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Studies on narrow sense heritability and heterosis for yield and yield contributing traits in baby corn (*Zea mays* L.)

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Abstract
An investigation was conducted to estimate narrow sense heritability and heterosis for yield, earliness, and quality traits in baby corn (*Zea mays* L.) across three locations: Rajendranagar, Jagityal, and Kampasagar. Seventy-five single cross hybrids, along with two standard checks (DMR-1142 and DMR-1144), were evaluated for thirteen traits, including days to 50% tasseling and silking, plant height, ear height, baby corn length and girth, cob weight, number of cobs per plant, cob yield per plant and per hectare, green fodder yield, and total soluble solids. High narrow sense heritability was observed for plant height (84.64%), green fodder yield (81.33%), cob yield per hectare (71.33%), baby corn length (68.98%), ear height (67.42%), and cob weight (57.86%), indicating predominance of additive gene action and effectiveness of selection for these traits. Moderate to low heritability was recorded for earliness and quality traits, suggesting a greater influence of non-additive gene action and environmental effects. Significant negative heterobeltiosis and standard heterosis for days to tasseling and silking indicated potential for early-maturing hybrids, while positive heterosis was observed for cob yield per plant, cob yield per hectare, cob weight, and green fodder yield. Hybrids BML-5121 × CM-131, BML-5212 × BML-13, and BML-5121 × BML-6 showed superior heterotic performance over parents and checks. The study highlights the combined role of additive gene action and heterosis in developing high-yielding, early-maturing, and superior quality baby corn hybrids for commercial cultivation.

Keywords: Baby corn, narrow sense heritability, heterobeltiosis, standard heterosis, yield traits

Introduction

Baby corn (*Zea mays* L.) is a specialty form of maize harvested at an immature stage. In India, maize production exceeded 35 million metric tonnes during 2023-24, and baby corn is cultivated on a limited but expanding scale, with an estimated annual production of 20-25 thousand tonnes. Improvement of this crop focuses on enhancing yield, earliness, uniformity, and quality traits through systematic breeding approaches.

Genetic improvement in baby corn is contingent upon the extent of genetic variability present in breeding populations and the nature of gene action governing economically important traits. Among genetic parameters, heritability, particularly narrow sense heritability, is of critical importance as it measures the proportion of additive genetic variance relative to total phenotypic variance and predicts the effectiveness of selection (Panse and Sukhatme, 1967). Traits with high narrow sense heritability are largely controlled by additive gene action and respond favourably to selection, facilitating the development of superior inbred lines and stable genotypes (Singh and Chaudhary, 1985) [15].

Heterosis (hybrid vigor) has been extensively exploited in maize improvement since its classical documentation by Shull (1908) [14]. In Indian maize breeding programmes, heterosis has played a pivotal role in enhancing yield potential and adaptability of hybrids (Dhillon *et al*., 2014). The superiority of hybrids over their parents is primarily attributed to non-additive gene action, including dominance and epistatic interactions, which cannot be readily fixed through selection but can be effectively exploited through hybrid breeding. Estimation of heterosis over better parent (heterobeltiosis), and standard checks provides valuable information for identifying superior cross combinations and assessing their commercial potential (Arunachalam and Bandyopadhyay, 1984). In baby corn, heterosis for yield and yield-related traits such as cob yield, cob weight, number of cobs per plant, and green fodder yield has been widely reported under Indian conditions (Singh *et al.*, 2017) [15].

The magnitude and expression of heritability and heterosis are often influenced by environmental conditions, resulting in genotype × environment interactions that affect trait performance (Rao *et al.*, 2012). In this context, the present investigation was undertaken to estimate narrow sense heritability and heterosis for yield, yield components, growth, earliness, and quality traits in baby corn evaluated across three locations; Rajendranagar, Jagityal, and Kampasagar; with pooled analysis. The findings are expected to provide insights into the genetic control of key traits and to identify promising hybrids and characters for future baby corn breeding programmes.

