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Mung bean (*Vigna radiata* L.) growth response to prilled and super granule urea application

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ABSTRACT

Indiscriminate use of nitrogenous fertilizers not only causes soil degradation but also significantly increases production costs, thus sought the urgent call for judicial application of this fertilizer to sustain soil fertility, particularly in producing pulse crops as they also trap atmospheric nitrogen. This study was conducted at the farm of Sher-e-Bangla Agricultural University, to explore the best nitrogenous fertiliser (prilled and super granule urea) application rate fostering better growth and yield of mung bean. A randomized complete block design (RCBD) was adopted with 16 treatments having three replications. Data on different growth contributing characteristics of mung bean were recorded, and statistical analysis was conducted to present the results. Findings of this study revealed significant variations in majority of the yield and yield contributing parameters of the mung bean influenced by the rate and methods of nitrogenous fertilizer application. The results demonstrated that application of prilled urea in furrows fostered the growth-related parameters of the mung bean crop such as the highest plant height (50.57 cm), the maximum number of leaves plant^{-1} (22.57), the maximum number of branches plant^{-1} (6.00) and the highest above ground dry matter plant^{-1} (12.08 g) which could enhance better yield as compared to any other treatments studied. However, application of urea super granule (USG) placement at 10 cm depth with a 40 cm distance exhibited the worst growth responses in regards to yield contributing parameters of mung bean.

Key Words: *Mung bean, Prilled urea, Urea super granule and Growth response*

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I. Introduction

Mung bean (*Vigna radiata* L.) is one of the most important pulse crops of Bangladesh and belongs to the family Fabaceae. The area under pulse crops in Bangladesh is 919251.02 acres (2.3% of entire cultivable area) with a production of 424713.74 metric tones (MT), where mung bean is cultivated in

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the area of 109304.77 acres (11.89% of entire pulse cultivable area) with production of 41189.26 metric tons (BBS, 2010). Bangladesh is a densely populated country where the number of people has grown exponentially in the last few decades, whereas the cultivable land has also been decreasing at the same pace. In a previous study in 2010, findings show that due to high population pressure, the total cultivable lands have been decreasing day by day at a rate of one lac hectare per year due to urbanization and other human interventions (BBS, 2010). As we need to feed an extensively large population, we do not have any other choice but to improve the capacity to produce more balanced food in the space left for agricultural production. Therefore, the remaining land has been utilized for cultivating rice, wheat, maize, oils, pulse and other crops over the years. However, among many other essential crops, pulse has been pushed down to marginal land to give space for the cereal crops. Moreover, pulses with poor yielding ability do not get farmers' choice in cultivating pulses on the mainland.

Pulse crop is an important food crop because it provides a cheap source of easily digestible dietary protein, which complements the staple rice food for better nourishment of human body. Per capita requirement of pulse should be 80 g, whereas it is only about 10 g in Bangladesh (BBS, 2010); thus, the ideal cereal of pulse ratio (10:1) is not maintained, which is now 30:1. This is a fact that national production of the pulses is not adequate to meet the population demand. On top of that, the area under pulse production and amount (MT) of pulse production is decreasing over time compared to other countries (Rahman et al., 2018). Mung bean plays a vital role in supplementing protein in the cereal-based low-protein diet of Bangladesh, but the acreage production of mung bean is gradually declining (BBS, 2010). It is one of the least cared-for crops. Mung bean is cultivated with minimum tillage, local varieties, no or minimum fertilizers, pesticides, very early or very late sowing, no irrigation and drainage facilities, etc., when nitrogen significantly loses nutrients with broadcast application. Nitrogen, given as basal, is significantly limiting when plant requires adequate at different stages of its growth. All these factors combined are responsible for low yield of mung bean (Hussain et al., 2008). Mansoor (2007) noted that lack of attention to fertilizer application in proper way with an appropriate amount is identified for lowering mung bean yields. Being leguminous, mung bean needs low nitrogen but requires optimum during its onset of flowering and podding.

