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Response of boron on different wheat genotypes under late sown condition

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In West Bengal wheat growing climate is widely different than other states where the duration is about 140 – 150 days. In West Bengal winter persist not more than 100 – 110 days generally. Thus, an ideal climate required for optimum wheat crop is meager in the state. More over wheat is grown generally after the harvest of *aman* rice resulting delay in sowing (late sown condition). Besides wheat crop is affected to sudden rise in temperature resulting initiation of reproductive phase. During grain developmental phase the temperature exceeds 35ºC. this reduces grain size and grain filling which ultimately results substantial loss in wheat yield. No studies have been made on incomplete grain filling (sterility) as well as effect of boron application on grain filling under new alluvial soil zone. Therefore, the present studies have been made on the above object in addition to nitrogen concentration of whole plant.

The experiment was conducted during the year 2007 – 2008 at Jaguli farm of Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal with ten genotypes of bread wheat (K- 0303, CBW- 38, HD- 2733, K- 0607, K- 0617, PBW- 612, HUW- 612, HUW- 616, DBW- 39 and Raj- 4120) in new alluvial soil of West Bengal sown on 20th December in split plot design with three replications. The farm is located at 22°56' N latitude and 88°32' E latitude at an elevation of 9.75 m above mean sea level and soil of the experimental site is classified as sandy loam. Basic chemical properties of the surface (0-15 cm) soil were: pH 6.80, organic carbon 5.4 g kg^{-1}, available N, P2O5 and K_2O as 85, 15.3 and 40 kg ha^{-1}, respectively. Three doses of boron in the form of sodium borate (0 kg, 3 kg and 4 kg sodium borate/ha) as main plot and different ten genotypes in the sub plot was considered. Nitrogen (N) as urea, phosphorus (P) as single super phosphate and potassium (K) through muriate of potash were applied @ 80 kg, 60 kg and 40 kg per hectare respectively. Plot size 3 m × 2.3 m was maintained. Inter row and inter plant spacing were 23 cm and 15 cm respectively. Broad casting of total phosphorus and potassium along with nitrogen at recommended dose was done during land preparation and top dressing of nitrogen was also done at 45 days (Tillering) of crop growth stage. Boron was applied at the time of sowing. Soil samples were collected before fertilizer application and studied. Height of plant, number of days to 50% flowering and number of days to 50% maturity, number of grains per spike, spike length and 100 grain weight were recorded from each plot. Soil boron soluble in hot water was estimated by the method of Parker and Gardner (1981).

Effects of boron under late sown condition in wheat was studied during 2007 – 2008 with ten bread wheat genotypes (K- 0303, CBW- 38, HD- 2733, K- 0607, K- 0617, PBW- 612, HUW- 612, HUW- 616, DBW- 39 and Raj- 4120) in new alluvial soil of West Bengal, India. Genetic characters such as plant height, number of days to 50% flowering, number of days to 50% maturity and spike length were studied and observed their variability. Genotypes like K- 0617 and Raj- 4120 showed highest significant value in case of grain number per spike, this was also supported by Mandal *et al.*, (2011). Genotypes like PBW- 612, HUW- 612 and HUW- 616 were not able to show any remarkable result. In case of 100 grain weight overall performance of wheat genotypes like HD- 2733, K- 0607 and PBW- 612 was remarkably good.

