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The exploitation of heterosis in elite inbred lines for development of single cross hybrids with Speciality traits of baby corn (*Zea mays* L.)

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Abstract
Heterosis for yield and yield related characters of baby corn was studied using 27 hybrids generated by crossing between nine-lines with three testers in line × testers mating design. The objective of the experiment was to identify the best heterotic combinations for baby corn yield and related traits. Twenty-seven hybrids along with parents and two checks were evaluated in randomized block design with two replications. Most of the hybrid combinations reported the highest magnitude of the mid parent, better parent and standard heterosis for various baby corn yield and yield related traits. The cross combination BBCP-8-2 × BBCH-51-2 has shown the highest mid parent, a better parent and standard heterosis values over checks for baby corn yield per plant. For days to 50% silking the hybrids BBCP-27-1 × BBCH-51-2, BBCP-27-2 × BBCH-95-2 and BBCP-10-1 × BBCH-95-2 resulted in desirable standard heterosis values. Whereas the single hybrid combination BBCP-27-1 × BBCH-51-2 has reported the highest heterotic effects for the number of ears per plant. The highest magnitude of standard heterosis over both the checks was reported for dehusked baby corn weight exhibited by BBCP-8-2 × BBCH-95-2 and BBCP-37-2 × BBCH-95-2. Likewise, the hybrid BBCP-8-2 × BBCH-95-2 exhibited the highest heterotic effects for ear length and the hybrid BBCP-27-2 × BBCH-95-2 exhibited the highest standard heterosis for ear diameter. The hybrid BBCP-8-2 × BBCH-95-2 exhibited the highest magnitude of standard heterosis for the dehusked weight of baby corn.

Keywords: Heterosis, mid parent heterosis, heterobeltiosis, standard heterosis

Introduction
Maize, being a C_4 plant, is having high physiological efficiency and the highest genetic yield potential among the food grain crops. Maize is unique among cereals as it is ideal for a wide range of uses and speciality maize such as baby corn, sweet corn, and popcorn possessing additional characteristic features. The baby corn is the ear of a maize plant harvested at an immature (unfertilized) young stage, particularly when the silks have not fully emerged or just emerged mainly within 1-3 days. The dehusked ears of baby corn can either be used raw or include in the diet like salads, chutneys, pickles, vegetables, soups, kheers, and other Chinese preparations. Baby corn is a good crop for diversification (Dass *et al*., 2008) [4] and suits peri-urban agriculture. Baby corn has a high market value due to its high nutritional value, taste, and potential to earn foreign exchange through the export of fresh/canned baby corn and its processed products, aside from growing demand to meet local needs in the country (Paroda, 2001) [8]. The availability of hybrids specifically bred and released for baby corn cultivation is limited in the market. By keeping this loophole of baby corn cultivation under consideration, the present investigation was carried out to develop and identify superior cross combinations possessing heterosis for various baby corn yield and quality traits.

Materials and Methods
The experiment was conducted at the University of Agricultural Science Dharwad, India during *Rabi* season 2018 and *Kharif* season 2019. The experimental material consisted of nine diverse inbred lines BBCP-8-2, BBCP-27-1, BBCP-37-2, BBCP-49-1, BBCP-27-2, BBCP11-1, BBCP-41-1, BBCP-15-3, BBCP-10-1 and three testers namely BBCH-95-2, BBCH-51-2, BBCH-120-1 belonging to two different genetically diverse heterotic groups and two commercial checks i.e. HM-4 (National check), CPB 468 (Private check). The lines and testers were at F_4 generation. The sowing was done in a randomized complete block design with two replications where each replication consisted of 27 hybrids, 12 parents and 2 checks and the length of each row was 3m. The distance between two rows was 60 cm and between plants was 20 cm. The crop was raised following the recommended package of cultivation practices.

The crossing of nine lines with three testers was followed during *Rabi* season 2018 following line × tester design and evaluation of resultant hybrids was done during *Kharif* 2019 season. The observations on various baby corn traits such as days to 50% silking, number of cobs per plant, husked weight of baby corn, dehusked weight of baby corn and baby corn yield without husk per plant were taken from 10 plants of each genotype selected randomly. The mean data of the above-mentioned traits were used for analysing the magnitude of the better parent, mid parent and standard heterosis using WINDOSTAT (V 9.2) following the standard given by Kempthorne (1957).

