International Journal of Natural and Social Sciences
ISSN: 2313-4461

Performance of BARI Mung 6 at recommended fertilizer rate, biofertilizer and farmer practice

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ARTICLE INFO

Article history

Accepted 10 July 2018
Online release 03 August 2018

Keyword

Biofertilizer
Mungbean
Power Tiller Operated Seeder
Yield

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ABSTRACT

Use of chemical fertilizer in the crop field is harmful though its bring bit higher yield in production but it causes devastating harm in near future like destruction of soil friability, reduction of living microorganism, leach away ground water before they use, encourage plant disease etc. So alternate practice should be followed. An experiment was conducted at Gabua village under Badarpur Union, Patuakhali to study the performance evaluation of chemical fertilizer, biofertilizer and fertilizer rate (only urea) on performance of Mung. The study was done using BARI Mung 6 and Power Tiller Operated Seeder (PTOS) was used as cultivation technique The result from the experiment shows that there is no significant difference in plant number and 1000 grain weight (g) among those treatments and their mean were 31.11, 29, 28.55 and 38.28g, 36.97g, 36.39g respectively. But other yield attributing characters shows significant variation among treatments i.e. chemical fertilizer used field, biofertilizer used field and farmers' practiced mungbean field respectively. Average grain yield in biofertilizer applied field was significantly higher than farmers practiced field. Mean of grain yield were 0.66, 0.57 and 0.49 t/ha respectively.

INTRODUCTION

Pulses are the important protein source for the majority of the people of Bangladesh. It contains protein about twice as much as cereals. It also contains amino acid, lysine which is generally deficit in food grains (Elias, 1986). Pulse bran is also used as quality feed for animals. Apart from these, the ability to fix nitrogen and addition of organic matter to the soil are important factors in maintaining soil fertility (Senanayake et al., 1987; Zapata et al., 1987). In the existing cropping systems, pulses fit well due to its short duration, low input, minimum care required and drought tolerant nature. Mungbean is the third most important pulse in terms of area and tonnage after grasspea (*Lathyrus sativus*) and lentil (*Lens culinaris*)) and first in terms of price (Asaduzzaman et al. 2008). It is grown three times in a year covering 23264 ha with an average yield of 0.77 t/ha (BBS, 2010). Historically, mungbean production in southern Bangladesh has been as a Rabi-season crop following the harvest of transplanted (T.) aman rice.

Sustainable agriculture is the farmers' ability for producing food without affecting the environment as well as the surrounding ecosystem. There are a few issues which are connected to agriculture and one of them is the biophysical issue. It is linked with activities like fertilizer usage, use of artificial nutrients and crop rotation along with the availability of resources like sunlight, water and wind. When it comes to fertilizers, Nitrogen, Potassium and Phosphorus are the 3 main elements or macronutrients. Nitrogen helps in leaf growth, whereas potassium aids sturdy stem growth, water movement and promotion of fruiting and flowering. The nutrients needed for healthy growth of plants are classified based on the elements.

Currently, a real challenge for the workers in the field of agricultural research is to stop the use of expensive agrochemicals/chemical fertilizers. Which negatively affect the environment as well

How to cite this article: Islam MA, Atikuzzamman M, Islam MS and Sathi MA (2018). Performance of BARI Mung 6 at recommended fertilizer rate, biofertilizer and farmer practice. International Journal of Natural and Social Sciences, 5(4): 16-19.

as human health. Chemical fertilizers are used to replenish soil N, in large quantities, they are highly costly and contaminate environment severely (Dai et al, 2004). Biofertilizers fix the atmospheric nitrogen in the available form for plants (Chen 2006). Use of Biofertilizer is of great importance because they are components of integrated nutrient management, and they are also cost effective and renewable source of energy for plants and to help in reducing the use of chemical fertilizers for sustainable agriculture (Rana et al, 2013). Biofertilizer or microbial inoculants can be generally defined as latent cells of efficient strains of a phosphate solubilizing and nitrogen fixing microorganism used for treatment of soil.

In case of farmers in the southern region of Bangladesh, they usually don't use all chemical fertilizer but sometimes a little amount of urea. They don't follow the recommended dose. Therefore the study was carried out to know the differences in yield and yield component of three (3) treatments and recommended dose of urea.

MATERIALS AND METHODS

The experiment was conducted at Gabua village (Latitude 22.408063 and Longitude 90.325082) under Badarpur Unoin which is situated at the northern side of Patuakhali Sadar Upazilla in Rabi season in 2016-17. The variety of mungbean that used for experiment was BARI Mung 6. This experiment was laid out as RCBD with 3 treatments and 3 replications. Seeding was done using Power Tiller Operated Seeder (PTOS) on January 23 and 24, 2017 and the spacing was 30cm x 8 cm with the seed rate of 25 kg/ha. The each plot size was 400 sq.m. Production technology followed as per BARI manual (Krishi Projukti Hatboi).

In 1st treatment all fertilizers (Urea, TSP, MoP, Boric Acid) were applied before land preparation in chemical fertilizer treated plot and in 2nd treatment bio fertilizer (microbial inocula) were applied mixing with seed as per BARI recommendation. We applied only urea as per recommendation in farmers' field. All fertilizers were applied before land preparation. Bio fertilizer was applied mixing with seed.

