Progressive Agriculture 29 (4): 313-319, 2018 ISSN: 1017 - 8139

Progressive Agriculture
Journal homepage:http://www.banglajol.info/index.php/PA

Study on growth and yield of mungbean in southern part of Bangladesh

A Momen, MHK Howlader*, AJMN Nabi, MAR Sharif, MZ Haque

Department of Agricultural Botany, Patuakhali Science and Technology University, Patuakhali 8602, Bangladesh.

Abstract

An experiment was carried out at the field laboratory of the Department of Agricultural Botany, Patuakhali Science and Technology University (PSTU), Patuakhali during the period from January to March, 2012 to study the effect of mugbean genotypes on growth, development, morpho-physiological, yield and yield attributing characters under the agro ecological Zone (AEZ-13) in the region of Southern part of Patuakhali District. Five hybrid genotypes of mugbean viz., Local variety (V_1), BARI mung 5(V_2), BINA mung 5(V_3), BARI mung 6(V_4) and BINA mung 8(V_5) were used as planting materials for this study. Among the genotypes, BINA mung 5 showed significantly better performance on growth, yield and morpho-physiological characters compare to other genotype during this study while local variety were less efficient among those parameters. As a result, the tallest plant of 57.020 cm higher TDM (72.538 g/plant) and LA (421.152 cm^2) were recorded in BINA mung 5 at harvest. BINA mung 5 also had higher number of seeds per pod (13.25), 1000 seeds weight (52.495g), grain yield (1.997t/ha), straw yield (3.660t/ha), biological yield (5.657t/ha) and harvest index (35.303%). On basis of these findings, BINA mung 5 was the most productive variety under the coastal area.

Key words: Variety, coastal, productive

***Corresponding Author:** hhkabir63@gmail.com

Introduction

Pulses are important crops in Bangladesh. They occupy an area of about 317.80 thousands hectares with an annual production of 237 thousands metric tons (BBS, 2005). Pulses mainly being the Rabi season crops which are losing area under cultivation each year due to increase in cultivation of wheat, vegetables and high yielding boro rice with increasing facilities of irrigation. Mungbean (*Vignaradiata* L.) is an important, wide spreading, herbaceous, annual, self-pollinated legume pulse crop under the family Leguminosae. In Bangladesh, among pulses mungbean ranks fourth in acreage, third in production and first in market price (BBS, 2011). Mungbean is one of the important pulse crops grown principally for its protein rich edible seeds. As a legume crop Mungbean has also the ability to improve the physical, chemical, biological nitrogen fixation from the atmosphere. The green plant and hay are utilized as fodder. So, it may be considered as an inevitable component of sustainable agriculture. Mungbean contributed 6.5% of the total pulse production in our country (BBS, 2011). Most of the farmers of Bangladesh were cultivating traditional, local varieties with low yield potential. However, expansion of mungbean cultivation in such non-traditional areas depends largely on its competitive ability with other crops (Hamid, 1996; Islam *et al.*, 2015) as well as its adaptability over a wide range of environmental conditions rather than pesticide residues (Popalghat *et al.*, 2001; Rahman *et al.,* 2018; Rokonuzzaman*et al.,* 2018; Islam *et al.*, 2015).

Moreover, farmers are losing interest in producing Black gram due to low income per unit of resources invested. Therefore, attention should be given to increasing yield through the proper selection of high yielding varieties (Sing *et al*., 2009).The pesticide frequency for the cultivation is followed by Islam *et al.* (2015). However, other conditions are almost normal for the cultivation of mungbean. The yield components depend on some physiological traits rather than metal pollution either in soil and cultivated crops (Uddin *et al.,* 2016). To understand the physiological basis of yield difference among the genotypes of mungbean, it is essential to quantify the components of growth, and the variation, if any may be utilized in crop improvement. However, the present experiment was performing under the southern part of Patuakhali region of Bangladesh which was slightly affected by salinity was the major causes of its low yield. Therefore, this was carried out to investigate the varietal performances on the growth, development and yield attributes of Mungbean under the southern part of Patuakhali District.

