



Effective Nutrient Combination for Advance Capsularis Breeding Line BJC-5050 Production

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Abstract: Nutrient requirement has been optimized for the cultivation of advanced breeding line BJC-5050 in Bangladesh. Different nutrient levels influenced the yield contributing characters which ultimately increased the fibre and stick yield over control. Among the nitrogen doses, the rate 100 kg N/ha demonstrated significantly tallest plant (3.17m), highest base diameter (17.34 mm), fibre (2.81 t/ha) and stick (7.06 t/ha) yield. The highest yield of fibre and stick were found with the dose of 15 kg P/ha. The K level up to 45 kg/ha influenced the yield and yield contributing characteristics over the control. The tallest plant was found with 30kg K/ha which was statistically identical the treatments other than treatments of T₁, T₂, T₅, and T₉. The significant highest fibre yield was induced by K 30kg/ha. In case of S results showed significant yield increase with different rates over the control. It indicates that 20kg S/ha is enough in producing highest yield of fibre and stick. Study revealed that combined dose of NPKS 100-15-30-20 kg/ha may be a suitable dose for the cultivation of advance breeding line BJC-5050.

INTRODUCTION

Fiber yield step up and quality of jute is the prime need of Bangladesh. Jute fibre was produced annually from an average area of 4.50–5.00 lakh ha of land in Bangladesh [1]. But the area and production was increased significantly from 2010-2011 and onwards due to developing more conscious about environment and stepping forward to the natural fibre by escaping from the perilous impact of synthetic fibre to the environment. As a result demand of jute fibre is being increased in the recent years both in home and abroad. 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 capsularis line is lower than that of olitorius. The importance of N, P, K and S on the growth, yield and quality of fiber crops is well established [2-12]. 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. Therefore, much attention should be given towards the improvement of yield and quality of jute fiber to bring back the past glory of Bangladeshi jute. Considering the above facts the present study has been undertaken to observe the effects of N, P, K and S fertilizers on the growth, yield and quality of the advance breeding line, BJC-5050 and to find out the optimum requirement of all of these nutrients to achieve the maximum yield potential of this new advance breeding line, BJC-5050.

MATERIALS AND METHODS

The research was carried out at the Jute Agricultural Experimental Station (JAES) of Bangladesh Jute Research Institute, under Sadar Upazila of Manikganj district. The experiment was laid out in randomized complete

Effective Nutrient Combination for Advance Capsularis Breeding Line BJC-5050 Production

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.

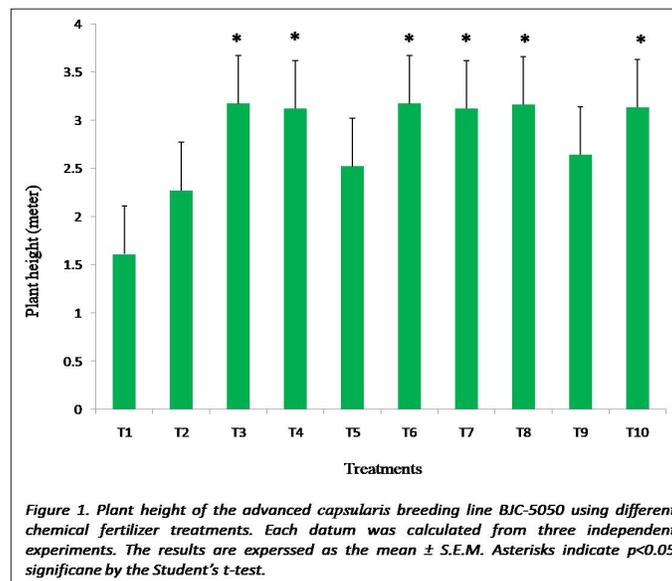
Table1. Treatment combinations (NPKS in Kg/ha)

$T_1: N_0 P_{10} K_{30} S_{20}$	$T_6: N_{100} P_{15} K_{30} S_{20}$
$T_2: N_{75} P_{10} K_{30} S_{20}$	$T_7: N_{100} P_{10} K_{30} S_{20}$
$T_3: N_{100} P_{10} K_{30} S_{20}$	$T_8: N_{100} P_{10} K_{45} S_{20}$
$T_4: N_{125} P_{10} K_{30} S_{20}$	$T_9: N_{100} P_{10} K_{30} S_0$
$T_5: N_{100} P_0 K_{30} S_{20}$	$T_{10}: N_{100} P_{10} K_{30} S_{15}$

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), fiber yield (FY) and stick yield (SY). Statistical [13] and economic analyses were also carried out.

RESULTS AND DISCUSSION

Combined chemical fertilizers demonstrated significant positive effect on all the growth parameter like plant height (Figure 1), base diameter (Figure 2). The maximum plant height (3.17 m), base diameter (17.34 mm) were found by the treatment T_6 ($N_{100} P_{15} K_{30} S_{20}$ kg/ha). Application of different treatments showed statistically significant positive effect on fibre yield (FY) and stick yield (SY) of jute. Highest FY (2.81 t/ha) and SY (7.06 t/ha) were reported with T_6 ($N_{100} P_{15} K_{30} S_{20}$ kg/ha) treatment.