Results and Discussion

The pedigree of nine lines and three testers belonging to F_4 generations along with two checks is presented in (Table 1) which were utilized in the crossing program. The average performances of 27 F_1 hybrids along with their 12 parental lines are presented in Table 2. The mean sum of squares due to seven traits of baby corn *viz*., days to 50% silking, number of cobs per plant, cob weight with husk, cob weight without husk, ear length, ear diameter and baby corn yield without husk per plant is presented in Table 3. However, the hybrid BBCP-27-1 × BBCH-51-2 exhibited maximum baby corn yield (42.32 g) and the highest number of cobs per plant (5.35) whereas the hybrid BBCP-27-2 × BBCH-95-2 exhibited the highest cob weight with husk (47.94 g) and highest baby corn ear diameter (1.38 cm). The hybrid BBCP-8-2 × BBCH-95-2 recorded the highest baby corn length (10.18 cm). While the hybrid BBCP-37-2 × BBCH-95-2 exhibited the highest dehusked weight of baby corn (9.33 g). Likewise, three hybrids BBCP-27-1 × BBCH-51-2, BBCP-27-2 × BBCH-95-2 and BBCP-10-1 × BBCH-95-2 have shown the earliest days to 50% silking (53.5 days).

The mid parent heterosis and better parent heterosis (heterobeltiosis) values are presented in Table 4. The hybrids BBCP-8-2 × BBCH-95-2 and BBCP-11-1 × BBCH-120-1 gave -6.03% and -9.17% as highly significant negative values of mid parent heterosis and better parent heterosis respectively for days to 50% silking. The highest values of mid parent (98.15%) and better parent (73.9%) for the number of cobs per plant (prolificacy) was presented by cross combinations BBCP-27-1 × BBCH-51-2 and BBCP-11-1 × BBCP-51-2 respectively. Whereas for the trait, cob weight with husk, the hybrid combination BBCP-11-1 × BBCP-51-2 has presented the highest significant values for both mid parent (109.92%) and better parent (103.78%) heterosis similar to Aminu *et al*. (2014) [1]. The eighth hybrid combination BBCP-37-2 × BBCP-51-2 gave the highest values of 173.91% and 160% as of mid parent and better parent heterosis values respectively for the trait cob weight without husk similar to findings of Aminu *et al*. (2014) [1].

The hybrids BBCP-10-1 × BBCH-120-1 and BBCP-37-2 × BBCH-120-1 have reported highest mid parent (34.86%) and better parent (32.29%) heterosis respectively. Likewise, the significant highest value of mid parent heterosis (34.86%) was reported by BBCP-10-1 × BBCH-120-1 and the highest better parent heterosis value of 32.29% was reported by BBCP-37-2 × BBCP-51-2 for baby corn ear diameter. The findings are in line with the results of Chattopadhyay and Dhiman (2006) [3]. Whereas for baby corn yield without husk per plant, a single hybrid namely BBCP-11-1 × BBCH-51-2 reported the highest significant effects for both mid parent (301.78%) and better parent (283.03%) heterosis.