Materials and Methods

The experiment was conducted at the field laboratory of Patuakhali Science and Technology University (PSTU) and covered by the Ganges Tidal Flood Plains under AEZ-13. The soil of the experiment field was silty clay loam having P^H value of 7.0. The seeds of Five Mungbean Varieties viz. BARI mung 5, BINA mung 5, BARI mung 6 and BINA mung 8, Local cultivar were used as planting material for this experiment. The experiment was laid out in Randomized Block Design (RCBD) with four replications. The fertilizer were applied such as urea, TSP and MOP at the rate of 20, 150 and 50 kg per ha, respectively during the final land preparation. Seeds were sown in rows by hand plough on January 22, 2012. The distance between row to row and seed to seeds were 40 and 15 cm, respectively. Randomly selected four plants in each plot for measures plant height, and number of leaves. Leaf area index was measured by dividing leaf area per plant with surface area (cm^2) covered by the plant.

Results and Discussion

Number of leaves per plant**:** It is evident from the data that the genotypes differed significantly with respect to number of leaves plant^{-1} at all the stages in this study (Table 1). In general, leaves increased up to 55 DAS and decreased thereafter at harvest. Among the genotypes, BINA mung 5 recorded significantly higher number of leaves at all the stages and minimum number of leaves was recorded in Local variety. On the basis of these results, the maximum number of leaves plant^{-1} (23.75) was produce from the variety BINA mung 5 while the minimum number of leaves (15.250) was found from the Local variety at 55 DAS. Similarly, BINA mung 5 recorded the maximum number of leaves plant^{-1} (8.00, 18.00 and 22.75) followed by BINA mung 8 (6.750, 15.250 and 18.250) at 15, 35 and at harvest, respectively whereas Local variety produces the minimum leaves plant^{-1} (3.75, 11.25 and 13.50), respectively. Similar results reported by Hossain *et al.* (2001). The results showed that different genotypes had different degrees of salt tolerance in plant height attribute.

Dry weight of root**:** The dry weight of root data was statistically similar at 15 DAS in case of they did not differ significantly among the genotypes of mungbean (Table 2). On the other hand, the highest dry weight of root (1.922 g plant^{-1}) was recorded in BINA mung 5 which was statistically identical with BINA mung 8 (1.882 g plant^{-1}) and BARI mung 6 (1.823 g plant^{-1}) at 35 DAS**.**Similar results reported by Kandil*et al.* (2012) studied the similar result where they found that the mungbean IV 2010 variety recorded the highest root fresh and dry weight compare to other genotypes.

Dry weight of shoot**:** The data on shoot dry weight presented in Table 3, which indicated significant differences among the genotypes at all the stages except 15 DAS. Among the genotypes ofMungbean, dry weight of shoot had higher (30.400 g plant^{-1}) in

Table 1. Effect of mungbean genotypes on number of leaves per plant at different days after sowing (DAS)

Genotypes	Number of leaves plant^{-1} at different DAS			
	15	35	55	Harvest
Local variety	3.750 d	11.250 d	15.250 d	13.500 d
BARI mung 5	5.500 c	12.250 c	17.750 c	15.750 c
BINA mung 5	8.000 a	18.000 a	23.750 a	22.750 a
BARI mung 6	6.000 c	14.750 b	19.000 bc	17.750 b
BINA mung 8	6.750 b	15.250 b	19.750 b	18.250 b
$LSD_{0.05}$	0.5806	0.7437	1.289	0.6890
Level of sig.	**	**	**	**
CV (%)	6.27	3.38	4.38	2.54
Sx	0.1884	0.2414	0.4183	0.2236

** = Significant at 1% level of probability

Table 2. Effect of mungbean genotypes on dry weight of root (g plant^{-1}) at different days after sowing (DAS)

