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Effects of boron on germination percentage and morphological parameters of wheat (*Triticum aestivum* L.)

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Abstract
Morphological characters are essential growth parameters that have a direct relationship to plant growth, production, and yield. Boron is a critical micronutrient for seedling vigour, shoot and root growth, and overall plant health. Both boron deficiency and toxicity can reduce the yield of a variety of agricultural plants. The effect of different boron concentrations of 0 (control), 50, 100, 150, and 200 ppm on wheat var. HUW-234 vs. HUW-468 was investigated in this study. Seeds were germinated in a growth chamber at 25°C in Petri plates lined with blotting papers soaked in various concentrations of B. Germination percentage, shoot and root lengths, and fresh and dry weights of shoot and root were all recorded. Increased boron concentrations reduced seed germination percentages; T_2 (100 ppm B) showed better germination in HUW-234 than HUW-468. T0, on the other hand, performed well throughout the board, showing that boron has a reversal effect on seedling germination and development in both wheat varieties. For both wheat varieties, the length of the shoot and root was observed to decrease as the boron content increased.Wheat variety HUW-468 has a higher shoot and root length, fresh and dry weight, total biomass, dry and fresh weight of shoot and root, and shoot and root ratio than wheat variety HUW-234.

Keywords: boron, germination percentage, *Triticum aestivum* L., HUW-234 and HUW-468

Introduction

A variety of factors in nature have a direct or indirect impact on crop production. Water scarcity, mineral imbalances in the soil, and other environmental stresses are also major major obstacles. Micronutrients such as boron, zinc, iron, copper, molybdenum, and chlorine are needed by plants in large amounts (Fageria *et al.*, 2002). Despite low demand, if micronutrients are unavailable, essential plant functions are hampered, resulting in plant deformations, lower yields, and reduced growth. Singh *et al.* (Singh *et al.*, 2004) [24]. Boron is also active in sugar transfer, cell wall synthesis and lignification, cell wall composition, carbohydrate and RNA metabolism, respiration, membrane functions, DNA synthesis, and control of metal activated enzymes (Dordas and Brown 2005). Boron is a microelement that is required for proper crop growth and reproduction tissue development. Boron deficiency and overuse, on the other hand, could have an effect on crop production. Boron is an essential micronutrient that helps pollen germinate and form pollen tubes, resulting in higher yields (Ahmed *et al.*, 2012). It is, though, toxic in large quantities. As boron is an important micronutrient for plant growth and yield (Ali *et al.*, 2012) [3], it is involved in cell wall formation, nitrogen fixation, nucleic acid, membrane stabilisation, sugar transport, carbohydrate metabolism, and Indol Acetic Acid metabolism. Because of both of these functions, boron causes plants to grow taller and produce more (Dake *et al.*, 2011 and Hellal *et al.*, 2009) [8, 11]. Boron improves rice germination, germination percentage, germination energy, and germination time, as well as seedling development, development, and yield (Farooq *et al.*, 2011 and Iqbal *et al.*, 2017) [10, 12]. In most soils, the concentration range between B deficiency and toxicity is small and varies by crop. Both of these factors have a significant impact on seed quality and yield. Agronomically, B toxicity is more difficult to control, but it can be mitigated by planting B-tolerant crop varieties. A typical symptom of B toxicity is the appearance of chlorotic and/or necrotic patches at the edges and tips of older leaves (Princi *et al.*, 2016). Short-term B-excess therapy had a noticeable impact on various root morphological characteristics, according to Princi *et al*. (2013).