Experimental findings revealed that pulse crops stop to nourish *Rhizobia* rather than trans-local energy towards development of flowers and pods. Thus, nitrogen fixation ceases during reproductive stage, which eventually hampers the development of reproductive traits. In this situation, nitrogen given as basal to the crop is not sufficiently available to the plant for nourishing its flowers and pods thus, seed yield value is lower (Patel et al., 1984; BARC, 2005). So, nitrogen management is required to synchronize this demand of plant growth stages. Triggering nitrogen at the plant demand would be an attempt towards yield improvements of pulse. Keeping this in mind, attention is given to nitrogen placement or use of Urea Super Granule (USG) in pulse. Both these ways of nitrogen placement might have some influencing technique that would be better utilization by the major nutrient for nitrogen for its maximum seed yield. The maximum grain yield in rice (6.8 t ha^{-1}) was recorded by Bhardwaj and Singh (1993) when placing nitrogen fertilizer as prilled or USG. The experiment's goals were to determine the comparative performance of prilled urea and USG on mung bean growth and to identify an appropriate application method of prilled urea or USG for maximum mung bean production.

II. Materials and Methods

The experiment was conducted to study the growth and yield response of mung bean to the application of prilled and super granule urea from September to December 2012. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. An area of 57.5 m × 19.0 m was divided into three equal blocks. Each block was divided into 16 plots, where 16 treatments were allotted randomly. There were 48-unit plots altogether in the experiment. The size of each unit plot was 5.0 m × 3.0 m. The space between two blocks and plots was 1.0 m and 0.5 m, respectively. This study consisted of the following treatments:

T_1 = Prilled urea (PU) broadcast

T_2 = PU given in furrows

T_9 = USG placed at 10 cm depth at 20 cm distance (avoid two rows),

T_{10} = USG placed at 10 cm depth at 20 cm distance (avoid three rows),

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T_3 = PU given between two rows

T_4 = PU and seeds given in same furrows

T_5 = USG placed at 10 cm depth at 10 cm distance (avoid one row),

T_6 = USG placed at 10 cm depth at 10 cm distance (avoid two rows),

T_7 = USG placed at 10 cm depth at 10 cm distance (avoid three rows),

T_8 = USG placed at 10 cm depth at 20 cm distance (avoid one row),

T_{11} = USG placed at 10 cm depth at 30 cm distance (avoid one row)

T_{12} = USG placed at 10 cm depth at 30 cm distance (avoid two rows)

T_{13} = USG placed at 10 cm depth at 30 cm distance (avoid three rows),

T_{14} = USG placed at 10 cm depth at 40 cm distance (avoid one row),

T_{15} = USG placed at 10 cm depth at 40 cm distance (avoid two rows)

T_{16} = USG placed at 10 cm depth at 40 cm distance (avoid three rows).

Other intercultural operations were carried out as and when necessary to establish the experimental crops successfully.

Data collection and data analysis

Plant height: The height of plant was recorded in centimetres (cm) at 20, 30, 40 and 50 DAS (Days after sowing) and harvest. Data were recorded as the average of 10 plants selected randomly from the inner rows of each plot that were tagged earlier. The height was measured from the ground level to the tip of the plant with the help of a meter scale.

Branches plant^{-1}: Total number of branches plant^{-1} was recorded at 20, 30, 40 and 50 DAS and harvest. Data were recorded by counting branches from each plant and as the average of 10 plants selected at random from the inner rows of each plot.

Above ground dry matter plant^{-1}: Data from ten plot sample plants were collected, gently washed with tap water, and soaked with a paper towel. The sample was oven-dried at 70^{0}C for 72 hours. Then oven-dried samples were transferred into a desiccator and allowed to cool down to room temperature after that dry weight of plant was taken and expressed in grams. Above ground dry matter plant^{-1} was recorded at 20, 30, 40 and 50 DAS.

Yield contributing characters and yield of mung bean

Pods plant^{-1}: Number of total pods of selected plants from each plot was counted and the mean numbers were expressed on a plant^{-1} basis. Data were recorded as the average of 10 plants selected at random from the inner rows of each plot.

Seeds pod^{-1}: Seeds pod^{-1} was recorded randomly from selected plants at harvest time. Data were recorded as the average of 10 pods selected at random from the inner rows of each plot.

Weight of 1000 seeds: One thousand cleaned, dried seeds were counted from each harvest sample and weighed using a digital electric balance and weight was expressed in grams (g).

