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Hybrid Vigor for Quantitative and Quality Traits in Maize (*Zea mays* L.)

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ABSTRACT: In this study, a set of nine parents, seventy-two F_1's (direct and reciprocals) and three standard checks was conducted in *rabi,* 2020 with three replications in randomized block design at research farm of All India Coordinated Research Project on maize Rahuri center Mahatma Phule Krishi Vidyapeeth, Rahuri Dist. Ahmednagar. The cross combinations, EC-639008 × IC-552819 exhibited high *per se* performance and highly significant standard heterosis for almost all the characters studied. The other combinations EC-639008 × IC-552819, EC-639232 × IC-552819, HYD-52327 × IC-552819 exhibited high *per se* performance with highly significant better parent and standard heterosis for kernel yield, yield contributing character with quality character in almost all the three environments. Among all the crosses, EC-639008 × IC-552819 was identified as superior, which ranked 1st for *per se* performance, with highest magnitude of standard heterosis for kernel yield per plant with other characters. These crosses should be evaluated in multilocation trials and could be used as hybrids.

Keywords: Heterosis, yield, hybrid vigor and maize.

INTRODUCTION

Maize, scientifically known as *Zea mays*, is one of the most widely cultivated cereal grains globally, cherished for its versatility and nutritional value. Originating from the Americas, maize has been a staple crop for thousands of years, serving as a dietary cornerstone for various civilizations, including the Mayans, Aztecs, and Native American tribes (Sarvari and Pepo 2014). Today, it holds a prominent position in agriculture, playing a crucial role in feeding both humans and livestock worldwide. Maize is characterized by its tall, grassy stalks with large, broad leaves and distinctive tassel-like flowers known as inflorescences (Shao *et al*., 2021). Its kernels, typically arranged in rows on cylindrical cobs, vary in color from yellow and white to blue and purple, offering a diverse range of culinary applications. Rich in carbohydrates, fiber, vitamins, and minerals, maize contributes significantly to global food security (Erenstein *et al*., 2022) and serves as a vital source of sustenance in various forms, including cornmeal, cornflour, corn oil, and as a whole grain. Among the maize growing countries (Ghete *et al*., 2020). India rank 4th in area and 7th in production, representing around 4% of the world maize area and 2% of total production. The predominant maize growing states that contributes more than 80 % of the total maize production are Andhra Pradesh (20.9 %), Karnataka (16.5 %), Rajasthan (9.9 %), Maharashtra (9.1 %), Bihar (8.9 %), Uttar Pradesh (6.1 %), Madhya Pradesh (5.7 %), Himachal Pradesh (4.4 %). Despite of this production level, in the era of growing population and climate change (Malhi *et al*., 2021), yield improvement of maize is main focus. In India very less importance was given for exploitation of heterosis for yield and quality traits (Li *et al*., 2021).

Hence, the present study aimed to harness the heterosis potential for quality traits alongside grain yield by developing and identifying single-cross hybrids in maize.

MATERIALS AND METHODS

A set of nine inbred lines (Table 1) were crossed in full diallel mating design (Griffing, Model-I, Method-II) (Griffing, 1956) during *Rabi* 2020 to generate 72 full-diallel crosses (reciprocals included).The final evaluation trial comprising of nine parents, seventy-two F_1's (direct and reciprocals) and three standard checks was conducted in *rabi*, 2020 with three replications in randomized block design at research farm of All India Coordinated Research Project on Maize, Rahuri center, at Mahatma Phule Krishi Vidyapeeth, Rahuri Dist. Ahmednagar. on a uniform piece of land. All the standard package of practices was followed to raise a good crop. The data were recorded on, days to 50 per cent tasseling, days to 50 per cent silking, days to maturity, plant height (cm), earhead height (cm), number of nodes per plant, number of leaves per plant, number of ears per plant, ear length (cm), ear girth (cm), number of kernel rows per ear, number of kernel per row, number of kernel per ear, 100 kernel weight (g), kernel weight per ear (g), kernel yield per plant (g), kernel color and kernel shape. Heterobeltiosis was estimated following Fonseca and Patterson (1968).

Table 1: Salient features of inbred lines used.

Sr. No.	Name of genotype	Salient features
1.	Hyd-52212	Bold, Yellow, Dent, Shiny
2.	IC-470475	Medium-Bold, Dent, Yellow, Long grain
3.	Hyd-52184	Yellow, Flint, Medium
4.	Hyd-52065	Round, Dent, Yellow
5.	Hyd-52327	Medium Bold, Golden yellow
6.	EC-639232	Medium, Round, Dent, Yellow
7.	IC-552819	Bold, Long grain, Dent, Yellow
8.	EC-639008	Whitish yellow, Medium round, Long grain
9.	IC-437070	White, Small seed

RESULTS AND DISCUSSION

Heterosis is one of the most significant phenomena that indicate superior performance of hybrid over their parents. It is denoted by the name hybrid vigour. Primary objective of breeder is to predict the performance of hybrids in maize breeding and to accumulate desirable genes in hybrids through the crossing of genetically unlike parents that express heterosis. High heterosis for important character is very helpful for development of synthetic, composite variety, hybrids and useful for stable yielding lines. Heterosis may be either positive or negative. Negative heterosis is extremely essential for traits like earhead height and earliness in maturity. Exploitation of hybrid vigour (Heterosis) depends on high mean performance of hybrids over its superior standard hybrids that are used as standard check (Birchler *et al*., 2010). In the present investigation desirable heterosis observed for yield characters in three environments viz. number of kernels per row, number of kernels per ear, 100 kernel weight (g), kernel weight per ear (g) and kernel yield per plant (g)are presented and discussed. The results obtained with each character are described below.

A. Number of kernel per row

The heterosis for number of kernel rows per row ranged from 13.32 per cent (EC-639008 X IC-552819) to -30.94 (HYD-52065 X IC-437070) per cent in E-1, 10.36 per cent (HYD-52327 × EC-639232) to -39.16 per cent (IC-470475 X IC-437070) in E-2 and 13.11 per cent (EC-639008 X IC-552819) to -28.21 per cent (EC-639008 X IC-437070) in E-3 for better parent, from 35.60 per cent (EC-639008 × IC-552819) to -40.89 per cent (HYD- 52212 X IC-437070) in E-1, 26.35 per cent (EC-639008 X IC-552819) to -49.52 per cent (HYD- 52212 X IC-437070) in E-2 and 48.85 per cent (EC-639008 X IC-552819) to -35.19 per cent (HYD- 52212 X IC-437070) in E-3 over the standard check Parmeshwar, from 95.43 per cent (EC-639008 X IC-552819) to -14.80 per cent (HYD- 52212 X IC-437070) in E-1, 126.06 per cent (EC-639008 X IC-552819) to -9.69 per cent (HYD- 52212 X IC-437070) in E-2 and 99.02 per cent (EC-639008 X IC-552819) to -13.35 per cent (HYD- 52212 X IC-437070) in E-3 over the standard check Rajarshi and 111.01 per cent (EC-639008 X IC-552819) to -8.01 per cent (HYD-52212 X IC-437070) in E-1, 139.69 per cent (EC-639008 X IC-552819) to -4.25 per cent (HYD- 52212 X IC-437070) and 112.60 per cent (EC-639008 X IC-552819) to -7.43 per cent (HYD- 52212 X IC-437070) in E-3 over the standard check Maharshi (Table 2).

Out of seventy-two F_1 hybrids, thirty crosses over better parent, thirty-six crosses over standard check Parmeshwar, sixty-three crosses over standard check Rajarshi, sixty-six crosses over standard check Maharshi showed highly significant positive heterosis for the character number of kernel per row in each individual season.

The crosses; EC-639008 X IC-552819 (13.32 in E-1 and 13.11 in E-3) and HYD-52327 X EC-639232 (10.36 in E-2) followed by EC-639232 X EC-639008 (13.12 in E-1) and IC-470475 X EC-639232 (9.59 in E-2 and 12.30 in E-3) and HYD-52327 X EC-639008 (12.60 in E-3), HYD-52065 X EC-639232 (9.44 in E-2) and IC-470475 X EC-639232 (12.30 in E-3) over better parent, EC-639008 X IC-552819 (35.60, 26.35 and 48.85) followed by EC-639232 X IC-552819 (33.41, 25.80 and 46.42) and HYD-52327 X IC-552819 (32.19, 24.91 and 3.63) over the standard check Parmeshwar, EC-639008 X IC-552819 (95.43, 126.06 and 99.02) followed by EC-639232 X IC-552819 (92.29, 125.07 and 95.77) and HYD-52327 X IC-552819 (90.52, 123.48 and 92.04) over the standard check Rajarshi and EC-639008 X IC-552819 (111.01, 139.69 and 112.60) followed by EC-639232 X IC-552819 (107.61, 138.64 and 109.13) and HYD-52327 X IC-552819 (105.70, 136.95 and 105.15) over the standard check Maharshi displayed significantly positive heterosis for number of kernel per row in all seasons separately. Here, better parent heterosis results are in correspondence with Kumawat *et al*. (2020); Sabitha *et al*. (2021); Yadav and Gangwar (2021); Kamal *et al*. (2022); Mogesse *et al*. (2022); Shafiq-Ur-Rehman *et al*. (2022).

B. Number of kernel per ear

Heterosis for number of kernel per ear ranged from 19.85 per cent (EC-639232 X EC-639008) to -49.92 (HYD-52184 X IC-437070) per cent in E-1, 21.17 per cent (EC-639008 X IC-552819) to -49.13 per cent (HYD-52065 X IC-437070) in E-2 and 24.14 per cent (EC-639008 X IC-552819) to -47.78 per cent (HYD-52184 X IC-437070) in E-3 for better parent, from

56.41 per cent (EC-639008 X IC-552819) to -63.53 per cent (HYD- 52212 X IC-437070) in E-1, 51.00 per cent (EC-639008 X IC-552819) to -65.10 per cent (HYD- 52212 X IC-437070) in E-2 and 50.08 per cent (EC-639008 X IC-552819) to -64.88 per cent (HYD-52212 X IC-437070) in E-3 over the standard check Parmeshwar, from 185.47 per cent (EC-639008 X IC-552819) to -33.43 per cent (HYD- 52212 X IC-437070) in E-1, 197.79 per cent (EC-639008 X IC-552819) to -31.17 per cent (HYD- 52212 X IC-437070) in E-2 and 184.54 per cent (EC-639008 X IC-552819) to -33.42 per cent (HYD- 52212 X IC-437070) in E-3 over the standard check Rajarshi and 225.04 per cent (EC-639008 X IC-552819) to -24.21 per cent (HYD-52212 X IC-437070) in E-1, 249.27 per cent (EC-639008 X IC-552819) to -19.27 per cent (HYD-52212 X IC-437070) and 216.86 per cent (EC-639008 X IC-552819) to -25.86 per cent (HYD- 52212 X IC-437070) in E-3 over the standard check Maharshi (Table 3).

Out of seventy-two F_1 hybrids, thirty crosses over better parent, thirty-six crosses over standard check Parmeshwar, sixty-three crosses over standard check Rajarshi, sixty-six crosses over standard check Maharshi showed highly significant positive heterosis for the character number of kernel per ear in all seasons.

The crosses; EC-639232 X EC-639008 (19.85 in E-1) and EC-639008 X IC-552819 (21.17 in E-2 and 24.14 in E-3) followed by HYD-52327 X EC-639008 (19.60 in E-1), EC-639232 X IC-552819 (20.19 in E-2 and 23.75 in E-3) and IC-470475 X EC-639008 (18.15 in E-1) and HYD-52327 X IC-552819 (18.95 in E-2 and 23.65 in E-3) over better parent, EC-639008 X IC-552819 (56.41, 51.00 and 50.08) followed by EC-639232 X IC-552819 (54.54, 49.77 and 49.61) and HYD-52327 X IC-552819 (54.10, 48.24 and 49.50) over the standard check Parmeshwar, EC-639008 X IC-552819 (185.47, 197.79 and 184.54) followed by EC-639232 X IC-552819 (182.06, 195.37 and 183.65) and HYD-52327 X IC-552819 (181.26, 192.34 and 183.43) over the standard check Rajarshi and EC-639008 X IC-552819 (225.04, 249.27 and 216.86) followed by EC-639232 X IC-552819 (221.15, 246.42 and 215.88) and HYD-52327 X IC-552819 (220.24 , 242.87 and 215.63) over the standard check Maharshi, showed positively and statistically significant heterosis for number of kernel per ear in all seasons separately.

