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Research Article

Response of Boron and Light on Morph-Physiology and Pod Yield of Two Peanut Varieties

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Boron is an important micronutrient that enhances vegetative growth and yield of crops, like peanut. Light also plays an important role in pegging of peanut. There has been little information regarding the application of boron and light in peanut in Bangladesh. Therefore, a field experiment was conducted to study the response of boron and light on morph-physiology and pod yield of two peanut varieties. Treatments considered two peanut varieties, *namely*, Dhaka-1 and BARI Chinabadam-8, three levels of boron (B), *namely*, 0-kg B ha^{-1} (B_0), 1-kg B ha^{-1} (B_1), and 2-kg B ha^{-1} (B_2), and two levels of light, *namely*, normal day light (≈12 h light) and normal day light + 6 h extended red light at night (≈18 h light). Result revealed that days to first-last emergence and days to first-50% flowering took shorter times and vegetative growth, pods dry weight $plant^{-1}$, pod yield, and germination were markedly increased with the application of boron. Vegetative growth and germinations were significantly increased in light, but the lowest leaf area, pods dry weight $plant^{-1}$, and pod yield were found in light. Without germination, the highest vegetative growth, reproductive unit, and pod yield were observed from BARI Chinabadam-8. Days to first-last emergence, days to first-50% flowering, and number of branches $plant^{-1}$ were found linearly related to pod yield.

1. Introduction

Peanut (*Arachis hypogaea* L.) is one of the most important oil seed crops throughout the world [1]. Boron (B) is a micronutrients required by plants in a very small quantity [2] which are rapidly becoming deficient in soils [3]. Boron is an essential element needed for normal growth and development of peanut plant [4–7]. Boron makes the stigma receptive and sticky, makes pollen grain fertile, and enhances the pollination [8]. It regulates carbohydrate metabolism and plays role in seed formation [9]. Application of boron in soil significantly increases the growth and yield of groundnut [10, 11]. But boron deficiency problems for crop production have been identified [12] because application of boron in crops is limited at farmer's field [13]. To overcome this problem and to specify the optimum doses of boron in peanuts a little bit of research has been found. So, more research is needed regarding on application of boron at farmer's fields in Bangladesh. Therefore, it is important to study the effect of boron on morph-physiology and pod yield of peanut.

Light plays an important role in the vegetative and reproductive growth in peanut. The quantity, quality, and direction of light are perceived by several different photosensory systems that together regulate nearly all stages of plant development, presumably in order to maintain photosynthetic efficiency [14]. However, the number of flowers markedly reduces if less light is received by the peanut plants [15]. Total numbers of pegs and pods and therefore yield are lower in long day photoperiods, but vegetative production is higher in long day photoperiod [16, 17]. In peanut, for light supplementation, peg to pod conversation rate and yield are lower [18], but light stress can lead to ROS (Reactive Oxygen Species) accumulation and antioxidant enzymes activation in plant [19]. Little or no research studies were conducted in Bangladesh to find out the impact of light on peanut. Therefore, the present studies were conducted to find out the effect of boron

Table 1: (a) Soil test results of the experimental filed (mean of two years). (b) Monthly record of air temperature, relative humidity, and rainfall of the experimental site during the period of March to July 2014 and 2015 (mean of two years).

(a)

Element	*Levels in the soil plot
pH	5.9
Total nitrogen	0.071%
Exchangeable K	0.31 meq/100 g soil
Exchangeable Ca	6.36 meq/100 g soil
Exchangeable P	14.04 μg/g soil
Exchangeable S	15.16 μg/g soil
B	0.30 μg/g soil
Sand	27%
Silt	43%
Clay	30%
Organic matter	0.78%

*Soil was tested at Soil Resource Development Institute (SRDI) Laboratory, Farmgate, Dhaka, Bangladesh.

(b)

Month	Air temperature (°C)		Relative humidity (%)		Rainfall (mm) (total)
	Maximum	Minimum	Maximum	Minimum	
March	37.4	20.2	80.2	32.4	3.80
April	39.4	19.4	80.2	39.2	65.60
May	38.2	19.3	89.2	40	202
June	37.2	17.4	88.4	46.3	282.7
July	35.6	18.2	88.2	55.4	107.8

Source. Sher-e-Bangla Agricultural University mini weather station, Dhaka 1207, Bangladesh.

and duration of light on morph-physiology and pod yield of peanut.