Materials and Methods

The present piece of experiment was conducted in Laboratory of Department of Plant Physiology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi in rabi season 2020. Wheat seeds of variety HUW-234 and HUW-468. The treatments were T_0, T_1, T_2, T_3, T_4 representing different concentrations of boron 0 ppm (control), 50 ppm, 100 ppm, 150 ppm, 200 ppm respectively. Healthy, disease free and vigorous seeds were first washed thoroughly with distilled water and placed in the middle of the *Petri* plates with blotting papers coated with different concentration of boron and all the *Petri* plates containing 4 treatments and control one along with their five replications are incubated in growth chamber at 25°C for germination.The per cent germination were measured after 2, 3, 4, 5 and 6 days of germination and at 3, 5, 7, 9 and 11 days after treatment, the following measurements were carried out:

Germination (%), shoot and root length (cm): Number of germinated seeds was recorded daily after sowing of seeds of one day. A seed was considered germinated when visible protrusion of plumule was observed. After 2 days seedlings were harvested. Shoot and root length, fresh and dry weights were recorded for each variety and treatment. After final count, germination percentage (GP) was calculated by the formulae given by Raun *et al.* (2002):

$$GP = \frac{\text{Total number of germinated seeds}}{\text{Total number of seeds tested}} \times 100$$

Wheat seedlings were evaluated as follows: The shoot length of the seedling from the seed to the tip of the first leaf was measured with the help of scale and expressed in centimetres. The root length of the seedling from the seed to the tip of the root was also measured in centimetres.

Both shoots and roots were separated softly; plants were blotted gently with soft paper towel to remove any free surface moisture then immediately weighed to obtain fresh weights of shoots and roots of seedling in each replicate. The fresh weight of seedling shoots and roots were measured with electronic balance and expressed in mg. The weight of seedling shoots and roots were also recorded with electronic balance after oven drying at 70 °C for 48 hrs.

Result and Discussion

Germination percentage showed significant difference was observed between treatments and varieties on all the days of observation (Table 1). It increased progressively with number of days after incubation.

In the wheat variety HUW-468control showed maximum germination percentage was at all the stages of growth followed by $T_4 > T_2 > T_1 > T_3$ treatments on 2nd day, $T_2 > T_4 > T_3 > T_1$ treatments on 3rd day, $T_4 > T_2 > T_1 > T_3$ treatments on 4th day,6th day and $T_2 > T_3 > T_4 > T_1$ on 5th day after incubation. These results observed germination percentage decreased with increasing concentration of boron solution *i.e.*, 50 ppm to 200 ppm. Better results were also observed inunprimed seeds of variety HUW-468. These results are on par with the findings of the beneficial effects of priming with nutrients have been successfully reported by various scientists in various crops (Peeran and Natanasabapathy, 1980; Sherrell, 1984; Wilhelm *et al.*, 1980; Shah *et al.*, 2011; Aboutalebian*et al.*, 2012; Mirshekari*et al.*, 2012; Rehman *et al.*, 2012) [17, 23, 21, 20]. However, deficiency or toxicity of these nutrients may damage seed or restrict germination as reported by Roberts (1948). It may also cause abnormal seedlings as reported by Louzada and Vieira (2005) [14] in bean seeds. They observed mortality of the seedlings in bean seeds due to high applications of micronutrients.

Table 1: Effect of different levels of boron on germination (per cent) of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of germination

Days after treatment	Germination (%) of HUW-234 under different treatments*					Germination (%) of HUW-468 under different treatments*				
	T_0	**T_1**	**T_2**	**T_3**	**T_4**	**T_0**	**T_1**	**T_2**	**T_3**	**T_4**
2	83.33	74.29	85.71	76.47	80.56	84.62	77.50	78.05	75.56	80.49
3	85.29	75.29	86.16	79.43	83.33	85.21	77.78	80.49	80.57	82.93
4	85.71	77.14	88.57	85.71	88.27	87.53	80.36	84.62	83.32	84.21
5	88.10	77.78	91.43	91.35	91.23	89.74	80.56	87.18	85.71	85.37
6	91.18	80.38	94.44	94.29	97.14	92.31	86.11	89.74	88.15	89.47
CD at 5%	4.04	3.17	4.94	10.17	8.77	4.29	4.64	6.40	6.52	4.45
SE (m)±	1.35	1.06	1.65	3.39	2.93	1.43	1.55	2.14	2.18	1.49
C.V.	3.48	3.07	4.13	8.87	7.42	3.64	4.30	5.68	5.89	3.93

*T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

The shoot length of both the wheat varieties (*Triticum aestivum* L.) was measured at 3, 5, 7, 9 and 11 days, respectively. The significant difference was registered between treatments at all stages of observation (Table 2). It increased progressively with increasing in plant age. At all the days of observation, the maximum shoot length was recorded in plants under T_0 treatment followed by $T_1 > T_2 > T_3 > T_4$ treatments.

