Response of organic and inorganic sources of nitrogen application inwheat (*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 the 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 and dry matter accumulation, 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.

Key words: Plant height, number of shoots m^{-1} row length, dry matter accumulation, application of 100% nitrogen.

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 $spike^{-1}$, grain yield and straw yield of wheat increased with increased nitrogen level (Sobhoel*et al*., 2000). 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}) (Anonymous, 2018-19).In India, during past three decades, intensive agriculture involving exhaustive high yielding varieties of cereals particularly, wheat has led to heavy withdrawal of nutrients from the soil. This resulted in the increase in consumption of chemical fertilizers but the trend of fertilizer use efficiency is not encouraging. These erratic fertilizer use patterns, if continued for years, could cause much greater drain on native soil fertility and the soil may not be able to support high production levels in future. Therefore, in the event of nutrient turnover in soil plant system being considerably high under intensive farming, neither chemical fertilizer nor organic/biological sources alone can achieve production sustainability of wheat crop.

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.

Treatment details

Table 1. List of treatments used for the study

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)

Result and Discussion

Initial plant population (m^{-2})

The data pertaining to plant population of wheat recorded at 20 DAS that initial plant population of the crop was not significantly affected by any of the treatment. Similar results have been reported by Azad *et al.* (1998) and Patra *et al*. (1998).

Plant height (cm)

The plant height at 30, 60 and 90 DAS was influenced significantly by various treatments. The treatment T_1 (recommended dose of nitrogen through inorganic sources) recorded maximum plant height, which was at par with T_3 (75% of recommended dose of N through inorganic source + 25% of recommended dose of N through organic source) and T_4 (50% of recommended dose of N through inorganic source + 50% of recommended dose of N through organic source) at 30 and 90 DAS and with T_3 (75% of recommended dose of N through inorganic source + 25% of recommended dose of N through organic source) at 60 DAS, and was superior to rest of the treatments. The lowest plant height was recorded with T_2 (recommended dose of nitrogen through organic source) at all the growth stages. Similar results have been reported by Azad *et al.* (1998) and Patra *et al*. (1998).

Number of shoots m^{-1} 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 (recommended dose of N through inorganic source) resulted in the highest number of shoots per meter row

length, which was at par with T_3 (75% of recommended dose of N through inorganic source + 25% of recommended dose of N through organic source) 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 (recommended dose of nitrogen through organic source) at all the growth stages. Similar results have been reported by Azad *et al.* (1998) and Patra *et al*. (1998).

Dry matter accumulation (g) m^{-1} row length

The data revealed that at 30, 60 DAS dry matter accumulation in T_1 (recommended dose of nitrogen through inorganic sources) and were significantly higher than rest of the treatments. The treatment with T_1 recorded maximum dry matter accumulation which were at par with T_3 (75% of recommended dose of N through inorganic source + 25% of recommended dose of N through organic source) at 90, 105 DAS and at harvest. The lowest dry matter accumulation was recorded with T_2 (recommended dose of nitrogen through organic source) at different growth stages. Similar results were reported by Bhagwati *et al*. (1992) and Chaudhary *et al.* (1997).

Table 2. 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)									
		Plant height (cm)			Number of shoots m^{-1} row length			Dry matter (g) m^{-1} row length			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**

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 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.

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