



## Research Article

### EFFECT OF ENVIRONMENTAL FACTORS ON THE GROWTH AND YIELD PERFORMANCE OF MUNGBEAN VARIETIES IN THE SYLHET REGION

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#### Article info

##### Article history

Received: 05.10.2025

Accepted: 20.12.2025

Published: 31.12.2025

##### Keywords

Mungbean (*Vigna radiata*), Sowing date, Environmental factors, Growth parameters

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#### Abstract

An experiment was conducted at the experimental field of the Department of Agronomy and Haor Agriculture, Sylhet Agricultural University, Sylhet, Bangladesh during October 2015 to October 2016 to find out the effect of environmental factors on growth and yield performances of the mungbean varieties in Sylhet region. At the present experiment mungbean variety BARI mung-6 was evaluated at thirteen different sowing dates started from October 2015 (S<sub>1</sub>) to October 2016 (S<sub>13</sub>). Due to unfavorable environmental conditions, only plants grown from nine sowing dates could successfully complete vegetative and reproductive phase. The experiments were laid out in a Randomized Complete Block Design (RCBD) with three replications and maintain 3 plots for each sowing time. The combinations of treatments were allocated randomly to the plots in each replication. The unit plot size was 10 m<sup>2</sup> (4m × 2.5m). The distance between the replication was 1.0 m and the adjacent unit plot was 0.5 m. The result of the experiment revealed that maximum temperature, minimum temperature, average temperature had positive relationship along with other factors on yield and yield attributes of mungbean. Temperature parameters showed significant positive correlations (p≤0.01) with most growth and yield attributes, while relative humidity and rainfall showed weaker, non-significant associations. The highest grain yield (866.07 kg ha<sup>-1</sup>) was obtained 1 October, 2015 sowing and lowest (131.79 kg ha<sup>-1</sup>) was obtained 1 November, 2015 sowing (S<sub>2</sub>). The results also showed that BARI mung-6 performed better in 1 October, 2015 sowing and 8 April, 2016 sowing in Sylhet.

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#### Introduction

Mungbean (*Vigna radiata* L.) is an important pulse crop in Bangladesh, also known as "Moog". It originated in Southeast Asia, specifically in India, Myanmar, and Thailand (Poehlman, 1991). It is ranked third in protein content and fourth in acreage and productivity in Bangladesh (MOA, 2014). In Bangladesh, the land allocated for Mungbean cultivation in 2020-21 was 44,250 hectares, resulting in a total production of 41,189 metric tons (BBS, 2021). Approximately 65% of mungbean cultivation occurs in the southern region of the country, integrated within the T. Aman rice – mungbean – fallow or Aus rice – T. Aman rice – mungbean cropping systems. (Haque et al., 2002). Mungbean has 19.5% to 28.5% protein (AVRDC, 1988), 26% moisture, 4% minerals and 3% vitamins and (Kaul, 1982).

#### Cite This Article

Ghosh KB, Sarkar S, Mridha R, Islam K and Islam MN. 2025. Effect of Environmental Factors on the Growth and Yield Performance of Mungbean Varieties in the Sylhet Region. J. Sylhet Agril. Univ. 12(2): 97-104, 2025. <https://doi.org/10.3329/jsau.v12i2.87851>

Pulse production in Bangladesh remains significantly lower than national demand, creating a persistent supply gap. Recent estimates indicate that the country produces approximately 0.9 million metric tons of pulses annually, whereas the annual demand is about 2.5 million metric tons, implying that domestic production meets only around 35–40% of total requirements. This substantial shortfall is mainly attributed to low productivity, limited adoption of improved varieties, and competition with cereal crops, resulting in heavy reliance on pulse imports to meet dietary needs (The Financial Express, 2024). The (FAO 2015) estimated that per capita pulse consumption should be 80 g, but in Bangladesh, actual intake is approximately 14.19 g. Mungbean is a crop of short duration and has drought tolerance; thus, it grows well in low rainfall areas; however, mungbean performs best when precipitation ranges from 750-900 mm (Kay, 1979). The crop is grown with the residual soil moisture under rainfed conditions. It is cultivated in many countries of the world as a summer and winter crop (Bose, 1982; Singh and Bhardwaj, 1975). The crop is sown either in the rabi or kharif season. It practices well into the existing cropping system in most regions of Bangladesh. It is generally grown during kharif-II season (August to November) throughout the country, but now-a-days it has been shifted towards kharif-I season (March to June). It requires a warm temperature to survive. Summer mungbean tolerates high temperature up to 40°C but soars around 30-35 °C of temperature and gives maximum yield when grown in summer season throughout our country (Satter and Ahmed, 1995).

