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YIELD TRIALS OF TOSSA JUTE (*Corchorus olitorius* L.) AT DHAKA AND MANIKGANJ DISTRICTS OF BANGLADESH

M. D. H. Sarker[1], M. H. Kabir[2], R. Ferdous[1], K. Hasan[3] and P. C. Dhar[4]
[1]Genome Research Centre, Bangladesh Jute Research Institute, Dhaka
[2]Jute Research Sub-Station, BJRI, Jamalpur
[3]BADC, Muktagacha, Mymensingh
[4]Dept of Crop Botany, BAU, Mymensingh

ABSTRACT

The experiments were carried out at two locations of BJRI (Dhaka and Manikganj) during August, 2024 to January, 2025 to evaluate the yield and quality performances of some tossa jute varieties. BJRI Tossa pat 8, BJRI Tossa pat 9, O-9897, Robi-2, JRO-524 were used as experimental materials. The experiment was laid out in a randomized complete block design with three replications. Results showed that Dhaka significantly out-performed Manikganj in seed yield per plant (3.08 g vs. 2.70 g), largely due to a higher number of branches per plant. Varietal analysis revealed significant differences across all measured parameters. BJRI Tossa pat 9 consistently emerged as the highest-yielding variety (3.51 g/plant), demonstrating superior branching and capsule formation. Although Robi-2 had the highest plant population and height, its seed yield was the lowest (2.11 g/plant). Significant locations x variety interactions were observed for most traits, highlighting the importance of genotype-by-environment considerations. BJRI Tossa pat 9, particularly when grown in Dhaka, showed exceptional seed yield (3.78 g/plant), suggesting its strong adaptability and potential for increased jute seed production in specific regions. These findings underscore the necessity of location-specific varietal selection for optimizing jute seed yield and quality.
Key words: Jute, seed yield, quality, location

Introduction

Jute (Corchorus sp.) is Bangladesh's primary fiber crop, contributing 6% of its foreign exchange earnings from exports (Islam, 2009). Bangladesh dominates the global market, supplying nearly 95% of raw jute and around 60% of jute goods (Rahman, 2010). Beyond fiber, jute leaves are a nutritious edible vegetable, rich in minerals and proteins. Efforts are also underway to utilize jute plants for pulp in paper manufacturing (Dastogeer *et al*., 2011). Unfortunately, Bangladesh faces a significant deficit in good quality jute seeds, with annual requirements of 4000-4500 MT far exceeding domestic production from the Bangladesh Agricultural Development Corporation (BADC) (800-1000 MT) and farmers (400-600 MT). This forces the country to rely heavily on imports, mainly from India, and on often poor-quality farmer-produced seeds (Pulok *et al*., 2014). Therefore, ensuring the production, quality, and proper storage of healthy jute seeds is essential to meet the demand for natural fiber and enhance overall yield. It is well-established that environmental factors, including soil characteristics, climate, and various management practices, significantly influence crop performance. Similarly, different crop varieties inherently possess distinct genetic potentials that dictate their growth, development, and reproductive success. While the individual impacts of these factors on crop production are widely recognized, there remains a notable gap in comprehensive studies specifically evaluating the combined effects of geographical location and varietal choice on key seed yield and quality attributes of jute in Bangladesh. This study aims to bridge that knowledge gap by investigating how different varieties and locations influence jute seed yield.

Materials and Methods

The experiment was carried out at two locations under the Bangladesh Jute Research Institute (BJRI): the headquarters at Manik Mia Avenue, Dhaka-1207, and the Jute Agriculture Experimental Station in Jagir, Manikganj. The study period spanned from August 2024 to January 2025. A selection of jute genotypes