The collected data were processed in Excel and then statistical analysis was conducted using MSTAT-C software. The significance of the difference among the treatment means was estimated by Duncan's Multiple Range Test (DMRT) at a 5% probability level (Gomez and Gomez, 1984).

III. Results and Discussion

Plant height

Statistically significant variation was recorded in terms of plant height of mung bean at 20, 30, 40 and 50 DAS and harvest for the different nitrogen management under the present trial (Figure 01). At 20 DAS, the longest plant (18.61 cm) was observed from T_2 [PU given in furrows] which was statistically similar with T_1 [Prilled urea (PU) broadcast] (17.71 cm), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (17.57 cm), T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (17.26 cm) and T_7 [USG placed at 10 cm depth at 10 cm distance (avoid three rows)] (17.15 cm). The shortest plant was recorded T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (10.67 cm) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (10.68 cm) and T_{13} [USG placed at 10 cm depth at 30 cm distance (avoid three rows)] (11.35 cm).

At 30 DAS, T_2 [PU given in furrows] gave the taller (24.35 cm) and was followed by T_1 [Prilled urea (PU) broadcast] (22.89 cm), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (22.80 cm) and T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (22.64 cm). Shortest plant was observed from T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (17.51 cm) and similar with T_{12} [USG placed at 10 cm depth at 30 cm distance (avoid two rows)] (18.98 cm) and T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (19.15 cm).

At 40 DAS, the longest plant (37.60 cm) was observed from T_2 [PU given in furrows] which was statistically similar with T_1 [Prilled urea (PU) broadcast] (37.60 cm), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (35.60 cm), T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (35.27 cm), T_7 [USG placed at 10 cm depth at 10 cm distance (avoid three rows)] (35.38 cm) and T_8 [USG placed at 10 cm depth at 20 cm distance (avoid one row)] (34.71). The shortest plant was recorded T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (28.38 cm) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (29.60 cm).

At 50 DAS the longest plant (45.98 cm) was observed from T_2 [PU given in furrows], which was statistically similar to T_1 [Prilled urea (PU) broadcast] (45.12 cm), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (44.01 cm) and T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (43.83 cm) and T_7 [USG placed at 10 cm depth at 10 cm distance (avoid three rows)] (43.43 cm). The shortest plant was recorded T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (34.67 cm) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (35.45 cm).