All data were collected during harvesting while 80% pods turned into black/brown color and after harvesting. Data were collected from 1.2 sq.m and each plot had 3 sampling point. For measuring dry moisture Lab oven was used and sample were dried at 70°C. Grain yield and other yield component data were collected after sun drying of pods using electrical balance.

Statistical analysis

All data on yield and yield components were subjected to single factor (cultivar) analysis of variance in Randomized Complete Block Design (RCBD). The data were analysed using statistical software R.

RESULTS AND DISCUSSION

The data (Table 1) revealed that effect of different fertilizer and biofertilizer application on morphology, yield and yield contributing characters of Mungbean.

Table 1
Morphology, yield and yield contributing characters of BARI Mung 6 under different fertilizer use.

Treatments	Plant No. (1.2 sq.m)	Pod No. (1.2 sq.m)	Pod wt. (gm)	Straw sample	1000 grain wt (g)	Grain yield g (1.2 sq.m)
Chemical fertilizer	31.11	204.22	107.89	36.89	38.28	71
Bio fertilizer	29	163.33	92.22	28	36.97	64.22
Farmers' practice	28.55	157.56	79.33	25.89	36.39	53.44
Significance	NS	*	**	**	NS	*

* Significant at a 5% level of significance; ** Significant at a 1% level of significance;***Significant at a 0.1% level of significance

Plant number

Plant nubmer. shows no significant variation in terms of treatments. Mean of different treatments i.e. chemical fertilizer, biofertilizer and farmers' practice (urea) are 31.11, 29 and 28.55 respectively.

Pod number

There is significantly variation (P< 0.05) in pod number. of different treatments. Application of chemical fertilizer shows more pod number. (204.22) and only urea fertilizer shows less pod (157.56/1.2 sq.m). But bio fertilizer applied field produced more pod number than farmer practice indicating the yield difference. Similar results were reported by Khan (2004).

Pod weight

Pod weight showed significant variation among treatments (P< 0.01). Mean pod weight of chemical fertilizer, biofertilizer and minimum urea applied plots were 107.89, 92.22 and 79.33 respectively. But biofertilizer using field shows significant difference in pod weight from farmers' practice plots.

Straw yield

There is a significant difference (P<0.01) among treatments on straw yield. Straw from chemical fertilizer applied field shows higher (36.89 g) value than others. But there is a little difference between biofertilizer and farmer practice.

1000 grain weight

1000 grain weight showed no significant differences among treatments. But weight differs slightly. Maximum weight of 1000 grain weight were obtained in chemical fertilizer applied crops (38.28 gm). But there is a little difference between biofertilizer and urea applied field in terms of 1000 grain weight i.e 36.97 gm and 36.39 gm respectively. These results are in accordance with that of Rao et al. (1993), Srinivas and Shaik (2002).

Grain yield

Higher grain produced in fertilizer applied plots (71 g) followed by biofertilizer applied plots (64.22 g). Minimum yield showed in farmer practiced plot (53.44 g). These results are strongly supported by the reported findings of Sharma and Room (1993),and Khan et al. (2002).

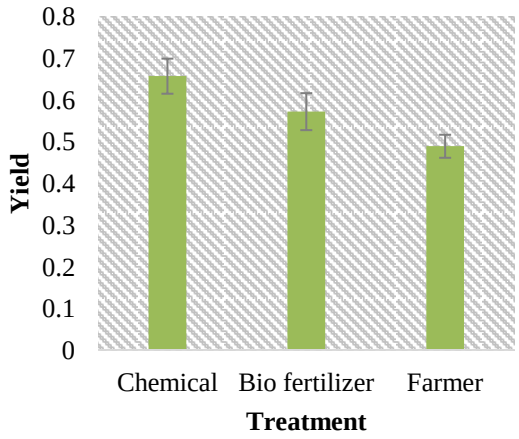

Figure 1
Effect on yield (t/ha) of BARI Mung 6 plant treated with different fertilizer. Vertical bar represents standard error of means (n=3).

Figure 1 shows that chemical fertilizer (0.66 ton) applied field exhibits higher yield than other two fields (0.57 and 0.49 ton). But there is a little or no significant differences among three treatments. However, biofertilizer shows higher yield than farmer field.

CONCLUSION

Chemical fertilizer can inhibit plant growth. Increase allergenic pollen production, affect the dynamics of several vector borne disease. Although it increases crop yield but it is reducing soil health gradually which alarming or agricultural sector and human health Bio-fertilizers can be expected to reduce the use of chemical fertilizers and pesticides. The microorganisms in bio-fertilizers restore the soil's natural nutrient cycle and build soil organic matter. Through the use of bio-fertilizers, healthy plants can be grown, while enhancing the sustainability and the health of the

soil. They are extremely advantageous in enriching soil fertility and fulfilling plant nutrient requirements by supplying the organic nutrients. Bio-fertilizers do not contain any chemicals. This research concluded that farmer can increase the yield of mungbean by applying biofertilizer rather than only using nitrogen in their field for production of mungbean.

ACKNOWLEDGEMENT

This research is supported by CSISA-MI project which is funded by USAID.

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