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Performance of Wheat (*Triticum aestivum* L.) Crop as Influenced by Nitrogen and Phosphorus Fertilization in Alluvial Soil of Agra

Yogesh Singh*

Department of Agricultural Chemistry and Soil Science, R.B.S. College, Bichpuri, Agra, U.P., India

**Corresponding author*

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A B S T R A C T

A field experiment was conducted during *Rabi* season, 2018-19 at research farm of R.B.S. College Bichpuri, Agra (U.P.) on alluvial soil to evaluate the performance of wheat (*Triticum aestivum* L.) crop as influenced by nitrogen and phosphorus fertilization. The four nitrogen levels (0, 40, 80, and 120 kg N/ha) and three phosphorus levels (0, 30, and 60kg P2O5/ha). Treatment was tasted in Randomized Block Design with three replication. Result revealed that the application of nitrogen significant effect on growth character, plant height, number of tiller, spike length and yield attributes i.e. grains /ear test weight, grain and straw yield and nutrient N P K uptake the maximum value under N120 kg/ha as comparison to other treatment and lowest under control. However, the application of phosphorus 60kg/ha significant effect on growth character, yield attributes and yield, protein content and nutrient uptake in comparison to 30kg P2O5 and lowest under control. Application of N120kg/ha and P2O5 60kg/ha improve grain and straw yield over control. The higher grain (41.9 and 38.7 kg/ha) and straw (71.6 and 65.8 kg/ha), Protein contact ingrain (11.43 and 10.61) recorded under Nitrogen 120kg/ha and P2O5 60kg/ha dose.

Introduction

The wheat (*Triticum aestivum* L.) family Poaceae common name gahun is a crop of global significance. It is grown in diversified environment. It is a staple food of millions people approximately one-sixth of the total arable land in the world is cultivated with wheat and where as paddy is mainly cultivated in Asia. Wheat is grown in all the continent of the world it supplies about 20% of the food calories and 55% carbohydrates for the world' growing population. Wheat is the second important cereals crop after rice in India. In India introduced dwarf intensive high yielding Mexican wheat varieties in 1963 like lermaroja, sonara 63, 64 and maya 64 were imported by ministry of agriculture and released for commercially cultivated in India (1965).

These varieties were responsible for green revolution in India. Carbohydrates and protein are two main constituents of wheat on an average wheat

contain 76% carbohydrates and 11-12 protein. Wheat is *Rabi* season crop considering the quality wheat has been divided in two categories soft and hard wheat *Triticum aestivum* (bread wheat) is known as soft wheat and *Triticum duram* is known as hard wheat. In India mainly three species of *Triticum aestivum* (94%), duram (4%) and *Triticum dicoccum* is (0.1), respectively.

Optimum nutrition is requined for getting maximum yield and good quality of produce (Pandey *et al.*, 2020). Nitrogen is one of the major deficient plant nutrients particularly in light textured soil of semi-arid region of western Uttar Pradesh. An optimum supply of nitrogen is important for vigorous vegetative growth, Chlorophyll formation and carbohydrate utilization but the nitrogen use efficiency in cereal is quite low. The crop removal nitrogen or apparent recovery of applied nitrogen is often used as one of the important criteria to judge the crop response to nitrogen application. Application of nitrogen has shown promising results not only sustaining the production but also increased the quality of produce (Singh and Singh, 2017).

Wheat is quite response to phosphorus is an important nutrient needed for normal growth and development of the plant. It plays an important role in energy transformation and metabolic process in plants. Phosphorus is essential plant nutrient for crop growth yield and quality production of wheat. (Singh and Singh, 2020).

Materials and Methods

A field experiment was conducted during *Rabi* season, 2018-19 at research farm of R.B.S. College Bichpuri, Agra (U.P.) on alluvial soil to evaluate the performance of wheat (*Triticum aestivum* L.) crop as influenced by nitrogen and phosphorus fertilization. The four nitrogen levels (0, 40, 80, and 120 kg N/ha) and three phosphorus levels (0,30, and 60kg P2O5/ha). Treatment was tasted in Randomized Block Design with three replication. The soils of experimental field was sandy loam in texture, and their pH value (8.2), E.C. (0.4dSm), low in organic carbon (3.3 gkg^{-1}), available nitrogen (155 kg ha^{-1}) available phosphorus (9.0 kg $ha^{-1)}$ and potassium (115 kg ha^{-1}). The crop was grown by adopting standard agronomic practices and adopting appropriate amount of nitrogen, phosphorus and potassium was applied as per treatment in furrow below the seed. The seed wad sown 5 cm depth having 30 cm row spacing and recommended seed rate 100 kg ha^{-1} on 01 December, 2018. The crop was harvested on 12 march, 2019 and threshing was done each plot separate.