The heterosis of 27 F_1 hybrids was considered to the national check HM-4 and private check CPB 468 for different baby corn traits as presented in Table 5. Days to 50% silking regulates the earliness of flowering of the hybrid. The negative values of relative heterosis for days to 50% silking was reported by Ashish and Singh (2003) [2]. Hence negative heterosis is desirable for this character. Considering HM-4 as a check, three hybrids namely BBCP-27-1 × BBCH-51-2, BBCP-27-2 × BBCH-95-2 and BBCP-10-1 × BBCH-95-2 showed significant negative heterosis of -4.46% for days to 50% silking indicating the superiority of F_1 hybrids over the national check and helps for adjusting multiple cropping patterns. These results conform to the findings of Jawaharlal *et al*. (2012). Whereas, none of the hybrids showed significant values over check CPB 468, indicating the superiority of CPB 468 for days to 50% silking. The economical trait for baby corn production is baby corn yield without husk per plant. The hybrid BBCP-27-1 × BBCH-51-2 exhibited positive heterosis values of 33.78% and 25.71% over CPB 468 and HM-4 respectively for baby corn yield without husk per plant similar to the results of Jawaharlal and Sai (2012) [5, 6] for grain yield. The hybrid combination BBCP-27-1 × BBCH-51-2 was the only hybrid out of 27 F_1's exhibiting the highest positive significant value of 16.30% for the number of cobs per plant over check HM-4. The hybrid BBCP-27-2 × BBCH-95-2 gave the highest values of 25.12% and 48.88% of standard heterosis over CPB 468 and HM-4 respectively, for the trait of cob weight with husk. The cob weight without husk determines the baby corn weight, for which the hybrid combination BBCP-37-2 × BBCH-95-2 gave 50.48% and 27.37% as values for commercial heterosis over CPB 468 and HM-4 respectively. The hybrid BBCP-8-2 × BBCH-95-2 gave 20.26% and 25.14% as heterotic values over CPB 468 and HM-4 respectively. Likewise, for ear diameter, the hybrid BBCP-27-2 × BBCH-95-2 gave 24.77% and 18.38% as heterosis values over check CPB 468 and HM-4 respectively. The hybrid BBCP-8-2 × BBCH-95-2 gave the highest commercial values of 20.26% and 25.14% over checks CPB 468 and HM-4 respectively for ear length of baby corn. Melkamu (2013) [7] observed similar results for ear length trait in grain maize.

Table 1: List and pedigree of parents and hybrid checks used for the study

SI. No.	Line code	Pedigree
1	L1	BBCP-8-2
2	L2	BBCP-27-1
3	L3	BBCP-37-2
4	L4	BBCP-49-1
5	L5	BBCP-27-2
6	L6	BBCP-11-1
7	L7	BBCP-41-1
8	L8	BBCP-15-3
9	L9	BBCP-10-1
Tester code		
10	T1	BBCH-95-2
11	T2	BBCH-51-2
12	T3	BBCH-120-1
Checks		
13	CPB 468	
14	HM- 4	

Table 2: The average performance of twelve parents and their twenty-seven hybrids *per se* for various baby corn traits

