



# International Journal of Research in Agronomy

E-ISSN: 2618-0618

P-ISSN: 2618-060X

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2024; SP-7(7): 477-479

Received: 16-04-2024

Accepted: 25-05-2024

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## Effect of nitrogen and plant densities on growth and yield attributes of sweet corn

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DOI: <https://doi.org/10.33545/2618060X.2024.v7.i7Sg.1083>

### Abstract

A field experiment was conducted during *Kharif* 2023 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). The experiment was laid out in Randomized Block Design with ten treatments which are replicated thrice based on one year experimentation. The treatments consisted of three levels of Nitrogen (80, 100, 120 kg/ha), and Spacing (30 x 25 cm, 35 x 20 cm and 45 x 15 cm) and a control. Application of Nitrogen (120 kg/ha) + Spacing (45 x 15 cm) (Treatment 9) recorded maximum Plant height (204.52 cm), Dry weight (82.83 g) per plant, Number of cobs per plant (1.69), Number of rows per cobs (14.31), Number of grains per row (39.56), Green cob yield (5.02 t/ha).

**Keywords:** Nitrogen, plant density, sweet corn, growth attributes, yield attributes

### Introduction

Maize (*Zea mays* L.) is an annual plant that belongs to the own circle of relatives Gramineae. Among the cereals, maize ranks third in total world production of cereal after wheat and rice and it is a major staple food in many countries, particularly in the tropics and subtropics. Maize is considered as the “Queen of cereals”. “Beside this maize has many kinds like regular yellow, white grain, candy corn, child corn, popcorn, waxy corn, excessive amylase corn, excessive oil corn, quality protein maize, etc. Among the styles of maize, child corn is the ear of maize plant harvested young, especially when the silk has either not emerged or simply emerged, and no fertilization has taken place, relying on the cultivar grown” Muthukumar *et al.*, (2007) [2].

Sweet corn (*Zea mays* var. *saccharata*) has won recognition the world over because of its candy, creamy, tender, crispy and shell-much less kernels. Sweet corn is one of the maximum famous veggies with inside the USA, Canada and Australia. It is gaining recognition in India and different Asian countries. The inexperienced cobs are harvested at dough degree at which out of 18-20% carbohydrates the kernels include 5-6% unfastened sugar, 2.1–4.5% proteins and 70% water. The sweetness of candy corn is because of a spontaneous mutation inside the (“sugary”) gene of the sphere corn, which controls conversion of sugar to starch in the endosperm of the corn kernel Khan *et al.*, (2018) [3].

Nitrogen will increase biomass manufacturing of a crop which in large part relies upon the characteristic of leaf place improvement and consequential photosynthetic activity. Nitrogen in candy corn development is a critical thing influencing each yield and amino acids, which determine the flavor and nutrient cost of kernels. “Plant spacing is every other critical issue which performs a tremendous function on increase, improvement and yield of maize. Optimum plant populace affords scope to the flora for green usage of sun radiation and nutrients. Closer spacing hampers intercultural operations and as such greater opposition arises to a few of the plants for nutrients, air and light. As effects, plant will become shorter, weaker, thinner and therefore reduces yield of maize. Adjustment of right plant spacing withinside the maize subject is critical to make certain most usage of sun power through the crop and decrease evaporation of soil moisture”. “So, most efficient populace must be maintained to take advantage of most herbal resources, which includes nutrients, sunlight, and soil moisture, to make certain pleasant increase and yield. Narrow row spacing and better plant density effects to put off initiation of intraspecific opposition. Maximum yield may be anticipated most effective whilst plant populace lets in person plant to acquire their most inherent capacity Khan and Singh (2023) [4].

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## Materials and Methods

The experiments on the effect of Nitrogen and Planting densities along with recommended dose of fertilizers (RDF) on the growth and yield enhancement of sweet corn were conducted at *Kharif* season of 2023 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj which is located at 25° 24' 42" N latitude, 81° 50' 56" E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Prayagraj Rewa Road about 5 km away from Prayagraj city. A composite soil sample was collected at a depth of 0-30 cm. It was air dried, crushed, and tested for physical and chemical properties. The soil was sandy clay loam in texture with soil reaction of (pH 7.0), 0.57 organic matter (0.63%), available nitrogen (152.6 kg/ha), phosphorus (9.27 kg/ha), potassium (149.40 kg/ha), sulphur (6.6 mg/kg), Zn (0.45 mg/kg) and available B (0.36 mg/kg). Before seed sowing operation, it was ensured that sufficient moisture for germination of seed is present in the soil. The seed was sown at the rate of 10 kg/ha. In the lines at a different spacing of (30 x 20 cm), (35 x 35 cm) and (45 x 30 cm) in northeast direction. Immediately after sowing the lines were closed with soil and slightly pressed to have good contact of seed with soil to ensure good germination.

## Results and Discussion: Plant height

Maximum plant height (204.52 cm) was recorded with application of Nitrogen (120 kg/ha) + Spacing (45 x 15 cm). Whereas the minimum plant height (164.74 cm) was recorded with Control (RDF) 120:60:40 kg/ha (NPK). There was a significant difference between different treatment combinations. However, Nitrogen (120 kg/ha) + Spacing (35 x 20 cm) and Nitrogen (120 kg/ha) + Spacing (30 x 25 cm) are found statistically at par to Nitrogen (120 kg/ha) + Spacing (45 x 15 cm). Significant and better plant top turned into with software of nitrogen (a hundred and twenty kg/ha) is due more synthesis of amino acids, proteins and boom selling materials beautify the pastime and elevated the mobileular department and elongation results in growth in boom of plant. Similar consequences have been additionally suggested through Naik *et al.* 2019 [7]. Further, better plant top turned into with (60x20 cm<sup>2</sup>) spacing is probably because of the opposition among flora may have decreased and identical distribution of all assets like sun radiation, minerals, vitamins and water. Similar findings have additionally suggested through Reddy *et al.* 2019 and Khan and Singh (2023) [4].

