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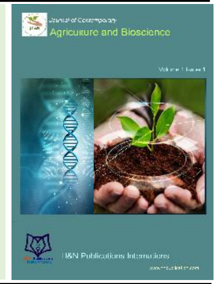

Research Article

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Comparative Seed yield and quality Performance of Different Dark (*Corchorus olitorius* L.) jute cultivars

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Abstract

Among the several jute varieties, *Corchorus olitorius* occupies around 85% of Bangladesh's total jute cultivable land. Country needs six thousand metric tonnes of jute seed annually. O-9897, JRO-524 and BJRI tossa pat- 8 are prominent jute varieties in Bangladesh. Three prominent jute varieties *viz.,* BJRI tossa pat-8, O-9897 and JRO 524 were used in this study. The study was conducted to evaluate the seed yield and quality performance of three dark jute varieties at, Jute Agriculture Experimental Station, Manikganj, Bangladesh. Results revealed that plant population/m^2 (5.74), plant height (3.16 m), Capsule per plant (95.40), capsule length (6.29 cm), thousand seed weight (1.86 g), Seed yield (0.67 t/ha) observed maximum in BJRI tossa pat-8 (rabi-1). Number of branch/plant (10.27), seed per capsule (218.85), germination percentage (95.67), field emergence percentage (90.33), CVG percentage (72.25) and Seed vigour percentage (42.72) were maximum in O-9897. Result showed that, BJRI tossa pat-8 produced higher seed yield compared other two varieties but seed quality was better for O-9897.

Keywords: *Jute seed, varieties, phenotypic characters, yield and seed quality*.

Introduction

The importance of jute in the agrarian economy of Bangladesh is well known. In terms of output, jute is only second to cotton and is one of nature's toughest vegetable fibers (Mahapatra *et al.,* 2012). It is completely biodegradable, recyclable, and one of the most spinnable natural fibers available (Palit and Meshram, 2010). Indian subcontinents contribute about eighty-four percent of the world's jute fiber. (kumari *et al.,* 2020). The lignocellulose fiber jute is entirely recyclable, biodegradable, and environmentally sensitive (Mir *et al*., 2008; Islam, 2019). Demand for jute is rising as environmental awareness grows globally. Jute and jute products safeguard the environment as a whole, preventing ecological deterioration (Ghosh *et al.,* 2013; Mamun *et al*., 2017). The family Malvaceae, which has over 100 species, includes the genus *Corchorus* (Saunders, 2001). *Corchorus olitorius* L. and *Corchorus capsularis* are mostly cultivated jute species for natural fibre. These two species are notably widespread in jute growing area (Hossain *et al*., 2002). About 85% of Bangladesh's entire jute cultivable land is covered by *Corchorus olitorius* L., or dark jute. Bangladesh needs between 5500 and 6000 tons of jute seeds annually, but only 10% to 15% of them are produced and distributed by the BADC (Al mamun and saha, 2017; Ali *et al*., 2003). Bangladesh primarily depends on a neighboring country for dark jute seed. As a result, a substantial quantity of dark jute seeds is imported each year through both legal and illegal trading from countries nearby (karim *et al.,* 2020). One of the main causes of low yield is unofficial imports of jute seed, which are not ensured to be of high quality (Islam, 2009). Due to the official sector's inadequate supply of seed and the great demand for jute seed, unlicensed traders often use the chance to introduce minimal seeds to the market. In order to stop illegal traffickers, the nation's jute seed production must be increased. Jute seed of improved varieties must be supplied in a timely manner with assurance of quality because they account for 20% of the output (Hossain *et al*., 1994). Therefore, the present investigation on the viability of growing jute seed of dark jute varieties were put to the test with the intention of producing quality jute seed in Bangladesh and increasing farmer profitability.

Materials and Methods

Experimental site and soil

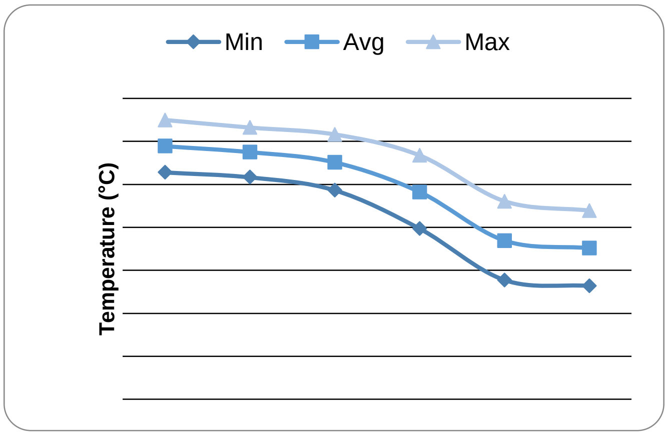
The study was conducted in the research area at Manikganj's from August through December of 2021 to evaluate the seed production and grade performance of three jute cultivars.