2. Materials and Methods

2.1. Experimental Site. The experiment was conducted at the Central Experimental Farm, Sher-e-Bangla Agricultural University, Dhaka 1207, Bangladesh, during March to July 2014, and the same experiment was conducted during Mach to July 2015 in the same plot. Soil of the experimental field was analyzed before the studies were conducted and means of two years were recorded (Table 1(a)). The experimental filed was located at 23°41′N latitude and 90°22′E longitude at a height of 8.6 m above the sea level belonging to the agroecological zone "AEZ-28" of Madhupur Tract [20]. The environmental factor, that is, mean air temperature, relative humidity, and rainfall in 2014 and 2015 of the experimental site, was also recorded (Table 1(b)).

2.2. Methods of Soil Nutrient Elements and Particle Size Analysis

2.2.1. pH. pH was determined by Jenway 3570 pH meter using soil and water ratio 1 : 2.5.

2.2.2. Total Nitrogen. Micro Kjeldahl method was used for determining total nitrogen.

2.2.3. Exchangeable Potassium and Calcium. For these two elements soil extraction was made by using 1 M ammonium acetate solution and K; Ca was measured directly from the soil extract in the flame photometer.

2.2.4. Exchangeable Phosphorous. Phosphorous was extracted with 0.3 M NH_4F according to Bray and Kurtz method.

2.2.5. Exchangeable Sulphur. Sulphur was determined turbid metrically using acid seed solution and turbid metric reagent with soil filtrate. Reading was taken on Perkin Elmer Lambda 11 (2.2) UV/VIS Spectrometer at 535 nm.

2.2.6. Boron. Extraction of boron was made by using 0.01 M $CaCl_2$. The extract was then processed with buffer solution and azomethine-H reagent. The concentration of boron was measured in spectrophotometer.

2.2.7. Sand, Silt, and Clay. Hydrometer method was used to analyze the percentage of sand, silt, and clay.

2.2.8. Organic Matter. Total organic carbon was determined with LECO-C-200 carbon analyzer. Organic matter content of individual soil sample was determined by multiplying the presence of carbon by the factor 1.724.

Table 2: Effect of boron and light on days to emergence and days to flowering in two peanut varieties (mean of two trials).

Treatment	Days to 1st emergence	Days to last emergence	Days to 1st flowering	Days to 50% flowering
Boron (B)				
B_0	7.83^{a^z}	17.83^a	28.91^a	34.83^a
B_1	7.42^b	17.42^a	28.75^a	33.83^b
B_2	6.75^c	16.50^b	27.75^c	32.58^c
Light (L)				
L	—	—	—	—
L_0	—	—	—	—
Variety (V)				
V_1	7.72^a	16.89^b	28.83	34.11
V_2	6.94^b	17.61^a	28.11	33.39
Significance (*P*)				
B	<0.001	<0.001	<0.001	<0.001
L	—	—	—	—
V	<0.001	<0.001	<0.001	<0.001

B = boron; L = light; V = variety; ^{z}means, column having the same letter(s) are insignificant and different letter(s) statistically significant, P = probability. Means were separated by Tukey's test at $P \leq 0.05$, $B_0 = 0\,kg\,B\,ha^{-1}$ (control), $B_1 = 1\,kg\,B\,ha^{-1}$, $B_2 = 2\,kg\,B\,ha^{-1}$, L = normal day light + 6 h extended red light at night (≈18 h light), L_0 = normal day light (≈12 h light), V_1 = Dhaka-1, and V_2 = BARI Chinabadam-8.

2.3. Plant Material and Treatments. Two peanut varieties were used in this experiment, *namely*, Dhaka-1 (Maizchar Badam) and BARI Chinabadam-8. The seeds of the groundnuts were collected from Bangladesh Agricultural Research Institute (BARI), Gazipur, Bangladesh. The experiment was laid out in a 2 × 3 × 2 factorial design with three replications. The experimental unit was $4\,m^2$ (2 m × 2 m) plot. The first factor was the two peanut varieties, *namely*, Dhaka-1 (V_1) and BARI Chinabadam-8 (V_2); second factor was the three levels of boron, *namely*, $0\,kg\,B\,ha^{-1}$ (B_0), $1\,kg\,B\,ha^{-1}$ (B_1), and $2\,kg\,B\,ha^{-1}$ (B_2) and third factor was duration of light, that is, normal day light (≈12 h light) (L_0) and normal day light + 6 h extended red light at night (≈18 h light) (L). In both years, to extend the photoperiod, one month after seed sowing (after seedling emergence), artificial lightening was used by florescence bulb from 1800 h to 2400 h at 30–50,000 lux, measured by lux meter.

