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RESEARCH PAPER

Studies of standard heterosis for quantitative traitsin eggplant (*Solanum melongena* L.)

VENKATA NARESH BODDEPALLI*, A.K. DUBEY AND M.R. DABBAS
Department of Vegetable Science, C.S. Azad University of Agriculture and Technology, KANPUR (U.P.) INDIA

Abstract : Standard heterosis has been amply exploited in developing hybrids in eggplant by increasing commercial value of them. In an experiment, fifteen parents (12 lines and 3 testers) were selected on the basis of divergence and mated them in line x tester design. Hybrids and parents rose to measured heterosis for different quantitative traits. Some of the hybrids exhibited positive standard heterosis. In case of days to 50 per cent flowering, plant height and days to maturity, where negative heterosis is desirable, seven hybrids showed negative standard heterosis for days to 50 per cent flowering, twenty four hybrids for plant height and three hybrids showed significant negative heterosis for days to maturity. For number of branches per plant, three hybrids showed significant and twenty hybrids showed positive standard heterosis. In case of fruit length and fruit diameter both positive and negative heterosis was observed. Twenty six hybrids showed positive standard heterosis for number of fruits per plant. Yield, the ultimate product of different yield components, nine hybrids showed positive standard heterosis for yield. In case of Cercospora leaf spot incidence, seventeen hybrids showed highly significant standard heterosis.

Key Words : Eggplant, Standard heterosis, Quantitative traits, Cercospora leaf spot

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INTRODUCTION

Eggplant or brinjal (*Solanum melongena* L.) is widely cultivated as one of the most important vegetables in both subtropical and tropical areas of India as well as abroad. Being a centre of origin, brinjal has a huge genetic divergence in our country which offers much scope for improvement through heterosis breeding. Earlier, eggplant breeding was relied both on mass selection and pure line selection from the land races for the development of improved varieties. Heterosis breeding has become the widely used breeding method could enhance its quality and productivity without sacrificing the consumers' choice. Exploitation of the hybrid vigor in solanaceous crops is commercially possible (Bavage *et al*., 2005; Prabhu *et al*., 2005 and Dhanwad *et al*., 2010) due to manifestation of high heterosis and other important characters, ease of handling the flowers during artificial emasculation and pollination and realization of higher number of hybrid seed per effective pollination.In India, only 17.8 per cent area of eggplant cultivation is under hybrid seed due to lack of appropriate hybrids which satisfied the consumer preference and as well as commercial values.

The present study was under taken with an objective

*** Author for correspondence :**

of studying the extent of heterosis in different crosses and their utilization in future crop improvements programmes.

MATERIAL AND METHODS

The experiment was undertaken during rainy season (2011-12 and 2012-13) at Vegetable Research Farm, Chandra Shekhar Azad University of Agriculture and Technology, Kalyanpur, Kanpur (U.P.) India, lying at 20.27^0N latitude, 80.14^0E longitude and 126 m above mean sea level.The plant materials comprised of fifteen local genotypes, out of which 12 genotypes as lines, *viz.*, KS-7570, KS-8204-2, KS-7305, KS-6103, KS-7509-1, KS-7846, KS-8507, KS-5623,T2, KS-7846, KS-8507, KS-7840 and three genotypes as testers *viz.*, KS-8821, KS-7512, KS-8822were crossed in line x tester fashion to produce thirty six F_1 hybrids. All the 36 F_1 hybrids along with the parents were grown in Randomized Block Design with two replications. Each plot consisted of 20 plants spaced by 60 cm in 2 rows, each of which was 6 m long. Data were recorded on five randomly selected plants from each hybrid and parent over replication for the characters *viz.*, days to 50 per cent flowering, plant height (cm), days to maturity, number of branches per plant, fruit diameter (cm), fruit weight (g), number of fruits per plant, yield per plant (kg), Cercospora leaf spot incidence (0-6 scale.) over standard parent. The observationon Cercospora leaf spot incidence was recorded by the screening of germplasm at field level by inoculating the disease on the plants in the experimental field. The standard heterosis or economic heterosis was calculated based on standard procedure.

RESULTS AND DISCUSSION

Standard or economic heterosis is an important parameter as it provides information about presence of dominance and gene action in the expression of various traits. The results indicated that the mean sum of squares due to analysis variance of line x tester showing significant performance (*P*=0.05) in days to 50 per cent flowering, branches per plant and highly significant performance (*P*=0.01) for fruit length, fruit diameter and Cercospora leaf spot resistance (Table 1). The magnitude of heterosis for different characters under study among the hybrid combinations are presented in Table 2.