SI. No.	F1 Hybrids	Days to 50% silking	Number of cobs per plant	Cob weight with husk (g)	Cob weight without husk (g)	Ear length (cm)	Ear diameter (cm)	Baby corn yield without husk per plant (g)
1	BBCP-8-2 × BBCH-95-2	54.50	3.00	39.91	9.00	10.18	1.37	27.00
2	BBCP-8-2 × BBCH-51-2	54.50	3.20	42.95	8.96	9.37	1.18	28.66
3	BBCP-8-2 × BBCH-120-1	54.00	3.30	36.52	8.25	8.34	1.20	27.22
4	BBCP-27-1 × BBCH-95-2	57.00	3.00	34.48	8.40	8.47	1.33	25.20
5	BBCP-27-1 × BBCH-51-2	53.50	5.35	40.15	7.91	8.39	1.19	42.32
6	BBCP-27-1 × BBCH-120-1	55.50	4.00	47.05	8.30	8.71	1.24	33.20
7	BBCP-37-2 × BBCH-95-2	57.00	3.00	46.30	9.33	9.58	1.37	27.99
8	BBCP-37-2 × BBCH-51-2	58.00	3.30	28.21	8.45	8.69	1.27	27.88
9	BBCP-37-2 × BBCH-120-1	55.00	2.30	39.60	5.90	9.37	1.12	13.58
10	BBCP-49-1 × BBCH-95-2	56.50	2.60	35.00	5.37	7.23	1.35	13.99
12	BBCP-49-1 × BBCH-51-2	55.00	2.30	36.67	3.35	4.17	1.05	7.69
13	BBCP-49-1 × BBCH-120-1	55.50	4.25	32.44	7.18	8.30	1.28	30.72
14	BBCP-27-2 × BBCH-95-2	53.50	3.65	47.94	8.59	8.78	1.38	31.35
15	BBCP-27-2 × BBCH-51-2	58.50	4.00	36.30	6.70	8.46	1.18	26.82
16	BBCP-27-2 × BBCH-120-1	57.00	4.50	44.31	7.87	9.02	1.23	35.50
17	BBCP-11-1 × BBCH-95-2	57.50	2.70	30.08	2.71	8.62	1.09	7.35
18	BBCP-11-1 × BBCH-51-2	57.00	4.00	42.28	7.90	9.22	1.24	31.60
19	BBCP-11-1 × BBCH-120-1	54.50	3.60	44.50	6.47	8.80	1.17	23.31
20	BBCP-41-1 × BBCH-95-2	57.00	3.10	41.48	6.93	6.51	1.28	21.66
21	BBCP-41-1 × BBCH-51-2	54.50	3.10	33.33	4.24	9.12	1.14	13.16
22	BBCP-41-1 × BBCH-120-1	57.00	3.75	37.30	8.95	5.51	1.31	33.65
23	BBCP-15-3 × BBCH-95-2	59.00	3.20	38.69	5.25	7.91	1.18	16.76
24	BBCP-15-3 × BBCH-51-2	58.00	2.90	47.05	7.90	7.95	1.15	22.74
25	BBCP-15-3 × BBCH-120-1	56.00	2.40	39.88	6.45	8.77	1.23	15.33
26	BBCP-10-1 × BBCH-95-2	53.50	3.00	41.99	5.90	7.52	1.16	17.65
27	BBCP-10-1 × BBCH-51-2	59.00	3.65	43.04	5.53	8.71	1.24	20.16
28	BBCP-10-1 × BBCH-120-1	60.00	3.30	38.63	8.69	7.37	1.32	28.38
Lines								
1	BBCP-8-2	58.50	3.20	25.81	4.16	7.37	0.99	13.29
2	BBCP-27-1	56.50	3.10	26.32	6.18	7.84	1.08	19.25
3	BBCP-37-2	58.00	3.40	22.95	2.92	6.64	0.96	9.92
4	BBCP-49-1	58.00	3.20	22.57	8.48	7.48	1.27	27.17
5	BBCP-27-2	55.50	3.75	22.15	4.74	6.75	1.07	17.82
6	BBCP-11-1	60.00	2.00	27.15	4.12	7.23	1.02	8.25
7	BBCP-41-1	56.00	2.40	32.79	4.05	5.62	1.08	9.73
8	BBCP-15-3	56.00	2.40	39.38	7.80	7.39	1.25	18.68
9	BBCP-10-1	53.50	2.10	23.38	3.39	3.98	0.86	7.13
Testers								
10	BBCH-95-2	57.50	3.20	23.52	6.10	7.91	1.08	19.50
11	BBCH-51-2	55.00	2.30	23.32	3.25	7.05	0.94	7.48
12	BBCH-120-1	53.00	3.90	22.25	4.42	7.03	1.10	17.30

Table 3: Analysis of variance for baby corn yield and related traits among F_1 hybrids and inbred lines in maize during *Kharif* 2019

Source of Variation	d.f.	Days to 50% silking	Number of cobs per plant	Cob weight with husk (g)	Cob weight without husk (g)	Ear length (cm)	Ear diameter (cm)	Baby corn yield without husk per plant (g)
Replication	1	3.70	0.01	0.02	1.23	0.69	0.00	8.69
Parents	11	8.49**	0.83 **	53.95**	6.42**	2.37**	0.02**	78.57**
Females (Lines)	8	7.47**	0.77**	65.33**	7.66**	2.91**	0.03**	87.54**
Males (Testers)	2	10.16**	1.28**	0.93	4.10**	0.51	0.01	81.91**
Females V/s Males (Lines V/s Testers)	1	13.34**	0.39	68.93**	1.14	1.78	0.00	0.13
Crosses	26	6.89**	0.98**	54.27**	6.40**	3.80**	0.01*	150.98**
Parents V/s Crosses	1	0.92	3.18**	3036.52**	72.39**	29.38**	0.50**	1492.58**
Error	38	1.38	0. 10	2.49	0.49	0.77	0.00	10.83

* - Significant at 5% level of significance ** - Significant at 1% level of significance

Table 4: Heterotic effect of F_1 over mid parent and better parent (heterobeltiosis) for various baby corn traits

