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Heterotic Effect of Some Intra-specific Crosses of Brinjal (*Solanum melongena* L.) for Yield and Yield Attributes

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A B S T R A C T

Eighteen F_1s were generated from line x tester mating design using six parents as lines and three parents as testers during *rabi*, 2015-16. The F_1s along with their parents were evaluated altogether during *rabi*, 2016-17 for fruit yield and component characters in a randomized block design (RBD) with three replications at the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat, Assam. The heterosis was worked out for the quantitative traits viz., days to 50 percent flowering, plant height (cm), number of branches per plant, fruit length (cm), fruit girth (cm), fruit weight (g), number of fruits per plant, number of seeds per fruit, fruit yield per plant (kg), crude fiber content (%) and shelf life (days) of fruits. The magnitudes of mid-parent heterosis (MPH), better-parent heterosis (BPH) and standard heterosis (SPH) were obtained in all the eighteen F_1s for eleven characters. The study revealed that the F_1 SX × SM-6-7 gave the highest estimate of SPH (40.17 %) and it was followed by the other promising F_1's viz., BM × SM-6-7 (39.19%), SX × Longai (36.61%), DH × Longai (36.12%), SX × JC-1(35.38%), MLC-1 × JC-1 (33.66%), MLC-1 × Longai (30.59%) and BM × Longai (25.80%) for fruit yield per plant.

Introduction

Brinjal (*Solanum melongena* L., 2n=24), also known as eggplant or aubergine, is an important Solanaceous vegetable crop. It is widely grown in India throughout the year. Exploitation of hybrid vigour in brinjal has been recognized as a sound technological option in providing the breeders with a means of enhancing fruit yield and other economic traits. The consumer preferences for brinjal are highly variable from region to region. A

wide range of fruit shapes and colours, ranging from oval or egg-shaped to long club-shaped; and from white, yellow, green through various degrees of purple pigmentation to almost black fulfils the demand of local people. It is not possible to have one common cultivar to suit different localities, climates and local preferences. Locally adaptable varieties have many important traits including yielding ability that could elevate the performance of the improved varieties when combined together by the process of hybridization. Hence, keeping this point in view, the present research work was undertaken with an objective to evaluate the brinjal F_1s for their heterotic performance in respect of various important characters.

Materials and Methods

The present study was conducted at Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat, Assam. The F_1 hybrids were generated during *rabi*, 2015-16 using six lines namely, Utsav, Dari Hariharka, Manipur local-3, Manipur local-1, Baromohiya and Sagoli Xingiya and three testers viz., JC-1, SM-6-7 and Longai by hand emasculation and pollination. The seeds of eighteen F_1s and their nine parents were sown in the nursery bed and one-month-old seedlings were transplanted in the main field with spacing 75 cm x 60 cm in an RBD with three replications during *rabi*, 2016-17. Each plot of size 3 m x 3 m comprised five plants in a row and four rows in a plot. The observations were recorded on five competitive plants selected at random from each plot on plant height (cm), number of branches per plant, fruit length (cm), fruit girth (cm), fruit weight (gm), number of fruits per plant, number of seeds per fruit, fruit yield per plant (kg), crude fiber content on fresh weight basis (per cent) and shelf life of fruits on ordinary laboratory temperature (days). The counting of days to 50 per cent flowering was done on a plot basis. The shelf life of fruit was calculated on the basis of physiological loss of weight using the formula referred by Murugan *et al.,* (2011). The crude fibre content was calculated by using the protocol used for the estimation of crude fibre by Sadasivam and Manickam (1992). Critical difference was computed as SEd x t-value at error degree of freedom at 5% level of significance. Per cent estimates for MPH, BPH and SPH and their corresponding values of standard errors were calculated as per standard procedures.