Similar results were observed by Onejeme *et al*. (2020); Tolley *et al*. (2021); Yadav and Gangwar (2021); Li *et al*. (2022), reported similar findings for mid parent, better parent and standard heterosis in maize.

C. 100 kernel weight (g)

The 100 kernel weight heterosis ranged from 9.54 per cent (EC-639008 X IC-552819) to -23.82 (IC-470475 X IC-437070) per cent in E-1, 12.93 per cent (EC-639008 X IC-552819) to -30.48 per cent (HYD-52184 X IC-437070) in E-2 and 18.89 per cent (HYD-52065 X IC-472475) to -24.34 per cent (EC-639232 X IC-437070) in E-3 for better parent, from 23.96 per cent (EC-639008 X IC-552819) to -33.84 per cent (HYD-52212 X IC-437070) in E-1, 19.69 per cent (EC-639008 X IC-552819) to -34.70 per cent (HYD- 52212 X IC-437070) in E-2 and 37.60 per cent (EC-639008 X IC-552819) to -21.00 per cent (HYD- 52212 X IC-437070) in E-3 over the standard check Parmeshwar, from 66.61 per cent (EC-639008 X IC-552819) to -11.07 per cent (HYD- 52212 X IC-437070) in E-1, 50.01 per cent (EC-639008 X IC-552819) to -18.16 per cent (HYD-52212 X IC-437070) in E-2 and 63.95 per cent (EC-639008 X IC-552819) to -5.87 per cent (HYD- 52212 X IC-437070) in E-3 over the standard check Rajarshi and 74.97 per cent (EC-639008 X IC-552819) to -6.61 per cent (HYD- 52212 X IC-437070) in E-1, 76.69 per cent (EC-639008 X IC-552819) to -3.60 per cent (HYD- 52212 X IC-437070) and 67.25 per cent (EC-639008 X IC-552819) to -3.97 per cent (HYD- 52212 X IC-437070) in E-3 over the standard check Maharshi (Table 4).

Out of seventy-two F_1 hybrids, thirty crosses over lesser parent, thirty-six crosses over standard check Parmeshwar, sixty-three crosses over standard check Rajarshi, sixty-six crosses over standard check Maharshi for the character 100 kernel weight in each individual seasons.

The crosses; EC-639008 X IC-552819 (9.54 in E-1 and 12.93 in E-2) and HYD-52065 X IC-472475 (18.89 in E-3) followed by EC-639232 X IC-552819 (8.81 in E-1 and 11.61 in E-2) and IC-470475 X HYD-52065 (17.57 in E-3) and HYD-52327 X IC-552819 (8.38 in E-1 and 11.24 in E-2) and IC-470475 X HYD-52327 (9.46 in E-3) over better parent, EC-639008 X IC-552819 (23.96, 19.69 and 37.60) followed by EC-639232 X IC-552819 (23.12, 18.29 and 36.32) and HYD-52327 X IC-552819 (22.64, 17.90 and 35.79) over the standard check Parmeshwar, (66.61, 50.01 and 63.95) followed by EC-639232 X IC-552819 (65.49, 48.26 and 62.42) and HYD-52327 X IC-552819 (64.84, 47.76 and 61.78) over the standard check Rajarshi and (74.97, 76.69 and 67.25) followed by EC-639232 X IC-552819 (73.80, 74.63 and 65.70) and HYD-52327 X IC-552819 (73.11, 74.05 and 65.05) over the standard check Maharshi revealed significant positive heterosis for all seasons.

Mid parent and better parent heterosis results are in accordance Onejeme *et al*. (2020); Sabitha *et al*. (2021); Vinoth *et al.* (2021); Yadav and Gangwar (2021); Tabu *et al*. (2023).

D. Kernel weight per ear (g)

The heterosis for kernel weight per ear ranged from 17.61 per cent (EC-639008 X IC-552819) to -38.24 (HYD-52184 X IC-437070) per cent in E-1, 16.63 per cent (EC-639008 X IC-552819) to -41.75 per cent (HYD-52065 X IC-437070) in E-2 and 16.61 per cent (EC-639008 X IC-552819) to -36.85 per cent (HYD-52065 X IC-437070) in E-3 for better parent, from 52.12 per cent (EC-639008 X IC-552819) to -52.53 per cent (HYD- 52212 X IC-437070) in E-1, 44.90 per cent (EC-639008 X IC-552819) to -54.53 per cent (HYD- 52212 X IC-437070) in E-2 and 52.13 per cent (EC-639008 X IC-552819) to -50.71 per cent (HYD-52212 X IC-437070) in E-3 for the standard check

Parmeshwar, from 144.49 per cent (EC-639008 X IC-552819) to -23.70 per cent (HYD- 52212 X IC-437070) in E-1, 157.18 per cent (EC-639008 X IC-552819) to -19.30 per cent (HYD- 52212 X IC-437070) in E-2 and 150.13 per cent (EC-639008 X IC-552819) to -18.96 per cent (HYD- 52212 X IC-437070) in E-3 for the standard check Rajarshi and 169.22 per cent (EC-639008 X IC-552819) to -15.99 per cent (HYD-52212 X IC-437070) in E-1, 181.67 per cent (EC-639008 X IC-552819) to -11.62 per cent (HYD-52212 X IC-437070) in E-2 and 175.96 per cent (EC-639008 X IC-552819) to -10.60 per cent (HYD-52212 X IC-437070) in E-3 for the standard check Maharshi (Table 5).

Out of seventy-two F_1 hybrids, thirty crosses are over better parent, thirty-six crosses over standard check Parmeshwar, sixty-three crosses over standard check Rajarshi, sixty-six crosses found over standard check Maharshi for the character kernel weight per ear in all seasons.

The crosses; EC-639008 X IC-552819 (17.61 in E-1), EC-639008 X IC-552819 (16.63 in E-2) and EC-639008 X IC-552819 (16.61 in E-3) followed by EC-639232 X EC-639008 (16.99 in E-1) and EC-639232 X IC-552819 (14.47 in E-2 and 16.33 in E-3), EC-639232 X IC-552819 (16.09 in E-1) and HYD-52327 X IC-552819 (13.70 in E-2 and 15.64 in E-3) over better parent, EC-639008 X IC-552819 (52.12, 44.90 and 52.13) followed by EC-639232 X IC-552819 (50.16, 42.22 and 51.77) and HYD-52327 X IC-552819 (49.67, 41.27 and 50.87) over the standard check Parmeshwar, EC-639008 X IC-552819 (144.49, 157.18 and 150.13) followed by EC-639232 X IC-552819 (141.34, 152.42 and 149.53) and HYD-52327 X IC-552819 (140.55, 150.73 and 148.05) over the standard check Rajarshi and EC-639008 X IC-552819 (169.22, 181.67 and 175.96) followed by EC-639232 X IC-552819 (165.75, 176.46 and 175.30) and HYD-52327 X IC-552819 (164.88, 174.61 and 173.66) over the standard check Maharshi, revealed highly significant positive heterosis for all seasons.

Better parent findings were similar with Saleh *et al*. (2002); Karim *et al.* (2018); Abed and Hassan (2020); Yadav and Gangwar (2021).

E. Kernel yield per plant (g)

Heterosis for kernel yield per plant varied from 19.05 per cent (EC-639008 X IC-552819) to -42.10 (HYD-52065 X IC-437070) per cent in E-1, 18.27 per cent (EC-639008 X IC-552819) to -48.44 per cent (HYD-52065 X IC-437070) in E-2 and 18.19 per cent (EC-639232 X EC-639008) to -52.29 per cent (HYD-52184 X HYD-52212) in E-3 for better parent, from 57.58 per cent (EC-639008 X IC-552819) to -59.16 per cent (HYD- 52212 X IC-437070) in E-1, 51.95 per cent (EC-639008 X IC-552819) to -62.38 per cent (HYD- 52212 X IC-437070) in E-2 and 58.98 per cent (EC-639008 X IC-552819) to -60.60 per cent (HYD-52184 X HYD-52212) in E-3 for the standard check Parmeshwar, from 167.69 per cent (EC-639008 X IC-552819) to -30.63 per cent (HYD- 52212 X IC-437070) in E-1, 202.37 per cent (EC-639008 X IC-552819) to -25.13 per cent (HYD- 52212 X IC-437070) in E-2 and 186.14 per cent (EC-639008 X IC-552819) to -29.08 per cent (HYD-52184 X HYD-52212) in E-3 for the standard check Rajarshi and 207.45 per cent (EC-639008 X IC-552819) to -20.32 per cent (HYD-52212 X IC-437070) in E-1, 244.00 per cent (EC-639008 X IC-552819) to -14.38 per cent (HYD-52212 X IC-437070) and 239.90 per cent (EC-639008 X IC-552819) to -15.75 per cent (HYD-52184 X HYD-52212) in E-3 for the standard check Maharshi (Table 6).

Out of seventy-two F1 hybrids, thirty crosses showed highly significant positive heterosis in E-1 and E-2, forty-two in E-3 over lesser parent. While thirty-six crosses resulted highly significant positive heterosis in E-1 and E-2, thirty-six in E-3 over standard check Parmeshwar. However, sixty-three crosses showed highly significant positive heterosis in E-1 and E-2, nine in E-3 over standard check Rajarshi. Meanwhile sixty-six crosses found highly significant positive heterosis in E-1 and E-2, six in E-3 over standard check Maharshi for the character plant height.

The crosses; EC-639008 X IC-552819 (19.05 in E-1 and 18.27 in E-2) and EC-639232 X EC-639008 (18.19 in E-3) followed by EC-639232 X EC-639008 (17.75 in E-1), EC-639232 X IC-552819 (17.71 in E-2) and IC-552819 X IC-437070 (18.04 in E-3), EC-639232 X IC-552819 (16.99 in E-1), HYD-52327 X IC-552819 (17.63 in E-2) and HYD-52327 X EC-639008 (17.47 in E-3) over better parent, EC-639008 X IC-552819 (57.58, 51.95 and 58.98) followed by EC-639232 X IC-552819 (54.85, 51.23 and 57.26) and HYD-52327 X IC-552819 (54.68, 51.12 and 57.00) over the standard check Parmeshwar, EC-639008 X IC-552819 (167.69, 202.37 and 186.14) followed by EC-639232 X IC-552819 (163.04, 200.95 and 183.04) and HYD-52327 X IC-552819 (162.76, 200.73 and 182.58) over the standard check Rajarshi and EC-639008 X IC-552819 (207.45, 244.00 and 239.90) followed by EC-639232 X IC-552819 (202.11, 242.38 and 236.22) and HYD-52327 X IC-552819 (201.78, 242.13 and 235.67) over the standard check Maharshi, revealed highly significant and positive heterosis for this character in all seasons.

Better parent and better parent results were in tune with Onejeme *et al*. (2020); Vinoth *et al*. (2021); Pawar *et al*., (2021); Sabitha *et al*. (2021); Yadav and Gangwar (2021); Shafiq-Ur-Rehman *et al*. (2022) reported mid parent, better parent and standard heterosis for this trait in maize.

Table 2: Percent heterosis over better parent and standard checks for number of kernels per row in maize.