Sylhet is located in the Eastern Surma-Kushiara Floodplain of Agro Ecological Zone 20 (FAO, 1988). The Sylhet Division in the northeast is formed by Sylhet, Moulvibazar and Habiganj district. The soil fertility and productivity status of the area is low due to inadequacy of organic matter, excessive use of inorganic fertilizers, low application level of organic manures and use of high yielding modern varieties. The incorporation of nitrogen fixing pulse crops is fundamental to increase soil fertility (Senanayake et al., 1987; Zapata et al., 1987). For example, in Rabi season 228,980 ha of total culturable land (798,528 ha) remains un-cropped and while the same figure for Kharif-1 is 216,453 ha and for Kharif-2 is 93,588 (BARC, 2011). The fallow areas can be brought under cultivation through the introduction of mungbean. This limitation does not apply to short-duration, improved mungbean varieties, which can be cultivated without modifying the existing cropping system. The Sylhet region is characterized by deep soils and adequate rainfall; however, the soils are predominantly acidic. Climatic and edaphic factors, including temperature, rainfall, relative humidity, soil moisture, and photoperiod, play a crucial role in determining seed germination duration and significantly influence plant growth, flowering phenology, and yield of mungbean (*Vigna radiata* L.). So, it is necessary to study the yield and its component traits of mungbean across varying environment.

## Materials and methods

The experiment was performed at Agronomy Field Laboratory, SAU (Sylhet Agricultural University), Bangladesh. The site is located in Sylhet district (23° 57' to 25° 13' N latitude and 90° 56' and east longitude); northeastern part of Bangladesh at thana level; elevation approximately 30 meter above the sea level (AEZ 20). Randomized complete block Design with three replications was used in the experiment. Three plots were set for each of planting times. Plot treatments in each replication were randomly allocated the combination of treatments. The area of the experimental unit plot was 10 m<sup>2</sup> (4 m X 2.5 m). Replications were 1 m apart but the next unit plot measure was made at 0.5 m. The trial included a single cultivar, BARI mung-6, and all showing dates from October 2015 (S<sub>1</sub>) to October 2016 (S<sub>13</sub>). Sowing dates were assigned from S<sub>1</sub> to S<sub>13</sub> and considered as treatments. Months and sowing dates were designated as S<sub>1</sub>= 1 October, S<sub>2</sub>= 1 November, S<sub>3</sub>= 1 December, S<sub>4</sub>= 1 January, S<sub>5</sub>= 1 February, S<sub>6</sub>= 1 March, S<sub>7</sub>= 8 April, S<sub>8</sub>= 12 May, S<sub>9</sub>= 9 June, S<sub>10</sub>= 1 July, S<sub>11</sub>= 1 August, S<sub>12</sub>= 4 September, and S<sub>13</sub>= 5 October. Seeds were sowed; however, the plants did not endure between December (S<sub>3</sub>), January (S<sub>4</sub>), and February (S<sub>5</sub>) post-germination due to extremely low soil moisture and lack of rainfall. Conversely, plants sown in July (S<sub>10</sub>) thrived for around

20-25 days before perishing, resulting in an absence of harvestable grain. Data from additional sowing times (nine sowing instances) were recorded, analyzed, and reported in the results. In the event of correlation, data were analyzed using all sowing times, including damage. Before each sowing, the plots were plowed and the ground was carefully prepared. Cow dung (well-decomposed) was applied at a rate of 3 t/ha and incorporated into the soil during land preparation to improve soil structure and nutrient availability. Urea, TSP and MoP Fertilizer were used at the rate of 40, 40 and 50 kg N, P, K per hectare, respectively. All fertilizers were applied as a base dose during the final land preparation. The seeds in this study were planted on the specified dates at a rate of 40 kg per hectare. Seeds were sown in rows with a spacing of 30 cm by 10 cm. Hand weeding was performed at 19-20 days after seeding (DAS). Thinning was performed as required to sustain an ideal plant population. Irrigation was performed in accordance with the needed. The crop was administered the pesticide Admire (*Imidacloprid*) during the blossoming and pod-setting time to safeguard against pod borer (*Maruca vitrata*) and was also sprayed with Bavistin (*Carbendazim*) at a concentration of 0.2% to avert *Cercospora* leaf spot and foot and root rot infections.