Results and Discussion

The analysis of variance revealed highly significant differences among the entries including F_1s and their parental lines for most of the yield contributing traits indicating that parental lines have generated sufficient variability in the materials under study (Table 1). The extent of per cent mid-parent heterosis, better-parent heterosis and standard-parent heterosis for various traits contributing to yield and quality are presented in Table 2a, 2b, 2c and 3. The promising crosses showing significant standard parent heterosis for fruit yield and component characters along with their mean performances are also presented in Table 3. In vegetables, earliness is more desirable as it fetches a higher price and fits well with multiple cropping systems (Kamalakannan *et al.,* 2007). In the present study, the F_1s Utsav x JC-1, DH x JC-1, MLC-3 x Longai and Utsav x SM-6-7 expressed significant and desirable mid-parent heterosis, better-parent heterosis and standard heterosis for days to 50 per cent flowering. These F_1s also exhibited the significant and favourable heterosis for the number of branches per plant which is desirable for production of more number of fruits and thereby higher yield in brinjal. This finding was also supported by Joshi *et al.,* (2008), Chowdhury *et al.,* (2010), Singh *et al.,* (2012), Biswas *et al.,* (2013),

Dudhat *et al.,* (2013), Makani *et al.,* (2013), Dubey *et al.,* (2014) and Desai *et al.,* (2016).

In brinjal, the ideal plant type should be one which is tall and supports yield and its component traits. The data on heterosis support that some of the crosses, in general, were taller whereas some were shorter than their standard parent. The F_1 BM x JC-1 was found to be tallest over MP, BP and SP whereas the F_1 BM x SM-6-7 was the tallest of the F_1s over both mid-parent and the better parent. These two F_1s also had heterotic effects for the number of branches per plant and number of fruit per plant which is directly correlated to yield and its component traits. Similar findings have also been reported by Suneetha *et al.,* (2008), Pachiyappan *et al.,* (2012), Biswas *et al.,* (2013), Makani *et al.,* (2013), Reddy and Patel (2014) and Dubey *et al.,* (2014). The shortest plant stature is necessary where the problem of lodging is prevalent. To overcome this problem, we need to search for short stature variety/hybrid which would compromise with yield since plant height is positively correlated with yield. The F_1 MLC-3 x JC-1 has the shortest plant height over their MP and BP whereas F_1 Utsav x JC-1 had shorter plant height over SP but was observed to be lower yielder.

The number of branches per plant is a major parameter which can support yield and its component traits. In the present study, parental lines Baromohiya and SM-6-7 had the highest number of primary branches among lines and testers, respectively. The cross combination DH x SM-6-7 recorded the highest positive heterosis over MP, BP and SP. The cross DH x Longai had a heterotic effect over MP and BP while the F_1 BM x SM-6-7 had heterosis over only SP for this trait. Studies on MPH, BPH and SPH in different sets of material were reported by earlier workers viz., Shafeeq *et al.,* (2007), Joshi *et al.,* (2008), Sharma (2010) and Reddy and Patel (2014).

Fruit length and fruit girth are important parameters for deciding consumer preference. Therefore, the crosses showing negative heterosis for fruit length might be useful as shorter fruits are preferred in a certain region of India. The cross DH x JC-1 exhibited negative heterosis over the MP, BP and SP for fruit length. Majority of the crosses showed negative heterosis over SP for this trait.

Similar studies were conducted on different materials by Shafeeq (2005), Suneetha *et al.,* (2008) and Chowdhury *et al.,* (2010). Similarly, in certain other regions of India, mainly long fruit with medium girth is preferred. In this regard, the F_1 BM x SM-6-7 showing significant positive estimates for MPH and BPH and the F_1 BM x JC-1 showing SPH over JC-1 can be exploited for the hybrid breeding programme. Positive heterosis at different levels for fruit length was earlier reported by Pachiyappan *et al.,* (2012), Biswas *et al.,* (2013), Dubey *et al.,* (2014), Makani *et al.,* (2013), Reddy and Patel (2014) and Venkata *et al.,* (2014).

