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Short Communication

Performance of Promising Pre-release Maize Varieties at Different Nitrogen Levels Under Rainfed Conditions

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Maize is an important coarse cereal, predominantly grown as a rainfed crop. Although it occupies considerable area in the country, the productivity remained as low as 1600 kg ha^{-1}. To meet the expected demand of 18.33 million tones or 3160 kg ha^{-1} by 2000 AD, the priority must be given to increase the productivity of rainfed maize (AICMIP, 1988). An attempt has been made to identify the high yielding varieties and their nitrogen requirement under rainfed conditions at Agricultural Research Station, Karimnagar. The soil was sandy loam having 220 kg ha^{-1} available nitrogen, 50 kg ha^{-1} phosphorus and 550 kg ha^{-1} potassium. The pH of the soil was 7.5. The seasonal rainfall in 1995 was 958.3 mm, with 49 rainy days, while in 1994, it was 538.1 mm in 31 rainy days. There were four nitrogen levels (45, 90, 135 and 180 kg ha^{-1}) during both the years. During first year (1994, season 1), five varieties of medium maturity group (ICI-731, ICI-738, KH-5107, Navjot and DHM-107), and during second year (1995, season 2), seven varieties of full season maturity group (SSF-9374, JK-2492, BIO-9681(Y), Ganga-11, DHM-103, Prabhat and DHM-105) were selected. In all, there were 20 and 28 treatment combinations in first and second year, respectively. N was applied as urea in three equal splits at basal, knee high stage and at flowering stage. A uniform dose of 40 kg P_2O_5 and 30 kg ha^{-1} of K_2O was applied as basal dose during both the years.

There was significant effect of N in both the years of study. Grain yield increased significantly due to 90 kg N ha^{-1} over 45 kg N ha^{-1} in the first year. There was no significant improvement in yield with the application of either 135 or 180 kg ha^{-1} over 90 kg N ha^{-1}, whereas, in the second year, significant response was seen up to 135 kg ha^{-1} and beyond this level, there was marked reduction in the yield. This may be due to more dry matter production, which resulted in early depletion of soil moisture and shading effect at the highest level of 180 kg N ha^{-1}. Significant response showed by 135 kg ha^{-1} in the second year may be due to high rainfall, coupled with its even distribution. Besides the rainfall, the types of germplasm (medium and full season maturity groups in season 1 and 2, respectively) tested in two seasons might have also responded differently to N application. The increase in yield by 90 kg ha^{-1} in season 1, and by 135 kg N ha^{-1} in season 2, over the lower level of 45 kg N ha^{-1}, were in the order of

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Table 1. Grain yield and yield attributes of medium duration maize germplasm as affected by nitrogen levels during season 1

Treatments	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})	Plant height (cm)	Ear length (cm)	Ear girth (cm)	100 seed weight (g)
Nitrogen (kg ha^{-1})						
45	3.43	6.20	165.4	18.3	11.5	28.3
90	4.98	9.85	180.2	22.4	15.8	34.4
135	5.02	10.20	185.0	23.5	16.2	38.0
180	5.10	10.50	186.5	23.8	16.0	37.0
C.D. (5%)	1.05	1.22	10.2	1.6	1.8	2.2
Germplasm						
ICI-731	5.04	10.50	194.0	23.6	16.0	36.8
ICI-735	4.79	9.75	187.3	21.3	14.8	34.4
KH-510	4.51	9.25	183.0	20.8	13.6	32.0
Navjot (check)	3.59	8.00	180.0	19.2	12.2	30.2
DHM-107 (check)	3.99	8.50	183.0	20.4	13.2	31.0
C.D. (5%)	0.65	0.85	6.8	1.4	1.6	1.8

45.0 and 26.0%, respectively. Similar trend of nitrogen response was observed in respect of stover yield. The growth and yield attributes like plant height, ear length, ear girth and test weight also increased significantly up to 90 kg N ha^{-1} level in season 1. However, in season 2, the above parameters showed significant improvement up to 135 kg N ha^{-1}. The results suggest that in the years of high rainfall with even distribution, application of 135 kg N ha^{-1} would be appropriate for producing higher yields of full season maturity maize varieties under rainfed conditions. On the other hand, 90 kg N ha^{-1} seems to be the reasonable dose for higher grain yields in the years of low rainfall and with medium season maturity maize varieties. Similar findings were reported by Singh *et al.* (1984).

In the first year, ICI-731 recorded significantly higher grain yield over the checks (Navjot and DHM-107); however, it remained at par with the other two varieties, viz., ICI-735 and KH-510. The increase in yield of ICI-731 over Navjot and DHM-107 was 40.3 and 26.3%, respectively. Maximum yield, plant height, ear length and girth, and test weight were recorded in ICI-731. In the season 2, JK-2492 recorded the highest grain and straw yields of 6.04 t ha^{-1} and 11.55 t ha^{-1}, respectively and proved significantly superior over SSF 9374 and BIO-9681 (Y) and checks. The variety JK-2492 registered a yield increase of 48.0% over the checks average yield of 4.08 t ha^{-1}. The growth and yield attributing characters, viz., plant height, ear length, ear girth and test weight were the maximum in JK-2492. A good genotype has more vigor and inheritance of high yield attributing characters. Genotypic variation in maize has also been reported by Reddy and Raja (1988) and Singh *et al.* (1984). The genotype did not show interaction effect with nitrogen in either of the seasons.

Table 2. Grain yield and yield attributes of full season maturity maize germplasm affected by nitrogen levels during season 2

Treatments	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})	Plant height (cm)	Ear length (cm)	Ear girth (cm)	100 seed weight (g)
Nitrogen (kg ha^{-1})						
45	4.02	9.05	177.0	20.2	12.0	28.4
90	4.35	10.80	198.0	21.8	14.2	32.4
135	5.08	11.50	202.7	23.0	16.5	34.2
180	4.40	11.75	204.0	21.0	14.6	32.8
C.D. (5%)	0.33	0.53	8.3	1.4	1.6	2.8
Germplasm						
SSF-9374	4.31	10.20	184.0	21.4	13.2	30.2
JK-2492	6.04	11.55	195.0	25.2	16.4	34.3
BIO-9681 (Y)	4.63	10.70	190.0	22.5	13.8	32.0
Ganga-11 (check)	3.43	9.00	180.0	20.2	12.3	25.6
DHM-103 (check)	4.14	9.80	184.0	21.4	13.0	28.0
Prabhat	4.48	10.30	180.0	21.6	13.5	31.4
DHM-105 (check)	4.27	10.00	185.5	21.0	12.8	30.8
C.D. (5%)	0.28	0.75	6.4	1.6	1.8	4.4

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