Materials and Methods

The study was conducted using baby corn (*Zea mays* L.) with the aim of estimating heritability and heterosis for key yield and yield contributing traits. The experimental material comprised 25 female inbred lines and 3 male testers**,** which were crossed in a Line × Tester mating design (Kempthorne, 1957) to generate 75 F_1 hybrids**.** In addition, two standard checks were included, resulting in a total of 105 experimental entries for evaluation. The experiments were conducted across three diverse agro-ecological locations**:** Rajendranagar, Jagityal, and Kampasagar. At each location, the trials were laid out in a Randomized Complete Block Design (RCBD) with three replications. Each experimental plot consisted of specify row length, e.g., 4 m and row spacing, e.g., 60 cm × 20 cm, and standard agronomic practices were uniformly applied across all plots to ensure healthy crop growth. Data were recorded on important growth, earliness, yield, and quality traits**,** including: Days to 50% tasselling, Days to 50% silking, Plant height (cm), Ear height (cm), Number of cobs per plant, Baby corn length (cm) and girth (cm), Cob weight (g), Cob yield per plant (g) Green fodder yield (kg plot^{-1}). Observations for plant-based traits were recorded on randomly selected competitive plants, while plot-based traits were measured across the whole plot.

Estimation of Narrow sense Heritability (h^2)

The heritability (h^2) in narrow sense for different characters were worked out by using formula suggested by Lush (1949) and Burton and De Vance (1953).

$$Heritability\ (Narrow\ sense) = \frac{Additive\ variance(\sigma^2 A)}{Phenotypic\ variance(\sigma^2 P)} x100$$

Where,
h^2 (ns) = heritability (narrow sense) expressed in per cent
σ^2A = Additive genetic variance
σ^2P = Phenotypic variance

Estimation of Heterosis

Heterosis was estimated using means of various quantitative characters studied. Heterosis was expressed as percentage increase or decrease of F_1 over better parent (heterobeltiosis) and standard parent (economic heterosis) as suggested by Hays *et. al.*, (1955) and Liang *et. al.*, (1971). The formulas used for estimation of heterosis for 75 hybrids, 12 characters.

Heterosis over better parent

Heterobeltiosis was expressed as per cent increase or decrease observed in F_1 over the better
parent as per the formula of Liang *et al.* (1971).

$$\text{Heterobeltiosis (\%) } (h_2) = \frac{\overline{F}_1 - \overline{BP}}{\overline{BP}} x100$$

Where,
$\overline{BP}$ = Mean of better parent (for the characters like days to 50% flowering, earliness
is desirable so the early parents are taken as better parents).

Heterosis over standard checks

Standard heterosis was expressed as per cent increase or decrease observed in F_1 over standard checks.

$$\text{Standard heterosis (\%) } (h_3) = \frac{\overline{F}_1 - \text{Mean of check}}{\text{Mean of check}} x100$$

Test of significance of heterosis

The significance of heterosis *viz.*, heterobeltiosis and standard heterosis was then tested by comparing the calculated 't'- value with the tabulated student's 't'-value for appropriate error degrees of freedom at 5 per cent and 1 per cent level of significance (0.05 and 0.01 level of probability), respectively. $'t'_{cal}$ for

$$\text{heterobeltiosis} = \frac{\overline{F}_1 - \text{Mean of mid parents or better parent}}{\text{SEM}}$$

Where,
$SEm = \sqrt{2EMS/r}$
EMS = Error mean of squares
r = Number of replications

$$'t'_{cal} \text{ for Standard heterosis} = \frac{\overline{F}_1 - \text{Mean of check}}{\text{SEM } \overline{SC}}$$

Where,
$SEm\ \overline{SC} = \sqrt{2\sigma e^2 / r}$

Results and Discussion

Estimates of narrow sense heritability (h^2ns) reflect the relative contribution of additive gene action in the inheritance of traits and determine the efficiency of selection in breeding programmes. In the present investigation, heritability estimates exhibited wide variation across locations and in pooled analysis for yield, yield components, growth, and quality traits of baby corn (Table-1).

