



PROFITABILITY AND SUITABILITY OF FERTILIZERS IN MAIZE UNDER SAURASHTRA AGRO-CLIMATIC ZONE

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ABSTRACT

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A field experiment was conducted during *kharif* season of 2012 on calcareous soil to study the effect of nitrogen and phosphorus levels on yield, nutrient content, uptake and economics of maize in Saurashtra agro-climatic zone. The experiment consisted of four levels of N (60, 80, 100 and 120 kg/ha) and three levels of P (40, 50 and 60 kg P₂O₅/ha) with three replications. Maximum growth, yield attributes, nutrients uptake and economic both net return and benefit cost ratio was higher recorded with 120 kg N/ha over control (60 kg N/ha). Results indicated that application of 60 kg P₂O₅/ha significantly increased the maximum seed yield, straw yield, phosphorus concentration in seed and straw, nutrient uptake by seed and straw, economic both net return and benefit cost ratio over control (40 kg P₂O₅/ha)

Maize (*Zea mays* L.) ranks third in total world production after wheat and rice and it is principal staple food in many countries, particularly in the tropics and subtropics. Maize is considered as the "Queen of Cereals". Nowadays maize assumes a special significance in Indian agriculture on account of its utilization as food, feed and fodder besides several industrial uses. Among the different nutrients, nitrogen is the most commonly deficient nutrient in the soil and gives considerable response in maize crop. It has the quickest and the most pronounced effect on plant growth, development and nutrient uptake by crop (Mehta *et al.*, 2005). It is an integral part of chlorophyll which is essential for photosynthesis. Nitrogen is essential constituent of protein and is present in many other compounds of physiological importance in plant metabolism such as nucleotide, phosphatides, alkaloids, enzymes, hormones and vitamins etc. It has best physiological efficiency thus N will help in boosting higher yield. Phosphorus nutrition plays a key role in plant metabolism. It is most essential for all living creatures for their growth and development. Being involved in various biochemical processes, it ensures transfer and storage of energy as ADP and ATP, permits conversion and transmission of genetic characters, as it is a constituent of RNA and DNA. Therefore, the present study was carried out to find out the best combination of profitability and

suitability of N and P dosage for *kharif* maize Kumar (2009). Field experiment was conducted during *kharif* season of 2012 at Instructional Farm, Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh. Experimental soil have medium black in texture, alkaline in reaction (pH 8.0), medium in organic carbon (5.4 g/kg), low available nitrogen (238 kg/ha), medium available phosphorus (27.50 kg P₂O₅/ha) and medium in potassium (236 kg K₂O/ha) content. Experiment comprising twelve treatment combinations consisting four levels of nitrogen viz., 60, 80, 100 and 120 kg N/ha and three levels of phosphorus viz., 40, 50 and 60 kg P₂O₅/ha were tested in a factorial randomized block design with three replications. During the experiment GM-6 maize cultivar was used with seed rate of 20 kg/ha.

Effect of nitrogen levels

Nitrogen application up to 120 kg/ha significantly influenced on seed, straw yield and net returns over lower nitrogen levels (Table 1). Significantly in net returns (₹39228/ha) and benefit cost ratio (3.14) with 120 kg N/ha over the all other treatments, it might be due to higher seed and straw yields (4905 kg/ha and 8478 kg/ha). Treatment have 120 kg N/ha also recorded significantly higher nitrogen, phosphorus and potassium uptake by seed and straw, it may be due to improved nutritional environment

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under root zone as well as in the plant system leading to enhanced translocation of N, P and K in plant parts. These

results are in close conformity with the findings of Kar *et al.* (2006) and Kumar (2009) in maize

Table 1 Effect of nitrogen and phosphorus on seed and straw yields, nutrient concentration in seed and straw, nutrient uptake in seed and straw and economics in maize

Treatment	Yield		Grain content (%)			Straw content (%)			Uptake by grain (kg/ha)			Uptake by straw (kg/ha)			Economics	
	Grain	Straw	N	P	K	N	P	K	N	P	K	N	P	K	Net return (₹/ha)	B:C ratio
<i>Nitrogen (kg N/ha)</i>																
N ₁ - 60	4243	6096	1.57	0.48	0.44	0.70	0.22	1.07	66.99	20.59	18.88	45.01	14.59	68.61	31006	2.76
N ₂ - 80	4691	7016	1.68	0.49	0.45	0.78	0.22	1.08	78.63	23.12	21.34	54.22	16.42	77.36	36148	3.03
N ₃ - 100	4820	8034	1.75	0.50	0.46	0.83	0.23	1.09	84.47	24.38	22.09	67.12	18.74	87.76	38192	3.11
N ₄ - 120	4905	8478	1.79	0.51	0.46	0.86	0.23	1.09	87.94	25.07	22.51	71.69	19.55	90.69	39228	3.14
CD (<i>P</i> =0.05)	387	736	0.09	NS	NS	0.04	NS	NS	7.86	1.95	2.14	5.71	1.79	8.70	-	-
P ₁ - 40	4343	6447	1.66	0.46	0.44	0.78	0.19	1.07	72.04	19.89	19.12	49.87	12.54	67.47	31512	2.71
P ₂ - 50	4664	7489	1.70	0.50	0.45	0.79	0.22	1.08	79.46	23.21	21.17	60.70	17.38	83.12	35361	2.88
P ₃ - 60	4987	8281	1.74	0.54	0.47	0.81	0.26	1.10	87.02	26.77	23.33	67.96	22.05	92.73	38967	3.03
CD (<i>P</i> =0.05)	335	638	NS	0.02	NS	NS	0.01	NS	6.81	1.69	1.85	4.94	1.55	7.54	-	-

Application of phosphorus levels up to 60 kg/ha significantly increased the seed yield, straw yield and net returns over lower phosphorus levels (Table 1). Application of 60 kg P₂O₅/ha recorded the maximum and significantly higher net returns (₹ 38967/ha) and benefit cost ratio (3.03) over all other treatments. Increase in net returns might be due to higher seed and straw yields (4987 kg/ha and 8281 kg/ha) obtained under this treatment as compared to cost involved under this treatment. Application of 60 kg P₂O₅/ha also recorded significantly higher phosphorus content in seed and straw, nitrogen, phosphorus and potassium uptake by seed and straw (Mehta *et al.*, 2005).

On the basis of one year field experimentation, it seems quite logical to conclude that maximum production and net returns from *kharif* maize by the application of nitrogen and phosphorus @ 120 and 60 kg/ha and it is most profitability and suitable dose of fertilizers in maize on calcareous soil under Saurashtra agro-climatic Zone.

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