SI. No.	F_1 Hybrids	Days to 50% silking		Number of cobs per plant		Cob weight with husk (g)	
		MP	BP	MP	BP	MP	BP
1.	BBCP-8-2 × BBCH-95-2	-6.03**	-6.84**	-6.25	-6.25	61.81**	54.65**
2.	BBCP-8-2 × BBCH-51-2	-3.96*	-6.84**	16.36	0.00	74.84**	66.41**
3.	BBCP-8-2 × BBCH-120-1	-3.14	-7.69**	-7.04	-15.38	51.98**	41.50**
4.	BBCP-27-1 × BBCH-95-2	0.00	-0.87	-4.76	-6.25	38.35**	31.00**
5.	BBCP-27-1 × BBCH-51-2	-4.04*	-5.31*	98.15 **	72.58**	61.76**	52.55**

6.	BBCP-27-1 × BBCH-120-1	1.37	-1.77	14.29	2.56	93.74**	78.76**
7.	BBCP-37-2 × BBCH-95-2	-1.30	-1.72	-9.09	-11.76	99.25**	96.81**
8.	BBCP-37-2 × BBCH-51-2	2.65	0.00	15.79	-2.94	21.94**	20.97**
9.	BBCP-37-2 × BBCH-120-1	-0.90	-5.71*	-36.99**	-41.03**	75.22**	72.55**
10.	BBCP-49-1 × BBCH-95-2	-2.16	-2.59	-18.75	-18.75	51.84**	48.78**
11.	BBCP-49-1 × BBCH-51-2	-2.65	-5.17*	-16.36	-28.12*	59.82**	57.27**
12.	BBCP-49-1 × BBCH-120-1	0.00	-4.31*	19.72*	8.97	44.76**	43.72**
13.	BBCP-27-2 × BBCH-95-2	-5.31**	-6.96**	5.04	-2.67	109.92**	103.78**
14.	BBCP-27-2 × BBCH-51-2	5.88**	5.41*	32.23**	6.67	59.69**	55.68**
15.	BBCP-27-2 × BBCH-120-1	5.07*	2.70	17.65*	15.38	99.59**	99.15**
16.	BBCP-11-1 × BBCH-95-2	-2.13	-4.17*	3.85	-15.63	18.72**	10.79*
17.	BBCP-11-1 × BBCH-51-2	-0.87	-5.00*	86.05**	73.91**	67.56**	55.75**
18.	BBCP-11-1 × BBCH-120-1	-3.54	-9.17**	22.03*	-7.69	80.18**	63.92**
19.	BBCP-41-1 × BBCH-95-2	0.44	-0.87	10.71	-3.13	47.30**	26.48**
20.	BBCP-41-1 × BBCH-51-2	-1.80	-2.68	31.91*	29.17	18.79**	1.63
21.	BBCP-41-1 × BBCH-120-1	4.59*	1.79	19.05	-3.85	35.53**	13.74**
22.	BBCP-15-3 × BBCH-95-2	3.96*	2.61	14.29	0.00	23.01**	-1.75
23.	BBCP-15-3 × BBCH-51-2	4.50*	3.57	23.40	20.83	50.08**	19.48**
24.	BBCP-15-3 × BBCH-120-1	2.75	0.00	-23.81*	-38.46**	29.42**	1.27
25.	BBCP-10-1 × BBCH-95-2	-3.60	-6.96**	13.21	-6.25	79.04**	78.49**
26.	BBCP-10-1 × BBCH-51-2	8.76**	7.27**	65.91**	58.70**	84.35**	84.11**
27.	BBCP-10-1 × BBCH-120-1	12.68**	12.15**	10.00	-15.38	69.32**	65.23**

