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EFFECT OF DIFFERENT SOWING DATES ON GROWTH AND YIELD OF MUNGBEAN (*Vigna radiate* L.)

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ABSTRACT

Islam S, Chakrabarty S, Shamsunnahar, Hoshain S (2021) Effect of different sowing dates on growth and yield of mungbean (*Vigna radiate* L.). *Int. J. Expt. Agric*. 11(2), 5-10.

The field experiment was carried out during January 2019 to first week of April 2019 at the field Agriculture of Noakhali Science and Technology University to find out the suitable sowing date and observed effect of different sowing dates on growth and yield of BARI Mung-5. The experiment was conducted considering only one factor *i.e.*, different sowing dates. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications and three treatments. The treatments consisted of three dates of sowing *viz.* 1st January (S_1), 15th January (S_2) and 30th January (S_3). Results from this experiment had shown that, the yield performance of mungbean (BARI Mung-5) responded significantly to different sowing time. The highest plant height (29.2 cm), branch plant^{-1} (6.40), seed pod^{-1} (6.46), pod length (6.01 cm) and maximum pod plant^{-1} (29.06) was obtained from the sowing date of 15th January and the highest weight of 1000 seed (46.34 gm) was found from the sowing date of 1st January. The result of the study indicated that, BARI Mung-5 with the sowing date of 15th January produced the highest seed yield (1.82 tha^{-1}). The plant height, pod length (cm) and seed plant^{-1} were found statistically non-significant according to the result of the experiment while branches plant^{-1}, pod plant^{-1}, 1000- seed weight (gm) and yield (tha^{-1}) was obtained statistically significant on different dates of sowing.

Key words: *BARI Mung-5, sowing, growth, yield*

INTRODUCTION

Mungbean (*Vigna radiata* L.) is one of the major pulse crops supplementing protein in cereal-based diet of the poor people in Bangladesh. Mungbean [*Vigna radiata* (L.) Wilczek] belongs to Fabaceae family and usually it is known as green gram and called leguminous crop (Patel *et al*. 2014). Legume grains provide food for humans and feed for livestock, along with providing these benefits legume crops also improve soil fertility (Baddeley *et al*. 2013). Mungbean (*Vigna radiate* L.) being a leguminous crop can replenish soil fertility and avert land degradation and improves crop production and livestock rearing while sustaining the ecosystem (Chattha *et al*. 2017). Mungbean seed have contained higher percentage of protein (28.5%), fiber (0.95%), fats (0.65%) and ash (3.75%) (Monem *et al*. 2012). Being a rich source of protein, it maintains soil fertility through biological nitrogen fixation in soil and thus plays a vital role in sustainable agriculture (Kannaiyan 1999). Average rate of atmospheric nitrogen fixed by mungbean is 34 kgha^{-1} annually (Torabian *et al*. 2019; Khan *et al*. 2020). It is potentially useful in the predominant rice-based farming system because of its short duration (Ahmed *et al.* 1978). It is a short duration crop and got harvest maturity within100 days after sowing (Aziz-ur-Rehman *et al.* 2019). Mungbean has ability to endure water scarcity conditions because of its short life cycle it can be adjusted in cropping systems of winter and summer crops (Raina *et al.* 2016). According to Food and Agriculture Organization (FAO), per capita requirement of pulse is 45 g but in Bangladesh, only 12 g of pulse is available per capita per day. About 6.01 million metric tons of pulse will be required to meet the present per capita requirement of Bangladesh (FAO 2012). There has been a continuous decline in production of pulses in Bangladesh during the last decade. Yield potential of mungbean is generally low. Various factors responsible for low yield of mungbean at the farmer's field. Among different reasons for the lower production of pulses in Bangladesh, seeding time and plant population have special importance. In the changing scenario of different abiotic and biotic stress, the managerial practices must be optimized for ensuring the better crop production (Hassan *et al.* 2020a,b). Sowing time, a non-monetary input is the single most important factor to obtain maximum yield from mungbean (Samanta *et al.* 1999). Early or late sown crop may not germinate properly followed by lower growth and development producing lower yield (Hussain *et al.* 2004; Islam 1983). In Bangladesh many research has been done on growth, yield attributes and yield of different varieties of mungbean in relation to variation of sowing time (Ahmed *et al.* 1978; Miah *et al.* 2009). Optimum time of sowing of mungbean may vary from variety to variety and season to season under different agro-ecological conditions. Agro-ecological conditions play a vital role in the determination of planting time. Similarly, optimum sowing time in mungbean may vary from variety to variety (Sarkar *et al.* 2004). Planting time is of paramount importance, and it has a significant effect on growth, development, and yield (Asghar *et al*. 2006; Aslam *et al*. 2015; Hassan *et al*. 2020c; Mohsin *et al*. 2021). A significant effect of sowing date on seed yield was found in mungbean. Various varieties of mungbean respond differently to sowing dates and growing season. Thus, for different varieties of mungbean there should be varied optimum sowing dates (Reddy 2009) After identifying high yielding cultivars, sowing at optimum dates can result in higher yields (Ali and Gupta, 2012). Sowing date is important for pulses that must be adjusted, or alternative cropping patterns developed. However, information about response of newly developed mungbean cultivar to different sowing date is lacking.