Results and Discussion

Growth Character

The data pertaining to growth character of wheat crop summarized in (Table 1). The result indicated that the growth character ie; plant height, number of tillers per plant and spike length of wheat increased significantly with nitrogen application.

The highest value was recorded under the treatment of 120 kg N ha^{-1}fallowed by 80 kg N ha^{-1}, 40 kg N ha^{-1} and lowest value under control similar result ware also observed by Kumpawat *et al.*, (2009); Singh *et al.*, (2013) and Kumar *et al.*, (2018).

The application of phosphorus in wheat significantly improved growth character ie; plant height number of tillers and spike length. The highest value recorded under P 60 kg ha^{-1} and lowest under control. Similar result was reported by Singh *et al.*, (2009) and Kumar *et al.*, (2010).

Yield attributes and Yield

The data of yield attributing character i e; grains per spike, test weight, grain yield and straw yield of wheat are summarized in (Table 1). The yield attributing character of wheat increased significantly with increasing the levels of nitrogen, the maximum value was recorded under N3 treatment as comparison to N2 and lowest under control. The N3 treatment have grain and straw yield (41.9 and 71.6 9 q ha^{-1}), N2 (39.5 and 66.5 q ha^{-1}), N1 (37.0 and

59.4 q ha^{-1}) and lowest under control No treatment (34.3 and 53.4 q ha^{-1}).

Increase in the levels of nitrogen was responsible for increasing the number of leaves and leaf area causing higher photosynthesis and assimilation rates, metabolic activity and cell division, which were responsible for significant increase the grain and straw yield similar results were reported by Singh and Brar (1994); Kumpawat *et al.,* (2009); Kumar *et al.,* (2010) and Kumar *et al.,* (2018).

The yield attributing character and yield of wheat increased significantly with increasing the levels of phosphorus. The highest values were recorded under P2 treatment fallowed by P1 and lowest under P0 control treatment. The maximum value of grain and straw yield under P2 (40.37 and 65.08 q ha^{-1}), P1 (38.5 and 62.75 q ha^{-1}) and lowest under P0 control (37.7 and 60.83) treatment. The results confirm the findings of Singh *et al.,* (2009 and Singh *et al.,* (2013).

Protein content in grain

The application of nitrogen affect the protein content in wheat. The maximum protein content in grain observed with N3 (10.62%) as compared to N2 (10.5%), N1 (10.31%) and lowest under N0 (10.06%) treatment. The significant effect of nitrogen fertilization on protein content may be due to the nitrogen. Nitrogen and protein is inter related, and main constituents of protein, make more availability and uptake in plant and grin, the protein content already increased the result one in close agreement with those reported by Kulhari *et al.,* (2003); Prasad and Singh (2007) and Singh and Singh (2017).

The application of phosphorus significant affect protein content in grain of wheat as composes to control. The highest value of protein was recorded P2 (10.69%) more as companied to control. The application of phosphorus tended to increase more availability of nutrient and improve the protein content similar results were also observed by Jat *et al.,* (2003) and Kumar *et al.,* (2010).

Uptake of nutrients in plant

Nitrogen uptake

The uptake of nitrogen (Table.2) by wheat grain and straw increased significantly at all the levels of nitrogen as compared to control. The highest nitrogen uptake was observed under N3 treatment followed by N2, N1 and N0 control. Improve the uptake of nitrogen due to increased grain and straw yield and higher nutrient demand for plant growth similar findings were reported by Kumar *et al.,* (2018) and Singh and Singh (2020).

Application of phosphorus significantly improve the uptake of nitrogen both grain and straw in compared to control. The highest N uptake under P2 treatment and lowest under P0 treatment similar result were also reported by Singh *et al.,* (2009) and Kumar *et al.,* (2010).

Phosphorus uptake

The (Table.2) data on phosphorus uptake by wheat grain and straw significantly improved due to nitrogen fertilization. The highest P removal under N3 treatment followed by N2, N1 and lowest under N0 control. Similar result reported by Singh *et al.,* (2009); Kumar *et al.,* (2019) and Pandey *et al.,* (2020).

The uptake of phosphorus by wheat grain and straw increased significantly with increasing levels of phosphorus as comparison to control. Similar results were also reported by Singh *et al.,* (2009) and Kumar *et al.,* (2010).

