Fertilizer Management of Late Jute Seed Production in
Different Agro-Ecological Zones of Bangladesh

Bangladesh Jute Research Institute, Manik Mia Avenue, Dhaka-1207, Bangladesh

Abstract: Responsiveness of the variety Falgooni Tossa i.e. O-9897 (Corchorus olitorius L.) in late jute seed production to Nitrogen (N), Phosphorus (P) and Potassium (K) was assessed in different Agro-Ecological Zones (AEZ) with increasing dose of N, P and K fertilizers. A highly significant effect was observed for plant height, number of branches/plant, number of pods/plant, pod length, number of seeds/pod, 1000 seeds weight and seed yield with the application of increasing doses of N fertilizer. There was no significant effect of increasing doses of P fertilizer on plant height, number of branches/plant, pod length and number of seeds/pod but a significant effect found for number of pods/plant, 1000 seeds weight and seed yield. No effect towards seed yield and yield contributing characters was observed with increasing doses of K fertilizer. Significantly high seed yields were found with the application of 100-20-20, 75-40-20 and 100-20-20 kg N-P-K/ha at Rangpur (AEZ No. 3b), Manikganj (AEZ No. 8d) and Khorgangan (AEZ No. 8b) respectively.

Key words: Fertilizer, yield contributing characters, late jute seed yield

Introduction
Late jute seed production technology is that where jute crop is grown for the production of seed during mid August to mid September. Seed yield per unit area decreases the dry matter accumulation in the seed during their filling period. Moreover, seed yield depends on the response of yield contributing characters including plant population, plant height, number of branches, number of pods, pod length, number of seeds in pod and weight of 1000 seeds. The potential of jute seed crop can be improved through effective manipulations of those yield components, which have positive contribution towards seed yield (Talukder and Hossain 1989). On the other hand, full expression of genetic potentiality of a crop could not be attained unless appropriate management practices are ensured. Fertilizer is one of the most important inputs of management. Seed yield and yield-contributing characters are directly related to the plant growth. The plant growth is directly related to plant nutrition i.e. fertilization. In fact 50 percent of the total increase in yield comes from the use of fertilizer alone and the rest from all other factors combined together (Mukherjee, 1965). Therefore, efforts have been made to find the effect of N, P and K fertilizer on the yield and yield contributing characters of late jute seed.

Materials and Methods
Experiments were conducted at Rangpur under AEZ no. 3b (Central Tista Meandro Floodplane) non calcareous brown flood plain soils in Gangachara soil series, Manikganj under AEZ no. 8d (Low Jamuna Flood Plain) noncalcereous gray floodplain soil in Sonatola soil series and at Khorgangan under AEZ no. 8b (Upper Brahmaputra flood plain) non calcereous gray flood plain soils in Shilmondi soil series in the year 1994 to 1997 with sixteen selective doses of N, P and K fertilizers in randomized complete block design with three replications. The unit plot size was 3.0 x 3.0 m². Experiments of all these locations and years were conducted within 15 August to 30th August with the variety O-9897 i.e. Falgooni Tossa (Corchorus olitorius L.). The treatment combinations of N, P and K in kg/ha were (1) 0.0-0.0-0.0 (2) 0.0-20-20 (3) 25-20-20 (4) 50-20-20 (5) 75-20-20 (6) 100-20-20 (7) 125-20-20 (8) 150-20-20 (9) 75-30-20 (10) 75-40-20 (11) 75-50-20 (12) 75-60-20 (13) 75-70-20 (14) 75-80-20 (15) 75-90-20 and (16) 75-20-40. Full amount of P and K from triple super phosphate and muriate of potash respectively and 1/3 amount of N from urea were applied as basal dose as per treatment at the time of sowing. Another 1/3 N from urea was applied at 20-25 days after sowing and rest 1/3 amount of N also from urea was applied 40-45 days after sowing. Seeds were sown in lines with a spacing of 30 cm apart. Weeding, thinning, insect pest and disease management were done in time. The experiments were harvested within January of the following year when 80 percent of the pods were brown in colour at all locations and years. During the time of harvest, plant population was recorded. The plant height, number of branches per plant, number of pods per plant, pod length and seeds per pod were recorded from each plot. The weight of 1000 seeds and seed yield per plot was recorded after sun dry. The soil samples were collected before setting the experiments by a soil sampler (Augat) at all locations and years from a depth of 0-15 cm. The collected samples were dried and processed for analysis. Particle size analysis of the soils were made by combination of sieving and hydrometer method as described by Day (1965) and textural classes were determined by Marshall’s (1951) Triangular coordinate curve. Soil pH was measured electrometrically by combined glass/calomel electrode with a combing pH meter from a soil suspension (Soil:Water=1:2.5). Total N (Nitrogen) was measured by Kjeldhal digestion method and that of available P was measured colorimetrically after developing yellow colour (Jackson, 1973). Potassium was determined by ASI method as described by Hunter (1984). Soil organic matter (OM) was determined by wet oxidation method as described by Walkley and Black (1934). Statistical analysis was done after Gomez and Gomez (1983). General characteristics of initial soil samples are presented in Table 1.