Genotypes	Dry weight of root (g plant^{-1}) at different DAS			
	15	35	55	Harvest
Local variety	0.202	1.630 b	2.895 b	3.343 d
BARImung 5	0.228	1.730 ab	2.980 b	3.765 bc
BINA mung 5	0.288	1.922 a	3.307 a	4.063 a
BARImung 6	0.233	1.823 a	3.027 b	3.965 ab
BINA mung 8	0.237	1.882 a	3.148 ab	3.657 c
$LSD_{0.05}$	0.0689	0.1823	0.2484	0.2756
Level of sig.	**	**	**	**
CV (%)	18.97	6.63	2.95	4.74
Sx	0.0224	0.0592	0.0806	0.0894

*= Significant at 5% **=Significant at 1% level of probability and ns=not significant

Table 3. Effect of mungbean genotypes on dry weight of shoot (g plant^{-1}) at different days after sowing (DAS)

Genotypes	Dry weight of root (g plant^{-1}) at different DAS			
	15	35	55	Harvest
Local variety	5.950	24.850 c	42.400 c	56.225 e
BARImung 5	6.100	24.975 c	42.550 c	57.750 d
BINA mung 5	6.800	30.400 a	49.750 a	68.475 a
BARImung 6	6.350 c	28.075 b	46.675 b	61.475 c
BINA mung 8	6.600	27.600 b	46.725 b	63.325 b
$LSD_{0.05}$	0.6026	1.348	1.408	1.362
Level of sig.	**	**	**	**
CV (%)	6.148.74	3.22	2.00	1.44
Sx	0.1956	0.4376	0.4569	0.4422

** = Significant at 1% level of probability and ns= not significant

BINA mung 5 while Local variety recorded the significant lower dry weight of shoot (24.850 g plant^{-1}) which was statistically similar with BARI mung 5 (24.975 g plant^{-1}) at harvest. Similar results were also observed at 55 DAS. Kandil *et al.* (2012) studied the similar result with my study where studied on the performance of mungbean to salinity stress.

***Total dry matter (TDM)*: ** A significant variation was found due to the effect of mungbean in respect of total dry matter (TDM) at 35, 55 and harvest but 15 DAS did not differ significantly (Table 4). However, TDM showed significantly increasing trend with the increasing DAS and continuing at harvest. These results revealed that, the higher TDM was recorded at harvest while BINA mung 5 recorded the highest TDM (72.538 g plant^{-1}) which was significantly differ among the other genotypes of mungbean. On the other hand, Local variety (59.568 g plant^{-1}) and BARI mung 6 (62.515 g plant^{-1}) were statistically similar at this stage where Local variety had lower TDM.

Table 4. Effect of mungbean genotypes on total dry matter (g plant^{-1}) at different days after sowing (DAS)

Genotypes	Total dry matter (g plant^{-1}) at different DAS			
	15	35	55	Harvest
Local variety	6.153	26.480 c	45.295 c	59.568 c
BARImung 5	6.327	26.705 c	45.530 c	62.515 c
BINA mung 5	7.087	32.323 a	53.057 a	72.538 a
BARImung 6	6.583	29.898 b	49.703 b	65.440 b
BINA mung 8	6.837	29.483 b	49.872 b	66.983 b
$LSD_{0.05}$	0.6855	1.355	2.072	2.049
Level of sig.	NS	**	**	**
CV (%)	6.74	3.03	2.76	2.04
Sx	0.2225	0.4396	0.6723	0.6650

** = Significant at 1% level of probability and ns= not significant

***Leaf area index (LAI)*: ** Statistical analysis of the data on LAI showed significant difference among the genotypes of mungbean at different days after sowing except 15 DAS (Table 5). Among the genotypes, the LAI had higher (0.291) in BINA mung 5 at 35 DAS which was closely followed by BINA mung 8 (2.275), BARI mung 6 (0.258) and BARI mung5 (0.242) at 35 DAS where other variety Local variety recorded significantly the lower LAI (2.32).This variation was also indicated that the different variety were different effect on LAI in case of the variation in genetic makeup and their regional adaptability in southern part of Patuakhali.