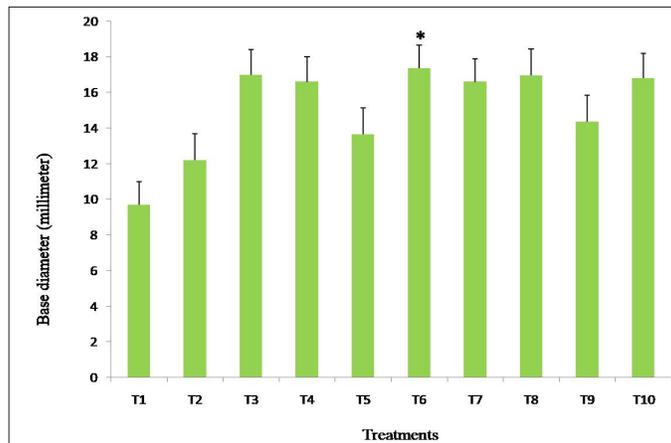


Figure 2. Base diameter of the advanced capsularis breeding line BJC-5050 using different chemical fertilizer treatments. Each datum was calculated from three independent experiments. The results are expressed as the mean \pm S.E.M. Asterisks indicate $p < 0.05$ significance by the Student's t-test.

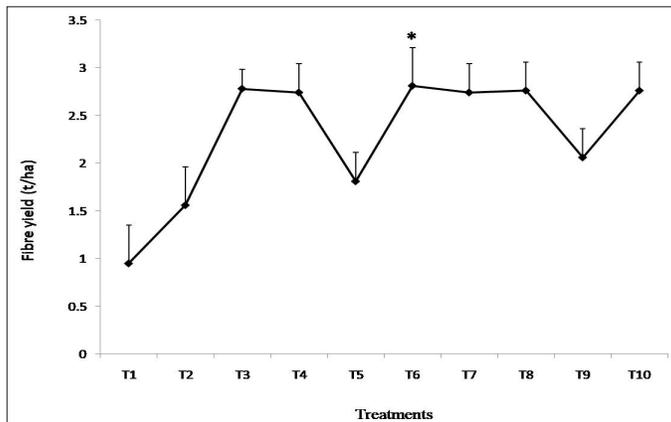


Figure 3. Fibreyield of the advanced capsularis breeding line BJC-5050 using different chemical fertilizer treatments. Each datum was calculated from three independent experiments. The results are expressed as the mean \pm S.E.M. Asterisks indicate $p < 0.05$ significance by the Student's t-test.

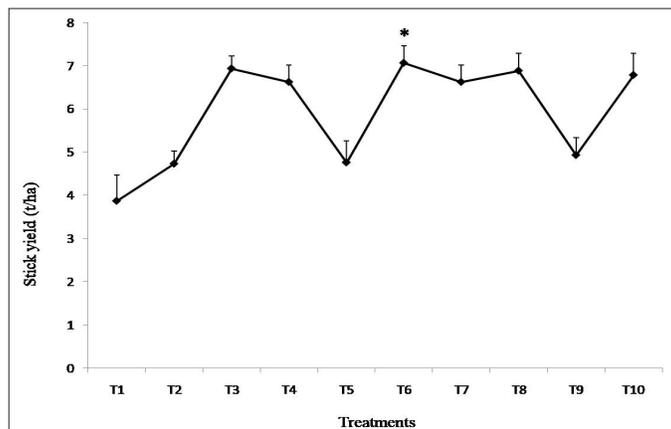


Figure 4. Stick yield of the advanced capsularis breeding line BJC-5050 using different chemical fertilizer treatments. Each datum was calculated from three independent experiments. The results are expressed as the mean \pm S.E.M. Asterisks indicate $p < 0.05$ significance by the Student's t-test.

Effective Nutrient Combination for Advance Capsularis Breeding Line BJC-5050 Production

Effect of Nitrogen

Yield contributing characters were influenced by nitrogen levels which ultimately increased the fibre and stick yield over control. Among the nitrogen doses, the rate 100 kg N/ha demonstrated significantly tallest plant (3.17m), highest base diameter (17.34mm), fibre (2.81t/ha) and stick (7.06t/ha) yield. The dose of 100kg N/ha might be an effective dose for producing BJC-5050.

Effect of Phosphorus

Different P rates influenced to plant height, base diameter, yield of fibre and stick over control. The highest yield of fibre (2.81t/ha) and stick yield (7.06t/ha) found with the dose of 15 kg P/ha. Results exposed that the dose of 15 kg P/ha will be sufficient to grow BJC-5050.

Effect of Potassium

The tallest plant (3.17m) was found with K 30 kg/ha (T_7) which was statistically similar with T_3 , T_4 , T_7 , T_8 , and T_{10} . Significantly highest fibre yield was induced by K 30kg/ha (2.81t/ha). Taking into consideration the findings that the dose of K 30 kg/ha will be a sufficient to produce the advance breeding line BJC-5050. Study revealed that the advance breeding line BJC-5050 needs lower amount of K.

Effect of Sulfur

Different rate of S result showed significant increased on the yield and yield contributing characters over control. Study revealed that 20kg S/ha is enough in producing highest yield of fibre and stick. The combination dose of $N_{100} P_{15} K_{30} S_{20}$ kg/ha may be enough for the advanced breeding line BJC-5050.

The preeminent FY and SY were found with the combination of $N_{100} P_{15} K_{30} S_{20}$ kg/ha. These results are strongly supported by the previous research results [2-5, 7].

CONCLUSION

It could be concluded that combined dose of NPK and S 100-15-30-20 kg/ha would be a suitable dose for the cultivation of advanced breeding line BJC-5050. The study evolved a technology which ultimately recommendation of fertilizer (NPK & S 100-15-30-20 Kg/ha) for the advance line BJC-5050.

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Effective Nutrient Combination for Advance Capsularis Breeding Line BJC-5050 Production

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