Table 1: General characteristics (Range) of initial soil samples of four years

<table>
<thead>
<tr>
<th>Properties</th>
<th>Rangpur</th>
<th>Manikganj</th>
<th>Khorgangan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textural class</td>
<td>Sandy loam</td>
<td>Sandy loam</td>
<td>Loam</td>
</tr>
<tr>
<td>pH</td>
<td>5.6-6.1</td>
<td>6.1-6.4</td>
<td>6.1-6.6</td>
</tr>
<tr>
<td>O.M. %</td>
<td>1.16-1.28</td>
<td>1.21-1.26</td>
<td>1.12-1.18</td>
</tr>
<tr>
<td>Total N(%)</td>
<td>0.07-0.09</td>
<td>0.08-0.11</td>
<td>0.06-0.08</td>
</tr>
<tr>
<td>Exchangeable K (meq/100g)</td>
<td>0.18-0.21</td>
<td>0.21-0.24</td>
<td>0.15-0.19</td>
</tr>
</tbody>
</table>

Results and Discussion
Plant population: There was no significant variation in plant population with the increasing dose of nitrogen, phosphorus and potassium fertilizer application on late jute seed production at all locations (Table 2). Ali et al. (1990) also reported that application of fertilizers did not have any significant effect on the number of plants/m².

Plant height: Significant effect of increasing dose of nitrogen fertilizer application on plant height was observed at all locations. But there was no significant effect on plant height with the application of increasing dose of phosphorus and potassium fertilizer. The highest significant plant height was observed with
The application of 100, 125 and 125 kg N per hectare along with 20 kg P and 20 kg K per hectare at Rangpur, Manikganj and Kishorganj respectively (Table 2).

Number of branches/plant: Number of branches/plant increased significantly with increasing doses of N fertilizer up to a certain limit and beyond that it was not increased significantly at all locations (Table 2). Application of increasing doses of P and K fertilizer affects the number of branches/plant significantly only at Rangpur. Highest number of branches/plant were observed with 100, 125 and 125 kg N per hectare along with 20 kg P and 20 kg K per hectare at Rangpur, Manikganj and Kishorganj respectively.
highest number of pods/plant having no significant difference with 100 kg N (T₅₀) per hectare at all locations. A significant effect of P fertilizer application was observed on number of pods/plant at all locations. 40 (T₃₀), 40 (T₈₀) and 30 (T₇₀) kg P per hectare along with 75 kg N and 20 kg K per hectare showed highest number of pods/plant at Ranpur, Manigunj and Kishorganj respectively. Das (1992) and Jiang et al. (1988) observed an increase in pods number of peanut by applying phosphoric fertilizer. No significant effect was found on number of pods/plant with the application of increased doses of K fertilizer.