Fruit weight is one of the important component traits having a positive correlation with the fruit yield. In the present study, among the parents, the maximum average fruit weight was recorded in Dari Hariharka among the lines and JC-1 among testers. Among all F_1s, the F_1 SX x SM-6-7 recorded the highest significant positive heterosis over MP and BP whereas the F_1 BM x JC-1 exhibited significant positive heterosis over SP. Similar studies were reported by Suneetha *et al.,* (2008), Nalini *et al.,* (2011), Pachiyappan *et al.,* (2012), Biswas *et al.,* (2013), Makani *et al.,* (2013), Dubey *et al.,* (2014), Reddy and Patel (2014) and Venkata *et al.,* (2014).

The number of fruits per plant directly influences the yield of crop plants. Hence, emphasis should be given to developing such hybrids which bear higher fruits per plant.

Table.1 Analysis of variance for different characters

Source of variation	D. F.	Mean Squares											
		Days to 50% flowering	Days to 50% flowering	Plant height (cm)	Number of branches per plant	Fruit length (cm)	Fruit girth (cm)	Number of fruit/ plant	Number of seeds/fruit	Fruit yield/pl ant (kg)	Fruit yield/ ha(q)	Fiber content (%)	Shelf life (days)
Replication	2	5.15**	5.15**	51.49	0.66	2.91	0.57	0.74	227.75	0.01	552.41	0.06	0.39
Genotype	26	39.52**	39.52**	253.32**	41.51**	75.65**	27.58**	29.51**	74570.75**	1.95**	96352.24**	5.14**	2.96**
Parents	8	33.23**	33.23**	389.73**	4.57**	108.13**	45.63**	20.44**	72407.54**	1.59**	79246.69**	1.04**	5.25**
Parent vs. crosses	1	364.50**	364.50**	411.88**	701.25**	12.43**	62.63**	289.39**	871.48	22.53**	1114851.35**	11.82**	0.72*
crosses	17	23.37**	23.37**	179.80**	20.08**	64.09**	17.03**	18.49**	79923.98**	0.90**	44490.20**	6.68**	2.02**
Error	52	2.65	2.65	16.39	1.51	1.53	0.64	0.42	434.65	0.01	260.12	0.07	0.16

*P<0.05 Significant; **P<0.01 Highly significant.

Table.2a Percentage of F_1 heterosis over mid-parent (MP), better parent (BP) and standard parent (SP)

Genotype	Days to 50 per cent flowering			Plant height (cm)			Number of branches per plant		
	MPH	BPH	SPH	MPH	BPH	SPH	MPH	BPH	SPH
Utsav x JC-1	-9.87 **	-11.03 **	-11.03 **	-4.32	-17.39 **	-17.39 **	37.55 **	27.67 *	49.09 **
Utsav x SM-6-7	-6.80 **	-9.43 **	-11.76 **	13.05 **	1.43	-7.21	81.62 **	75.32 **	119.99 **
Utsav x Longai	-6.57 **	-7.09 **	-8.46 **	5.61	-6.85	-11.40 *	50.12 **	39.45 **	62.85 **
DH x JC-1	-7.12 **	-8.82 **	-8.82 **	-2.95	-12.39 **	-12.39 **	76.98 **	59.75 **	98.37 **
DH x SM-6-7	0.39	-1.91	-5.51 **	1.21	-4.84	-12.95 **	111.25 **	110.15 **	163.69 **
DH x Longai	-6.42 **	-7.46 **	-8.82 **	10.47 **	2.01	-2.97	108.41 **	88.28 **	133.80 **
MLC-3 x JC-1	-5.19 **	-7.67 **	-2.57	-18.04 **	-22.57 **	-12.95 **	58.21 **	56.80 **	59.65 **
MLC-3 x SM-6-7	-6.52 **	-12.54 **	-7.72 **	-2.75	-11.81 **	-0.85	91.74 **	73.66 **	117.90 **
MLC-3 x Longai	-7.03 **	-10.10 **	-5.15 **	-2.19	-9.72 *	1.50	87.76 **	86.26 **	89.63 **
MLC-1 x JC-1	-3.14 *	-3.68 *	-3.68 *	-3.16	-5.36	-0.85	69.46 **	55.32 **	55.32 **
MLC-1 x SM-6-7	-4.82 **	-8.18 **	-9.19 **	10.03 *	3.05	7.96	100.18 **	66.54 **	108.97 **
MLC-1 x Longai	-3.17 *	-3.35 *	-4.41 **	12.10 **	6.94	12.03 *	88.09 **	72.25 **	72.57 **
BM x JC-1	-6.39 **	-8.46 **	-8.46 **	35.84 **	15.76 **	15.76 **	78.73 **	53.40 **	114.09 **
BM x SM-6-7	-3.92 **	-5.77 **	-9.93 **	31.80 **	16.64 **	6.70	92.39 **	82.68 **	154.95 **
BM x Longai	2.27	0.75	-0.74	17.33 **	2.11	-2.87	101.24 **	72.85 **	141.24 **
SX x JC-1	-5.56 **	-6.25 **	-6.25 **	10.46 **	6.38	14.86 **	40.44 **	29.29 *	53.70 **
SX x SM-6-7	-3.47 *	-6.72 **	-8.09 **	-1.53	-9.06 *	-1.80	74.28 **	69.69 **	112.92 **
SX x Longai	-1.87	-1.87	-3.31 *	9.56 *	3.04	11.25 *	63.03 **	50.22 **	78.57 **
SEd ±	1.15	1.33	1.33	2.86	3.31	3.31	0.87	1.00	1.00