was used as experimental material, including BJRI-released varieties such as BJRI Tossa pat 8, BJRI Tossa pat 9, and O-9897; an advanced line Robi-2; and the Indian tossa jute variety JRO-524. Seeds for the trial were sourced from the Jagir experimental farm of BJRI. The trial was laid out in a randomized complete block design (RCBD) with three replications. Field preparation involved three rounds of ploughing and cross-ploughing followed by laddering to ensure a fine tilth. Each experimental plot measured 2 meters by 3 meters, with row and plant spacing maintained at 30 cm and 5 cm, respectively. Sowing was performed on 10 August 2024. During the study period, the weather remained typically hot and humid with frequent rainfall. Fertilization was applied during final land preparation using urea, triple superphosphate, muriate of potash, and gypsum at rates of 200, 50, 60, and 95 kg per hectare, respectively. Standard intercultural operations were carried out as needed throughout the growing season. The crop was harvested at physiological maturity. Prior to harvest, ten plants were randomly sampled from each plot to assess yield-related traits. The collected data were subjected to statistical analysis using Analysis of Variance (ANOVA). Treatment means were compared using Duncan's Multiple Range Test (DMRT) with the aid of the statistical software package MSTAT-C, as outlined by Gomez and Gomez (1984).

Results and Discussion

Effect of location on jute seed yield and quality

The study revealed notable differences in jute seed yield attributes between the two locations, Manikganj and Dhaka (Table 1). While plant population, plant height, number of capsules per plant, number of seeds per capsule, and 1000-seed weight did not show significant differences between the locations, significant variations were observed in the number of branches per plant and seed yield per plant. Dhaka recorded a significantly higher number of branches per plant (3.14g) compared to Manikganj (2.47g). This difference likely contributed to the significantly higher seed yield per plant observed in Dhaka (3.08 g) compared to Manikganj (2.70 g). The improved branching in Dhaka suggests more favorable environmental conditions for vegetative growth, which directly impacts the reproductive capacity of the jute plants and, consequently, the seed yield.

Table 1. Jute seed yield and quality attributes at different locations of Bangladesh

Location	Plant population per plot	Plant height (cm)	Number of branches per plant	Number of capsules per plant	Number of seed per capsule	Seed yield per plant (g)	1000-seed weight (g)
Manikganj	149a	160.06a	2.47 b	2.07a	160.67a	2.70b	1.972a
Dhaka	152a	159.17a	3.14 a	23.85a	145.40a	3.08a	1.983a
CV (%)	8.26	0.87	19.11	23.11	14.70	5.02	1.43
LSD (0.05)	9.4360	0.9395	0.4107	4.5328	17.256	0.1113	0.0217

Effect of variety on jute seed yield and quality

Varietal differences played a significant role in determining jute seed yield and quality attributes (Table 2). All the studied parameters, including plant population, plant height, number of branches per plant, number of capsules per plant, seed yield per plant, and 1000-seed weight, showed significant variations among the five jute varieties (BJRI Tossa pat 8, BJRI Tossa pat 9, O-9897, JRO-524, and Robi-2). Robi-2 exhibited the highest plant population (180) and plant height (176.25 cm), while JRO-524 had the lowest plant population (109). Interestingly, BJRI Tossa pat 9 recorded the highest number of branches per plant (3.55) and number of capsules per plant (35.00), which directly translated into the highest seed yield per plant (3.51 g) among all varieties. This highlights the importance of branching and capsule formation for maximizing seed production in jute. Robi-2, despite its impressive plant population and height, had the lowest seed yield per plant (2.11 g), suggesting that these vegetative traits do not always correlate directly with higher seed yield, likely due to other limiting factors or reproductive efficiency. Regarding seed

quality, BJRI Tossa pat 9 also showed the highest 1000-seed weight (2.017 g), followed closely by Robi-2 (2.042 g), indicating larger and potentially more vigorous seeds. JRO-524 had the lowest 1000-seed weight (1.918 g).

Location x variety interaction effect on jute seed yield and quality

The interaction between location and variety had a significant impact on most of the studied parameters, indicating that the performance of a particular jute variety can vary depending on the growing location (Table 3). The interaction effect was particularly pronounced for number of capsules per plant and seed yield per plant. For instance, L_1XV_2 (Manikganj x BJRI Tossa pat 9) showed the highest number of capsules per plant (42.00) and seed yield per plant (3.23 g), though the highest seed yield per plant (3.78g) was found in BJRI Tossa pat-9 alone generally performed well in seed yield. However, in Dhaka, L_2XV_2 (Dhaka x BJRI Tossa pat 9) recorded an even higher seed yield per plant (3.78 g), demonstrating that BJRI Tossa pat 9 performs exceptionally well in Dhaka for seed yield. Conversely, some interactions resulted in lower yields. For example, L_1XV_5 (Manikganj x Robi-2) had the lowest seed yield per plant (1.89 g), despite Robi-2 showing good plant population and height in general. This suggests that Robi-2 might not be well-suited for seed production in the Manikganj region.