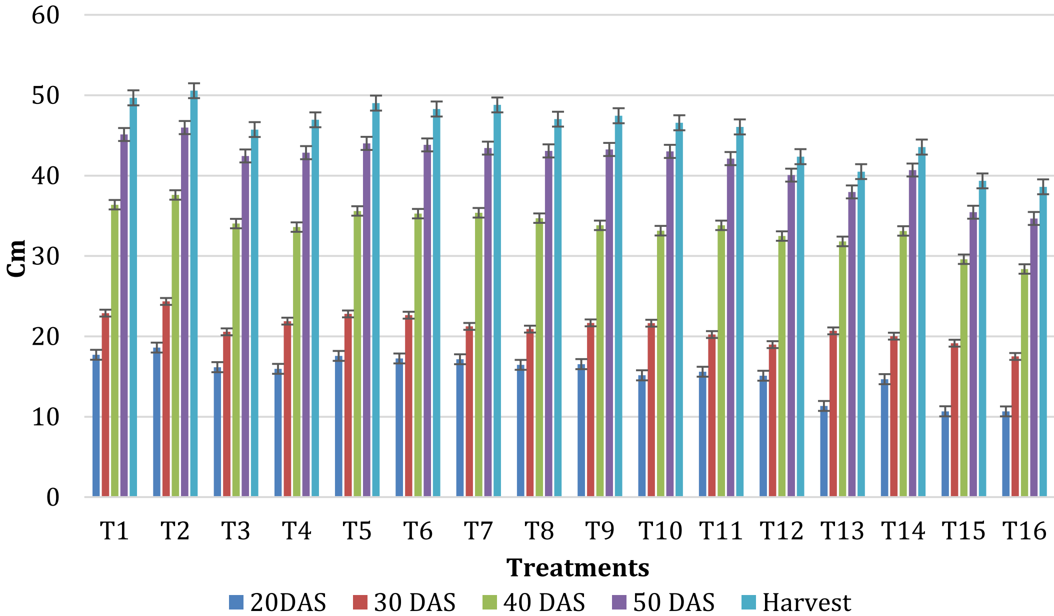

Figure 01. Effect of nitrogen managements on plant height of mung bean

T_1 = Prilled urea, T_2 = PU given in furrows, T_3 = PU given between two rows, T_4 = PU and seeds given in same furrows, T_5 = USG placed at 10 cm depth at 10 cm distance, T_6 = USG placed at 10 cm depth at 10 cm distance, T_7 = USG placed at 10 cm depth at 10 cm distance, T_8 = USG placed at 10 cm depth at 20 cm distance, T_9 = USG placed at 10 cm depth at 20 cm distance, T_{10} = USG placed at 10 cm depth at 20 cm distance, T_{11} = USG placed at 10 cm depth at 30 cm distance, T_{12} = USG placed at 10 cm depth at 30 cm distance, T_{13} = USG placed at 10 cm depth at 30 cm distance, T_{14} = USG placed at 10 cm depth at 40 cm distance, T_{15} = USG placed at 10 cm depth at 40 cm distance and T_{16} = USG placed at 10 cm depth at 40 cm distance.

At harvest, T_2 [PU given in furrows] gave the taller (50.57 cm) and was followed by T_1 [Prilled urea (PU) broadcast] (49.68 cm), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (49.03 cm) and T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (48.29 cm). Shortest plant was observed from T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (38.61 cm) and similar T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (39.35 cm). T_2 was found very influential in giving maximum taller plants as plants could uptake nitrogen efficiently from placed urea in furrows when nutrient requirement was varied at different growth stages. Use of

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USG was found to be effective. It was economic to cultivate. Malik et al. (2003) reported that nitrogen fertilizer significantly affected plant height. Akter (2010) reported that plant height was highest when USG was applied as a basal dose and in another study, Rahman et al. (2016) also found similar results when they used USG in BRRI Dhan 48.

Branches plant^{-1}

Branches plant^{-1} varied significantly at 20, 30, 40 and 50 DAS and were harvested for different nitrogen management under the present trial (Table 01). At 20 DAS, the maximum branches plant^{-1} (1.53) was observed from T_2 [PU given in furrows], which was statistically similar to T_1 (1.50), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (1.50), T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (1.47) and T_7 [USG placed at 10 cm depth at 10 cm distance (avoid three rows)] (1.43). The minimum branches plant^{-1} was recorded T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (1.13) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (1.17).

At 30 DAS, T_2 [PU given in furrows] gave maximum branches plant^{-1} (4.26) and was followed by T_1 [Prilled urea (PU) broadcast] (3.95), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (3.84) and T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (3.51). Minimum branches plant^{-1} was observed from T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (2.39) and similar with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (2.69).

At 40 DAS, the maximum branches plant^{-1} (4.57) was observed from T_2 [PU given in furrows], which was statistically similar to T_1 [Prilled urea (PU) broadcast] (4.33), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (4.07) and T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (4.13). The minimum branches plant^{-1} was recorded T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (2.88) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (3.24).

Table 01. Effect of nitrogen managements on number of branches plant^{-1} of mung bean

