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Effect of Different Nitrogen Doses on Various Characters against Foliar Blight of Wheat (*Triticum aestivum* L.)

Ghanshyam verma*, S.P. Singh, S.K. Singh, Chandra Pal, Sheetala Varma and Nutan Singh

Department of of Plant Pathology, N. D. University, Kumarganj, Faizabad (U.P.), India

**Corresponding author*

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A B S T R A C T

A field experiment was conducted to study the effects of different doses (60, 80, 100, 120, and 140kg/ha) of nitrogen application on 100kg/ha seed rate a semi dwarf, high yielding with good quality traits on 'DBW 17', variety of wheat was evaluated to study the effect of 100kg/ha seed rate and different doses of nitrogen application on percent disease intensity, AUDPC, and yield of wheat. The results showed that different doses 120kg/ha nitrogen and 100kg/ha seed rate significantly out yielded the 100 kg/ha and 140kg/ha nitrogen and seed rate in seed yield. Almost similar result were obtained in case of plant height(cm), spike length (cm.), number of tillers/plant,1000 seed weight(gm).

Introduction

Wheat (*Triticum aestivum* L.) belongs to the family Poaceae. It is the most important cereal crop after rice in India and is the most important food of about two billion people (36% of the world population).The common bread wheat, *T. aestivum*, is the most important species, occupying more than 90 % of the wheat area and 87% of the total wheat production in the country. In world, Wheat is grown over 224.7 million hectare area with production of 734.80 million metric tons and yield of 3.27 metric tons per hectare. In India, wheat is grown over 31.47 million hectare area with production of 86.53 million metric tons and yield of 2.75 metric tons per hectare (Anonymous, 2016) about 91% of the total wheat production is contributed by northern states. Among them, Uttar Pradesh rank first with respect to area (9.645 m.ha.) and production of (30.00 m.t.) but the average productivity (27.86 q/ha) is much lower as compare to Punjab and Haryana (Anonymous,

2016). Wheat is nature's unique gift to mankind as it is an excellent source of nutrition. Wheat is nature's unique gift to mankind as it produces excellent source of nutrition in terms of carbohydrates, minerals and proteins. Although wheat is grown in most of the states, the major production comes from the north western part of the country. The increase in domestic demand of baked and pasta products in the country and economic liberalization and global trade have offered opportunities for better utilization of wheat. Wheat quality needs uppermost attention to meet the trade requirements of the domestic and international markets. Quality of food grain is a complex phenomenon and may be influenced by several factors which may be genetic and /or environmental. Cultural practices considerably influence the grain quality. Adoption of suitable practices different nitrogen application play a key role on the quality of wheat. Nitrogen is the most important constituent of plant proteins and is required throughout the crop growth period from vegetative stage to subsequent harvesting. Application of nitrogen is known to mainly increase the grain yield, and other characters including plant height and 1000 seed weight etc. Many researchers have found that late season top dressed nitrogen addition as dry fertilizer material were most effective in attaining higher grain protein concentration, yield and increased fertilizer recovery and efficiency (Satyanarayana., 2015) and (Parveen Kousar *et al.,* 2015). Therefore, availability of nitrogen to wheat during various phases of its growth and development is an important factor influencing the yield and quality of grain (Muhammad Yousaf *et al.,* 2015). Nitrogen level and 100kg/ha seed rate also plays a key role in the grain yield and quality of wheat. Seed rate governs the inter and intra plant competition, the numbers of tillers per plant, spikelet number per spike, grain size, grain shape etc. Likewise nitrogen nutrition, also influences the plant growth, development, seed size and other qualities of wheat. Although sufficient information is available on the effect of fertilizers on yield attributes but the information on the effect of time of nitrogen application and seed rate on biochemical parameters is meager Keeping this aspect in mind, the present investigation is planned with the objectives to study the impact of different doses of nitrogen application (60,80,100.120 and 140kg/ha)on seed yield, and other characters and its quality in a national variety 'DBW-17'of wheat (*Triticum aestivum* L.) in the agro-climatic condition of Faizabad region (U.P.).

