Effect of different sources of nitrogen on various soil properties on wheat (*Triticum aestivum* L.)crop

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 nitrogen content in grain and total uptake of nitrogen were significantly affected by various treatments and highest with T_1 recommended dose of N through inorganic source and significantly superior over T_2 recommended dose of N through organic source.The availability of Nwas not significantly influenced by various treatments.

Key words: Recommended dose of N, organic source, nitrogen content in grain and total uptake of nitrogen were significantly.

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. 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}) (Anonymous, 2018-19). Nitrogen is an essential nutrient among essential plant nutrients, play key role in plant growth, development and reproduction. Though nitrogen is one of the most abundant elements on earth, still nitrogen deficiency is probably the most common nutritional problem affecting plants worldwide. Number of tillers m^{-2} in wheat increased when N were increased (Mossedaq and Smith 1994; Iqtidar *et al*., 2006). To cope this situation and compensate loses due to synthetic N fertilizations, the inclusion of organic sources of nutrients are considered the best possible sol--ution.

Application of farmyard manure (FYM) to soil have been practiced for many centuries and its application to soil have increased crop yield, improved soil fertility, increased soil organic matter, increased microbiological activities and improved soil structure for sustainable agriculture (Blair *etal*., 2006; Kundu *et al*., 2007).

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. Total number of shoots per meter row length was counted from 3 places (marked with sticks) in each plot at 30, 60, and 90 days after sowing. Plants were harvested from 25 cm row length from two places in the second row on either side in each plot at 30, 60, 90 and 105 DAS and at harvest. The plants were sun dried separately and then oven dried at $70^0C \pm 2^0C$ till a constant weight was obtained. By summing the values of dry weight of plant, dry matter accumulation of plants per meter row length was computed.

Table 1: Treatment details

T_1	Recommended dose of nitrogen through inorganic source (120 Kg) urea.
T_2	Recommended dose of nitrogen through organic source (FYM)
T_3	75% of recommended dose of nitrogen through inorganic + 25% of recommended dose of nitrogen through organic source (FYM)
T_4	50% of recommended dose of nitrogen through inorganic + 50% of recommended dose of nitrogen through organic source (FYM)
T_5	25% of recommended dose of nitrogen through inorganic + 75% of recommended dose of nitrogen through organic source (FYM)

Available nitrogen (Kg ha^{-1})

Available nitrogen content in soil sample was estimated by the alkaline permanagante method as described by Subbiah and Asija (1956).

Plant analysis

Analysis of grain and straw samples at harvest was carried out for their nitrogen, phosphorus and potassium contents. Each sample was first dried in thesun and finally in an oven at 70 ±2 ^{O}C and ground in Wiley mill. Grinded grain and straw samples weighted 0.2 and 0.5 g, respectively were digested in diacid mixture of H_2SO_4+ $HClO_4$ (4:1). After digestion, a known volume was made with glass distilled water and stored in well washed plastic bottles after filtration through Whatman filter paper no.42. All the estimations in the aliquot were made according to the following procedures:

(a) Nitrogen content was determined by Nessler's reagent method (Linder, 1944).

Nitrogen uptake by crop (Kg ha^{-1})

First of all thoroughly powdered grains and straw of wheat from each plot were analyzed by modified micro Kjeldahl's method as suggested by Jackson (1973). Nitrogen content in grain and straw thus obtained separately was multiplied with respective yield. The values of both were expressed as total nitrogen uptake by the crop in Kg ha^{-1}.

Total nitrogen uptake (kg ha^{-1}) = N uptake by grain (kg ha^{-1}) + N uptake by straw (kg ha^{-1}).

$$\text{N uptake by grain (kg ha}^{-1}\text{)} = \frac{\text{N content in grain (\%) x Grain yield (kg ha}^{-1}\text{)}}{100}$$

$$\text{N uptake by straw (kg ha}^{-1}\text{)} = \frac{\text{N contnetin straw (\%) x Straw yield (kg ha}^{-1}\text{)}}{100}$$

Results and discussion

Table 2: Nitrogen content, uptake in grain and straw of wheat as influenced by different sources of Nitrogen

Treatments	N content (%)		N uptake (kg ha^{-1})		Total uptake (kg ha^{-1})
	grain	straw	grain	straw	
T_1-Recommended dose of nitrogen through inorganic source	1.44	0.38	69.70	24.56	94.26
T_2-Recommended dose of nitrogen through organic source	1.34	0.36	35.64	13.02	48.66
T_3-75% of recommended dose of nitrogen through inorganic source + 25% of recommended dose of nitrogen through organic source	1.56	0.43	61.09	21.30	82.39
T_4-50% of recommended dose of nitrogen through inorganic source + 50% of recommended dose of nitrogen through organic source	1.50	0.42	50.89	18.02	68.92
T_5-25% of recommended dose of nitrogen through inorganic source + 75% of recommended dose of nitrogen through organic source	1.46	0.41	39.93	14.83	54.76
SEm±	**0.016**	**0.004**	**1.746**	**0.636**	**1.886**
CD at 5%	**0.048**	**0.013**	**5.381**	**1.960**	**5.812**

Nitrogen content (%)

Data pertaining to the nitrogen content shown in table 2 revealed that the nitrogen content was highest in grains than in straw. The nitrogen content in grains and straw were significantly affected by the application of various treatments. Maximum nitrogen content in grain (1.44%) was found with the treatment T_1 (recommended dose of nitrogen through inorganic sources) and was significantly higher with the rest of treatments. Minimum nitrogen content in grain was recorded with T_2 (recommended dose of nitrogen through organic source).

Nitrogen uptake (Kg ha^{-1})

The data shown in the table 2 revealed that nitrogen uptake was significantly affected by various treatments. T_1 (recommended dose of nitrogen through inorganic source) resulted in highest uptake of N in grain (69.70 kg ha^{-1}) and was found significantly higher than re st of the treatment. Minimum nitrogen uptake was recorded in T_2 (recommended dose of nitrogen through organic source).

Total nitrogen uptake (Kg ha^{-1})

The data on total uptake of nitrogen given in table 2 revealed that the total uptake of nitrogen also followed the same trend as observed in its uptake in grain and straw.

The maximum nitrogen content in grain (1.44%) was observed under treatment T_1 recommended dose of N through inorganic source which was significantly higher than rest of the treatments. However, same trend also found in nitrogen content in straw was observed among the treatments. Similarly the nitrogen uptake in grain and straw was significantly higher than rest of the treatments. Similar trend was observed in total uptake of nitrogen. This was perhaps due to improved availability of nitrogen. The results are in confirmation with the findings of Chaudhary *et al.* (1997)and Parmar and Sharma (1996).

The maximum available nitrogen (172.50 kg ha^{-1}) in the soil was observed with T_3 75% of recommended dose of nitrogen through inorganic source + 25% of recommended dose of nitrogen through organic source was higher than T_2 recommended dose of nitrogen through organic source and T_1 recommended dose of nitrogen through inorganic source but not significantly affected by any of the treatment. The results exhibited that the integrated nutrient application through organic and inorganic fertilizer used in a suitable combination

improved the soil fertility. Similar results were reported by Bhiday (1994), Singh *et al*. (1999).

Conclusion

Nitrogen content in grain and total uptake of nitrogen were significantly affected by various treatments and highest with T_1 recommended dose of N through inorganic source and significantly superior over T_2 recommended dose of N through organic source.

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