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Effect of nutrient management on productivity of maize (*Zea mays* L.)

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Abstract
A field experiment was conducted at "Effect of nutrient management on productivity of maize (*Zea mays* L.) conducted during *kharif* 2024 at Agriculture farm, Suresh Gyan Vihar University, Jaipur on loamy sand soil. Application of 125% RDF to the maize crop significantly length of cob, number of seeds per cob, seed, stover and biological yield of maize as compared to control and 75% RDF and remained statistically at par with 100% RDF. Maximum net return and B : C ratio were recorded with application of 100% RDF. Results revealed that application of urban compost @ 5 t/ha significantly higher significantly length of cob, number of seeds per cob, seed, stover and biological yield of maize. Higher net and B : C was recorded with poultry manure @ 5 t/ha as compared to control and 1 FYM @ 10 t/ha and remained statistically at par with urban compost @ 5 t/ha.

Keywords: Cob, maize, seed, poultry and net return

Introduction
Maize (*Zea mays* L.) is a major agronomic crop cultivated worldwide, is cross-pollinated long day plant belongs to the family Poaceae. It is the second highest producing cereal crop after rice in terms of area & production in India. It is the traditional crop cultivated as food, feed & fodder in slopping Bari land (rainfed upland) in the hills of India. It contains 11.1% protein, 3.6% fat, 2.7% fiber, 66.3% carbohydrate and 1.5% minerals (Calcium, phosphorous, Iron) and Vitamins (A, B, E) (Joshi *et al*., 2017) [8].

In India total area under maize is 11.00 million ha with total production 34.06 million tones (Anonymous, 2023-24). While in Rajasthan area, production and productivity under maize is 1.10 million hectares, 20.40 lakh tones (Anonymous, 2023-24). In Rajasthan, maize is cultivated mainly in the districts of Banswara, Bhilwara, Udaipur Pali, Jodhpur, Nagaur and Sikar in tube-well and canal water irrigated areas. Vermicompost has been shown to have high levels of total and available nitrogen, phosphorous, potassium and micro nutrients, microbial and enzyme activities and growth regulators. Enriched Farmyard manure (EFYM) is also considered as an important source of macro and micronutrients to increase crop yield. Due to higher prices of inorganic fertilizers, farmers in India could easily manage to prepare EFYM in their farms and to apply them in fields. Organic Manure contains all the plant nutrients needed for the crop growth. The biofertilizer Azospirillum is an important free-living organism that can fix atmospheric nitrogen into the soil ranging from 20 to 30 kg ha^{-1} (Radhakrishnan, B. (2009) [9].

Materials and Methods
The experiment was conducted during *kharif* 2024 at Agronomy farm, School of Agriculture, Suresh Gyan Vihar University, Jaipur. Geographically, the study area is located at 75°48'84" E longitude and 26°82'47" N latitude and this region falls under agro-climatic zone III A (Semi-arid Eastern Plain Zone) of Rajasthan. Results of analysis showed that experimental soil was sandy loamy in texture, low in organic carbon (0.23%) and available nitrogen (125.73 kg N/ha), medium in available phosphorus (17.92 kg P_2O_5/ha) and available potassium (151.76 kg K_2O/ha). The soil was non saline with a pH value of 8.25. The experiment consisting four Recommended Dose of Fertilizer of nutrient management (control, 75% RDF, 100% RDF and 125% RDF) and organic manure (control, FYM @ 10

t/ha, Poultry manure @ 5 t/ha and Urban compost @ 5 t/ha). The total sixteen treatment combinations were tested in factorial randomized block design with three replications.

Results and Discussion

Effect of nutrient management

Recommended Dose of Fertilizer (RDF)

Data presented in Table 1 indicated that 125% RDF significantly gave higher cob length, seed per cob and test weight as compared to control and 75% RDF. Application of 125 RDF significantly superior in seeds per cob over to control and 75% RDF but remained statistically at par with 100 RDF. The causes for the improved cob length and seeds per cob may be due to the fact that of more photosynthesis occurred maize plants in improved supply of nitrogen because primary nutrient, is a crucial element for crop growth. Therefore, an improved cob length will be the key of the improvement economical yield in maize crop (Ahmed *et al*. 2024) [10].

Application of 125 RDF significantly superior seed, stover and biological yield over to control and 75% RDF but remained statistically at par with 100 RDF. The increase in stover yield due to 125% RDF was 10.13 and 26.32 percent over 75% RDF and control, respectively. This may be due to the greater contribution of nutrient from recommended dose of fertilizer which enables the plant to develop a more extensive root system to extract water and nutrient from deeper soil layer and its also helps growth, and yield attributes These results are in line with the findings of Kaleeswari R.K. (2019) [11].

The highest significant net returns (₹ 88427) were obtained with 100% RDF. 100% significantly increased the B : C ratio of maize as compared to control and 75% RDF and remained statistically at par with 125% RDF. The highest significant B:C ratio (2.04) was obtained with 100% RDF. The significant improvement in net return with 100% RDF can be attributed to the balanced and adequate nutrient supply that enhanced crop growth, yield attributes, and ultimately the marketable grain yield of maize. These findings are supported by Kumar *et al*. (2021) [7] and Yadav *et al*. (2020) [6] who found that 100% RDF significantly maximized the economic returns in maize without compromising input efficiency, especially under rainfed conditions.

Organic Manure

Urban compost @ 5 t/ha compost was significantly increased the cob length and number of seeds per cob over control and farm yard manure @ 10 t/ha but remained statistically at par with poultry manure @ 5 t/ha. Similar results were reported by Sharma *et al*. (2021), who found that poultry manure significantly improved cob characteristics in maize due to enhanced nutrient availability.

