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Research Paper

Influence of fertility levels and zinc fertilization on yield performance and nutrient dynamics of baby corn and hybrids in Southern-Rajasthan

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ABSTRACT

A 2-years field experiment was conducted during *kharif* season of 2019 and 2020 at Rajasthan College of Agriculture, Maharana Pratap University of Agricultural and Technology (MPUAT), Udaipur, to evaluate the performance of baby corn hybrids under varying fertility levels and zinc fertilization. The experiment was laid out in factorial randomized block design with three replications. The treatments included 2 baby corn hybrids (HM 4 and Pratap Hybrid Maize-3), three fertility levels [125:60:50, 150:70:60, and 175:80:70 kg N, P_2O_5, and K_2O/ha], and three zinc levels [5.0 kg Zn/ha; 3.75 kg Zn/ha + Zn solubilizing bacteria (ZnSB); and 2.5 kg Zn/ha + ZnSB]. The results revealed significant differences in yield and quality attributes across fertility levels and hybrids. On a pooled data basis, hybrid HM-4 recorded higher yields and nutrient uptake compared to 'PHM 3', with increases of 15.35%, 15.32%, 15.26% and 15.28% in baby cob, baby corn, green fodder, and biological yield, respectively, along with 27.07%, 26.31%, 24.52% and 21.16% higher total uptake of nitrogen, phosphorus, potassium, and zinc. Fertility level F_2 noted significant increases of 5.96%, 6.59%, 6.20% and 5.89% in baby cob,green fodder, and biological yields, respectively, over F_1. Nutrient uptake by baby corn also improved under F_2, with increases of 10.95%, 10.58%, 10.70% and 10.63% in total nitrogen, phosphorus, potassium, and zinc, respectively. Similarly, zinc application at Z_1 enhanced baby cob, green fodder, and biological yields by 10.37%, 10.35%, 10.31% and 10.32%, respectively, compared to Z_3. The maximum yield and nutrient (N, P, K, Zn) content and uptake were recorded with the 150: 70: 60 kg N, P_2O_5 and K_2O/ha + 5.0 kg/ha Zn fertilization with HM-4 which significantly outperformed 'PHM 3'.

***Key words*:** Fertilization, Genotypes, Green fodder yield, Hybrid and Zinc

India is home to an estimated 536.76 million livestock, making it one of the largest livestock populations globally. (GOI, 2019). The livestock sector contributes approximately 4.11% to the national GDP and 25.67% to the agricultural GDP (Dash *et al.,* 2017), underscoring its vital role in rural economy. Sustaining such a vast population requires a continuous and balanced supply of both dry and green fodder. However, the country faces a significant deficit in feed resources, with an estimated shortfall of 10.95% in dry crop residues, 35.6% in green fodder, and 44% in concentrate feed ingredients (Vision document-2050, ICAR-IGFRI, Jhansi). In this case, baby corn emerges as a promising dual-purpose crop that can meet both nutritional fodder needs and dietary requirements of humans. Baby corn refers to the immature, tender cobs of maize, harvested just after silk emergence and prior to fertilization (Dar *et al.*, 2014). It is harvested in 65 to 75 days after planting, providing not only succulent green cobs for human consumption but also substantial green biomass for livestock feed. Nutritionally, baby corn is a low-calorie vegetable, rich in fiber, potassium, carotenoids and vitamins B and C, while being naturally low in cholesterol, (Sinha, 2017). Its fast-growing nature, high palatability, and nutritional richness make baby corn an ideal crop to support the dual challenges of food and fodder security in India's evolving agricultural landscape.

