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# Response of Organic and Inorganic Sources of Nitrogen Application in Wheat (*Triticum aestivum* L.) Crop

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

An experiment conducted at Agriculture Research Farm, Shri Durga Ji Post Graduate College, Chandeshwar, Azamgarh, Uttar Pradesh during winter session of 2019-20. Among the initial plant population per square meter was not influenced significantly due to various treatments. All the growth characters *viz.* plant height (cm), no. of shoots per meter row length and accumulation of dry matter, increased significantly at all the stages of crop growth with the application of 100% nitrogen through inorganic source except 30 DAS regarding to number of shoots.

*Keywords: Plant population; 100% nitrogen; 30 DAS; number of shoots and inorganic source.*

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## 1. INTRODUCTION

"Wheat (*Triticum aestivum* L.) belongs to the family Gramineae (Poaceae), is a staple food of the world. The important and economic consideration for increasing wheat productivity is the effective use of nitrogen fertilization. Nitrogen fertilization is the most important factor in front of wheat agronomist for achieving high yield targets. Previous research reviewed that number of tillers, spikes $m^{-2}$, plant height, spike length, number of spikelet, grains spike per plant, grain yield and straw yield of wheat increased with increased nitrogen level" [1]. "Sufficient supply of nitrogen at optimum planting time also resulted good quality and vigorous seed. Wheat compares well with other important cereals in terms of nutritive value. It contains more protein than other cereals. Wheat has relatively high content of niacin and thymine. Wheat protein gluten is very essential for bakers. Flour of other cereals lacking gluten is therefore not good for bread making. It is consumed mostly in the form of chapatti. Wheat straw is used for feeding the cattle. About 91% of the total wheat production is contributed by northern states. India is one of the major wheat producing and consuming country. In India, it is cultivated on an area of 29.14 million hectare having production of 102.20 million tonnes and productivity 3140 kg $ha^{-1}$ respectively. It contributes about 34% of total food grain production of the country. Among them, Uttar Pradesh ranks first in respect to area 9.734 million ha and production 32.74 million tonnes but the productivity is much lower (3113 kg $ha^{-1}$) than Punjab (5097 kg $ha^{-1}$) and Haryana (5182 kg $ha^{-1}$)" [2]. In India, extensive high yielding cereal types, particularly wheat, have resulted in a significant loss of soil nutrients during the past three decades due to intensive agriculture [3,4]. The usage of chemical fertilizers increased as a result, although the trend in fertilizer use efficiency is not positive [5,6]. If these inconsistent fertilizer usage patterns are maintained for many years, the native soil fertility may be greatly depleted, and the soil may no longer be able to support high output levels. Therefore, neither chemical fertilizers nor organic/biological sources by themselves can attain production sustainability of wheat crop in the case that nutrient turnover in soil plant system is very high under intensive farming.

## 2. MATERIALS AND METHODS

The experiment was conducted at Agriculture Research Farm of Shri Durga Ji Post Graduate College, Chandeshwar, Azamgarh during winter season of 2019-20 on wheat (variety Kundan-DL-153-2) as test crop. The experiment comprised of five (5) treatments were tested in randomized block design with four (4) replications with gross plot size 4.0 m x 5.0 m wheat sowing at 20 cm in rows. Number of plants $m^{-2}$ was counted from one squre meter from three places (marked with sticks) in each plot at 20 DAS and averaged out. Five plants were tagged randomly in each plot for recording height in cm at 30, 60, and 90 DAS. The height was measured from ground surface to the base of fully opened leaf before the ear emergence and up to the base of ear head after heading and averaged out. At 30, 60 and 90 days following sowing, three locations (marked with sticks) in each plot were counted to determine the overall number of shoots per meter row length. At 30, 60, 90 and 105 DAS as well as at harvest, plants were taken from each plot at two locations in the second row on either side, each with a 25 cm row length. The plants were sun dried separately and then oven dried at $70^0C \pm 2^0C$ till the weight was consistent. Dry matter accumulation of plants per meter row length was calculated by averaging plant dry weight data.

## 3. RESULTS AND DISCUSSION

### 3.1 Initial Plant Population Per Meter Square

The information about the plant population of wheat recorded at 20 DAS that initial plant population of the crop was not significantly affected by any of the treatment. The same outcomes were reported by Azad et al. [7] and Patra et al. [8].