2.4. Field Preparation and Data Recorded. The recommended doses of organic manure and inorganic fertilizer were also used for the present experiment. Cow dung, urea, triple superphosphate, muriate of potash, gypsum, and zinc sulphate were applied at $10\,t\,ha^{-1}$, $25\,kg\,ha^{-1}$, $160\,kg\,ha^{-1}$, $75\,kg\,ha^{-1}$, $170\,kg\,ha^{-1}$, and $4\,kg\,ha^{-1}$, respectively. The crop was harvested at maturity stage (114 days after planting (DAP) for 1st EXPT and 120 days after planting for 2nd EXPT); in the meantime randomly three plants of each plots were uprooted and different reproductive data were recorded at 60 DAP and 90 DAP and at harvest.

2.5. Data Analysis. Data recorded in 2014 and 2015 cropping seasons were mean together on account of nonsignificant interaction between year and treatment. Mean data of two trials, days to 1st and last emergence, days to 1st and 50% flowering, plant height, number of branches $plant^{-1}$, shoot dry weight, leaf area, pods dry weight $plant^{-1}$, and pod yield were analyzed using SPSS (version 20.0) and the means were separated using Tukey's test at $P \leq 0.05$. Pearson correlation was also analyzed using statistical computer software SPSS (version 20.0).

3. Results and Discussion

3.1. Days to Emergence. Boron had a significant impact on days to groundnut seed emergence. From the three levels of boron, when B was applied at $2\,kg\,ha^{-1}$, seed took shorter times for days to 1st and last emergence in both the varieties compared to that of control (Table 2). BARI Chinabadam-8 took shorter time to first emergence, but in case of last emergence Dhaka-1 took shorter times. This might be due to the application of boron because boron is the important micronutrient that helps to facilate early germination and faster growth of the hypocotyl [21]. Rerkasem [22] reported that low boron is responsible for poor seed germination and/or seedling establishment in peanut.

In both studies, the extended light was used after 30 days of seed sowing and the effect of light on days to seed emergence could not be observed.

3.2. Days to Flowering. The application of boron at $2\,kg\,ha^{-1}$ facilitated 2 days early of 1st flowering and 3 days early of 50% flowering (Table 2). Result revealed that the application of B at $2\,kg\,ha^{-1}$, $1\,kg\,ha^{-1}$ and control had a significant variation of days to flowering because application of B had pronounced influence on flowering [23]. Singh et al. [23] reported that B application caused 2-3 days of early flowering. There was an evidence that application of boron reduced days to 50% flowering by 4-5 days over control in peanut [24].

Though light treatment showed 1 day early of flowering (50% flowering), in spite of light treatment, we could not

Table 3: Effect of boron and light on plant height and number of branches plant^{-1} in two peanut varieties (mean of two trials).

Treatment	Plant height at 30 DAP	Plant height at 60 DAP	Plant height at 90 DAP	Plant height at harvest	Number of branches plant^{-1} at 30 DAP	Number of branches plant^{-1} at 60 DAP	Number of branches plant^{-1} at 90 DAP	Number of branches plant^{-1} at harvest
Boron (B)								
B_0	14.10^{az}	41.48^{c}	81.22^{c}	95.17^{c}	1.57^{b}	8.36^{c}	7.56^{b}	7.42^{b}
B_1	13.71^{ab}	42.64^{b}	84.30^{b}	99.87^{b}	1.79^{b}	9.06^{b}	7.86^{b}	7.95^{ab}
B_2	13.23^{b}	43.78^{a}	88.02^{a}	103.49^{a}	2.08^{a}	10.39^{a}	8.75^{a}	8.61^{a}
Light (L)								
L	—	46.63	90.79	109.08	—	9.91	8.39	8.54
L_0	—	38.64	78.24	89.84	—	8.63	7.72	7.44
Variety (V)								
V_1	14.48	44.74	86.86	102.90	1.40	8.78	7.54	7.06
V_2	12.88	40.53	82.17	96.12	2.22	9.76	8.57	8.93
Significance (*P*)								
B	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002
L	—	<0.001	<0.001	<0.001	—	<0.001	0.010	<0.001
V	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