Treatment	Number of branches plant^{-1}				
	20 DAS	30 DAS	40 DAS	50 DAS	Harvest
T_1	1.50 ab	3.95 ab	4.33 ab	4.95 a	5.51 ab
T_2	1.53 a	4.26 a	4.57 a	5.11 a	6.00 a
T_3	1.43 a-c	3.20 d-g	3.68 cd	4.39 a-c	4.75 cd
T_4	1.40 bc	3.59 b-e	3.94 bc	4.59 ab	4.87 b-d
T_5	1.50 ab	3.84 a-c	4.07 a-c	4.93 a	5.48 ab
T_6	1.47 ab	3.51 b-e	4.13 a-c	4.86 a	5.16 bc
T_7	1.43 a-c	3.68 b-d	3.88 bc	4.81 a	5.11 bc
T_8	1.33 cd	3.35 b-f	3.74 b-d	4.62 ab	5.01 b-d
T_9	1.40 bc	3.05 e-g	3.66 cd	4.44 a-c	4.61 c-e
T_{10}	1.43 a-c	3.31 c-f	3.51 c-e	4.60 ab	4.99 b-d
T_{11}	1.40 bc	3.17 d-g	3.03 ef	3.30 d-f	5.09 b-d
T_{12}	1.40 bc	3.40 b-f	3.65 cd	3.84 c-e	4.05 ef
T_{13}	1.43 a-c	3.05 e-g	3.56 c-e	3.94 b-d	4.42 de
T_{14}	1.27 d	2.83 f-h	3.76 b-d	4.44 a-c	3.72 fg
T_{15}	1.17 e	2.69 gh	3.24 d-f	3.25 ef	3.51 fg
T_{16}	1.13 e	2.39 h	2.88 f	2.92 f	3.33 g
$S\bar{x}$	0.045	0.262	0.274	0.322	0.285
CV(%)	6.87	9.61	8.82	8.80	7.41

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly as per 0.05 level of probability

T_1 = Prilled urea, T_2 = PU given in furrows, T_3 = PU given between two rows, T_4 = PU and seeds given in same furrows, T_5 = USG placed at 10 cm depth at 10 cm distance, T_6 = USG placed at 10 cm depth at 10 cm distance, T_7 = USG placed at 10 cm depth at 10 cm distance, T_8 = USG placed at 10 cm depth at 20 cm distance, T_9 = USG placed at 10 cm depth at 20 cm distance, T_{10} = USG placed at 10 cm depth at 20 cm distance, T_{11} = USG placed at 10 cm depth at 30 cm distance, T_{12} = USG placed at 10 cm depth at 30 cm distance, T_{13} = USG placed at 10 cm depth at 30 cm distance, T_{14} = USG placed at 10 cm depth at 40 cm distance, T_{15} = USG placed at 10 cm depth at 40 cm distance and T_{16} = USG placed at 10 cm depth at 40 cm distance.

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At 50 DAS, the maximum branches plant^{-1} (5.11) was observed from T_2 [PU given in furrows] which was statistically similar with T_1 [Prilled urea (PU) broadcast] (4.95), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (4.93), T_6 [(USG placed at 10 cm depth at 10 cm distance (avoid two rows)] (4.86) and T_7 [USG placed at 10 cm depth at 10 cm distance (avoid three rows)] (4.81). The minimum branches plant^{-1} was recorded T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (2.92) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (3.25).

At harvest, T_2 [PU given in furrows] gave maximum branches plant^{-1} (6.00) and was followed by T_1 [Prilled urea (PU) broadcast] (5.51) and T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (5.48). Minimum branches plant^{-1} was observed from T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (3.33) and similar T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (3.51). T_2 was found to be very influential in giving the highest branches as plants could uptake nitrogen efficiently from placed urea in furrows when nutrient requirement was varied at different growth stages. Rajender et al. (2002) reported that branches of mung bean increased with increasing N rates. Akter (2010) reported that number of branches plant^{-1} was highest when USG was applied as basal dose and lowest when USG was applied at 25 DAS in mustard.

Above ground dry matter plant^{-1}

Different nitrogen management varied significantly at 20, 30, 40 and 50 DAS for above ground dry matter plant^{-1} of mung bean (Figure 02). At 20 DAS the maximum above ground dry matter plant^{-1} (8.55 g) was observed from T_2 [PU given in furrows], which was statistically similar to T_1 [Prilled urea (PU) broadcast] (7.57 g), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (7.70 g). The minimum above ground dry matter plant^{-1} was recorded T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (5.14 g) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (5.79 g).

