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Nutritional Requirements of Newly Released Tossa Jute MG-1

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Abstract: The present study was aimed to determine the nutritional requirements of the newly releasedTossa Jute MG-1 for its optimum growth and yield. The experimental location wasManikganj and Kishoreganj of BJRI during the year of 2012-2015. Results showed that N levels affected yield and yield contributing characters over the control. N 100 Kg/ha (T_6) produced highest fibre at both Manikganj (3.08t/ha) and Kishoreganj (3.4 t/ha). But highest dose of N 150Kg/ha showed lower yield than the dose N 100kg/ha. Plant height obtained significantly superior by N 100Kg/ha. Base diameter found highest by N 100Kg/ha that was identical with T_9 where N 150Kg/ha applied. The dose P 10 Kg/ha contributed maximum yield of fibre. Results also explored that the longest plant and base diameter were found significantly higher with 10 kg P/ha. The rate 60 kg K/ha gave the highest fibre yield whereas the supreme rate of K 90 kg /ha yielded significantly lower fibre yield. The dose 20 kg S/ha showed significantly highest fibre yield and yield contributing characters. The results suggested that the combination dose of N100 P10 K60 S20 Kg/ha could be consider producing Tossa Jute MG-1.

Keywords: Tossa Jute MG-1, NPKS, Yield, Cost Analysis

1. Introduction

Nutrients play a vital role on the production of newly released jute varieties. Jute varieties may be different due to their variation in genetic potentialities. Judicial application of NPK and S may increase the yield of a variety. Jute holds an important position in the industrial sector of the economy of Bangladesh [1]. Demand of jute fibre is being increased in the recent years both in home and abroad [2-3]. In this aspect, research regarding development of new high yielding variety of jute and determination of its fertilizer requirement is very important. In actual fact, these requirements vary within the same type of crop. For example, fertilizer requirement of *olitorius* variety is higher than that of*capsularis*. The importance of N, P, K and S on the growth, yield and quality of fiber crops is well established [3 - 17]. It is necessary to find a fertilizer combination which is economically profitable and at the same time gives yield very close to maximum yield potential. Since the varieties of a species may differ in their nutritional requirements. Investigation is needed to find a suitable dose for a variety with different levels of nutrients. Nutritional requirement of Tossa Jute MG-1 (BLG/BJRI Tossa Pat 7) is not finalized yet, which very much important for its release by NSB. The study was aimed to determine the nutritional requirement of Tossa Jute MG-1 for its optimum growth and yield.

2. Materials and Methods

The experiment was conducted at Jute Agriculture Experimental Station at Manikganj and Regional Station Kishoreganj of Bangladesh Jute Research Institute during the year 2012-2015. The experiment was laid out in randomized complete block design with three replications. A total 10 treatment combinations along with a control were distributed randomly in each plot as one replication (Table 1). The dimension of unit plots was 3.1 m × 3.1 m having 1 m space between the plots, blocks and around the field. There was 20 cm deep drain around each block and plot. Each replication was divided into 10 unit plots and the total land required of 13.3 m × 42 m. At the beginning of the experiment, the land was well prepared and fertilizers were applied as per treatment.

Table 1. *Treatment combinations (NPKS in Kg/ha).*

T_1: $N_0P_0K_0S_0$	T_6: $N_{100}P_{10}K_{60}S_{20}$
T_2: $N_{50}P_5K_{30}S_{10}$	T_7: $N_{100}P_{15}K_{90}S_{30}$
T_3: $N_{50}P_{10}K_{60}S_{20}$	T_8: $N_{150}P_5K_{30}S_{10}$
T_4: $N_{50}P_{15}K_{90}S_{30}$	T_9: $N_{150}P_{10}K_{60}S_{20}$
T_5: $N_{100}P_5K_{30}S_{10}$	T_{10}: $N_{150}P_{15}K_{90}S_{30}$

Required amounts of N, P, K, S fertilizers were applied in the form of urea, TSP, MoP and gypsum. Half of Urea was applied at sowing and the rest half was top dressed at 45 days after sowing while all other fertilizers were applied at the time of sowing. Jute seeds were broadcasted at the rate of 8 kg/ha. All cultural operations were done as and when necessary. The crop was harvested when 80% of the plants showed the sign of maturity. After shedding of leaves, the bundles were steeped plot-wise in pond water for 15-20 days for retting and fiber was extracted. At harvesting time, six plants were selected at random from each plot and tagged in the field to note plant height (PH), base diameter (BD), green yield (GY), fiber yield (FY) and stick yield (SY). Statistical analysis was done [18].

