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EVALUATION OF NEW MAIZE HYBRIDS FOR BABY CORN AND FODDER YIELD DURING SPRING SEASON

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SUMMARY

The field experiment was conducted at CCS HAU, RRS Karnal during spring 2024 in RBD Design using fourteen maize hybrids and one check HM 4 to evaluate the performance of hybrids for baby corn and fodder yield. The findings revealed considerable differences among hybrids for the studied traits. Among the fourteen maize hybrids evaluated in baby corn trial, four hybrids *viz*. HKH 423 (2756 and 22987 kg/ha), HKH 433 (2552 and 22456 kg/ha), HKH 388 (2575 and 21965 kg/ha) and IMH 225 (2367 and 21954 kg/ha) were recorded more than 10 percent superiority for the baby corn and fodder yield respectively over the check HM 4 (2060 and 19525 kg/ha for baby corn and fodder yield respectively). First three principal components explain the 95% of the total variance.

Key words: Baby corn, fodder, superiority and PCA

Maize in India is not just a grain crop but also a highly valuable vegetable (baby corn) and fodder source. It is one of the best fodder crops, due to its zero anti nutritional content, higher crude protein content and higher *in-vitro* digestibility percentage (IVDP) than other non-legume fodder crops, making it favorite among the small and marginal farmers in the country. Properties like quick growth, higher biomass productivity, high palatability, sufficient nutrient content, high biomass yield, and suitability for silage production make it ideal as fodder crop. The total livestock population in India is 536.76 million as per the 21st Livestock Census released in 2019. It has shown an increase of 4.8 percent compared to the previous Census in 2012 (Livestock Census, 2024). The total area under fodder crops in India is nearly 8.6 million had which is less than 5 percent of the total area under cultivation in country. According to the Ministry of Agriculture assessment, there is a huge gap between demand and supply of feed and fodder for the livestock in the country. A deficit of 64.21 per cent and 24.8 per cent in demand and supply during 2020 for fodder reported by Rathod and Dixit 2020, therefore, to fulfil the demand and supply, new alternatives for the fodder resources need to be explored. After a number of experiments conducted on various types of maize, it has been found out that baby corn, sweet corn and green maize fodder can be the best alternatives. These speciality corn provide significant amount of green biomass (along with their economical part) which can be serve to the animals as fodder. Baby corn is a specialty corn that can play role as dual income source for the farmers, they can sell baby corn as vegetable and remaining biomass can be use as green fodder for livestock or sold to dairy farms. this ensures zero-waste utilisation and high profit margin (Dhar *et al.,* 2014 and Hargilas *et al.,* 2015). The superior baby corn hybrids can meet the growing demand of baby corn and quality fodder, supporting both farmers and the livestock industry. Thus, this study was conducted to evaluate the performance of various single cross maize hybrids in terms of baby corn and fodder yield.

MATERIALS AND METHODS

The field experiment was conducted during spring 2024 at CCS HAU Regional Research Station, Karnal in randomised block design (RBD) with three replications. The plot size was 0.60 x 4 m^2 x 2 rows, row to row and plant to plant spacing was kept at 60 x 15 cms respectively. Fourteen hybrids were assessed alongside a check hybrid HM4. The data were collected for the traits namely, days to first picking and days to last picking, baby corn yield, baby corn taste, baby corn color, row arrangement and fodder yield. Green ears were harvested within 2-3 days after silk emergence. The dehusked baby corn hybrids were weighed both the plot wise and replication wise. After the final harvesting of baby corn, the crop was harvested and weighed to record the fodder yield per plot. Baby corn colour and row arrangement were

visually observed and noted down whereas, a panel of 12 members conducted the organoleptic/sensory test to detect the taste of baby corn. The test was performed using 9-point hedonic scale where 1 is disliked extremely and 9 is liked extremely. The superiority of each hybrid over the check variety was calculated. Statistical analysis, including the critical difference (CD) and coefficient of variation (CV), was performed to assess variability and significance.

RESULTS AND DISCUSSION

Days to first picking: The range for days to first picking of baby corn was 72-84 days after sowing. The earliest days to first picking was recorded in maize hybrids HKH 424, HKH 433 and IMH 225 (72 days) whereas hybrid HKH 423 was the latest hybrid reported first picking of babycorn at 84 days after sowing as shown in Table 1.