At Rajendranagar, high narrow sense heritability was observed for plant height (84.12%), ear height (75.27%), cob yield (75.24%), green fodder yield (72.10%), baby corn length (62.38%), and cob weight (57.07%). The high estimates for these traits indicate the predominance of additive gene action and suggest greater effectiveness of direct selection under this environment. Moderate to low heritability was recorded for days to 50% tasseling (36.85%), days to 50% silking (32.53%), TSS content (25.61%), cob yield per plant (14.01%), number of cobs per plant (11.07%), baby corn girth (9.18%), and moisture percentage (1.69%), indicating substantial environmental influence and/or non-additive gene action.

At Jagityal, green fodder yield exhibited very high heritability

(91.35%), followed by plant height (81.25%), cob yield (72.95%), baby corn length (70.35%), cob weight (61.72%), and ear height (53.36%). Moderate heritability was recorded for cob yield per plant (48.00%) and number of cobs per plant (46.54%), whereas flowering traits, baby corn girth, TSS content, and moisture percentage showed low heritability, suggesting limited scope for improvement through simple selection.

At Kampasagar**,** plant height recorded the highest heritability (88.56%), followed by green fodder yield (80.74%), baby corn length (74.21%), ear height (73.65%), cob yield (67.04%), and cob weight (54.79%). As observed at other locations, days to 50% tasseling and silking, cob yield per plant, baby corn girth, TSS content, number of cobs per plant, and moisture percentage exhibited low heritability estimates.

The pooled analysis revealed consistently high narrow sense heritability for plant height (84.64%), green fodder yield (81.33%), cob yield (71.33%), baby corn length (68.98%), ear height (67.42%), and cob weight (57.86%). These results clearly indicate the predominance of additive gene action governing these traits across environments. Traits related to earliness and quality exhibited moderate to low heritability, suggesting that their improvement may require exploitation of heterosis or selection in advanced generations. Similar findings have been reported earlier by Rodrigues and Silva (2002), Viola *et al*. (2003) [16], Konar and Prodhan (2005), Vaghela *et al*. (2009), Sarala Yadav (2010), and Dhasarathan *et al*. (2012) [5]. Overall, high heritability estimates for plant height, green fodder yield, cob yield, baby corn length, ear height, and cob weight indicate substantial scope for genetic improvement of these traits through selection and their effective utilization in the development of superior inbred lines in baby corn.

Heterosis for Earliness, Growth, Yield and Quality Traits in Baby Corn

Heterosis was estimated for twelve traits in seventy-five baby corn hybrids across three locations (Rajendranagar, Jagityal and Kampasagar) and pooled analysis, considering heterobeltiosis and standard heterosis over the checks DMR-1142 and DMR-1144 (Tables 2 and Table 3 and Fig-1). Wide variation in magnitude and direction of heterosis was observed for all traits, indicating differential expression of non-additive gene action under diverse environments.

Earliness Traits (Days to 50% Tasseling and Silking)

Negative heterosis for days to 50% tasseling and silking, which is desirable for early maturity, was recorded by a large proportion of hybrids across locations and in pooled analysis (Table 2 and 3). In pooled data, heterobeltiosis ranged from −15.10 to 1.66% for both traits, while standard heterosis over DMR-1142 and DMR-1144 extended up to −10.40% and −9.26%, respectively. Sixty-three hybrids exhibited significant negative heterobeltiosis for both tasseling and silking, indicating substantial scope for developing early maturing baby corn hybrids. The frequency distribution graphs revealed a predominance of negative heterotic classes, confirming the stability of earliness across environments. These results indicate the involvement of non-additive gene action governing flowering traits and agree with earlier reports in maize and baby corn.

Growth Traits (Plant Height and Ear Height)

Plant height and ear height exhibited predominantly positive and significant heterosis across locations and in pooled analysis (Table 2 & Table 3). In pooled analysis, heterobeltiosis for plant height ranged from 10.72 to 38.32%, while standard heterosis over DMR-1142 and DMR-1144 reached 54.51% and 51.39%, respectively. Ear height also showed high positive heterosis, with pooled heterobeltiosis ranging from 13.26 to 47.11%. The right-skewed distribution observed in the heterosis graphs suggests strong dominance and epistatic interactions controlling these traits. Increased plant and ear height contribute to overall plant vigour, which indirectly supports yield enhancement in baby corn hybrids.

