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HETEROSIS IS YIELD AND YIELD COMPONENTS IN EGGPLANT (*Solanum melongena* L.)

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A B S T R A C T

The study was carried out with seven lines and three testers to estimate the heterosis for eight traits *viz*., days to first flowering, plant height, number of branches per plant, number of fruits per plant, fruit length, fruit girth, fruit weight and fruit per plant. Heterosis to the extent of 79.99 and 54.11 per cent over the mid parent and better was recorded fruit yield per plant respectively. The parent KKM-1 found to be very promising which exhibited higher heterosis for fruit yield per plant. Two hybrids *viz*., CO-2 x KKM-1 and Annamalai x KKL-1 were identified as promising for fruit yield and other desirable traits which may be useful for exploitation of hybrid vigour in egg plant.

INTRODUCTION

Eggplant *Solanum melongena* L., (2n=24), also known as anbergine/ *Guinea squash* / brinjal, is a member of the family solanceae. It is an important vegetable crop, grown in all parts of India. India (or) indo-china is considered to be the centre of origin in eggplant (Vavilov, 1951). Egg plant is well adopted to high rainfall and high temperatures that prevail during the May-September. Eggplant is an important sources of plant derived nutrients during lean periods of the year. Eggplant is generally considered to be a self-pollinated and cross pollination reported. Improvement in this crop so far has been mostly confined to single plant selection, recombination breeding is commonly followed. Considerable amount of heterosis has been reported in this crop. To exploit heterosis, knowledge on choosing appropriate parent with good genetic potential is very essential. Many biometrical techniques are available to the breeder for choosing desirable parents. Line X tester analysis appears to be an ideal method to evaluate parents and crosses (Kempthorne, 1957). In the present investigation, attempt has been made to evaluate ten parents (seven lines, three testers) and 21 hybrids developed through Line x Tester analysis in eggplant.

MATERIALS AND METHODS

To evaluate seven lines *viz*., Chidambaram local -1 Chidambaram local – 2, Sevendampalli, Gnanamadu, Palur – 1, Co-2 and Annamalai, Four testers *viz*., SM – 16, SM-24 and KKM-1, twenty one hybrids were raised during the year 2007-2009. The twenty one hybrids and the parents were grown in randomized block design with three replications. The seeds of selected parents and hybrids were sown different rows on raised bed nursery by following normal nursery practices. After 35 days the seedling form the nursery were transplanted in experiential plot with a plant spacing of 75 cm within and between rows and normal cultural practices. Observation were recorded on five randomly selected plants from each entry on eight characters *viz*., days to first flowering, plant height, number of branches per plant number of fruits per plant, fruit length, fruit girth, fruit weight and fruit yield per plant. Heterosis was estimated over the mid parent (MP) and better parent (BP) and tested for significant as suggested by Wynne *et al*. (1970).

RESULT AND DISCUSSION

The estimates of mean squares were highly significant for most of the characters indicting considerable diversity of the parents and hybrids. Most heterotic crosses identified on the basis of range, mean performance and heterosis parameters are presented in Table 1. The highest range was observed for plant height and fruit yield per plant in both the parents and the crosses, where as the range of MP and BP heterosis was high for number of fruits per plant, fruit girth, fruit weight and fruit yield per plant. A perusal

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Table 1 Range of mean performance and heterosis and most crosses for eight characters in eggplant

Characters	Range		Heterosis (%)		Best parents		Best hybrids	
	Parents	Crosses	MP	BP	Lines	Testes	Based on mean performance	Based on BP heterosis
Days to first flowering	73.50 to 86.50	70.50 to 86.50	-5.69 to 5.43	-5.37 to 10.00	L_1, L_5 and L_7	T_3	L_1 xT_3 and L_7 x T_3	L_1 xT_3 and L_3 x T_3
Plant height	62.60 to 93.65	74.75 to 108.00	-5.89 to 26.14	16.25 to 15.32	L_7	T_1,T_2 and T_3	L_7 xT_2 and L_7 x T_3	L_3 xT_3, L_7 xT_1 and L_7 x T_1
Number of branches per plant	2.00 to 7.50	2.00 to 10.50	-52.94 to 47.83	-64.29 to 40.00	L_7	T_3	L_7 x T_3	L_5 x T_3 and L_7 xT_3
Number of fruits per plant	5.50 to 10.50	7.00 to 19.00	-12.50 to 100.00	-38.33 to 80.95	L_7	T_3	L_6 xT_3 and L_7 x T_3	L_5 xT_1 and L_7 x T_3
Fruit length	5.40 to 10.85	6.85 to 12.40	-10.16 to 30.56	-12.74 to 20.86	L_7	T_3	L_7 xT_2 and L_7 x T_3	L_5 xT_3 and L_7 x T_3
Fruit girth	7.10 to 14.15	9.85 to 14.85	-1.96 to 58.89	-24.38 to 48.96	L_5 and L_6	T_1 and T_3	L_5 xT_2 and L_7 x T_3	L_7 xT_2
Fruit weight	31.00 to 48.50	23.50 to 75.00	-25.40 to 62.16	-32.95 to 54.64	L_7	T_3	L_6 xT_3 and L_7 x T_3	L_6 xT_3 and L_7 x T_3
Fruit yield per plant	253.00 to 731.00	314.00 to 870.00	-28.68 to 76.99	-39.21 to 54.11	L_7	T_3	L_6 xT_3 and L_7 x T_3	L_5 xT_1, L_5 x T_2 and L_6xT_3