Several research works on different varieties of mungbean with time of sowing have been done in different regions of Bangladesh. But little information is available particularly for Lower Meghna River and Estuarine Floodplain soil under agro-ecological zone-19. In this zone, farmers usually sow local variety of mungbean without maintaining proper time schedule and planting density. They hesitate to grow mungbean in rows, although row sowing facilitates easy intercultural operations resulting in higher yield. Therefore, the present work to be carried out to find out the suitable sowing dates and view to effect of different sowing dates on growth and yield of mungbean cv. BARI Mung-5.

MATERIALS AND METHODS

Description of experimental site

Location

The experiment was carried out at the Agricultural field laboratory, Noakhali Science and Technology University, Noakhali during the period from January 2019 to first week of April 2019 to study the effect of different sowing date on growth and yield of mung-bean cv. BARI Mung-5. Geo-graphically the experimental field was located at 25"75' latitude and 91"50' longitude at mean altitude of 18 m above the sea level.

Agro-ecological region

The experiment field is conducted to the agro-ecological zone 19 and the name is Lower Meghna River and Estuarine Floodplain. This region occupies a large area, mainly low lying between the south of the Surma-Kushiyara Floodplain and the North edge of the Young Meghna Estuarine Floodplain. It comprises smooth, almost level, flood-plain ridges, and shallow basins.

Soil

The experimental field was almost level land having sandy loam soil, moderately alkaline, with pH value 7.5. The soils become more saline in dry season. General fertility is medium but low in organic matter. Source: Soil Resource Development Institute (SRDI), Noakhali.

Experimental treatment and design

Three levels of sowing dates were used as experimental treatment *viz*., S_1= 1st January, S_2 = 15th, January and S_3 = 30th January. The experimental was laid out in Randomized Complete Block Design (RCBD) with three replications. The unit plot size was 10 m^2 (4m x 2.5m). The replications were separated from one another by 1m spacing. The spacing between the individual plot was 0.5 m.

Seed Collection

Seeds of BARI Mung-5 were collected from the Bangladesh Agriculture Research Institute (BARI), Gazipur, Bangladesh.

Main land preparation and fertilization

The experimental land was first opening by power tiller. Later 4-5 ploughing and cross ploughing was done at last week of December 2018. The land was ploughed and deep ploughing for good tilt which help to get desire yield. To break the soil clods was used small less weight bamboo stick with ladder. The total amount of Urea, TSP and MoP at the rate of 52 kgha^{-1}, 73 kgha^{-1}, 50 kgha^{-1} respectively were applied at the time of final land preparation.

Sowing of seeds

Before seed sowing, the seeds are soaked into water about 8 hours for proper spouting. The seeds of mungbean were planted in the line sowing method maintained 2-3 cm depth on 1st January 15th January and 30th January using 30 cm × 10 cm spacing at @ 40 kgha^{-1} seed.

Intercultural operations

The following intercultural operations were done to maintain and ensure the normal growth of the crops. Few weeds were found in each plot after two weeks of seed sowing. They were uprooted immediately by hand pulling. Weeding was done three times within 15 days intervals. After sowing the irrigation was needed as the soil was too much dry and the weather was sunny. The first irrigation was done at 15 DAS. After that the rainfall was available throughout the whole cultivation period so there was no needed for artificial irrigation.