Baby Corn Traits (Length and Girth)

Baby corn length exhibited moderate to high positive heterosis across environments (Table 2 & Table 3). In pooled analysis, heterobeltiosis ranged from −4.40 to 17.65%, while standard heterosis over checks extended up to 38.68%. Forty-six hybrids recorded significant positive heterobeltiosis, indicating improvement in market-preferred cob size. In contrast, baby corn girth showed low and inconsistent heterosis, with pooled heterobeltiosis ranging from −14.04 to 8.79%. The predominance of low or negative heterosis for girth suggests limited scope for heterotic improvement of this trait, possibly due to greater environmental influence or partial dominance.

Yield Components and Yield Traits

Cob weight exhibited substantial heterosis across locations and pooled analysis (Table 2 & Table 3) Pooled heterobeltiosis ranged from −19.31 to 29.67%, while standard heterosis over both checks exceeded 31% in several hybrids. Number of cobs per plant also recorded appreciable positive heterosis, with pooled heterobeltiosis ranging from 0.50 to 49.21%, indicating its significant contribution to yield improvement.

Cob yield per plant expressed the highest magnitude of heterosis among all traits (Table 2 & Table 3). In pooled analysis, heterobeltiosis ranged from −9.37 to 78.33%, while standard heterosis over DMR-1142 and DMR-1144 reached 77.58% and 69.16%, respectively. Cob yield per hectare also showed considerable heterosis, with pooled standard heterosis extending up to 38.76%. The wide dispersion and predominance of positive heterotic classes observed in the graphs clearly indicate that yield enhancement in baby corn is largely governed by cumulative heterosis expressed through component traits such as cob weight, number of cobs per plant, and plant vigour.

Green Fodder Yield and Quality Trait (TSS)

Green fodder yield exhibited high positive heterosis across locations and pooled analysis (Table 2 & Table 3). Pooled heterobeltiosis ranged from −15.12 to 35.32%, while standard heterosis over checks reached 41.32%, highlighting the potential of baby corn hybrids for dual-purpose utilization. Total soluble solids (TSS) exhibited moderate heterosis with pooled heterobeltiosis ranging from −11.86 to 15.92%. The relatively lower magnitude and inconsistent direction of heterosis suggest limited scope for improving sweetness through heterosis alone.

Table 1: Heritability (narrow sense) for cob yield per plant and other traits in Baby corn at three locations and pooled

Character	Heritability narrow sense (%)			
	Rajendranagar	Jagityal	Kampasagar	Pooled
Days to 50% tasseling	36.85	29.14	42.85	40.90
Days to 50% silking	32.53	27.63	34.11	31.42
Plant height (cm)	84.12	81.25	88.56	84.64
Ear height (cm)	75.27	53.36	73.65	67.42
Baby corn length (cm)	62.38	70.35	74.21	68.98
Baby corn girth (cm)	9.18	25.97	13.24	16.13
Cob weight (g)	57.07	61.72	54.79	57.86
Number of cobs per plant	11.07	46.54	7.92	21.84
Cob yield per plant (g)	14.01	48.00	20.85	27.42
Cob yield (Kg/ha)	75.24	72.95	67.04	71.33
Green fodder yield (Q/ha)	72.10	91.35	80.74	81.33
TSS (%)	25.61	13.29	11.54	16.81

Table 2: Estimates of heterobeltiosis and standard heterosis (DMR-1142 and DMR-1144) for cob yield per plant and other traits in Baby corn at three locations and pooled (Range of heterosis)

