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Enhancing Yield and Yield Components of BARI Sarisha-14 and BARI Sarishaa-15 through Boron Fertilization

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Abstract
Boron is an essential micronutrient for mustard that plays important roles in growth, development as well as yield of mustard. A field experiment was conducted at the Agronomy Field Laboratory of Bangladesh during November through January to study the effect of boron fertilizer on the yield of mustard two varieties in T. *aman* rice- Mustard- *Boro* rice cropping pattern. The experiment consisted of two factors- Factor A: Two mustard cultivars viz., BARI Sarisha-14 and BARI Sarisha-15 and Factor B: Four levels of boron viz., 0 kg boron ha^{-1} (control), 0.5 kg boron ha^{-1} (50% of RD), 1.0 kg boron ha^{-1} (100% of RD) and 1.5 kg boron ha^{-1} (150% of RD). The experiment was laid out in a randomized complete block design with three replications. Results reveal that yield and yield contributing characters were not significantly influenced by studied two mustard varieties except plant height. Numerically the higher seed yield was recorded from the variety BARI Sarisha-14. In case of level of boron application, the highest seed yield was obtained with the application of 1.0 kg boron ha^{-1} (100% of RD) which was followed by application of 1.5 kg boron ha^{-1} (150% of RD) and the lowest seed yield of mustard was recorded in control treatment (no boron application). From the interaction, it is observed that BARI Sarisha-14 with 1.0 kg boron ha^{-1} (100% of RD) produced the highest seed yield which was statistically similar with BARI Sarisha-15 with 1.0 kg boron ha^{-1} (100% of RD). From the results of the study, it may be concluded that BARI Sarisha-14 or BARI Sarisha-15 with 1.0 kg boron ha^{-1} (100% of RD) could be cultivated for obtaining highest seed yield of mustard in T. *aman* rice-Mustard-*Boro* rice-based cropping pattern.

Keywords: BARI Sarisha-14, BARI Sarisha-15, Boron, Mustard, Seed Yield

Introduction
Mustard is the principal oilseed crop of Bangladesh, covers about 80% of the total oil seed area (Miah *et al.* 2015) [27]. Its production is 410 thousand metric tons against a total oilseed production of 1034 thousand metric tons annually and its acreages is 817 thousand acres against a total oilseed area of 1236 thousand acres (BBS, 2022) [6]. The average yield of mustard in Bangladesh is very low (1.2 t ha^{-1}) (BBS, 2022) [6] compared to that of other oilseeds growing countries in the world. The reasons of lower yield are lack of good quality mustard seeds, lack of inadequate irrigation water and lack of inadequate adoption of improved production technologies. Bangladesh has witnessed its annual oilseeds output double from over 0.6 million tons in 2009 to over 1.2 million tons in 2022. There has been a big gap between supply and demand of edible oils, which has been met through imports incurring a big amount of foreign exchange every year.
Variety plays an important role in mustard production. Using high yielding varieties (HYVs) can contribute to get optimum yield. There are some HYVs of mustard, which have been released by the Bangladesh Agricultural Research Institute (BARI). The yields of these cultivars range between 1.4 to 2.1 t ha^{-1} (BARI, 2002) [5]. The yield of rapeseed and mustard in Bangladesh has been increased obviously with the introduction of high yielding varieties and improvement of management practices.
Developing new high yielding varieties with a package of production technologies should increase the productivity of oilseed crops. Farmers generally use local variety Tori-7 with their own fertilizer management, which yielded very low. Therefore, the scope to introduce high yielding varieties of mustard like BARI Sarisha-14 and BARI Sarisha-15 with proper fertilizer management can encourage the oilseed production in this area. This will help increase the present yield level of rapeseed and thus will reduce the gap between present production and requirement. Farmers generally apply lower amount of NPK and they