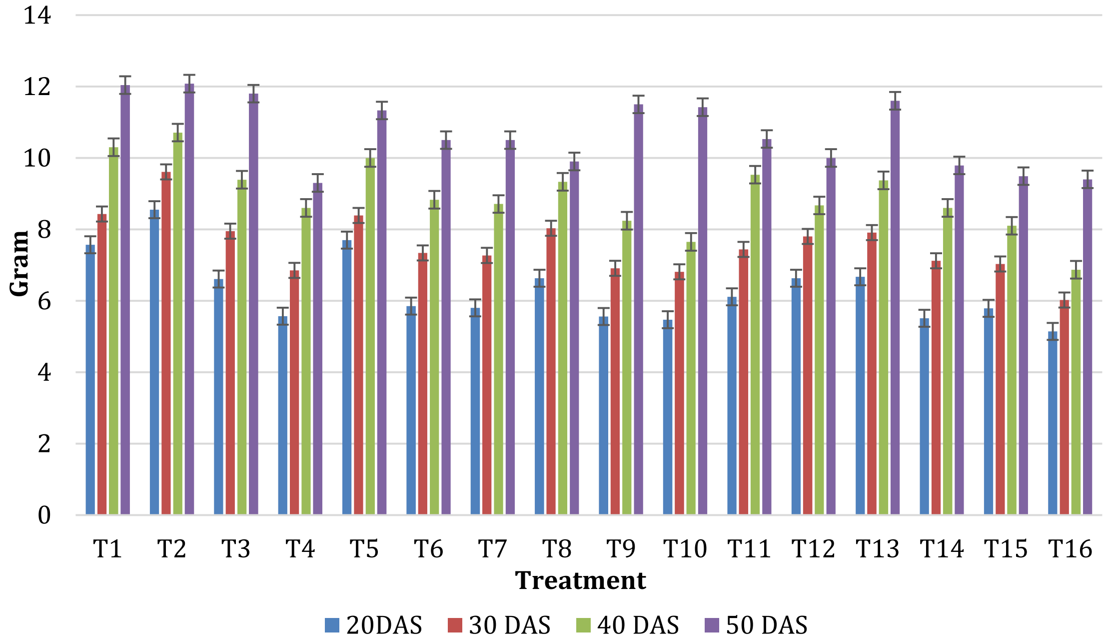

Figure 02. Effect of nitrogen management on above ground dry matter plant^{-1} of mung bean

T_1 = Prilled urea, T_2 = PU given in furrows, T_3 = PU given between two rows, T_4 = PU and seeds given in same furrows, T_5 = USG placed at 10 cm depth at 10 cm distance, T_6 = USG placed at 10 cm depth at 10 cm distance, T_7 = USG placed at 10 cm depth at 10 cm distance, T_8 = USG placed at 10 cm depth at 20 cm distance, T_9 = USG placed at 10 cm depth at 20 cm distance, T_{10} = USG placed at 10 cm depth at 20 cm distance, T_{11} = USG placed at 10 cm depth at 30 cm distance, T_{12} = USG placed at 10 cm depth at 30 cm distance, T_{13} = USG placed at 10 cm depth at 30 cm distance, T_{14} = USG placed at 10 cm depth at 40 cm distance, T_{15} = USG placed at 10 cm depth at 40 cm distance and T_{16} = USG placed at 10 cm depth at 40 cm distance.

At 30 DAS, T_2 [PU given in furrows] gave maximum above ground dry matter plant^{-1} (9.61 g) and was followed by T_1 [Prilled urea (PU) broadcast] (8.43 g), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (8.39 g). Minimum above ground dry matter plant^{-1} was observed from T_{16} [USG

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placed at 10 cm depth at 40 cm distance (avoid three rows)] (6.02 g) and similar with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (7.03 g).

At 40 DAS, the maximum above ground dry matter plant^{-1} (10.71 g) was observed from T_2 [PU given in furrows], which was statistically similar to T_1 [Prilled urea (PU) broadcast] (10.30 g), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (10.00 g). The minimum above ground dry matter plant^{-1} was recorded T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (6.87 g) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (8.10 g).

At 50 DAS the maximum above ground dry matter plant^{-1} (12.08 g) was observed from T_2 [PU given in furrows], which was statistically similar to T_1 [Prilled urea (PU) broadcast] (12.04 g), T_5 [USG placed at 10 cm depth at 10 cm distance (avoid one row)] (11.33 g). The minimum above ground dry matter plant^{-1} was recorded from T_{16} [USG placed at 10 cm depth at 40 cm distance (avoid three rows)] (9.40 g) and as per with T_{15} [USG placed at 10 cm depth at 40 cm distance (avoid two rows)] (9.49 g).