Character	Rajendranagar			Jagityal			Kampasagar			Pooled		
	Hetero beltiosis	Standard heterosis		Hetero beltiosis	Standard heterosis		Hetero beltiosis	Standard heterosis		Hetero beltiosis	Standard heterosis	
		DMR-1142	DMR-1144		DMR-1142	DMR-1144		DMR-1142	DMR-1144		DMR-1142	DMR-1144
Days to 50% tasseling	-10.71 to 6.67	-9.64 to 6.02	-5.06 to 11.39	-16.77 to 4.46	-16.77 to 3.11	-17.79 to 0.61	-19.30 to 1.27	-11.04 to 5.84	-15.10 to 5.84	-15.10 to 1.66	-10.40 to 2.49	-9.26 to 3.79
Days to 50% silking	-12.22 to 3.45	-8.72 to 5.81	-5.42 to 9.64	-14.69 to 3.70	-14.37 to 2.99	-15.38 to 1.78	-16.09 to 1.23	-10.63 to 5.63	-11.18 to 4.97	-15.10 to 1.66	-10.40 to 2.49	-9.48 to 3.23
Plant height (cm)	10.45 to 46.35	10.10 to 54.74	9.44 to 53.82	14.33 to 58.94	14.58 to 57.89	13.92 to 52.75	10.52 to 40.10	-9.91 to 49.22	-11.99 to 45.77	10.72 to 38.32	6.81 to 54.51	6.66 to 51.39
Ear height (cm)	12.30 to 65.72	11.73 to 67.50	13.39 to 91.99	9.64 to 47.78	9.63 to 46.52	10.45 to 52.45	8.70 to 53.75	-15.35 to 55.93	-20.17 to 47.06	13.26 to 47.11	-5.90 to 53.11	6.17 to 57.61
Baby corn length (cm)	-10.93 to 22.13	-12.30 to 37.30	-14.37 to 34.05	-12.73 to 24.23	-5.79 to 46.28	-2.98 to 50.64	-4.15 to 28.96	-16.29 to 34.09	-15.00 to 36.15	-4.40 to 17.65	-9.75 to 37.73	-9.13 to 38.68
Baby corn girth (cm)	-18.16 to 11.65	-19.53 to 0.00	-23.66 to -5.13	-16.67 to 21.05	-17.07 to 12.20	-15.00 to 15.00	-21.43 to 10.53	-25.58 to 6.98	-27.27 to 4.55	-14.04 to 8.79	-15.34 to 0.79	-16.85 to -1.01
Cob weight (g)	-22.81 to 35.00	-32.16 to 12.94	-29.10 to 18.03	-16.36 to 29.15	-26.10 to 40.56	-28.68 to 35.66	-34.66 to 31.43	-18.41 to 51.04	-18.41 to 51.04	-19.31 to 29.67	-17.02 to 31.18	-16.79 to 31.55
Number of cobs per plant	-0.17 to 50.25	-0.17 to 50.17	-14.29 to 28.71	-1.67 to 86.44	-3.28 to 80.33	-1.67 to 83.33	-3.28 to 75.00	-1.67 to 33.33	-1.67 to 33.33	0.50 to 49.21	0.00 to 38.18	-5.26 to 31.63
Cob yield per plant (g)	-22.95 to 104.31	-32.17 to 51.01	-39.39 to 34.94	-2.09 to 134.50	-27.32 to 151.08	-28.74 to 146.17	-26.73 to 67.99	-18.58 to 74.38	-18.54 to 74.46	-9.37 to 78.33	-15.53 to 77.58	-19.54 to 69.16
Cob yield (Kg/ha)	-27.20 to 22.55	-32.06 to 26.53	-31.35 to 27.84	-11.19 to 30.19	-20.14 to 38.80	-21.19 to 36.98	-19.45to 68.39	-26.27 to 60.20	-28.02 to 56.41	-14.56 to 31.29	-19.20 to 38.76	-19.84 to 37.66
Green fodder yield (Q/ha)	-20.34 to 47.12	-41.26 to 38.98	-45.13 to 29.83	-8.53 to 42.87	-25.22 to 37.55	-31.64 to 25.75	-20.59 to 62.55	-37.81 to 59.43	-35.70 to 64.83	-15.12 to 35.32	-33.55 to 41.32	-36.32 to 34.77
TSS (%)	-29.19 to 36.05	-22.97 to 25.00	-17.99 to 33.09	-18.02 to 25.53	-10.73 to 28.70	14.11 to 35.44	-10.93 to 15.63	-12.70 to 8.33	-17.91 to 1.87	-11.86 to 15.92	-10.09 to 13.47	-9.31 to 15.62

