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COMPARATIVE YIELD PERFORMANCE STUDY OF SOME MUNGBEAN MUTANTS IN THAKURGAON REGION OF BANGLADESH

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ABSTRACT

A field experiment was carried out during the 2016 and 2017 main cropping seasons using a randomized complete block design with three replications in order to evaluate seven characteristics viz., days to 90% physiological maturity, plant height, number of pod per plant, number of seeds per pod, seed yield for two mung bean treatments under rain-fed conditions at Thakurgaon. Analysis of variance showed that, differences varietal was observed for traits studied except number of pods per plant. The variety MBM-656-51-2 mutant had better performance than the other variety with the highest seed yield (1.57 tha^{-1}), while the lowest seed yield was obtained from BARI Moog 6 (1.52 tha^{-1}). Thus, MBM-656-51-2 mutant is recommended as promising variety to the farmers of Thakurgaon areas.

Key words: Yield, mungbean, mutants.

Introduction

Mungbean (*Vigna radiate* L.) also known as green gram, golden gram, Oregon peas and chokoro (Swahili), is native to Bangladesh, India and Pakistan. Grain legumes are the most important food and feed crops in the semi-arid areas of Bangladesh. Protein rich dry land grain legumes, mainly haricot bean, pigeon pea, cowpeas and mung beans are the other crops used in the strategy for improving food security, improving nutrition and generating income. These crops also contribute to improvement of the natural resource base through addition of organic matter and biological nitrogen fixation. Mung bean is grown widely for use as a human food (as dry beans or sprouts) but can be used as a green manure crop and as forage for livestock (CSA, 2016). The crop is characterized by fast growth under warm conditions, low water requirement and excellent soil fertility enhancement via nitrogen fixation (Yagoob and Yagoob, 2014). Fertilization of this crop occurs through self-pollination without requirement of other pollinators like insects, water and wind (Rashid *et al*., 2013). Among legumes, mung bean is noted for its protein and lysine-rich grain, which supplements cereal-based diets (Khan *et al*., 2012, Minh, 2014). The crop is utilized in several ways; seeds, sprouts and young pods are all consumed and provide a rich source of amino acids, vitamins and minerals (Somta and Srinives, 2007). The seed (dry beans) contains 24.2% protein, 1.3% fat and 60.4% carbohydrate (Hussain *et al*., 2011). It is also known to be very healthy and packed with a variety of nutrients such as vitamin B, vitamin C, protein, manganese and a lot of other essential nutrients required for effective functioning of the human health. Mung bean is low in calories and rich in fiber and easily digestible crop without cause flatulence as happens with many other legumes (Minh, 2014). Sprouts are high in protein (21 to 28%), calcium, phosphorus and certain vitamins. Because they are easily digested, replace scarce animal protein in human diets in tropical areas of the world (MoA, 2017). The low land areas of Bangladesh are climatically characterized by high temperature and insufficient amount of rainfall during the crop-growing season. In most of these areas, rainfall distribution is erratic and unreliable. Very short growing seasons are available for the crops grown in this part of the country. Thakurgaon is part of the dry lowland areas of northern Bangladesh. The rain fall is unpredictable in amount and distribution; moreover, the duration is very short. As a result, crops are frequently exposed to moisture stress at critical stages of growth which result in either low yield or total crop failure. Those crops which are early maturing, drought tolerant and resistant to higher temperatures are of great interest to the farmers of the lowland areas of Bangladesh. Several legumes exhibit good drought and heat resistance and this make them potentially very valuable for crop diversification in low rain fall conditions (Dereje *et al*., 1995). Mung bean is very early maturing crop and drought resistant and has great potential for the semi-arid areas with short growing cycle. Special

features are high yield, good nutritive value, the earliness/ drought escape features and the reasonable cost of production. However, it is less cultivated pulse crop in Thakurgaon due to lack of improved varieties. Therefore, the objectives of this study were to evaluate and select early matured, well adaptable and high yielding mung bean varieties in Thakurgaon region.

Materials and Methods

The field experiment was carried out under rain-fed conditions at Thakurgaon during the 2016 and 2017 main cropping seasons. Plains, hills and river valley, characterize the topography of the district and it is highly exposed to soil erosion. Most soils of the district are dominated by sandy textured with poor water holding capacity and less fertile hence most crops failed to produce good yield (Assefa, 2007).The rainfall distribution is unimodal, concentrated during the summer (July to August) leading to one cropping season per year. The experimental material comprised one Mung bean genotypes including one lines (MBM-656-51-2) and one local BARI Moog 6. The seeds of two entries were sown in randomized complete block design (RCBD) with three replications. The plot size was 4 x 3.2 m (12.8 m^2) with harvestable plot and spacing 40 cm between rows and 10 cm between plants was maintained. The spacing between plots and blocks were 0.50 and 1m, respectively. Di-ammonium phosphate (DAP) fertilizer was applied at a rate of 100 kg ha-1 at planting. Livestock were excluded by fencing. No irrigation was applied. Weeds were controlled periodically by hand weeding and other management practices like pest or disease-control was done as required. Homogeneity of error variance was tested prior to combined analysis for collected data using Bartlett's test (Steel and Torrie, 1980) and statistical analyses was performed using Genstat statistical program version 16th edition. Means were separated using Fisher's Least Significant Difference (LSD) test at 5% level of probability as stated in Gomez and Gomez (1984).

