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Manifestation of hybrid vigour in brinjal (*Solanum melongena* L.)

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ABSTRACT

Evaluation of 29 F_1 hybrids indicated manifestation of pronounced hybrid vigour for fruit yield and most of the yield components in them. It established brinjal as a prominent candidate for commercial exploitation of heterosis provided consumer acceptable character constellation are framed in the hybrids. Selection of hybrids should be based on both manifestations of heterosis and per se performance of the hybrids as both all the time did not match. Outstanding hybrids emerged from the study were BCB 75 × BCB 45, BCB 38 × BCB 1 and BCB 23 × BCB 42. This report suggested the possibility for getting commercial exploitable heterosis in the hybrids with the involvement of locally adapted cultivars as parental lines.

Key Words: Hybrid vigour, heterosis, fruit yield, brinjal

Brinjal offers much scope for improvement through heterosis breeding which can further be utilized for the development of desirable recombinants. The required goals of increasing productivity in the quickest possible time can be achieved only through heterosis breeding which is feasible in this crop. Information on the magnitude of heterosis in different cross combination is a basic requisite for identifying crosses that exhibit high amount of exploitable heterosis. The present report describes the nature and extent of heterosis in hybrids for plant growth attributes as well as fruit yield and its components.

MATERIALS AND METHODS

Twenty nine hybrids were developed involving 13 parental lines namely, BCB 18, BCB 20, BCB 23, BCB 38, BCB 43, BCB 45, BCB 75, BCB 26, BCB 42, BCB 1, BCB 48, BCB 17 and BCB 6.

These hybrids along with their parents were grown during autumn – winter season in randomized block design with 3 replications. Each net plot had one row of 6 m. long consisting of 10 plants. Data were recorded on five randomly taken plants from each plot of the parental lines and F_1 hybrids. Observations were recorded on plant height (cm.), primary branches/plant, fruits/plant, fruit length (cm.), fruit girth (cm.), fruit weight (gm.) and fruit yield/plant (kg.). Heterosis was worked out as per Fonesca and Patterson (1968).

RESULTS AND DISCUSSION

Heterosis is an expression of genetic balance, which might vary with the breeding behaviour of species (Mather, 1955). The phenomenon heterosis has amply been exploited in developing hybrids in different self pollinated crops including brinjal. In brinjal heterosis is manifested mainly for enhanced fruit yield and other important economic traits like earliness, adoptability and prolonged fruiting period.

Considering the heterobeltiosis, the number of crosses having desirable significant heterosis was more in fruit yield/plant, plant height, primary branches/plant, fruit weight and fruits/plant. The magnitude of desirable heterobeltiosis effects was highest in fruit yield/plant followed by plant height. Number of crosses having negative heterobeltiosis was highest within fruit length and fruit girth. The negative heterosis observed in crosses may be attributed due to non-allelic interactions which can either increase or decrease the expression of heterosis.

In most of the hybrids, plant height was higher than the respective better parent and highest heterobeltiosis was observed in BCB 23 × BCB 42 (65.77%). Eighteen hybrids showed significantly better performance with respect to their respective better parent for primary branches. However, magnitude of heterosis was comparatively low. Out of 29 hybrids, ten hybrids showed significantly positive heterobeltiosis for fruits/plants of which the cross BCB 43 × BCB 48 had the highest value. However, most of the hybrids produced much higher number of fruits with respect to the average of the two parents.

For fruit weight most of the hybrids showed heterotic depression with respect to better parent although, fruit weight in all the hybrids was higher than the respective mid parental values. This *per se* performance of the hybrid indicated dominant action of polygene for the conditioning of the character. Cross BCB 45 × BCB 43 had the highest heterosis over better parent (81.74%) for fruit weight. Twenty two crosses each showed negative heterosis for fruit length and fruit girth. However all the hybrids surpassed the mid parental values for fruit length

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indicating the dominance gene effect for the said character. It appeared that fruit length, girth and weight were expressed in the hybrids in associated manner. So it would be less likely to develop a hybrid having high fruit size For fruit yield/plant all 29 hybrids manifested positive heterosis over better parent and the hybrid BCB 75 × BCB 45 showed the highest value (152.01%). This finding clearly indicated over dominance gene action for fruit yield/plant. High fruit yield in the hybrids was manifested through enhancement in the vegetative and fruit characters particularly plant height, primary branches/plant, fruits/plant and fruit weight.

