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Differential varietal response of boron on late sown wheat (*Triticum aestivum* L)

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In west Bengal wheat is sown from the 3rd weak of December after the harvest of *aman* paddy and the productivity is being declined for want of prolonged favorable winter season and due to rise in temperature at grain filling stage both the number of grain.spike^{-1} and grain weight are substantially reduced. Boron, as a micronutrient played an important role to maintain floret fertility as well as grain size and its weight (Sharma and Das, 1982). As earlier investigation on boron requirement in new alluvial zone to increase productivity of wheat is scanty, the present investigation was attempted to estimate the appropriate dose of boron with identification of genotypes with least requirement of micronutrient to maintain productivity.

The experiment was conducted with ten genotypes *viz*., HD 2985, HD 2997, HI 1563, NW 4035, PBW 343, HUW 234, DBW 51, NIVT 2969, NW 2036 and DBW 52 during the winter season at Instructional farm of Bidhan Chandra Krishi Vishwavidylaya, Jaguli, Nadia. The experimental site was located at 22^0 N latitude and $88^0 59'$ E longitude and 9.75 meter above mean sea level. The soil was sandy loam in texture with medium fertility and neutral reaction and the estimated boron content was 0.6 ppm. The seeds were sown on 3rd January 2007 following split plot design where the subplots consisted of ten genotypes and the main plot with three doses of boron, B0 (without boron), B1 (4kg ha^{-1}) B2 (6Kg ha^{-1}), in the form of sodium borate. Borax and NPK @120:60:60 kg ha^{-1} were applied at land preparation and additional 40 kg N ha^{-1} was applied in two split doses during tillering and panicle initiation stage. Ten plants were randomly selected from each sub plot and each replication to take data on grains spike^{-1}, 100 grain weight and percent nitrogen content in grains. Nitrogen was estimated following Micro Kjeldahl method (McKenzie and Wallace, 1954).

Analysis of variance revealed strong significant effects on genotypes, boron application and their interactions for the characters, number of grains spike^{-1} and 100 grain weight. On the other hand nitrogen content in grains revealed presence of significant differences among the genotypes only (Table 1).

Table1: Analysis of variance of different characters of wheat varieties in split plot design

Source	D.f.	No. of grains spike^{-1}	100 grain weight (g)	Nitrogen content %
Replication	2	13.864	0.114	0.027
Genotypes	9	241.641**	0.351**	0.060*
Boron	2	155.166**	8.195**	0.027
Genotype × Boron	18	49.401**	0.213**	0.023

**, ** Significant at 5% and 1% level of significance, respectively.*

Table 2: Effect of boron on grains spike^{-1}, grain weight and nitrogen content of different wheat varieties

Varieties	Grains spike^{-1}				100 grain weight (g)				Nitrogen content (%)			
	B_0	B_1	B_2	Mean	B_0	B_1	B_2	Mean	B_0	B_1	B_2	Mean
HD 2985	41.93	48.26	45.33	45.17	3.82	4.48	4..73	4.34	1.227	0.974	1.193	1.131
HD 2997	40.00	38.60	38.80	39.10	3.64	5.18	5.03	4.61	1.109	1.058	1.276	1.148
HI 1563	31.46	39.13	43.46	38.00	4.02	4.96	5.20	4.72	0.966	0.949	0.975	0.963
NW 4035	41.33	42.86	48.60	44.26	4.08	4.62	5.00	4.56	1.092	1.025	0.823	0.980
PBW 343	50.93	54.60	54.73	53.42	3.50	4.54	4.86	4.30	1.025	1.075	1.011	1.037
HUW 234	26.13	40.26	39.40	35.26	3.86	4.44	4.10	4.13	1.227	1.119	1.123	1.156
DBW 51	49.80	47.13	43.13	46.60	3.73	4.49	5.30	4.65	1.125	1.011	0.934	1.023
NIVT 2969	49.60	49.66	41.93	47.06	3.72	4.51	5.13	4.45	1.085	1.126	1.176	1.129
NW 2036	39.73	46.73	41.86	42.70	4.34	4.68	4.86	4.62	1.126	1.092	0.940	1.053
DBW 52	39.86	46.60	50.33	45.50	4.06	4.38	4.66	4.36	0.914	0.943	0.941	0.933
Mean	**41.08**	**45.38**	**44.75**		**3.87**	**4.62**	**4.89**		**1.090**	**1.037**	**1.039**	
	V	**B**	**V x B**		**V**	**B**	**V x B**		**V**	**B**	**V x B**	
LCD(0.05)	**4.16**	**NS**	**7.21**		**0.21**	**0.21**	**0.36**		**0.1239**	**NS**	**NS**	

Note: B= Boron and V= Variety

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Earlier workers also have observed varietal differences in response to boron with respect to number of grains ear^{-1} (Mondal and Roy, 1999; Pradhan and Chakraborty, 2002). Ghatak *et al.* (2006) also failed to show significant effect on NPK concentration in plants due to boron application. All the varieties except HD 2997, PBW 343, DBW 51, NIVT 2969 showed characteristic improvement in number of grains spike^{-1} of which highest number was found in PBW 343 and the genotypes which did not show any significant differences can be categorized as non responsive to boron treatment for total number of grains (Table 2). Substantial improvement with application of boron in genotypes with less number of grains was recorded in HUW 234 followed by HI 1563 and these genotypes may be considered as highly boron responsive for the trait. Increased 100 grain weight due to application of boron was observed in all the genotypes except NW 2036 and DBW 51 where improvement was found to be marginal and these genotypes can be considered as non responsive to boron to maintain the seed size and genotype NBW 2036 was found to be best for the trait. Application of boron at higher doses exhibited concomitant improvement in number as well as size of grains in most of genotypes and dose has been suggested for yield improvement in the region. Mete *et al.* (2005) also observed increased number of grains panicle^{-1} and 1000 grain weight at higher doses of boron in old and new alluvial soil of Burdwan and Hooghly in West Bengal. The genotypes PBW 343 and NW 2036 may be considered as parents for development of high yielding varieties with improvement in total sink size with increased number as well as size of grains.

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