Day to 50 per cent flowering and days to maturity:

Earliness leads to early supply of the produce in the market and enables it to fetch a remunerative price. Thus, heterosis for days to 50 per cent flowering and days to maturity had been estimated in terms of earliness. For days to 50 per cent flowering two crosses *viz.*, KS-8204-2 x KS-8821 and KS-6103 x KS-8821(- 2.17%) recorded negative heterosis over standard check. From the point of view of days to maturity three crosses KS-6103 x KS-8821 (-9.57), KS-7509-1 x KS-7512 and KS-8507 x KS-8821 (-6.96) exhibited significant negative heterosis (*P*=0.05) over the standard check were desirable (Table 2). Negative heterosis for earliness has also been reported by Kumar *et al.* (1999) and Boddepalli *et al.* (2013 and 2014).

Plant height :

Here also short stature was taken as a positive trait, and in such respect, two crosses, that is, T_2 x KS-7512 and T_2 x KS-8822 exhibited negative and non-significant

Table 1 : ANOVA for parents and hybrids for yield traits

Source	Lines	Testers	Line x tester	Error	Contribution		
					Lines	Tester	L x T
DF	11	2	22	35	11	2	22
Days to 50% flowering	4.2	1.13	3.69 •	1.64	35.65	1.74	62.61
plant height	98.2	16.32	56.15	153.1	46	1.39	52.61
Branches per plant	1.64	0.03	1.65 •	0.51	33.09	0.12	66.8
Days to maturity	6.76	0.54	6.12	3.37	35.4	0.52	64.09
Fruit diameter(cm)	2.01	0.68	1.25 • •	0.33	43.29	2.65	54.06
fruit weight (cm)	171.63	116.74	116.26	84.64	40.35	4.99	54.66
fruits per plant	4.58	0.14	4.17	9.38	35.39	0.19	64.42
Yield per plant (kg.)	0.32	0.05	0.2	0.14	44.03	1.34	54.63
Harvest index (%)	0	0	0	0	31.54	9.14	59.32
CLS incident	39.37	9.57	18.04 • •	1.23	51	2.25	46.75