did not use boron fertilizer in mustard. But, Sing (1963) [33] reported that boron increased number of siliqua and yield of mustard. *Brassica* group generally has a high boron requirement (Mengel and Kirkby, 1987) [26]. Micronutrients, such as B, Zn, Mo, and Mg, are crucial for raising the productivity of mustard farming (Halim *et al*. 2023) [11]. The development of seeds, cell division, and the absorption of water are all highly dependent on boron (Keya *et al.* 2023) [19]. As observed by Dutta *et al.* (1984) [8] and Islam and Sarker (1993) [16], boron application markedly increased pod number and seed set. Mehrotra *et al.* (1977) [25] observed a seed yield increase ranging from16-69 % due to boron application. Therefore, a comprehensive study is needed to find out the effect of boron on mustard. The present experiment was undertaken with the following objectives: (i) to find out the effect of varieties on the yield of mustard (ii) to investigate the effect of boron on the yield of mustard and (iii) to determine the interaction effect of variety and boron on the seed yield of mustard.

Materials and Methods

Location of the study area

The experiment was conducted at the Agronomy Field Laboratory of Bangladesh Agricultural University, Mymensingh from November 2023 to January 2024 to evaluate the effect of level of boron on the seed yield of mustard varieties. The experimental site is located at 24°75' N latitude and 90°50' E longitudes at an elevation of 18 m above the mean sea level. The experimental field belongs to the Old Brahmaputra Floodplain (AEZ-9). The region occupies a large area of Brahmaputra sediments which were laid down before the river shifted into its present Jamuna Channel about 200 years ago (UNDP and FAO, 1988) [37]. The soil of experimental site belongs to the Sonatola soil series of non-calcareous dark grey flood plain soil under the Old Brahmaputra Alluvial floodplain. With a pH value of 6.8 and an adequate drainage condition, the soil in the experimental field was nearly neutral in reaction. The climate of the experimental site is under sub-tropical in nature and is characterized by high temperature, high humidity and heavy precipitation with occasional gusty winds during Kharif (April to September) season.

Climate and Weather

The experimental site's climate is classified as sub-tropical and is distinguished by high temperature, high levels of humidity and a lot of precipitation with periodic gusty winds during the Kharif (April to September) season and little precipitation with a moderately low temperature and abundant sunshine during the Rabi season. Humidity remains high, during most part of the year except Rabi season.

Experimental treatments

Two factors included in the experiment which were as follows: Factor A: Variety (2) *viz.*, BARI Sarisha-14 (V_1) and BARI sarisha-15 (V_2), Factor B: Level of boron (4) *viz.*, 0 kg boron ha^{-1} (control) (B_0), 0.5 kg boron ha^{-1} (50% of the recommended dose (B_1), 1.0 kg boron ha^{-1} (100% of the recommended dose (B_2) and iv. 1.5 kg boron ha^{-1} (100% of the recommended dose (B_3).

Design of the experiment

The experiment was laid out in a randomized complete block design with three replications.

Experimental materials

BARI Sarisha-14 and BARI Sarisha-15 were used as the experimental materials. These varieties of mustard are developed by Bangladesh Agricultural Research Institute (BARI), Joydebpur (Gazipur). The salient features of the varieties are mentioned below:

BARI Sarisha-14

BARI Sarisha-14 is a selected high yielding and short duration variety which released in 2006. Plant height is 80-90 cm with 4-5 primary branches plant^{-1}. Each plant contains 80-90 siliqua and each siliqua contains 15-20 seeds. Weight of 1000 seeds is 2.5-8.5g. The colour of seed is yellow. It takes about 75-80 days to mature. Average yield is 1.40-1.60 t ha^{-1}. Seeds contain 50-60% oil.

BARI Sarisha-15

BARI sarisha-15 is a selected high yielding variety and released in 2006. Plant height is 80-90 cm with 4-5 primary branches plant^{-1}. Each plant contains 80-100 siliqua and each siliqua contains 15-20 seeds. Weight of 1000 seeds is 2.5-8.5g. The colour of seed is yellow. It takes about 75-80 days to mature. Average yield is 1.40-1.60 t ha^{-1}. Seeds contain 50-60% oil.

Land preparation

The experimental land was prepared with a tractor driven plough and then ploughed thrice with a power tiller followed by laddering to achieve fine tilth. Field layout was done on 28 October 2015 according to the design adopted. Finally individual plots were prepared by spading. Weeds and stubbles were removed from each plot before sowing.