L_1-Chidambaram Local -1 L_2-Chidambaram Local -2 L_3-Sevandampalli L_4-Gnanamadu
L_5-Palur -1 L_6- CO-2 L_7-Annamalai T_1- SM-16 T_2- SM-24 T_3- KKM-1

Table 2 Heterosis for eight characters in promising crosses of eggplant

Crosses	Heterosis	DFF	PH	NBPP	NFPP	FL	FG	FW	FYPP
L_1xT_3	MP	-5.69**	3.15*	-44.44**	2.86	-3.75	0.71	-21.23*	-16.40*
	BP	-5.37*	-10.09**	-64.29**	-14.29	-5.52	-24.38**	-32.95*	-34.28**
L_3xT_3	MP	-3.77**	26.14**	-27.27*	-5.88	25.09**	-1.98	18.29*	-5.96
	BP	2.00	5.23*	-42.86*	-23.81	8.59	-12.72**	10.23	-34.28**
L_5xT_1	MP	-0.33	9.56**	-27.27*	100.00**	12.50**	7.13*	32.90**	76.99**
	BP	0.66	2.75	-27.27	72.22**	9.46	-0.36	13.19	54.11**
L_5xT_2	MP	2.58*	12.63**	47.83**	73.33**	18.44**	33.80**	10.23	49.21**
	BP	5.30*	2.74	-50.00*	52.94**	17.61**	20.42**	6.59	30.97**
L_5xT_3	MP	0.33	16.53**	4.00	52.94**	30.03**	10.13**	39.66**	33.27**
	BP	0.67	6.89**	-7.14	23.81	20.89**	1.77	37.36**	6.76
L_6xT_3	MP	5.26**	17.09**	16.67	94.44*	26.25**	6.82*	52.00**	67.15**
	BP	6.67**	4.81*	0.00	66.67**	16.56**	-0.35	51.14**	36.79**
L_7xT_1	MP	-3.65**	11.02**	-7.69	33.33**	27.74**	27.96**	18.01*	6.45
	BP	-1.36	8.68**	-20.00	23.81	3.23	2.53	-2.06	-9.17
L_7xT_2	MP	-1.96	12.81**	-25.93	63.16**	28.69**	58.89**	14.29	0.16
	BP	2.04	7.28**	-33.33*	47.62**	6.45	48.96**	7.22	-15.18*
L_7xT_3	MP	-3.70**	20.57**	44.83**	80.95**	30.53**	31.71**	62.16**	19.75**
	BP	-2.72	15.32**	40.00*	80.95**	14.29**	4.95	54.64**	11.97**

* Significant at 5 per cent level ** significant at 1 per cent level
L_1-Chidambaram Local -1 L_2-Chidambaram Local -2 L_3-Sevandampalli L_4-Gnanamadu
L_5-Palur -1 L_6- CO-2 L_7-Annamalai T_1- SM-16 T_2- SM-24 T_3- KKM-1

of heterotic crosses revealed that none of the crosses was top heterosis for all the traits simultaneously.

Out of 21 crosses studied, nine most promising combinations were identified and their heterosis expression for different characters were analysed Table -2. All 9 promising crosses showed positive significant heterosis for fruits yield per plant. This may be attributed to presence of non-additive gene effects for fruit yield per plant. A similar result was reported by Dixit *et al*. (1987) and Venkatesan (2007). For fruit yield per plant, the crosses L_5 x T_1 showed the highest MP (76.99 per cent) and BP (54.11 per cent) heterosis respectively. The crosses L_5 x T_1, L_5 x T_2, L_5 X T_3 and L_6 x T_3 also displayed more than 30 per cent of positive significant heterosis for fruit yield per plant. For earliness the negatively significant heterosis was observed by the crosses L_1 x L_3. The cross L_7 x T_3 displayed highest and significant heterosis for number of branches per plant number of fruit per plant and fruit weight.

For number of fruits per plant, 9 out of 21 crosses showed positive MP heterosis of which 12 significantly exceeded the BP values. MP and BP heterosis was positively significant in 15 and 6 crosses for plant height respectively. The magnitude and high incidence of heterosis in these crosses were indicative of high degree of dominance of epistasis or both similar results were reported by earlier workers Booby et *al*. (1994) and Venkatesan (2007).

A insight into the heterosis for component traits in relation to fruit yield indicated that the four components contributed differentially in expression of heterosis for fruit yield per plant, number of fruits per plant was found to contribute significantly in corsses L_5 x T_1, L_5 x T_2, L_6 x T_3 and L_7 x T_3. Plant height, number of branches per plant, number of fruits per plant, fruit length and fruit weight, both contributed towards fruit yield heterosis in crosses L_6 x T_3 and L_7 x T_3 followed L_5 x T_3 was contributed in number of fruits per plant, fruits length, fruit girth and fruit yield per plant in four factors. Similar reported observation was reported by Richharia *et al*. (1983) and Venkatesan (2007).

In general, the tester KKM-1 (T_3) was as promising parents which resulted high heterosis for fruit yield per plant. The present study suggested that the hybrids Co-2 x KKM-1 (L_6 x T_3) and Annamalai x KKM-1(L_7 x T_3) would be promising sources for commercial exploration of heterosis.

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