	22.83	1.71	2.03	1 22	4.44	0.485	11.33	2.16
F_1	I	151.66	23.00	1.41	2.00	1.47	5.45	0.683	9.42	2.63
	II	150.66	23.33	1.85	2.33	1.08	4.83	0.557	10.43	2.90
	III	148.66	22.86	1.34	1.85	1.48	5.49	0.796	11.32	2.80
	V	151.66	23.00	2.16	2.40	1.98	6.90	0.686	13 15	3.00
	IV	146	23.33	1.74	2.75	3.03	6.62	0.760	11 25	2.87
	VI	153	26.00	1.90	2.23	1.52	5.46	0.638	9.93	2.46
B.P	I	146.33	24.66	1.89	2.06	1.39	4.63	0.497	11.56	2.50
	II	146.33	21.00	1.69	2.67	1.04	4.27	0.518	11.51	2.26
	III	155.00	26.66	1.89	2.08	1.68	6.35	0.831	12	3.13
	V	142	24.66	1.53	2.55	1.39	5.14	0.497	11.56	2.50
	IV	142	24.66	1.53	2.57	1.39	4.63	0.497	11.51	2.50
	VI	146.33	24.66	1.89	2.06	1.39	4.63	0.497	12	2.50
H (M.P) %	I	5.19*	0.745	- 17.54	- 1.235	20.98	22.61	40.82	- 7.87	21.76
	II	4.144	13.81*	- 0.08	- 1.46	2.913	13.25	12.41	2.25	42.16
	III	1.33	- 4.91	- 26 17	- 0.302	1.37	3.49	22.08	8.37	13.13
	V	10.56**	- 4.15	43.05	5.73	44.65	41.25*	44.42	16.38	20.00**
	IV	5.42*	1.46	22.53	20.61	155.69	45.97**	58 49	1 49	17.25
	VI	6.12*	13.88	11.11	10.12	25.103	22.84	31.55	12.36	13.89
H (B.P) %	I	3.64*	- 6.73	- 25.39	- 2.913	5.75	17.71	37.42	- 18.51	5.20
	II	2.95	11.09*	- 0.127	- 12.734	1.923	13.12	7.53	- 9.38	28.32
	III	- 4 09	- 15.004	- 29.10	- 19.903	- 21.27	- 13.54	- 4.21	- 5.68	- 10.54
	V	6.80**	- 6.73	41.176	- 5.88	41.01	34.24*	36.03	- 13.75	20.00**
	IV	2.82*	- 5.39	13.73	7.004	117.96	42.98**	52.92	- 0.02	14.60
	VI	4.55*	5.43	0.53	8.25	9.352	17.93	28.37	- 17 25	- 1.6
F_2	I	194.67	17.00	4.04	1.89	1.065	4 62	0.499	9.00	2.00
	II	140.00	19.33	2.13	1.09	0.704	4.38	0.498	11.51	2.43
	III	196.33	26.66	5.22	0.88	0.813	4.59	0.573*	9.50	2.00
	V	176.00	26.33	3.06	2.17	1.73*	4.29	0.515	12.66*	2.67*
	IV	196	26.33	1.44	2.75*	1.25	4.80	0.506	11.00	2.50
	VI	146.67	25.32	2.26	1.08	0.690	4.59	0.498	9.50	2.00
Deg. of dom.	I	3.46*	0.093	- 1.66	- 0.714	1.457	5.49	16.50	0.603	1.38 3.91
	II	3.60	5.66*	- 1.526	- 0.115	3.00	113.00	2.73	0.153	3.91
	III	0.48	- 0.413	- 6.33	- 0.012	0.048	0.18	0.604	0.582	0.50
	V	2.99**	- 1.496	32.5	0.464	17.29	7.80*	9.59	4.53	0.05
	IV	2.14*	0.201	2.91	1.621	9.00	21.95**	16.03	0.39	2 48
	VI	4.06*	1.73	1.06	5.857	1.74	5.49	12.66	2.09	0.88
I.D	I	28.36**	- 26.08*	186.52*	- 15.5	- 27.55	- 15.23	- 26.93	- 4.45	-23.95**
	II	- 7.08	- 17 14	29.09	- 53.21**	- 33.58**	- 9.32	- 10.59	10.35	- 16.21**
	III	34.47**	26.47*	289.55*	46.667**	- 45.06*	- 16.39	- 28.01	- 16.07	- 28.57**
	V	20.54**	14.48	41.66*	- 9.58	11.73**	- 37.62	- 24.92	- 3.72	- 11.00*
	IV	34.24**	12.85*	- 17 24	- 13.45**	- 58.74	- 27.49	- 33 42	- 2.22	- 12.89
	VI	- 4.13	- 2.57	18.95	- 51.56**	- 54.93**	- 15.93	- 21.94	- 4.33	- 16.69**

*, **: Significant at the 0.05 and 0.01 Probability levels, respectively.

Significant positive heterosis over better-pavent ralues was observed for plant height, number of internodes, total fruit yield (ton/fed) and flesh thickness of the crosses (P_1xP_3), (P_1xP_3), (P_2xP_4) (P_2xP_5). Similar results were obtained by Dixit and Kalo (1983), and Kosba and EL-Diasty (1991).

Degree of dominance estimates showed significant positive values for four out of the six crosses for plant height, one out of the six crosses for number of internodes and two out of the six crosses for total fruit yield (ton/ fed). this indicated that, over - dominance were controlled these traits. Meanwhile partial dominance was observed for three out of the six crosses for flesh thickness, and four out of the six crosses for total soluble solids and number of fruits plant. These results were inharmony with those obtained by Hatem *et al.* (1996) and Hatem *et al.* (1997) in melon.