Sr. No.	Crosses		Number of kernels per row											
			E-1				E-2				E-3			
			Better Parent	Parmeshawar	Rajarshi	Maharshi	BetterParent	Parmeshawar	Rajarshi	Maharshi	BetterParent	Parmeshawar	Rajarshi	Maharshi
1	**P1XP2**	D	-23.65**	-22.12**	12.24**	21.19**	-34.87**	-33.55**	18.89**	26.06**	-21.16**	-20.53**	6.26**	13.52**
2	**P2XP1**	R	-27.20**	-25.74**	7.03**	15.56**	-38.73**	-37.49**	11.85**	18.59**	-23.13**	-22.51**	3.6	10.67**
3	**P1XP3**	D	-28.09**	-36.15**	-7.97**	-0.64	-26.49**	-47.48**	-6.03*	-0.37	-17.69**	-30.43**	-6.98**	-0.63
4	**P3XP1**	R	-29.49**	-37.39**	-9.76**	-2.56	-27.68**	-48.33**	-7.56**	-1.99	-20.64**	-32.92**	-10.31**	-4.19
5	**P1XP4**	D	-25.20**	-29.11**	2.17	10.32**	-30.49**	-42.10**	3.6	9.84**	-14.18**	-24.13**	1.45	8.37**
6	**P4XP1**	R	-29.82**	-33.49**	-4.14	3.5	-35.51**	-46.27**	-3.88	1.92	-18.45**	-27.91**	-3.6	2.97
7	**P1XP5**	D	-22.81**	-16.64**	20.14**	29.72**	-35.05**	-30.64**	24.10**	31.58**	-25.36**	-16.95**	11.05**	18.62**
8	**P5XP1**	R	-25.64**	-19.71**	15.72**	24.95**	-36.37**	-32.05**	21.58**	28.91**	-26.81**	-18.56**	8.89**	16.32**
9	**P1XP6**	D	-15.76**	-6.97**	34.08**	44.76**	-25.92**	-20.28**	42.62**	51.22**	-24.53**	-12.52**	16.97**	24.95**
10	**P6XP1**	R	-19.08**	-10.64**	28.79**	39.06**	-32.54**	-27.41**	29.87**	37.70**	-26.03**	-14.27**	14.63**	22.46**
11	**P1XP7**	D	-10.85**	6.68**	53.76**	66.01**	-11.57**	5.36**	88.50**	99.86**	-19.99**	5.28**	40.77**	50.38**
12	**P7XP1**	R	-12.60**	4.59**	50.74**	62.75**	-13.08**	3.55*	85.27**	96.44**	-21.84**	2.86	37.53**	46.91**
13	**P1XP8**	D	-12.02**	-1.15	42.47**	53.83**	-17.59**	-4.60**	70.69**	80.98**	-23.69**	-4.83**	27.25**	35.93**
14	**P8XP1**	R	-14.15**	-3.55*	39.01**	50.09**	-26.64**	-15.08**	51.93**	61.09**	-27.41**	-9.46**	21.06**	29.32**
15	**P1XP9**	D	-25.33**	-40.89**	-14.80**	-8.01**	-24.90**	-49.52**	-9.69**	-4.25	-19.11**	-35.19**	-13.35**	-7.43**
16	**P9XP1**	R	-22.99**	-39.03**	-12.13**	-5.13*	-24.22**	-49.07**	-8.87**	-3.38	-17.87**	-34.21**	-12.03**	-6.02**
17	**P2XP3**	D	-25.86**	-24.37**	9.00**	17.69**	-36.17**	-34.87**	16.52**	23.54**	-22.63**	-22.01**	4.28*	11.40**
18	**P3XP2**	R	-23.20**	-21.66**	12.91**	21.90**	-34.43**	-33.09**	19.71**	26.92**	-20.67**	-20.03**	6.92**	14.22**
19	**P2XP4**	D	6.42**	8.56**	56.46**	68.93**	4.78**	6.91**	91.28**	102.81**	10.64**	11.53**	49.13**	59.30**
20	**P4XP2**	R	7.75**	9.91**	58.41**	71.04**	5.26**	7.40**	92.16**	103.75**	11.06**	11.94**	49.68**	59.89**
21	**P2XP5**	D	3.81**	12.10**	61.56**	74.44**	7.86**	15.19**	106.10**	118.52**	11.08**	23.60**	65.26**	76.53**
22	**P5XP2**	R	3.16*	11.39**	60.55**	73.35**	7.07**	14.35**	104.59**	116.92**	9.62**	21.97**	63.08**	74.21**
23	**P2XP6**	D	6.65**	17.78**	69.75**	83.28**	9.59**	17.92**	110.98**	123.70**	12.30**	30.16**	74.04**	85.91**
24	**P6XP2**	R	3.10*	13.86**	64.10**	77.18**	8.54**	16.79**	108.96**	121.56**	9.71**	27.16**	70.02**	81.62**
25	**P2XP7**	D	9.72**	31.29**	89.23**	104.31**	4.21**	24.16**	122.14**	135.53**	8.69**	43.03**	91.24**	104.29**
26	**P7XP2**	R	7.55**	28.69**	85.47**	100.26**	2.99*	22.70**	119.53**	132.77**	5.44**	38.74**	85.51**	98.17**
27	**P2XP8**	D	12.12**	25.97**	81.55**	96.02**	4.31**	20.74**	116.02**	129.05**	8.79**	35.67**	81.41**	93.79**
28	**P8XP2**	R	7.25**	20.50**	73.67**	87.52**	3.48**	19.79**	114.32**	127.24**	6.37**	32.66**	77.37**	89.48**
29	**P2XP9**	D	-28.93**	-27.50**	4.49*	12.82**	-39.16**	-37.92**	11.07**	17.77**	-23.51**	-22.90**	3.09	10.12**
30	**P9XP2**	R	-25.71**	-24.22**	9.22**	17.93**	-35.74**	-34.43**	17.32**	24.39**	-21.78**	-21.15**	5.42**	12.62**
31	**P3XP4**	D	-24.69**	-28.62**	2.87	11.07**	-28.74**	-40.64**	6.20*	12.61**	-13.66**	-23.68**	2.05	9.02**
32	**P4XP3**	R	-28.77**	-32.49**	-2.71	5.05*	-33.14**	-44.30**	-0.34	5.66*	-16.85**	-26.49**	-1.71	4.99*
33	**P3XP5**	D	-20.64**	-14.31**	23.51**	33.35**	-34.52**	-30.07**	25.11**	32.66**	-24.91**	-16.46**	11.71**	19.33**
34	**P5XP3**	R	-24.69**	-18.67**	17.21**	26.56**	-35.94**	-31.59**	22.40**	29.78**	-26.00**	-17.67**	10.08**	17.59**
35	**P3XP6**	D	-14.95**	-6.08**	35.36**	46.15**	-24.17**	-18.41**	45.98**	54.78**	-24.41**	-12.38**	17.15**	25.14**
36	**P6XP3**	R	-17.75**	-9.17**	30.91**	41.34**	-31.79**	-26.60**	31.32**	39.23**	-25.03**	-13.11**	16.18**	24.11**
37	**P3XP7**	D	-10.15**	7.51**	54.95**	67.30**	-11.15**	5.85**	89.38**	100.80**	-16.50**	9.88**	46.91**	56.94**
38	**P7XP3**	R	-11.82**	5.52**	52.08**	64.20**	-12.62**	4.10**	86.26**	97.49**	-21.22**	3.67*	38.62**	48.07**
39	**P3XP8**	D	-11.62**	-0.7	43.11**	54.52**	-14.36**	-0.87	77.36**	88.06**	-23.01**	-3.98**	28.39**	37.15**
40	**P8XP3**	R	-13.31**	-2.61	40.37**	51.56**	-22.10**	-9.82**	61.34**	71.07**	-25.33**	-6.87**	24.52**	33.02**
41	**P3XP9**	D	-30.19**	-38.01**	-10.66**	-3.54	-27.89**	-48.48**	-7.82**	-2.26	-21.36**	-33.54**	-11.13**	-5.07*
42	**P9XP3**	R	-28.96**	-36.91**	-9.08**	-1.83	-27.13**	-47.94**	-6.85*	-1.23	-18.77**	-31.35**	-8.21**	-1.94
43	**P4XP5**	D	3.63**	11.90**	61.28**	74.14**	7.17**	14.46**	104.78**	117.13**	10.18**	22.59**	63.92**	75.10**
44	**P5XP4**	R	3.00*	11.23**	60.31**	73.09**	1.71	8.63**	94.36**	106.07**	9.10**	21.39**	62.31**	73.39**
45	**P4XP6**	D	5.23**	16.21**	67.49**	80.84**	9.44**	17.77**	110.70**	123.41**	11.41**	29.13**	72.66**	84.45**
46	**P6XP4**	R	2.66*	13.37**	63.40**	76.43**	8.10**	16.32**	108.12**	120.67**	8.59**	25.86**	68.29**	79.78**
47	**P4XP7**	D	9.64**	31.19**	89.08**	104.15**	3.90**	23.79**	121.47**	134.83**	7.56**	41.53**	89.24**	102.15**

48	**P7XP4**	R	7.14**	28.20**	84.78**	99.50**	2.83*	22.51**	119.19**	132.40**	4.77**	37.86**	84.33**	96.91**
49	**P4XP8**	D	11.55**	25.33**	80.63**	95.03**	3.91**	20.28**	115.21**	128.18**	8.43**	35.23**	80.82**	93.16**
50	**P8XP4**	R	6.73**	19.91**	72.83**	86.60**	3.14*	19.39**	113.61**	126.49**	5.99**	32.19**	76.75**	88.81**
51	**P4XP9**	D	-30.94**	-34.55**	-5.67**	1.85	-35.95**	-46.65**	-4.54	1.21	-18.86**	-28.27**	-4.09*	2.46
52	**P9XP4**	R	-25.53**	-29.42**	1.73	9.84**	-32.28**	-43.59**	0.93	7.01*	-14.40**	-24.33**	1.18	8.08**
53	**P5XP6**	D	8.04**	19.31**	71.96**	85.67**	10.36**	18.76**	112.47**	125.28**	13.03**	31.02**	75.18**	87.13**
54	**P6XP5**	R	3.65**	14.47**	64.99**	78.14**	8.79**	17.07**	109.46**	122.08**	11.13**	28.81**	72.23**	83.99**
55	**P5XP7**	D	10.47**	32.19**	90.52**	105.70**	4.84**	24.91**	123.48**	136.95**	9.15**	43.63**	92.04**	105.15**
56	**P7XP5**	R	7.81**	29.01**	85.94**	100.76**	3.05*	22.78**	119.66**	132.91**	6.01**	39.50**	86.53**	99.26**
57	**P5XP8**	D	12.60**	26.50**	82.33**	96.86**	4.50**	20.97**	116.43**	129.48**	9.38**	36.42**	82.41**	94.85**
58	**P8XP5**	R	8.04**	21.38**	74.94**	88.89**	3.61**	19.93**	114.58**	127.52**	6.75**	33.14**	78.02**	90.16**
59	**P5XP9**	D	-26.07**	-20.17**	15.06**	24.23**	-36.83**	-32.54**	20.70**	27.97**	-27.43**	-19.26**	7.96**	15.33**
60	**P9XP5**	R	-23.79**	-17.70**	18.61**	28.07**	-35.43**	-31.03**	23.39**	30.83**	-25.84**	-17.48**	10.33**	17.86**
61	**P6XP7**	D	11.50**	33.41**	92.29**	107.61**	5.59**	25.80**	125.07**	138.64**	11.27**	46.42**	95.77**	109.13**
62	**P7XP6**	R	8.71**	30.08**	87.48**	102.43**	3.47**	23.27**	120.55**	133.84**	6.39**	40.00**	87.19**	99.96**
63	**P6XP8**	D	13.12**	27.09**	83.17**	97.77**	5.06**	21.62**	117.60**	130.71**	9.93**	37.10**	83.32**	95.83**
64	**P8XP6**	R	9.06**	22.53**	76.60**	90.68**	3.73**	20.08**	114.84**	127.79**	7.85**	34.51**	79.85**	92.13**
65	**P6XP9**	D	-19.38**	-10.97**	28.31**	38.54**	-32.87**	-27.76**	29.25**	37.04**	-26.41**	-14.71**	14.04**	21.83**
66	**P9XP6**	R	-17.40**	-8.78**	31.48**	41.96**	-31.17**	-25.93**	32.52**	40.51**	-24.91**	-12.96**	16.38**	24.32**
67	**P7XP8**	D	9.24**	30.72**	88.40**	103.42**	3.70**	23.55**	121.04**	134.37**	6.87**	40.62**	88.03**	100.86**
68	**P8XP7**	R	13.32**	35.60**	95.43**	111.01**	6.05**	26.35**	126.06**	139.69**	13.11**	48.85**	99.02**	112.60**
69	**P7XP9**	D	-13.79**	3.15*	48.67**	60.52**	-13.62**	2.91	84.13**	95.23**	-22.55**	1.92	36.28**	45.58**
70	**P9XP7**	R	-10.94**	6.57**	53.59**	65.83**	-11.72**	5.18**	88.18**	99.52**	-20.28**	4.90**	40.26**	49.83**
71	**P8XP9**	D	-15.21**	-4.74**	37.30**	48.24**	-27.70**	-16.31**	49.73**	58.76**	-28.21**	-10.46**	19.72**	27.89**
72	**P9XP8**	R	-12.95**	-2.2	40.96**	52.20**	-19.90**	-7.28**	65.88**	75.88**	-24.72**	-6.11**	25.54**	34.10**
	S.E.D.		0.38	0.38	0.38	0.38	0.41	0.41	0.41	0.41	0.37	0.37	0.37	0.37
	CD95 %		0.76	0.76	0.76	0.76	0.81	0.81	0.81	0.81	0.74	0.74	0.74	0.74
	CD99 %		1.00	1.00	1.00	1.00	1.07	1.07	1.07	1.07	0.98	0.98	0.98	0.98

Table 3: Percent heterosis over better parent and standard checks for number of kernels per ear in maize.