## **Results and Discussion**

### ***Yield and yield attributes of mungbean***

Plant density varied significantly across sowing dates (Table 1). The highest density (36.21 plants m<sup>-2</sup>) was observed in 5 October sowing, statistically at par with 8 April and 4 September sowings, while the lowest density (26.71 plants m<sup>-2</sup>) occurred in 1 March sowing, similar to 1 November. Higher densities in optimally timed sowings are associated with favourable soil moisture and temperature for seed germination and early establishment. Low densities in early (March) and late (November) sowings may be due to suboptimal temperatures and limited soil moisture during germination (Sarker et al., 2017; Anonymous, n.d.). Significant differences in plant height were recorded among sowing dates (Table 1). Maximum height (59.36 cm) was found in 1 April sowing, whereas the shortest plants (26.80 cm) were observed in 1 November sowing. Optimal temperatures and photoperiod during April likely enhanced vegetative growth, while late sowing in November exposed plants to cooler temperatures and shorter day length, restricting shoot elongation (Kundu et al., 2024). Dry weight was highest (6.99 g) in 5 October sowing and lowest (3.13 g) in 9 June sowing. This reflects the combined effects of temperature, moisture, and photosynthetic efficiency, with optimal environmental conditions promoting greater biomass accumulation (Shantharaja et al., 2016; Sarker et al., 2017). Maximum leaf number (5.53) was recorded in 4 September sowing, while the minimum (4.40) occurred in 9 June sowing. Adequate temperature and moisture during vegetative growth in September favoured leaf development, whereas high temperatures or moisture stress during June limited leaf initiation and expansion (Shantharaja *et al.*, 2016). Nodulation significantly differed with sowing date (Table 1). The highest number of nodules (5.33) was observed in 1 October sowing, whereas the lowest (1.93) occurred in 8 April. Optimal soil conditions and rhizobial activity in October facilitated nodule formation, while less favourable early April conditions reduced nodulation (Singh et al., n.d.). Branch number was significantly influenced by sowing date. The maximum (6.0) was observed in 8 April, statistically similar to 1 October, and the minimum (4.33) in 1 November and 12 May sowings. Adequate vegetative growth period and favourable environmental factors promoted branching in April and October sowings, whereas late or early sowings reduced branch initiation (Shantharaja et al., 2016).

**Table 1.** The growth characteristics of mungbean influenced by environmental conditions from October 2015 to October 2016

Treatment*	Plant m <sup>-2</sup>	Plant height (cm)	Dry weight plant <sup>-1</sup> (g)	No. of leaves Plant <sup>-1</sup>	Nodule plant <sup>-1</sup> (No.)	Branch plant <sup>-1</sup> (No.)	Pod length (cm)
S <sub>1</sub>	34.14 bc	56.6 b	6.10 b	5.47 ab	5.53 a	5.60 ab	8.55 a
S <sub>2</sub>	26.94 e	26.8 f	3.45 f	5.07 c	4.73 b	4.33 f	5.83 e
S <sub>6</sub>	26.71 e	50.54 e	4.03 e	5.20 bc	4.20 c	4.53 ef	7.97 bc
S <sub>7</sub>	35.63 ab	59.36 a	4.55 d	5.40 ab	1.93 e	6.00 a	8.32 ab
S <sub>8</sub>	28.79 d	53.73 cd	4.12 e	5.47 ab	2.53 d	4.53 ef	7.67 c
S <sub>9</sub>	34.02 bc	52.98 d	3.13 g	4.40 d	4.13 c	4.73 def	7.09 d
S <sub>11</sub>	33.45 c	55.10 bc	3.52 f	4.93 c	4.60 b	5.20 bcd	8.21 ab
S <sub>12</sub>	34.48 abc	56.40 b	5.41 c	5.53 a	5.20 c	5.33 bc	8.05 b
S <sub>13</sub>	36.21 a	53.93 cd	6.99 a	5.07 c	4.20 c	5.00 cde	8.21 ab
LSD	2.96	1.89	0.20	0.29	0.33	0.54	0.35
F-Text	**	**	**	**	**	**	**
CV (%)	1.65	2.12	2.51	3.28	4.70	6.23	2.62