Inbreeding depression:

Data presented in Table (6) illustrated that, inbreeding depression values were differed among morphological characters, yield components and its quality.

For morphological characters, plant height, number of internodes and plant growth rate, most of these crosses for these characters had significant and positive values, while the yield traits and its quality had insignificant and negative values. This indicated that, the morphological characters were not affected by inbreeding, but yield and its quality had well affected by inbreeding in melon. This indicates that, these economic traits of yield and its quality were controlled by non-additive gene action.

Meanwhile, the greatest value of inbreeding depression was observed for plant growth rate in the cross of (P_1xP_5) followed by the cross (P_1xP_3). These values were positive and significant indicating the presence of additive gene action for this character.

These findings were in harmony with those obtained by EL-Adl *et al.* (1981), Kosba *et al.* (1993) and EL-Adl *et al* (1996); Hatem *et al.*(1996).

Generally, heterosis was observed in F_1 generation in relation to either mid or high parents in different melon characters, while negative inbreeding depreesion values in F_2 populations were pronounced for yield components and its quality, indicating that, both F_1 and F_2 individual plants could be used commercially if hybrid could be realized. Furthermore, selection may be useful tooi among segregating generations for high yielding genotypes.

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وراثــة بعض الصفات الاقتصادية في القــاوون

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أجريت التجارب الخاصة بهذه الدراسة بمزرعة محطة بحوث البســاتين بالقصــاصين محافظــة الاسماعيلية خلال الفترة من عام ٢٠٠٠ حتى ٢٠٠٣ وذلك لدراسة أفضل الأباء التي يمكن الاعتمــاد عليــها في إنتاج هجين محلى واستخدم في هذه الدراسة ٤ تراكيب وراثية مســتوردة هــى P.I 124111 و P.I 183227 و Hearts of Gold و Honey dew orange fresh وصنف محلى هــو إســماعيلاوى حيث أجرى التهجين بينهما في اتجاه واحد في الموسم الأول للحصول علــى بــذور الجيــل الأول اللازمــة للدراسة وفي الموسم الثاني زرعت بذور الجيل الأول داخل الصوبة للحصول على بذور الجيل الثاني وفــى الموسم الثالث زرعت بذور الأباء والجيلين الأول الثاني في تجربة مصممة بطريقة قطاعات كاملة العشــوائية وأخذت القياسات اللازمة على المحصول والنباتات الفردية وكانت أهم النتائج كالآتي:

١) كان تباين القدرة الخاصة على الائتلاف أعلى من تباين القدرة العامة للأباء والهجن تحت الدراسة للصفــات المدروسة.

٢) كانت الجينات السائدة هي التي تحكم تعبير كل الصفات المدروسة.

٣) كانت النسبة بين التباين الإضافي إلى التباين السيادى أقل من الوحدة لكل الصفات المدروسة ما عــدا صفــة عدد الثمار/ نبات.

٤) توضح النتائج أن تأثيرات الجينات السائدة والمضيفة مهمة في وراثة صفة عدد الثمار/ النبات.

٥) توضح تقديرات القدرة الخاصة على التآلف للهجين أن أفضل الهجن لصفة كمية المحصول الكلى/ فدان هــو F_1 $(P_1 \times P_5)$ بينما كان F_1 $(P_1 \times P_4)$ هو أفضل الهجن لصفة معدل نمو النبات.

أوضحت تقديرات القدرة العامة على التآلف للآباء أن الأب الأول P.I124111 هو مؤتلف جيد لصفة كمية المحصول فقط بينما الأب الثاني P.I 183227 هو مؤتلف جيد لكل الصفات المدروســـة الخضريــة والثمرية وأن الأب الثالث Heart of Gold كان أفضل الآباء لصفة طول النبات وكمية المحصول الكلــى/ فدان ونسبة المواد الصلبة الذائبة الكلية بينما سجل الأب الرابــع Honey dew orange flesh أعلــى تقديرات لصفة عدد الثمار/ نبات والمحصول الكلى/ فدان في حين سجل الأب الخامس إســـماعيلاوى أعلــى قيمة لصفة متوسط وزن الثمرة وكذلك عدد العقد على الساق الرئيسي فقط.

٦) تشير النتائج إلى أن التباين الوراثي المحسوب كان أكبر من التباين البيئي وأن التباين السيادى أيضــا كــان أكبر من التباين الإضافي لكل الصفات المدروسة فيما عدا عدد الثمار/ النبات ومتوسط وزن الثمرة فكانتــا محكومتان بالتأثير الإضافي للجينات.

٧) كانت تقديرات القدرة على التوريث بمعناها الواسع أعلى من قيمة القدرة على التوريث بمعناها الضيق لكــل الصفات المدروسة.

٨) ظهرت قوة الهجين بالنسبة لمتوسط الأبوين وأفضل الآباء لجميع الصفات تحت الدراسة.

٩) بالنسبة لدرجة السيادة، ظهرت حالات السيادة التامة والجزئية والسيادة الفائقة في الـــهجن تحــت الدراســة للصفات المختلفة.

١٠) لم يحدث انخفاض في صفات النمو الخضرى باتباع نظام التربية الداخلية بينما حدث انخفــاض فــى صفــة كمية المحصول ومكوناته وكذلك نوعيته نتيجة التربية الداخلية.