Crosses			**Number of kernels per ear**											
Sr. No.			**E-1**				**E-2**				**E-3**			
			Better Parent	**Parmeshawar**	**Rajarshi**	**Maharshi**	**BetterParent**	**Parmeshawar**	**Rajarshi**	**Maharshi**	**BetterParent**	**Parmeshawar**	**Rajarshi**	**Maharshi**
1	**P1XP2**	D	-33.69**	-33.51**	21.35**	38.17**	-38.51**	-38.20**	21.88**	42.95**	-40.01**	-39.02**	15.62**	28.75**
2	**P2XP1**	R	-38.48**	-38.32**	12.57*	28.18**	-41.96**	-41.67**	15.04**	34.93**	-43.44**	-42.50**	9.01*	21.39**
3	**P1XP3**	D	-43.58**	-56.15**	-19.96**	-8.87	-43.65**	-57.97**	-17.11**	-2.79	-40.53**	-53.08**	-11.04**	-0.93
4	**P3XP1**	R	-48.00**	-59.58**	-26.23**	-16.01**	-46.71**	-60.25**	-21.61**	-8.05	-45.70**	-57.16**	-18.78**	-9.55*
5	**P1XP4**	D	-36.06**	-42.26**	5.39	19.99**	-41.01**	-45.54**	7.41	25.97**	-38.53**	-45.33**	3.65	15.42**
6	**P4XP1**	R	-42.92**	-48.45**	-5.92	7.11	-48.33**	-52.30**	-5.92	10.34*	-42.48**	-48.84**	-3.01	8.00
7	**P1XP5**	D	-32.32**	-25.74**	35.52**	54.31**	-32.89**	-27.82**	42.36**	66.97**	-30.56**	-24.87**	42.43**	58.62**
8	**P5XP1**	R	-35.87**	-29.64**	28.42**	46.22**	-37.22**	-32.48**	33.16**	56.18**	-39.79**	-34.86**	23.49**	37.52**
9	**P1XP6**	D	-24.24**	-13.79**	57.35**	79.16**	-20.92**	-13.01**	71.55**	101.20**	-22.53**	-14.70**	61.73**	80.10**
10	**P6XP1**	R	-28.61**	-18.76**	48.27**	68.82**	-30.48**	-23.53**	50.81**	76.88**	-25.01**	-17.43**	56.54**	74.33**
11	**P1XP7**	D	-20.87**	5.50*	92.54**	119.23**	-15.12**	5.77**	108.59**	144.65**	-11.54**	6.94**	102.76**	125.79**
12	**P7XP1**	R	-23.66**	1.78	85.75**	111.50**	-18.22**	1.91	100.98**	135.73**	-15.22**	2.5	94.33**	116.41**
13	**P1XP8**	D	-20.64**	-3.98	75.24**	99.53**	-15.42**	-1.76	93.75**	127.24**	-18.32**	-6.00**	78.22**	98.46**
14	**P8XP1**	R	-24.06**	-8.12**	67.69**	90.93**	-18.30**	-5.11**	87.14**	119.49**	-21.42**	-9.57**	71.45**	90.93**
15	**P1XP9**	D	-46.96**	-63.53**	-33.43**	-24.21**	-45.64**	-65.10**	-31.17**	-19.27**	-44.02**	-64.88**	-33.42**	-25.86**
16	**P9XP1**	R	-44.14**	-61.59**	-29.89**	-20.17**	-41.49**	-62.44**	-25.92**	-13.11**	-37.99**	-61.10**	-26.25**	-17.87**
17	**P2XP3**	D	-35.26**	-35.08**	18.48**	34.90**	-40.85**	-40.55**	17.24**	37.51**	-42.71**	-41.76**	10.41**	22.96**
18	**P3XP2**	R	-32.52**	-32.33**	23.50**	40.61**	-36.58**	-36.26**	25.70**	47.43**	-39.07**	-38.07**	17.42**	30.76**
19	**P2XP4**	D	11.33**	11.63**	103.73**	131.97**	8.11**	8.65**	114.27**	151.31**	7.27**	9.03**	106.72**	130.20**
20	**P4XP2**	R	11.68**	11.98**	104.38**	132.71**	8.75**	9.30**	115.55**	152.81**	7.78**	9.56**	107.71**	131.31**
21	**P2XP5**	D	8.42**	18.96**	117.12**	147.21**	7.06**	15.15**	127.10**	166.35**	4.70*	13.27**	114.74**	139.14**

22	**P5XP2**	R	5.10*	15.32**	110.48**	139.65**	3.83*	11.68**	120.25**	158.32**	3.39	11.85**	112.06**	136.15**
23	**P2XP6**	D	14.57**	30.37**	137.95**	170.93**	12.50**	23.75**	144.05**	186.24**	8.56**	19.54**	126.64**	152.38**
24	**P6XP2**	R	9.20**	24.26**	126.78**	158.21**	6.91**	17.60**	131.92**	172.01**	6.08**	16.81**	121.46**	146.62**
25	**P2XP7**	D	14.76**	52.99**	179.23**	217.93**	17.59**	46.54**	189.00**	238.95**	23.25**	49.00**	182.49**	214.58**
26	**P7XP2**	R	9.79**	46.37**	167.14**	204.16**	10.72**	37.98**	172.12**	219.16**	13.79**	37.56**	160.81**	190.44**
27	**P2XP8**	D	18.15**	42.95**	160.90**	197.06**	15.00**	33.57**	163.43**	208.96**	12.54**	29.51**	145.54**	173.44**
28	**P8XP2**	R	12.14**	35.67**	147.62**	181.94**	9.13**	26.76**	149.98**	193.19**	7.43**	23.64**	134.40**	161.03**
29	**P2XP9**	D	-39.04**	-38.88**	11.56*	27.02**	-42.96**	-42.67**	13.06**	32.60**	-44.08**	-43.15**	7.77*	20.02**
30	**P9XP2**	R	-34.44**	-34.27**	19.97**	36.60**	-40.08**	-39.78**	18.76**	39.29**	-41.07**	-40.10**	13.57**	26.47**
31	**P3XP4**	D	-34.21**	-40.59**	8.43	23.46**	-40.19**	-44.78**	8.90*	27.72**	-37.16**	-44.12**	5.95	17.99**
32	**P4XP3**	R	-41.17**	-46.87**	-3.03	10.41	-45.84**	-49.99**	-1.38	15.67**	-41.22**	-47.72**	-0.89	10.37*
33	**P3XP5**	D	-31.35**	-24.68**	37.47**	56.52**	-32.18**	-27.06**	43.85**	68.71**	-29.24**	-23.45**	45.14**	61.63**
34	**P5XP3**	R	-33.81**	-27.37**	32.55**	50.92**	-34.07**	-29.09**	39.85**	64.02**	-37.92**	-32.84**	27.33**	41.80**
35	**P3XP6**	D	-22.53**	-11.85**	60.89**	83.19**	-18.64**	-10.50**	76.51**	107.02**	-21.60**	-13.67**	63.67**	82.26**
36	**P6XP3**	R	-25.88**	-15.66**	53.94**	75.27**	-25.33**	-17.87**	61.98**	89.98**	-23.68**	-15.96**	59.34**	77.44**
37	**P3XP7**	D	-19.22**	7.69**	96.55**	123.79**	-14.62**	6.40**	109.84**	146.11**	-10.97**	7.64**	104.06**	127.25**
38	**P7XP3**	R	-23.36**	2.18	86.49**	112.33**	-17.73**	2.53	102.20**	137.15**	-14.17**	3.77	96.73**	119.08**
39	**P3XP8**	D	-19.78**	-2.94	77.15**	101.70**	-15.15**	-1.45	94.36**	127.96**	-16.87**	-4.33*	81.37**	101.98**
40	**P8XP3**	R	-23.06**	-6.91*	69.90**	93.45**	-17.13**	-3.74	89.83**	122.65**	-20.93**	-9.00**	72.52**	92.12**
41	**P3XP9**	D	-49.92**	-61.07**	-28.95**	-19.11**	-47.65**	-60.95**	-22.99**	-9.68*	-47.78**	-58.79**	-21.88**	-13.00**
42	**P9XP3**	R	-45.63**	-57.74**	-22.87**	-12.18*	-45.58**	-59.41**	-19.95**	-6.12	-42.94**	-54.98**	-14.64**	-4.94
43	**P4XP5**	D	7.40**	17.84**	115.07**	144.88**	6.41**	14.46**	125.72**	164.74**	3.93*	12.44**	113.18**	137.39**
44	**P5XP4**	R	4.57	14.74**	109.41**	138.43**	2.59	10.34**	117.60**	155.21**	2.07	10.42**	109.35**	133.14**
45	**P4XP6**	D	12.29**	27.78**	133.20**	165.53**	10.65**	21.72**	140.04**	181.53**	8.05**	18.97**	125.56**	151.19**
46	**P6XP4**	R	7.56**	22.39**	123.38**	154.34**	6.38**	17.02**	130.77**	170.66**	5.16**	15.80**	119.54**	144.49**
47	**P4XP7**	D	13.44**	51.24**	176.03**	214.28**	16.06**	44.62**	185.22**	234.52**	23.20**	48.94**	182.37**	214.45**
48	**P7XP4**	R	8.91**	45.19**	164.99**	201.72**	9.86**	36.90**	169.99**	216.66**	12.53**	36.04**	157.92**	187.22**
49	**P4XP8**	D	16.05**	40.41**	156.26**	191.78**	13.91**	32.31**	160.93**	206.03**	10.49**	27.15**	141.07**	168.46**
50	**P8XP4**	R	11.19**	34.53**	145.53**	179.56**	8.39**	25.89**	148.28**	191.20**	6.49**	22.55**	132.35**	158.75**
51	**P4XP9**	D	-44.88**	-50.23**	-9.16	3.43	-49.13**	-53.04**	-7.38	8.63	-43.97**	-50.18**	-5.54	5.19
52	**P9XP4**	R	-38.15**	-44.14**	1.94	16.07**	-42.84**	-47.22**	4.08	22.07**	-39.66**	-46.34**	1.73	13.29**
53	**P5XP6**	D	15.73**	31.69**	140.35**	173.66**	12.84**	24.13**	144.80**	187.11**	9.42**	20.49**	128.44**	154.39**
54	**P6XP5**	R	11.28**	26.63**	131.11**	163.15**	9.15**	20.07**	136.80**	177.73**	7.19**	18.03**	123.78**	149.20**
55	**P5XP7**	D	15.59**	54.10**	181.26**	220.24**	18.95**	48.24**	192.34**	242.87**	23.65**	49.50**	183.43**	215.63**
56	**P7XP5**	R	11.26**	48.32**	170.71**	208.22**	12.10**	39.70**	175.51**	223.13**	14.80**	38.79**	163.13**	193.03**
57	**P5XP8**	D	19.60**	44.70**	164.09**	200.69**	16.35**	35.14**	166.52**	212.58**	13.34**	30.43**	147.29**	175.38**
58	**P8XP5**	R	13.45**	37.26**	150.52**	185.24**	10.85**	28.75**	153.92**	197.81**	8.60**	24.97**	136.94**	163.85**
59	**P5XP9**	D	-36.43**	-30.25**	27.30**	44.94**	-38.82**	-34.19**	29.78**	52.22**	-40.20**	-35.30**	22.66**	36.59**
60	**P9XP5**	R	-33.12**	-26.61**	33.94**	52.50**	-33.83**	-28.83**	40.35**	64.61**	-36.36**	-31.15**	30.53**	45.36**
61	**P6XP7**	D	15.92**	54.54**	182.06**	221.15**	20.19**	49.77**	195.37**	246.42**	23.75**	49.61**	183.65**	215.88**
62	**P7XP6**	R	12.16**	49.52**	172.89**	210.72**	14.47**	42.65**	181.32**	229.95**	15.44**	39.57**	164.60**	194.66**
63	**P6XP8**	D	19.85**	45.00**	164.65**	201.33**	16.87**	35.75**	167.71**	213.99**	15.28**	32.66**	151.51**	180.08**
64	**P8XP6**	R	14.21**	38.18**	152.19**	187.14**	12.55**	30.72**	157.80**	202.36**	9.61**	26.14**	139.15**	166.32**
65	**P6XP9**	D	-29.54**	-19.83**	46.33**	66.61**	-31.36**	-24.50**	48.90**	74.64**	-26.00**	-18.52**	54.48**	72.03**
66	**P9XP6**	R	-25.55**	-15.28**	54.62**	76.05**	-23.13**	-15.44**	66.76**	95.58**	-23.27**	-15.51**	60.19**	78.39**
67	**P7XP8**	D	12.79**	50.36**	174.43**	212.47**	14.91**	43.20**	182.41**	231.23**	22.94**	48.63**	181.78**	213.79**
68	**P8XP7**	R	17.32**	56.41**	185.47**	225.04**	21.17**	51.00**	197.79**	249.27**	24.14**	50.08**	184.54**	216.86**
69	**P7XP9**	D	-24.37**	0.82	84.01**	109.51**	-19.16**	0.74	98.67**	133.01**	-15.50**	2.15	93.67**	115.68**
70	**P9XP7**	R	-22.13**	3.82	89.47**	115.74**	-16.70**	3.80*	104.71**	140.10**	-13.17**	4.97*	99.02**	121.63**
71	**P8XP9**	D	-24.77**	-8.98**	66.12**	89.15**	-19.18**	-6.13**	85.13**	117.13**	-22.07**	-10.31**	70.03**	89.35**
72	**P9XP8**	R	-22.43**	-6.15*	71.28**	95.02**	-16.01**	-2.44	92.39**	125.65**	-20.37**	-8.36**	73.75**	93.49**
	S.E.D.		10.57	10.57	10.57	10.57	7.57	7.57	7.57	7.57	8.08	8.08	8.08	8.08
	CD 95 %		20.87	20.87	20.87	20.87	14.95	14.95	14.95	14.95	15.95	15.95	15.95	15.95
	CD 99 %		27.55	27.55	27.55	27.55	19.73	19.73	19.73	19.73	21.06	21.06	21.06	21.06