Pod length was significantly influenced by sowing date (Table 2). The longest pods (8.55 cm) occurred in 1 October sowing, while the shortest (5.82 cm) were in 1 November sowing. Similarly, seed number per pod was highest in sowings such as 4 September, 1 October, and 1 August, and lowest in 1 November. Optimal sowing dates support pod development and seed filling by providing favourable temperature and photoperiod, while late sowing reduces reproductive success (Sarker et al., 2017; Anonymous, n.d.). Maximum pods per plant (24.47) were recorded in 8 April sowing, and minimum (17.13) in 1 November sowing. Reduced pod number in late sowing is likely due to poor vegetative growth and shorter reproductive duration (Kundu et al., 2024). 1000-seed weight was significantly affected by sowing date, with the highest (60.53 g) in 1 October sowing and lowest (45.47 g) in 12 May. This indicates that seed filling is highly sensitive to temperature and moisture conditions during reproductive stages (Shantharaja et al., 2016).

**Table 2.** Yield and yield attributes of mungbean as affected by environmental factors during October 2015 to October 2016

Treatment	Seeds pod <sup>-1</sup> (No.)	Pods plant <sup>-1</sup> (No.)	1000 seed weight (g)	Grain yield (kg ha <sup>-1</sup> )	Stover yield (kg ha <sup>-1</sup> )	Harvest index (%)
S <sub>1</sub>	11.00 a	22.93 a	60.53 a	866.07 a	1470.32 a	37.07 bc
S <sub>2</sub>	7.27 c	17.13 b	51.33 b	131.79 h	240.26 e	35.42 c
S <sub>6</sub>	9.33 b	19.20 b	51.80 b	631.65 c	1173.08 b	35.00 c
S <sub>7</sub>	11.43 a	24.47 a	51.27 b	856.41 a	1480.14 a	36.66 bc
S <sub>8</sub>	9.39 b	18.27 b	45.47 e	398.65 e	732.38 d	36.19 c
S <sub>9</sub>	9.18 b	24.47 a	51.20 b	209.20 g	306.87 e	40.54 ab
S <sub>11</sub>	10.89 a	18.87 b	47.33 d	252.48 f	350.65 e	41.86 a
S <sub>12</sub>	11.09 a	24.27 a	50.13 bc	533.13 d	950.29 c	35.87 c
S <sub>13</sub>	10.78 a	23.93 a	49.47 c	808.62 b	1377.47 a	36.99 bc
LSD	0.74	3.27	1.68	14.14	136.90	4.19
F-Text	**	**	**	**	**	*
CV (%)	4.28	8.80	1.89	1.57	8.81	6.49

S <sub>1</sub> = 1 October, 2015 sowing	S <sub>9</sub> = 9 June, 2016 sowing
S <sub>2</sub> = 1 November, 2015 sowing	S <sub>11</sub> = 1 August, 2016 sowing
S <sub>6</sub> = 1 March, 2016 sowing	S <sub>12</sub> = 4 September, 2016 sowing
S <sub>7</sub> = 8 April, 2016 sowing	S <sub>13</sub> = 5 October, 2016 sowing
S <sub>8</sub> = 12 May, 2016 sowing	

Grain yield was significantly influenced by sowing date (Table 2). The highest grain yield (866.07 kg ha<sup>-1</sup>) occurred in 1 October sowing, statistically similar to 8 April, whereas the lowest yield (131.79 kg ha<sup>-1</sup>) was in 1 November. Higher grain yield in October and April sowings is attributed to greater pod number, seed per pod, and 1000-seed weight. Pod yield was highest (1480.14 kg ha<sup>-1</sup>) in 8 April and lowest (240.26 kg ha<sup>-1</sup>) in 1 November, reflecting the influence of vegetative growth and reproductive success on yield. Stover yield trends followed a similar pattern (Sarker et al., 2017; Kundu et al., 2024). Harvest index varied with sowing date. The maximum HI (41.86%) occurred in 1 August sowing, while the minimum (35.00%) was in 1 March. Variation in HI indicates differential partitioning of assimilates to reproductive organs under varying environmental conditions, consistent with earlier reports (Shantharaja et al., 2016).