Weather Condition

Figure 1a represents the weather during the crop-production period, as well as the monthly mean least, highest, and average temperatures at the research site. Figure 1b illustrates the monthly precipitation at the experiment site.

Table 1. Experimental soil's physiochemical characteristics

Properties	**Typical substance**
soil type	Silty soil
Soil pH	6.6
Organic matter	1.65%
Total N (%)	0.09%
available Phosphorus	7.66 ppm
Potassium (100g-1)	0.24 meq
available Sulphure	12.88 ppm



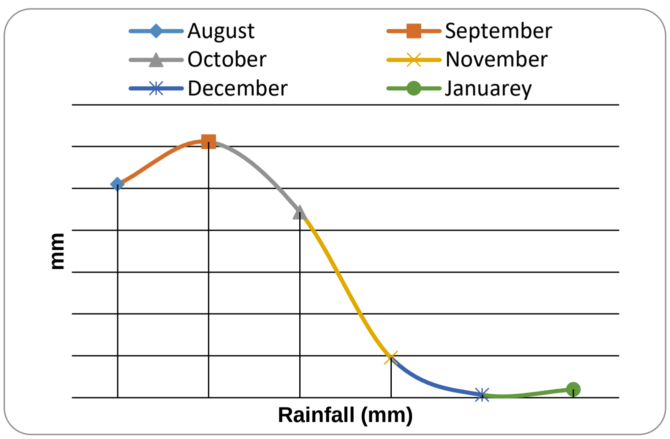


Figure 1. shows the weather conditions at the locations in Manikganj, Bangladesh (1a. month - to - month mean of lowest, highest, and mean temperatures; 1b. rainfall).

Treatments and layout of the investigation

Three dark jute cultivars were utilized for the experiment. Three ploughing and cross plowing were used to prepare the experimental field, then laddering. RCBD design and three replications were used investigate the study. A 3 m by 4 m unit plot was being used. The cutting was planted on August 11th, 2019. Because a prior study revealed that 100-day-old mother plants had a higher yield, they were used (Alam *et al*., 2019). The crop received the proper fertilizer dose. All intercultural operations were carried out in accordance with specifications.

Harvesting and Plant sampling

Plant samples were taken from each plot according to treatment when the jute seed had reached maturity (approximately 80% of the seeds reached maturity). Ten plants from each plot were randomly selected in order to provide trustworthy data. After threshing seeds were Seeds were dried.

Morpho-physiological characters' yield & yield attributes

The morpho-physiological parameter plant height (m) was recorded using a scale meter. Using a standard methodology, morpho-physiological characteristics were investigated. Production and distinct yield factors, such as pod length (mm), pod plant-1, seeds pod-1, 1,000 seed weight, and production, were calculated using the conventional methodology (ton ha-1). In order to measure any height, length, quantity, or yield, a analog count and scale was utilized.

Seed quality

Dried seed with 9% moisture was taken for quality inspection after threshing. A fungicide (1 g L-1Benlate) was applied to the seeds for 30 minutes to prepare them for germination. They were then immersed in a 6% $Ca(ClO)_2$ suspension for 5 minutes, washed in 70% C_2H_6O for 5 min, and completely cleaned with disinfected filtered water. Using sterile perlite, jute kernel was put into glass petri dishes. with a diameter of 9 cm in a growth chamber with a temperature and humidity of 25 °C and 80%, respectively, and a photoperiod of 16 hours day-1. The lighting was provided by OSRAM L36W/77 type lights (FLUORA, white fluorescent tubes) with an intensity of 1500 mol h-1 photon-1. 100 seed were placed in each Petri dishes.

1. Germination capacity (GC): GC (%) = n/N* 100
Here, n is the entire unit of seeds that grew, and N represents entire of unit that were examined.

2. **Field Emergence (%):** FE(%)=n/N* 100
Here, N is the entire unit of seeds tested, and represents the unit of seeds that had germination in the field.

3.Vigour test: V=a/1+b/2+c/3+...where V for Vigor and a, b, and c are the units of seeds that sprouted after one, two, and three days, respectively, is the formula used to calculate vigor (Vigour value). The ultimate tally was of the conclusion was done at 6th day.

Statistical analysis

The "Statistix 10" program was used to statistically assess and split the variance of the recoded data for the various parameters.

Results and Discussion

Plant Population

BJRI tossa pat-8 had the highest plant population (5.74), which was statistically different from the other two kinds, while JRO-524 had the lowest plant population (3.89) (Table 2). This outcome was brought about by the significant rate of transplanted cutting death that was present in JRO-524. Comparing the cutting transplanting method to the late jute seed sowing method, the plant population number always remains low. Population rate in cutting method is low because due to transplanting shock, fungal attack on cutting edge mortality rate of cutting is high.