## Plant dry weight

Maximum dry weight (g) of each plant (82.83) at 80 DAS was measured with nitrogen delivery (120 kg/ha) + spacing (45 x 15

cm). On the other hand, the Control (RDF) of 120:60:40 kg/ha (NPK) reported the lowest dry weight (g) of 56.40 per plant. The various therapy combinations differed significantly from one another. Notably, the maximum plant dry weight reached when nitrogen was applied was 120 kg/ha. This could be because starch and sugars are translocated by plants, which promotes growth and the buildup of dry matter.

Rahman *et al.* (2016) [6] also reported a similar outcome. Furthermore, the highest dry weight was seen at 60x20 cm spacing, which may have resulted from best resource and space availability as well as maximal ground area exploitation, which improved photosynthetic translocation and dry matter accumulation in plants. Similar results were also reported by Khan and Singh (2023) [4].

## Number of cobs per plant

The highest number of cobs per plant (1.69) was seen in treatment Nitrogen (120 kg/ha) + Spacing (45 x 15 cm), whereas the lowest number of cobs per plant (1.12) was found in treatment Control (RDF) 120:60:40 kg/ha (NPK). There was a significant difference between different treatment combinations. However, Nitrogen (120 kg/ha) + Spacing (30 x 25 cm) and Nitrogen (120 kg/ha) + Spacing (35 x 20 cm) are found statistically at par to Nitrogen (120 kg/ha) + Spacing (45 x 15 cm).

## Number of rows per cob

The highest Number of rows per cob (14.31) was seen in treatment Nitrogen (120 kg/ha) + Spacing (45 x 15 cm), whereas the lowest Number of rows per cob (12.06) was found in treatment Control (RDF) 120:60:40 kg/ha (NPK). There was a significant difference between different treatment combinations. However, Nitrogen (120 kg/ha) + Spacing (30 x 25 cm) and Nitrogen (120 kg/ha) + Spacing (35 x 20 cm) are found statistically at par to Nitrogen (120 kg/ha) + Spacing (45 x 15 cm).

## Number of grains per row

The highest Number of grains per row (39.56) was seen in treatment Nitrogen (120 kg/ha) + Spacing (45 x 15 cm), whereas the lowest Number of grains per row (27.40) was found in treatment Control (RDF) 120:60:40 kg/ha (NPK). There was a significant difference between different treatment combinations. However, Nitrogen (120 kg/ha) + Spacing (30 x 25 cm) and Nitrogen (120 kg/ha) + Spacing (35 x 20 cm) are found statistically at par to Nitrogen (120 kg/ha) + Spacing (45 x 15 cm).

**Table 1:** Effect of Nitrogen and Planting densities on growth and yield of sweet corn

S No	Treatments	Plant height	Plant dry weight	Number of cobs per plant	Number of rows per cobs	Number of grains per row	Green cob yield (t/ha)
1.	Nitrogen (80 kg/ha) + Spacing (30 x 25 cm)	170.63	64.03	1.31	12.22	35.19	3.53
2.	Nitrogen (100 kg/ha) + Spacing (30 x 25 cm)	178.99	66.01	1.36	12.32	35.17	3.65
3.	Nitrogen (120 kg/ha) + Spacing (30 x 25 cm)	197.33	70.51	1.54	14.14	37.11	4.55
4.	Nitrogen (80 kg/ha) + Spacing (35 x 20 cm)	182.22	66.73	1.42	12.21	35.20	3.84
5.	Nitrogen (100 kg/ha) + Spacing (35 x 20 cm)	184.87	66.76	1.42	12.28	35.52	4.01
6.	Nitrogen (120 kg/ha) + Spacing (35 x 20 cm)	201.78	71.90	1.59	14.22	38.20	4.88
7.	Nitrogen (80 kg/ha) + Spacing (45 x 15 cm)	189.18	64.71	1.46	12.37	36.16	4.30
8.	Nitrogen (100 kg/ha) + Spacing (45 x 15 cm)	190.13	66.67	1.49	12.54	36.00	4.38
9.	Nitrogen (120 kg/ha) + Spacing (45 x 15 cm)	204.52	82.83	1.69	14.31	39.56	5.02
10.	Control (RDF) 120:60:40 kg ha-1 (NPK)	164.74	56.40	1.12	12.06	27.40	3.35
	S.Em±	1.70	0.82	0.028	0.049	0.250	0.061
	CD (p=0.05)	5.06	2.45	0.084	0.145	0.742	0.183
	CV	1.58	2.11	3.398	0.065	1.216	2.563

**Green cob yield (t/ha)**

The highest green cob yield (t/ha) (5.02) was observed in treatment Nitrogen (120 kg/ha) + Spacing (45 x 15 cm), whereas the lowest green cob yield (t/ha) (3.35) was found in treatment Control (RDF) 120:60:40 kg/ha (NPK). There was a significant difference between different treatment combinations. However, Nitrogen (120 kg/ha) + Spacing (30 x 25 cm) and Nitrogen (120 kg/ha) + Spacing (35 x 20 cm) are found statistically at par to Nitrogen (120 kg/ha) + Spacing (45 x 15 cm).

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