Table 4: Percent heterosis over better parent and standard checks for 100 kernel weight(g) in maize.

Crosses			100 kernel weight(g)											
Sr. No.			E-1				E-2				E-3			
			Better Parent	Parmeshawar	Rajarshi	Maharshi	BetterParent	Parmeshawar	Rajarshi	Maharshi	BetterParent	Parmeshawar	Rajarshi	Maharshi
1	**P1XP2**	D	-19.88**	-19.47**	8.24**	13.67**	-9.09**	-8.94**	14.13**	34.44**	-12.60**	-12.31**	4.48**	6.59**
2	**P2XP1**	R	-23.52**	-23.13**	3.32*	8.50**	-10.96**	-10.81**	11.78**	31.67**	-13.26**	-12.96**	3.70**	5.80**
3	**P1XP3**	D	-19.72**	-29.56**	-5.32**	-0.56	-29.41**	-32.41**	-15.29**	-0.22	-9.38**	-18.10**	-2.41	-0.44
4	**P3XP1**	R	-21.28**	-30.92**	-7.15**	-2.49	-30.02**	-33.00**	-16.02**	-1.09	-10.55**	-19.15**	-3.67**	-1.73
5	**P1XP4**	D	-20.15**	-24.59**	1.37	6.45**	-12.51**	-14.42**	7.27**	26.35**	-8.43**	-14.46**	1.91	3.97**
6	**P4XP1**	R	-21.93**	-26.27**	-0.89	4.08*	-25.73**	-27.35**	-8.94**	7.26**	-10.80**	-16.67**	-0.72	1.29
7	**P1XP5**	D	-19.17**	-14.45**	14.99**	20.76**	-7.50**	-5.03**	19.04**	40.21**	-19.25**	-10.11**	7.10**	9.26**
8	**P5XP1**	R	-21.15**	-16.54**	12.17**	17.80**	-9.52**	-7.10**	16.44**	37.15**	-20.47**	-11.47**	5.48**	7.61**
9	**P1XP6**	D	-13.38**	-7.52**	24.30**	30.54**	-5.88**	-2.60*	22.08**	43.79**	-22.94**	-7.43**	10.29**	12.51**
10	**P6XP1**	R	-14.85**	-9.09**	22.19**	28.32**	-6.85**	-3.60**	20.82**	42.31**	-24.20**	-8.95**	8.48**	10.67**
11	**P1XP7**	D	-7.97**	4.14**	39.97**	47.00**	-3.82**	1.94	27.76**	50.49**	-16.32**	6.08**	26.39**	28.93**
12	**P7XP1**	R	-10.36**	1.44	36.35**	43.19**	-4.45**	1.26	26.92**	49.49**	-18.12**	3.80**	23.68**	26.17**
13	**P1XP8**	D	-9.03**	-0.82	33.31**	40.00**	-5.14**	-0.71	24.44**	46.58**	-20.88**	-3.45**	15.04**	17.36**
14	**P8XP1**	R	-12.60**	-4.72**	28.07**	34.50**	-6.25**	-1.88	22.98**	44.86**	-21.86**	-4.65**	13.61**	15.90**
15	**P1XP9**	D	-18.90**	-33.84**	-11.07**	-6.61**	-29.10**	-34.70**	-18.16**	-3.60*	-10.35**	-21.00**	-5.87**	-3.97**
16	**P9XP1**	R	-17.34**	-32.57**	-9.36**	-4.81**	-28.52**	-34.18**	-17.50**	-2.82	-9.22**	-20.00**	-4.69**	-2.76*
17	**P2XP3**	D	-23.04**	-22.65**	3.97*	9.18**	-10.55**	-10.39**	12.31**	32.28**	-12.94**	-12.65**	4.08**	6.18**
18	**P3XP2**	R	-19.16**	-18.74**	9.22**	14.70**	-8.77**	-8.62**	14.53**	34.91**	-12.36**	-12.06**	4.78**	6.89**
19	**P2XP4**	D	5.69**	6.23**	42.78**	49.95**	2.80**	2.98**	29.07**	52.03**	17.57**	17.96**	40.55**	43.39**
20	**P4XP2**	R	5.88**	6.42**	43.04**	50.22**	3.08**	3.26**	29.42**	52.44**	18.89**	19.30**	42.14**	45.01**
21	**P2XP5**	D	2.1	8.07**	45.25**	52.54**	1.74	4.46**	30.93**	54.22**	9.46**	21.84**	45.17**	48.10**
22	**P5XP2**	R	1.49	7.41**	44.38**	51.62**	1.43	4.14**	30.53**	53.75**	8.77**	21.07**	44.26**	47.17**
23	**P2XP6**	D	5.35**	12.47**	51.17**	58.76**	1.92	5.47**	32.19**	55.70**	3.68**	24.54**	48.38**	51.37**
24	**P6XP2**	R	2.95**	9.90**	47.72**	55.14**	1.59	5.12**	31.76**	55.19**	2.71**	23.37**	47.00**	49.96**
25	**P2XP7**	D	8.12**	22.35**	64.45**	72.70**	10.20**	16.79**	46.38**	72.42**	6.42**	34.91**	60.74**	63.98**
26	**P7XP2**	R	5.75**	19.66**	60.84**	68.91**	7.31**	13.73**	42.54**	67.90**	3.94**	31.76**	56.99**	60.16**
27	**P2XP8**	D	6.83**	16.47**	56.55**	64.41**	6.23**	11.19**	39.36**	64.15**	5.74**	29.03**	53.74**	56.84**
28	**P8XP2**	R	4.75**	14.20**	53.49**	61.20**	2.52*	7.31**	34.49**	58.41**	4.27**	27.24**	51.60**	54.66**
29	**P2XP9**	D	-23.82**	-23.44**	2.91	8.07**	-11.63**	-11.47**	10.95**	30.69**	-13.58**	-13.29**	3.32*	5.40**
30	**P9XP2**	R	-22.61**	-22.22**	4.55**	9.80**	-9.85**	-9.70**	13.18**	33.32**	-12.72**	-12.42**	4.34**	6.45**
31	**P3XP4**	D	-19.71**	-24.16**	1.93	7.05**	-12.19**	-14.11**	7.65**	26.80**	-7.99**	-14.04**	2.41	4.48**
32	**P4XP3**	R	-21.51**	-25.87**	-0.36	4.64**	-21.30**	-23.02**	-3.52**	13.64**	-10.66**	-16.54**	-0.56	1.45
33	**P3XP5**	D	-18.61**	-13.86**	15.78**	21.59**	-7.08**	-4.60**	19.57**	40.84**	-19.04**	-9.88**	7.38**	9.54**
34	**P5XP3**	R	-20.99**	-16.37**	12.40**	18.04**	-9.11**	-6.68**	16.96**	37.77**	-20.26**	-11.24**	5.76**	7.89**
35	**P3XP6**	D	-12.91**	-7.03**	24.97**	31.24**	-5.61**	-2.33*	22.42**	44.19**	-22.78**	-7.24**	10.52**	12.75**
36	**P6XP3**	R	-14.57**	-8.79**	22.59**	28.75**	-6.70**	-3.46**	21.00**	42.53**	-23.71**	-8.36**	9.18**	11.39**
37	**P3XP7**	D	-6.94**	5.31**	41.55**	48.65**	-3.44**	2.34*	28.27**	51.09**	-13.44**	9.73**	30.74**	33.38**
38	**P7XP3**	R	-9.58**	2.32*	37.53**	44.43**	-4.15**	1.58	27.32**	49.96**	-17.45**	4.65**	24.69**	27.20**
39	**P3XP8**	D	-8.80**	-0.57	33.65**	40.36**	-4.79**	-0.34	24.90**	47.12**	-18.58**	-0.64	18.38**	20.77**
40	**P8XP3**	R	-10.88**	-2.84*	30.59**	37.15**	-6.01**	-1.62	23.31**	45.24**	-21.53**	-4.25**	14.09**	16.39**
41	**P3XP9**	D	-21.82**	-31.39**	-7.79**	-3.16	-30.48**	-33.44**	-16.58**	-1.74	-10.93**	-19.49**	-4.08**	-2.14
42	**P9XP3**	R	-20.96**	-30.64**	-6.78**	-2.1	-29.68**	-32.67**	-15.61**	-0.60	-9.87**	-18.54**	-2.94*	-0.98
43	**P4XP5**	D	1.66	7.59**	44.62**	51.88**	1.52	4.23**	30.63**	53.87**	9.03**	21.36**	44.60**	47.51**
44	**P5XP4**	R	1.2	7.11**	43.97**	51.19**	1.17	3.87**	30.19**	53.35**	8.24**	20.49**	43.56**	46.45**
45	**P4XP6**	D	4.93**	12.02**	50.57**	58.13**	1.81	5.36**	32.05**	55.54**	3.45**	24.26**	48.05**	51.04**
46	**P6XP4**	R	2.57*	9.51**	47.19**	54.57**	1.27	4.79**	31.34**	54.71**	1.77	22.25**	45.66**	48.59**
47	**P4XP7**	D	7.46**	21.60**	63.44**	71.65**	9.55**	16.11**	45.52**	71.41**	6.15**	34.57**	60.34**	63.57**
48	**P7XP4**	R	5.22**	19.06**	60.03**	68.06**	5.90**	12.23**	40.67**	65.69**	3.16**	30.78**	55.82**	58.96**
49	**P4XP8**	D	6.21**	15.79**	55.64**	63.45**	5.52**	10.44**	38.42**	63.05**	5.33**	28.53**	53.14**	56.23**
50	**P8XP4**	R	4.45**	13.87**	53.06**	60.74**	1.58	6.33**	33.26**	56.97**	4.19**	27.14**	51.48**	54.53**
51	**P4XP9**	D	-22.78**	-27.06**	-1.97	2.95	-29.91**	-31.44**	-14.07**	1.21	-11.19**	-17.04**	-1.15	0.84
52	**P9XP4**	R	-20.58**	-24.98**	0.83	5.89**	-15.15**	-17.00**	4.03**	22.53**	-9.87**	-15.81**	0.31	2.33
53	**P5XP6**	D	5.58**	12.72**	51.51**	59.12**	2.07*	5.63**	32.39**	55.94**	4.29**	25.27**	49.25**	52.26**
54	**P6XP5**	R	3.05**	10.01**	47.87**	55.29**	1.76	5.31**	31.99**	55.47**	3.10**	23.84**	47.56**	50.53**
55	**P5XP7**	D	8.38**	22.64**	64.84**	73.11**	11.24**	17.90**	47.76**	74.05**	7.11**	35.79**	61.78**	65.05**
56	**P7XP5**	R	6.09**	20.05**	61.36**	69.46**	8.18**	14.65**	43.69**	69.25**	4.73**	32.77**	58.19**	61.38**
57	**P5XP8**	D	7.91**	17.64**	58.13**	66.06**	6.56**	11.53**	39.79**	64.66**	5.94**	29.28**	54.03**	57.14**
58	**P8XP5**	R	5.11**	14.60**	54.03**	61.76**	3.47**	8.30**	35.74**	59.88**	4.73**	27.80**	52.27**	55.34**
59	**P5XP9**	D	-21.56**	-16.98**	11.59**	17.19**	-10.17**	-7.77**	15.59**	36.16**	-20.60**	-11.61**	5.31**	7.43**
60	**P9XP5**	R	-20.68**	-16.05**	12.84**	18.50**	-8.63**	-6.19**	17.58**	38.49**	-19.57**	-10.47**	6.68**	8.83**
61	**P6XP7**	D	8.81**	23.12**	65.49**	73.80**	11.61**	18.29**	48.26**	74.63**	7.53**	36.32**	62.42**	65.70**
62	**P7XP6**	R	6.51**	20.52**	62.00**	70.13**	8.72**	15.22**	44.42**	70.10**	5.61**	33.88**	59.51**	62.73**
63	**P6XP8**	D	8.12**	17.87**	58.44**	66.39**	6.78**	11.77**	40.08**	65.00**	6.39**	29.83**	54.69**	57.81**
64	**P8XP6**	R	5.59**	15.12**	54.73**	62.50**	4.19**	9.06**	36.69**	61.00**	4.87**	27.97**	52.48**	55.55**
65	**P6XP9**	D	-17.42**	-11.84**	18.50**	24.45**	-7.07**	-3.84**	20.53**	41.97**	-24.34**	-9.12**	8.28**	10.47**
66	**P9XP6**	R	-14.09**	-8.28**	23.28**	29.46**	-6.21**	-2.94**	21.65**	43.29**	-23.25**	-7.81**	9.84**	12.05**
67	**P7XP8**	D	7.11**	21.20**	62.91**	71.08**	9.37**	15.91**	45.28**	71.12**	5.86**	34.20**	59.90**	63.13**
68	**P8XP7**	R	9.54**	23.96**	66.61**	74.97**	12.93**	19.69**	50.01**	76.69**	8.54**	37.60**	63.95**	67.25**
69	**P7XP9**	D	-10.74**	1.01	35.76**	42.57**	-4.92**	0.77	26.30**	48.77**	-18.34**	3.51**	23.33**	25.82**
70	**P9XP7**	R	-8.36**	3.70**	39.39**	46.38**	-4.00**	1.74	27.52**	50.20**	-17.21**	4.95**	25.05**	27.57**
71	**P8XP9**	D	-12.97**	-5.12**	27.54**	33.94**	-6.35**	-1.97	22.86**	44.72**	-22.52**	-5.45**	12.66**	14.93**
72	**P9XP8**	R	-10.39**	-2.31*	31.31**	37.90**	-5.61**	-1.2	23.83**	45.86**	-21.38**	-4.06**	14.31**	16.61**
	S.E.D.		0.32	0.32	0.32	0.32	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
	CD 95 %		0.63	0.63	0.63	0.63	0.56	0.56	0.56	0.56	0.57	0.57	0.57	0.57
	CD 99 %		0.83	0.83	0.83	0.83	0.74	0.74	0.74	0.74	0.75	0.75	0.75	0.75