Plant height

Variety has less impact on plant height (Table 2). The lowest height (3.10 m) was recorded in JRO 524, while the greatest (3.16 m) was recorded in BJRI tossa pat-8. Karim *et al*. (2020a) discovered a similar plant height for BJRI tossa pat 8. Low plant population meant less competition for nutrients, water and air, which resulted in high height.

Branch plant-1

The unit of branch plant-1 displayed meaningful variation (table 2). The O-9897 site had the highest number of branches/plants (10.27), which was statistically similar to JRO-524, and the control plot BJRI tossa pat-8 had the lowest number (6.95). Plant population was maximum in BJRI tossa pat-8 that's why this variety have to face maximum competition for sunlight, air, water and nutrition that have negative impact on branch number.

Capsule plant-1

It was found that depending on the type, the number of capsules per plant varied greatly (Table 2). The BJRI tossa pat-8 produced the most capsules per plant (95.40), whereas O-9897 produced the least (73.97). BJRI tossa pat-8 have more capsule bearing capacities.

Table 2: Comparison of late jute seed development and production characteristics among different cultivars.

Treatment	Plant population	Plant height (m)	Branch/ plant	Capsule/ plant
BJRI tossa pat-8	5.74 a	3.16 a	6.95 b	95.40 a
O-9897	3.59 b	3.13 a	10.27 a	73.97 b
JRO-524	3.89 b	3.10 a	9.89 a	85.65 ab
CV value	10.48	6.35	10.07	9.03

Capsule length

The late jute seed plant's capsule length was not noticeably altered due to variety (Table 3). The BJRI tossa pat-8 had the longest capsules (6.29 mm), whereas O-9897 had the shortest (6.10 mm).

Seed capsule-1

Variety had no discernible impact on the quantity of seed/capsules (Table 3). The capsule with the most seeds (218.85) per serving was BJRI tossa pat-8.

Thousand seed weight

Variety did not have a massive influence on jute's 1000 seed weight (Table 3). The BJRI tossa pat-8 had the largest 1,000 seed weight (1.86 g), while O-9897 had the lowest (1.79 g). Number of seed per capsule is low in BJRI tossa pat-8 that why seed development is high compares to others two varieties as a result weight is high in BJRI tossa pat-8.

Production (tha-1)

The production of late jute seed was greatly affected with cultivars (table 3). The BJRI tossa pat-8, which is statistically similar to JRO-524, has the highest observed seed yield (0.67 ton ha-1). O-9897 produced the lowest seeds (0.47 tons per hectare). Seed yield of jute depends upon different characters. These seed yield contributing characters such as capsule/plant, capsule length and 1000 seed weight was highest in BJRI tossa pat-8 comparing to other varieties.

Table 3. Comparison of various cultivars' late jute seed production (tha^{-1}), seed/capsule, and 1000 seed weight.

Treatment	Capsule length (cm)	Seed/capsule	1000 seed weight	Seed yield (tha^{-1})
BJRI tossa pat-8	6.29 a	205.81 a	1.86 a	0.67 a
O-9897	6.10 a	218.85 a	1.79 a	0.47 b
JRO-524	6.13 a	207.56 a	1.81 a	0.62 ab
CV value	0.89	7.81	2.37	5.90

Seed quality

Variety has no important impact in the case of germination and field emergence percentage (table 4). Numerically maximum germination (95.67) and field emergence (90.33) % was recorded in O-9897. Minimum seed germination and field emergence percentage was found in JRO-524. Highest CVG percentage (72.25) was recorded in O-9897that is statistically different from other two varieties. Seed vigor related to seed germination and field emergence percentage. Germination (%) and field emergence (%) was high in)-9897 though those were not statistically identical but in cumulative influenced the seed vigour (%). Maximum seed vigour was found in O-9897 that is statistically non-identical to others two varieties.

Table 4. Comparison of various cultivars' late jute seed characteristics related to seed quality.

Treatment	Germination %	Field Emergence %	CVG %	Seed vigour%
BJRI tossa pat-8	95.33 a	89.67 a	59.76 b	39.86 b
O-9897	95.67 a	90.33 a	72.25 a	42.72 a
JRO-524	94.45 a	87.78 a	60.10 b	40.16 b
CV value	1.13	0.45	0.92	1.07

Conclusions

The findings of this research indicate that the maximum seed yield contributing characters found best in BJRI tossa pat-8 compares to other two varieties. Highest seed yield was recorded in BJRI tossa pat-8. Germination (%), Field emergence (%) and CVG (%) were not influenced by jute varieties. The difference in seed quality among the three varieties was marginal. It may be concluded that using BJRI tossa pat-8 for seed production purpose is more fruitful.

Conflict of interest

The authors declare that they have no conflict of interest.

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