DAP = day after planting, B = boron; L = light; V = variety; ^{z}means, columns having the same letter(s) are insignificant and different letter(s) statistically significant, *P* = probability. Means were separated by Tukey's test at $P \leq 0.05$, B_0 = 0 kg B ha^{-1} (control), B_1 = 1 kg B ha^{-1}, B_2 = 2 kg B ha^{-1}, L = normal day light + 6 h extended red light at night (≈18 h light), L_0 = normal day light (≈12 h light), V_1 = Dhaka-1, and V_2 = BARI Chinabadam-8.

report any findings because light treatment was imposed after 30 days of seed sowing.

3.3. Plant Height. Plant height increased significantly with the application of boron at all the sampling dates except 30 DAP. At 30 DAP control produced highest plant height; this might be due to slow release of available form of boron from boric acid and probably environmental factor was involved to get highest plant height from control treatment. In the rest of sampling dates boron at 2 kg ha^{-1} showed the best result for both of the varieties compared to control treatment, but Dhaka-1 showed the best result over BARI Chinabadam-8 (Table 2). This might be due to the fact that boron helped in cell elongation and meristematic tissue development in plant [25]. It was reported that plant height increased with the application of boron in peanut [10].

The significant increasing trend of plant height was also obtained from light treatment for both of the varieties. Artificial light showed the highest plant height than control (Table 2). Light had a positive effect on cell development and plant growth rate significantly influenced by light in peanut [26]. Wynne and Emery [27] stated that long day photoperiod produced taller plant than the short day photoperiod.

3.4. Number of Branches Plant^{-1}. The effect of boron on the number of branches plant^{-1} was significantly higher for both varieties. The highest number of branches plant^{-1} was obtained from 2 kg B ha^{-1} compared to 1 kg B ha^{-1} and control (Table 3). The increasing trend of number of branches plant^{-1} is due to the fact that B helped in side branching and it also promoted the vegetative growth of peanut [11]. The similar result was reported that number of branches plant^{-1} increased with application of boron in peanut [10, 28].

Light had a positive effect on number of branches plant^{-1}. Additional light helped to increase the number of branches plant^{-1} in peanut (Table 3). This might be due to the fact that light helped in cell elongation and cell development and plays crucial role in increasing the vegetative growth in peanut [18]. Wynne and Emery [27] have also reported that vegetative growth increased in long day treatment.

3.5. Shoot Dry Weight Plant^{-1}. With the increase of dose of boron, a significant increment in shoot dry weight plant^{-1} was observed from the present study. Maximum shoot dry weight was recorded from B at 2 kg ha^{-1} and BARI Chinabadam-8 showed the best result over the Dhaka-1 variety (Table 4). Boron had a positive effect on vegetative growth as like plant height and number of branches. And as a result shoot dry weight might be increased due to the application of boron in peanut plant [10]. Harris and Brolman [5] also reported that shoot dry weight increased with the application of boron in peanut.

With the supplementation of artificial light, shoot dry weight markedly increased and the highest shoot dry weight was recorded from light treatment (Table 4). The reason behind the result might be due to the fact that extended photoperiod helped in increasing the vegetative growth [29]. Since vegetative growth was higher in light treatment, shoot dry weight might also increase for supplementation of light. The present finding is consistent with the finding of Nigam et al. [18].

Table 4: Effect of boron and light on shoot dry weight and leaf area in two peanut varieties (mean of two trials).