Fertilizer application

The total amount of urea, triple super phosphate (TSP) and muriate of potash (MoP) at the rate of 230, 140 and 50 kg ha^{-1}, respectively were applied at the time of final land preparation except urea. Boron was applied as per experimental treatments at the time of final land preparation. Urea was applied in three equal splits. First dose of urea fertilizer was applied at the time of final land preparation, second and third doses of urea fertilizer were applied at 20 and 45 days after sowing, respectively.

Seed sowing

Seeds were sown continuously at 25 cm apart rows at the rate of 8 kg ha^{-1} on 29 October 2023.

Intercultural operations

Intercultural operations such as weeding, thinning, irrigation, spraying of insecticides were done uniformly in all plots. Weeding was done at 20 and 45 days after sowing (DAS). One irrigation was applied at 32 days after sowing. The plants were infested with mustard aphid *(Rhopalosiphum erysimi)* and mustard saw-fly *(Atalia lugens)* at early growth stage. The insects were controlled effectively by spraying Sumithion 50 EC @ 1.0 L ha^{-1}.

Harvesting and processing

Mustard plants were harvested from each plot with sickle at full maturity (i.e. when 90% siliqua became brown). Both BARI sarisha-14 and BARI sarisha-15 were harvested on 10 January 2024. The harvested plants were preserved for five days and then brought to the threshing floor and dried for four consecutive days.

Collection of experimental data

Before harvesting five sample plants were randomly selected and uprooted from each unit plot to collect data on different vegetative and yield contributing characters of mustard *viz*., plant height (cm), number of branches plant^{-1}, number of pods plant^{-1}, length of pod (cm), number of seeds pod^{-1}, 1000-seed weight (g), Seed yield (t ha^{-1}) and stover yield (t ha^{-1}).

Statistical analysis of data

The recorded data were complied and tabulated in proper form for statistical analysis. Analysis of variance was done following the Randomized Complete design with the help of computer package M-STAT. The mean differences were compared with Duncan's Multiple Range Test (Gomez and Gomez, 1984) [10].

Results and Discussion

This chapter includes presentation and discussion of the results obtained from the study to see the effect of variety and boron on the yield of mustard.

Effect of variety on yield and yield attributes of mustard

Plant height

Variety exerted significant effect on plant height of mustard (Table 1). The taller plant (93.52 cm) was recorded in variety BARI Sarisha-14. Variation of plant height was occurred due to the genetic makeup of the varieties.This finding coroborrates the finding of Islam *et al.* (2011) [17] who observed the variation in plant height among the tested mustard varieties and found the variation of plant height among the different varieties. Similar variation of plant height among rapeseed/mustard varieties was also reported by many scientists (Hossain *et al*. 1996; Ahmed and Kashem, 2017) [13, 1].

Number of branches plant^{-1}

Number of branches plant^{-1} was not significantly influenced by the two varities used in this study (Table 1). Similar research finding was also reported by Tripathi *et al.* (2021) [36] who reported that variety did not exert any significant effect on number of branches plant^{-1}.

On the contrary, many authors reported that number of branches plant varied significantly varied due to variety (Hossain *et al*. 1996; Laila, 2014; Ahmed and Kashem, 2017) [13, 22, 1].

Number of pods plant^{-1}

Variety did not exert any significant effect on number of pods plant^{-1} (Table 1). Numerically the higher number of pods plant^{-1} was obtained from BARI Sarisha-15 (67.07) and the lower one (64.05) from BARI Sarisha-14. Number of pods plant^{-1} is the result of genetic makeup of the variety (Sana *et al*. 2003) [31], hence the number of pods plant^{-1} did not vary in the present study due similar genetic makeup of the varieties studied. But many authors reported that number of pods plant^{-1} significantly affected by cultivar. Mamun *et al.* (2014) [24] reported that pods plant^{-1} varied significantly due to varieties.