It is revealed from the analysis of soil samples that the boron soluble in hot water was 0.5 ppm which is considered as deficient soil according to Reisenauer *et al.* (1973). Analysis of variance revealed that application of borax increased grain number per spike and 100 grain weight of wheat. Similar results were obtained by Ganguli (1979), Chatterjee *et al.* (1980) and Mandal (1991) at highly boron deficient soil of Coochbehar in West Bengal. Similar result was also obtained by Mandal (2000) at North Bengal in West Bengal. Percent increase in grains $spike^{-1}$ parameter varied widely from -5.36% to 54.07% at 3 kg borax ha^{-1} application. Genotypes like CBW- 38 and HD- 2733 showed significant increase in number of grains per

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Table 1: Effect of boron on grains spike^{-1}, 100 grains weight and nitrogen content of different genotypes of wheat

Genotypes	No. of grain. spike^{-1}						100 Grain weight (g)						N content (mg)					
	B_0	B_3	% I/D	B_4	% I/D	Mean	B_0	B_3	% I/D	B_4	% I/D	Mean	B_0	B_3	% I/D	B_4	% I/D	Mean
K-0307	41.93	48.26	15	45.33	8.1	45.17*	3.82	4.48*	17.2	4.73*	23.8	4.34*	1.494	0.974	-3.48	1.193	-2.04	1.22
CBW-38	26.13	40.26*	54	39.40*	50	35.26	3.86	4.44*	15	4.1	6.2	4.13	1.109	1.058	-4.56	1.295	1.67	1.56
HD-2733	31.46	39.13*	24	43.46*	38	38.00	4.02	4.96*	23	5.2*	29.3	4.72*	0.966	0.049	-9.50	1.109	1.48	1.08
K-0607	41.33	42.86	3.7	48.60*	17.5	44.26*	4.08	4.62*	13.2	5*	22.5	4.56*	1.092	1.025	-0.62	0.823	-2.46	0.99
K-0617	50.93	54.60	7.2	54.73	7.46	53.42*	3.50	4.54*	29	4.86*	38.8	4.30	1.025	1.075	4.89	1.344	3.42	1.15
PBW-612	40.06	38.60	-3.6	38.80	-3.1	39.10	3.64	5.18*	42	5.03*	38	4.61*	1.361	1.119	-17.78	1.123	-17.48	1.21
HUW-612	49.80	47.13	-5.3	43.13	-13.3	46.60*	3.73	4.49*	20	5.3*	42	4.65*	1.125	1.344	19.47	0.934	-16.98	1.14
HUW-616	49.60	49.66	0.12	41.93	-15	47.06*	3.72	4.51*	21.2	5.13*	38	4.45*	1.085	1.126	3.78	1.176	8.39	1.13
DBW-39	39.73	46.73	17.6	41.86	5.36	42.70*	4.34	4.68	7.8	4.86*	11.9	4.62*	1.126	1.092	-3.02	0.940	-16.52	1.06
Raj-4120	39.86	46.60	16.9	50.33*	26.2	45.50*	4.06	4.38	7.8	4.66*	14.7	4.36*	0.912	0.610	-3.31	0.941	3.17	0.83
Mean	**41.08**	**45.38**		**44.75**			**3.87**	**4.62**		**4.88**			**1.130**	**1.037**		**1.088**		
LSD(0.05)	**B**	**G**	**B×G**				**B**	**G**	**B×G**				**B**	**G**	**B×G**			
	NS	**4.16**	**7.21**				**0.208**	**0.210**	**0.363**				**NS**	**0.1239**	**NS**			

Note: B = Boron, G = Genotype, I = Increase, D = Decrease, B_0 = 0 kg Borax, B_3 = 3 kg Borax, B_4 = 4 kg Borax

spike. Genotypes *viz.* PBW- 612 and HUW- 612 did not perform well and showed negative values due to toxic effect of borax. But at 4.0 kg ha^{-1} borax application treatment, CBW- 38 and Raj- 4120 showed significant increase in grain number per spike which was also supported by Mandal and Das, (1988). At 3.0 kg ha^{-1} level of borax application treatment, all the genotypes increased in 100 grain weight except for DBW- 39 and Raj- 4120 genotypes.. At 4 kg ha^{-1} of borax application treatment, all the genotypes except CBW- 38 increased in 100 grain weight. Nitrogen content in all the genotypes showed no significant variation due to borax application at any applied level which was also reported by Mandal and Chettri, (2008).

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