
Potential Uses of Fertilizer for *Advanced olitorius* O-0412-9-4 Production

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Citation

Md. Marfuldul Hoque, Md. Saheb Ali, Md. Abdul Alim, Bornali Mostofa, Md. Mahbubul Islam. Potential Uses of Fertilizer for *Advanced olitorius* O-0412-9-4 Production. *International Journal of Agricultural and Biosystems Engineering*. Vol. 4, No. 2, 2019, pp. 8-11.

Received: February 1, 2019; Accepted: August 7, 2019; Published: September 6, 2019

Abstract: A fertilizer assessment trial was conducted to observe growth and yield of advanced olitorius breeding line O-0412-9-4 at Jute Agriculture Experimental Station, Manikganj and Rangpur districts of Bangladesh under Bangladesh Jute Research Institute. Results showed that N rates affected yield and yield contributing characters over the control. N 100kg/ha (T₃) produced highest fibre at both Manikganj (2.93t/ha) and Rangpur (2.88t/ha) Highest dose of N 125kg/ha showed lower yield than the dose N 100kg/ha. Plant height (3.17m) and base diameter (18.45mm) were obtained highest by N 100kg/ha at Manikganj. The dose P 10Kg/ha contributed maximum yield of fibre. Results also showed that the longest plant and highest base diameter were found with 10kg P/ha. The dose 20kg S/ha showed significantly highest fibre yield and yield contributing characters. The results suggested that the combination dose of N₁₀₀P₁₀K₃₀S₂₀kg/ha could be considered for producing the breeding line O-0412-9-4.

Keywords: Fertilizer, Fibre Production, Growth, Yield

1. Introduction

Typically Jute production depends on nutrients management. So 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/line 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 release of a jute advance line with different levels of nutrients. Nutritional requirement of Jute advanced breeding line O-0412-9-4 is not finalized yet, which very much important for its release by NSB. The study was aimed to determine the nutritional requirement of advanced breeding line O-0412-9-4 for its optimum growth and yield.

2. Materials and Methods

The experiment was conducted at Jute Agriculture Experimental Station at Manikganj and Regional Station Rangpur of Bangladesh Jute Research Institute. 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 3.1m × 3.1m having 1space between the plots, blocks and around the field. There was 20cm deep drain around each block and plot. Each replication was divided into 10 unit plots and the total land required of 13.3m × 42m. At

the beginning of the experiment, the land was well prepared and fertilizers were applied as per treatment. 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].

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

T ₁ : N ₀ P ₁₀ K ₃₀ S ₂₀	T ₆ : N ₁₀₀ P ₁₅ K ₃₀ S ₂₀
T ₂ : N ₇₅ P ₁₀ K ₃₀ S ₂₀	T ₇ : N ₁₀₀ P ₁₀ K ₀ S ₂₀
T ₃ : N ₁₀₀ P ₁₀ K ₃₀ S ₂₀	T ₈ : N ₁₀₀ P ₁₀ K ₄₅ S ₂₀
T ₄ : N ₁₂₅ P ₁₀ K ₃₀ S ₂₀	T ₉ : N ₁₀₀ P ₁₀ K ₃₀ S ₀
T ₅ : N ₁₀₀ P ₀ K ₃₀ S ₂₀	T ₁₀ : N ₁₀₀ P ₁₀ K ₃₀ S ₁₅

3. Results and Discussion

The plant growth and yield were affected by the different N rates over the control and N @ 100 Kg/ha treatment (T₃) produced significantly highest fibre yield at Manikganj (2.93t/ha) and Rangpur (2.88t/ha). The highest dose of N 125Kg/ha showed statistically identical yield with the dose N 100kg/ha. The results showed that 100 kg N/ha may be an adequate amount to produce the advance breeding line O-0412-9-4.

Table 2. Yield contributing characters of advance breeding line O-0412-9-4 with different levels of NPK & S.

