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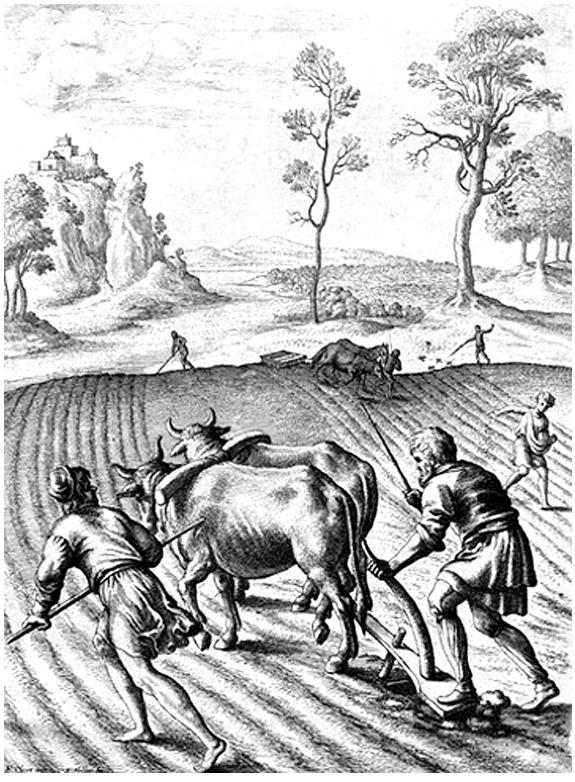

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A Comparative Study of Yield and Return of Late Jute Seed Production at Normal and Puddled Soil

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Abstract: A field experiment was conducted to examine the comparative performance of different methods of planting techniques of late jute seed production. Line sowing technique in normal soil gave the highest seed yield (585 kg ha^{-1}) while the top cutting plantation technique gave the lowest seed yield (260 kg ha^{-1}). The yield performance due to different techniques graded from the highest to the lowest were line sowing, broadcasting in normal soil, broadcasting in puddled soil, seedling transplantation and top cutting plantation in normal soil.

Key words: Late jute seed, normal soil, puddled soil, broadcasting, line sowing, seedling and top cutting plantation

Introduction

In Bangladesh, annually 1.18 million acres of land is cultivated for the production of 0.806 million tons of fibre (Anonymous, 1997). To cultivate the said area, the farmers require about 30 thousand tons of seeds annually. Many jute farmers use to produce jute crops by their own seeds to meet their requirements but such seeds are of poor quality. One of the most important problems for jute production in Bangladesh is the non-availability of quality seed at proper time of sowing. Only 30% quality jute seed is supplied by different national agencies but the rest amount of quality seed is yet to be managed to supply (Anonymous, 1997).

The conventional method of jute seed production is not enough at all to meet the demand of the farmers. The jute growers in Bangladesh generally do not grow a separate jute crop for seed production as it requires long time from March to December which hampers transplant aman rice and rabi (winter) crops. The farmers usually keep a small portion of the crop at one corner of the field to produce seed and rest of the crop is harvested for fibre. This traditional system of seed production is characterized by low yield and poor quality of seed. So, appropriate technology to produce quality seed is a must, to increase the production of jute in Bangladesh. Late jute seed production technology can solve this problem.

In this technology seeds and seedling materials are sown in the August and seeds are harvested in January and the crops are subjected to favourable environmental stimuli (Singh *et al.*, 1984; Hossain *et al.*, 1992; Islam *et al.*, 1994). With these facts in mind, the present piece of work was, therefore, undertaken to find the comparative merits of yield and return of late jute seed production at normal and puddled soil.

