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# Performance of NJ 7050 Olitorius Jute for Eastern Plains

**R. Banerjee*, A. Chakraborty, S. Chowdhury, S. Biswas and P. Bandopadhyay**

*Department of Agronomy, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur-741252, Nadia, West Bengal, India*

**Corresponding author*

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**A B S T R A C T**

Crop improvement scientists in jute constantly strives for new varieties in the seed chain and come up with new entries which needs adaptive research primarily in nutrient management. An experiment was conducted at Mondouri Research Farm, Bidhan Chandra Krishi Viswavidyalaya, West Bengal during pre-kharif season of 2018 and 2019. The experimental soil was sandy loam, neutral, organic carbon (0.56%), available nitrogen 210 kg $ha^{-1}$, available phosphorus 33 kg $ha^{-1}$ and available potassium 166 kg $ha^{-1}$. The test entry was from *olitorius* jute *viz.* $V_1$=NJ 7050 and was adjudged against two national check variety namely $V_2$=JRO 524 (Navin) and $V_3$=JRO 8432 (Shakti). Four different nutrient schedules $F_1$= Control, $F_2$ = 60: 13: 25 (N: P: K, kg/ha) kg $ha^{-1}$ $F_3$ = 80: 17.5:33.3 (N: P: K, kg/ha), F4 = 100: 21.8: 41.7 (N: P: K, kg/ha) was taken. The experimental design was ''Factorial RBD'' having two factors, i.e. fertilizer and variety. Total treatment combinations are 12 and replicated thrice. Fertilizers were applied as basal as per schedule. The seeds were sown on 17$^{th}$ April, 2018 and 17$^{th}$ April 2019. Crop management was done according to recommended package of practices. As pre harvest observations, plant height, dry matter, basal girth, leaf area index were recorded along with green yield and fibre yield. Fibre quality parameters were also adjudged to understand the superiority of different entries. The best variety was NJ 7050 as evidenced by fibre productivity of 36.44 q/ha, fibre strength of 17.6 g/tex with $F_3$ nutrient schedule and fineness of 2.4 texresulting in fibre grade of W4+50% in pooled analysis. The maximum fibre production (37.14 q/ha) was obtained from the dose of F3 (80: 17.5:33.3 N: P: K, kg/ha). The best crop economics was given by $F_3V_1$ with net returns of Rs. 115561.60 and B:C ratio of 2.19.

## Introduction

Jute (*Corchorus spp.*) is a natural fibre crop is second in the world after Cotton in terms of global production, consumption and availability. Jute is the oldest cash crop of eastern India. It is a natural coarse fibre, made from the stems of a tropical plant and used for making rope/yard and woven into sacking, hessian etc. Raw jute, as it is known in trade,

comprises jute and mesta fibres. Predominant jute species grown in India is *Corchorus olitorious* (*Tossa* jute). The major jute crop is cultivated in West Bengal, Assam, Bihar, Odisha, Tripura, Meghalaya and Andhra Pradesh. It is an environment friendly crop responsible for out doing synthetic fibers. Leaves are a source of vegetable and leaf fall enhance the fertility of the land. The root and stubble of jute increase the fertility. The stick of jute is used as a particle and composite and it reduce the dependency on the wood as a fuel which reduces the deforestation (Islam *et al.*, 2012). India and Bangladesh has a strong heritage of jute cultivation. The jute area is more or less stagnant in this millennium being the highest in India (varying between 0.87 and 1.03 m ha during (2000-04), followed by Bangladesh (0.43-0.52 m ha) and China (0.05-0.058) m ha. In West Bengal relatively higher productivity is observed in South Bengal with *olitorius spp.* The impressive increase in crop yields has resulted, in addition to other components, primarily due to improve crop varieties. Improved varieties play important role in enchanting productivity of any corp. improved varieties alone can add 20-25% to increased productivity, even if other components of production remain the same. Unaffordable farmer's practice of using sub recommended doses of fertilizers and absence of FYM use resulted in the crop responding to more and more applied nutrient levels. This implies declining factor productivity for nutrient use in the Jute crop. In a study of technology change and input use, Chatterjee and Bandopadhyay (2010) showed that among the inputs growth of fertilizer has been the highest (10.67%), in the decade 1995 to 2006.Keeping this in mind the present experiment on "Effect of nutrient schedules and varieties on the growth and yield of tossa jute (*Corchorus olitorious* L.)" has been taken up to screen out *olitorious* jute varieties to understand the nutrient need in the present day context.