Data collection and statistical analysis

For data collection, seven hills were selected at random from each plot and tagged for measuring plant height and seven hills were selected for counting the number of leaves plant^{-1} at 30, 40 and 50 DAS. To determine dry weight the sample plants were first air dried for 3-4 hours. Then the samples were packed in labeled brown paper bags and dried in the oven for 24 hours until constant weight was reached. After oven drying, the samples were weighed by using electric balance. Seven plants from each plot were selected at randomly before harvesting and were uprooted for collection of yield attributes data of BARI Mung-5. In each plot central

1m×1m area was harvested to record the yields of grain. The harvested crop of each plot was separately bundled, properly tagged, and then brought to the threshing floor. The harvested crops were threshed by hand sticks and the fresh weight of grain yield was recorded plot wise. Data recorded for growth and yield parameter were compiled and tabulated in proper form for statistical analysis. Analysis of variance was done with the help of MSTAT-C computer package programme, developed by Russel (1986). The mean differences among the treatments were adjudged by DMRT test (Gomez and Gomez, 1984).

RESULT AND DISCUSSION

Effect of different sowing dates on growth parameters of mungbean

The early growth parameters (plant height, leaves plant^{-1} and dry weight) were very slow at 30 DAS, then it increased rapidly from 40 DAS and highest at 50 DAS. At 30 DAS and 40 DAS the plant height was statistically significant but at 50 DAS the plant height was found statistically non-significant (Table 1). The highest plant height 29.57 cm was observed at 50 DAS with the planting date of 15th January and the lowest plant height 18.79 cm was recorded at 30 DAS with the planting date of 30th January (Table 1). Number of leaves plant^{-1} were statistically significant at all sampling dates (Table 1). The highest number of leaves plant^{-1} (28.59) was found at 50 DAS sown mungbean 15th January and the lowest number of leaves plant^{-1} (15.39) was recorded at 30 DAS sown 1st January (Table 1). Different scientists reported that majority of crops can utilize the factors of favourable environment which ultimately influences plant to have more growth in mungbean plants (Miah *et al*. 2009; Soomro 2003; Sarkar *et al.* 2004; Quresh and Rahim, 1987). On the other hand, the dry weight of plant was statistically significant at 30 DAS and 40 DAS and 50 DAS at 1% level of probability (Table 1). The maximum dry weight (18.54) was found at 50 DAS on sowing date of 15th January and minimum dry weight (9.34) was recorded on sowing time 30th January at 30 DAS (Table 1).

Effect of different sowing date on yield contributing characters of mungbean

Sowing time had no significant effect on plant height (Table 2). Plant height increased gradually with delay in sowing due to increased temperature as reported by Poehlman (1991). Number of days required for first flowering was reduced with delay in sowing; the resultant effect might be due to increased temperature. This present study revealed that the highest plant height (29.2 cm) was recorded sown mungbean 15th January and the lowest plant height (23.7 cm) was observed sown mungbean 30th January (Table 2). The number of branches plant^{-1} was not significantly influenced by different planting dates (Table 2). The results clearly indicated variation among sowing in terms of producing number of branches per plant. The maximum number of branches plant^{-1} (6.40) was recorded sown 15th January, while minimum branches plant^{-1} (4.05) was noted sown 30th January (Table 2). The number of pods plant^{-1} was significantly influenced by different sowing dates at 1% level of probability (Table 2). The highest number of pods plant^{-1} was recorded (29.06) which obtained from sown 15th January and the lowest number of pods plant^{-1} recorded (21.34) which was recorded from the date of sowing 30th January (Table 2). The highest number of pods plant^{-1} (29.06) was recorded at planting date 15th January which was statistically identical with planting date 1st January (Table 2). Rakesh *et al*. (2000) and Rehman *et al.* (2009) stated that maximum number of pods plant^{-1} was recorded for 30 March while minimum was recorded for 15 July. Those results were dissimilar to the present study. On other hand, Miah *et al*. (2009) reported higher number of pods in mungbean plant sown in March and April. Those results had also dissimilarities to the present study. From table 2, it was observed that, the length of pod in relation to different sowing date is statistically non-significant. It was noted that the longest pod length (6.01 cm) was found sown 15th January and shortest pod length (4.9 cm) was recorded sown 30th January (Table 2). Number of seeds pod^{-1} is an important feature that unswervingly linked to the possible highest yield of legume crops. It is the final product at harvest and important source of human food. Data concerning to seed per pod presented in Table 2 and noted that sowing had no significant effect on it. The maximum number of seeds pod^{-1} (12.46) was found sown 15th January and the minimum number of seeds pod^{-1} (10.34) was obtained sown 30th January (Table 2). The above findings were dissimilar with Miah *et al.* (2009) who found lower number of seeds pod^{-1} found when mungbean sown in April. Among various growth and yield parameters, the most important and promising factor that contributes toward yield is 1000-seed weight of mungbean. Data regarding 1000-seed weight is given in Table 2. Results directed that sowing dates had positive effect on 1000-seed weight. Maximum 1000-seed weight (46.34 g) was obtained from sown 1st January, and it was statistically identical with sown 15th January and minimum 1000-grain weight (44.52 g) was obtained from sown 30th January (Table 2). Rehman *et al.* (2009) who stated that highest 1000 seed weight was recorded for 30 March while lowest was recorded for crop planted on 15 July. On other hand, Farghali and Hussain (1995) was reported maximum 1000 seed weight in mungbean crop sown on 1 May. These two findings dissimilar with the present study because this study was conducted in winter period instead of summer. Seed yield of mungbean (BARI mung5) was significantly influenced by different sowing dates at 1% level of probability. (Table 2). Results showed that 15th January sowing produced the highest seed yield, which resulted from the highest number of branches plant^{-1}, pods plant^{-1}, pod length, seeds pod^{-1} and 1000 seed weight. Sowing after 15th January decreased the seed production and 30th January sowing produced the lowest seed yield. Soomro (2003) found that delay in sowing causes a