3. Results and Discussion

The experiment was conducted with four nitrogen levels (0, 50, 100, 150 kg/ha) in integration with other nutrients to introduce combination treatments. The nitrogen levels affected the plant growth and yield over the control. Nitrogen @ 100 Kg/ha treatment (T_6) produced significant highest fibre yield at Manikganj (3.08t/ha) and Kishoreganj (3.4t/ha). But highest dose of N 150Kg/ha showed significantly lower yield than the dose N 100kg/ha. The growth indicator i.e. plant height and base diameter found significantly highest by N 100Kg/ha and treatment T_9 where N 150Kg/ha used showed statistically identical base diameter to treatment T_6 where used N 100Kg/ha. From the results, it was observed that 100 kg N/ha may be an adequate amount to produce Tossa Jute MG-1.

Addition of different phosphorus levels affected growth and yield parameters of Tossa Jute MG-1. The dose of P 10 Kg/ha contributed maximum yield of fibre (3.08t/ha) andstick (6.91 t/ha). Results also explored that the longest plant and base diameter were found significantly higher with 10 kg P/ha (Figure 1 & 2).

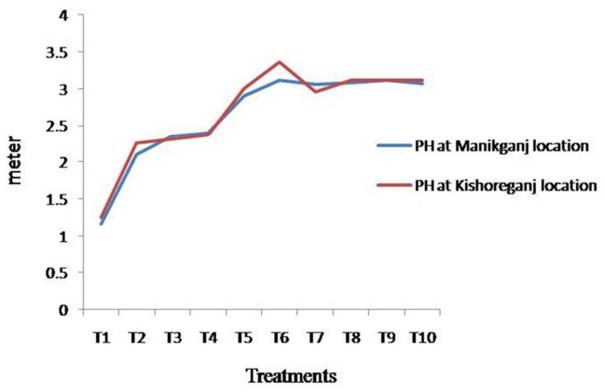

Figure 1. *Plant height of the Tossa Jute MG-1using different chemical fertilizer treatments.*

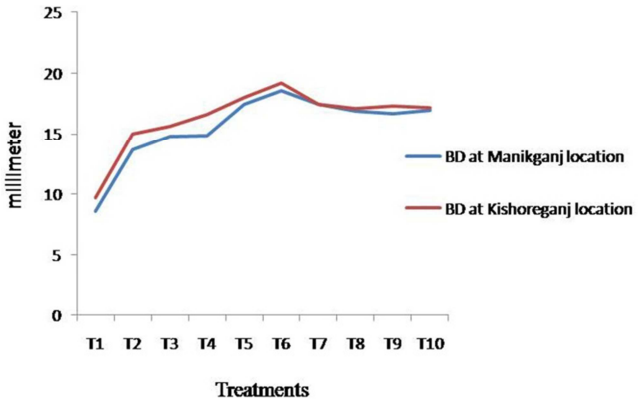

Figure 2. *Base diameter of Tossa Jute MG-1using different chemical fertilizer treatments.*

Four rates of potassium were applied such as 0, 30, 60 and 90 kg/ha. The rate 60 kg K/ha gave the statistically significant plant height, base diameter and fibre yield (3.08t/ha). But the supreme rate of K 90 kg /ha yielded lower fibre yield (3.07 t/ha) compare to K 60kg/ha. Study noticed that Tossa Jute MG-1, needs K 60 Kg/ha to produce maximum yield.