**Chart 1. Treatment details**

| | |
|---|---|
| $T_1$ | RDF of N through inorganic source (120 Kg) urea |
| $T_2$ | RDF of N through organic source (FYM) |
| $T_3$ | 75% RDF of N through inorganic + 25% RDF of N through organic source (FYM) |
| $T_4$ | 50% RDF of N through inorganic + 50% RDF of N through organic source (FYM) |
| $T_5$ | 25% RDF of N through inorganic + 75% RDF of nitrogen through organic source (FYM) |

**Table 1. Initial plant population and plant height, Number of shoots and dry matter accumulation of wheat as influenced by different sources of nitrogen**

| Treatment | Plant population $m^{-2}$ 20 DAS | Initial plant population and plant height, Number of shoots and dry matter accumulation (Days after sowing) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height of the plant (cm) | | | No. of shoot per meter row length | | | Dry matter per meter row length (g) | | | | At harvest |
| | | 30 | 60 | 90 | 30 | 60 | 90 | 30 | 60 | 90 | 105 | |
| $T_1$ | 193.00 | 18.20 | 60.80 | 86.80 | 50.28 | 85.80 | 94.70 | 13.50 | 97.47 | 149.52 | 160.60 | 191.28 |
| $T_2$ | 188.00 | 15.30 | 47.50 | 71.30 | 49.27 | 65.20 | 76.80 | 8.40 | 59.40 | 89.76 | 97.50 | 114.73 |
| $T_3$ | 192.50 | 17.40 | 58.10 | 81.50 | 48.88 | 78.80 | 88.10 | 11.20 | 88.48 | 138.56 | 150.80 | 177.44 |
| $T_4$ | 191.00 | 17.10 | 54.40 | 80.60 | 50.15 | 75.70 | 84.50 | 10.00 | 74.85 | 120.32 | 130.60 | 153.68 |
| $T_5$ | 189.50 | 15.60 | 50.20 | 75.60 | 49.66 | 69.70 | 77.90 | 8.90 | 66.33 | 98.32 | 108.00 | 127.12 |
| SEm± | 6.153 | 0.460 | 1.617 | 2.751 | 1.776 | 2.407 | 2.321 | 0.284 | 2.314 | 4.184 | 4.687 | 4.909 |
| CD at 5 % | NS | 1.417 | 4.984 | 8.477 | NS | 7.416 | 7.152 | 0.876 | 7.134 | 12.892 | 14.441 | 15.127 |

### 3.2 Plant Height (cm)

Height of the plant at 30, 60 and 90 DAS was influenced significantly by various treatments. The treatment $T_1$ recorded a maximum plant height that was comparable to $T_3$ and $T_4$ at 30 and 90 DAS and with $T_3$ at 60 DAS, and was superior to rest of the treatments. The lowest plant height was recorded with $T_2$ at all the growth stages. The same outcomes were reported by Azad et al. [7] and Patra et al. [8].

### 3.3 Number of Shoots per Meter Row Length

The number of shoots was not affected significantly with the treatments at 30 DAS. The number of shoot per meter row length was significantly influenced by different treatments at 60 and 90 DAS. Application of $T_1$ resulted in the highest number of shoots per meter row length, which was at par with $T_3$ at 60, 90 DAS and was found significantly superior to rest of the treatments. The lowest number of shoots per meter row length was recorded with $T_2$ at all the growth stages. The same outcomes were reported by Azad et al. [7] and Patra et al. [8].

### 3.4 Dry matter Accumulation (g) per Meter Row Length

The data revealed that at 30, 60 DAS dry matter accumulation in $T_1$ and were a lot higher than the other treatments. The treatment with $T_1$ recorded maximum dry matter accumulation which were at par with $T_3$ at 90, 105 days after sowing harvest time. The smallest amount of dry matter buildup was seen when $T_2$ at different growth stages. The same outcomes were reported by Bhagwati et al. [9] and Chaudhary et al. [10].

## 4. CONCLUSION

After the proper field preparation, the experiment was laid out according to plan. FYM and inorganic fertilizer were applied as per technical programme. The observations were recorded to elucidate the phenomenon operating the yield manifestation. The salient features of the experimental results have been summarized here under: Initial plant population ($m^{-2}$) was not influenced significantly due to various treatments. All the growth characters viz. plant height, number of shoots $m^{-1}$ row length, dry matter accumulation, leaf area index and CGR increased notably at all stages of crop development using the application of 100% nitrogen through inorganic source except 30 DAS regarding to number of shoots.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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