Table 2. Jute seed yield and quality attributes of different varieties

Variety	Plant population per plot	Plant height (cm)	Number of branches per plant	Number of capsules per plant	Number of seed per capsule	Seed yield per plant (g)	1000-seed weight (g)
V_1	143c	163.45b	2.20 d	24.75b	148.33a	3.08b	1.972b
V_2	150bc	142.44d	3.55 a	35.00a	143.17a	3.51a	2.017a
V_3	161b	164.81b	2.89bc	25.72b	153.83a	2.84c	1.938bc
V_4	109d	150.62c	3.08ab	22.33b	152.50a	2.93bc	1.918c
V_5	180a	176.25a	2.28cd	23.49b	167.33a	2.11d	2.042a
CV (%)	8.26	0.77	19.11	23.11	14.70	5.02	1.43
LSD (0.05)	14.920	1.4854	0.6494	7.1670	27.284	0.1759	0.0343

Table 3. Location X variety interaction effect on jute seed yield and quality attributes

Location x Variety	Plant population per plot	Plant height (cm)	Number of branches per plant	Number of capsules per plant	Number of seed per capsule	Seed yield per plant (g)	1000-seed weight (g)
L_1XV_1	144c	163.90c	2.0e	15.67d	146.00bc	2.94de	1.967cde
L_1XV_2	152c	142.55e	2.67bcde	42.00a	159.33abc	3.23b	2.01abc
L_1XV_3	161bc	164.95c	2.33cde	22.33bcd	142.00bc	2.69f	1.923ef
L_1XV_4	112d	150.90d	3.0bcd	26.67bc	169.00ab	2.75ef	1.913f
L_1XV_5	174ab	177.50a	2.33cde	28.67b	187.00a	1.89h	2.047a
L_2XV_1	142c	163.00c	2.40cde	25.83bc	150.67abc	3.22bc	1.977bcd
L_2XV_2	149c	142.33e	4.43a	28.00bc	127.00c	**3.78a**	2.023ab
L_2XV_3	161bc	164.67c	3.46b	29.10b	165.67ab	2.98cde	1.953def
L_2XV_4	106d	150.33d	3.17bc	18.00cd	136.00bc	3.11bcd	1.923ef
L_2XV_5	187a	175.00b	2.22de	18.33cd	147.67bc	2.32g	2.037a
CV (%)	8.26	0.77	19.11	23.11	14.70	5.02	1.43
LSD (0.05)	21.100	2.1007	0.9184	10.136	38.586	0.2488	0.0485

Note: V_1: BJRI Tossa pat 8; V_2: BJRI Tossa pat 9; V_3: O-9897; V_4: JRO-524; V_5: Robi-2

L_1: Manikganj, L_2: Dhaka

CV= Coefficient of variation

In a column, figures having similar letter(s) do not differ significantly at 5% level as per DMRT.

Overall, the data suggests that BJRI Tossa pat 9 appears to be a robust variety for seed production, exhibiting high seed yield potential across both locations, particularly in Dhaka. The varied responses observed in the interaction effects underscore the need for further research to identify the most suitable jute varieties for different regions of Bangladesh based on specific yield and quality objectives. Similar results were reported by many researchers like Mollah *et al*. (2017a) in jute, Mollah *et al*. (2017b) and Mollah *et al*. (2018) in kenaf.

Conclusion

The BJRI Tossa pat 9 variety consistently yields more seeds in both areas, likely because it develops more branches and capsules. This shows how important it is to choose the right jute variety for a specific growing area, like how well BJRI Tossa pat 9 performed in Dhaka, to get the most seeds possible.

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