***Relationship between yield and yield contributing character of mungbean with environmental factors at Sylhet.***

Illustrates the correlation between environmental circumstances and yield along with yield-contributing traits of mungbean (Table 3). The findings of the study demonstrated a clear relationship between maximum temperature, minimum temperature, mean temperature, relative humidity, rainfall and sunshine hours with yield and yield-contributing characters of mungbean. Similar relationships between weather parameters and mungbean growth and yield have also been reported by several researchers (Sarker et al., 2017; Shantharaja et al., 2016). The number of plants per square meter showed a strong and significant positive correlation with maximum temperature ( $r = 0.74$ ), minimum temperature ( $r = 0.66$ ) and mean temperature ( $r = 0.70$ ). However, it showed weak positive and non-significant correlations with relative humidity ( $r = 0.25$ ), rainfall ( $r = 0.43$ ) and sunshine hours ( $r = 0.48$ ). This indicates that plant establishment in mungbean was mainly governed by temperature conditions during germination and early growth stages, which is in agreement with earlier findings (Singh et al., 2014; Kundu et al., 2024). Plant height exhibited a significant positive relationship with maximum temperature ( $r = 0.74$ ), minimum temperature ( $r = 0.67$ ) and mean temperature ( $r = 0.71$ ). Positive but non-significant correlations were observed with relative humidity ( $r = 0.27$ ), rainfall ( $r = 0.50$ ) and sunshine hours ( $r = 0.35$ ). Similar temperature-driven variations in plant height of mungbean have been reported by Shantharaja et al., (2016). Dry weight per plant showed a significant positive association with maximum temperature ( $r = 0.69$ ), minimum temperature ( $r = 0.59$ ), mean temperature ( $r = 0.64$ ) and sunshine hours ( $r = 0.57$ ). Although dry weight was positively associated with relative humidity ( $r = 0.20$ ) and rainfall ( $r = 0.24$ ), these relationships were not statistically significant. This suggests that biomass accumulation in mungbean is more responsive to thermal and radiation regimes than to moisture factors under favourable rainfall conditions (Singh et al., 2014). The total number of leaves per plant was significantly and positively correlated with maximum temperature ( $r = 0.70$ ), minimum temperature ( $r = 0.59$ ) and mean temperature ( $r = 0.64$ ). However, very weak positive correlations were observed with relative humidity ( $r = 0.14$ ), rainfall ( $r = 0.38$ ) and sunshine hours ( $r = 0.52$ ). These results indicate that leaf development was largely influenced by temperature, as also reported by Sarker et al. (2017). The average number of nodules per plant showed a significant positive correlation with maximum temperature ( $r = 0.74$ ), minimum temperature ( $r = 0.60$ ), mean temperature ( $r = 0.66$ ) and sunshine hours ( $r = 0.61$ ). In contrast, relative humidity ( $r = 0.06$ ) and rainfall ( $r = 0.07$ ) exhibited weak and non-significant relationships. This confirms that nodulation in mungbean is strongly influenced by favourable temperature and light conditions (Singh et al., 2014). Branches per plant also showed strong and positive correlations with maximum

temperature ( $r = 0.72$ ), minimum temperature ( $r = 0.62$ ) and mean temperature ( $r = 0.67$ ), while weak positive associations were observed with relative humidity ( $r = 0.21$ ), rainfall ( $r = 0.44$ ) and sunshine hours ( $r = 0.49$ ). Similar observations regarding temperature-dependent branching in mungbean have been documented by Shantharaja et al., (2016).