Table 5: Percent heterosis over better parent and standard checks for kernel weight per ear(g) in maize.

Crosses			Kernel weight per ear(g)											
Sr. No.			E-1				E-2				E-3			
			Better Parent	Parmeshawar	Rajarshi	Maharshi	Better Parent	Parmeshawar	Rajarshi	Maharshi	BetterParent	Parmeshawar	Rajarshi	Maharshi
1	**P1XP2**	D	-29.58**	-29.25**	13.70**	25.21**	-35.70**	-34.84**	15.65**	26.66**	-34.47 **	-33.37 **	9.55 **	20.87**
2	**P2XP1**	R	-32.91**	-32.60**	8.32*	19.28**	-38.85**	-38.03**	9.98*	20.46**	-36.02 **	-34.94 **	6.96	18.01 **
3	**P1XP3**	D	-33.24**	-43.76**	-9.62**	-0.47	-37.05**	-48.92**	-9.34*	-0.70	-28.91 **	-45.42 **	-10.26 **	-0.99
4	**P3XP1**	R	-36.43**	-46.45**	-13.93**	-5.22	-38.43**	-50.03**	-11.32*	-2.87	-32.41 **	-48.10 **	-14.67 **	-5.86
5	**P1XP4**	D	-29.11**	-36.00**	2.86	13.26**	-34.06**	-39.76**	6.92	17.11**	-29.61 **	-36.48 **	4.44	15.22 **
6	**P4XP1**	R	-34.83**	-41.17**	-5.44	4.12	-40.86**	-45.97**	-4.1	5.03	-35.80 **	-42.06 **	-4.74	5.1
7	**P1XP5**	D	-26.81**	-20.67**	27.50**	40.40**	-28.82**	-22.57**	37.44**	50.53**	-32.53 **	-25.70 **	22.16 **	34.77 **
8	**P5XP1**	R	-29.70**	-23.80**	22.47**	34.86**	-35.12**	-29.42**	25.26**	37.20**	-35.75 **	-29.24 **	16.33 **	28.35 **
9	**P1XP6**	D	-21.49**	-11.38**	42.43**	56.84**	-22.39**	-12.67**	54.99**	69.76**	-25.42 **	-12.87 **	43.25 **	58.04 **
10	**P6XP1**	R	-23.03**	-13.12**	39.64**	53.76**	-26.68**	-17.51**	46.42**	60.36**	-31.68 **	-20.19 **	31.21 **	44.76 **
11	**P1XP7**	D	-17.42**	6.82**	71.67**	89.04**	-14.33**	6.44*	88.91**	106.91**	-16.86 **	8.46 **	78.33 **	96.74 **
12	**P7XP1**	R	-20.15**	3.29	66.00**	82.79**	-17.48**	2.52	81.96**	99.30**	-20.52 **	3.69	70.49 **	88.09 **
13	**P1XP8**	D	-17.67**	-2.16	57.25**	73.15**	-17.82**	-2.43	73.17**	89.67**	-20.80 **	-2.86	59.71 **	76.20 **
14	**P8XP1**	R	-21.54**	-6.75**	49.87**	65.03**	-21.50**	-6.80**	65.42**	81.18**	-24.42 **	-7.30 **	52.42 **	68.16 **
15	**P1XP9**	D	-35.56**	-52.53**	-23.70**	-15.99**	-32.30**	-54.53**	-19.30**	-11.62*	-28.77 **	-50.71 **	-18.96 **	-10.60**
16	**P9XP1**	R	-33.23**	-50.81**	-20.95**	-12.95**	-27.16**	-51.08**	-13.17**	-4.9	-27.04 **	-49.52 **	-17.00 **	-8.43*
17	**P2XP3**	D	-31.74**	-31.43**	10.21**	21.36**	-38.47**	-37.64**	10.68*	21.22**	-35.48 **	-34.40 **	7.86 *	19.00 **
18	**P3XP2**	R	-28.19**	-27.86**	15.95**	27.68**	-35.28**	-34.41**	16.42**	27.51**	-33.28 **	-32.16 **	11.54 **	23.06 **
19	**P2XP4**	D	9.48**	9.99**	76.77**	94.66**	8.38**	9.83**	94.94**	113.51**	10.33 **	12.18 **	84.44 **	103.48 **
20	**P4XP2**	R	11.01**	11.53**	79.24**	97.38**	9.50**	10.97**	96.95**	115.71**	13.73 **	15.63 **	90.12 **	109.75 **
21	**P2XP5**	D	9.06**	18.21**	89.99**	109.21**	7.47**	16.91**	107.50**	127.26**	10.67 **	21.88 **	100.39 **	121.08 **
22	**P5XP2**	R	8.00**	17.06**	88.14**	107.18**	5.25*	14.50**	103.22**	122.58**	8.10 **	19.05 **	95.73 **	115.94 **
23	**P2XP6**	D	10.73**	25.00**	100.89**	121.22**	8.89**	22.52**	117.45**	138.17**	10.03 **	28.53 **	111.33 **	133.15 **
24	**P6XP2**	R	8.64**	22.63**	97.09**	117.03**	6.47**	19.80**	112.63**	132.88**	7.05 **	25.05 **	105.60 **	126.83 **
25	**P2XP7**	D	15.08**	48.85**	139.23**	163.44**	12.69**	40.01**	148.49**	172.16**	15.15 **	50.23 **	147.00 **	172.50 **
26	**P7XP2**	R	11.30**	43.96**	131.38**	154.79**	8.85**	35.24**	140.02**	162.89**	7.69 **	40.50 **	131.00 **	154.85 **
27	**P2XP8**	D	15.15**	36.85**	119.95**	142.20**	9.28**	29.75**	130.29**	152.23**	12.06 **	37.45 **	125.98 **	149.32 **
28	**P8XP2**	R	11.64**	32.68**	113.24**	134.81**	6.69**	26.67**	124.82**	146.24**	8.93 **	33.60 **	119.66 **	142.34 **
29	**P2XP9**	D	-34.24**	-33.94**	6.17	16.91**	-39.85**	-39.04**	8.2	18.50**	-36.70 **	-35.64 **	5.81	16.74 **
30	**P9XP2**	R	-29.85**	-29.52**	13.27**	24.73**	-37.50**	-36.67**	12.41**	23.12**	-34.74 **	-33.64 **	9.10 *	20.37 **
31	**P3XP4**	D	-28.13**	-35.12**	4.28	14.83**	-33.62**	-39.35**	7.64	17.90**	-29.32 **	-36.22 **	4.87	15.69 **
32	**P4XP3**	R	-33.55**	-40.02**	-3.59	6.16	-38.97**	-44.24**	-1.04	8.39	-35.28 **	-41.60 **	-3.97	5.94
33	**P3XP5**	D	-25.50**	-19.25**	29.78**	42.91**	-27.44**	-21.06**	40.10**	53.45**	-31.85 **	-24.95 **	23.40 **	36.14 **
34	**P5XP3**	R	-27.82**	-21.76**	25.74**	38.46**	-32.93**	-27.04**	29.50**	41.83**	-34.87 **	-28.27 **	17.94 **	30.11 **
35	**P3XP6**	D	-20.84**	-10.65**	43.61**	58.14**	-20.15**	-10.16**	59.46**	74.64**	-23.90 **	-11.10 **	46.16 **	61.25 **
36	**P6XP3**	R	-22.94**	-13.01**	39.81**	53.95**	-25.10**	-15.72**	49.58**	63.83**	-30.54 **	-18.86 **	33.41 **	47.18 **
37	**P3XP7**	D	-16.66**	7.80**	73.25**	90.78**	-13.64**	7.30**	90.44**	108.58**	-16.29 **	9.21 **	79.56 **	98.10 **
38	**P7XP3**	R	-19.06**	4.69*	68.26**	85.28**	-15.55**	4.92	86.22**	103.95**	-19.58 **	4.92 *	72.50 **	90.31 **
39	**P3XP8**	D	-16.31**	-0.54	59.85**	76.02**	-16.40**	-0.74	76.18**	92.96**	-20.24 **	-2.18	60.83 **	77.44 **
40	**P8XP3**	R	-20.00**	-4.92*	52.81**	68.27**	-20.15**	-5.20*	68.26**	84.29**	-23.63 **	-6.33 **	54.00 **	69.91 **
41	**P3XP9**	D	-38.24**	-47.97**	-16.39**	-7.93*	-38.85**	-50.37**	-11.92**	-3.53	-33.91 **	-49.26 **	-16.57 **	-7.96*
42	**P9XP3**	R	-35.00**	-45.24**	-12.00**	-3.09	-37.93**	-49.63**	-10.61*	-2.09	-29.57 **	-45.92 **	-11.09 **	-1.91
43	**P4XP5**	D	8.65**	17.78**	89.29**	108.44**	6.37**	15.71**	105.38**	124.94**	9.93 **	21.06 **	99.05 **	119.60 **
44	**P5XP4**	R	6.11**	15.02**	84.86**	103.56**	3.98	13.12**	100.77**	119.90**	6.97 **	17.80 **	93.69 **	113.68 **
45	**P4XP6**	D	9.44**	23.54**	98.55**	118.63**	8.54**	22.12**	116.75**	137.40**	8.74 **	27.02 **	108.85 **	130.41 **
46	**P6XP4**	R	8.20**	22.14**	96.30**	116.16**	6.12**	19.41**	111.93**	132.12**	5.62 **	23.38 **	102.86 **	123.81 **
47	**P4XP7**	D	14.77**	48.45**	138.59**	162.73**	11.24**	38.21**	145.30**	168.67**	15.06 **	50.11 **	146.80 **	172.29 **
48	**P7XP4**	R	8.34**	40.14**	125.22**	148.01**	7.82**	33.95**	137.75**	160.40**	6.54 **	39.00 **	128.53 **	152.13 **
49	**P4XP8**	D	14.48**	36.05**	118.66**	140.78**	8.57**	28.90**	128.78**	150.58**	11.49 **	36.74 **	124.83 **	148.04 **
50	**P8XP4**	R	11.11**	32.05**	112.23**	133.70**	5.63**	25.41**	122.58**	143.79**	6.78 **	30.97 **	115.34 **	137.57 **