Treatment	Plant height (m)		Base diameter (mm)	
	Manikganj	Rangpur	Manikganj	Rangpur
T ₁ : N ₀ P ₁₀ K ₃₀ S ₂₀	2.17c	2.11c	13.45c	13.37c
T ₂ : N ₇₅ P ₁₀ K ₃₀ S ₂₀	2.92ab	2.66b	17.43b	17.42ab
T ₃ : N ₁₀₀ P ₁₀ K ₃₀ S ₂₀	3.17a	3.11a	18.45a	18.37a
T ₄ : N ₁₂₅ P ₁₀ K ₃₀ S ₂₀	3.12ab	3.06ab	18.18ab	18.1ab
T ₅ : N ₁₀₀ P ₀ K ₃₀ S ₂₀	2.92ab	2.86ab	17.5ab	17.35b
T ₆ : N ₁₀₀ P ₁₅ K ₃₀ S ₂₀	3.1ab	3.03ab	17.94ab	17.69ab
T ₇ : N ₁₀₀ P ₁₀ K ₀ S ₂₀	2.94ab	2.86ab	17.56ab	17.23b
T ₈ : N ₁₀₀ P ₁₀ K ₄₅ S ₂₀	3.09ab	3.04ab	17.77ab	17.86ab
T ₉ : N ₁₀₀ P ₁₀ K ₃₀ S ₀	2.72b	2.88ab	17.31b	17.48ab
T ₁₀ : N ₁₀₀ P ₁₀ K ₃₀ S ₁₅	3.12ab	3.06ab	17.97ab	17.89ab
CV (%)	5.0	5.11	6.28	6.20

Yield parameters were affected by the addition of different rates of P. The dose of P 10Kg/ha contributed maximum yield of fibre (2.88t/ha) and stick (6.36t/ha) at Rangpur. Results

also explored that the longest plant (3.17m) and base diameter (18.45mm) were found significantly higher with 10kg P/ha (Table 2).

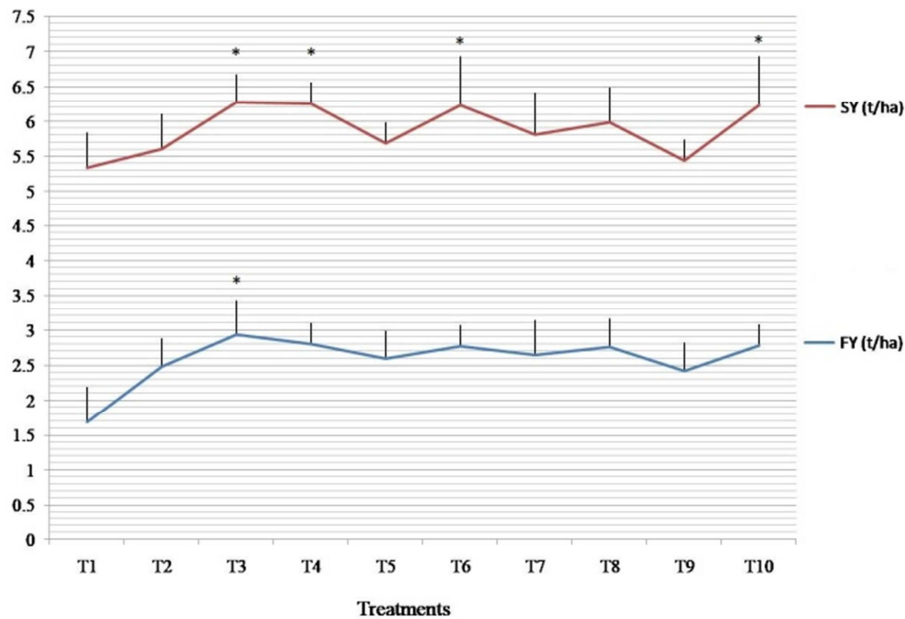


Figure 1. Fibre and Stick yield of the advanced *olitorius* breeding line O-0412-9-4 using different chemical fertilizer treatments at Manikganj location. Each datum was calculated from three independent experiments. The results are expressed as the mean ± S.E.M. Asterisks indicate $p < 0.05$ significance by the Student's *t*-test.