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India produces approximately 28.6 million tons of maize annually, cultivated across 9.47 million hectares, with an average productivity of 3,190 kg/ha (DACNET, 2022). In Rajasthan alone, maize covers around 1.0 million ha area, yielding 1.1 million tonnes with a productivity of 1100 kg/ha, primarily under rainfed conditions during *kharif* season in Udaipur, Kota, part of Ajmer, Pali and Sirohi districts (Maize Outlook, 2020). Among maize variants, baby corn has gained attention as a crop with dual utility serving both food and fodder purposes. It is particularly responsive to nutrient management due to its short growth duration and high biomass potential. Being a heavy feeder, baby corn requires a well-balanced and timely supply of macro- and micronutrients to achieve optimal growth and yield (Das *et al*., 2020). However, soils in Southern Rajasthan have undergone nutrient depletion over the years due to intensive cropping systems, especially maize-wheat sequences. This has led to deteriorated soil fertility and imbalanced nutrient supply, affecting both crop productivity and quality. Therefore, adopting a balanced nutrient strategy is essential for enhancing yield, maintaining soil health, and ensuring sustainable production of baby corn in the region. Among the essential micronutrients, zinc plays a pivotal role in plant physiology. It is involved in protein synthesis, enzyme activation, gene expression and maintaining the structural integrity of biological membranes (Singh *et al.*, 2022). Zinc deficiency not only reduces crop yield but also affects the nutritional quality of the produce with wider implications for human health including immune functions, growth and reproduction (Begum *et al.*, 2016), (Reid *et al.*, 2011). Research has shown that zinc application, whether through soil incorporation or foliar sprays, can enhance nutrient use efficiency and yield performance. Foliar application has been reported to be more effective than soil application in terms of increasing zinc accumulation in grains (Jan *et al*., 2016). However, region-specific recommendations, especially for the semi-arid and sub-humid zones of Rajasthan, remain underexplored. In this backdrop, the present study was undertaken to assess the interactive effects of NPK and zinc fertilization, on yield attributes, fodder productivity, nutrient content, and uptake in different baby corn hybrids under the agro-climatic conditions of Southern Rajasthan.

MATERIALS AND METHODS

A 2-years field experiment was conducted during the *kharif* season of 2019 and 2020 at the Instructional Farm (Agronomy), Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology (MPUAT), Udaipur (Rajasthan). The experimental site is located at 23°34'N latitude, 73°42'E longitude with an altitude of 582.17 meters above mean sea level. This region falls under agroclimatic zone IVa (Sub-humid Southern plain and Aravali hills) of Rajasthan. The factorial experiment was laid out in randomized block design with three replications, comprising three factors viz. baby corn hybrids [HM-4, Pratap hybrid maize-3 (PHM-3)], NPK levels [(i)125:60:50 kg N, P_2O_5 and K_2O/ha (ii) 150:70:60 kg N, P_2O_5 and K_2O/ha (iii) 175:80:70 kg N, P_2O_5 and K_2O/ha] and zinc fertilization [(i) 5 kg Zn/ha (ii) 3.75 kg Zn/ha + Zn-solubilizing bacteria (ZnSB) (iii) 2.50 kg Zn/ha + ZnSB]. The soil of experimental site was clay loam in texture. Chemical analysis of soil showed alkaline reaction (*p*H 7.7 and 7.8), available nitrogen (266.1 and 269.3 kg/ha), available phosphorus (17.3 and 18.2 kg/ha), available potassium (295.6 and 299.6 kg/ha) and available zinc (1.89 and 1.93 ppm) during both the years i.e. 2019 and 2020, respectively.

The weather data showed mean weekly maximum temperatures ranged from 27.6°C to 33.6°C (2019) and 28.5°C to 34.3°C (2020), while minimum temperatures ranged from 21.3°C to 24.1°C (2019) and 20.3°C to 23.4°C (2020). The region received 820.6 mm and 761.1 mm rainfall during 2019 and 2020, respectively.

To avoid pollination, detasseling was performed immediately after tassel emergence. Baby cobs were harvested 2–3 days after silk emergence, dehusked, counted, and weighed to determine baby corn yield. After final harvest, the remaining crop biomass was collected for green fodder yield estimation. Total green fodder yield was calculated by summing the weights of tassels, husks, and green biomass per plot. Nutrient contents (N, P, K and Zn) in baby corn were analyzed following standard procedure. Nutrient uptake was calculated based on dry matter yield and respective nutrient concentration. Data from both the years subjected to pooled analysis of variance (ANOVA) following the methodology described by Gomez and Gomez, 1984.Treatment means were compared using the F-test, and significant differences were evaluated using the critical difference (CD) at 5% probability level.