Results and Discussion

Plant height: Highly significant difference was observed between two treatments for plant height. The highest plant height (66 cm) was recorded for MBM-656-51-2 mutant, whereas the shortest plant height (63.33 cm) was recorded for BARI Moog 6 (Table 1). In line with the finding, the existence of genotypic variation in plant height (Fahad *et al*., 2014; Zelalem, 2014 and Teame *et al*., 2017) has been reported for common bean.

Table 1. Yield attributing performances of two mung bean mutants grown in Thakurgaon region of Bangladesh

Treatments	Plant height (cm)	No. of branch plant-1	No. of pod branch-1	Pod Length (cm)	No. of seed pod-1
MBM-656-51-2	66.00a	12.67a	30.67	3.47a	11.67
BARI Moog 6	63.67b	12.33b	25.33	3.43b	12.33
CV (%)	3.51	13.7	7.71	3.14	3.4
LSD (0.05)	1.7	0.3	NS	0.02	NS

Number of branch per plant: Highly significant difference was observed between two treatments for number of branch per plant. The highest number of branch per plant (12.67) was recorded for MBM-656-51-2 mutant, whereas the lowest number of branch per plant (12.33 cm) was recorded for BARI Moog 6.

Number of pod per branch: Significant difference was not observed between two treatments for number of pod per branch. The highest number of pod per branch (30.67) was recorded in MBM-656-51-2 mutant, whereas the lowest number of pod per branch (25.33) was recorded for BARI Moog 6 (Table 1).

Pod length: Highly significant difference was observed between two treatments for pod length (Table 1). The highest pod length (3.47 cm) was recorded for MBM-656-51-2 mutant, whereas the lowest pod length (3.43 cm) was recorded for BARI Moog 6.

Number of seeds per pod: Mung bean varieties exhibited variation for number of seeds per pod. The variety BARI Moog 6 produces a greater number of seeds per pod (12.33) compared to the other treatment, while, mutant MBM-656-51-2 produces the lowest number of seeds per pod, about 11.67 seeds per pod.

Seed Yield (tha^{-1}): No significant variation was observed among the treatments response to seed yield. The highest seed yield was recorded from the nutant MBM-656-51-2 (1.57 tha^{-1}) while the lowest yield was recorded from BARI Moog 6 (1.52 tha^{-1}) as shown in Fig. 1. The trial site is characterized with less moisture and low soil fertility condition; hence varieties which tolerate these stresses perform best. Successful cultivars must have good yield and other essential agronomic characters. The greatest yield of this variety could be due to its inherent genetic potential. It could be also due to better local adaptation to study area.

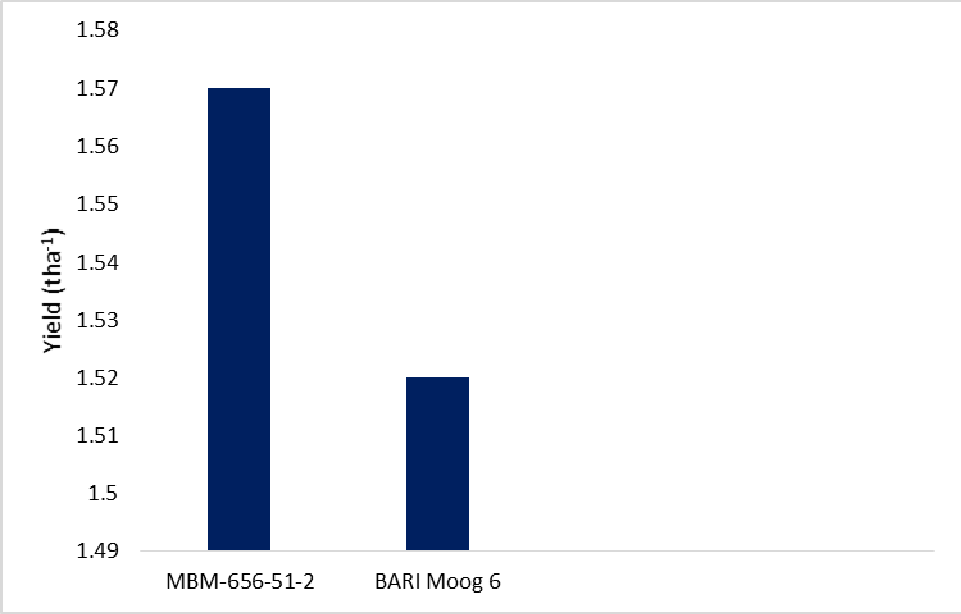

Fig 1. Yield performance of MBM-656-51-2 and BARI Moog 6

Conclusion and recommendation

Overall, MBM-656-51-2 mutant had significantly higher yield (perform well and gave better yield) than the other mung bean variety. The greatest yield of this variety could be due to its inherent genetic potential. Besides, it was more suitable to areas with unreliable rainfall in terms of total amount, distribution and duration where crop failure is often attributed to early cessation of rains and thereby making it adaptive to the study area. As compared to the rest, MBM-656-51-2 mutant is therefore recommended as promising variety to the farmers of Thakurgaon areas.

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