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Effect of Boron on Different Varieties of Durum Wheat Under Late Sowing Condition

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Abstract

Ten varieties of durum wheat were evaluated in three replications with two dosages of boron in split plot design to study the boron responsiveness. The data were collected on six characters of which three characters viz number of grains-1, 100 grains weight and grain yield-1 responded well to boron application from 10 randomly selected plants. It was found that IC 212172 produced highest number of grains-1 in both treated and untreated control condition whereas IC 35061 showed lowest value in both the condition. IC 532300, IC 118768 and IC 138859 registered negative % increase of grain yield. For 100 grain weight IC 532878, IC 532300 and IC 118768 showed highest value at treated condition. So it can be conducted that IC 35061, IC 532878, IC 78912 and IC 534071 and for 100 grain weight all the varieties revealed highly boron responsive under late sown condition in gangetic alluvial plain zone soil.

Keywords

Durum wheat; Boron application; Late sowing; Grain yield; Grain weight

Introduction

Wheat is the most important food grain in the world in respect of production as a cereal crop. Wheat is the staple food of millions of people. It is also an important part of the daily diet of many millions more. Durum wheat or macaroni wheat also spelled Durhum, *Triticum durum* is the only tetraploid species of wheat of commercial importance that is widely cultivated today. Macaroni wheat is the second most important species of wheat occupying about 14% of total wheat area in India.

In West Bengal, India wheat is sown from 3rd week of December after the harvest of Aman paddy and the productivity is being declined for want of prolonged favourable winter season and due to rise in temperature at grain filling stage, both the number of grains spike^{-1} and grain weight are substantially reduced.

Boron as a micro-nutrient played an important role to florets fertility as well as grain size and its weight [1]. In durum wheat a few study has been made as compared to bread wheat [2-6]. As earlier investigation on boron requirement in new alluvial zone of West Bengal to increase productivity of durum wheat is scanty, therefore, in the present investigation an attempt has been made to study the appropriate dose of boron with identification of durum genotypes with least requirement of micronutrient to maintain productivity.

Materials and Methods

The field experiment was conducted in West Bengal during Rabi season. The experiment was sown on 22nd December. The details of materials and methods adopted are described. The experiment was conducted with 10 genotypes *viz.* IC 11877, IC 35061, IC 532878, IC 78912, IC 212712, IC 532300, IC 118768, IC 138895, IC 533988, IC 534071 at the university farm during Rabi season.

Experimental site

The experiment was conducted during winter season at the departmental field of Instructional farm, Jaguli of Agricultural University, West Bengal, India. The farms geographical location was latitude 22.93^0 N, Longitude 88.59 E, Altitude 9.75 m above mean sea level.

Experimental soil

The soil in which the experiment was conducted is Gangetic alluvial sandy loam in texture with good drainage facilities having medium fertility and neutral reaction, available boron content of this soil was 0.7 ppm which required boron application.

Experimental details

Ten genotypes were tested with two levels of borax (Bo= without borax, B_1=6 kg of borax/ha) with 3 replications in split plot design. The main plot treatment was two dosage of borax applied by broadcast at the time of land preparation and subplot treatments were ten varieties. N 120 kg/ha in the form of Urea, P_2O_5 60 kg/ha in the form of single super phosphate and K 60 kg/ha in the form of Muriate of Potash were applied. All doses P_2O_5, K and ½ N were applied during land preparation and rest half were applied during 60 days of crop growth. The row to row spacing was 22 cm and spacing between two plants within row was 10 cm apart.

Observation

Data were recorded on plant height (cm), spike length (cm), numbers of spikelet per spike, numbers of tillers per plant, numbers of grains per spike, 100 grain weight (g) and yield per plant (g). Statistical analysis was done by split plot design.

Result and Discussion

The analysis of variance revealed strong significant effects on genotypes, borax application and their interactions for the characters number of grains spike^{-1}, 100 grains weight and for yield plant^{-1} only B was significant (Table 1).

No. of grains spike^{-1}

Variety IC 212172 produced the maximum number of grains spike^{-1} which was significantly different from all other varieties (Table 2). However, lowest number of grains spike^{-1} was recorded in case of the variety IC 350 61 (about 34% lower than IC 212172). Boron level was also found to have significant effect on this yield attribute.

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Table 1: Analysis of variance of different characters of durum wheat varieties in split plot design.

Mean Square				
Source	**DF**	**No. of grains spike^{-1}**	**100 grains weight (g)**	**Yield plant^{-1}**
Replication	2	13.854	0.114	4.887
Genotype	9	239.641**	35.100**	12.959**
Error	18	14.432	0.084	1.338
Boron	1	155.166**	8.195**	25.412**
Genotype x Boron	9	49.401**	21.300**	1.280NS
Error	20	19.412		
NS= non significant				
**=significant at 1% leve				

Table 2: Effect of boron and its interaction on different varieties of wheat.

Varieties	Grains spike^{-1}				100 grains weight				Yield plant^{-1}			
	Bo	B_1	Increase (%)	Mean	Bo (%)	B_1 Mean	Increase		Bo	B_1	Increase (%)	Mean
IC 11877	42.25	48.09	13.82	45.17	3.82	4.86	27.22	4.34	13.43	14.63	8.93	14.03
IC 35061	29.54	40.98	38.72	35.26	3.86	4.40	13.98	4.13	14.16	15.68	10.73	14.92
IC 532878	32.44	43.56	34.27	38.00	4.02 4.72	5.42	34.82		11.56	13.62	17.82	12.59
IC 78912	39.92	48.60	21.74	44.26	4.16	4.96	19.23	4.56	13.03	14.77	13.35	13.90
IC 212172	52.11	54.73	5.02	53.42	3.82	4.78	25.13	4.30	15.17	15.53	2.31	15.35
IC 532300	40.06	38.14	-4.79	39.10	3.84	5.38	39.26	4.61	13.23	16.51	24.79	14.87
IC 118768	49.80	43.40	-12.85	46.60	4.04	5.26	30.19	4.65	12.56	14.14	12.57	13.35
IC 138895	44.52	41.93	-5.81	47.06	3.72	5.18	39.24	4.45	13.36	12.74	-4.64	13.05
IC 533988	40.73	41.67	2.30	42.70	4.34	4.90	12.90	4.62	15.10	18.92	25.29	17.01
IC 534071	41.59	49.41	18.80	45.50	4.06	4.66	14.77	4.36	13.03	16.13	23.79	14.58
Mean	41.2	44.66			3.87	5.07			13.49	15.23		
CD Value	V	B	V×B		V	V	V×B		V	B	V×B	
	4.16	2.72	7.21	0.21	0.21	0.36			1.02	0.83	NS	

The highest and lowest per cent increase in the number of grains spike^{-1} was observed in case of IC 35061 and IC 533988 respectively. Varieties IC 532300, IC 118768 and IC 138895 showed negative effect at 6 kg level of borax.

100 grains weight

Variety IC 532878 produced the maximum 100 grain weight as compared to others. However, there were minimum differences in hundred grain weight among the varieties after boron application. Lowest grain weight was observed in case of variety IC 35061.

The highest and lowest per cent increase in 100 grain weight was observed in case of IC 532300 and IC 533988 respectively. However, the increase per cent is significantly higher in all other varieties as compared to yield attributing trait.

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