Treatment	Shoot dry weight at 30 DAP	Shoot dry weight at 60 DAP	Shoot dry weight at 90 DAP	Shoot dry weight at harvest	Leaf area at 30 DAP	Leaf area at 60 DAP	Leaf area at 90 DAP	Leaf area at harvest
Boron (B)								
B_0	1.57^{bz}	27.73^{c}	86.92^{c}	110.33^{c}	24.41^{c}	125.69^{c}	127.16^{c}	98.94^{c}
B_1	1.79^{b}	33.31^{b}	113.42^{b}	135.42^{b}	33.84^{a}	144.02^{a}	141.87^{a}	106.32^{a}
B_2	2.08^{a}	38.84^{a}	130.42^{a}	148.08^{a}	30.47^{b}	129.60^{b}	134.59^{b}	103.02^{b}
Light (L)								
L	—	36.68	118.83	136.61	—	129.16	131.10	101.69
L_0	—	29.91	101.67	125.94	—	137.04	137.98	103.83
Variety (V)								
V_1	1.40	28.26	100.61	98.83	28.53	118.44	124.50	99.00
V_2	2.22	38.33	119.89	163.72	30.62	147.77	144.59	106.52
Significance (*P*)								
B	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
L	—	<0.001	<0.001	<0.001	—	<0.001	<0.001	<0.001
V	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

DAP = day after planting, B = boron; L = light; V = variety; ^{z}means, columns having the same letter(s) are insignificant and different letter(s) are statistically significant, P = probability. Means were separated by Tukey's test at $P \leq 0.05$, $B_0 = 0$ kg B ha^{-1} (control), $B_1 = 1$ kg B ha^{-1}, $B_2 = 2$ kg B ha^{-1}, L = normal day light + 6 h extended red light at night (≈18 h light), L_0 = normal day light (≈12 h light), V_1 = Dhaka-1, and V_2 = BARI Chinabadam-8.

3.6. Leaf Area Plant^{-1}. Leaf area increased with the application of boron in case of both varieties. Leaf area significantly increased for B at 1 kg ha^{-1} and the lowest was found from control (Table 4); probably in boron deficiency soil, supplementation of boron helped in the leaf expansion of peanut [30]. Kabir et al. [10] also reported that the leaf area increased with the application of boron.

Leaf area of both varieties increased gradually with the advancement of growth stage that was up to 90 DAP and then decreased at harvest. This might be due to the fact that vegetative growth was highest up to 90 DAP and then photosynthates diverted to pod development because we found highest pod dry weight at harvest. Data (Table 4) showed that leaf area was significantly lower in light treatment compared to control. The lowest leaf area was observed from light treatment and this result is not supported by the report of Nigam et al. [18]. Imposition of light did not increase the leaf area; probably photosynthates increased leaf thickness instead of leaf area. In this study leaf thickness was not monitored.

3.7. Pod Dry Weight Plant^{-1}. Pod dry weight plant^{-1} was adversely affected in control and with the application of varying levels of boron in peanut a significant increment in pod dry weight plant^{-1} was found. Result showed that 2 kg B ha^{-1} produced the highest value of pod dry weight plant^{-1} compared to that of control and BARI Chinabadam-8 produced maximum pod dry weight (Table 5) because B helped in flowering, pod retaining and increased pod weight [31]. The present finding agreed with the findings of Quamruzzaman et al. [32] and Chitdeshwari and Poongothai [33].

Lowest pod dry weight was recorded in the light treatment for both varieties (Table 5). Extended photoperiod had limited impact on reproductive growth as per Bagnall and King [16]. Quamruzzaman et al. [32] stated similar findings.

3.8. Pod Yield. Significant pod yield variations were observed from the varying boron levels and maximum yield was recorded from B at 2 kg ha^{-1} whereas BARI Chinabadam-8 gave best result as compared with Dhaka-1 (Table 5). Boron had a positive effect on the reproductive development of peanut and significantly increased the pod yield [34]. Naiknaware et al. [35] reported that application of boron increased the number of pegs and pods and finally it helped to get the maximum pod yield of peanut.

Light plays a vital role in pod yield of peanut. In case of imposition of artificial light, pod yield was decreased (Table 5). This might be due to the fact that extended photoperiod limits the reproductive development of groundnut [29]. The present finding is consistent with the findings of Ansari et al. [31] and Wynne and Emery [27].

3.9. Germination Percentage. After harvesting seeds were stored in normal store condition and after 3 months the germination percentage was checked for both of studies.