***Number of seeds per pot*: ** Seeds per pod data obtained the significant variation due to the effect of mungbean genotypes at harvest. The data on seeds per pod indicated that the genotypes BINA mung 5 recorded the maximum seeds per pod (13.25) among all the genotypes which was significantly differ with all the genotypes of mungbean. It is also evident from data that the genotypes Local variety recorded the minimum seed per pod (8.750) compared to all other genotypes. Similar results reported by Rahman *et al.* (2016) the highest number of seed pods plant-1 (40.73 was obtained from BINA mung-5. Similar study was also trend by Hussain *et al.* (2001) who conducted an experiment on growth and yield response of two mungbean cultivers.

Grain yield: Analysis of variance data on grain yield of t/ha significantly influenced by the genotypic effect of mungbean harvest. The grain yield was higher in (1.997 t/ha) in BINA mung 5 which was statistically similar to BINA mung 8 (1.933 t/ha). In contract, the lower grain yield was recorded in the genotype Local variety (1.545 t/ha) which was differing significantly with the other mungbean genotypes. Similar results reported by Rahman *et al.*(2016) the highest seed yield was obtained from Bina mung-5.

Straw yield: A significant variation was observed due to the effect of mungbean genotypes in relation to straw yield. This significant variation results indicate that the straw yield (3.660 t/ha) was in BINA mung 5 while Local variety and BARI mung 5 produces statistically the similar lower yield of straw (3.237 and 3.320 t/ha respectively). Similar results reported by Rahman *et al.* (2016) the highest stover yield were obtained from BINA mung-5. Miah *et al* (2009) reported the similar results who found that the yield characters differences among the varieties might be due to their genetic constituents.

Biological yield: Biological yield data showed significant differences by the genotypic effect of mungbean at harvest (Table 1) where the variation results of biological yield had higher (5.667 ton/ha) with BINA mung 5 and it differ significant among other genotypes. However, the lowest biological yield (4.782 ton/ha) was obtained with the Local variety.

Table 5. Effect of mungbean genotypes on leaf area index (LAI) at different days after sowing (DAS)

Genotypes	Leaf area index (LAI) at different DAS			
	15	35	55	Harvest
Local variety	0.024	0.232 b	0.464 d	0.570 d
BARImung 5	0.026	0.242 ab	0.474 d	0.594 cd
BINA mung 5	0.029	0.291 a	0.523 a	0.702 a
BARImung 6	0.027	0.258 ab	0.490 c	0.635 bc
BINA mung 8	0.028	0.275 ab	0.506 b	0.652 b
$LSD_{0.05}$	0.0487	0.0487	0.01541	0.0487
Level of sig.	NS	**	**	**
CV (%)	9.43	8.68	1.89	2.70
Sx	0.0158	0.0158	0.005	0.0158

** = Significant at 1% level of probability and ns=not significant.

Harvest index: A significant variation was found on harvest index due to the effect of mungbean genotypes but all the genotypes of mungbean viz. BINA mung 5 (35.303%), BINA mung 8 (35.263%), BARI mung 6 (35.165%), and BARI mung 5 (34.770%) were statistically higher harvest index except Local variety (Table 6). If so, BARI mung 5 had higher among those

HI and Local variety recorded the lower HI (32.302%). The maximum harvest index in genotypes BINA mung 5 could be attributed mainly be due to better partitioning of dry matter into economic parts and yields of grain and straw.