Days to last picking: The range for days to last picking of baby corn was 82-92 days after sowing. The earliest days to last picking was recorded in maize hybrids HKH 417, HKH 424, HKH 433 and HKH 434 (82 DAS) whereas hybrid HKH 423 was the latest hybrid reported last picking of baby corn at 92 days after sowing as shown in Table 1.

Baby corn yield: Considerable variations were observed in baby corn yield across different hybrids. The highest baby corn yield was observed in HKH 423 (2756 kg/ha) followed by HKH388 (2575 kg/ha) and HKH433 (2552 kg/ha), outperforming the check HM 4 (2060 kg/ha) by 33.79%, 25.00% and 23.88%, respectively. Other hybrids, such as HKH436 (2378 kg/ha) and IMH225 (2367 kg/ha), also exhibited superior baby corn yield, indicating their potential for large-scale cultivation as shown in Table 1. Similar results were obtained by Singh *et al.,* 2025, Rajendran *et al.,* 2018 and Verma *et al.,* 2001.

Fodder yield: The highest fodder yield was obtained from HKH440 (23776 kg/ha), 21.77% superior to the check, making it a promising hybrid for fodder production. HKH423 also demonstrated a high fodder yield (22987 kg/ha), showing 17.73% superiority. Other hybrids, including HKH433 (22456 kg/ha) and HKH388 (21965 kg/ha), also exhibited high fodder yields, reinforcing their dual-purpose potential for both baby corn and fodder production. On the contrary, HKH442 recorded the lowest fodder yield (18548 kg/ha), being 5.00% lower than the check, indicating its limited use in fodder production as shown in table 1. Baby corn fodder, after harvesting of green cobs, has similar chemical composition and nutritive value as hybrid maize fodder with higher economic return as dual purpose crop (Gupta *et al.,* 2019).

Statistical Analysis: The CD and CV values for baby corn and fodder yield indicate moderate

TABLE 1
Performance of maize hybrid w.r.t. babycorn and fodder yield during Spring 2024

S. No.	Name of	Days to first picking	Days to last picking	Row arrangement	Babycorn color	Babycorn taste	Baby corn yield (kg/ha)	Fodder yield (kg/ha)	Superior in Baby corn yield over check	Superior in Fodder yield over check
1.	HKH423	84	92	Regular	Creamish	7	2756	22987	33.79	17.73
2.	HKH417	73	82	Regular	Light yellow	6	1854	21034	-10.00	7.73
3.	HKH424	72	82	Regular	Light yellow	6	1976	20582	-4.08	5.41
4.	HKH428	73	84	Regular	Light yellow	7	2155	21529	4.61	10.26
5.	HKH429	73	85	Regular	Light yellow	7	2162	20834	4.95	6.70
6.	HKH433	72	82	Regular	Creamish	8	2552	22456	23.88	15.01
7.	HKH436	73	82	Regular	Light yellow	8	2378	21189	15.44	8.52
8.	HKH440	73	83	Regular	Light yellow	5	1899	23776	-7.82	21.77
9.	HKH442	75	84	Regular	Light yellow	5	1964	18548	-4.66	-5.00
10.	HKH388	74	85	Regular	Creamish	8	2575	21965	25.00	12.50
11.	HKH391	73	84	Regular	Creamish	6	1753	21008	-14.90	7.60
12.	HKH398	74	85	Regular	Creamish	6	1841	20348	-10.63	4.22
13.	IMH225	72	84	Regular	Creamish	8	2367	21954	14.90	12.44
14.	IMH226	73	85	Regular	Creamish	7	2148	21778	4.27	11.54
	Check (HM4)	74	85	Regular	Creamish	8	2060	19525	-	-
	C.D. at 5%	3.5	3.0	-	-	-	205	406	-	-
	C.V.	6.5	6.0	-	-	-	7.9	9.3	-	-

variability among hybrids. These values highlight the statistical significance of yield differences and provide confidence in selecting superior hybrids for enhanced productivity as shown in Table 1.

The heat map of Pearson correlation coefficient is presented in Fig. 1 represents the association between the traits under consideration. The Pearson correlation coefficient between baby corn yield and fodder yield is 0.459 indicating moderate positive correlation, suggesting that baby corn and fodder yield can be improved simultaneously as shown in Fig. 1. The results are in unison with Chandra *et al.*, 2022 and Kumar *et al.*, 2015. Traits namely days to first picking and last picking were also positively associated with baby corn yield whereas as they showed weak positive association with fodder yield indicating change in these traits do not strongly affect the fodder yield suggesting fodder yield is relatively independent of days to first and last picking of baby corn.