Germination percentage showed significant variation due to different levels of boron application (Figure 1). Data revealed that 2 kg B ha^{-1} showed the highest germination percentage (90.67%) and control showed the lowest germination percentage (82.00%) for both varieties. Boron is responsible for vigorous seedling [22]. The present finding is consistent with the findings of Gupta and Solanki [36].

Table 5: Effect of boron and light on pod dry weight $plant^{-1}$ and pod yield in two peanut varieties (mean of two trials).

Treatment	Pod dry weight $plant^{-1}$ at (g) 60 DAP	Pod dry weight $plant^{-1}$ at (g) 90 DAP	Pod dry weight $plant^{-1}$ at (g) Harvest	Pod yield (t/ha)
Boron (B)				
B_0	1.97^{cz}	19.17^{c}	35.00^{c}	1.63^{c}
B_1	2.36^{b}	27.42^{b}	49.58^{b}	1.83^{b}
B_2	3.58^{a}	33.42^{a}	54.09^{a}	2.16^{a}
Light (L)				
L	3.18	28.44	48.05	1.74
L_0	2.10	24.89	44.39	2.02
Variety (V)				
V_1	0.81	20.39	43.06	1.65
V_2	4.47	32.94	49.39	2.10
Significance (*P*)				
B	<0.001	<0.001	<0.001	<0.001
L	<0.001	<0.001	<0.001	<0.001
V	<0.001	<0.001	<0.001	<0.001

DAP = day after planting, B = boron; L = light; V = variety; [z]means, columns having the same letter(s) are insignificant and different letter(s) statistically significant, *P* = probability. Means were separated by Tukey's test at $P \leq 0.05$, $B_0 = 0$ kg B ha^{-1} (control), $B_1 = 1$ kg B ha^{-1}, $B_2 = 2$ kg B ha^{-1}, L = normal day light + 6 h extended red light at night (≈18 h light), L_0 = normal day light (≈12 h light), V_1 = Dhaka-1, and V_2 = BARI Chinabadam-8.

Table 6: Pearson correlation coefficient (*r*) among the days to emergence, days to flowering, and pod yield of peanut (mean of two trials).

		Days to emergence 1st	Days to emergence Last	Days to flowering 1st	Days to flowering 50%	Number of branches at 30 DAP	Number of branches at 60 DAP	Number of branches at 90 DAP	Number of branches at HV	Pod yield (t/ha)
Days to emergence	1st	1								
	Last	0.037	1							
Days to flowering	1st	0.224	−0.127	1						
	50%	0.120	−0.242	0.644^{**}	1					
Number of branches at	30 DAP	−0.273	0.298	-0.684^{**}	-0.600^{**}	1				
	60 DAP	-0.380^{*}	−0.001	-0.564^{**}	-0.667^{**}	0.603^{**}	1			
	90 DAP	−0.289	0.075	-0.671^{**}	-0.635^{**}	0.662^{**}	0.652^{**}	1		
	HV	−0.190	0.226	-0.609^{**}	-0.627^{**}	0.834^{**}	0.666^{**}	0.609^{**}	1	
Yield (t/ha)		−0.317	0.601^{**}	-0.570^{**}	-0.520^{**}	0.670^{**}	0.280	0.423^{*}	0.505^{**}	1

Notes. DAP = days after planting; HV = harvesting.
$^{*}P < 0.05$ and $^{**}P < 0.01$ (means were separated by Tukey's test).

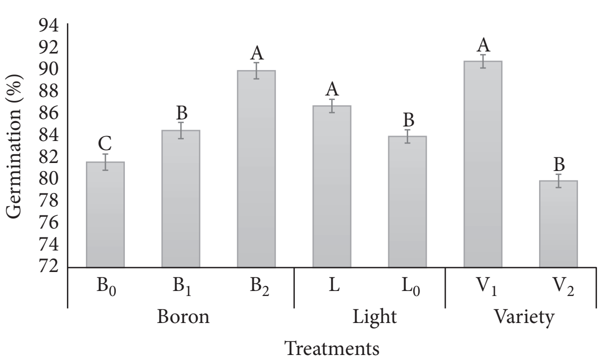

Figure 1: Effect of boron and light on germination percentage of two peanut varieties (mean of two trials). B = boron; L = light; V = variety; $B_0 = 0$ kg B ha^{-1}, $B_1 = 1$ kg B ha^{-1}, $B_2 = 2$ kg B ha^{-1}, L = normal day light + 6 h extended red light at night (≈18 h light), L_0 = normal day light (≈12 h light), V_1 = Dhaka-1, and V_2 = BARI Chinabadam-8. Means were separated by Tukey's test at $P \leq 0.05$. Vertical bars represent the standard error of the means. A, B, and C are statistically significant among the treatment means.

