FRONTLINE DEMONSTRATION: AN EFFECTIVE TOOL FOR ENHANCING YIELD OF JUTE FIBRE IN SUB-HIMALAYAN PLAINS (TERAI ZONE) OF WEST BENGAL, India

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ABSTRACT
This study was taken up for wider dissemination of the improved packages of practices for increasing the productivity of jute in the area. Participatory approaches were followed to identify different problems of jute cultivation in the selected villages. Based on the identified problems, frontline demonstrations (FLDs) were conducted involving 149 farmers covering an area of 19.86 ha. in three consecutive years viz. 2006, 2007 and 2008. The results revealed that the increase in yield of demonstration plots varied from 24.93 to 26.75 per cent in three years with an average of 25.95 per cent over the control plots. The technology gap and extension gap ranged from 6.48 to 8.51 q/ha and 5.49 to 6.02 q/ha, respectively with a technology index varying from 18.51 to 24.32 per cent during the period of study. Considering the benefit-cost ratio (ranging between 1.91 to 2.05), it can be stated that there is an enhanced scope for increasing the productivity of jute in the terai region as the agro-ecological environment is very much suitable for the cultivation of the crop and the frontline demonstration will help in accelerating the adoption of the demonstrated technology leading to an increase in productivity of jute to a considerable extent.

Key words: Demonstration, Frontline, Jute fibre, Terai.

INTRODUCTION
Jute is a cash-earning fast growing crop with higher biological efficiency as it can add 6.3 MT per hectare of biomass per year to the soil leading to maintenance of better soil health (Maqsudul Alam et al., 2001). Besides, in India, raw jute (jute and mesta) farming, industry and trade supports livelihood to 5 million people and the jute industry contributes to the export earning to the tune of nearly INR 120 million per annum though it shares only 0.15 per cent of the total cropped area of the country (Anonymous, 2010).

At present the jute acreage in the country has stabilized at 8 lakh hectares with a total production of 100 lakh bales and national productivity has stepped up to 22 q/ha from 11 q/ha during post partition India (Roy et al., 2009). West Bengal alone shares 64.7 percent of the national acreage and contributes 70.8 per cent of the total production. The state produced 7.87 million bales of jute with coverage of 5.84 lakh hectares in 2008-09. In West Bengal during 2008-09, Terai zone accounted for 18.12% of the area and 12.98% of the produce though jute-rice is the most prevalent cropping system in the zone and the productivity of jute in Terai zone is very low (1912 kg/ha) in comparison to the state average (2570 kg/ha). Hence, there remains a scope to increase the productivity upto a considerable extent by introducing appropriate crop management strategy.

MATERIALS AND METHODS
The study was conducted in 8 villages across four districts namely Coochbehar, Jalpaiguri, Darjeeling and NorthDinajpur under Sub-Himalayan Plains (Terai zone) of West Bengal. Participatory approaches were followed to identify different problems of jute production in the selected villages. Farmers identified the following problems in jute production:
1. Cultivation of traditional varieties year after year
2. Lack of knowledge on improved agro-techniques
3. High cost involvement in hand weeding
4. Use of banana pseudo-stem as weighing material in retting
5. Lack of knowledge on pest and disease management
6. Poor marketing facilities
7. Lack of knowledge about grade assessment

Keeping in mind the above identified problems and for wider dissemination of the improved packages of practices in order to increase the productivity of jute, frontline demonstrations (FLD) were planned. Various studies have revealed that on-farm demonstration is by far the most effective extension teaching method (Ajayi, 2001, Eke and Emah, 2001). Frontline demonstration is intended to demonstrate the production potential of newly released technology in the farmers’ field under different agro-climatic regions and farming situation. In the study, frontline demonstrations were conducted involving 149 farmers covering an area of 19.86 ha. (number of demonstration is 36) in three consecutive years viz. 2006, 2007 and 2008. The demonstrations were carried out in block concept with an area varying from 0.49 hectare to 0.70 hectare involving 7 to 10 farmers per block. The fields of the farmers adjacent to the demonstration plot served as controls, which were managed by the farmers traditionally. The demonstrations were conducted to compare the improved packages of practices with the existing practices of the farmers (Table-1).