## Materials and Methods

The experiment was conducted at Mondouri Research Farm of Bidhan Chandra Krishi Viswa vidyalaya, West Bengal during pre-kharif season of 2018 and 2019. This tropical irrigated farm has a bearing of 89 °E longitudes, 23 °N latitude and about 10 m above the sea level. The experimental soil was sandy loam, neutral, organic carbon (0.56%), available nitrogen 210 kg/ha, available phosphorus 33 kg/ha and available potassium 166 kg/ha. The test entry was from *olitorius* jute *viz.* $V_1$=NJ 7050 and two national check variety namely $V_2$=JRO 524 (Navin) and $V_3$=JRO 8432 (Shakti).

Four different nutrient schedules $F_1$= Control, $F_2$ = 60: 13: 25 (N: P: K, kg/ha) kg $ha^{-1}$ $F_3$ = 80: 17.5:33.3 (N: P: K, kg/ha), F4 = 100: 21.8: 41.7 (N: P: K, kg/ha) was taken. The experimental design was ''Factorial RBD'' having two factors, i.e. fertilizer and variety. Total treatment combinations are 12 and replicated thrice. Net plot size was 12 $m^2$. Fertilizers were applied as basal as per schedule. The seeds were sown on 17$^{th}$ April, 2018 and 17$^{th}$ April 2019. Crop management was done according to recommended package of practices. As pre harvest observations, plant height, dry matter, basal girth, leaf area index were recorded along with green yield and fibre yield. Fibre quality parameters were also adjudged to understand the superiority of different entries.

## Results and Discussion

### Growth attributes

Data presented in Table 1 showed that the maximum plant height was observed in variety NJ 7050 (317.85 cm) in pooled analysis, with corresponding values of highest basal diameter (1.45 cm), significantly highest leaf area index (6.94) and highest dry matter

(1356.98 $gm^{-2}$). This observation is in accordance with Olaniyi,-J O; Ajibola, A T (2008)

Nutrient schedule showed a significant effect on the plant height of *olitorious* jute (Table 1). Among the nutrient schedules highest plant height, basal diameter, leaf area index, dry matter accumulation was observed in F3 nutrient schedule (80: 17.5:33.3 N: P: K, kg/ha) which was followed closely by F4 (100: 21.8: 41.7 N: P: K, kg/ha). In many occasions F3 and F4 were at par. The mean plant height for F3 was 298.74 cm and the corresponding values for basal diameter was 1.46 cm, LAI 7.42, dry matter accumulation (1425.13 g $m^{-2}$). Such variation in growth attributes in response to nutrient schedules also observed by Paikaray *et al.,* (2006).

Among the interactions (Table 2), significantly highest LAI (7.61) was enjoyed by the $F_3V_1$ combination which maintained at parity with $F_3V_2$ (7.46) and $F_4V_1$ (7.26) treatment combination in the pooled analysis. The maximum dry matter accumulation (1533.05 $g/m^2$) was recorded in NJ 7050 variety with $F_3$ fertilizer schedule which is statistically at par with $F_3V_3$ (1446.42 $g/m^2$) and $F_4V_1$ (1435.58 $g/m^2$).