The increases the seed yield due to urban compost @ 5 t/ha and poultry manure @ 5 t/ha were 38.94 and 36.38 percent over control, respectively. The increases the stover yield due to urban compost @ 5 t/ha and poultry manure @ 5 t/ha were 38.60 and 35.79 percent over control, respectively. Similar result was found by Choudhary and Jat (2006) [4]. The use of integrated nutrient management produces nutrients are balanced in soil for plant growth, yield and sustainability. Similar results were observed by Kumar and Ahlawat (2017) [3].

Economics

Table 1: Effect of nutrient management on yield attributes

Treatment	Yield attributes		
	Cob length (cm)	Seeds/cob	TW (g)
Recommended Dose of Fertilizer (RDF)			
Control	13.94	231	241.8
75% RDF	14.27	244	253.9
100% RDF	14.59	250	258.8
125% RDF	15.19	254	266.2
SEm±	0.27	4	3.9
CD (p=0.05)	0.77	11	11.1
Organic Manure			
Control	13.60	233	241.6
FYM @ 10 t/ha	14.44	244	253.3
Poultry manure @ 5 t/ha	14.93	249	259.9
Urban compost @ 5 t/ha	15.02	253	265.9
SEm±	0.27	4	3.9
CD (p=0.05)	0.77	11	11.1

Table 2: Effect of nutrient management on yields

Treatment	Yield (kg/ha)			HI (%)
	Seed	Stover	Biological	
Recommended Dose of Fertilizer (RDF)				
Control	3556	5842	9398	37.92
75% RDF	4225	6788	11013	38.32
100% RDF	4601	7348	11949	38.47
125% RDF	4639	7380	12019	38.64
SEm±	96	126	181	0.56
CD (p=0.05)	276	365	523	NS
Organic Manure				
Control	3388	5478	8866	38.25
FYM @ 10 t/ha	4288	6850	11138	38.46
Poultry manure @ 5 t/ha	4637	7438	12076	38.38
Urban compost @ 5 t/ha	4707	7592	12299	38.25
SEm±	96	126	181	0.56
CD (p=0.05)	276	365	523	NS
SEm±	7.79	6.41	5.65	5.05

Table 3: Effect of nutrient management on economics (Rs/ha)

Treatment	Return (Rs/ha)		B : C ratio
	Gross return	Net return	
Recommended Dose of Fertilizer (RDF)			
Control	102484	65709	1.78
75% RDF	121157	79467	1.90
100% RDF	131755	88427	2.04
125% RDF	132746	87780	1.94
	1569	1569	0.04
CD (p=0.05)	4531	4531	0.11
Organic Manure			
Control	97292	61477	1.71
FYM @ 10 t/ha	122811	80496	1.90
Poultry manure @ 5 t/ha	132935	91120	2.17
Urban compost @ 5 t/ha	135104	88289	1.88
SEm±	1569	1569	0.04
CD (p=0.05)	4531	4531	0.11

Data in Table 4.3 revealed that organic manure at poultry manure @ 5 t/ha significantly gave higher net return as compared to control and FYM @ 10 t/ha but remained at par with urban compost @ 5 t/ha. Further result shows that the maximum B:C ratio (2.17) obtained by poultry manure @ 5 t/ha over control and FYM @ 10 t/ha but remained at par with urban compost @ 5 t/ha. This might be due to higher yield and least cost of cultivation. Integration of vermicompost and FYM with inorganic source in different

proportion recorded low net realization and B:C ratio mainly due to high cost of manure over 120% RDN through inorganic source. These results are in accordance with the findings Meena *et al*. (2015) [2].

References

1. Government of India. At a glance of agriculture. Ministry of Farmer Welfare and Agriculture; 2023-24.
2. Meena SK, Mundra SL, Singh P. Response of maize (*Zea mays*) to nitrogen and zinc fertilization. Indian J Agron. 2015;58(1):127-128.
3. Kumar V, Ahlawat IPS. Effect of organic manures on growth and yield of maize (*Zea mays* L.). Res Crops. 2017;18(2):233-237.
4. Choudhary GR, Jat NL. Response of coriander (*Coriandrum sativum*) to inorganic nitrogen, farm yard manure and biofertilizer. Indian J Agric Sci. 2004;78:761-763.
5. Sharma RK, Meena RS, Yadav GS. Comparative effect of poultry manure and other organics on growth and productivity of maize. Agric Res J. 2021;58(2):296-301.
6. Yadav RS, Verma UN, Singh D. Effect of integrated nutrient management on yield, economics and soil fertility in maize. Int J Chem Stud. 2020;8(4):365-369.
7. Kumar S, Meena RK, Jat RK. Effect of different fertility levels on productivity and profitability of maize under semi-arid conditions. J Pharmacogn Phytochem. 2021;10(1):1212-1216.
8. Joshi SC, Sharma RK, Kumar S. Nutritional composition of maize: It contains 11.1% protein, 3.6% fat, 2.7% fibre, 66.3% carbohydrate, and 1.5% minerals (calcium, phosphorus, iron) and vitamins (A, B, E). J Cereal Sci. 2017;76:123-130.
9. Radhakrishnan B. Nutrient value and microbial population of vermicompost and vermiwash. J Newsletter-UPASI Tea Res Found. 2009;19(2):3-5.
10. Ahmed A, Ahmed N, Arif U, Khalid S, Zafar L, Ahmed R, *et al*. Application of organic and inorganic nutrient sources for improving growth and yield attributes of maize (*Zea mays* L.) under climatic conditions of Pakistan. Pak J Biotechnol. 2024;21(2):484-488.
11. Kaleeswari RK. Customized fertilizers for improving yield and nutrient uptake of hybrid maize. Int J Cereal Sci. 2019;7(4):2342-2346.