Pod length

Pod length was not significantly varied due to varieties (Table 1) Numerically the longer pod (7.20 cm) was recorded in BARI Sarisha-15 and the shorter one (6.83 cm) was found in the variety BARI Sarisha-14. The probable cause of similarity in pod length might be genetic makeup of the two varieties.

Number of seeds pod^{-1}

Number of seeds pod^{-1} was not significantly affected by variety (Table 8). Numerically higer number of seeds pod^{-1} (23.17) was recorded from the variety BARI Sarisha-15 and lower one (2.92) was observed in the variety BARI Sarisha-14.

1000-seed weight

1000-seed weight is a genetic character and this usually differs from variety to variety. But in this experiment, 1000-seed weight did not vary in between the two varieties (Table 1) due to similarity of seed size of the varieties. Similar research findings were also reported by Yadav *et al*. (2016) [38] who reported that 1000-seed weight did not vary among the tested mustard varieties. The probable cause was due to similarity of the seed size of the tested varieties. On the contrary, Hussain *et al.* (2008) [15], Hossain *et al.* (2012) [12], Alam *et al.* (2014) [2] and Sarker *et al.* (2021) [32] reported that 1000-seed weight differed significantly among the tested varieties. Since 1000-seed weight is a varietal character and it varies variety to variety.

Seed yield

Seed yield of the two varieties did not vary significantly (Table 1). Since yield contributing characters like branches plant^{-1}, pods plant^{-1}, seeds pod^{-1} and 1000-seed weight of the two varieties did not differ, therefore, seed yield did not differ.

Stover yield

Stover yield did not vary between the two tested varieties in this experiment (Table 1), which was due to the similarity in growth and yield attributes of the two mustard varieties.

Table 1: Effect of variety on the performance of mustard

Boron level (kg ha^{-1})	Plant height (cm)	Branches plant^{-1} (no.)	Effective pods plant^{-1} (no.)	Pod length (cm)	Seeds pod^{-1} (no.)	1000-seed weight (g)	Seed yield (t ha^{-1})	Stover yield (t ha^{-1})
BARI Sarisha-14	86.55b*	4.69	64.05	6.83	22.92	2.59	1.367	3.31
BARI Sarisha-15	93.52a	4.04	67.07	7.20	23.17	2.51	1.356	3.40
CV (%)	1.13	18.82	8.24	7.27	8.71	7.48	5.37	4.34
Level of significance	0.01	NS	NS	NS	NS	NS	NS	NS

*In a column figures having common letter(s) do not differ significantly, NS = Not significant

Effect of level of boron on the yield and yield attributes of mustard

Plant height

Plant height was significantly affected by level of boron (Table 2). The tallest plant (9184 cm) was recorded from application of 1.5 kg boron ha^{-1} which was statistically idnetical (91.49 cm) to 1.0 kg boron ha^{-1}. Rana *et al.* (2005) [29], Hussain *et al.* (2008) [15], Hossain *et al.* (2012) [12] and Ara *et al.* (2015) [4] conducted field trials to examine the response of boron on the growth of mustard. They reported that plant height showed significant variations among different boron levels with 1.0 to 1.5 kg ha^{-1} of boron producing the tallest plant. The shortest plant (87.57 cm) was obtained from no boron (0 kg bron ha^{-1}) application.

Number of branches plant^{-1}

Level of boron application exerted significant influence on the number of branches plant^{-1} (Table 3). The highest number of branches plant^{-1} (5.67) was observed with the application 1.0 kg boron ha^{-1} which was statistically similar with that of 0.5 kg boron ha^{-1} and 1.5 kg boron ha^{-1}. Hu *et al.* (1994) [14] and Riaj *et al.* (2018) [30] reported that levels of boron exerted significant influence on number of branches plant^{-1} of mustard. The lowest number of branches plant^{-1} (3.17) was observed with 0 kg boron ha^{-1} (control) treatment.

Number of pods plant^{-1}

Level of boron had significant effect on number of pods plant^{-1} (Table 2). Application of 1.0 kg boron ha^{-1} produced the maximum number of on number of effective pods plant^{-1} (79.44) which was statistically identical (72.75) to 1.5 kg boron ha^{-1}. Similar research findings were also reported by Dutta and Uddin (1983) [9] and Chatterjee *et al.* (1985) [7] who observed increased number of pods plant^{-1} of mustard by increasing rate of boron up to 1.5 kg ha^{-1}.The lowest on number of effective pods plant^{-1} (46.10) was observed with 0 kg kg boron ha^{-1} (control) treatment.