Germination percentage of peanut showed statistically significant variations with the imposition of light for both varieties. It was observed that light treatment showed highest germination percentage (87.33%) compared to control treatment (84.44%) (Figure 1). Little or no information is available regarding this finding. This might be due to the fact that crop cultivated under artificial light helped to get viable seed as well as vigorous seedling.

3.10. Coefficient of Determination. Some significant correlation among days to 1st emergence, days to 1st and 50% flowering, number of branches $plant^{-1}$ at 30 DAP, 60 DAP, and 90 DAP and at harvest was found out. Correlation of coefficient (Table 6) and coefficient of determination showed that with decrease of days to 1st emergence, 1st flowering, and 50% flowering, the pod yield of peanut was increased. On the contrary, with the increase in number of branches $plant^{-1}$ at all the sampling dates, the pod yield of peanut was increased (Figures 2–5).

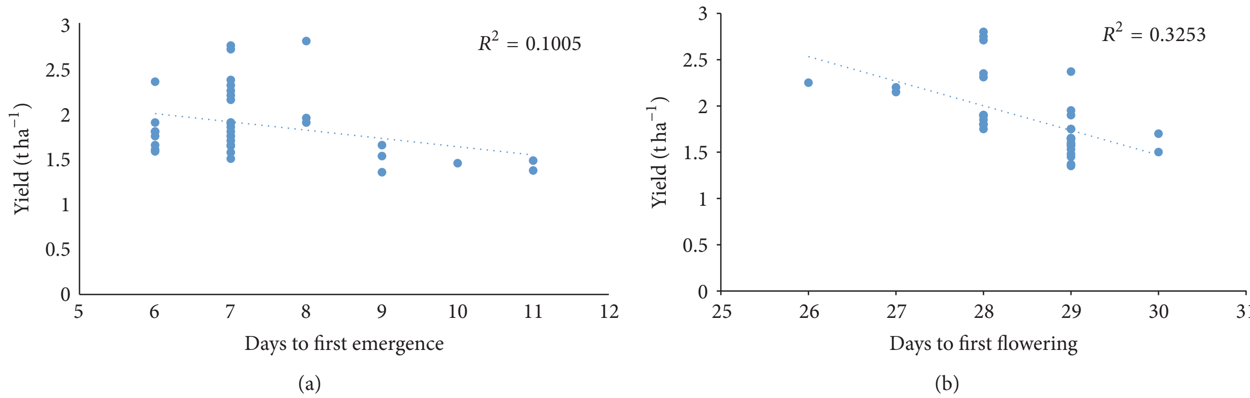

FIGURE 2: Relationship between days to first emergence and first flowering on yield of peanut (mean of two trials).