RESULTS AND DISCUSSION

Yield

Effect of Hybrids on yields and protein yield

The results (Fig. 1) revealed baby corn hybrids had a significant influence on green fodder, biological yield, and baby corn cob yield. On a pooled basis, hybrid 'HM 4' outperformed 'PHM 3', recording increases of 15.35% in baby cob yield, 15.32% in baby corn yield, 15.26% in green fodder yield, and 15.28% in biological yield, respectively. 'HM 4' also recorded protein yield of 93.30 kg/ha, which was 27.06% higher than 'PHM 3'. The superior performance of 'HM 4' may be attributed to its better genetic potential, enhanced photosynthetic efficiency, and higher

biomass accumulation. These advantages resulted in improved dry matter production and nutrient utilization efficiency, ultimately contributing to enhanced yield parameters. Similar findings have been reported by Sobhana *et al.* (2012) and Meena *et al.* (2022), highlighting the role of hybrid vigour in improving yield performance. According to Das *et al*. (2020), this was simply because of the better growth performance of the maize genotype, resulting in a higher yield.

Effect of fertility levels on yields and protein yield

Among the NPK treatments,150 kg + 70 kg + 60 kg $N:P_2O_5:K_2O$/haled to a significant improvement in yield over 125 kg + 60 kg + 50 kg $N:P_2O_5:K_2O$/ha, which resulted in higher baby cob yield, baby corn yield, green fodder yield, and biological yield by 5.96%, 6.59%, 6.20%, and 5.89%, respectively (Table 1). This improvement in yield can be attributed to the enhanced availability of essential nutrients, which positively influenced photosynthetic activity, assimilate partitioning, and reproductive growth. Meena *et al.* (2022). F_2 also recorded the highest protein yield (86.08 kg/ha) treatment, which was 11.32% greater than F_1. The findings align with those of Singh *et al.* (2010) and Hrudaya *et al.* (2024), who reported that moderate-to-high fertility levels significantly enhance productivity in baby corn. The rate of photosynthesis and its efficient transfer for the development of reproductive tissues may also increased due to the availability of nitrogen, phosphate, and potassium. This enhanced nutrient availability likely stimulated vegetative growth and reproductive development, ultimately resulting in increased baby cob and corn yield per plant. These findings are consistent with Hrudaya *et al*. (2024), Kumar and Bohra (2014), and Neupane *et al.* (2017), who observed similar yield improvements under balanced fertility regimes.

Effect of Zinc Fertilization on yields and protein yield

Zinc fertilization had a significant impact on all yield parameters. Compared to Z_3 (2.5 kg Zn/ha + ZnSB), the treatments Z_1 (5.0 kg Zn/ha) and Z_2 (3.75 kg Zn/ha + ZnSB) increased baby cob yield by 10.37% and 8.80%, and baby corn yield by 10.35% and 8.79%, respectively. (Table 1). Similarly, green fodder yield increased by 2,392.94 kg/ha (10.31%) under Z_1 and 2,039.2 kg/ha (8.75%) under Z_2 compared to Z_3. Biological yield improvements also followed similar trends. The highest protein yield was recorded under Z_1, which was 6.43% and 20.83% higher than Z_2 and Z_3, respectively. These results suggest that adequate zinc application enhances dry matter production and nutrient assimilation, thereby improving yield and protein synthesis. These findings corroborate the reports of Singh *et al.* (2022) and Hemmat *et al.* (2023).

Nutrient content

Effect of Hybrids on Nutrient content of baby corn and green fodder at harvest (%)

Data revealed that hybrid ‘HM 4’ exhibited superior nutrient content compared to ‘PHM 3’ in both baby corn

Table 1. Performance of hybrids and effect of NPK levels & Zinc fertilization on yields and protein yield of baby corn (on pooled basis)