51	**P4XP9**	D	-35.40**	-41.68**	-6.27	3.21	-41.75**	-46.78**	-5.55	3.45	-36.85 **	-43.01 **	-6.3	3.37
52	**P9XP4**	R	-29.79**	-36.62**	1.86	12.17**	-35.48**	-41.06**	4.62	14.58**	-31.21 **	-37.92 **	2.07	12.61 **
53	**P5XP6**	D	12.02**	26.46**	103.24**	123.80**	9.59**	23.31**	118.86**	139.71**	11.50 **	30.25 **	114.15 **	136.26 **
54	**P6XP5**	R	9.07**	23.12**	97.88**	117.90**	8.00**	21.52**	115.68**	136.22**	7.74 **	25.86 **	106.93 **	128.29 **
55	**P5XP7**	D	15.72**	49.67**	140.55**	164.88**	13.70**	41.27**	150.73**	174.61**	15.64 **	50.87 **	148.05 **	173.66 **
56	**P7XP5**	R	11.93**	44.77**	132.67**	156.21**	9.21**	35.68**	140.82**	163.76**	7.81 **	40.66 **	131.26 **	155.14 **
57	**P5XP8**	D	15.50**	37.27**	120.61**	142.93**	11.65**	32.56**	135.28**	157.70**	12.21 **	37.62 **	126.27 **	149.64 **
58	**P8XP5**	R	13.17**	34.50**	116.17**	138.04**	7.36**	27.47**	126.23**	147.78**	10.42 **	35.43 **	122.67 **	145.67 **
59	**P5XP9**	D	-31.17**	-25.39**	19.91**	32.04**	-36.51**	-30.93**	22.59**	34.27**	-36.24 **	-29.78 **	15.45 **	27.37 **
60	**P9XP5**	R	-27.35**	-21.25**	26.57**	39.37**	-31.04**	-24.98**	33.15**	45.84**	-33.61 **	-26.89 **	20.21 **	32.62 **
61	**P6XP7**	D	16.09**	50.16**	141.34**	165.75**	14.47**	42.22**	152.42**	176.46**	16.33 **	51.77 **	149.53 **	175.30 **
62	**P7XP6**	R	13.35**	46.61**	135.62**	159.46**	10.21**	36.93**	143.02**	166.17**	11.15 **	45.02 **	138.43 **	163.05 **
63	**P6XP8**	D	16.99**	39.03**	123.45**	146.06**	12.06**	33.04**	136.13**	158.63**	13.05 **	38.66 **	127.97 **	151.51 **
64	**P8XP6**	R	14.09**	35.59**	117.92**	139.97**	8.42**	28.72**	128.46**	150.23**	11.01 **	36.15 **	123.85 **	146.97 **
65	**P6XP9**	D	-23.52**	-13.66**	38.76**	52.79**	-27.57**	-18.50**	44.64**	58.42**	-32.78 **	-21.47 **	29.11 **	42.44 **
66	**P9XP6**	R	-21.56**	-11.46**	42.31**	56.70**	-24.19**	-14.70**	51.39**	65.81**	-27.19 **	-14.95 **	39.84 **	54.28 **
67	**P7XP8**	D	14.32**	47.87**	137.65**	161.69**	10.54**	37.34**	143.76**	166.98**	14.65 **	49.58 **	145.93 **	171.32 **
68	**P8XP7**	R	17.61**	52.12**	144.49**	169.22**	16.63**	44.90**	157.18**	181.67**	16.61 **	52.13 **	150.13 **	175.96 **
69	**P7XP9**	D	-21.78**	1.17	62.59**	79.04**	-18.00**	1.87	80.81**	98.04**	-21.22 **	2.78	68.99 **	86.44 **
70	**P9XP7**	R	-18.10**	5.93**	70.26**	87.48**	-14.85**	5.79*	87.76**	105.65**	-17.94 **	7.06 **	76.02 **	94.19 **
71	**P8XP9**	D	-22.66**	-8.09**	47.72**	62.66**	-22.27**	-7.72**	63.79**	79.39**	-26.15 **	-9.43 **	48.92 **	64.29 **
72	**P9XP8**	R	-19.26**	-4.04	54.23**	69.83**	-19.36**	-4.25	69.94**	86.13**	-21.52 **	-3.75	58.25 **	74.59 **
	S.E.D.		1.96	1.96	1.96	1.96	2.35	2.35	2.35	2.35	1.98	1.98	1.98	1.98
	CD95 %		3.87	3.87	3.87	3.87	4.64	4.64	4.64	4.64	3.91	3.91	3.91	3.91
	CD99 %		5.11	5.11	5.11	5.11	6.12	6.12	6.12	6.12	5.17	5.17	5.17	5.17

Table 6: Percent heterosis over better parent and standard checks for kernel yield per plant(g) in maize.

Sr. No.	Crosses		Kernel yield per plant(g)											
			E-1				E-2				E-3			
			Better Parent	Parmeshawar	Rajarshi	Maharshi	Better Parent	Parmeshawar	Rajarshi	Maharshi	Better Parent	Parmeshawar	Rajarshi	Maharshi
1	**P1XP2**	D	-32.22**	-32.07**	15.39**	32.53**	-39.93**	-38.00**	23.37**	40.36**	-35.10 **	-34.50 **	17.89 **	40.04 **
2	**P2XP1**	R	-35.87**	-35.73**	9.17*	25.38**	-42.51**	-40.67**	18.07**	34.32**	-39.12 **	-38.56 **	10.58 **	31.35 **
3	**P1XP3**	D	-37.42**	-50.37**	-15.69**	-3.17	-43.36**	-57.03**	-14.49**	-2.72	-51.23 **	-59.72 **	-27.51 **	-13.89 **
4	**P3XP1**	R	-39.50**	-52.02**	-18.49**	-6.39	-45.87**	-58.93**	-18.27**	-7.02	-52.29 **	-60.60 **	-29.08 **	-15.75 **
5	**P1XP4**	D	-33.56**	-39.85**	2.17	17.35**	-41.76**	-47.41**	4.66	19.07**	-36.11 **	-41.95 **	4.48	24.11 **
6	**P4XP1**	R	-38.69**	-44.49**	-5.71	8.29	-47.36**	-52.46**	-5.4	7.62	-42.06 **	-47.36 **	-5.26	12.54 **
7	**P1XP5**	D	-30.26**	-23.95**	29.18**	48.37**	-32.98**	-26.18**	46.90**	67.12**	-29.87 **	-23.41 **	37.85 **	63.74 **
8	**P5XP1**	R	-34.91**	-29.02**	20.57**	38.47**	-35.99**	-29.50**	40.30**	59.61**	-35.82 **	-29.91 **	26.15 **	49.84 **
9	**P1XP6**	D	-23.26**	-12.14**	49.25**	71.42**	-26.37**	-15.65**	67.86**	90.97**	-22.84 **	-10.94 **	60.30 **	90.41 **
10	**P6XP1**	R	-26.88**	-16.28**	42.22**	63.34**	-29.98**	-19.78**	59.64**	81.62**	-25.88 **	-14.45 **	53.98 **	82.91 **
11	**P1XP7**	D	-18.81**	7.47**	82.56**	109.67**	-15.74**	8.25**	115.42**	145.08**	-21.26 **	6.06 **	90.89 **	126.75 **
12	**P7XP1**	R	-23.08**	1.81	72.95**	98.64**	-19.01**	4.05	107.06**	135.56**	-23.02 **	3.68 *	86.60 **	121.66 **
13	**P1XP8**	D	-20.22**	-2.34	65.90**	90.54**	-18.76**	-0.9	97.20**	124.34**	-19.41 **	-1.21	77.81 **	111.21 **
14	**P8XP1**	R	-24.07**	-7.06**	57.87**	81.32**	-22.19**	-5.09*	88.88**	114.88**	-22.07 **	-4.46 **	71.96 **	104.26 **
15	**P1XP9**	D	-41.09**	-59.16**	-30.63**	-20.32**	-41.49**	-62.38**	-25.13**	-14.83**	-38.27 **	-58.75 **	-25.75 **	-11.80 **
16	**P9XP1**	R	-35.59**	-55.34**	-24.14**	-12.88**	-39.87**	-61.34**	-23.06**	-12.47*	-40.51 **	-60.25 **	-28.45 **	-15.01 **
17	**P2XP3**	D	-33.67**	-33.53**	12.92**	29.69**	-41.48**	-39.61**	20.18**	36.72**	-38.13 **	-37.56 **	12.38 **	33.49 **
18	**P3XP2**	R	-31.75**	-31.60**	16.19**	33.45**	-38.84**	-36.88**	25.62**	42.91**	-34.40 **	-33.79 **	19.16 **	41.55 **
19	**P2XP4**	D	9.57**	9.81**	86.53**	114.23**	9.44**	12.95**	124.76**	155.70**	9.07 **	10.07 **	98.11 **	135.33 **
20	**P4XP2**	R	12.40**	12.65**	91.35**	119.77**	10.47**	14.01**	126.89**	158.12**	10.63 **	11.65 **	100.95 **	138.71 **
21	**P2XP5**	D	11.16**	21.20**	105.89**	136.47**	10.04**	21.20**	141.18**	174.38**	10.79 **	20.99 **	117.77 **	158.68 **
22	**P5XP2**	R	7.74**	17.48**	99.56**	129.20**	8.54**	19.55**	137.90**	170.65**	9.44 **	19.51 **	115.10 **	155.51 **
23	**P2XP6**	D	14.77**	31.40**	123.21**	156.36**	10.75**	26.88**	152.50**	187.25**	15.33 **	33.11 **	139.58 **	184.60 **
24	**P6XP2**	R	11.73**	27.92**	117.30**	149.57**	8.77**	24.62**	147.98**	182.12**	10.01 **	26.97 **	128.53 **	171.47 **
25	**P2XP7**	D	16.42**	54.09**	161.76**	200.64**	17.50**	50.97**	200.42**	241.78**	16.28 **	56.61 **	181.88 **	234.83 **

