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EFFECT OF DIFFERENT LEVELS OF N-FERTILIZERS ON THE YIELD AND QUALITY OF MAIZE

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The experiment was carried out to study the effect of 4 nitrogen levels on grain yield and quality of maize. The yield with 200 kg nitrogen ha^{-1} was 7130 kg ha^{-1} but was 5450 ha^{-1} without nitrogen. The increase in yield with 100 and 150 kg nitrogen ha^{-1} was statistically at par but significantly lower from that with 200 kg nitrogen ha^{-1}. The oil and protein contents were significantly increased with the successive increase of nitrogen, maximum being at 200 kg nitrogen ha^{-1}.

INTRODUCTION

The major constraints limiting the maize production are poor plant density, low fertilizer use, inadequate plant protection measures, shortage of irrigation water and lack of weed control. The role of fertilizers, especially nitrogen is of utmost importance in improving the yield and quality of maize. In a study, Lang *et al.* (1956) found an increase in the protein and oil contents of corn by increasing nitrogen application. Later, Gill and Maan (1963) observed that the use of NP (1:1) increased the length, thickness and the weight of maize grain. Negrila *et al.* (1984) conducted experiments on maize from 1979 to 1983 on non-irrigated Chernozem with 80, 120 and 160 kg P_2O_5 ha^{-1} and 50, 150, 200 kg N ha^{-1}. These were applied alone and in combinations. They recorded an increase in protein contents with increasing nitrogen and phosphorus applications. The most economical nitrogen rate for grain production was suggested to be 150 kg nitrogen ha^{-1}. Syed and Sadni (1984) reported that nitrogen application increased ear length, weight and plant height in maize on sandy loam soil.

Keeping in all the above mentioned facts in mind, the present project was, therefore, undertaken to see the effect of different nitrogen levels on the yield and quality of maize crop.

MATERIALS AND METHODS

A field experiment on a sandy clay loam soil was conducted at the Research Area, Department of Agronomy, University of Agriculture, Faisalabad. Four nitrogen levels (control, 100, 150 and 200 kg N ha^{-1}) along with a basal dose of 50 kg P_2O_5 ha^{-1} as SSP were used. Randomized Complete Block Design with three replications was used. The total nitrogen (Jackson, 1962), available P (Olsen *et al.*, 1954) and K (Richards, 1954) were 0.052%, 1.57 and 200 mg kg^{-1}, respectively.

Half of the nitrogen was applied at the time of sowing while the remaining with the first irrigation. The crop was sown in rows of 40 cm apart with 30 cm plant to plant distance. All the other recommended cultural practices i.e. hoeing, weeding and irrigation were adopted equally in all the treatments up to maturity. The data on weight of grains cob^{-1}, grain to stover ratio, grain yield, protein and oil contents in grains were recorded.

The oil and protein were measured by

the Near Infrared Diffused technique. The data collected were subjected to statistical analysis by using analysis of variance technique (Steel and Torrie, 1980).

Shafi (1983) who reported a significant effect of planting patterns on grain to stover ratio rather than the effect of higher doses of N.

Table 1. Effect of nitrogen on the yield and quality of maize grain

N (kg ha^{-1})	Grain weight cob^{-1} (g)	Grain to stover ratio	Grain yield (kg ha^{-1})	Oil (%)	Protein (%)
F_0 (Control)	103.1 c	4.3 b	5450 c	4.4 c	7.4 d
F_1 (100)	114.4 bc	4.3 b	6280 b	4.4 b	8.4 c
F_2 (150)	125.3 b	4.5 a	6710 ab	4.5 b	9.7 b
F_3 (200)	139.9 a	4.6 a	7130 a	4.6 a	10.6 a

*Any significant means not sharing a letter in a column differ significantly at 5% probability.

Table 2. Economic analysis of effect of nitrogen on the yield and quality of maize grain

Treatment	Yield (q ha^{-1})		Income (Rs. ha^{-1})		Total income	Cost ha^{-1}	Net income
	Grain	Stalk	Grain	Stalk			
F_0	54.50	81.90	13625	614	14239	3448	10791
F_1	68.80	98.66	15200	740	1644	4049	12391
F_2	67.10	112.80	16775	846	17621	4327	13294
F_3	71.30	147.16	17825	1104	18929	4612	14317

Maize grain @ Rs. 250 q^{-1}; Stalk @ Rs. 7.50 q^{-1}.

RESULTS AND DISCUSSION

The data (Table 1) revealed that the application of N @ 200 kg ha^{-1} gave maximum grain weight cob^{-1}. The treatments 100 and 150 kg N ha^{-1} were statistically at par with each other but the plots fertilized with 150 kg N ha^{-1} had a relatively higher grain weight cob^{-1} and was lowest in the control. There was a significant increase in stover weight with increasing grain weight. But these results are contradictory to those of

With increasing rates of nitrogen, the photosynthetic activity might have sustained in such a way that source sink relationship yielded maximum. The plots which were treated with 200 kg N ha^{-1} gave 7130 kg ha^{-1} grain yield (Table 1) followed by 150, 100 kg ha^{-1} and the control. These findings are in accordance with those of Syed and Sadni (1984).

The quality of maize crop depends on oil and protein contents of grain. The oil was maximum (4.56%) with 200 kg N ha^{-1}

whereas oil with 150 and 100 kg N ha^{-1} was statistically at par with each other. Lang *et al.* (1956) also reported 4.33% oil at 100 kg N ha^{-1}.

The grains from control plot had 7.4% protein which increased to 10.6% with 200 kg N ha^{-1}. Since N is a basic constituent of amino acid, the protein contents increased linearly with increase in nitrogen. These results are similar to those of Negrila *et al.* (1984).

The efficiency of N fertilization can be determined by the net income $unit^{-1}$ area in a specified period of time. The data (Table 2) indicate that there is a linear increase in net income with an increase in N. The net income of Rs. 14317 was obtained with 200 kg N ha^{-1} as against 10791 without N. The economic efficiency of over 200 kg N ha^{-1} in case of maize is needed to be further studied.

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