Treatments	Baby cob yield (kg/ha)	Baby corn yield (kg/ha)	Green fodder yield (kg/ha)	Biological yield (kg/ha)	Total protein yield of baby corn
Hybrids					
‘HM 4’	8,012.15	2,905.04	26,444.26	34,456.41	93.30
‘PHM 3’	6,946.02	2,518.93	22,943.94	29,889.96	73.43
SEm±	83.08	30.12	272.78	355.87	0.86
CD (P=0.05)	234.47	84.99	769.80	1,004.27	2.43
*NPK Levels**					
F_1	7,164.99	2,592.23	23,662.87	30,827.86	77.33
F_2	7,591.94	2,763.10	25,130.29	32,642.24	86.08
F_3	7,680.32	2,780.62	25,289.13	33,049.46	86.70
SEm±	101.76	36.88	334.09	435.85	1.05
CD (P=0.05)	287.16	104.09	942.81	1,229.97	2.97
Zinc fertilization					
5.0 kg Zn/ha	7,758.79	2,813.27	25,612.42	33,371.21	90.38
3.75 kg Zn/ha + ZnSB	7,648.52	2,773.35	25,250.40	32,898.92	84.92
2.50 kg Zn/ha + ZnSB	7,029.95	2,549.34	23,219.48	30,249.43	74.80
SEm±	101.76	36.88	334.09	435.85	1.05
CD (P=0.05)	287.16	104.09	942.81	1229.97	2.97

and green fodder. At harvest, nitrogen, phosphorus, potassium and zinc content of baby corn and green fodder was significantly higher for hybrid 'HM 4', compared to 'PHM 3' during the study. However, data indicated that nitrogen, phosphorus, potassium and zinc content of baby corn of 'HM 4' were significantly higher in tune of 10.03, 8.67, 8.07 and 2.19%, respectively in comparison to 'PHM 3' (Table 1). Data pooled basis that increases in nitrogen, phosphorus, potassium and zinc content of green fodder of hybrid 'HM 4' were to the tune of 10.12, 8.14, 9.19 and 9.32%, respectively, compared to 'PHM 3'. Significant differences in the concentrations of macronutrients among varieties may result from differences in the processes in which different plants may absorb and utilize nutrients from the soil. Additionally, Akter *et al.* (2014) noted notable variations in the N content of various rice cultivars.

Effect of NPK Levels on Nutrient content of baby corn and green fodder at harvest (%)

The nitrogen, phosphorus, potassium, and zinc content of baby corn and green fodder was considerably increased during the study by applying 150 kg N+70 kg P_2O_5+60 kg K_2O/ha (F_2), which seemed to be at a suitable level and comparable to 175 kg N+80 kg P_2O_5+70 kg K_2O/ha (F_3). Furthermore, pooled data showed that, in comparison to the F_1 level, the F_2 level considerably raised the quantity of nitrogen, phosphorus, potassium, and zinc by 3.90, 3.96, 3.89 and 3.32 per cent, respectively in baby corn and by 3.96, 4.02, 3.82, and 3.70%, respectively in green fodder (Table 1). The application of FYM and higher amounts of NPK fertilizer in baby corn left these nutrients as residues, which raised the plant's N, P, and K contents because of their enhanced availability in the root zone and crop absorption, according to Sinha, (2017).

Effect of Zinc Fertilization on Nutrient content of baby corn and green fodder at harvest (%)

When evaluated in terms of the nitrogen, phosphorus, potassium, and zinc content of baby corn and green fodder recorded at harvest, Z_1 was shown to be significantly better than Z_2 and Z_3 both throughout the experiment. According to pooled data Z_1's nitrogen, phosphorus, potassium, and zinc content in baby corn increased by 9.55, 9.32, 8.70 and 4.39percent, respectively, in comparison to Z_3. Z_1 over Z_3 resulted in corresponding increases of 9.38, 7.56, 8.46, and 8.96 percent in green fodder (Table 2). According to reports, zinc's involvement in photosynthesis and metabolic processes increases the synthesis of photosynthates and their movement to different plant parts, which raises the nutritional concentration in green fodder. According to Meena *et al.* (2013), the combination of a significant increase in the concentration of these parameters and the effects of rising zinc levels on fodder dry yield results in an increase in the uptake of these components.