Table 2: Effect of different levels of boron on shoot length (cm) of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of growth

Days after treatment	Shoot length (cm) of HUW-234 under different treatments*					Shoot length (cm) of HUW-468 under different treatments*				
	T_0	**T_1**	**T_2**	**T_3**	**T_4**	**T_0**	**T_1**	**T_2**	**T_3**	**T_4**
3	2.34	1.61	1.12	0.34	0.25	6.84	3.32	1.06	1.03	0.56
5	3.73	2.73	1.34	0.36	0.27	7.91	3.67	1.27	1.14	0.72
7	4.12	3.15	1.43	0.37	0.29	8.56	3.96	1.53	1.23	0.84
9	5.86	3.72	1.85	0.39	0.34	9.67	4.34	1.79	1.31	0.93
11	7.65	4.24	2.16	0.43	0.38	10.73	4.68	1.98	1.42	1.02
CD at 5%	2.76	1.35	0.56	0.05	0.07	2.03	0.72	0.50	0.20	0.24
SE (m)±	0.92	0.45	0.19	0.02	0.02	0.68	0.24	0.17	0.07	0.08
C.V.	43.35	32.54	26.50	9.05	17.39	17.31	13.43	24.49	12.27	22.14

*T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

Seedling vigor index is important for rapid stand establishment and early growth of the plants as reported by Tabrizian and Osareh (2007) [26]. Mirshekari (2012) [15] observed restricted seedling vigor index of dill when he used boron and iron concentrations beyond 1% and 1.5% respectively. He observed higher SVI at 1% boron solution. However, further SVI increased when boron was used in combination with iron. In present study, SVI was observed higher at the lowest concentration of boron.The significant increase in shoot and root lengths and fresh weight from seeds primed at the lowest concentration of boron may be due to its involvement in cell elongation or cell division and meristematic growth (Bohnsack and Albert 1977; Shelp, 1993; Mouhtaridou*et al*. 2004; Khan *et al*. 2006) [5, 13]. Boron at lowest concentration of 0.001% has been found successful for improved lengths and fresh weights of shoot and root in rice cultivar as reported by Rehman *et al*. (2012) [20]. Our findings are in correlation with these findings.

The root length of both the wheat varieties (*Triticum aestivum* L.) was measured at 3, 5, 7, 9 and 11 days, respectively. The significant difference was registered between treatments at all stages of observation (Table 3). It increased progressively with increasing in plant age. At all the days of observation, the maximum root length was recorded in plants under T_0 treatment followed by T_1> T_2> T_3> T_4 treatments.

Table 3: Effect of different levels of boron on root length (cm) of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of growth

Days after treatment	Root length (cm) of HUW-234under different treatments*					Root length (cm) of HUW-468 under different treatments*				
	T_0	T_1	T_2	T_3	T_4	T_0	T_1	T_2	T_3	T_4
3	3.31	1.26	0.45	0.09	0.07	5.82	1.52	0.23	0.19	0.17
5	3.69	1.82	0.51	0.11	0.09	6.93	1.69	0.27	0.21	0.19
7	4.56	1.94	0.86	0.13	0.11	7.35	1.95	0.29	0.23	0.21
9	5.42	2.32	0.97	0.18	0.12	7.78	2.14	0.32	0.26	0.23
11	6.87	2.53	1.08	0.23	0.14	8.24	2.53	0.36	0.29	0.27
CD at 5%	1.92	0.66	0.38	0.08	0.04	1.24	0.53	0.07	0.05	0.05
SE (m)±	0.64	0.22	0.13	0.03	0.01	0.41	0.18	0.02	0.02	0.02
C.V.	29.97	24.86	36.21	38.34	25.49	12.79	20.09	16.77	16.84	17.98

*T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

The Fresh weight of shoot of both the wheat varieties (*Triticum aestivum* L.) was measured at 3, 5, 7, 9 and 11 days, respectively. The significant difference was registered between treatments at all stages of observation (Table 4). It increased progressively with increasing in plant age. At all the days of observation, the maximum root length was recorded in plants under T_0 treatment followed by T_1> T_2> T_3> T_4 treatments. Increasing levels of boron may decrease the fresh weight of the shoot as reported by Ayvaz *et al*. (2012).