Pod length

Boron level exerted significant effect on pod length (Table 2). The longest pod (8.92 cm) was obseved from the application of 1.0 kg boron ha^{-1} which was statistically idnetical (7.54 cm) with that of 1.5 kg boron ha^{-1}. This findings corroborate the finding of Jana *et al.* (2009) [18] who obtained longest pod by applying 1.5 kg boron ha^{-1}. The shortest pod (4.70 cm) was observed with no boron application (0 kg boron ha^{-1}) treatment.

Seeds pod^{-1}

Boron level had significant effect on the number of seeds pod^{-1} (Table 2). The highest number of seeds pod^{-1} (28.33) was recorded from the application of 1.0 kg boron ha^{-1} which was statistically identical (26.50 to application of 1.5 kg boron ha^{-1}. Islam and Sarker (1993) [16], Yadav *et al.* (2016) [38] and Kour *et al.* (2017) [20] noted favourable effect of boron on seeds pod^{-1} in their study. The lowest number of seeds pod^{-1} (14.80) was observed in 0 kg boron ha^{-1} (control) treatment.

1000-seed weight

1000-seed weight was not significantly influenced by level of boron application (Table 2). This might be due to the fact that 1000-seed weight is a genetic character and it might dffer from varieity to variety but not for boron fertilization. Similr research finding was also reported by Yadav *et al.* (2016) [38] who observed non significant effect of boron on 1000-seed weight.

Seed yield

Seed yield of mustard increased profusely with the inclement of boron level up to 1.0 kg ha^{-1} and beyond that level seed yield declined (Table 2). The highest seed yield (1.50 t ha^{-1}) was produced by the application of 1.0 kg boron ha^{-1} which was significantly higher over boron control by 32.74%. Mollah *et al.* (2005) [28], Yang *et al.* (2009) [39], Singh and Pal (2011) [34], Al-Hilfy *et al.* (2012) [3] and Kumararaja *et al.* (2015) [21] reported that boron application increased seed yield of mustard. The probable causes are with the increment of supply of boron to mustard, their availability, acquisition, mobilization and influx into the plant tissues increased and thus improved yield attributes and finally the seed yield increased. On the other hand, due to severity of boron deficiency restrict the normal flow of hormone resulting pollen tube germination and stigma receptivity sharply declined. The increase in seed yield might be due to significant effect of boron application on yield attributes such as number of pods plant^{-1}, length of pod and number of seeds pod^{-1}. However, the lowest seed yield (1.13 t ha^{-1}) was recorded from control (0 kg boron ha^{-1}). Moreover, from the mean data a positive but quadratic relationship was observed in between the seed yield and boron level (Fig 1). It means that beyond that boron level there might be a risk of losing yield.

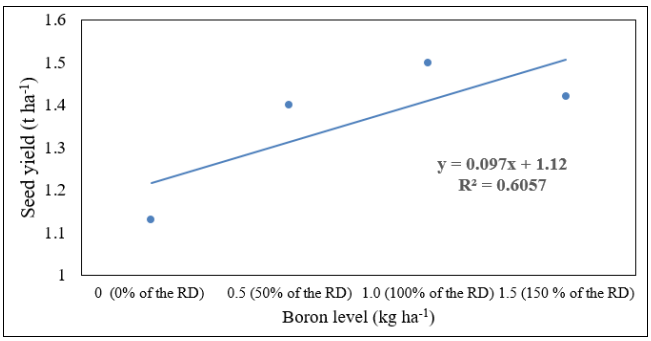

Fig 1: Response of boron level on the seed yield of mustard

Stover yield

Boron level exerted significant effect on stover yield (Table 2). The highest stover yield (3.71 t ha^{-1}) was observed in the application of 1.5 kg boron ha^{-1} which was statistically similar with that of 1.0 kg boron ha^{-1} and 0.5 kg boron ha^{-1}. The result matches with the findings of Sinha *et al.* (1991) [35] and Malewar *et al.* (2001) [23] who observed that stover yield was significantly increased with the increment of boron levels. The lowest stover yield (2.56 t ha^{-1}) was observed in the application of 0 kg boron ha^{-1}.