Table 2. Performance of hybrids and effect of NPK levels & Zinc fertilization on nutrient content of baby corn at harvest

Treatment	Nitrogen content (%)		Phosphorus content (%)		Potassium content (%)		Zinc content (ppm)	
	Baby corn	Green fodder	Baby corn	Green fodder	Baby corn	Green fodder	Baby corn	Green fodder
Hybrids								
'HM 4'	1.93	1.08	0.35	0.18	0.55	1.24	50.76	31.54
'PHM 3'	1.75	0.98	0.32	0.17	0.51	1.13	49.67	28.85
SEm±	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.12
CD (P=0.05)	0.01	0.01	0.00	0.00	0.01	0.01	0.37	0.33
*NPK Levels**								
F_1	1.79	1.01	0.33	0.17	0.51	1.15	48.46	29.42
F_2	1.86	1.05	0.34	0.18	0.53	1.19	50.07	30.51
F_3	1.87	1.05	0.34	0.18	0.54	1.21	52.11	30.65
SEm±	0.01	0.00	0.00	0.00	0.00	0.00	0.16	0.15
CD (P=0.05)	0.02	0.01	0.01	0.00	0.01	0.01	0.45	0.41
Zinc fertilization								
5.0 kg Zn/ha	1.93	1.09	0.35	0.18	0.55	1.23	51.57	31.49
3.75 kg Zn/ha + ZnSB	1.84	1.04	0.34	0.18	0.52	1.19	49.67	30.19
2.50 kg Zn/ha + ZnSB	1.76	0.99	0.32	0.17	0.51	1.13	49.40	28.90
SEm±	0.01	0.00	0.00	0.00	0.00	0.00	0.16	0.15
CD (P=0.05)	0.02	0.01	0.01	0.00	0.01	0.01	0.45	0.41

Nutrient uptake

Effect of Hybrids on Nutrient uptake by baby corn and green fodder at harvest (%)

Hybrid HM-4 recorded significantly higher total uptake of nitrogen, phosphorus, potassium, and zinc by baby corn and green fodder compared to PHM-3. On a pooled basis, increases due to HM-4 were 26.82% (N), 24.75% (P), 25.78% (K), and 25.49% (Zn) relative to PHM-3. These findings support the superior nutrient foraging ability and genetic efficiency of HM-4 in assimilating and translocating nutrients, leading to enhanced biomass production. Similar genotypic differences in nutrient uptake have been also observed by Sobhana *et al.* (2012), Kumari (2015), and Kumer *et al.* (2015).

Effect of NPK Levels on Nutrient uptake by baby corn and green fodder at harvest (%)

The application of 150 kg N+70 kg P_2O_5+60 kg K_2O/ha (F_2) was found to be an appropriate level, identical to 175 kg N+80 kg P_2O_5+70 kg K_2O/ha (F_3), and significantly greater than to 125 kg N+60 kg P_2O_5+50 kg K_2O/ha (F_1). The data indicated that the uptake of nitrogen, phosphorus, potassium, and zinc by baby corn was significantly higher by 11.32, 11.11, 11.19, and 9.38 percent, respectively, as a result of F_2 compared to F_1 level. F_3 level was also found to be significantly superior to F_1 in this regard. In comparison to F_1, the F_2 level boosted the intake of nitrogen, phosphorus, potassium and zinc by green fodder to 10.90, 10.51, 10.69, and 10.64 percent per hectare, respectively, according to pooled data (Table 3). The improvement in nutrient uptake is attributed to increased nutrient availability, enhanced root proliferation, and improved photosynthate translocation. Balanced fertilization created a favorable rhizosphere environment supporting both microbial activity and nutrient absorption (Singh *et al.,* 2014). There have also been reports by Singh *et al.*, 2010 and Suther *et al.*, 2014 of increased nutrient uptake by baby corn and subsequent increases in nutrient content with successive increases in fertility level.

Effect of Zinc Fertilization on Nutrient uptake by baby corn and green fodder at harvest (%)

Data showed that there exists significant variation in nitrogen, phosphorus, potassium and zinc uptake by baby corn and green fodder (table 2) due to zinc fertilization. Application of 5.0 kg Zn/ha (Z_1) resulted in significantly highest uptake of nitrogen, phosphorus, potassium and zinc by baby corn to the tune of 20.80, 20.30,19.95 and 15.77 per cent, respectivelycompared to Z_3. In comparison to Z_3, the Z_1 level boosted the intake of nitrogen, phosphorus, potassium and zinc bygreen fodder to 20.56, 18.76, 19.61 and 20.10 percent per hectare, respectively, according to pooled data.A synergistic impact between fertility and zinc may be the reason for the considerable increase in nutrient uptake of baby corn fodder caused by zinc application (Kumar *et al.,* 2015).