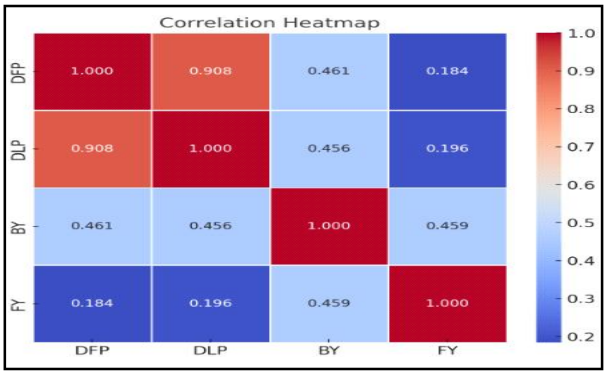

Fig. 1. Correlation heat map.

Fig. 2. Weighing of baby corn.

Fig. 3. Green fodder of maize.

Principal component analysis revealed that three principal components (PC1, PC2 and PC3) together explains 95.5% of the total variance, whereas, PC4 and PC5 contribute very little to the additional variance (only 4.5%) suggesting using only first three PCs would retain most of the information while reducing dimensionality. The >1 eigen value were reported by the PC1 and PC2 capturing 79% of the variance and PC3add some extra information (16.5%) (Table 2). In PC1, traits that have major influence are baby corn yield, days to last picking and days to first picking and in PC2, baby corn taste trait had strong positive impact whereas, fodder yield trait dominates the PC3 (Table 3).

A scree plot is used in principal component analysis (PCA) to determine the number of principal components to retain. The x-axis represents the component number, while the y-axis represents the

TABLE 2
Eigen values of correlation matrix

	PC1	PC2	PC3	PC4	PC5
Eigenvalues	2.539	1.41	0.827	0.175	0.049
Proportion	0.508	0.282	0.165	0.035	0.01
Cumulative Proportion	0.508	0.79	0.955	0.99	1

TABLE 3
Loadings (Eigen vectors) of correlation matrix

	PC1	PC2	PC3	PC4	PC5
DFP	0.497	-0.488	-0.072	0.249	-0.669
DLP	0.514	-0.423	-0.134	-0.531	0.507
BT	0.309	0.637	-0.418	-0.444	-0.356
BY	0.54	0.349	-0.095	0.648	0.397
FY	0.32	0.233	0.891	-0.198	-0.103

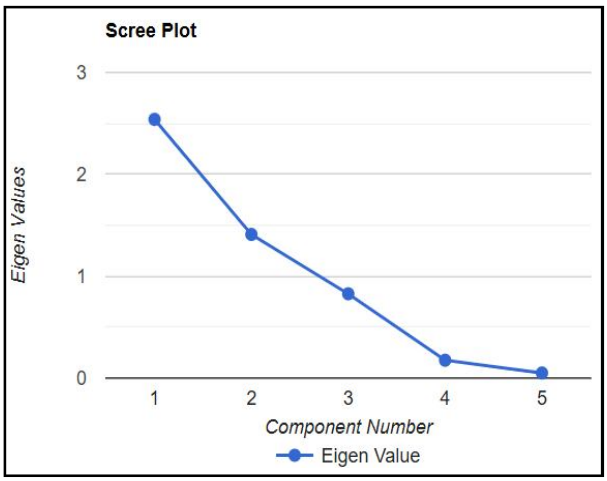

Fig. 4. Eigen values.

eigen values of each principal component. In this scree diagram PC1 (2.5) and PC2 (1.4) contribute the most variance. The elbow occurred at PC3 indicating PC3, PC4 and PC5 have <1 eigen values meaning they contribute less variance.

CONCLUSION

From a plant breeding standpoint, the goal is often to develop hybrids that maximize both baby corn yield and fodder yield. Four hybrids (HKH 423, HKH 433, HKH 388 and IMH 225) outperform the check hybrid HM 4. All the four selected hybrids have the desirable traits for baby corn (creamish colour, regular row arrangement and good taste). These selected hybrids can be the viable options for farmers aiming to optimize baby corn and fodder production. The findings provide valuable insights into hybrid selection for improved agricultural profitability and sustainability. Maize hybrids HKH 423, HKH388, HKH433, and IMH225 should be submitted to AICRP for their testing and release.

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