Table 3: Standard heterosis, heterobeltiosis and relative heterosis for top five crosses for each trait in maize

Character / Cross	Standard heterosis		Heterobeltiosis	Character / Cross	Standard heterosis		Heterobeltiosis
	Over DMR-1142	Over DMR-1144			Over DMR-1142	Over DMR-1144	
Days to 50 per centtasseling				**Cob weight**			
BML-5222 X CM-131	-10.40 **	-9.26**	-6.61**	BML-5212 X BML-6	31.18**	31.55**	22.33**
BML-5222 X BML-13	-10.19 **	-9.05**	-5.57**	BML-5121 X BML-13	30.21 **	30.58**	26.62**
BML-5222 X BML-6	-9.98**	-8.84**	-8.26 **	BML-5121 X CM-131	29.49 **	29.86**	29.67**
QPM-62 X BML-6	-5.41**	-4.21**	-7.61 **	BML-5212 X CM-131	27.60**	27.97 **	18.99 **
BML-5121 X CM-131	-4.57**	-3.37**	-6.52**	BML-5212 X BML-13	26.18**	26.54**	17.67**
Days to 50 per cent silking				**No. of cobs per plant**			
BML-5222 X CM-131	-10.40**	-9.48**	-6.61**	BML-5121 X BML-6	38.18 **	31.63**	38.87**
BML-5222 X BML-13	-10.19 **	-8.87 **	-5.57 **	BML-5212 X BML-13	38.12 **	31.58 **	47.93 **
BML-5222 X BML-6	-9.98 **	-7.66 **	-8.26**	BML-5121 X CM-131	27.07**	21.05**	27.71**
QPM-62 X BML-6	-5.41**	-4.23**	-7.61 **	BML-5212 X CM-131	26.52 **	20.53**	34.71**
BML-5121 X CM-131	-4.57**	-3.63 **	-6.52**	BML-5204-5-2-1 X CM-131	26.52**	20.53**	25.82 **
Plant height				**Cob yield per plant**			
BML-5212 X CM-131	54.59**	51.39**	37.77**	BML-5121 X CM-131	151.08 **	146.17 **	134.50 **
BML-5212 X BML-6	52.30**	49.14**	35.73**	BML-5212 X BML-13	139.94**	135.24**	121.68**

BML-5121 X CM-131	52.04**	48.90**	38.32**	BML-5121 X BML-6	128.99 **	124.52**	113.87**
BML-5121 X BML-6	45.18 **	42.18**	32.08**	BML-5212 X CM-131	126.19**	121.77**	108.98 **
BML-5212 X BML-13	43.40**	40.43**	27.80**	BML-5121 X BML-13	107.31**	103.25**	93.62**
Ear height				**Cob Yield**			
BML-5121 X CM-131	53.11 **	57.61**	47.11**	BML-5212 X CM-131	38.76**	37.66**	30.74**
BML-5212 X CM-131	49.41**	53.80**	45.31**	BML-5212 X BML-6	38.44**	37.34**	30.44**
BML-5212 X BML-6	48.04**	52.39**	43.98**	BML-5121 X BML-13	35.36**	34.29**	29.34**
BML-5212 X BML-13	46.37**	50.67**	42.35**	BML-5212 X BML-13	33.01**	31.95**	25.33**
BML-5121 X BML-13	45.38**	49.65**	39.68**	BML-5121 X BML-6	32.95 **	31.90**	27.04**
Baby corn length				**Green fodder yield**			
BML-5212 X CM-131	37.73**	38.68**	17.65**	BML-5212 X CM-131	41.32**	34.77**	15.14**
BML-5212 X BML-6	34.53**	35.45**	14.92 **	BML-5212 X BML-6	37.34**	30.98**	11.90**
BML-5121 X BML-6	30.13**	31.02**	11.04**	BML-5121 X BML-6	36.79 **	30.46 **	14.66**
BML-5121 X CM-131	29.47**	30.35**	10.47**	BML-5121 X CM-131	35.97**	29.68**	13.97**
BML-5121 X BML-13	26.80**	27.67 **	8.19 **	BML-5212 X BML-13	34.61**	28.37**	9.67**
Baby corn girth				**TSS**			
BML-5342 X BML-1	-15.34**	-16.85**	-14.04 **	BML-5118-3 X BML-13	13.47**	15.62**	15.92**
BML-5118-3 X CM-131	-13.68**	-15.22**	-9.00*	CM-104 X BML-6	-10.99 **	-9.31**	-11.32**
BML-5160 X BML-6	-13.60**	-15.14**	-2.58	CM-104 X CM-131	-10.26 **	-8.56**	-10.59**
BML-5342 X BML-6	-13.44**	-14.98**	-12.12 **	CM-104 X BML-13	-10.26**	-8.56**	-10.59**
BML-5118-3 X BML-6	-13.28**	-14.83**	-1.97	BML-5207 X BML-6	-9.89 **	-8.19 **	-11.86**