Number of seeds per pod

Due to different nitrogen management number of seeds pod^{-1} of mung bean varied significantly (Table 02). The highest number of seeds pod^{-1} (9.46) was recorded from T_2, which was statistically similar (9.20, 8.73, 8.62 and 8.57) with T_1, T_5, T_6 and T_7, respectively, while the lowest number of seeds pod^{-1} (5.73) was observed from T_{16} which was similar (6.19 and 6.31) with T_{15} and T_{14} treatment, respectively. Malik et al. (2003) reported that varying nitrogen levels significantly affected the number of seeds pod^{-1}.

Weight of 1000-seeds

Statistically significant variation was recorded for weight of 1000 seeds of mung bean due to different nitrogen management (Table 02). The highest weight of 1000 seeds (42.60 g) was found from T_2, which was statistically similar (41.38 g, 40.60 g, 40.27 g and 39.71 g) with T_1, T_5, T_6 and T_7, respectively. On the other hand, the lowest weight (33.38 g) was recorded from T_6, which was statistically similar (33.60 g) to T_{15} treatment. Patel et al. (1984) reported that application of 20 kg N ha^{-1} significantly increased the 1000-seed weight of mung bean. Akter (2010) reported that 1000-seed weight was highest when USG was applied as basal dose and lowest when USG was applied at 25 DAS in mustard.

Table 02: Effect of nitrogen management on Pod length, Seeds per pod and 1000 grain weight

Treatment	Pod Length (cm)	Seeds pod^{-1}	1000 grain weight (g)
T_1	7.20 ab	9.20 a	41.38 a
T_2	7.26 a	9.46 a	42.6 a
T_3	7.05 b	8.65 ab	37 ab
T_4	6.98 c	8.48 b	36 ab
T_5	7.17 abc	8.75 ab	40.60 a
T_6	6.70 e	8.62 c	40.27 c
T_7	6.58 e	8.57 c	39.71 cd
T_8	6.40 e	7.20 d	38.5 e
T_9	6.48 e	7.87 cd	37.70 e-f
T_{10}	6.67 f	7.22 d	36.80 f
T_{11}	7.01 f-g	6.78 e	35 g
T_{12}	6.35 g	6.50 e-f	34.2 g-h
T_{13}	6.32 g-h	6.42 g	34 h
T_{14}	6.31 h	6.31 g	34.9 i
T_{15}	6.15 i	6.19 g-h	33.60 i-j
T_{16}	5.52 i	5.73 h	33.38 j
Sx	0.51	0.98	3.00

T_1 = Prilled urea, T_2 = PU given in furrows, T_3 = PU given between two rows, T_4 = PU and seeds given in same furrows, T_5 = USG placed at 10 cm depth at 10 cm distance, T_6 = USG placed at 10 cm depth at 10 cm distance, T_7 = USG placed at 10 cm depth at 10 cm distance, T_8 = USG placed at 10 cm depth at 20 cm distance, T_9 = USG placed at 10 cm depth at 20 cm distance, T_{10} = USG placed at 10 cm depth at 20 cm distance, T_{11} = USG placed at 10 cm depth at 30 cm distance, T_{12} = USG placed at 10 cm depth at 30 cm distance, T_{13} = USG placed at 10 cm depth at 30 cm distance, T_{14} = USG placed at 10 cm depth at 40 cm distance, T_{15} = USG placed at 10 cm depth at 40 cm distance and T_{16} = USG placed at 10 cm depth at 40 cm distance.

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IV. Conclusion

Urea is one of the most widely used fertilizers to supplement the nitrogen requirement of crops. However, indiscriminate use of this fertilizer reported to not only cause soil degradation which ultimately increases crop production. Thus, judicial application of this fertilizer is imperative to sustain soil fertility, particularly in producing pulse crops as they also trap atmospheric nitrogen. A randomized complete block design (RCBD) was adopted to explore the growth responses of mung beans to different methods of nitrogenous fertilizer application. Findings of this study have shown prilled urea application in furrows has the potential to better yield through enhancing better performance in yield contributing parameters of mung bean. Such experiments with prilled urea and USG could be tested further in different mungbean cultivated areas of Bangladesh to justify the present findings.

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