Table 2: Effect of boron on the yield and yield attributes on mustard

Boron level (kg ha^{-1})	Plant height(cm)	Branches plant^{-1} (no.)	Pods plant^{-1} (no.)	Pod length (cm)	Seeds pod^{-1} (no.)	1000- seed weight (g)	Seed yield (t ha^{-1})	Stover yield (t ha^{-1})	% increase yield over control
0 (0% of the RD)	87.57c*	3.17 b	46.10c	4.70c	14.8c3	2.44	1.13c	2.65b	-
0.5 (50% of the RD)	89.24b	4.64a	63.95b	6.88b	22.50b	2.51	1.40b	3.45a	23.89
1.0 (100% of the RD)	91.49a	5.67a	79.44a	8.92a	28.33a	2.74	1.50a	3.62a	32.74
1.5 (150 of the RD)	91.84a	3.94a	72.75a	7.54a	26.50a	2.53	1.42b	3.71a	25.66
CV (%)	1.13	18.82	8.24	7.27	8.71	7.48	5.37	4.34	4.34
Level of significance	0.01	NS	0.01	0.01	0.01	NS	0.01	0.01	0.01

*In a column figures having common letter(s) do not differ significantly, NS = Not significant

Interaction effect of variety and level of boron on the yield and yield attributes of mustard

Plant height

The interaction of variety and boron showed significant influence on plant height (Table 3). It is observed that variety BARI Sarisha-15 with 1.0 kg boron ha^{-1} produced the tallest plant (95.51 cm) which was statistically similar with that of BARI Sarisha-15 × 1.5 kg boron ha^{-1}. The shortest plant (83.69 cm) was recorded from the variety BARI Sarisha-14 with no boron (0 kg boron ha^{-1}) application. This finding partially corroborates the finding of Hussain *et al.* (2008) [15] who found variation of plant height due to variety boron level.

Number of branches plant^{-1}

Interaction of variety and boron had no significant effect on number of branches plant^{-1} (Table 3). Numerically the highest number of branches plant^{-1} (6.78) was found in the treatment combination of variety BARI sarisha-14 × 1.0 kg boron ha^{-1} and the lowest one (22.92) was recorded in the interaction of BARI Sarisha-15 × 0 kg boron ha^{-1} (control) treatment.

Pods plant^{-1}

Interaction of varity and boron level had significant effect on pods plant^{-1} (Table 3). The highest number (79.96) of effective pods plant^{-1} was produced from the interaction of variety BARI Sarisha-14× 1.0 kg boron ha^{-1} which was statistically identical (78.93) to BARI Sarisha-15 × 1.0 kg boron ha^{-1}.

Pod length

Interaction of variety and boron level exerted significant effect on pod length (Table 3). Interaction of variety BARI Sarisha-14 × 1.0 kg boron ha^{-1} produced the longest pod (8.92 cm) which was statistically identical (8.88 cm) to that of variety BARI Sarisha-15 × 1.0 kg boron ha^{-1}. The shortest pod (4.22 cm) was obtained from the inteaction of variety BARI Sarisha-14 × 0 kg boron ha^{-1} (control) treatment.

Seeds pod^{-1}

Seeds pod^{-1} was significantly influenced by the interaction of variety and level of boron (Table 3). The highest number of seeds pod^{-1} (28.67) was found in the BARI Sarisha-14 with 1.0 kg boron ha^{-1} which was statistically similar (28.00) with that of variety BARI Sarisha-1 × 1.0 kg boron ha^{-1}. The lowest number of seeds pod^{-1} (14.67) was found in the variety BARI Sarisha-14 with 0 kg boron ha^{-1} (control) treatment. Similar research finding was also reported by Hossain *et al.* (2012) [12] who found the highest number of seeds pod^{-1} with the variety BARI Sarisha-8 and 1.0 kg boron ha^{-1}.