Materials and Methods

The present investigation was carried out on Wheat cultivar 'DBW 17' at the student instructional farm Narendradev university of agriculture & technology kumarganj faizabad (U.P.) during rabi (winter) season of 2014-15 and 2015-16. The treatment comprising of five levels of nitrogen viz- 60, 80, 100, 120 and 140 kg/ha and 100kg/ha seed rate were laid-out in randomized block design with three replications each. Thus total number of treatment combination were 05 with over check(untreated), plot size was 1.38X7=9.66m2, row to row spacing was 23 cm, Urea was the sources of nitrogen. The observation were recorded on percent disease intensity(PDI), AUDPC, ear length(cm), plant height(cm), number of tillers /plant, 1000 grain weight.

Percent disease intensity was calculated by employing the formula:

Mc Kinney (1975)

$$P.D.I. = \frac{\text{Sum of total numerical rating}}{\text{Total number of leaves examined x Highest rating}} \text{ x } 100$$

AUDPC: Disease severity calculated as per (Dubin *et al.,* 1998). The formula was used as follows:

$$\sum_{i}^{n-1}\left[\left(\frac{y_i + y_{i+1}}{2}\right)(t_{i+1} - t_i)\right]$$

Results and Discussion

For the use of proper quality of fertilizers in most essential for enhancing yield and quality important inputs for increasing productivity of this crop, therefore these fertilizer were tried to find their role in wheat crop and the results of present study are discussed.

All the treatments were significantly superior over check (untreated plot) in reducing the disease severity. Minimum percent disease intensity in first year (29.55%) AUDPC (314.0) and second year (28.54%) AUDPC (300.4) were recorded with the treatment T_4 (Nitrogen doses of 120 kg/ha) followed by treatment T_3 (Nitrogen doses of 100kg/ha) and T_5 (Nitrogen doses of 140 kg/ha) which have disease intensity of first year 32.62% or AUDPC (359.5) and 33.92% or AUDPC (403.9) and second year (32.89) or AUDPC (346.0) and (33.83) or AUDPC (398.0), respectively. Former treatment was significantly superior over the latter (Table 1 and 2).

Table.1 Effect of different nitrogen doses on severity of foliar blight- (2014-15)

Treatment	N. Doses Kg/ha	Date of disease appearance	Percent disease intensity			AUDPC
			12/3/2014	**19/3/2014**	**26/3/2014**	
T_1	60	26/1/15	20.96 (27.20)	29.26 (32.71)	36.27 (36.99)	405.1
T_2	80	24/1/15	22.19 (28.04)	28.74 (32.39)	35.20 (36.39)	402.0
T_3	100	26/1/15	15.48 (23.11)	26.81 (31.18)	33.62 (35.43)	359.5
T_4	120	26/1/15	11.39 (19.64)	24.39 (29.53)	29.55 (32.54)	314.0
T_5	140	25/1/15	21.67 (27.69)	30.40 (33.46)	32.92 (35.00)	403.9
T_6	00	21/1/15	27.67 (31.63)	32.86 (34.94)	37.61 (37.82)	458.5
SEm±			**0.886**	**1.793**	**0.718**	
CD			**2.669**	**5.404**	**3.165**	

Table.2 Effect of different nitrogen doses on severity of foliar blight- (2015-16

Treatment	N. Doses Kg/ha	Date of disease appearance	Percent disease intensity			AUDPC
			13/3/2015	**20/3/2015**	**27/3/2015**	
T_1	60	26/2/15	19.28 (25.99)	28.74 (32.39)	35.58 (36.57)	393.2
T_2	80	24/2/15	21.91 (27.90)	27.74 (31.76)	34.06 (35.67)	390.0
T_3	100	26/2/15	14.38 (22.22)	25.80 (30.53)	32.89 (34.94)	346.0
T_4	120	26/2/15	10.73 (19.09)	23.28 (28.79)	28.54 (32.27)	300.4
T_5	140	25/2/15	20.01 (26.56)	29.95 (33.15)	33.83 (35.55)	398.0
T_6	00	22/2/15	26.50 (30.33)	31.08 (33.83)	36.97 (37.41)	439.7
SEm±			**1.48**	**1.37**	**2.72**	
CD			**4.45**	**4.13**	**8.20**	