26	**P7XP2**	R	10.37**	46.09**	148.17**	185.03**	10.96**	42.56**	183.70**	222.75**	10.67 **	49.06 **	168.28 **	218.68 **
27	**P2XP8**	D	14.18**	39.77**	137.42**	172.69**	9.91**	34.08**	166.81**	203.54**	14.53 **	40.40 **	152.70 **	200.18 **
28	**P8XP2**	R	10.38**	35.10**	129.50**	163.59**	6.78**	30.26**	159.22**	194.90**	10.34 **	35.27 **	143.46 **	189.20 **
29	**P2XP9**	D	-37.13**	-36.99**	7.03	22.93**	-44.30**	-42.52**	14.39**	30.14**	-41.68 **	-41.14 **	5.93 *	25.83 **
30	**P9XP2**	R	-32.73**	-32.59**	14.52**	31.52**	-40.24**	-38.33**	22.73**	39.62**	-36.70 **	-36.12 **	14.97 **	36.57 **
31	**P3XP4**	D	-32.86**	-39.21**	3.26	18.60**	-37.89**	-43.92**	11.61*	26.97**	-35.68 **	-41.56 **	5.18	24.93 **
32	**P4XP3**	R	-36.70**	-42.70**	-2.66	11.80**	-45.87**	-51.12**	-2.73	10.66*	-41.08 **	-46.47 **	-3.65	14.45 **
33	**P3XP5**	D	-28.16**	-21.67**	33.07**	52.83**	-32.25**	-25.39**	48.48**	68.92**	-29.25 **	-22.73 **	39.07 **	65.20 **
34	**P5XP3**	R	-34.04**	-28.08**	22.18**	40.32**	-34.83**	-28.23**	42.83**	62.49**	-33.25 **	-27.11 **	31.19 **	55.84 **
35	**P3XP6**	D	-21.45**	-10.06**	52.78**	75.47**	-23.97**	-12.90**	73.33**	97.19**	-22.30 **	-10.32 **	61.42 **	91.74 **
36	**P6XP3**	R	-25.21**	-14.38**	45.45**	67.05**	-28.86**	-18.49**	62.20**	84.52**	-25.02 **	-13.46 **	55.76 **	85.02 **
37	**P3XP7**	D	-18.59**	7.75**	83.04**	110.23**	-14.76**	9.51**	117.92**	147.92**	-19.83 **	7.98 **	94.34 **	130.85 **
38	**P7XP3**	R	-21.60**	3.77	76.27**	102.46**	-17.10**	6.51**	111.96**	141.14**	-21.80 **	5.32 **	89.56 **	125.17 **
39	**P3XP8**	D	-19.47**	-1.43	67.45**	92.31**	-18.23**	-0.25	98.50**	125.83**	-19.21 **	-0.96	78.26 **	111.75 **
40	**P8XP3**	R	-23.08**	-5.85*	59.94**	83.70**	-20.46**	-2.97	93.08**	119.66**	-21.31 **	-3.53 *	73.62 **	106.24 **
41	**P3XP9**	D	-41.28**	-53.43**	-20.89**	-9.14*	-47.79**	-60.39**	-21.17**	-10.32*	-50.81 **	-59.37 **	-26.88 **	-13.14 **
42	**P9XP3**	R	-37.96**	-50.80**	-16.42**	-4.01	-45.07**	-58.33**	-17.07**	-5.66	-52.00 **	-60.36 **	-28.65 **	-15.25 **
43	**P4XP5**	D	9.82**	19.74**	103.41**	133.62**	9.40**	20.49**	139.78**	172.78**	10.16 **	20.30 **	116.52 **	157.20 **
44	**P5XP4**	R	7.11**	16.79**	98.39**	127.86**	5.52**	16.22**	131.28**	163.11**	7.96 **	17.90 **	112.20 **	152.07 **
45	**P4XP6**	D	13.51**	29.96**	120.76**	153.55**	10.57**	26.67**	152.08**	186.78**	13.12 **	30.56 **	134.99 **	179.14 **
46	**P6XP4**	R	10.08**	26.04**	114.10**	145.90**	7.49**	23.15**	145.06**	178.80**	7.62 **	24.22 **	123.57 **	165.57 **
47	**P4XP7**	D	15.10**	52.34**	158.79**	197.22**	17.32**	50.73**	199.94**	241.23**	16.47 **	56.87 **	182.34 **	235.38 **
48	**P7XP4**	R	9.63**	45.11**	146.50**	183.11**	10.07**	41.42**	181.42**	220.16**	9.93 **	48.06 **	166.49 **	216.56 **
49	**P4XP8**	D	12.72**	37.97**	134.38**	169.19**	9.18**	33.18**	165.03**	201.51**	14.10 **	39.87 **	151.75 **	199.04 **
50	**P8XP4**	R	10.08**	34.74**	128.89**	162.88**	5.56**	28.77**	156.25**	191.52**	10.06 **	34.93 **	142.85 **	188.47 **
51	**P4XP9**	D	-42.10**	-47.58**	-10.95**	2.28	-48.44**	-53.44**	-7.35	5.4	-43.87 **	-49.00 **	-8.21 **	9.03 *
52	**P9XP4**	R	-33.99**	-40.24**	1.52	16.60**	-42.99**	-48.51**	2.46	16.56**	-37.45 **	-43.16 **	2.3	21.51 **
53	**P5XP6**	D	15.34**	32.06**	124.33**	157.65**	11.05**	27.23**	153.18**	188.03**	16.02 **	33.91 **	141.02 **	186.30 **
54	**P6XP5**	R	12.26**	28.53**	118.34**	150.77**	9.03**	24.91**	148.57**	182.78**	11.20 **	28.35 **	131.01 **	174.41 **
55	**P5XP7**	D	16.86**	54.68**	162.76**	201.78**	17.63**	51.12**	200.73**	242.13**	16.57 **	57.00 **	182.58 **	235.67 **
56	**P7XP5**	R	11.74**	47.91**	151.25**	188.57**	11.68**	43.49**	185.54**	224.85**	11.98 **	50.82 **	171.46 **	222.46 **
57	**P5XP8**	D	15.41**	41.27**	139.98**	175.62**	12.13**	36.78**	172.19**	209.66**	17.47 **	44.01 **	159.19 **	207.89 **
58	**P8XP5**	R	11.28**	36.21**	131.38**	165.74**	7.45**	31.07**	160.84**	196.74**	11.80 **	37.05 **	146.67 **	193.01 **
59	**P5XP9**	D	-35.91**	-30.12**	18.71**	36.34**	-39.06**	-32.88**	33.56**	51.95**	-37.41 **	-31.65 **	23.02 **	46.13 **
60	**P9XP5**	R	-32.36**	-26.24**	25.29**	43.90**	-33.12**	-26.34**	46.58**	66.75**	-30.95 **	-24.59 **	35.72 **	61.22 **
61	**P6XP7**	D	16.99**	54.85**	163.04**	202.11**	17.71**	51.23**	200.95**	242.38**	16.76 **	57.26 **	183.04 **	236.22 **
62	**P7XP6**	R	13.04**	49.63**	154.18**	191.93**	12.19**	44.14**	186.84**	226.33**	12.69 **	51.78 **	173.18 **	224.51 **
63	**P6XP8**	D	17.75**	44.14**	144.85**	181.21**	13.49**	38.43**	175.48**	213.40**	18.19 **	44.88 **	160.77 **	209.76 **
64	**P8XP6**	R	12.33**	37.50**	133.57**	168.26**	8.97**	32.92**	164.52**	200.93**	13.18 **	38.75 **	149.72 **	196.64 **
65	**P6XP9**	D	-27.83**	-17.37**	40.37**	61.22**	-33.23**	-23.50**	52.24**	73.19**	-27.83 **	-16.70 **	49.92 **	78.09 **
66	**P9XP6**	R	-23.93**	-12.91**	47.94**	69.92**	-27.12**	-16.51**	66.15**	89.03**	-24.67 **	-13.05 **	56.49 **	85.90 **
67	**P7XP8**	D	13.81**	50.64**	155.89**	193.90**	17.09**	50.43**	199.36**	240.57**	16.35 **	56.71 **	182.05 **	235.04 **
68	**P8XP7**	R	19.05**	57.58**	167.69**	207.45**	18.27**	51.95**	202.37**	244.00**	18.04 **	58.98 **	186.14 **	239.90 **
69	**P7XP9**	D	-23.59**	1.14	71.81**	97.33**	-19.34**	3.63	106.22**	134.61**	-24.89 **	1.17	82.09 **	116.30 **
70	**P9XP7**	R	-19.82**	6.13**	80.28**	107.06**	-16.63**	7.11**	113.14**	142.48**	-21.64 **	5.54 **	89.96 **	125.65 **
71	**P8XP9**	D	-25.43**	-8.72**	55.06**	78.09**	-25.26**	-8.83**	81.42**	106.40**	-24.92 **	-7.96 **	65.66 **	96.78 **
72	**P9XP8**	R	-22.00**	-4.53*	62.18**	86.27**	-19.24**	-1.49	96.04**	123.03**	-20.28 **	-2.27	75.89 **	108.94 **
	S.E.D.		2.53	2.53	2.53	2.53	2.58	2.58	2.58	2.58	1.84	1.84	1.84	1.84
	CD95 %		4.99	4.99	4.99	4.99	5.10	5.10	5.10	5.10	3.63	3.63	3.63	3.63
	CD99 %		6.59	6.59	6.59	6.59	6.73	6.73	6.73	6.73	4.79	4.79	4.79	4.79

CONCLUSIONS

In conclusion, among the tested cross combinations, EC-639008 X IC-552819 emerged as particularly notable, demonstrating high per se performance and significant standard heterosis across multiple characters studied. Additionally, combinations such as EC-639232 X IC-552819 and HYD-52327 X IC-552819 also exhibited commendable performance in terms of kernel yield, yield-contributing traits, and quality characteristics across different environments. Notably, EC-639008 X IC-552819 stood out as the superior hybrid, ranking first in per se performance and demonstrating the highest magnitude of standard heterosis for kernel yield per plant, among other traits. These findings suggest the potential of these identified crosses for further evaluation in multilocation trials, with implications for their use as high-performing hybrids in maize cultivation. Further research and field testing are warranted to validate and harness the full potential of these promising hybrids in enhancing maize productivity and quality.

FUTURE SCOPE

These hybrids could be evaluated in multilocation trials, and their yield can be estimated. The hybrids performing better than check could be given to farmers for cultivation after release.

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Conflict of Interest. None.

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