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# EFFECT OF VARIETIES AND NUTRIENT LEVELS ON JUTE IN EASTERN UTTAR PRADESH

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## ABSTRACT

*A field experiment was conducted at Crop Research Station, Bahraich (U.P.) during name the season of 2012 and 2013 to study the effect of varieties and nutrients levels on jute (Carchorus capsularis). The three jute varieties viz. JRC-9057, JRC-321, JRC-698 and 3 nutrient levels viz. 60:13:25, 80:17.5:33.3 and 100: 21.8:41.7 kg NPK ha$^{-1}$ were evaluated in randomized block design with three replications. The results revealed that the jute variety JRC-321 produced higher plant height, (314.6) basal diameter (1.62 cm) and fibre yield (27.13 q ha$^{-1}$) along with net profit of ₹. 32200 ha$^{-1}$. Increasing levels of nutrients increased all the growth attributes as well as fibre yield of jute varieties. The highest plant height (314.5 cm), basal diameter (1.58 cm) and fibre yield (27.93 q ha$^{-1}$) were recorded with the application of 100:21.8:41.7 kg NPK ha$^{-1}$ which was significantly superior to other levels of nutrients. Net returns (₹. 32900 ha$^{-1}$) and B:C ratio (2.93) were the highest at 100: 21.8: 41.7 kg NPK ha$^{-1}$ level. Highest values of N (77.6 kg ha$^{-1}$) P (33.0 kg ha$^{-1}$) and K (103.5 kg ha$^{-1}$) uptake were recorded with 100: 21.8: 41.7 kg NPK ha$^{-1}$.*

**Keywords:** Variety, nutrient levels, yield, economics, nutrient uptake, jute.

## INTRODUCTION

Jute is one of the most important commercial crop of our country particularly of eastern and north eastern India. India has the largest area under jute cultivation (1.0 million ha) with the production of nearly 100 lakh bales (Sen, 2007). The productivity of jute has increased from 1138 kg ha$^{-1}$ in 1947-48 to around 2300 kg ha$^{-1}$ in 2004-05 More than 0.25 million industrial workers and 0.05 million traders get employment in jute sector and occupied only 0.15 percent of the cropped area in the country (Chaudhary and Sinha, 2004). The jute quality improvement is a continuous process employing various techniques such as development of new varieties with plant breeding and biotechnology.The varieties play an important role in growth as well as fibre production of jute. Genetical variability of varieties reflected the growth and yield attributes and yield. Alternatively, agronomic methods such as fertilizing crop through fertilizers can be used for enhancing the yield. Imbalanced use of fertilizers also affect the crop growth that leads to decline the fibre yield. Information on the effect of nutrients on jute varieties is meagre Therefore an experiment was laid out in the field to evaluate the effect of varieties and levels of nutrients on growth, yield uptake of nutrients by jute.

## MATERIALS AND METHOD

A field experiment was undertaken at the Crop Research Station, Bahraich (U.P.) during zaid season of 2012 and 2013 in sandy loam soil having pH 7.5, organic carbon 3.5 g kg$^{-1}$ and available N,P and K 240, 13.5, 250 kg ha$^{-1}$, respectively. The experiment consisted of three jute varieties (JRC-9057, JRC-321, JRC-698) and three fertility levels (60:13:25, 80:17.5:33.3, 21.8, 91.7 kg ha$^{-1}$) was conducted in randomized block design with 3 replications. The crop was sown on 15 April in both the years. The spacing of 30 cm row to row and plant to plant spacing was maintained 10 cm after two thinning of crop. The 5 kg seeds ha$^{-1}$ was used for sowing. Entire amount of P and K and 1/3 dose of N was applied at the time of sowing as basal dressing through urea, single superphosphate and muriate of potash and remaining 2/3 dose of nitrogen was applied of 45 and 75 days of sowing of the crop. All agronomical practices like weeding, intercultural operations, and irrigation and plant protection measures were followed time to time. The crop was harvested at 120 days after sowing. The growth and yield attributes were recorded at full growth stage of crop and yield was estimated after harvesting and retting of crop. Economics of each treatment was calculated considering the nearest market price of input and output. Nitrogen, P and K content in plants were estimated as per procedures described by Jackson (1973). The uptake of N, P and K was calculated by multiplying yield data with corresponding values of their concentrations and expressed in kg ha$^{-1}$.

## RESULTS AND DISCUSSION

### Varieties

The data (Table 1) revealed that the highest plant height (314.6 cm) and basal diameter (1.62 cm) were recorded under jute variety JRC-321 which was found significantly superior over variety JRC-9057 and JRC-698. This might be due to better genetical character in that variety. The variety JRC-9057 was

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found at second place and JRC-698 at third place in respect of plant height and basal diameter. Results indicated that the maximum fibre yield (27.13 q $ha^{-1}$) was noted under jute variety JRC-321 which was found 4.12, 10.28 % higher over jute variety JRC-9057 and JRC-698, respectively. This might be due to highest plant height and basal diameter of plant under the same variety. Higher net income of (` 32200 $ha^{-1}$) was noted under variety JRC-321 which was found 5.2 and 12.9 % more over variety JRC-9057 and JRC-698, respectively. This might be due to higher fibre yield recorded under jute variety JRC-321 and B:C ratio was also found in same manner. Nutrient uptake data (Table 1) indicated that higher nutrients uptake of N (77.0 kg $ha^{-1}$), P (31.8 kg $ha^{-1}$) and K (105.2 kg $ha^{-1}$) was recorded under variety JRC-321 followed by variety JRC-9057. The minimum uptake of nutrients was recorded in JRC-698 variety of jute which may be attributed to lower yield produced by JRC-698.Similar results were also reported by Kumar *et al.* (2010), Singh *et al.* (2011) and Anonymous (2014).

