

Optimization of nitrogen management in zero tilled wheat (*Triticum aestivum* L.) under Indo-Gangetic plain of eastern India

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ABSTRACT: Optimization of nitrogen (N) ‘scheduling’ and ‘rate of application’ are essential for obtaining higher yield of zero tilled wheat. Keeping these facts in view an experiment was conducted during Rabi season of 2012-13 at the Agricultural Research Farm, Banaras Hindu University, Varanasi. Experiment was laid out in split plot design, keeping 4-N-rates (90, 120, 150 and 180 kg/ha) in main plots and 6-methods of N-application (placement ? N + ? N at 1st node stage; placement $\frac{1}{2}$ N + $\frac{1}{2}$ N at 1st irrigation; broadcast $\frac{1}{3}$ N + $\frac{2}{3}$ N at 1st irrigation; broadcast $\frac{1}{3}$ N + $\frac{1}{3}$ N at 1st irrigation + $\frac{1}{3}$ N at earhead initiation; broadcast $\frac{1}{2}$ N + $\frac{1}{2}$ N at 1st irrigation and broadcast $\frac{1}{2}$ N + $\frac{1}{4}$ N at 1st irrigation + $\frac{1}{4}$ N at earhead initiation) in sub plots. Recommended full dose of P and K were applied as basal. The treatments were replicated thrice. Maximum and minimum crop growth (plant height, number of tillers/meter, dry matter accumulation, number of leaves), yield attributes (earhead weight, grains/earhead, test weight and harvest index) and yield (grain and straw yield) were observed at 180 and 90 kg N/ha, respectively. Application of N $\frac{1}{2}$ as placement + $\frac{1}{2}$ at 1st irrigation showed best results followed by split application of N $\frac{1}{3}$ broadcast + $\frac{1}{3}$ at 1st irrigation + $\frac{1}{3}$ at earhead initiation produced highest plant height, number of tillers, dry matter accumulation, ear head weight, grains/ear head, test weight, grain- and straw-yield and harvest index of wheat.

Key Words : Nitrogen scheduling, nitrogen levels, yield attributes, yield, performance.

Table-1: Effect of nitrogen rates and method of application on growth of zero tilled wheat.

Treatments	Plant height (cm)		Dry matter accumulation (g)		No. of tillers/m		No. of green leaves /m	
	60 DAS	90 DAS	60 DAS	90 DAS	60 DAS	90 DAS	60 DAS	90 DAS
Nitrogen rates								
90 kg/ha	29.9d	57.6d	8.4d	17.1d	65.7d	45.2d	113.1	107.9
120 kg/ha	33.9c	59.8c	10.8c	19.4c	69.7c	53.0c	114.7	104.4
150 kg/ha	38.8b	63.1b	12.6b	21.3b	74.2b	60.8b	155.7	137.6
180 kg/ha	43.5a	67.9a	13.6a	24.3a	79.5a	74.0a	122.7	115.8
SEm±	0.08	0.21	0.15	0.27	0.93	0.34	12.66	9.97
CD(P=0.05)	0.29	0.71	0.51	0.95	3.22	1.16	NS	NS
Methods of nitrogen application								
Placement $\frac{1}{3}$ N + $\frac{2}{3}$ N at 1 st node stage	37.0c	62.4b	11.7bc	20.7c	73.7ab	59.9c	113.9	112.8
Placement $\frac{1}{2}$ N + $\frac{1}{2}$ N at 1 st irrigation	39.4a	64.6a	13.7a	22.7a	75.3a	65.5a	132.1	111.9
Broadcast $\frac{1}{3}$ N + $\frac{2}{3}$ N at 1 st irrigation	34.7e	60.1c	9.9d	19.5de	70.2bc	53.4e	126.8	108.5
Broadcast $\frac{1}{3}$ N + $\frac{1}{3}$ N at 1 st irrigation + $\frac{1}{3}$ N at earhead initiation	38.2b	64.0a	12.3b	21.6b	73.9ab	61.9b	135.2	127.5
Broadcast $\frac{1}{2}$ N + $\frac{1}{2}$ N at 1 st irrigation	33.8f	59.9c	9.7d	18.7e	68.8c	52.1f	126.0	114.8
Broadcast $\frac{1}{2}$ N + $\frac{1}{4}$ N at 1 st irrigation + $\frac{1}{4}$ N at earhead initiation	36.0d	61.6b	11.0c	20.0cd	71.5abc	56.9d	125.3	123.0
SEm±	0.12	0.34	0.31	0.29	1.36	0.44	5.36	5.87
CD(P=0.05)	0.33	0.96	0.90	0.82	3.88	1.25	NS	NS

Table-2: Effect of nitrogen rates and method of application on yield attributes and yield of zero tilled wheat.

Treatments	Earhead weight (g)	No. of Grains /earhead	Test weight (g)	Grain yield (kg/ha)	Straw yield (kg/ha)	Harvest Index (%)
Nitrogen rates						
90 kg/ha	1.4d	37.4d	34.6d	3131.6d	4092.3d	43.3d
120 kg/ha	1.9c	40.4c	38.0c	3457.3c	4286.7c	44.6c
150 kg/ha	2.2b	42.5b	41.0b	3878.8b	4470.9b	46.4b
180 kg/ha	2.6a	47.8a	44.0a	4200.5a	4602.8a	47.7a
SEm±	0.04	0.38	0.29	11.46	14.26	0.09
CD(P=0.05)	0.13	1.31	0.99	39.66	49.33	0.30
Methods of nitrogen application						
Placement $\frac{1}{3}$ N + $\frac{1}{3}$ N at 1 st node stage	2.1bc	42.6c	39.8b	3713.8c	4398.9ab	45.7bc
Placement $\frac{1}{2}$ N + $\frac{1}{2}$ N at 1 st irrigation	2.3a	45.2a	41.6a	3916.9a	4412.4ab	46.9a
Broadcast $\frac{1}{3}$ N + $\frac{1}{3}$ N at 1 st irrigation	1.8d	40.3e	38.0c	3496.4e	4272.4c	44.9de
Broadcast $\frac{1}{3}$ N + $\frac{1}{3}$ N at 1 st irrigation + ? N at earhead initiation	2.2ab	44.0b	41.0a	3829.6b	4431.9a	46.2b
Broadcast $\frac{1}{2}$ N + $\frac{1}{2}$ N at 1 st irrigation	1.8d	39.0f	36.9d	3425.5f	4293.4c	44.3e
Broadcast $\frac{1}{2}$ N + $\frac{1}{4}$ N at 1 st irrigation + $\frac{1}{4}$ N at earhead initiation	2.0c	41.3d	39.0b	3620.1d	4370.1b	45.2cd
SEm±	0.05	0.31	0.31	15.33	18.84	0.22
CD(P=0.05)	0.14	0.88	0.89	43.80	53.86	0.62