**Pod length:** Significant effect of increasing doses of N fertilizer application on pod length was observed at all locations. But there was no significant effect of increasing doses of P and K fertilizer application on pod length. Significant highest pod length i.e. 6.952, 6.963 and 7.020 cm was observed with the application of 125, 100 and 100 kg N per hectare along with 20 kg P and 20 kg K per hectare at Ranpur, Manigunj and Kishorganj respectively. Kundu et al. (1999) reported that *Corchorus olitorius* L. fruits are elongated from 5 to 10 cm long and 0.3 to 0.8 cm in diameter. Alam et al. (2001) found 4.56 to 6.09 cm pod length with this variety. There was no significant effect of increasing doses of P and K fertilizer application on number of seeds/pod was found at all locations.

**Number of seeds/pod:** Application of increasing doses of N fertilizer affect significantly the number of seeds/pod at all locations. Application of 125, 100 and 100 kg N per hectare along with 20 kg P and 20 kg K per hectare produced the highest number of seeds/pod at Ranpur (190.58), Manigunj (178.61) and Kishorganj (181.13) respectively. Kundu et al. (1999) again reported 172 to 200 seeds in each fruit of *Corchorus olitorius* L. Alam et al. (2001) found 146.55 to 198.56 seeds/pod with this variety. There was no significant effect of increasing doses of P and K fertilizer application on number of seeds/pod was found at all locations.

**1000 seeds weight:** Significant effect of N and P fertilizer application on 1000 seeds weight was observed. The highest 1000 seeds weight was obtained with the application of 75 kg N and 30 kg P along with 20 kg K per hectare at Ranpur and Manigunj respectively. But at Kishorganj, it was obtained with 100-20-20 kg N-P-K per hectare, which was statistically identical with that of 75-30-20 kg N-P-K per hectare. No effect of increasing doses of K fertilizer application was observed on 1000 seeds weight at all locations.

**Seed yield:** Significant effect of N and P fertilizer application on seed yield were observed at all locations. With increasing doses of N and P fertilizer application, seed yield increased up to a certain limit and beyond that it was decreased or statistically identical. In case of increasing doses of N fertilizer application, significantly high seed yield was observed with 100, 75 and 100 kg N per hectare along with 20 kg P and 20 kg K per hectare at Ranpur, Manigunj and Kishorganj respectively and beyond that it did not increase significantly. In case of increasing doses of P fertilizer, significantly high seed yield was observed with 30, 40 and 30 kg P per hectare along with 75 kg N and 20 kg K per hectare at Ranpur, Manigunj and Kishorganj respectively and beyond that it did not increase significantly. In case of increasing doses of K fertilizer application significantly effect on seed yield was not observed at all locations. Sen and Banerjee (1960) reported that P & K application without N had little effect on jute. In presence of P and K, without N, fibre yield markedly decreased below the yield obtained without fertilizer (Alam et al., 1988). The results indicated that the plant height, number of branches per plant, number of pods per plant, pod length, number of seeds per pod and weight of 1000 seeds had influence on seed yield. Hossain and Wehbeh (1980), Rahima Khatoon and Sobhan (1965) and Talukder and Hossain (1989) also reported higher seed yield from crops having higher number of branches per plant, number of pods per plant, number of seeds per pod and weight of 1000 seeds.

It may be concluded that the application of increasing doses of N and P fertilizer has significant effect on seed yield and yield contributing characters but application of increasing doses of K fertilizer has no effect on them. However, the highest seed yield may be obtained with the application of 100-20-20, 75-40-20 and 100-20-20 kg N-P-K per hectare at Ranpur, Manigunj and Kishorganj respectively.

**References**


Mukherjee, J.N., 1965. The Role Fertilizer in Resolving the Critical Food Situation in India. Thorns Publication, India.