Table 4: Effect of different levels of boron on fresh weight of shoot (mg plant^{-1}) of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of growth

Days after treatment	Fresh weight of shoot (mg plant^{-1}) of HUW-234 under different treatments*					Fresh weight of shoot (mg plant^{-1}) of HUW-468 under different treatments*				
	T_0	T_1	T_2	T_3	T_4	T_0	T_1	T_2	T_3	T_4
3	36.74	17.85	6.72	3.92	1.85	47.69	19.34	7.69	3.66	1.84
5	49.88	19.91	7.41	4.29	2.27	59.79	21.29	7.69	3.80	1.87
7	52.66	21.37	7.70	4.81	2.34	70.37	22.38	7.82	4.08	2.27
9	56.32	23.12	7.87	4.88	2.37	78.23	25.16	9.66	4.27	2.69
11	74.29	24.79	8.29	5.74	2.74	79.70	27.20	9.77	4.93	2.70
CD at 5%	18.16	3.63	0.79	0.92	0.43	18.03	4.19	1.46	0.67	0.56
SE (m)±	6.06	1.21	0.26	0.31	0.14	6.02	1.40	0.49	0.22	0.19
C.V.	25.10	12.64	7.72	14.53	13.81	20.03	13.53	12.75	11.98	18.44

*T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

The Fresh weight of root of both the wheat varieties (*Triticum aestivum* L.) was measured at 3, 5, 7, 9 and 11 days, respectively. The significant difference was registered between treatments at all stages of observation (Table 5). It increased progressively with increasing in plant age. At all the days of observation, the maximum root length was recorded in plants under T_0 treatment followed by T_1> T_2> T_3> T_4 treatments.

Table 5: Effect of different levels of boron on dry weight of shoot (mg plant^{-1}) of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of growth

Days after treatment	Dry weight of shoot (mg plant^{-1}) of HUW-234 under different treatments*					Dry weight of shoot (mg plant^{-1}) of HUW-468 under different treatments*				
	T_0	T_1	T_2	T_3	T_4	T_0	T_1	T_2	T_3	T_4
3	2.86	2.77	1.40	0.68	0.35	4.91	3.25	1.17	0.84	0.37
5	3.76	3.20	1.54	0.75	0.43	6.16	3.58	1.17	0.88	0.38
7	3.97	3.43	1.60	0.84	0.44	7.24	3.77	1.19	0.94	0.46
9	4.25	3.71	1.64	0.85	0.45	8.05	4.23	1.47	0.99	0.54
11	5.61	3.98	1.73	1.00	0.51	8.21	4.58	1.48	1.14	0.54
CD at 5%	1.33	0.63	0.16	0.16	0.08	1.86	0.70	0.22	0.15	0.11
SE (m)±	0.45	0.21	0.06	0.05	0.03	0.62	0.24	0.07	0.05	0.04
C.V.	24.31	13.64	7.72	14.53	13.81	20.03	13.53	12.75	11.98	18.44

*T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

The dry weight of shoot of both the wheat varieties (*Triticum aestivum* L.) was measured at 3, 5, 7, 9 and 11 days, respectively. The significant difference was registered between treatments at all stages of observation (Table 6). It increased progressively with increasing in plant age. At all the days of observation, the maximum root length was recorded in plants under T_0 treatment followed by T_1> T_2> T_3> T_4 treatments.