Materials and Methods

The experiment was conducted at the Bangladesh Jute Research Institute's Regional Station at Kishoregonj from April 1997 to January 1998. The experimental site belongs to the Old Brahmaputra Floodplain Agroecological Zone (Anonymous, 1988). The soil was silt loam in texture with pH 6.9. The modern variety of Tossa jute O-9897 was used in the experiment. It is photo insensitive variety which can be sown after rabi season in high, medium and medium low land. The planting techniques of late jute seed production included in the study were I) broadcasting in normal soil, ii) broadcasting in puddled soil i.e., wet soil, iii) line sowing in normal soil, iv) seedling transplantation in normal soil and v) top cutting plantation in normal soil. The experiment was laid out in a randomized complete block design with four replications. The area of each unit plot was 2.5×2 m^2. The seeds were collected from the Regional Station, Bangladesh Jute Research Institute at Kishoregonj. For the collection of top cutting, one separate bed of 4×2.5 m^2 was prepared for raising plants for collecting top cuttings. The bed was first spaded, all weeds, stubbles and crop residues were removed and then leveled with the help of a ladder. The bed was uniformly fertilized with 72.5, 21.0 and 31.0 g urea, TSP and MP, respectively and 3 kg cowdung was applied before spading. Afterwards, jute seed were sown in the beds on 25th April 1997 and all intercultural operations were done as and when needed. The top cutting of plant of 15-20 cm from the tip with three buds were collected by cutting with sharp knife on 20th July 1997 prior to flowering stage. For raising seedlings one seedbed of 3×1 m^2 was prepared. The seed bed was first spaded and all weeds, stubbles and crop residues were removed from the bed as in top cutting method and then leveled with the help of ladder. No fertilizer was used in the seedbed. Later on, 5 g seeds were sown on 10th of August 1997. Twenty two-days old seedlings were uprooted from the seedbed carefully without causing any mechanical injury to the seedling for transplanting in the experimental plot. The main land of the whole experimental plot was first opened on 21st April 1997 with a tractor drawn disc plough and then the land was well prepared by ploughing and laddering. Clods were broken and stubbles were removed from the field. After rain on 28th August, the plots which were to be puddled were bunded and water was retained and puddled nicely. The seeds were sown in normal soil and puddled (wet) soil at the rate of 2.5 kg ha^{-1} on 2nd September 1997. The seeds at the rate of 2.5 kg ha^{-1} were also sown in lines on 2nd September 1997. Each top cutting was planted in soil to a depth of 5 cm at an angle about 45^0 maintaining plant to plant and row to row distances of 10 and 30 cm, respectively. Twenty-two-days old seedlings were transplanted in the experimental plot on 2nd September 1997. Experimental plots were fertilized with 72.83, 21.31, 31.45 and 3327 kg ha^{-1} of urea, TSP, MP and cowdung, respectively. One-third of urea and whole amount of TSP, MP and cowdung were applied at the time of final land preparation. The rest amount of urea was top dressed in two installments, one at 21 days after sowing (DAS) and the second at 45 DAS (Mannan *et al.*, 1994). Each unit plot was weeded twice at 21 and 45 days after sowing and planting, respectively. Plots were irrigated once at 50 DAS. There was no insect infestation in experimental field. All necessary intercultural operations were done as and when necessary.

Harvesting was done plot wise on 22nd January 1998 at full maturity by cutting the pod bearing top portion of each plant. Then the remaining part of the plants was harvested by cutting at base of the plant at ground level. Later on, the pod bearing portions were taken to the threshing floor and seeds were separated from the pods by beating with bamboo sticks. Then the

remaining portions and seeds were sun dried for four consecutive days. Seed yield was assessed on 14% moisture level. Afterwards, the seeds were cleaned and the remaining plant parts were bunded with pod bearing portion for measuring by product yield. Then the seed yield and the by-product yield were recorded separately. The data recorded from the experimental plot were plants plot^{-1}, plant height, base diameter, branches plant^{-1}, pods plant^{-1}, 1000-seeds weight, seed yield and by-product yield. All collected data were analyzed statistically following the ANOVA technique and the means were adjudged by DMRT (Gomez and Gomez, 1984).

Results and Discussion

Planting techniques exerted significant influence on different plant parameters (Table 1). It is found that the highest plant population (19500) (ha^{-1}) was recorded from line sowing in normal soil planting technique and the lowest (13500) was observed in top cutting plantation in normal soil which was statistically identical with broadcasting in wet soil (14626) and seedling transplantation in normal soil (14625). The tallest plant (1.05 m) was recorded from line sowing in normal soil which was followed by broadcasting in normal soil (1.03 m). The lowest plant was observed in top cutting transplantation technique. This result is in accordance with the findings of Islam *et al.* (1994). The base diameter varied significantly by different planting techniques. The highest base diameter (29.25 mm) was obtained from the top cutting transplantation and the lowest (23.00 mm) was from broadcasting in wet soil which was statistically identical with that of seedling transplantation in normal soil (Table 1). The number of branches plant^{-1} was significantly affected by different planting techniques. The number of branches plant^{-1} (3.72) due to line sowing in normal soil was statistically identical to that of top cutting plantation in normal soil (3.62), broadcasting in wet soil (3.38) and in normal soil (3.30) planting techniques (Table 1). The branches of jute plant were found to be reduced for seedling transplantation in normal soil. It has also been reported by Islam *et al.* (1994). The maximum number of pods plant^{-1} (37.00) was recorded from top cutting plantation which was followed by line sowing in normal soil (33.00). The lowest number of pods plant^{-1} (20.75) was observed from seedling transplantation in normal soil. This result corroborates with the findings of Islam *et al.* (1994). The number of seeds pod^{-1} was significantly affected by different planting techniques. The highest number of seeds pod^{-1} (156.00) was recorded from top cutting plantation which was statistically identical to that of seedling transplantation in normal soil (146.50) and line sowing in normal soil technique (145.000). The highest 1000-grains weight (1.88 g) was recorded from top cutting plantation which was statistically identical to the line sowing in normal soil (1.81 g). The lowest 1000-seeds weight (1.69 g) was observed from broadcasting in normal soil technique. Similar findings were also reported by Islam *et al.* (1994). The highest seed yield (585 kg ha^{-1}) was recorded from line sowing treatment. This might be due to the reason that the highest number of plant population plot^{-1}, increase number of branches plant^{-1}, pods plant^{-1}, seeds plot^{-1} and 1000-seeds weight. The lowest seed yield (260 kg ha^{-1}) was obtained from top cutting plantation in normal soil. Islam *et al.* (1994), Mannan *et al.* (1994) and Bhaswati (1995) also reported the similar results.

