INFLUENCE OF DIFFERENT NITROGEN LEVELS ON THE YIELD AND QUALITY OF MAIZE FODDER

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It is a fact that quality of a crop pertaining to its protein contents is enhanced by nitrogen application, besides an increase in vegetative growth. The present investigation was undertaken to see the effect of different levels of nitrogen on the yield and quality of maize fodder. Various nitrogen levels employed were 0, 50, 100, 150, 200 and 250 kg N/ha. The experiment was laid out in a randomized complete block design. A linear increase in green fodder and its protein and crude fibre contents was found with an increased application of nitrogen at different levels.

INTRODUCTION

In irrigated areas of Punjab maize (*Zea mays* L.) is grown as a fodder crop alone or in the form of mixture from mid February to September. It provides the cheapest and a valuable fodder for animals over a long period. Maize fodder has low protein contents (3.0-3.5%) yet it is relished by the animals due to its being succulent and palatable. Thus to establish its nutritive value and per hectare yield as realistic measures for the fodder quality, it seemed important to determine the nitrogen requirements of this fodder.

It has been documented by several researchers that quality of a crop with respect to its protein contents is enhanced by nitrogen application. However, it is possible only when suitable and proper amount of fertilizer is used. The present study was undertaken to determine the effect of different levels of nitrogen on the maize fodder yield and its quality under Faisalabad conditions.

MATERIALS AND METHODS

The effect of nitrogen levels on yield and quality of maize fodder was studied at the student's Farm, Department of Agronomy, University of Agriculture, Faisalabad. The crop (Neelum variety) was sown on a sandy clay loam soil having pH 8.15 with total nitrogen of 0.05% in the last week of August, 1992. The seed was broadcast at the rate of 60 kg/ha. The experiment was laid out in a randomized complete block design with four replications. Net plot size was 2.1 x 12.0 metres. All necessary agronomic and plant protection measures were adopted during crop growth.

Various levels of nitrogen fertilizer treatments are given below:

T0	=	Control
T1	=	50 kg N/ha
T2	=	100 kg N/ha
T3	=	150 kg N/ha
T4	=	200 kg N/ha
T5	=	250 kg N/ha

Nitrogen was applied in the form of urea, half at the time of sowing and the remaining half in the last week of September with second irrigation.

The effect of these factors was recorded on the following plant characteristics: germination count (No./m^2), stem diameter at harvest

(cm), number of leaves per plant at harvest, plant height at harvest (cm), stand density at harvest (No./m^2), and fresh fodder yield (t/ha).

After harvesting the fodder in the last week of November, 1992 the quality was determined on the basis of crude protein percentage (on dry weight basis) and crude fibre percentage (on dry weight basis).

For determining the quality of fodder twenty plants were selected at random from each plot. The representative samples were oven-dried and the composition of fodder was estimated according to the standard methods of analysis (Horwitz, 1980). The data so collected were statistically analysed using the analysis of variance technique and Duncan's New Multiple Range Test at 5% probability to compare the treatment means.

RESULTS AND DISCUSSION

The data given in Table 1 indicate that germination was increased from 2.5 to 10.1% over control with increasing levels of nitrogen but this increase was non-significant. Maximum germination count was 43.5 per unit area in T_5 where 250 kg N/ha was applied. It was 39.5 per unit area in control where no fertilizer was used. The increase in germination though non-significant was 10.1% higher than that of control. The results were in line with those reported by Vlakhova (1986). These data further show that average number of leaves per plant of maize fodder increased significantly with the use of nitrogen fertilizer. The minimum number of 12.08 leaves per plant was observed in control which increased with the addition of corresponding higher doses of nitrogen. Maximum average number of 13.24 leaves per plant was found with T_5 where 250 kg N/ha was applied. The results were in conformity with those reported by Blagovesta (1982).

The stem diameter increased significantly ranging from 8.0 to 43.4% over that of control. Minimum average stem diameter of 1.13 cm was found in control as against a maximum of 1.62 cm in T_5 where 250 kg N/ha was applied. Thus a significantly higher increase of 43.4% over control was observed. It was found that with increase in nitrogen application the stem diameter increased proportionately. Minimum plant height of 155.73 cm was recorded in control, while the maximum average plant height of 224.5 cm was found in T_5 with 250 kg N/ha.

Table 1.Analysis of variance showing the effect of different nitrogen levels on the yield and quality of maize fodder

Treatment	Nitrogen kg/ha	1*	2*	3*	4*	5*	6*	7*	8*
T0	0	39.50	12.08 c	1.13 d	155.73 d	35.75 c	34.33 e	7.30 e	28.71 c
T1	50	40.50	12.53 bc	1.22 cd	179.74 c	37.75 bc	38.29 b	8.20 b	29.22 c
T2	100	41.00	12.55 bc	1.29 bc	196.13 b	38.09 abc	44.44 d	8.80 c	29.00 c
T3	150	41.50	12.80 ab	1.38 b	198.33 b	39.82 ab	45.04 c	8.90 c	30.51 b
T4	200	43.00	12.88 ab	1.42 b	203.88 b	39.92 ab	51.79 b	9.70 b	30.90 ab
T5	250	43.50	13.24 a	1.62 a	224.05 a	41.83 a	56.35 a	10.50 a	31.45 a

Means not sharing a letter in common differ significantly.

1*: Germination count (No./m^2)
2*: No. of leaves per plant at harvest
3*: Stem diameter at harvest (cm)
4*: Plant height at harvest (cm)
5*: Plant stand density (No./m^2)
6*: Fresh stand density yield (t/ha)
7*: Crude protein contents (%)
8*: Crude fibre contents (%)

It was a significant increase of 43.9% over that of control. Similar results were reported by Ghaffar (1988).

Average stand density at harvest of maize fodder increased with increasing rates of nitrogen application. Minimum average stand density of 35.75/m^2 was observed in control and a maximum of 41.83/m^2 was recorded in T_3. The increase was statistically significant. The findings were in agreement with those reported by Ghaffar (1988). Fresh fodder yield significantly increased with increased application of nitrogen. Maximum average fresh fodder yield of 56.35 t/ha was recorded in T_3, while it was 34.33 t/ha in case of control. Similar conclusions had been drawn by Shahzad (1987).

A minimum of 7.3% of crude protein was observed in control as against a maximum of 10.5% in maize fodder given T_3. These results are supported by Sharma and Kanval (1986). Similarly, the crude fibre content also increased by the application of nitrogen. A minimum of 28.71% crude fibre was observed in control as against a maximum of 31.45% in T_3. It is evident from the data that crude fibre content increased with increasing nitrogen levels. Almost similar results were reported by Shahzad (1987). It may be concluded from the results of this study that all the yield and quality components of maize fodder, except germination, responded positively to increase in level of nitrogen application.

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