1000-seed weight

Interaction of mustard variety and level of boron dd not exert significant effect on 1000-seed weight (Table 3). Numerically the highest 1000-seed weight (2.76 g) was recorded in the variety BARI Sarisha-15 with 1.0 kg boron ha^{-1} and the litghtest 1000-seed weight (2.37 g) was obtained in the variety BARI Sarisha-15 with 1.5 kg boron ha^{-1} (150% of the recommedned dose).

Seed yield

The interaction effect of variety and level of boron for seed yield was found significant (Table 3). The highest seed yield was (1.53 t ha^{-1}) was found in the variety BARI Sarisha-14 with application of 1.0 kg boron ha^{-1} which was statistically similar with BARI Sarisha-15 × application of 1.0 kg boron ha^{-1}, BARI Sarisha-14 × application of 0.5 kg boron ha^{-1} and BARI Sarisha-15 × application of 1.5 kg boron ha^{-1}. Similar research finding was aslo reported by Hussain *et al.* (2008) [15] who found the highest seed yield of mustard in the variety BARI Sarisha-11 with 1.0 kg boron ha^{-1}.

Stover yield

The interaction effect of variety and level of boron had no significant effect on stover yield (Table 3). Numerically the highest stover yield (3.78 t ha^{-1}) was found in the treatment combination of variety BARI Sarisha-14 × application 1.5 kg boron ha^{-1}. The lowest stover yield (2.56 t ha^{-1}) was found in the variety BARI Sarisha-14 × application of 0 kg boron ha^{-1}.

Table 3: Effect of variety and boron fertilization on the yield and yield attributes of mustard

Variety × boron level	Plant height (cm)	Branches plant^{-1} (no.)	Effective pods plant^{-1} (no.)	Pod length (cm)	Seeds pod^{-1} (no.)	1000-seed weight (g)	Seed yield (t ha^{-1})	Stover yield (t ha^{-1})
V_1B_0	83.69e*	3.42	45.07	4.22d	14.67d	2.47	1.12c	2.56
V_1B_1	85.89d	4.44	58.49c	6.79b	22.00c	2.50	1.44ab	3.37
V_1B_2	87.48cd	6.78	79.96a	8.95a	28.67a	2.71	1.53a	3.52
V_1B_3	89.13c	4.03	72.75b	7.37b	26.33ab	2.69	1.39ab	3.78
V_2B_0	91.44b	2.92	47.20c	5.19c	15.00d	2.41	1.15c	2.75
V_2B_1	92.59b	4.84	69.41b	6.97b	23.00bc	2.52	1.35b	3.53
V_2B_2	95.51a	4.55	78.93a	8.88a	28.00a	2.76	1.48ab	3.71
V_2B_3	94.55 a	3.85	72.75	7.73b	26.67ab	2.37	1.44ab	3.63
CV (%)	1.13	1882	8.24	7.27	8.71	7.48	5.37	4.34
Level of sig.		NS	0.05	0.05		NS	0.05	NS

*In a column figures having common letter(s) do not differ significantly, NS = Not significant, V_1 = BARI sarisha-14, V_2 = BARI sarisha-15 B_0 = 0 kg boron ha^{-1}, B_1 = 0.5 kg boron ha^{-1}, B_2 = 1.0 kg boron ha^{-1} and B_3 = 1.5 kg boron ha^{-1}

Conclusion

The findings of present research suggest that boron fertilizer plays an important role in enhancing the yield of mustard varieties. From the results of the study, it is observed that any of the variety BARI Sarisha-14 or BARI Sarisha-15 with 1.0 kg boron ha^{-1} may be recommended for obtaining higher seed yield for short duration mustard cultivation.

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Conflict of interest

The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Authors' contribution

Md. Abdus Salam designed, supervised the experiment and wrote the manuscript. Kazi Ashika Mahmuda Onna performed the field experiment and collected data, Suriaya Perveen reviewed the manuscript. All authors have read and approved the final manuscript.

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