Table 6. Effect of mungbean genotypes on yield and contributing characters at harvest

Genotypes	Number of seeds per pod	Grain Yield (ton/ha)	Straw yield (ton/ha)	Biological Yield (ton/ha)	Harvest index (%)
Local Variety	8.750e	1.545d	3.237d	4.782e	32.302b
BARI mung 5	9.500d	1.770c	3.320d	5.090d	34.770a
BINA mung 5	13.250a	1.997a	3.660a	5.657a	35.303a
BARI mung 6	11.250c	1.867bc	3.442c	5.310c	35.165a
BINA mung 8	12.000b	1.933ab	3.547b	5.480b	35.263a
CV (%)	3.23	3.87	1.50	1.62	1.29

Conclusion

The genetic and environmental factors can cause a different level of variation of the tested characteristics of mung bean varieties. Because yield is a complex trait resulting from the interaction of morphological, phonological physiological and environmental parameters on the growth of plants, Mungbean. The study results expressed that among the four mung bean varieties, the performance of BINA mung-5 was superior as it produced the highest plant height, TDM, LA number of seeds per pod (, 1000 seeds weight, grain yield, straw yield, biological yield and harvest index were observed in BINA mung 5.Such studies are suggested that BINA mung 5 was the most productive variety under the coastal area of Bangladesh.

References

BBS (2005). Monthly Statistical Bulletin of Bangladesh, February 2005. Statistic Division Ministry of Planning, Government of the People Republic of Bangladesh, Dhaka, p. 133.

BBS (2006). Monthly Statistical Bulletin of Bangladesh, May 2006. Statistic Division Ministry of Planning, Government of the People Republic of Bangladesh, Dhaka, p. 48.

BBS (2011). Statistics Pocket Book of Bangladesh (2009-10). Bangladesh Bureau of Statistics Division, Government of the People Republic of Bangladesh, Dhaka, p. 38.

Hussain F, Malik AU, Haji MA, Malghani AL (2011). growth and yield response of two cultivers of mungbean to different potassium levels. *J. Animal and Plant Sci.,* 21(3): 622-625

Islam MA, Hossain MT, Khatun M, Hossen MS (2015). Environmental impact assessment on frequency of pesticide use during vegetable production. *Progressive Agriculture*, 26: 97-102.

Islam MA, Islam MZ, Hossain MK (2015). Residual analysis of selected pesticides in cucumber and spinach collected from local markets of Mymensingh sadar. *Progressive Agriculture,* 26(1): 38-44.

Kandil AA, Arafa AA, Sharief AE, Ramadan AN (2012). Genotypic differences between two mungbean varieties in response to salt stress at seedling stage. *Intl. J. Agric. Sci.,* 4(7): 278-283.

Miah, M.A.K., Anwar, M.P., Begum, M., Juraimi, A.S. and Islam, M.A. 2009. Influence of sowing date on growth and yield of summer mungbean varieties. *J. Agric. Soc. Sci.,* 5: 73-76

Popalghat, G.R., J.U. Patil, R.B. Deshmukh, and L.B Mhase. 2001. Genotype and environment interaction for seed and seed quality parameters in chickpea. *Legume Res*., 24:248-251.

Rahman MM, Zahan T, Ali MS, Begum M, Bell RW (2016). Effect of variety and seed rate on yield performance of mungbean under strip tillage system. *Bangladesh Agron. J*. 19(1): 81-86

Rahman MM, Hiya HJ, Auyon ST, Islam MA (2018). Exploring the status of disaster risk reduction focusing coping strategies in Rangpur division of Bangladesh. *Progressive Agriculture,* 29(3):195-204.

Rokonuzzaman M, Rahman MA, Yeasmin M, Islam MA (2018). Relationship between precipitation and rice production in Rangpur District. *Progressive Agriculture,* 29(1):10-21.

Singh SK, Singh IP, Singh BB, Singh O (2009). Correlation and path coefficient studies for yield and its components in mungbean. *Legume Res.,* 32(3): 180-185.

Uddin N, Islam MA, Baten MA (2016). Heavy metal determination of brinjal cultivated in Soil with wastes. *Progressive Agriculture*, 27 (4): 453-465.