

Effect of N-Fertilisation and Time of Cuttings on the Yield of Green Matter and Extractability of Protein in Maize

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In a field experiment with maize var. Ganga-5, application of N at 80 kg/ha increased the green matter yield. Among the cutting frequencies, 60th day cutting registered higher green matter yield at the same level. Among the different forms of extractable proteins from the leaves, water extractable protein (WEP) was more at 80 kg N/ha, while trichloroacetic acid (TCA) extractable protein and 90°C coagulable protein were more at 40 kg N/ha. Cutting on 40th day was found to be superior over other cutting frequencies with regard to WEP, TCA and 90°C coagulable proteins.

Deficiency of protein in the diet results in malnutrition and under-nutrition. It is widespread in thickly populated regions as well as developing countries. Even the staple food in these areas is deficient in proteins both in quantity and quality. Utilisation of unconventional sources to make up the deficit have led to the consumption of green leaves as a potential source of leaf proteins (Pirie, 1955). The effect of fertilization and time of cutting over the extractability of different forms of proteins tried with maize crop are reported in this paper.

MATERIAL AND METHODS

A randomised field trial was carried out with three replications in the black soils of Tamil Nadu Agricultural University, Coimbatore with three levels of N (0, 40 and 80 kg/ha) and three cutting frequencies (40, 50 and 60th day). Maize var. Ganga 5 was used as the test crop,

P and K was basally applied at 30 and 20 kg/ha respectively. After each cut, the green matter was weighed and processed for leaf protein extraction as described elsewhere (Pirie, 1955; Samuel and Kamalam, 1964 and Balasundaram and Samuel, 1971). The different forms of proteins were estimated and the statistically analysed data are presented in Tables I and II.

RESULTS AND DISCUSSION

Effect of N levels: The green matter ranged from 20,000 to 21,450 kg/ha respectively. Nitrogen at 80 kg/ha considerably increased the green matter yield. The overwhelming effect of N is in promoting lushy growth and higher green matter production with a small fibre to juice ratio (Arkcoll and Festenstein, 1971). Similar effects were observed in the present study also.

Effect of time of cutting: Among the different stages of cuttings, cuttings

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TABLE I. Chemical characteristics of maize and different fractions of proteins extracted from its leaves

Treatments	Total N in the plant %	Total protein in plant %	Total N in fibre %	Total protein in fibre %	Total N in LPC %	Protein in LPC %	Water extractable protein %	Trichloro-acetic acid extractable protein %	90° Coagutable protein %
N Levels									
1. Control (No Nitrogen)									
40th day cutting	2.54	15.75	1.52	9.50	7.59	47.43	1.662	1.337	1.575
50th day cutting	2.35	14.58	1.75	10.26	6.72	42.00	1.027	0.762	0.876
60th day cutting	1.48	9.27	1.32	8.23	5.60	35.00	1.177	0.796	0.131
2. N. at 40 kg/ha									
40th day cutting	2.92	18.25	1.48	9.25	7.48	45.75	2.406	1.318	1.618
50th day cutting	2.37	14.81	1.64	10.27	6.34	39.62	1.179	0.851	0.970
60th day cutting	1.70	10.60	1.48	9.27	5.10	31.88	1.225	0.896	0.146
3. N at 80 kg/ha									
40th day cutting	3.88	24.25	1.90	11.87	7.50	46.87	3.062	1.381	1.662
50th day cutting	2.58	16.15	1.81	11.33	6.90	43.17	1.330	0.820	0.888
60th day cutting	1.60	9.98	1.40	8.75	4.84	30.25	1.254	0.854	0.133

TABLE II. Influence of treatments on green matter yield (kg/plot of 9 sq.mt)

Time of cutting N Levels	T ₁ 40th day cutting	T ₂ 50th day cutting	T ₃ 60th day cutting	Mean
Control	9.66	19.63	23.66	17.95
40 kg/ha	10.73	22.93	25.93	19.86
80 kg/ha	11.20	25.50	27.66	21.45
Mean	10.53	22.68	25.75	

	SE. of mean	C.D. at 5% level
i) Time of cutting	0.339	0.718
ii) Nitrogen level	0.339	0.718
iii) Time of cutting x Nitrogen level	0.588	1.246

on 60th day have recorded the maximum green matter yield. This may be due to the lush vegetative growth of the crop.

Interaction between N and time of cutting, under all levels of N, cutting on 60th day recorded the maximum green matter yield than other treatments. It was observed that N has a slight influence on the rates of extracting leaf proteins and this agrees with the findings of Arkcoll and Festenstein (1971).

Effect on different forms of proteins: Water extractable protein (WEP) significantly increased with increase in the level of nitrogen. The results indicated that at 80 kg N/ha level WEP was 1.85 per cent and this

was more than 0.55 per cent over control. Trichloroacetic (TCA) and 90°C coagulable proteins were more at 40 kg N/ha than at other levels. All the three forms of protein were significantly greater in cuttings on 40th day.

It is clear that application of N at 40 kg/ha had increased the protein yield and cutting on 40th day was found to be beneficial for the maximum green matter yield.

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