Table.3 Effect of different nitrogen doses on Plant height, Ear length, No. of tillers 2014-15

Treatment	N. Doses	Plant height			Ear length			No. of tillers		
T1	60 KG	75.36	83.96	84.07	7.9	8.1	8.3	5.2	5.5	6.6
T2	80 KG	78.97	84.77	89.86	8.3	8.4	8.5	5.1	5.9	6.9
T3	100 KG	83.36	86.61	91.58	8.5	8.6	8.7	5.3	6.3	7.7
T4	120 KG	81.52	88.10	94.72	8.7	8.9	9.2	6.2	7.5	8.9
T5	140 KG	77.74	83.62	93.26	8.5	8.7	8.9	6.4	7.2	8.2
T6	00 KG	72.49	76.41	80.53	7.6	7.7	7.9	3.8	4.2	5.3
SEm±		**3.048**	**0.951**	**0.809**	**0.115**	**0.079**	**0.079**	**0.341**	**0.383**	**0.182**
CD		**9.187**	**2.865**	**2.438**	**0.348**	**0.239**	**0.239**	**1.027**	**1.154**	**0.549**

Table.4 Effect of different nitrogen doses on Plant height, Ear length, No. of tillers 2015-16

Treatment	N.Doses	Plant height			Ear length			No. of tillers		
T1	60 KG	76.97	84.30	86.29	8.1	8.3	8.4	6.1	6.5	7.3
T2	80 KG	82.31	86.27	91.01	8.5	8.6	8.6	5.6	7.2	7.4
T3	100 KG	84.40	88.29	92.06	8.7	8.7	8.9	6.2	7.1	7.9
T4	120 KG	81.55	89.36	94.49	8.9	9.1	9.4	6.6	7.9	9.1
T5	140 KG	79.16	85.69	94.82	8.8	8.9	9.1	6.6	7.8	8.3
T6	00 KG	73.36	77.66	81.95	7.7	7.7	7.8	3.5	3.7	5.1
SEm±		**2.74**	**1.52**	**1.36**	**0.13**	**0.10**	**0.14**	**0.37**	**0.47**	**0.26**
CD		**8.27**	**4.59**	**4.09**	**0.40**	**0.29**	**0.43**	**1.12**	**1.42**	**0.79**

Table.5 Effect of different nitrogen doses on yield kg/plot or q/ha and 1000 grain weight-2014-15

Treatment	N. Doses Kg/ha	Yield/ plot	Yield q/ha	1000 grain wt.
T_1	60	4.190	43.37	41.06
T_2	80	4.353	45.05	41.14
T_3	100	4.415	47.25	41.60
T_4	120	4.665	48.28	42.02
T_5	140	4.413	46.21	41.39
T_6	00	3.871	41.30	40.36
SEm±		**0.17**	**1.52**	**0.42**
CD		**0.51**	**4.58**	**1.28**

Table.6 Effect of different nitrogen doses on yield kg/plot or q/ha and 1000 grain weight-2015-16

Treatment	N. Doses Kg/ha	Yield/ plot	Yield q/ha	1000 grain wt.
T_1	60	4.285	44.35	40.56
T_2	80	4.478	46.35	41.28
T_3	100	4.716	48.81	41.87
T_4	120	4.816	49.85	41.36
T_5	140	4.624	47.86	41.27
T_6	00	3.801	39.34	40.37
SEm±		**0.25**	**2.55**	**0.51**
CD		**0.74**	**7.70**	**1.53**

Plant growth characters like plant height, ear length, no. of tillers were higher in all treatment compared to control. Among all the treatments T_4 was found best with maximum plant height (94.72 cm), ear length **(**9.2cm) number of tillers/ plant (8.9) in first year and plant height (94.49cm) ear length (9.4cm) number of tillers per plant (9.1) were found in second year compared to untreated control (Table 3 and 4).