**Table 3.** Correlation between yield and yield-contributing traits of mungbean with environmental variables in Sylhet

Yield and yield contributing character	Air temperature			Relative Humidity	Rainfall	Sunshine hours
	Maximum	Minimum	Average			
Number of plants	0.74**	0.66**	0.70**	0.25 <sup>NS</sup>	0.43 <sup>NS</sup>	0.48 <sup>NS</sup>
Plant height	0.74**	0.67**	0.71**	0.27 <sup>NS</sup>	0.50 <sup>NS</sup>	0.35 <sup>NS</sup>
Dry weight Plant <sup>-1</sup>	0.69**	0.59*	0.64*	0.20 <sup>NS</sup>	0.24 <sup>NS</sup>	0.56*
No. of leaves plant <sup>-1</sup>	0.70**	0.59*	0.64*	0.14 <sup>NS</sup>	0.38 <sup>NS</sup>	0.52 <sup>NS</sup>
No. of nodules plant <sup>-1</sup>	0.74**	0.60*	0.66**	0.06 <sup>NS</sup>	0.07 <sup>NS</sup>	0.61*
No. of branch plant <sup>-1</sup>	0.72**	0.62*	0.67**	0.21 <sup>NS</sup>	0.44 <sup>NS</sup>	0.49 <sup>NS</sup>
Pod length	0.73**	0.64*	0.68**	0.18 <sup>NS</sup>	0.41 <sup>NS</sup>	0.46 <sup>NS</sup>
No. seeds pod <sup>-1</sup>	0.74**	0.65*	0.70**	0.23 <sup>NS</sup>	0.44 <sup>NS</sup>	0.45 <sup>NS</sup>
No. of pod plant <sup>-1</sup>	0.73**	0.64*	0.69**	0.25 <sup>NS</sup>	0.44 <sup>NS</sup>	0.45 <sup>NS</sup>
Grain yield (kg ha <sup>-1</sup> )	0.52 <sup>NS</sup>	0.43 <sup>NS</sup>	0.47 <sup>NS</sup>	0.13 <sup>NS</sup>	0.29 <sup>NS</sup>	0.40 <sup>NS</sup>
Stover yield (kg ha <sup>-1</sup> )	0.50 <sup>NS</sup>	0.40 <sup>NS</sup>	0.45 <sup>NS</sup>	0.10 <sup>NS</sup>	0.28 <sup>NS</sup>	0.40 <sup>NS</sup>
1000 seed weight (g)	0.71**	0.59*	0.64*	0.11 <sup>NS</sup>	0.33 <sup>NS</sup>	0.55*
Harvest index (%)	0.73**	0.64*	0.68**	0.18 <sup>NS</sup>	0.40 <sup>NS</sup>	0.48 <sup>NS</sup>

Values in the column are correlation coefficient value

‘\*\*\*’= indicates at 1% level of significance; ‘\*’= indicates at 5% level of significance, ‘NS’= indicates non-significance

Pod length exhibited a positive and significant relationship with maximum ( $r = 0.73$ ), minimum ( $r = 0.64$ ) and mean temperature ( $r = 0.68$ ). It was also positively associated with relative humidity ( $r = 0.18$ ), rainfall ( $r = 0.41$ ) and sunshine hours ( $r = 0.46$ ), although these associations were not statistically significant. These results indicate that temperature played a major role in pod development, as reported earlier by Kundu et al. (2024). The number of seeds per pod showed strong and significant positive correlations with maximum ( $r = 0.74$ ), minimum ( $r = 0.65$ ) and mean temperature ( $r = 0.70$ ), while positive but non-significant relationships were observed with relative humidity ( $r = 0.23$ ), rainfall ( $r = 0.44$ ) and sunshine hours ( $r = 0.45$ ). This suggests that optimum thermal conditions during flowering and pod development enhanced seed formation (Sarker et al., 2017). The number of pods per plant was significantly and positively correlated with maximum temperature ( $r = 0.73$ ), minimum temperature ( $r = 0.64$ ) and mean temperature ( $r = 0.69$ ). Positive but non-significant correlations were observed with relative humidity ( $r = 0.25$ ), rainfall ( $r = 0.44$ ) and sunshine hours ( $r = 0.45$ ). These findings agree with earlier reports that pod formation in mungbean is highly sensitive to temperature variations (Kundu et al., 2024).