Table 3. Performance of hybrids and effect of NPK levels & Zinc fertilization on nutrient uptake of baby corn at harvest

Treatment	Nitrogen uptake (kg/ha)		Phosphorus uptake (kg/ha)		Potassium uptake (kg/ha)		Zinc uptake (g/ha)	
	Baby corn	Green fodder	Baby corn	Green fodder	Baby corn	Green fodder	Baby corn	Green fodder
Hybrids								
'HM 4'	14.93	72.95	2.72	12.49	4.24	82.97	40.29	211.75
'PHM 3'	11.75	57.53	2.15	10.02	3.41	65.93	33.26	168.12
SEm±	0.14	0.69	0.03	0.13	0.05	0.87	0.48	2.54
CD (P=0.05)	0.39	1.94	0.08	0.37	0.13	2.46	1.35	7.17
*NPK Levels**								
F_1	12.37	60.66	2.26	10.47	3.55	69.22	34.57	176.80
F_2	13.77	67.27	2.51	11.57	3.95	76.62	37.81	195.62
F_3	13.87	67.79	2.53	11.73	3.99	77.51	37.95	197.38
SEm±	0.17	0.84	0.03	0.16	0.06	1.07	0.59	3.11
CD (P=0.05)	0.48	2.38	0.09	0.45	0.16	3.01	1.65	8.78
Zinc fertilization								
5.0 kg Zn/ha	14.46	70.66	2.63	12.09	4.13	80.21	38.94	205.23
3.75 kg Zn/ha + ZnSB	13.59	66.45	2.48	11.50	3.91	76.07	37.75	193.69
2.50 kg Zn/ha + ZnSB	11.97	58.61	2.19	10.18	3.44	67.06	33.64	170.88
SEm±	0.17	0.84	0.03	0.16	0.05	1.07	0.59	3.11
CD (P=0.05)	0.48	2.38	0.09	0.45	0.16	3.01	1.65	8.78

Total Nutrient uptake

Effect of Hybrids on Total Nutrient uptake bybaby corn and green fodder at harvest (%)

The significantly higher uptake of total nitrogen, total phosphorus, total potassium and total zinc by baby corn and green fodder was registered under hybrid HM-4 during study (Fig. 1). On the basis of pooled data revealed that increases in total nitrogen, total phosphorus, total potassium and total zinc due to HM-4 were to the extent of 26.82, 24.75, 25.78 and 25.49%, respectively, compared to 'PHM 3'. The morphological characteristics of different varieties varies, which accounts for these discrepancies. Due to genetic differences, Sobhana *et al.,* 2012, Kumari *et al.*, 2015, and Kumer *et al.*, 2015 also observed a similar variation in the uptake of applied nutrients by different corn varieties.

Effect of NPK Levels on Total Nutrient uptake bybaby corn and green fodder at harvest (%)

F_2 increased significantly total nitrogen, total phosphorus, total potassium and total zinc uptake, compared to F_1 during study. On pooled data basis indicated that application of F_2 increased total nitrogen, total phosphorus, total potassium and total zinc uptake of baby corn and green fodder by 10.95, 10.58, 10.70 and 10.63%, respectively, compared to F_1 level (Fig. 1). Higher fertilizer application levels might have increased the amount of nutrients available for the plant to absorb from the soil environment. Consequently, higher fertilizer levels in balanced dosages enhance the nutrient concentration in both plants and cob. This resulted in to improved metabolites mobility to the roots and an improved root system, which led to improved absorption. Singh *et al.*, 2010 and Suther *et al.,* 2014 similarly found an increase in nutrient uptake by maize and a subsequent increase in nutritional content with repeated increases in fertility level.

Effect of NPK Levels on Total Nutrient uptake by baby corn and green fodder at harvest (%)

Z_1 resulted in significantly highest accumulation of total nitrogen, total phosphorus, total potassium and total zinc, compared to Z_2 and Z_3, when judged on pooled data basis (Fig. 1). Z_2 was also found significantly superior to Z_3 in this regard. On Pooled data basis indicated that application of Z_1 treatment increased total nitrogen, total phosphorus, total potassium and total zinc uptake by baby corn and green fodder by 6.34, 5.21, 5.45 and 5.84%, respectively compared to Z_2. Corresponding increases in total nitrogen, total phosphorus, total potassium and total zinc uptake due to Z_2 over Z_3 were 13.41, 13.17, 13.44 and 13.31 per cent on pooled basis.