substantial decrease in all the growth and development parameters of mungbean. In this experiment, the highest seed yield of mungbean was recorded 1.82 tha^{-1} which was obtained sowing 15th January and the lowest seed yield of mungbean was recorded 1.06 tha^{-1} sowing 30th January (Table 2). This result was agreed with the findings of Jahan and Adam, 2012. However, these results differ with the findings of Ramzan *et al.* (1992) and Raza and Hasanzadeh (1995) who reported that maximum seed yield of mungbean planted in July. Bhingarde and Dumbre (1994) was reported that seed yield of mungbean was significantly affected by dates of sowing. They reported that higher seed yield was obtained from 27 February and 12 March than another delayed sowing. They opined that higher grain yield was mainly associated with higher number of pods $plant^{-1}$, seeds $plant^{-1}$ and 1000 seed weight.

Table 1. Effect of different sowing dates on growth parameters of mungbean

Treatment	Plant height (cm)			Leaves $plant^{-1}$			Dry wt. (gm $plant^{-1}$)		
	30 DAS	40 DAS	50 DAS	30 DAS	40 DAS	50 DAS	30 DAS	40 DAS	50 DAS
S_1	21.73ab	23.93c	27.39	15.39c	19.52bc	20.43 c	10.02ab	15.87ab	15.39bc
S_2	22.57a	28.06a	29.57	22.21a	26.09a	28.59a	11.82a	16.03a	18.54a
S_3	18.79c	27.31ab	26.41	18.43b	21.47b	24.57b	9.34c	14.56bc	16.37b
F-test	**	**	NS	**	**	**	**	**	**
CV (%)	7.70	6.41	4.76	14.81	12.32	13.58	14.34	3.70	7.54

In a column figure with same letter do not differ significantly. NS= non-significant.
** indicate significant at 1% level of probability. S_1 = 1st January, S_2 = 15th January and S_3 = 30th January.

Table 2. Effect of different sowing dates on the yield contributing characters of mungbean

Sowing dates	Plant height (cm)	Branches $plant^{-1}$	Pods $plant^{-1}$	Pod length (cm)	Seeds pod^{-1}(no.)	1000 seed weight (gm)	Yield (tha^{-1})
S_1	27.47	6.06b	28.60a	5.57	11.90	46.34a	1.484b
S_2	29.2	6.40a	29.06a	6.01	12.46	46.06a	1.82a
S_3	23.7	4.05c	21.34b	4.90	10.34	44.52b	1.06c
CV (%)	8.57	19.24	13.52	9.01	7.38	1.76	22.49
F-test	NS	**	**	NS	NS	**	**

In a column figure with same letter do not differ significantly. NS= non-significant.
** indicate significant at 1% level of probability. S_1 = 1st January, S_2 = 15th January and S_3 = 30th January.

CONCLUSION

From the above findings it can be concluded that BARI Mung-5 showed better performance planting on 15th January (S_2) resulting highest seed yield. However, further research may be needed for ensuring highest yield performance in mungbean in different agro-ecological zones (AEZ) of Bangladesh for regional adaptability.

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CONFLICT OF INTEREST

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

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