*P<0.05; **P<0.01, DH: Dari Hariharka, MLC-1: Manipur local-1, MLC-3: Manipur local-3, BM: Baromohiya and SX: Sagoli Xingiya

Table.2b Percentage of F_1 heterosis over mid parent (MPH), better-parent (BPH) and standard-parent (SPH)

Genotype	Fruit length (cm)			Fruit girth (cm)			Fruit weight (g)		
	MPH	BPH	SPH	MPH	BPH	SPH	MPH	BPH	SPH
Utsav x JC-1	-7.02	-14.64 **	-14.64 **	-25.47 **	-28.62 **	-28.62 **	-48.18 **	-57.38 **	-57.38 **
Utsav x SM-6-7	2.01	-20.32 **	-33.38 **	-19.03 **	-22.94 **	-29.44 **	-25.75 **	-40.54 **	-61.66 **
Utsav x Longai	-19.01 **	-22.85 **	-35.50 **	-5.43	-13.91 **	-3.96	-16.30 **	-28.39 **	-35.06 **
DH x JC-1	-41.97 **	-42.39 **	-41.55 **	-2.47	-11.18 **	-11.18 **	-38.05 **	-43.13 **	-43.13 **
DH x SM-6-7	42.97 **	4.61	6.13	2.45	2.09	-15.55 **	12.49 **	-17.67 **	-31.15 **
DH x Longai	-1.20	-13.75 **	-12.50 *	13.72 **	-1.27	10.14 **	18.34 **	13.74 **	3.14
MLC-3 x JC-1	-15.92 **	-26.13 **	-26.13 **	1.05	-12.38 **	-12.38 **	-18.09 **	-38.91 **	-38.91 **
MLC-3xSM-6-7	-7.50	-25.03 **	-43.24 **	-2.41	-7.89	-23.80 **	51.68 **	35.67 **	-33.30 **
MLC-3 x Longai	-17.76 **	-17.78 **	-37.75 **	-2.40	-19.08 **	-9.73 **	7.27 *	-17.29 **	-24.99 **
MLC-1 x JC-1	-13.29 **	-23.69 **	-23.69 **	11.55 **	-8.61 *	-8.61 *	-1.84	-28.23 **	-28.23 **
MLC-1xSM-6-7	4.69	-15.29 *	-35.60 **	9.45 *	-3.03	-19.78 **	52.24 **	40.00 **	-35.29 **
MLC-1 x Longai	6.59	6.35	-19.15 **	11.59 **	-12.27 **	-2.13	36.17 **	2.79	-6.79 *
BM x JC-1	28.53 **	18.20 **	18.20 **	6.61 *	-6.69 *	-6.69 *	32.99 **	8.71 **	8.71 **
BM x SM-6-7	57.94 **	23.20 **	3.40	15.84 **	10.46 *	-8.62 *	54.90 **	24.76 **	-20.78 **
BM x Longai	15.49 **	9.81	-7.84	18.70 **	-0.72	10.75 **	22.83 **	4.42	-5.31
SX x JC-1	6.34	-10.93 **	31.92 **	18.73 **	-12.94 **	-12.94 **	20.20 **	-15.38 **	-15.38 **
SX x SM-6-7	-7.29	-38.93 **	-9.55 *	30.68 **	2.19	-15.46 **	67.95 **	63.84 **	-33.18 **
SX x Longai	-14.99 **	-35.78 **	-4.88	36.52 **	-3.19	8.00 *	28.84 **	-6.61 *	-15.31 **
SEd ±	0.88	1.01	1.01	0.57	0.65	0.65	6.69	7.72	7.72