## Yield attributes

The green biomass of jute in Table 3 showed significantly superior mean of 543.77 q/ha with variety $V_1$ that was statistically at par over JRO 8432 producing green yield of 496.87 q/ha in pooled analysis. For nutrient schedules, the maximum production was shown by $F_3$ treatment (568.16 q/ha) which was significantly at par with $F_4$ (537.59q/ha) nutrient schedule.

The fibre yield of jute reflects in Table 3 shows that the significantly superior mean of 36.44 q/ha with variety $V_1$ followed by $V_3$ (32.44 q/ha). In nutrient schedules, the maximum production was shown by $F_3$ treatment (37.10 q/ha) which was at par with $F_4$ (34.92 q/ha) nutrient schedule. Both $F_3$ and $F_4$ are significantly superior over $F_1$ (25.25 q/ha) and $F_2$ (29.93 q/ha). Variations in yield of jute as response to variety reported by Sinha *et al.,* (2004) and variation in yield of jute as response to fertilizer reported by Majumdar *et al.,* (2010).

## Quality parameters

Among the *olitorious* varieties the NJ 7050 variety showed best quality fibre compared to others varieties. The grading of *tossa* jute, analysed in NIRJAFT, showed that NJ 7050 have better grades in both the years ($W_4$ + 40% in 2018 and $W_4$+ 50 % in 2019. The date of harvesting or age of crop is playing key role for quality fibre and production too. Here, NJ 7050 variety was harvested In 120 days after sowing and fibre quality secured with grade $W_4$ without losing any fibre yield followed by JRO 8432 variety. Satya *et al.,*(2000) and Haque *et al.,* (2001) also found almost similar result.

## Economics

Amongst the *olitorious* varieties, NJ 7050 showed maximum B:C (2.19) with $F_3$ fertilizer schedule followed by same variety with $F_4$ fertilizer level (2.00). The net return of NJ 7050 with $F_3$ nutrient schedule was maximum among the treatments. The best variety was NJ 7050 as evidenced by fibre productivity of 36.44 q/ha, fibre strength of 17.6 g/tex with $F_3$ nutrient schedule and fineness of 2.4 texresulting in fibre grade of W4+50% in pooled analysis. The maximum fibre production (37.14 q/ha) was obtained from the dose of F3 (80: 17.5:33.3 N: P: K, kg/ha). The best crop economics was given by $F_3V_1$ with net returns of Rs. 115561.60 and B:C ratio of 2.19.

**Table.1** Effect of varieties and nutrient schedule on growth attributes of *Olitorious* Jute variety

| Treatments | Plant height (cm) | | | Basal diameter (cm) | | | Leaf Area Index | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2019 | Pooled | 2018 | 2019 | Pooled | 2018 | 2019 | Pooled |
| **Variety** | | | | | | | | | |
| **V1** | 307.92 | 327.78 | 317.85 | 1.40 | 1.49 | 1.45 | 6.79 | 7.10 | 6.94 |
| **V2** | 255.07 | 266.42 | 260.745 | 1.31 | 1.37 | 1.34 | 6.62 | 6.92 | 6.77 |
| **V3** | 277.48 | 294.23 | 285.855 | 1.34 | 1.42 | 1.38 | 6.45 | 6.74 | 6.59 |
| **S.Em** | 2.82 | 3.12 | 4.10 | 0.025 | 0.019 | 0.031 | 0.03 | 0.025 | 0.04 |
| **C.D (P=0.05)** | 8.33 | 9.35 | 12.4 | NS | NS | NS | 0.09 | 0.075 | 0.12 |
| **Nutrient Schedule** | | | | | | | | | |
| **F1** | 252.55 | 270.11 | 261.33 | 1.25 | 1.34 | 1.30 | 5.97 | 6.12 | 6.04 |
| **F2** | 277.92 | 292.46 | 285.19 | 1.30 | 1.37 | 1.34 | 6.35 | 6.71 | 6.53 |
| **F3** | 300.68 | 314.00 | 307.34 | 1.44 | 1.50 | 1.47 | 7.15 | 7.69 | 7.42 |
| **F4** | 289.48 | 308.00 | 298.74 | 1.41 | 1.50 | 1.46 | 7.01 | 7.18 | 7.09 |
| **S.Em** | 3.26 | 4.65 | 3.80 | 0.029 | 0.031 | 0.026 | 0.04 | 0.05 | 0.035 |
| **C.D (P=0.05)** | 9.62 | 13.95 | 11.40 | 0.087 | 0.093 | 0.078 | 0.10 | 0.15 | 0.105 |