The comparative cost and benefit ratios of different planting techniques of late jute seed production have been determined (Table 3). The highest seed yield (585 kg ha^{-1}) was obtained from line sowing in normal soil and was followed by broadcasting in normal soil, broadcasting in puddled soil, seedling transplantation in normal soil and top cutting plantation in normal soil. On the contrary highest by-product yield (5.89 t ha^{-1}) was resulted from broadcasting in normal soil and was followed by line sowing in normal soil, broadcasting in puddled soil, seedling transplantation in normal soil and top cutting plantation in normal soil. The maximum gross income (Tk. 54795) was obtained from top cutting plantation in normal soil technique. The second highest gross income (Tk. 46485) was resulted from line sowing followed by broadcasting in normal soil, broadcasting in puddled soil and seedling transplantation technique. But, the highest total cost (Tk. 63400) was recorded from top cutting technique,

Table 1: Effect of different planting techniques on the yield and yield contributing characters of jute

Treatments	Plant population ha^{-1} (No.)	Plant height (m)	Base diameter (mm)	Branches plant^{-1} (No.)	Pods plant^{-1} (No.)	Seeds pod^{-1} (No.)	1000-seeds weight (g)	Seed yield (kg ha^{-1})
Broadcasting in normal soil	16625b	1.03ab	26.25b	3.30a	32.75b	134.00bc	1.69c	440b
Broadcasting in puddled soil	14625c	0.97bc	23.00c	3.38a	29.25b	129.00c	1.75bc	400c
Line sowing in normal soil	19500a	1.05a	27.25b	3.72a	33.00ab	145.00ab	1.81ab	585a
Seedling transplantation in normal soil	14625c	0.92cd	23.25c	2.42b	20.75c	146.50a	1.72bc	380c
Top cutting plantation in normal soil	13500c	0.90d	29.25a	3.62a	37.00a	156.00a	1.88a	260d

In a column figures having common letter(s) do not differ significantly at $P < 0.01$

Table 2: Total cost of production of jute under different planting techniques

Treatments	Material input cost (Tk. ha^{-1})	Non-material input cost (Tk. ha^{-1})	Total cost (Tk. ha^{-1})
Broadcasting in normal soil	1550.00	36000.00	37650.00
Broadcasting in puddled soil	1650.00	46000.00	47650.00
Line sowing in normal soil	1650.00	36000.00	37650.00
Seedling transplantation in normal soil	1650.00	36000.00	37650.00
Top cutting plantation in normal soil	2350.00	61000.00	63400.00

Table 3: Comparative cost and benefit of different plantation techniques of late jute sees production

Treatments	Seed yield (kg ha^{-1})	By product yield (kg ha^{-1})	Gross income (Tk. ha^{-1})	Total cost (Tk. ha^{-1})	Benefit (TK. ha^{-1})
Broadcasting in normal soil	445	5890	37760.00	37650.00	202.50
Broadcasting in puddled soil	415	5360	35015.00	47660.00	-12850.00
Line sowing in normal soil	585	5640	46485.00	37650.00	8695.00
Seedling transplantation in normal soil	390	4650	32325.00	37650.00	-8180.00
Top cutting plantation in normal soil	285	4280	54795.00	63400.00	8615.00

Seed = 65 Tk. kg^{-1}, By product = 1500 Tk. t^{-1}

followed by (Tk. 37650) broadcasting in puddled soil. In case of broadcasting in puddled soil the cost of production was higher due to more number of ploughings and ladderings required to puddle the soil and more number of labourers were required for making bunds to retain water in the plots. In case of top cutting technique the cost of production was also higher due to seedbed preparation, its care and collection of top portion from the seedbed and plantation in the experimental plots. So negative benefit (Tk. ha^{-1}) was resulted from broadcasting in puddled soil and top cutting plantation in normal soil. The lowest similar total cost (Tk. 37650) ha^{-1} was recorded from line sowing and broadcasting in normal soil, respectively (Table 2). Similarly, the highest benefit amounting to Tk. 8695.00 and 202.00 were obtained from line sowing in normal soil and broadcasting in normal soil, respectively (Table 3). This sort of benefit was found to be associated with line sowing in normal soil and broadcasting in normal soil due to the fact that no extra money expenditure was necessary for these plantation techniques as were needed for raising seedlings and top cutting preparation for other plantation techniques.

From the results of current study it can be seen that both line sowing and broadcasting in normal soil techniques are beneficial for the farmers to produce good seed yield of jute.

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