*P<0.05; **P<0.01, DH: Dari Hariharka, MLC_1: Manipur local-1, MLC-3: Manipur local-3, BM: Baromohiya and SX: Sagoli Xingiya

Table.2c Percentage of F_1 heterosis over mid parent (MP), better parent (BP) and standard parent (SP)

Genotype	Number of fruits/plant			Number of seeds/fruit			Fruit yield/plant (kg)		
	MPH	BPH	SPH	MPH	BPH	SPH	MPH	BPH	SPH
Utsav x JC-1	48.20 **	35.77 **	63.13 **	-4.79 **	-7.38 **	-2.06	-21.80 **	-30.59 **	-30.59 **
Utsav x SM-6-7	51.76 **	33.41 **	111.41 **	-11.51 **	-27.89 **	-23.75 **	16.61 **	4.60	-18.92 **
Utsav x Longai	34.77 **	29.25 **	69.16 **	-31.91 **	-36.11 **	-32.44 **	11.83 **	-7.56 **	9.71 **
DH x JC-1	72.06 **	68.98 **	75.26 **	3.52 *	-1.80	-1.80	6.91 **	-0.25	-0.25
DH x SM-6-7	24.77 **	3.21	63.56 **	28.93 **	12.30 **	0.76	52.07 **	30.07 **	12.65 **
DH x Longai	12.28 **	0.63	31.71 **	6.01 **	4.31 *	-3.30 *	32.62 **	14.70 **	36.12 **
MLC-3 x JC-1	88.25 **	67.86 **	67.86 **	-1.29	-2.72	-2.72	47.40 **	2.58	2.58
MLC-3 x SM-6-7	55.41 **	16.11 **	84.00 **	25.46 **	5.74 **	2.68	143.66 **	99.40 **	22.73 **
MLC-3 x Longai	38.20 **	10.46 *	44.56 **	18.34 **	15.66 **	12.31 **	34.32 **	-10.66 **	6.02 **
MLC-1 x JC-1	85.91 **	85.04 **	86.78 **	-4.11 **	-8.86 **	1.15	82.24 **	33.66 **	33.66 **
MLC-1 x SM-6-7	45.71 **	19.26 **	88.99 **	-3.86 *	-23.09 **	-14.65 **	125.88 **	98.60 **	22.24 **
MLC-1 x Longai	20.86 **	7.04	40.09 **	18.50 **	8.74 **	20.68 **	57.95 **	10.04 **	30.59 **
BM x JC-1	-15.98 **	-31.22 **	7.95	-5.99 **	-10.10 **	-1.49	17.73 **	17.44 **	17.44 **
BM x SM-6-7	11.47 **	10.94 **	75.80 **	-25.62 **	-40.21 **	-34.49 **	72.85 **	39.88 **	39.19 **
BM x Longai	-7.85 *	-15.51 **	32.61 **	-3.53 **	-10.96 **	-2.43	15.32 **	6.00 **	25.80 **
SX x JC-1	29.94 **	9.35 *	60.09 **	6.53 **	1.71	1.71	69.54 **	35.38 **	35.38 **
SX x SM-6-7	37.53 **	32.29 **	109.64 **	12.60 **	-2.48	-11.31 **	131.21 **	127.74 **	40.17 **
SX x Longai	16.15 **	9.99 *	61.03 **	16.48 **	15.38 **	6.96 **	53.17 **	15.11 **	36.61 **
SEd ±	0.46	0.53	0.53	14.74	17.02	17.02	0.05	0.06	0.06