**Table.2** Interaction effect of varieties and nutrient schedule on growth attributes of *Olitorious* Jute variety

| Treatments | Basal diameter (cm) | | | Leaf Area Index | | |
|---|---|---|---|---|---|---|
| | **2018** | **2019** | **Pooled** | **2018** | **2019** | **Pooled** |
| **$F_1V_1$** | 1.32 | 1.38 | 1.35 | 6.17 | 6.32 | 6.25 |
| **$F_1V_2$** | 1.18 | 1.26 | 1.22 | 5.9 | 6.04 | 5.97 |
| **$F_1V_3$** | 1.25 | 1.37 | 1.31 | 5.84 | 5.98 | 5.91 |
| **$F_2V_1$** | 1.35 | 1.41 | 1.38 | 6.47 | 6.84 | 6.65 |
| **$F_2V_2$** | 1.29 | 1.35 | 1.32 | 6.35 | 6.71 | 6.53 |
| **$F_2V_3$** | 1.27 | 1.36 | 1.31 | 6.22 | 6.57 | 6.40 |
| **$F_3V_1$** | 1.47 | 1.61 | 1.54 | 7.33 | 7.88 | 7.61 |
| **$F_3V_2$** | 1.4 | 1.46 | 1.43 | 7.19 | 7.73 | 7.46 |
| **$F_3V_3$** | 1.44 | 1.42 | 1.43 | 6.92 | 7.44 | 7.18 |
| **$F_4V_1$** | 1.46 | 1.56 | 1.51 | 7.18 | 7.35 | 7.26 |
| **$F_4V_2$** | 1.38 | 1.41 | 1.40 | 7.04 | 7.21 | 7.12 |
| **$F_4V_3$** | 1.39 | 1.53 | 1.46 | 6.81 | 6.97 | 6.89 |
| **S.Em** | 0.05 | 0.035 | 0.055 | 0.06 | 0.05 | 0.042 |
| **C.D (P=0.05)** | 0.15 | 0.105 | 0.165 | 0.18 | 0.15 | 0.126 |

**Table.3** Effect of varieties and nutrient schedule on green yield and fibre yield of *Olitorious* Jute variety

| Treatments | Green yield (q/ha) | | | Fibre yield (q/ha) | | |
|---|---|---|---|---|---|---|
| | 2018 | 2019 | Pooled | 2018 | 2019 | Pooled |
| **Variety** | | | | | | |
| **V1** | 534.26 | 553.27 | 543.77 | 33.63 | 39.25 | 36.44 |
| **V2** | 422.07 | 467.16 | 444.62 | 26.35 | 29.21 | 27.78 |
| **V3** | 485.17 | 508.56 | 496.87 | 30.75 | 34.12 | 32.44 |
| **S.Em** | 11.92 | 9.20 | 13.12 | 0.735 | 0.91 | 0.64 |
| **C.D (P=0.05)** | 35.20 | 27.60 | 39.36 | 2.168 | 2.73 | 1.92 |
| **Nutrient Schedule** | | | | | | |
| **F1** | 393.34 | 402.36 | 397.85 | 24.42 | 26.13 | 25.25 |
| **F2** | 432.24 | 452.27 | 442.26 | 28.59 | 31.27 | 29.93 |
| **F3** | 563.42 | 572.89 | 568.16 | 34.92 | 39.28 | 37.14 |
| **F4** | 533.01 | 542.17 | 537.59 | 33.06 | 36.78 | 34.92 |
| **S.Em** | 13.77 | 17.01 | 16.20 | 0.85 | 1.03 | 1.32 |
| **C.D (P=0.05)** | 40.64 | 51.03 | 48.60 | 2.50 | 3.09 | 3.96 |