Table.1 Effect of different treatments on growth and yield of wheat crop

Treatments	Plant height(cm)	No of tiller per plant	Spike length(cm)	No of grains per spike	Test weight	Grain yield q/ha	Straw yield q/h	Protein content in grain(%)
Nitrogen levels								
No	75.6	82.6	11.6	56.66	33.83	34.3	53.4	9.75
N1	80.2	86.3	12.5	59.3	39.0	37.0	59.4	10.30
N2	85.0	90.0	13.3	62.0	40.16	39.5	66.7	10.83
N3	89.6	93.6	14.25	64.6	41.1	41.9	71.6	11.45
SEm±	0.17	0.38	0.11	0.39	0.92	0.16	0.30	0.14
CD at 5%	0.36	0.79	0.23	0.80	1.91	0.33	0.63	0.30
Phosphorus levels								
P0	81.5	87.0	12.7	60.25	39.2	37.2	60.83	10.44
P1	82.75	88.25	13.0	60.75	39.6	38.6	62.75	10.60
P2	83.6	89.25	13.06	61.0	36.7	36.7	65.08	10.68
SEm±	0.13	0.28	0.08	0.29	0.69	0.69	0.22	0.11
CD at 5%	0.27	0.59	0.17	0.60	1.43	1.43	0.47	0.23

Table.2 Effect of different treatments on nutrient uptake by wheat crop

Treatments	Nitrogen uptake Kg/ha		Phosphorus uptake Kg/ha		Potassium uptake Kg/ha	
	Grain	Straw	Grain	Straw	Grain	Straw
Nitrogen levels						
No	54.19	33.65	7.87	6.89	21.51	104.56
N1	61.45	40.94	9.30	8.58	23.87	117.9
N2	68.80	46.21	10.47	10.57	36.05	130.07
N3	77.19	53.71	11.71	12.74	28.03	143.12
SEm±	0.90	0.41	0.10	0.24	0.15	0.31
CD at 5%	1.88	0.85	0.22	0.49	0.32	0.64
Phosphorus levels						
P0	63.90	41.89	9.67	9.45	24.5	120.78
P1	65.06	43.92	10.05	9.82	25.16	124.07
P2	68.64	46.21	10.09	10.12	25.19	127.03
SEm±	0.68	0.30	0.08	0.18	0.11	0.23
CD at 5%	1.41	0.63	0.16	0.37	0.24	0.48

Potassium uptake

The potassium uptake (Table-2) by wheat grain and straw significantly improved by nitrogen application. The highs potassium uptake under N3 followed by N2, N1 and lowest under N0 (control). Similar results were also reported by Singh *et al.*, (2009) and Singh *et al.*, (2017).

The potassium uptake in wheat grain and straw increased significantly with increasing the levels of phosphorus in comparison to control. The highest value under P60 kg ha^{-1} fallowed by P 30 kg ha^{-1} and lowest under control. Similar finding also reported by Singh *et al.*, (2009) and Kumar *et al.*, (2010).

References

Jat, S. L. Sumeriya, M. K. Mehta, Y. K.(2003) Influnce of integrated nutrient management on content and uptake of nutrients of sorghum (*Sorghum bicolar* L.*) Crop Research Hissar*,26(3):280-390

Kumar, M, Bangarwa, A. S., Kumar, S. and Nehra, O. P. (2010). Effect of integrated nutrient management on quality and nutrient uptake by barley (*Hordeum vulgare* L.) *Haryana J. Agron* 26 (1&2):58-59.

Kumar, M., Singh L. and Gupta D. D. (2018). Productivity and profitability of barley (*Hordeum vulgare*) as affected by nitrogen levels and varieties under rainfed condition. *Annals of Plant and Soil Research* 20 (4): 375-378.

Kumpawat B. S. (2009) Effect of soil amelioration and nitrogen on growth and yield of barley (*Hordeum valgare* L.) under alkali water condition. *Haryana J. Agron*. 25(1&2):35-38.

Pandey, M., Kumar, S. and Singh, U. N. (2020) Effect of integrated nutrient management on productivity of oat (*Avena sativa* L.) and soil fertility. *Annals of Plant and Soil Research* 22(2):151-155.

Prasad, D. and Singh, M. M. (2007) Effect of sulphur and cutting management in growth, yield and uptake of nutrients in forage oat at varying nitrogen levels. *Annals of Plant and Soil Research* 9 (2) :133-139.

Singh, D. and Singh D. (2017) Effect of nitrogen and F.Y.M. on yield, quality and uptake of nutrients in wheat (*Triticum aestivum* L.). *Annals of Plant and Soil Research* 19 (2): 232-236.

Singh, U. N. and Sing, V. (2020) Effect of sources and levels of sulphur on yield, quality and uptake nutrients in pearl millet (*Penisetum glaucum*) and wheat (*Triticum aestivum*) grown in sequence on alluvial soil. *Annals of Plant and Soil Research* 22(3) :234-238.

Singh, V., Singh, S. P. Singh S. and Shivay, Y. S. (2013) growth, yield and nutrient uptake by wheat (*Triticum aestivum*) as affected by biofertilizer, F.Y.M. and nitrogen. *Indian Journal of Agricultural Sciences* 83(3) : 331-334.

Singh, B. R., Singh R. V. and Rajput O. P. (2009) Effect of nitrogen phosphorus and zinc on growth, yield and nutrient uptake of wheat. *Current Ad. In Agriculture Science* (3) 133-134.

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