All the treatment having different leveling of nitrogen doses treatments was significantly superior over check. Treatment T_4 was found best with 48.28q/ha in first year and 49.85 q/ha in second year. This treatment was closely followed by T_3 and T_5.which gave the seed yield 47.25 q/ha and 48.81q/ha in second year, 46.21q/ha 47.86 q/ha in first and second year, respectively. Similar trend were recorded in case of thousand grain weight. Minimum seed yield q/ha and thousand grain weight was recorded with treatment T_2 compared to untreated control (Table 5 and 6).

It can be concluded from the present study the treatment of nitrogen application at 120 kg N/ha made in conjunction with 100 kg seed rate/ha, are best than all other treatments for achieving the highest traits of expression of number of tillers, ear length(cm), plant height(cm), seed yield (q/ha),1000 grain weight and lower percent disease intensity, AUDPC, thus promising to boost the productivity of wheat (*Triticum aestivum* L.) in agro-ecological condition of Faizabad region (U.P.). Similar observations were recorded by other workers Yadav *et al.*, (2017) evaluated to study the effect of different seed rate and different doses of nitrogen application on germination percent, purity percent and yield of wheat. The results showed that different doses 100, 120 and 140 kg/ha nitrogen and 100, 125 and 150 kg/ha seed rate significantly out yielded the 100 kg/ha nitrogen and seed rate in seed yield, biological yield. Almost similar result were obtained in case of shoot length, plant height, dry matter (g.), spike length (cm.), number of spike/ear, number of seeds/ spike, 1000 seed weight and harvest index. The application of 140 kg N/ha and 150 kg seed rate/ha was the best combination for getting higher seed yield with its better quality. Kandel *et al.,* (2009) elucidated the role of nitrogen in wheat genotypes for management of the disease. Four doses of nitrogen in six different promising genotypes were tested. Nitrogen levels higher than 50 kg ha^{-1} significantly reduced disease severity and increased grain yield in all genotypes but there was no significant differences in grain yield in the first year. In the second year, grain yield difference among the genotypes was significant. Area under disease progress curve (AUDPC) was not significant between two doses 100 and 150 kg ha^{-1}. These results suggested that fertilizer should be applied in soil at balanced dose 100:50:50 N:P2O5:K2O kg ha^{-1}. Growing relatively resistant genotypes with the balance dose of fertilizers can reduce foliar blight severity in wheat. Singh and Singh (2006) reported the effect of mineral nutrition and environmental variables on the intensity of spot blotch, caused by *Cochliobolus sativus* (Ito & Kurib.) Drechs. Ex Dastur, and grain yield in wheat (*Triticum aestivum* L. emend. Fiori and Paol.). Mean spot blotch intensity being 38.80% in the first and 38.82% in the second year, environment mediated difference was not apparent at soft dough stage in the timely sown experiment, but at an intensity of 38.19% in the second year over 31.20% in the first, it was very obvious in the late sown one. Environmental variables could not modify the level of spot blotch intensity in timely sown experiment at 120 kg nitrogen, 60 kg phosphorus and 40 kg potash/ha. In the late sown experiment, supplementation of zinc sulphate (21%) and elemental sulphur (32.06%) @ 25 kg/ha each

to above NPK dose also gave similar results. Maximum intensity enhancement was noted for 180 kg nitrogen, 60 kg phosphorus and 40 kg potash/ha in the first experiment and zero supplementation of potash, zinc sulphate and elemental sulphur to 120 kg nitrogen and 60 kg phosphorus in the second.

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