



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2022; 11(3): 393-394

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www.thepharmajournal.com

Received: 13-01-2022

Accepted: 16-02-2022

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Effect of nitrogen levels and their split applications on growth characters of wheat (*Triticum aestivum* L. Emend, Fiori and Paol) var. 'Sangam' under the Bundelkhand conditions in U.P.

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Abstract

A field trial was conducted with four levels of nitrogen i.e. 25, 50, 75 and 100 kg ha⁻¹ and their split applications. The growth characters such as plant height, fresh and dry weight, number of functional leaves and number of tillers plant⁻¹ were found to increase with increasing levels of nitrogen upto 100 kg ha⁻¹ and with three equal split of nitrogen (1/3 N basal + 1/3 N as top dressing at Ist irrigation + 1/3 N as top dressing and IInd irrigation).

Keywords: *Brassica juncea*, correlation, Indian mustard, path coefficient analysis

Introduction

Wheat is the world's most widely cultivated food crops. It is eaten in various forms by more than one thousand million human being in the world. In India it is second important staple food crop, rice being the first. Wheat compares well with other important cereals in its nutritive values. It contains more protein than other cereals. Wheat has a relatively high content of niacin and thiamine. Wheat proteins are of special significance. Besides, their significance in nutrition, they are principally concerned in providing the characteristic substance 'gluten' which is very essential for bakers. In bakery gluten provides the structural frame work for the familiar spongy, cellular texture of bread and other baked products. Flours of other cereals lacking gluten are, therefore not good for bread making. The existing comparative low level of production is due to the quantity and quality of inputs and their uses. Among the inputs fertilizers are of great importance. Considering the above facts the present investigation was carried out to judge the quantity of nitrogen and their split applications on growth parameters of wheat under the conditions of Bundelkhand region.

Materials and Method

The experiment was carried out at the Research Farm of Brahmanand Post Graduate College Rath (Hamirpur) U.P., during the winter season of 2019-20 with four nitrogen levels viz. 25, 50, 75 and 100 kg N ha⁻¹ and their split applications such as ½ N as basal + ½ N as top dressing at Ist Irrigation, 1/3 N as basal + 1/3 N as top dressing at Ist irrigation and 1/3 N as top dressing at IInd irrigation and all 1/3 N as basal + 1/3 N as top dressing at Ist Irrigation + 1/3 as top dressing at IInd Irrigation. Each nitrogen levels was tried as above four splits and hence, there were sixteen treatment combinations. All the treatment combinations were arranged in Randomized Block Design with three replications. The seed of wheat Var. 'Sangam' @ 100 kg ha⁻¹ were sown at 22.5 x 5 cm spacing in the plot size of 2.5 x 2.25 metre each. Experimental site was silty loam with a pH 7.6. It contains 0.57% organic matter, 0.64% available nitrogen, 16.15 kg ha⁻¹ available phosphorus and 205.5 kg ha⁻¹ available potash. Each level of nitrogen was applied as per their split (according to treatment) and full dose of P₂O₅ (50 kgha⁻¹) and potash (30 kgha⁻¹) was applied at the time of sowing as basal. All the cultural operations were done as and when necessary for good stand of the crop.

Results and Discussion

Effect of nitrogen levels

The plant height, fresh and dry weight, recorded at three different stages i.e. 60 DAS, 90 DAS

and at maturity, were found to increase with increasing levels of nitrogen. The plant growth characters such as plant height, fresh and dry weight, number of functional leaves and number of tillers plant⁻¹ increased with increasing levels of nitrogen up to 100 Kg ha⁻¹. Linear increase in Above parameters were recorded up to 90 days stage which comes under vegetative growth phase after that slow increase were observed up to harvest stage. It is believed that stimulation in growth

following were observed up to harvest stage. It is believed that stimulation in growth following the application of nitrogen is primarily due to increase in foliar area and of assimilative tissues rather than increase in efficiency of assimilative processes. The results are in conformity with those of Gupta *et al.* (1972) [1], Rathore and Singh (1973) [2], Singh *et al.* (1985) [3] and Vishwanath and Singh (1996).

Table 1: Effect of nitrogen levels and their split applications on growth characters at various stages.

Treatment	Height of main shoot after sowing (cm)			Fresh weight after sowing (gm)			Dry weight after sowing (gm)			No. of functional leaves plant ⁻¹	
	60 days	90 days	At harvest	60 days	90 days	At harvest	60 days	90 days	At harvest	60 days	90 days
Nitrogen levels (kg/ha)											
N ₁	26.97	77.49	78.43	12.96	20.31	12.26	2.08	5.80	10.23	5.41	4.58
N ₂	29.91	82.83	83.11	13.31	21.29	13.58	2.54	5.93	11.30	6.16	5.16
N ₃	33.00	86.30	87.13	14.17	21.46	15.06	2.88	6.53	12.55	6.74	5.75
N ₄	37.47	91.91	92.98	15.86	23.95	15.12	3.25	7.76	13.37	7.16	6.16
S.E. m ±	0.784	1.542	0.805	0.297	0.607	0.465	0.128	0.388	0.232	0.264	0.223
C.D. at 5%	1.602	3.149	1.644	0.608	1.240	0.949	0.262	0.793	0.475	0.541	0.455
Split applications											
S ₁	30.11	81.97	82.90	13.47	21.09	13.47	2.31	6.22	11.45	6.16	5.33
S ₂	32.49	85.83	86.78	14.54	22.50	14.60	2.80	7.03	12.25	6.49	5.49
S ₃	30.91	83.33	84.07	12.67	19.61	13.26	2.11	5.19	11.21	5.83	4.83
S ₄	33.82	86.97	87.90	15.73	23.80	23.80	3.54	7.59	12.54	6.99	6.00
S.E. m ±	0.784	1.542	0.805	0.297	0.607	0.465	0.128	0.388	0.232	0.264	0.223
C.D. at 5%	1.602	3.149	1.044	0.609	1.240	0.949	0.262	0.793	0.475	0.541	0.455

Effect of split applications

All the plant growth characters were found to increase with the application of 1/3 N as basal + 1/3 N as top dressing after Ist irrigation + 1/3 N as top dressing after IInd irrigation. The increment in above parameters may be due to the fact that split application of nitrogen helps to provide its requirement to the wheat crop as and when needed, Singh *et al.* (1977) [4], Singh *et al.* (1980) [5].

Table 2: Effect of interaction among nitrogen levels and their split application on number of tillers per plant at 90 days after sowing.

Nitrogen levels Kg/ha	Split application			
	S1	S2	S3	S4
N ₁	4.55	4.66	4.44	5.00
N ₂	4.44	4.77	4.33	5.00
N ₃	5.33	5.00	4.66	5.00
N ₄	4.77	5.22	4.33	5.55
S.E. m ±	0.122			
C.D. at 5%	0.230			

Interaction effect of nitrogen levels and their split applications

The significant interaction effect were observed for number of tillers plant⁻¹. The useful interactions observed with the application of maximum dose of nitrogen in three equal split. Treatment combination (N₄S₄) produced maximum (5.55) number of tillers per plant which was significantly higher over rest of the treatment.

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