Highest plant height, base diameter, fibre yield (3.4t/ha) and stick yield (7.26t/ha) were observed with 20 kg S/ha in Kishoreganj. Results showed that combined dose of NPK and S 100-10-60-20 Kg/ha may be a suitable combination for the cultivation of Tossa Jute MG-1. These findings are strongly supported by the previous research results [4-13].

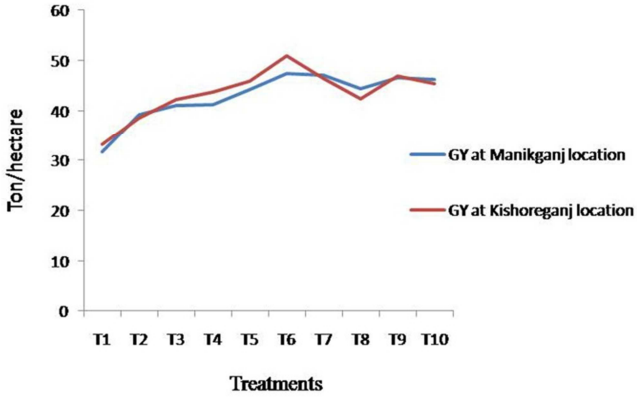

Figure 3. *Green yield with leaves of Tossa Jute MG-1using different chemical fertilizer treatments.*

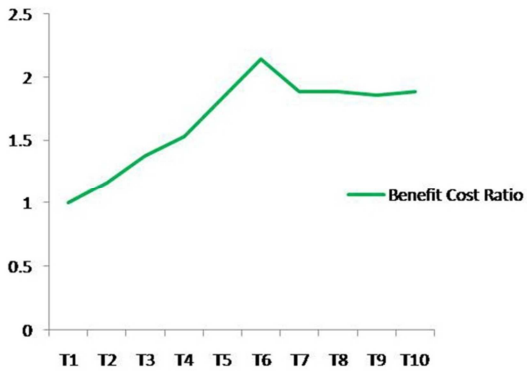

Figure 4. *Benefit cost ratio of Tossa Jute MG-1 using different chemical fertilizer treatments.*

Cost-effective analysis

Jute has always played an important role in the economyof Bangladesh. Considering the fact, benefit cost ratio was estimated andit was observedhighest for the treatment T_6.

Table 2. *Yield of Tossa Jute MG-1 using different nutrient combinations at Manikganj.*

Treatment	Fibre yieldt/ha	Stick yieldt/ha
T_1	0.98e	2.62f
T_2	2.12d	4.6e
T_3	2.33cd	5.76d
T_4	2.48bc	6.16cd
T_5	2.78ab	6.36bc
T_6	3.08a	6.91a
T_7	2.83ab	6.67abc
T_8	2.83ab	6.36bc
T_9	2.8ab	6.66abc
T_{10}	2.83ab	6.71abc
CV (%)	4.8	5.55

Table 3. *Yield of Tossa Jute MG-1 using different nutrient combinations at kishoreganj.*

Treatment	Fibre yieldt/ha	Stick yieldt/ha
T_1	1.10f	2.67f
T_2	2.38e	4.88e
T_3	2.54de	6.01d
T_4	2.63cde	6.5cd
T_5	3.16ab	6.74bc
T_6	3.4a	7.26a
T_7	3.02abc	6.82abc
T_8	2.93cde	6.51cd
T_9	3.02abc	6.62bc
T_{10}	2.98bc	6.66bc
CV (%)	5.24	6.48

4. Conclusion

Application of combined chemical fertilizers showed significant positive effect on all the yield contributing parameters and yield. Finally, we can conclude that combined dose of NPK and S 100-10-60-20 kg/ha is appropriate for the cultivation of Tossa Jute MG-1. The study evolved a technology which ultimately recommendation of fertilizer (NPK & S 100-10-60-20 Kg/ha) for Tossa Jute MG-1.

Author Contribution

All the authors contributed equally.

Conflict of Interest

The authors declare no conflict of interest exists. All correspondence goes to CSO, Agronomy Division, BJRI- Dr. Md. Mahbubul Islam.

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