Zinc enhances chlorophyll biosynthesis, enzymatic functions, and membrane stability, thereby stimulating metabolic processes that increase nutrient uptake and accumulation. As reported by Meena *et al.* (2013), improved dry matter yield under zinc fertilization also contributes to elevated nutrient uptake

The study demonstrated that both fertility levels and zinc fertilization strategies significantly influenced the yield, nutrient content, and uptake of baby corn hybrids

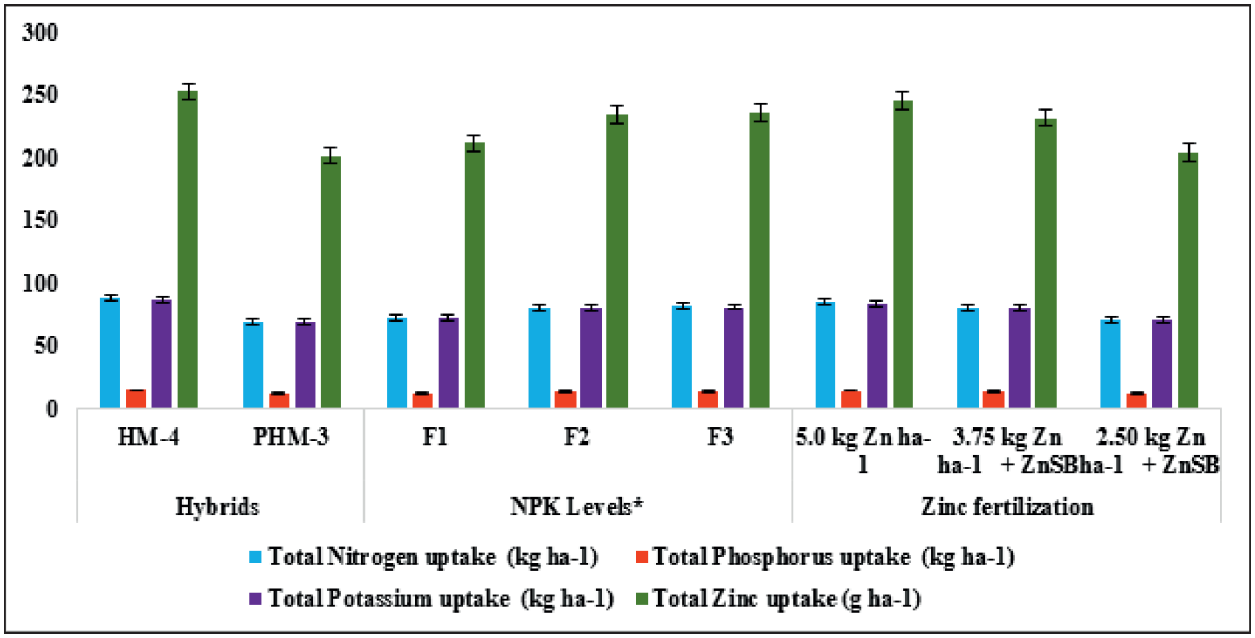

Fig. 1. Performance of hybrids and effect of NPK levels and Zinc fertilization on nutrient uptake of baby corn at harvest

under the sub-humid agro-climatic conditions of Southern Rajasthan. On a pooled basis, hybrid HM-4 recorded 15–27% higher yields and nutrient uptake than 'PHM 3'. Fertility level F_2 improved yields by ~6% and nutrient uptake by ~11% over F_1, while zinc application at Z_1 enhanced yields by ~10% compared to Z_3. The hybrid HM-4, when combined with 150:70:60 kg N:PO:KO/ha and 5.0 kg Zn/ha, resulted in the highest yields of baby cob, baby corn, and green fodder, along with improved nutrient concentrations and uptake efficiency. Thus, adopting this combination under rainfed conditions can serve as a viable agronomic strategy to boost baby corn productivity, enhance fodder supply, and support sustainable nutrient management.

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