Table 6: Effect of different levels of boron on dry weight of shoot (mg plant^{-1}) of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of growth

Days after treatment	Fresh weight of root (mg plant^{-1}) of HUW-234 under different treatments*					Fresh weight of root (mg plant^{-1}) of HUW-468 under different treatments*				
	T_0	T_1	T_2	T_3	T_4	T_0	T_1	T_2	T_3	T_4
3	29.68	6.81	4.77	2.11	1.16	43.16	8.64	5.12	3.58	2.08
5	31.79	8.67	5.64	2.38	1.57	53.64	9.58	6.59	4.23	2.11
7	41.37	9.13	5.65	2.62	1.71	69.64	10.09	6.62	4.68	2.57
9	52.34	9.62	6.21	3.18	1.78	74.83	14.17	7.18	5.29	2.69
11	53.23	10.73	6.27	3.19	2.19	79.18	16.18	8.21	5.67	3.18
CD at 5%	14.82	1.93	0.81	0.64	0.50	20.34	4.38	1.50	1.12	0.61
SE (m)±	4.94	0.64	0.27	0.22	0.17	6.79	1.46	0.50	0.37	0.20
C.V.	26.52	16.00	10.55	17.86	22.07	23.68	27.84	16.63	17.77	18.00

T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

The dry weight of root of both the wheat varieties (*Triticum aestivum* L.) was measured at 3, 5, 7, 9 and 11 days, respectively. The significant difference was registered between treatments at all stages of observation (Table 7). It increased progressively with increasing in plant age. At all the days of observation, the maximum root length was recorded in plants under T_0 treatment followed by T_1> T_2> T_3> T_4 treatments.

Table 7: Effect of different levels of boron on dry weight of root (mg plant^{-1}) of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of growth

Days after treatment	Dry weight of root (mg plant^{-1}) of HUW-234 under different treatments*					Dry weight of root (mg plant^{-1}) of HUW-468 under different treatments*				
	T_0	T_1	T_2	T_3	T_4	T_0	T_1	T_2	T_3	T_4
3	3.77	1.44	1.11	0.56	0.28	3.49	1.31	0.78	0.48	0.36
5	4.04	1.83	1.31	0.64	0.38	4.34	1.45	1.00	0.57	0.36
7	5.25	1.92	1.31	0.70	0.42	5.63	1.53	1.01	0.63	0.44
9	6.65	2.03	1.44	0.85	0.44	6.05	2.15	1.09	0.71	0.46
11	6.76	2.26	1.45	0.85	0.54	6.40	2.45	1.25	0.76	0.54
CD at 5%	1.88	0.41	0.19	0.17	0.12	1.65	0.66	0.23	0.15	0.10
SE (m)±	0.63	0.14	0.06	0.06	0.04	0.55	0.22	0.08	0.05	0.04
C.V.	26.52	16.00	10.55	17.86	22.07	23.68	27.84	16.63	17.77	18.00

T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

Shoot: root ratio when expressed on fresh weight basis of both the wheat varieties (*Triticum aestivum* L.) was measured at 3, 5, 7, 9 and 11 days, respectively. The significant difference was registered between treatments at all stages of observation (Table 8). It increased progressively with increasing in plant age. At all the days of observation, the maximum root length was recorded in plants under T_0 treatment followed by T_1> T_2> T_3> T_4 treatments.

Table 8: Effect of different levels of boron on shoot: root ratio expressed on fresh weight basis of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of growth

Days after treatment	Shoot: root ratio on fresh weight basis of HUW-234 under different treatments*					Shoot: root ratio on fresh weight basis of HUW-468 under different treatments*				
	T_0	T_1	T_2	T_3	T_4	T_0	T_1	T_2	T_3	T_4
3	1.24	2.62	1.41	1.86	1.60	1.11	2.24	1.50	1.02	0.89
5	1.57	2.30	1.31	1.80	1.45	1.12	2.22	1.17	0.90	0.89
7	1.27	2.34	1.36	1.84	1.37	1.01	2.22	1.18	0.87	0.88
9	1.08	2.40	1.27	1.54	1.33	1.05	1.78	1.35	0.81	1.00
11	1.40	2.31	1.32	1.80	1.25	1.01	1.68	1.19	0.87	0.85
CD at 5%	0.25	0.18	0.07	0.18	0.18	0.07	0.37	0.19	0.11	0.08
SE (m)±	0.08	0.06	0.02	0.06	0.06	0.02	0.12	0.07	0.04	0.03
C.V.	14.06	5.57	4.02	7.45	9.33	4.85	13.55	11.36	8.86	6.41