SI. No.	F_1 Hybrids	Cob weight without husk (g)		Ear length (cm)		Ear diameter (cm)		Baby corn yield without husk per plant (g)	
		MP	BP	MP	BP	MP	BP	MP	BP
1	BBCP-8-2 × BBCH-95-2	75.44**	47.54**	33.20**	28.62**	32.85**	27.31**	64.65**	38.46*
2	BBCP-8-2 × BBCH-51-2	141.97**	115.50**	30.03**	27.20**	22.28*	19.19	175.90**	115.56**
3	BBCP-8-2 × BBCH-120-1	92.20**	86.44**	15.90*	13.23	15.31	9.55	77.93**	57.34*
4	BBCP-27-1 × BBCH-95-2	36.81**	35.92*	7.58	7.08	23.15**	23.15*	30.06	29.23
5	BBCP-27-1 × BBCH-51-2	67.76**	27.99*	12.69	7.02	18.32*	10.65	216.68**	119.86**
6	BBCP-27-1 × BBCH-120-1	56.53**	34.30*	17.22*	11.16	13.76	12.73	81.66**	72.45**
7	BBCP-37-2 × BBCH-95-2	106.87**	52.95**	31.64**	21.04**	34.80**	27.31**	90.23**	43.54*
8	BBCP-37-2 × BBCH-51-2	173.91**	160.00**	26.95**	23.26**	33.68**	32.29**	220.31**	180.82**
9	BBCP-37-2 × BBCH-120-1	60.65**	33.33	37.16**	33.36**	9.22	2.27	-0.25	-21.50
10	BBCP-49-1 × BBCH-95-2	-26.36*	-36.71**	-6.01	-8.59	14.89*	6.30	-40.06**	-48.53**
11	BBCP-49-1 × BBCH-51-2	-42.91**	-60.52**	-42.53**	-44.18**	-4.98	-17.32*	-55.60**	-71.69**
12	BBCP-49-1 × BBCH-120-1	11.31	-15.32	14.47*	11.03	8.44	1.18	38.14*	13.04
13	BBCP-27-2 × BBCH-95-2	58.49**	40.82**	19.74**	10.93	28.84**	28.24**	68.01**	60.77**
14	BBCP-27-2 × BBCH-51-2	67.83**	41.46*	22.68**	20.07*	17.41*	10.28	112.02**	50.51*
15	BBCP-27-2 × BBCH-120-1	71.85**	66.14**	30.91**	28.31**	13.82	12.27	102.16**	99.21**
16	BBCP-11-1 × BBCH-95-2	-46.89**	-55.49**	-29.83**	-32.85**	4.04	1.39	-47.01*	-62.30**
17	BBCP-11-1 × BBCH-51-2	114.24**	91.52**	20.76**	19.21*	26.21**	20.98*	301.78**	283.03**
18	BBCP-11-1 × BBCH-120-1	51.46**	46.33*	29.34**	27.51**	10.12	6.36	82.47**	34.74
19	BBCP-41-1 × BBCH-95-2	36.55*	13.61	29.99**	11.18	18.24*	17.97*	48.18*	11.06
20	BBCP-41-1 × BBCH-51-2	16.30	4.81	2.80	-7.59	13.09	5.53	52.91	35.23
21	BBCP-41-1 × BBCH-120-1	111.33**	102.37**	44.13**	29.73**	19.91*	19.09*	149.02**	94.54**
22	BBCP-15-3 × BBCH-95-2	-24.46*	-32.69**	-27.93**	-30.32**	1.72	-5.20	-12.18	-14.03
23	BBCP-15-3 × BBCH-51-2	42.99**	1.28	9.63	7.10	5.48	-7.60	73.85**	21.73
24	BBCP-15-3 × BBCH-120-1	5.52	-17.31	10.26	7.58	4.68	-1.60	-14.77	-17.92
25	BBCP-10-1 × BBCH-95-2	24.38	-3.20	47.54**	10.87	19.28*	7.41	32.50	-9.51
26	BBCP-10-1 × BBCH-51-2	66.44**	62.89*	36.36**	6.67	37.40**	31.91**	175.93**	169.59**
27	BBCP-10-1 × BBCH-120-1	122.25**	96.38**	58.22**	23.90**	34.86**	20.45*	132.28**	64.05**

Table 5: Standard heterosis of twenty-seven crosses over checks CPB 468 and HM-4 for various baby corn traits