Stover yield exhibited a significant positive relationship with maximum temperature ( $r = 0.50$ ), minimum temperature ( $r = 0.40$ ) and mean temperature ( $r = 0.45$ ), while positive but non-significant correlations were observed with relative humidity ( $r = 0.10$ ) and rainfall ( $r = 0.28$ ). This indicates that vegetative biomass production was mainly governed by temperature conditions (Shantharaja et al., 2016). The 1000-seed weight

showed a significant positive correlation with maximum temperature ( $r = 0.71$ ), minimum temperature ( $r = 0.59$ ), mean temperature ( $r = 0.64$ ) and sunshine hours ( $r = 0.55$ ). Although positive relationships were observed with relative humidity ( $r = 0.11$ ) and rainfall ( $r = 0.33$ ), these were not statistically significant. Similar results were reported by Singh *et al.*, (2014), indicating that seed weight is strongly influenced by temperature during seed filling. Harvest index showed a strong and significant positive association with maximum temperature ( $r = 0.73$ ), minimum temperature ( $r = 0.64$ ) and mean temperature ( $r = 0.68$ ). It also exhibited positive but non-significant correlations with relative humidity ( $r = 0.18$ ), rainfall ( $r = 0.40$ ) and sunshine hours ( $r = 0.48$ ). This suggests improved partitioning efficiency towards economic yield under favourable thermal conditions, which is consistent with previous findings in mungbean (Sarker *et al.*, 2017).

## **Conclusion**

The experiment indicates that the yield and yield-contributing traits of mungbean, including plant density ( $m^{-2}$ ), harvest height, dry weight per plant at harvest, leaf count per plant at harvest, nodule count per plant at harvest, branch count per plant at harvest, pod length, seed count per pod, pod count per plant, weight of 1000 seeds (g), grain yield ( $kg\ ha^{-1}$ ), stover yield ( $kg\ ha^{-1}$ ), and harvest index (%), exhibited a positive correlation with maximum, minimum, and average temperatures, as well as other environmental factors. The grain yield of BARI mung-6 was superior in Sylhet for sowings on 1 October and 8 April. Additional experiments of this nature may be undertaken to validate the results.

## **Acknowledgement**

The author is very much grateful to Ministry of Science and Technology (MOST) for their financial support to carry out the research program.

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**Appendix 1.** Monthly average air temperature, relative humidity, rainfall and sunshine hours of the experimental site during October 2015 to October 2016

Month	Air temperature (°C)			Relative Humidity	Rainfall (mm)	Sunshine hours
	Maximum	Minimum	Average			
October, 2015 (S <sub>1</sub> )	33	23.4	28.2	69	56.6 (10 Days)	207.77
November, 2015 (S <sub>2</sub> )	30.6	19	24.8	63	0	239.31
December, 2015 (S <sub>3</sub> )	26.1	14.7	20.4	67	7.2 (3 Days)	166.69
January, 2016 (S <sub>4</sub> )	24.6	13.4	19	67	10.9 (2 Days)	103.34
February, 2016 (S <sub>5</sub> )	29.1	17.6	23.35	60	28.3 (7 Days)	171.1
March, 2016 (S <sub>6</sub> )	32	20.5	26.25	58	139.4 (11 Days)	164.4
April, 2016 (S <sub>7</sub> )	31	21.6	26.3	75	1023.1 (28 Days)	157.6
May, 2016 (S <sub>8</sub> )	31.3	23.2	27.25	74	670.1 (26 Days)	146.96
June, 2016 (S <sub>9</sub> )	33.2	25.5	29.35	76	657.2 (25 Days)	135.23
July, 2016 (S <sub>10</sub> )	32.6	25.7	29.15	82	528.2 (30 Days)	93.02
August, 2016 (S <sub>11</sub> )	34.3	26.2	30.25	73	482.9 (24 Days)	165.88
September, 2016 (S <sub>12</sub> )	34.3	26.2	30.25	78	482.9 (24 Days)	165.88
October, 2016 (S <sub>13</sub> )	33.2	24.5	28.85	74	156.9 (10 Days)	199.22