**Table.4** Effect of varieties and nutrient schedule on quality of *Olitorious* Jute variety

| Treatments | | Tenacity (g/tex) | | Fineness (tex) | | BIS Grade | |
|---|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2018 | 2019 | 2018 | 2019 |
| **NJ 7050** | $F_1$ | 16.4 | 16.5 | 2.2 | 2.3 | W4+40% | W4+50% |
| | $F_2$ | 17.1 | 17.3 | 2.2 | 2.2 | | |
| | $F_3$ | 17.2 | 17.6 | 2.3 | 2.4 | | |
| | $F_4$ | 17.0 | 17.4 | 2.3 | 2.4 | | |
| | | | | | | | |
| **JRO 524** | $F_1$ | 13.7 | 14.1 | 2.7 | 2.6 | W5+30% | W5+30% |
| | $F_2$ | 15.6 | 16.2 | 2.7 | 2.6 | | |
| | $F_3$ | 15.8 | 16.4 | 2.7 | 2.7 | | |
| | $F_4$ | 15.6 | 16.0 | 2.6 | 2.7 | | |
| | | | | | | | |
| **JRO 8432** | $F_1$ | 16 | 16.2 | 2.6 | 2.7 | W5+60% | W5+70% |
| | $F_2$ | 17.0 | 17.0 | 2.7 | 2.7 | | |
| | $F_3$ | 17.1 | 17.3 | 2.7 | 2.7 | | |
| | $F_4$ | 16.9 | 17.1 | 2.5 | 2.6 | | |

**Table.5** Economic analysis of *Olitorius* Jute variety (pooled)

| Treatments | Cost of cultivation (Rs./ha) | Gross Return (Rs./ha) | Net return (Rs./ha) | B:C |
|---|---|---|---|---|
| $F_1V_1$ | 48530 | 126198.40 | 77668.40 | 1.60 |
| $F_1V_2$ | 48530 | 85528.10 | 36998.10 | 0.76 |
| $F_1V_3$ | 48530 | 110386.20 | 61856.20 | 1.27 |
| $F_2V_1$ | 51677 | 149355 | 97678 | 1.89 |
| $F_2V_2$ | 51677 | 99960 | 48283 | 0.93 |
| $F_2V_3$ | 51677 | 126454.50 | 74777.50 | 1.45 |
| $F_3V_1$ | 52752 | 168313.60 | 115561.60 | 2.19 |
| $F_3V_2$ | 52752 | 134302.50 | 81550.50 | 1.55 |
| $F_3V_3$ | 52752 | 153498.50 | 100746.50 | 1.91 |
| $F_4V_1$ | 53811 | 161280 | 107469 | 2.00 |
| $F_4V_2$ | 53811 | 127925 | 74114 | 1.38 |
| $F_4V_3$ | 53811 | 144550.50 | 90739.50 | 1.69 |

In conclusion, the best variety was NJ 7050 as evidenced by fibre productivity of 36.44 q/ha, fibre strength of 17.6 g/tex with $F_3$ nutrient schedule and fineness of 2.4 texresulting in fibre grade of W4+50% in pooled analysis. The maximum fibre production (37.14 q/ha) was obtained from the dose of F3 (80: 17.5:33.3 N: P: K, kg/ha). The best crop economics was given by $F_3V_1$ with net returns of Rs. 115561.60 and B:C ratio of 2.19. That's why the farmers are recommended to cultivate NJ 7050 variety of Olitorius jute with nutrient dose 80:17.5:33.3 (N:P:K, kg/ha).

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