There were three rates of potassium (K) were applied such as 0, 30, and 45kg/ha respectively. The rate 30kg K/ha gave the statistically significant plant height (3.17m), base

diameter (18.45mm) and fibre yield (2.93t/ha). Study noticed that the advance olitorius breeding line O-0412-9-4, needs K 30Kg/ha to produce maximum yield.

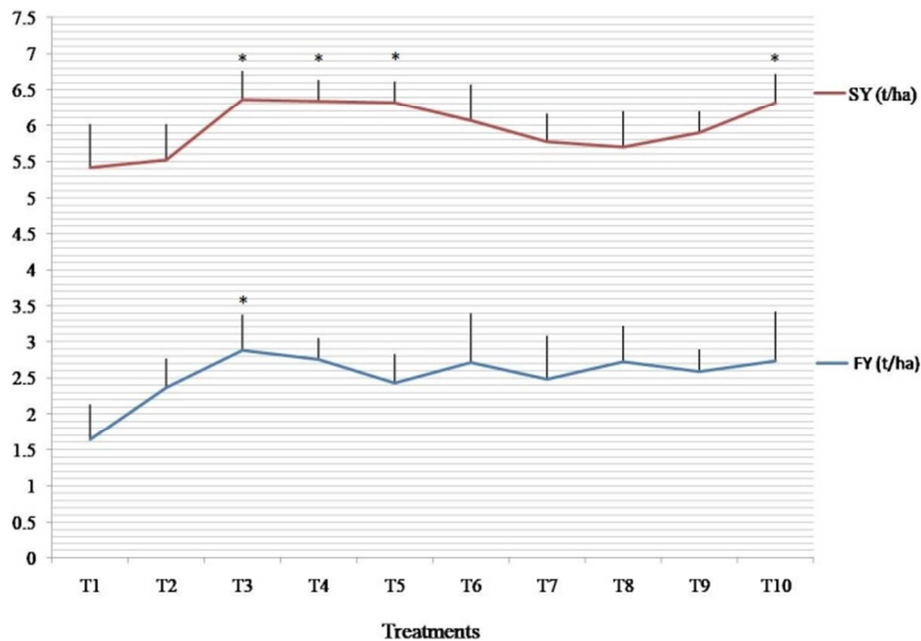


Figure 2. Fibre and Stick yield of the advanced olitorius breeding line 0-0412-94 using different chemical fertilizer treatments at Rangpur location. Each datum was calculated from three independent experiments. The results are expressed as the mean \pm S.E.M. Asterisks indicate $p < 0.05$ significance by the Student's *t*-test.

In Rangpur maximum plant height (3.11m), base diameter (18.37mm) fibre yield (2.88t/ha) and stick yield (6.36t/ha) were observed with 20 kg S/ha (Table 6). Results showed that combined dose of NPK and S 100-10-30-20Kg/ha may be a suitable dose for the cultivation of advance breeding line O-0412-9-4. These findings are strongly supported by the previous research results [4-13].



Figure 3. Inspection of experimental field by Head of Ag. Div. BJRI.

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 100-10-30-20kg/ha is appropriate for the cultivation of advance breeding line O-0412-9-4. The study evolved a technology which ultimately recommendation of fertilizer (NPK & S 100-10-30-20Kg/ha) for advance breeding line O-0412-9-4.

Author Contribution

All the authors contributed equally.

Conflict of Interest

The authors declare no conflict of interest exists.

Acknowledgements

The author tremendously uttered thanks to Dr. Md. Mahbulul Islam (CSO-Agronomy Division) and Dr. NasimulGani-(CSO-Fibre Quality Division) for their kind support and encouragement for execution to follow a line of investigation.

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