Table 2: Magnitude of heterosis for 11 characters in brinjal

Sr. No.	Entries	Days to 50 % flowering	Plant height (cm.)	Branches per plant	Days to maturity	Fruit diameter (cm)	Fruit weight (g)	Number of fruits per plant	Yield per plant (kg)	Harvest index	CLSI
1.	KS-7570 x KS-8821	-1.09	-6.53	0.25	-2.61	14.29	-6.43	-2.29	-7.66	0	-48.74 • •
2.	KS-7570 x KS-7512	6.52 •	-9.19	10.28	-0.87	8.93	-18.27 • •	4.8	-14.68	-6.82	-22.87 • •
3.	KS-7570 x KS-8822	2.17	1.27	-1.25	-5.22	12.5	-6.9	13.85	6.36	-6.25	-51.44 • •
4.	KS-8204-2 x KS-8821	-2.17	-3.51	-0.75	-4.35	27.86 • •	-9.52	0.22	-9.48	0	-15.37 •
5.	KS-8204-2 x KS-7512	-1.09	-1.96	-9.27	-2.61	10.71	-4.03	-6	-10.13	-3.41	-33.65 • •
6.	KS-8204-2 x KS-8822	-1.09	-7.43	0	0	5.36	-5.54	15.81	9.61	-3.41	-39.70 • •
7.	T_2 x KS-8821	8.70 • •	-9.82	-9.27	1.74	28.57 • •	-5.91	10.58	4.68	-6.25	1.24
8.	T_2 x KS-7512	1.09	-12.59	9.27	-3.48	7.14	-13.68 •	6.22	-7.66	-8.52	0.06
9.	T_2 x KS-8822	5.43 •	-11.84	12.78	0.87	10.71	-12.42 •	-8.07	-20.78 •	-9.09 •	-15.76 •
10.	KS-7305 x KS-8821	7.61 • •	-1.17	18.80 • •	2.61	0	-13.90 • •	1.53	-12.47	-9.09 •	29.20 • •
11.	KS-7305 x KS-7512	3.26	0.29	6.27	-1.74	-3.57	-7.8	-1.74	-9.61	-3.41	-2.72
12.	KS-7305 x KS-8822	2.17	7.41	23.31 • •	-2.61	14.29	-7.61	-1.85	-9.35	-2.84	-22.39 • •
13.	KS-6103 x KS-8821	-2.17	11.26	9.27	-9.57 • •	42.86 • •	-16.85 • •	2.51	-14.94	-3.41	-46.93 • •
14.	KS-6103 x KS-7512	5.43 •	-3.82	-1.25	-0.87	35.71 • •	-6.43	-2.4	-7.92	-1.14	15.04 •
15.	KS-6103 x KS-8822	1.09	11.02	10.78	-6.09	3.57	-12.35 •	-1.31	-13.64	-7.95	18.82 • •
16.	KS-7509-1 x KS-8821	-1.09	-5.95	0.75	1.74	-7.14	-19.74 • •	3.49	-17.40 •	1.7	4.72
17.	KS-7509-1 x KS-7512	-1.09	4.35	19.80 • •	-6.96 •	-9.64	-13.84 • •	1.42	-12.6	-8.52	10.89
18.	KS-7509-1 x KS-8822	3.26	-4.46	-1.25	-4.35	3.57	-10.78 •	0.22	-10.65	-6.25	-13.43
19.	KS-5605-1 x KS-8821	0	-2.97	10.28	0.87	5.36	-8.04	5.89	-1.69	-1.7	-29.65 • •
20.	KS-5605-1 x KS-7512	5.43 •	4.3	0	0	0	0	-1.09	-1.04	0	0
21.	KS-5605-1 x KS-8822	3.26	1.65	-8.02	0	21.43 • •	-9.48	4.69	-5.32	-5.11	3
22.	KS-8504 x KS-8821	6.52 •	12.06	7.77	-4.35	0	-13.96 • •	1.53	-12.73	2.27	-22.66 • •
23.	KS-8504 x KS-7512	2.17	-9.98	-8.52	0.87	14.29	-14.42 • •	4.25	-11.17	-5.11	-20.94 • •
24.	KS-8504 x KS-8822	1.09	-2.28	-2.76	0.87	17.86 •	-12.24 •	2.94	-9.74	-6.82	-23.48 • •
25.	KS-5623 x KS-8821	0	-4.51	-0.75	-0.87	-3.57	-1.97	11.45	8.7	0.57	-43.15 • •
26.	KS-5623 x KS-7512	2.17	-1.19	8.77	-2.61	10.71	-2.1	9.27	7.79	-3.41	-11.8
27.	KS-5623 x KS-8822	6.52 •	-2.6	10.03	1.74	21.43 •	-11.73 •	7.42	-5.06	-4.55	-20.21 • •
28.	KS-7846 x KS-8821	4.35	-3.61	13.03	1.74	26.79 • •	-15.38 • •	-0.22	-15.58	-5.68	-9.08
29.	KS-7846 x KS-7512	4.35	-3.21	0.75	0.87	21.43 •	-8.56	13.52	4.03	-1.7	-0.18
30.	KS-7846 x KS-8822	3.26	-3.43	2.26	-4.35	14.29	-8.54	2.51	-6.1	-6.25	-1.51
31.	KS-8507 x KS-8821	5.43 •	-2.6	-8.52	-6.96 •	5.36	-15.38 • •	6.87	-9.61	-3.41	-39.03 • •
32.	KS-8507 x KS-7512	4.35	0.27	11.78	0	14.29	-3.44	13.41	9.22	2.84	-41.09 • •
33.	KS-8507 x KS-8822	1.09	-4.83	10.28	-5.22	32.14 • •	-10.54 •	11.45	-0.26	0	-13.1
34.	KS-7840x KS-8821	3.26	5.68	8.27	-3.48	21.43 •	-3.61	15.59	11.82	-5.11	9.98
35.	KS-7840 x KS-7512	6.52 •	0.05	-7.27	-4.35	12.5	-6.78	12.76	5.58	-3.41	-10.68
36.	KS-7840 x KS-8822	1.09	-7.43	-9.27	-3.48	21.43 •	-6.5	1.74	-4.68	-0.57	20.57 • •
	S.E.Diff	1.19	10.5	0.66	1.88	1.37	8.56		0.33	0.04	1.14
	C.D. (P=0.05)	3.25	21.26	1.64	3.82	1.17	17.37		0.66	0.07	2.31
	C.D. (P=0.01)	3.25	28.52	1.8	5.12	1.58	23.31		0.89	0.1	3.1

• CLSI – Cercospora leaf spot insidence

heterosis over standard check of -12.59 per cent and 11.84 per cent, respectively (Table 2). Positive heterosis was reported by Timmapur (2007); Boddepalli *et al*. (2013 and 2014).