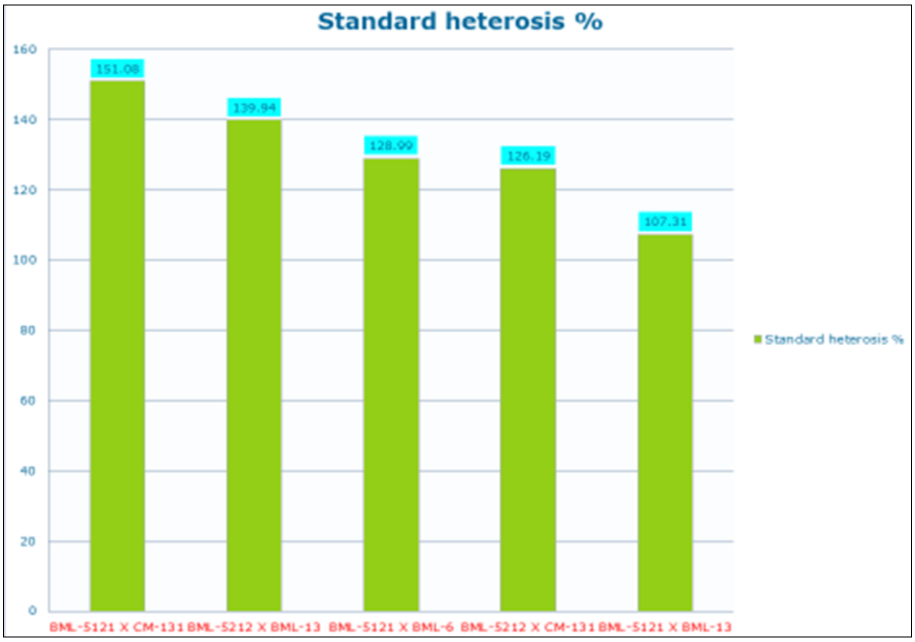

Fig 1: Standard heterosis, heterobeltiosis for top five crosses for each trait in maize

Conclusion

Based on pooled heterosis, consistency across locations, and superior per se performance (Table 3), hybrids BML-5121 × CM-131, BML-5212 × BML-13, BML-5121 × BML-6 and BML-5212 × CM-131 emerged as the most promising combinations. These hybrids recorded high heterobeltiosis and standard heterosis for cob yield per plant, cob yield per hectare, cob weight and green fodder yield, along with desirable earliness, indicating their potential for further multilocation evaluation and possible commercial exploitation. The heterosis analysis clearly demonstrated the predominance of non-additive gene action governing yield, growth and fodder yield traits in baby corn. While negative heterosis for flowering traits favoured earliness, strong positive heterosis for yield and its components highlighted the effectiveness of hybrid breeding. The concordance between heterosis tables and frequency distribution graphs confirmed the stability and magnitude of heterotic response across environments. These findings provide a strong genetic basis for exploiting heterosis in baby corn improvement programmes.

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