

Influence of Nitrogen and Stages of Cutting on the Fodder Yield, Crude Protein and Mineral Content of Maize Varieties

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Maize (*Zea mays* L.) varieties Ganga 5, F2 of Ganga 5 and Deccan were grown under four levels of N (0, 50, 100 and 150 kg/ha) to study their fodder yield potentiality, crude protein and mineral contents. The crop was harvested at four periods of growth (40, 50, 60 and 70 days after sowing) and evaluated. The experiment was conducted under irrigated condition in a sandy clay loam soil with low, medium and high in available N, P and K status respectively. The results of the study indicated that the variety Ganga 5 registered higher green matter and crude protein yields and P and Mg contents than the rest of the varieties, while they did not differ in their crude protein and Ca contents. The crude protein, P, Ca and Mg contents decreased with the age of the crop, while dry matter content increased. It was suggested that harvesting of maize varieties for fodder purpose between fiftieth and sixtieth day after sowing was found to be ideal for better green matter yield with higher crude protein and mineral contents. Nitrogen fertilization at 100 kg N/ha. was found to be sufficient for all the three varieties. Application of nitrogen had increased the fodder yield, crude protein and mineral contents.

Maize (*Zea mays* L) is an important cereal green fodder grown under varying agronomic practices. Several varieties of them are grown, cut at various stage of growth and fed to the animal. The varieties differ in their yield potential and their response to N fertilization. The dry matter, crude protein and mineral contents also vary depending upon varieties, stages of harvest and N fertilization. In order to gether information which is lacking on these lines for the maize varieties Ganga 5, F2 of Ganga 5 and Deccan this study was planned.

MATERIAL AND METHODS

A field exeriment was laid out in a sandy clay loam soil with available N, P and K status as low, medium and high respectively. The pH of the soil was 8.1. The experiment was conducted in a split plot design with two replications. The resulting twelve treatments arising out of all the combinations of three maize varieties (Ganga 5, F2 of Ganga 5 and Deccan) and four stages of harvest (40, 50, 60 and 70 days after sowing) were assigned to the main plot. while

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TABLE. Results of statistical analyses and mean yield and nutrient content of maize varieties

Varieties	Green matter yield (t./ha)	Dry matter content (per cent)	Crude protein content (per cent)	Crude protein yield (kg/ha)	Mineral contents		
					P	Ca.	Mg.
F2 of Ganga 5	26.52	14.80	12.64	473	0.248	0.79	0.42
Ganga 5	42.22	14.64	12.15	734	0.271	0.79	0.45
Deccan	35.59	15.00	11.84	621	0.258	0.83	0.41
S.E.	1.21	N.S.	N.S.	15.07	0.003	N.S.	0.01
C.D. at 5%	3.76	--	--	46.89	0.010	--	0.03
Stages of cutting							
40th day	18.26	12.19	14.48	318	0.304	0.87	0.52
50th day	30.77	14.49	13.31	585	0.276	0.88	0.47
60th day	42.25	15.01	11.04	694	0.250	0.75	0.41
70th day	47.91	17.55	10.00	839	0.206	0.63	0.31
S.E.	1.40	0.25	0.41	17.40	0.004	0.02	0.01
C.D. at 5%	4.34	0.78	1.28	54.15	0.011	0.06	0.03
Nitrogen levels (Kg/ha)							
0	28.89	16.21	10.41	474	0.236	0.75	0.36
50	33.44	15.18	11.72	571	0.247	0.76	0.41
100	38.18	14.16	12.99	684	0.268	0.84	0.45
150	38.68	13.69	13.70	708	0.286	0.91	0.49
S.E.	1.04	0.12	0.27	15.00	0.002	0.01	0.01
C.D. at 5%	2.99	0.25	0.78	43.00	0.006	0.02	0.02

N.S. = Not significant.

the four levels of N (0, 50, 100 and 150 kg/ha) were allotted to the sub plots. A uniform basal dose of 30 kg each of P₂O₅ and K₂O was applied to all the plots along with the full dose of N as per the treatment. The plant samples cut at different periods were analysed for their crude protein and mineral contents by adopting the standard procedure (Jackson, 1967).

RESULTS AND DISCUSSION

The results of statistical analysis of the green matter yield, crude protein and mineral contents along with the mean values are presented in Table.

Green fodder yield: The varieties differed significantly from each other in their green fodder yield. Variety Ganga.5 recorded the highest yield followed by Deccan and F2 of Ganga.5. Similar varietal variations in the green fodder yield among maize varieties was also reported by Hegde (1973) and Rajagopal and Morachan (1974). It was observed that the increase in yield was 11.81 per cent of the maximum from 60th to 70th day, while it was 23.97 per cent from fiftieth to sixtieth day. This result indicated that for optimum green matter yield, maize varieties should be harvested between fiftieth and sixti-

eth day after sowing. This observation is in accordance with the findings of Rakkiyappan (1976) and Natarajan (1976). Nitrogen application had significantly increased the green matter yield from 28.89 t/ha. in the control to 38.18 t./ha. at 100 kg N/ha. and beyond this level of N the yield increase was not appreciable suggesting that 100 kg N/ha. is sufficient for fodder yield of maize varieties included in this study.

Dry matter content : The varieties did not differ in their dry matter content, while it increased significantly from 12.19 per cent in the fortieth day to 17.55 per cent in the seventieth day. Application of N was found to decrease the dry matter from 16.21 in the control to 13.69 per cent at 150 kg N/ha. This reduction was due to succulence of the plant tissues with increased N concentration in the plant. This observation was also supported by the negative relationship between the crude protein and dry matter content ($r = 0.763^{**}$).

Crude protein content : The varieties failed to record any significant difference in their crude protein content. It was found to decrease with advancing age of the crop and the highest value (14.48 per cent) being recorded at fortieth which got reduced to 10 per cent seventieth day. Similar observation was also reported by Miaki and Nose (1967) in fodder maize. The crude protein content at fortieth and fiftieth day was on a par and significantly higher than that of it in the subsequent harvests. It could therefore be inferred that to get fodder with high protein content, harvesting should be commenced from fiftieth day onwards. Appli-

cation of N significantly increased the crude protein content from 10.41 in the control to 12.99 per cent in 100 kg N/ha and beyond this level of N the increase in the protein content was also reported by earlier workers (Sharma and Muddal, 1968; Gill *et al.*, 1972).

Crude Protein Yield : The variety Ganga 5 recorded significantly higher crude protein yield followed by Deccan and F2 of Ganga 5. The crude protein yield followed the same trend as green matter yield. The protein yield increased with the age of the crop recording the maximum value at - seventieth day. Nitrogen fertilization upto 100 kg N/ha was found to increase the yield significantly.

Mineral Constituents : Ganga 5 variety had significantly higher P and Mg content compared to Deccan and F2 of Ganga 5 which were similar in this respect, while Ca content did not differ among the varieties. Phosphorus, Calcium and Magnesium were found to decrease significantly with the age of the crop [due to dilution effect (Junk and Austenson, 1971)]. Nitrogen fertilization significantly increased the content of all the three minerals in the maize varieties.

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