*P<0.05; **P<0.01, DH: Dari Hariharka, MLC_1: Manipur local-1, MLC-3: Manipur local-3, BM: Baromohiya and SX: Sagoli Xingiya

Table.2d Percentage of F_1 Heterosis over mid parent (MP), Better parent (BP) and Standard parent (SP)

Genotype	Fiber content (%)			Shelf life (days)		
	MPH	BPH	SH	MPH	BPH	SH
Utsav x JC-1	7.48	4.07	11.12 *	9.22 *	-4.96	28.38 **
Utsav x SM-6-7	6.30	-0.42	21.72 **	-3.75	-11.12 **	20.07 **
Utsav x Longai	4.05	-1.06	17.16 **	-4.35	-18.53 **	10.06 *
DH x JC-1	18.10 **	5.11	34.76 **	-9.66 *	-12.52 *	-6.61
DH x SM-6-7	-18.49 **	-20.39 **	2.06	8.58 *	4.94	20.07 **
DH x Longai	8.93 **	4.77	34.32 **	5.8	0.00	6.76
MLC-3 x JC-1	15.10 **	7.22	7.22	0.44	-2.05	-2.05
MLC-3 x SM-6-7	13.91 **	-2.83	18.78 **	27.36 **	16.58 **	33.38 **
MLC-3 x Longai	-6.62	-19.28 **	-4.42	7.06	7.06	1.75
MLC-1 x JC-1	0.66	-4.13	5.96	-5.6	-14.32 **	5.11
MLC-1 x SM-6-7	-12.50 **	-16.69 **	1.84	3.61	0.12	22.82 **
MLC-1 x Longai	12.58 **	8.83 *	28.87 **	4.00	-7.71	13.21 *
BM x JC-1	89.66 **	79.28 **	101.33 **	-10.65 **	-25.55 **	11.71 *
BM x SM-6-7	88.45 **	80.78 **	120.99 **	5.45	-7.07 *	39.44 **
BM x Longai	30.67 **	27.30 **	50.74 **	2.06	-16.64 **	25.08 **
SX x JC-1	14.91 **	4.46	27.69 **	23.53 **	20.07 **	20.07 **
SX x SM-6-7	8.61 *	8.61 *	32.77 **	17.45 **	7.17	22.62 **
SX x Longai	2.45	0.84	23.27 **	15.03 **	14.64 **	8.96
SEd ±	0.18	0.21	0.21	0.29	0.33	0.33

*P<0.05; **P<0.01, DH: Dari Hariharka, MLC_1: Manipur local-1, MLC-3: Manipur local-3, BM: Baromohiya and SX: Sagoli Xingiya

Table.3 Promising crosses for fruit yield and component characters showing significant standard parent heterosis

Most heterotic crosses	Mean fruit yield/plant (kg)	Heterosis % for yield over standard parent	Significant standard parent heterosis for other traits in desirable direction
SX x SM-6-7	3.80	40.17 **	FYP, NSF, NFP, FC, SL, DF, PH and NBP.
BM x SM-6-7	3.78	39.19 **	FYP, NSF, NFP, FC, SL, FL, DF and NBP.
SX x Longai	3.71	36.61 **	FYP, NSF, NFP, FG, DF, PH, NBP, FC and SL
DH x Longai	3.69	36.12 **	FYP, FC, NFP, NSF, FG, DF and NBP
SX x JC-1	3.67	35.38 **	SL, FC, FYP, NFP, FL, NBP, PH and DF
MLC-1 x JC-1	3.63	33.66 **	FYP, NFP, NBP and DF
MLC-1 x Longai	3.54	30.59 **	FYP, FC, SL, NFP, NSF, NBP, PH and DF