Table 1: Effect of treatments on growth, characters of jute (mean of two years)

| Treatments | Plant population ( $m^2$) | Plant Height (cm) | Basal diameter (cm) |
|---|---|---|---|
| Varieties | | | |
| JRC-9057 | 4.7 | 310.7 | 1.55 |
| JRC-321 | 4.6 | 314.6 | 1.62 |
| JRC-698 | 4.6 | 308.8 | 1.44 |
| CD (P= 0.05) | N.S. | 0.9 | 0.06 |
| Fertility Levels (kg $ha^{-1}$) | | | |
| 60:13:25 | 44.7 | 308.7 | 1.49 |
| 80:17.5:33.3 | 45.9 | 311.0 | 1.55 |
| 100:21.8:41.7 | 44.5 | 314.5 | 1.58 |
| CD (P= 0.05) | N.S. | 0.9 | 0.06 |

**Nutrient**

The pooled data (Table 1) indicated that the growth characters and fibre yield increased significantly with increasing levels of NPK over control. The highest plant height (314.5 cm), basal diameter (1.58 cm) and fibre yield (27.93 q $ha^{-1}$) were recorded with application of nutrients (100:21.8:41.7 kg NPK $ha^{-1}$) which was 1.8 and 1.1 % higher in plant height; 5.6 and 1.8 % in basal diameter and 14.4 and 8.1 % in fibre yield over the application of 60:13:25 and 80:17.5:33.3 kg NPK $ha^{-1}$, respectively. The higher growth and yield under N, P and K levels might be due to increased growth and chlorophyll content in leaves as a result of favourable environment and improved fertility status of soil. All these favourable situations eventually brought about greater fibre yield of jute. Similar results were reported by Singh *et al.* (2011) Saha *et al.* (2008) and Ray and Chaudhary (2000). Data (Table 2) reveal that the hightest net returns (₹. 32900 $ha^{-1)}$ was noted with higher fertility level (100: 21.8: 41.7 kg NPK ha-$^{1}$) followed by 80: 17.5: 33.3: kg NPK $ha^{-1}$ (₹. 30000 $ha^{-1}$). The lowest net returns (₹.27885 $ha^{-1}$) was noted at control. Similar results were reported by Kumar et al. (2010).) The higher B:C ratio (2.93) was noted with100:21.8:41.7 kg NPK $ha^{-1}$ which was superior over other two doses of nutrients. All the combinations of nitrogen, phosphorus and potassium had significantly beneficial effect on the uptake of nutrients by the crop over control (Table 2). The highest uptake of N (77.6 kg $ha^{-1}$), P (33.0 kg $ha^{-1}$) and K (103.5 kg $ha^{-1}$) was recorded with 100: 21.8: 41.7 kg NPK $ha^{-1}$ and lowest under control. Since uptake of a nutrient is the result of concentration of that particular nutrient and yield. So, N, P and K uptake was also highest in the crop. The uptake of nutrients increased significantly with increasing levels of N, P and K over control.

Table 2: Effect of treatments on yield, economics and uptake of nutrients by jute crop

| Treatments | Fibre yield (q $ha^{-1}$) | Net profit (₹. $ha^{-1}$) | B:C ratio | Total nutrient uptake (kg $ha^{-1}$) | | |
|---|---|---|---|---|---|---|
| | | | | N | P | K |
| Varieties | | | | | | |
| JRC-9057 | 26.01 | 30508 | 2.84 | 75.4 | 31.3 | 100.3 |
| JRC-321 | 27.13 | 32200 | 2.95 | 77.0 | 31.8 | 105.2 |
| JRC-698 | 24.34 | 28016 | 2.69 | 71.3 | 29.6 | 91.3 |
| CD ( P= 0.05) | 0.21 | 1250 | 0.25 | 0.47 | 0.33 | 0.72 |
| Fertility Levels (kg $ha^{-1}$) | | | | | | |
| 60:13:25 | 23.89 | 27885 | 2.74 | 71.5 | 28.7 | 94.5 |
| 80:17.5:33.3 | 25.66 | 30000 | 2.82 | 74.6 | 31.0 | 98.7 |
| 100:21.8:41.7 | 27.93 | 32900 | 2.93 | 77.6s | 33.0 | 103.5 |
| CD ( P= 0.05) | 0.21 | 1150 | 0.25 | 0.47 | 0.33 | 0.72 |

On the basis of the data it could be concluded that the jute variety JRC-321 with application 100:21.8:41.7 kg NPK $ha^{-1}$ produced highest fibre yields, and profit. It is recommended to the farmers of eastern U.P. to adopt the variety JRC-321 with 100:21.8:41.7 kg NPK $ha^{-1}$ for obtaining higher fibre yield and net return.

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