T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

Shoot: root ratio when expressed on dry weight basis of both the wheat varieties (*Triticum aestivum* L.) was measured at 3, 5, 7, 9 and 11 days, respectively. The significant difference was registered between treatments at all stages of observation (Table 9). It increased progressively with increasing in plant age. At all the days of observation, the maximum root length was recorded in plants under T0 treatment followed by $T_1 > T_2 > T_3 > T_4$ treatments. The higher doses of micronutrients in soil solution may also slow the establishment of the seedlings as reported by Mershikari (2012).

Table 9: Effect of different levels of boron on shoot: root ratio expressed on fresh weight basis of wheat varieties HUW-234 and HUW-468 (*Triticum aestivum* L.) at different stages of growth

Days after treatment	Shoot: root ratio on dry weight basis of HUW-234 under different treatments*					Shoot: root ratio on dry weight basis of HUW-468 under different treatments*				
	T_0	T_1	T_2	T_3	T_4	T_0	T_1	T_2	T_3	T_4
3	0.74	1.99	1.26	1.21	1.25	1.41	2.48	1.50	1.75	1.03
5	0.93	1.75	1.18	1.17	1.13	1.42	2.47	1.17	1.54	1.06
7	0.76	1.79	1.22	1.20	1.05	1.29	2.46	1.18	1.49	1.05
9	0.64	1.83	1.14	1.00	1.02	1.33	1.97	1.35	1.39	1.17
11	0.83	1.76	1.19	1.18	0.94	1.28	1.87	1.18	1.50	1.00
CD at 5%	0.15	0.13	0.06	0.12	0.16	0.09	0.41	0.20	0.18	0.09
SE (m))±	0.05	0.04	0.02	0.04	0.05	0.03	0.14	0.07	0.06	0.03
C.V.	14.04	5.30	3.85	7.54	10.80	4.82	13.56	11.41	8.57	6.30

T_0: 0 ppm boron, T_1: 50 ppm boron, T_2: 100 ppm boron, T_3: 150 ppm boron, T_4: 200 ppm boron

Conclusion

Boron is a necessary microelement for the growth and production of higher plants, but it is harmful to them when it is present in excess. Germination of wheat variety HUW-234 is better than wheat variety HUW-468. In the present investigation lower doses of boron *i.e.*, at 100ppm showed maximum germination percentage in wheat variety HUW-234. Whereas, other variety HUW-468 showed good germination percentage in control (0 ppm boron). The shoot and root length of wheat varieties (HUW-234 and HUW-468) was recorded increasing trend as per increasing days of germination at 3, 5, 7, 9 and 11 days in all treatment combination T_0, T_1, T_2, T_3 and T_4, respectively. While the shoot and root growth and length were found decrease as per increasing concentration of boron for both varieties of wheat. The percentage of increasing shoot length was observed more in variety HUW-468 than HUW-234 at all treatments. Rest of the parameters showed good response in control compared to mall other treatments in both the varieties. Similar results were observed in the findings of Sujeet *et al*., 2020 in Broccoli, where the lower doses of boron like 10 and 50 ppm positively influenced the yield parameters and yield components in both the varieties under investigation. Madhura shows promising results with respect to all parameters like number of grains, weight of 100 seeds, grain yield, biological yield and harvest index with 50 ppm boron treatment. Similar response was also noticed with c.v. RSSV-9. But higher dose of 100 ppm boron reported to decrease in biological yield in both varieties. (Sujeet*et al*., 2020s). Deficiency or toxicity of boron levels are very narrow in plants (Çelik*et al*., 1998) and may vary from crop to crop.Thus, conclude that Boron has no significant positive effect in seed treatment of wheat varieties such as HUW-234 and HUW-648.

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