In the present investigation considerable amount of heterosis was observed in desired direction for all the characters studied which found support from several earlier reports (Salehuzzaman and Juardar, 1978; Singh and Kumar, 1988; Sawant *et al*, 1992). But in all the cases, positive association between *per se* performance and heterotic effect over better parent did not reveal. So selection of hybrids should be based on both manifestations of heterosis and *per se* performance. Outstanding hybrids emerged from the study were BCB 75 × BCB 45, BCB 38 × BCB 1 and BCB 23 × BCB 42 considering both fruit yield and consumer acceptability for fruit characters (Table 1, 2). Brinjal hybrids are very popular in Japan, Korea and China. In India hybrid varieties are gaining importance and at present over 20% of the total brinjal area are under hybrids. This report further supports the possibility of commercial exploitable heterosis with the involvement of locally adapted cultivars.

REFERENCES

Fonesca. S. and F. L. Patterson 1968. Hybrid vigour in a seven parent diallel cross in common wheat (*T. aestivum*). *Crop Sci.* **8** : 85-88.

Mather, K. 1955. The genetical basis of heterosis. *Proc. Royl. Soc. Biol.* **144** : 143-50.

Salehuzzaman, M. and Juarder, I. 1978. Heterosis in eggplant. *Philip. J.Biol*., **7**: 39-46.

Sawant, S. V., Desai, V. T., Kale, P. N. and Joi, M. B. 1992. Heterosis in brinjal. *J. Maharashtra Agric Univ*., **17**: 394-96.

Singh, B. and Kumar, N. 1988. Studies on hybrid vigour and combining ability in brinjal. *Veg. Sci.*, **15**: 72-78.

Table 1. Performances of most significant hybrids for different characters in brinjal

Characters	No of hybrids having significant heterosis over better parents		Best Hybrids	*Per se* performance			% of heterosis over better parents
	+ve	-ve		Female parent	Male parent	Hybrid	
Plant height(cm)	25	1	BCB-23×BCB-42	64.10	68.83	114.10	65.77
Primary branches/plant	18	3	BCB-23×BCB-42	12.00	13.80	17.71	28.34
No of fruits/plant	10	17	BCB-43×BCB-48	60.83	16.03	82.37	35.41
Fruit weight(g)	11	14	BCB-45×BCB-43	39.40	77.43	70.47	81.74
Fruit length(cm)	6	18	BCB-75×BCB-1	12.43	14.27	18.30	28.24
Fruit girth(cm)	6	20	BCB-43×BCB-45	3.57	4.00	4.87	21.75
Fruit yield/plant(kg)	26	0	BCB-75×BCB-45	3.73	3.33	9.40	152.01

Table 2. Range of parents, hybrids and best performing parents for different characters in brinjal

characters	Range			Better parents based on *per se* performance
	Per se performance		Heterosis over better parents	
	Parents	Crosses		
Plant height(cm)	59.23-98.74	74.93-117.10	-9.29 to 65.77	BCB-20, BCB-6, BCB-48
Primary branches/plant	9.50-16.50	14.10-19.43	-4.67 to 28.34	BCB-26, BCB-45, BCB-75
No of fruits/plant	2.70-101.90	29.94-109.41	-62.32 to 35.41	BCB-38, BCB-23, BCB-45
Fruit weight(g)	39.40-474.40	51.87-187.12	-60.39 to 81.74	BCB-1, BCB-6, BCB-26
Fruit length(cm)	7.57-20.43	9.41-18.30	-42.00 to 28.24	BCB-20, BCB-45, BCB-26
Fruit girth(cm)	2.27-8.73	2.89-5.48	-41.58 to 21.75	BCB-1, BCB-26, BCB-42
Fruit yield/plant(kg)	1.37-5.20	3.01-9.40	1.54 to 152.01	BCB-38, BCB-23, BCB-75