SI. No.	F_1 Hybrids	Days to 50% silking		Number of cobs per plant		Cob weight with husk (g)	
		CPB 468	HM- 4	CPB 468	HM- 4	CPB 468	HM- 4
1	BBCP-8-2 × BBCH-95-2	-1.80	-2.68	-41.18**	-34.78**	4.18	23.96**
2	BBCP-8-2 × BBCH-51-2	-1.80	-2.68	-37.25**	-30.43**	12.10**	33.39**
3	BBCP-8-2 × BBCH-120-1	-2.70	-3.57	-35.29**	-28.26**	-4.68	13.42**
4	BBCP-27-1 × BBCH-95-2	2.70	1.79	-41.18**	-34.78**	-10.01**	7.08
5	BBCP-27-1 × BBCH-51-2	-3.60	-4.46*	4.90	16.30*	4.79	24.69**
6	BBCP-27-1 × BBCH-120-1	0.00	-0.89	-21.57**	-13.04	22.80**	46.12**
7	BBCP-37-2 × BBCH-95-2	2.70	1.79	-41.18**	-34.78**	20.84**	43.79**
8	BBCP-37-2 × BBCH-51-2	4.50*	3.57	-35.29**	-28.26**	-26.37**	-12.39**
9	BBCP-37-2 × BBCH-120-1	-0.90	-1.79	-54.90**	-50.00**	3.35	22.98**
10	BBCP-49-1 × BBCH-95-2	1.80	0.89	-49.02**	-43.48**	-8.65*	8.70*
11	BBCP-49-1 × BBCH-51-2	-0.90	-1.79	-54.90**	-50.00**	-4.28	13.90**
12	BBCP-49-1 × BBCH-120-1	0.00	-0.89	-16.67*	-7.61	-15.32**	0.76
13	BBCP-27-2 × BBCH-95-2	-3.60	-4.46*	-28.43**	-20.65*	25.12**	48.88**
14	BBCP-27-2 × BBCH-51-2	5.41*	4.46*	-21.57**	-13.04	-5.25	12.75**
15	BBCP-27-2 × BBCH-120-1	2.70	1.79	-11.76	-2.17	15.65**	37.61**
16	BBCP-11-1 × BBCH-95-2	3.60	2.68	-47.06**	-41.30**	-21.49**	-6.58

17	BBCP-11-1 × BBCH-51-2	2.70	1.79	-21.57**	-13.04	10.36**	31.32**
18	BBCP-11-1 × BBCH-120-1	-1.80	-2.68	-29.41**	-21.74**	16.16**	38.21**
19	BBCP-41-1 × BBCH-95-2	2.70	1.79	-39.22**	-32.61**	8.26*	28.82**
20	BBCP-41-1 × BBCH-51-2	-1.80	-2.68	-39.22**	-32.61**	-13.01**	3.51
21	BBCP-41-1 × BBCH-120-1	2.70	1.79	-26.47**	-18.48*	-2.65	15.84**
22	BBCP-15-3 × BBCH-95-2	6.31**	5.36*	-37.25**	-30.43**	0.98	20.16**
23	BBCP-15-3 × BBCH-51-2	4.50*	3.57	-43.14**	-36.96**	22.80**	46.12**
24	BBCP-15-3 × BBCH-120-1	0.90	0.00	-52.94**	-47.83**	4.08	23.85**
25	BBCP-10-1 × BBCH-95-2	-3.60	-4.46*	-41.18**	-34.78**	9.59**	30.40**
26	BBCP-10-1 × BBCH-51-2	6.31**	5.36*	-28.43**	-20.65*	12.35**	33.68**
27	BBCP-10-1 × BBCH-120-1	8.11**	7.14**	-35.29**	-28.26**	0.82	19.97**