FYP: Fruit yield per plant (kg), NSF: Number of seeds per fruit, NFP: Number of fruits per plant, FC: Fiber content (%), SL: Shelf life of fruit (days), DF: Days to 50% flowering, PH: Plant height (cm), FL: Fruit length (cm), FG: Fruit girth (cm), NFP: Number of fruits per plant, NBP: Number of branches per plant, DH: Dari Hariharka, MLC-1: Manipur local-1, BM: Baromohiya and SX: Sagoli Xingiya

The improvement in the number of fruits per plant can be achieved by using diverse parents and progenies. From the present study, MLC-3 x JC-1, MLC-1 x JC-1 and Utsav x SM-6-7 were found to have the highest significant positive heterosis over MP, BP and SP compared to all the other cross combinations. Similar results were also found by earlier works like Shafeeq *et al.,* (2007), Chowdhury *et al.,* (2010) and Biswas *et al.,* (2013), Reddy and Patel (2014), Venkata *et al.,* (2014) and Desai *et al.,* (2016).

Brinjal is regarded as poor men's vegetable. Higher yield is necessary to meet the people's demand for vegetables which will essentially provide valuable minerals and nutrient for proper growth, development and human health. Higher yield is also necessary to improve the economic status of Indian farmers for the overall benefit of the country's economy. In the present study, a highly significant positive heterosis (MP and BP) was exhibited by the F_1 SX x SM-6-7 followed by MLC-3 x SM-6-7 which exhibited significant heterosis (SP) for yield per plant and yield per ha. Similar findings were reported by several workers such as Kumar *et al.,* (2012), Biswas *et al.,* (2013), Makani *et al.,* (2013), Dubey *et al.,* (2014), Reddy and Patel (2014), Venkata *et al.,* (2014) and Boddepalli *et al.,* (2016).

The seed inside the fruit is a major constraint for consumer preference hence the development of variety having few seeds inside the fruit is desirable for consumption. In the present investigation, many hybrids having lesser seed over their parents were observed. The hybrid Utsav x Longai recorded to have highly significant negative heterosis for this trait over MP while the F_1 BM x SM-6-7 was found to have highly significant negative heterosis over both BP and SP. High yielding hybrids with fewer seeds per fruit but with a seed parent having more number of seeds per fruit will be preferred in a commercial hybrid

seed production. Only high yielding hybrid never full fills the consumer requirement and producer requirement. Hence the quality of produce is a prerequisite for the fulfilment of both consumer and producer requirement.

Keeping this point in view, high fibre content and long shelf life is a necessity for hybrid development. In the present study, the F_1 BM x JC-1 showed highly significant positive heterosis over MP whereas BM x SM-6-7 had highly significant positive heterotic effect over both BP and SP for high fibre content which could fulfil the consumer and farmers requirement. For shelf life which prevents the market glut, the F_{1S} MLC-3 x SM-6-7 and SX x JC-1 were found to have a longer shelf life over MP and BP. The F_1 BM x SM-6-7 was found with highly significant positive heterosis over SP (JC- 1) for both the traits. These crosses can be exploited for developing high-quality hybrids.

On the basis of economic heterosis, it can be concluded that the heterosis breeding could be advantageous for the improvement of brinjal genotypes for yield and fruit characters. The F_1s namely, SX x SM-6-7 and BM x SM-6-7 showing significant standard parent heterosis (SPH) in Table 2a, 2b, 2c and 2d were probably due to the highly significant heterotic effect in yield and its contributing traits viz., number of branches per plant and number of fruits per pant which can be utilized for commercial exploitation of heterosis towards maximizing yield.

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