Number of branches per plant :

Highly significant positive heterosis over superior parent for this character (Table 2) was exhibited by some of the crosses *viz.*, KS-7305 x KS-8822 (23.31%), KS-7509-1 x KS-7512 (19.80%) and KS-7305 x KS-8821 (18.80%).

Number of fruits per plant :

For this character, three crosses *viz.*, KS-8204-2 x KS-8822 (15.81), KS-7840x KS-8821(15.59) and KS-7846 x KS-7512(13.52) showed positive non-significant heterosis over superior parent may be selected (Table 2). Heterosis for number of fruits per plant in tomato has earlier been reported by Prabhu *et al*. (2005) and Boddepalli *et al*. (2013 and 2014).

Fruit diameter :

Highly positive significance was shown by KS-6103 x KS-8821(42.86), KS-6103 x KS-7512 (35.71), KS-8507 x KS-8822 (32.14), T_2 x KS-8821 (28.57), KS-8204-2xKS-8821(27.86) and KS-7846 x KS-8821(26.79). The same was reported by Boddepalli *et al*. (2013 and 2014).

Yield per plant :

The positive heterosis over standard check were shown by KS-7840x KS-8821(11.82), KS-8507 x KS-7512(9.22), KS-8204-2 x KS-8822(9.61) and KS-5623 x KS-8821(8.70) (Table 2). Earlier heterosis of varying degree for yield has been reported by Dhamwad *et al*. (2010); Boddepalli *et al*. (2013 and 2014) and Singh *et al*. (2004).

Harvest index :

Economic yield is an important criterion for a cultivar to withstand against market demand. For this character positive heterosis was shown by KS-8507 x KS-7512 (2.84), KS-8504 x KS-8821(2.27) and KS-7509-1 x KS-8821(1.70) which was reported by Boddepalli *et al*. (2014).

Cercospora leaf spot resistance :

Leaf spot resistance is directly related with the yield of the plant so in this case negative heterosis was preferred. Highly significant negative heterosis (P=0.01) was shown by KS-7570 x KS-8822(-51.44), KS-7570 x KS-8821(-48.74), KS-6103 x KS-8821(-46.93) and KS-5623 x KS-8821(-43.15). These results were reported by Boddepalli *et al*. (2013 and 2014).

REFERENCES

Bavage, M.S., Madalageri, M.B. and Mulge, R. (2005). Hybrid performance in round fruited brinjal (*Solanum melongena* L.). *Karnataka J. Hort.*, **1** (3): 95-97.

Boddepalli, Venkata Naresh, Dubey, A.K., Tiwari, P.K. and Avani, P. (2013). Heterosis studies for yield components and cercospora leaf spot resistance in brinjal (S*olanum melongena* L.). *Prog. Res.*, **8** : 410-412.

Boddepalli, Venkata Naresh, Dubey, A.K., Tiwari, P.K. and Dabbas, M.R. (2014). Line x tester analysis for yield components and cercospora leaf spot resistance in brinjal (*Solanum melongena* L.). *Electronic J. Plant Breed.*, **5**(2): 230-235.

Dhanwad, Nalini, Patil, S.A. and Salimath, P.M. (2010). Study on genetic diversity and its relation to heterosis in F1 hybrids of germplasm lines of brinjal (*Solanum melongena* L.). *Asian J. Bio. Sci.*, **5** (1): 134-137.

Kumar, R., Prasad, K.K. and Singh, D.N. (1999). Heterosis in brinjal (*Solanum melongena* L.). *J. Res.*, **11**: 217-227.

Prabhu, M., Natarajan, S. and Pugalendhi, L. (2005). Studies on heterosis and mean performance in brinjal (*Solanum melongena* L.). *Veg. Sci.*, **32** (1): 86-87.

Singh, A.K., Pan, R.S., Rai, Mathura and Krishnaprasad, V.S.R. (2004). Heterosis for yield and its contributing attributes in brinjal (*Solanum melongena* L.). *Veg. Sci.*, **31** (2): 146-148.

Timmapur, Prakash H. (2007). Heterosis and combining ability studies in brinjal (*Solanum melongena* L.). M. Sc. (Ag.) Thesis, University Agricultural Sciences, Dharwad, KARNATAKA (INDIA).