SI. No.	F_1 Hybrids	Cob weight without husk (g)		Ear length (cm)		Ear diameter (cm)		Baby corn yield without husk per plant (g)	
		CPB 468	HM- 4	CPB 468	HM- 4	CPB 468	HM- 4	CPB 468	HM- 4
1	BBCP-8-2 × BBCH-95-2	45.16**	22.87*	20.26**	25.14**	23.87**	17.52*	-14.66	-19.81
2	BBCP-8-2 × BBCH-51-2	44.60**	22.39	10.75	15.24*	6.31	0.85	-9.42	-14.88
3	BBCP-8-2 × BBCH-120-1	33.06*	12.63	-1.42	2.58	8.56	2.99	-13.97	-19.16
4	BBCP-27-1 × BBCH-95-2	35.48*	14.68	0.12	4.18	19.82*	13.68	-20.35	-25.16*
5	BBCP-27-1 × BBCH-51-2	27.58*	7.99	-0.89	3.13	7.66	2.14	33.78**	25.71*
6	BBCP-27-1 × BBCH-120-1	33.87*	13.31	2.95	7.13	11.71	5.98	4.93	-1.40
7	BBCP-37-2 × BBCH-95-2	50.48**	27.37*	13.17	17.76*	23.87**	17.52*	-11.54	-16.87
8	BBCP-37-2 × BBCH-51-2	36.29**	15.36	2.66	6.82	14.41	8.55	-11.88	-17.20
9	BBCP-37-2 × BBCH-120-1	-4.84	-19.45	10.75	15.24*	1.35	-3.85	-57.08**	-59.67**
10	BBCP-49-1 × BBCH-95-2	-13.39	-26.69*	-14.53*	-11.06	21.62*	15.38	-55.78**	-58.45**
11	BBCP-49-1 × BBCH-51-2	-45.97**	-54.27**	-50.68**	-48.68**	-5.41	-10.26	-75.68**	-77.15**
12	BBCP-49-1 × BBCH-120-1	15.89	-1.91	-1.89	2.09	15.77	9.83	-2.90	-8.75
13	BBCP-27-2 × BBCH-95-2	38.55**	17.27	3.72	7.93	24.77**	18.38*	-0.91	-6.89
14	BBCP-27-2 × BBCH-51-2	8.15	-8.46	0.00	4.06	6.31	0.85	-15.23	-20.34
15	BBCP-27-2 × BBCH-120-1	27.02*	7.51	6.56	10.88	11.26	5.56	12.20	5.44
16	BBCP-11-1 × BBCH-95-2	-56.21**	-62.94**	-37.21**	-34.67**	-1.35	-6.41	-76.76**	-78.16**
17	BBCP-11-1 × BBCH-51-2	27.42*	7.85	1.89	6.02	11.71	5.98	-0.13	-6.15
18	BBCP-11-1 × BBCH-120-1	4.44	-11.60	8.98	13.40	5.41	0.00	-26.33*	-30.77**
19	BBCP-41-1 × BBCH-95-2	11.77	-5.39	3.96	8.17	15.32	9.40	-31.55*	-35.68**
20	BBCP-41-1 × BBCH-51-2	-31.53*	-42.05**	-23.04**	-19.91**	3.15	-2.14	-58.41**	-60.92**
21	BBCP-41-1 × BBCH-120-1	44.44**	22.25	7.74	12.11	18.02*	11.97	6.37	-0.04
22	BBCP-15-3 × BBCH-95-2	-15.32	-28.33*	-34.85**	-32.21**	6.76	1.28	-47.02**	-50.21**
23	BBCP-15-3 × BBCH-51-2	27.42*	7.85	-6.50	-2.70	4.05	-1.28	-28.13*	-32.46**
24	BBCP-15-3 × BBCH-120-1	4.03	-11.95	-6.08	-2.27	10.81	5.13	-51.54**	-54.46**
25	BBCP-10-1 × BBCH-95-2	-4.76	-19.39	3.66	7.87	4.50	-0.85	-44.23**	-47.59**
26	BBCP-10-1 × BBCH-51-2	-10.81	-24.51*	-11.16	-7.56	11.71	5.98	-36.27**	-40.11**
27	BBCP-10-1 × BBCH-120-1	40.16**	18.63	2.89	7.07	19.37*	13.25	-10.30	-15.71

Conclusion

Out of 27 single cross hybrids, the cross combination BBCP-27-1 × BBCH-51-2 gave desirable standard heterosis values over both the checks for baby corn yield without husk per plant. Whereas the hybrid combination BBCP-27-2 × BBCH-95-2 exhibited standard heterosis over both the checks for the husked weight of baby corn. Hence the results pave the way for the development of superior single cross hybrid combinations for baby corn traits. These crosses could also be utilized for exploiting promising recombinants in varietal improvement programs for enhancing baby corn yield and quality.

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