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## Effect of Various Doses of Nitrogen on the Growth, Yield and Protein Content of two Maize (*Zea mays* L.) Genotypes

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### Abstract

In a study conducted at Agronomic Research Area, University of Agriculture, Faisalabad, during 1996, standard variety Golden out yielded EV-6089 due to more number of grains and 1000-grain weight. Highest grain yield of 6.28 t ha<sup>-1</sup> and maximum grain protein content of 10.07% were obtained by applying 230 kg N ha<sup>-1</sup>.

### Introduction

The soils of Pakistan are deficient in N which is a vital plant nutrient. The growth of plant primarily depends on the nitrogen availability in the soil solution and its utilization by the crop plant. Nitrogen requirements of a crop depend on yield potential, soil N concentration, N mineralization and soil type. Cultivation of varieties with high yield potential and wide range of adaptability is also of prime importance in increasing maize production. Aguilar and Villareal (1989) planted four sweet corn maize cultivars on four different sites. They concluded that none of the cultivars exhibited general yield stability to all the environments. Amano and Kazar (1989) studied the effects of 0, 60, 90 and 120 kg N ha<sup>-1</sup> on maize. Grain yield, dry matter yield, LAI, plant height and 100-seed weight increased with increasing N-levels. Hanif (1990) applied 0-200 kg N, 0-100 kg P<sub>2</sub>O<sub>5</sub> and 0-100 kg K<sub>2</sub>O ha<sup>-1</sup> to four maize cultivars. Maximum grain yield was obtained with fertilizer dose of 200-100-100 kg N-P-K ha<sup>-1</sup> while Sultan cv. gave maximum yield. Awan (1994) applied 0, 100, 150 and 200 kg N ha<sup>-1</sup> to maize cv. Mehri. N levels significantly increased plant height, number of cobs per plant, number of grains per cob, grain weight per cob, 1000-grain weight and grain to pith ratio. Saha *et al.* (1994) reported that maize cv. Deccan 103 produced grain yields of 4.52, 4.88 and 5.41 t ha<sup>-1</sup> when applied 100, 150 and 200 kg N ha<sup>-1</sup>, respectively. Jamil (1996) applied 0, 62, 124, 186 and 248 kg N ha<sup>-1</sup> on two maize cultivars composite-17 and Sultan. He reported that nitrogenous growth and yield components like number of days taken to tasseling, silking and maturity, grain weight per cob, number of grain rows per cob, biological yield and grain yield increased with the increase in N-levels. In the present study was, therefore, undertaken to compare the growth, yield and quality performance of a new maize genotype "EV-6089" against a standard variety "Golden" at different doses of nitrogen.

### Materials and Methods

The experiment was laid out in a split plot design with three replications and net plot size was 7m x 3m. Two maize genotypes viz; Golden and EV-6089 were fertilized with

130, 180 and 230 kg N ha<sup>-1</sup>. Control was included for comparison in which no N was applied. A basal dose of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O at a rate of 80 and 40 kg ha<sup>-1</sup>, respectively was applied. Genotypes were randomized in main plots while fertilizer levels were randomized in sub-plots. Crop was sown with a single row hand drill in 60 cm apart rows. Nitrogen was applied in three equal splits (at seeding, knee height and at tasseling). The crop was thinned out at 3-4 leaf stage. Five plants were selected at random from each plot to record number of days taken to maturity. Ten plants were selected from each plot to record average plant heights, average number of cobs per plant and average number of grains per cob. From each plot, 1000-grains were counted and weighed to determine the 1000-grain weight. Grain yield obtained from each plot was converted to t ha<sup>-1</sup>. Total nitrogen of grains was determined by using Gunning and Hibbard's method of H<sub>2</sub>SO<sub>4</sub> digestion and using micro kjeldahl method for distillation (Jackson, 1962). Crude protein was determined by multiplying total nitrogen content with 6.25 as a factor. Data collected were analysed statistically using Fishers analysis of variance and least significant difference (LSD) test was used at 0.05 probability to compare the treatment means (Steel and Torrie, 1984).

### Results and Discussion

It is evident from table 1 that Nitrogen levels tended to influence most of the parameters and significantly differed from control. Golden significantly matured earlier as compared to EV-6089. Golden took 97.52 days while EV-6089 took 100.62 days to mature. N application also significantly enhanced maturity. Maximum days were taken when 230 kg N ha<sup>-1</sup> was applied whereas minimum days were taken where N was not applied. These results were supported by that of Hanif (1990).

In case of plant height at maturity, Golden variety attained an average of 231.15 cm while EV-6089 attained an average of 227.27 cm but these were statistically non-significant. Plant height was significantly increased by increase in N levels. Maximum plant height was obtained by applying 230 kg N ha<sup>-1</sup> which was, however, statistically at par with the height obtained at 180 kg N ha<sup>-1</sup>. These

Table 1: Performance of two maize genotypes under different levels of Nitrogen.

	No. of days taken to maturity	Plant height at harvest (cm)	No. of cobs per plant	No. of grains per cob	1000-grain weight (g)	Grain yield (t ha <sup>-1</sup> )	Grain protein content (%)
<b>Genotypes</b>							
Golden	97.52 b	231.15 <sup>NS</sup>	1.035 <sup>NS</sup>	269.65 a	230.75 a	4.14 a	8.98 <sup>NS</sup>
EV-6089	100.62 a	227.27	0.998	250.45 b	221.58 b	3.55 b	8.66
<b>Nitrogen Levels (Kg ha<sup>-1</sup>)</b>							
Control	86.50 d	204.87 c	0.593 b	136.22 c	190.20 d	1.02 d	7.26 d
130	97.75 c	228.13 b	1.072 a	286.11 b	222.70 c	4.45 c	8.55 c
180	103.42 b	240.42 a	1.160 a	307.87 a	241.00 b	5.61 b	9.39 b
230	108.54 a	243.43 a	1.242 a	310.05 a	250.80 a	6.25 a	10.07 a

results are in agreement with those of Amano and Salazar (1989). The data regarding number of cobs per plant show that the two genotypes produced the same, while amongst different N levels, 130 kg N ha<sup>-1</sup> showed a significant increase in the number of cobs per plant as compared to control. These findings were supported by Awan (1994). In case of number of grains per cob Golden variety produced significantly more grains as compared to EV-6089. Maximum grains per cob were produced by applying 230 kg N ha<sup>-1</sup> which was, however, statistically similar with the grains per cob produced with 180 kg N ha<sup>-1</sup>. Golden variety produced 1000-grain weight which was statistically greater than that of EV-6089. Maximum 1000-grain weight was obtained by applying 230 kg N ha<sup>-1</sup> which was significantly different from other levels. Golden variety produced on an average grain yield of 4.14 t ha<sup>-1</sup> while genotype EV-6089 produced significantly less grain yield of 3.55 t ha<sup>-1</sup>. These results were supported by that of Aguilar and Villareal (1989). Maximum grain yield was obtained by applying 230 kg N ha<sup>-1</sup> which was significantly greater than the grain yield obtained from all other treatments. Similar observation was also made by Jamil (1996). There was no significant difference in the grain protein content of the two genotypes. All nitrogen levels significantly increased grain protein content with maximum (10.07%) obtained from 230 kg N ha<sup>-1</sup>.

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