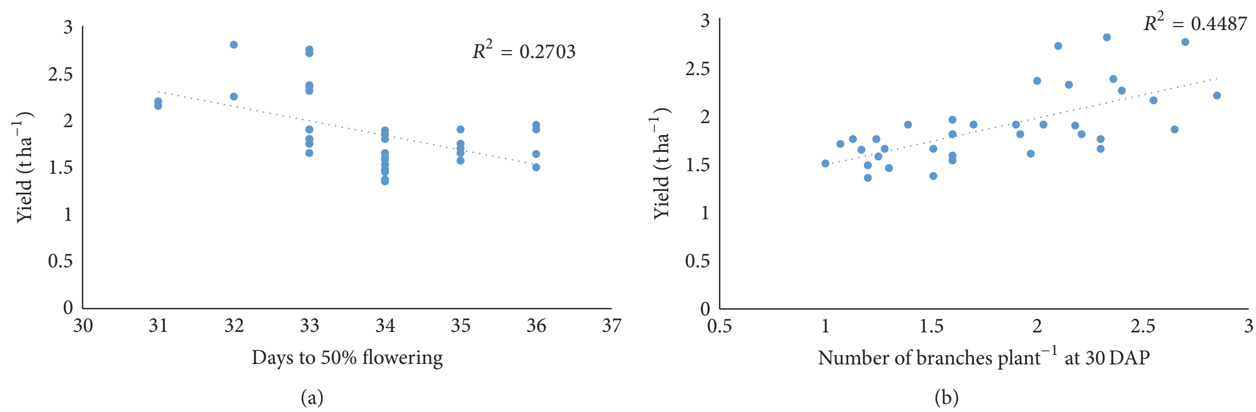

FIGURE 3: Relationship between days to 50% flowering and number of branches/plant at 30 DAP with yield of peanut (mean of two trials).

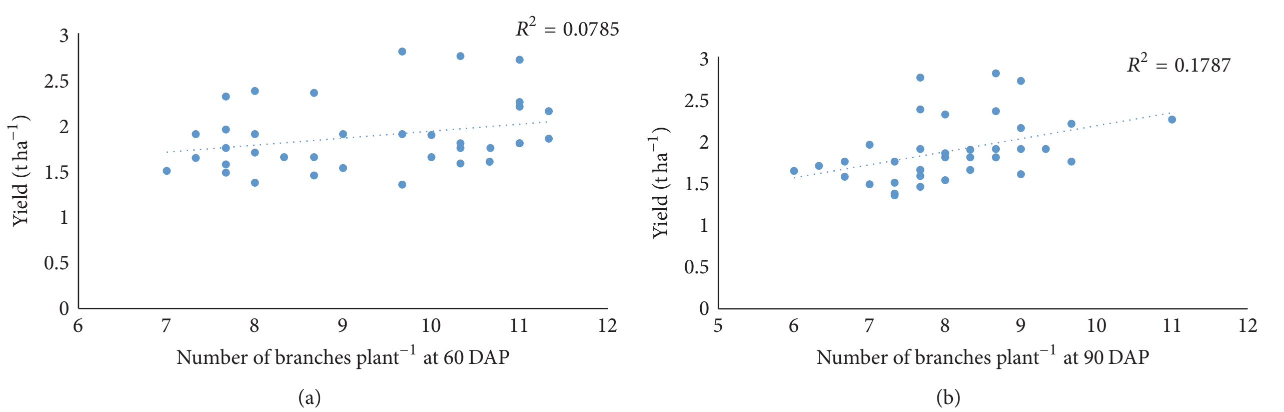

FIGURE 4: Relationship between number of branches/plant at 60 DAP and number of branches/plant at 90 DAP with yield of peanut (mean of two trials).

3.11. Correlation (r). A significant correlation was found out among the days to first-last emergence, days to first-50% flowering, and number of branches plant^{-1}. Correlation of coefficient showed that boron had a positive effect on growth and reproductive unit whereas growth and reproductive unit are positively correlated with yield of peanut (Table 6).

4. Conclusion

The present investigation indicated that the application of boron on soil has a positive effect on vegetative growth, yield performance, and germination percentage of peanut. Light treatment showed the best result for plant height, number

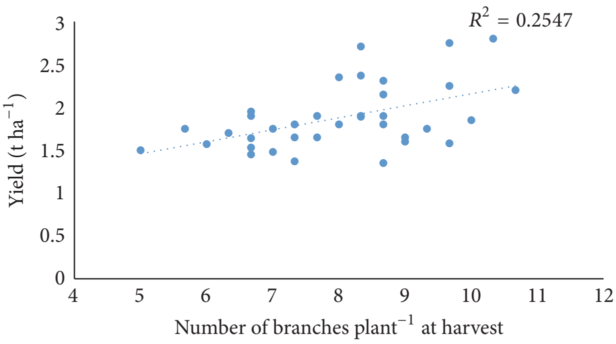

FIGURE 5: Relationship between number of branches/plant during harvest and yield of peanut (mean of two trials).

of branches plant, shoot dry weight plant, and germination percentage, but light had a negative effect on leaf area, pods dry weight plant, and pod yield. It was also observed that BARI Chinabadam-8 produced the best result for all studied parameters except plant height. Therefore, it can be concluded that the application of boron and supplementation of artificial light helped to increase the vegetative growth, yield, and germination behavior of peanut.

Competing Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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