The yield data from both demonstration and control plots were collected from sample plots and accordingly the technology gap, extension gap and technology index were worked out (Samui et. al., 2000), which are given below:

Technology gap (q/ha) = potential yield – demonstration yield

Extension gap (q/ha) = demonstration yield – farmers yield

Technology index (%) = (potential yield – demonstration yield / potential yield) x 100

**Agro-climatic features of terai zone in respect to jute cultivation**

The terai zone comprises of the districts of Cooch Behar, Jalpaiguri, plains of Darjeeling and Northern part of North Dinajpur and is located in the sub-Himalayan plains of West Bengal. The zone experiences a typical sub-tropical pre-humid climate with a high annual precipitation (2500-3500 mm), high relative humidity (average max. and min. of 95 per cent and 65 per cent respectively) and moderate temperature (average max. and min. of 31°C and 11°C respectively). Rainy days alternating bright sunshine during pre-monsoon periods favours the

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**TABLE 1: Comparison between demonstration package and existing farmers practices under Jute FLD.**

<table>
<thead>
<tr>
<th>Package of practices</th>
<th>Farmers’ practice</th>
<th>Demonstration package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety</td>
<td>Traditional variety: JRO 524</td>
<td>Improved Variety: S 19</td>
</tr>
<tr>
<td>Date of sowing</td>
<td>Mid- March to End April</td>
<td>First week of April</td>
</tr>
<tr>
<td>Seed rate</td>
<td>7.5 kg/ha</td>
<td>5.0 kg/ha</td>
</tr>
<tr>
<td>Seed Treatment</td>
<td>Nil</td>
<td>Carbendazim @2 g/kg of seed</td>
</tr>
<tr>
<td>Soil Treatment</td>
<td>Nil</td>
<td>Lime or Dolomite depending on soil test values</td>
</tr>
<tr>
<td>Method of sowing</td>
<td>Broadcasting</td>
<td>Line sowing with seed drill</td>
</tr>
<tr>
<td>Spacing</td>
<td>-</td>
<td>20 cm x 10 cm</td>
</tr>
<tr>
<td>Thinning</td>
<td>Once at 20-25 DAS</td>
<td>Once at 15-20 DAS</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>Very little organic manure applied during land preparation; N:P:K=60:30:40; Micronutrient namely Zn (20-25 kg/ha as ZnSO₄); B (@10 kg/ha as Borax), and secondary nutrient S (@30 kg/ha as elemental S) depending on soil test value.</td>
<td>Organic manure applied @ 5 t/ha during land preparation; N:P:K=40:20:20; No micronutrient is applied.</td>
</tr>
<tr>
<td>Weed Control</td>
<td>Manual(Twice, at 20-25 and 40-45 DAS)</td>
<td>Chemically by the application of Quizalofop-ethyl 5%(Targa Super @2 ml/l of water) at 15-20 DAS followed by running wheel-hoe at 35-40 DAS</td>
</tr>
<tr>
<td>Plant Protection</td>
<td>Indiscriminate use of pesticides recommended by local fertilizer dealers</td>
<td>Need based application of insecticides and fungicides.</td>
</tr>
<tr>
<td>Harvesting</td>
<td>Harvested depending upon rain water availability</td>
<td>To be harvested at 110-120 DAS</td>
</tr>
</tbody>
</table>
production of jute fibre. The soils are, however, coarse textured, acidic, having poor water retention capacity leading to poor soil fertility which is supposed to be one of the major bio-physical constraints towards yield increase in jute.

RESULTS AND DISCUSSION
Perusal of data in Table-2 reveals that the fibre yield obtained from demonstration plots was much higher than the control plots during all the years of the study. The average demonstration yield varied between 26.49 to 28.52 q/ha in three years with an average of 27.71 q/ha. The increase in yield of demonstration plots varied from 24.93 per cent to 26.75 per cent in three years with an average of 25.95 per cent over the control plots. This yield increment over control was attributed to sowing seeds in line with seed drill, thus maintaining an optimum plant population in the field. Balanced fertilization and effective weed control through IWM resulted in higher yield performances. This was in conformity with the findings of Ghorai (2008). However, the variation in yield of successive years may be attributed to variation in climatic condition prevailing during the crop growth periods in different years.

As far as, crop production economics is concerned, the benefit-cost ratio was recorded to be higher in demonstration plots as compared to control plots. In control plot the B-C ratio varied between 1.32 to 1.46, while in case of demonstration it ranged between 1.91 to 2.05. The variation in B-C ratio during successive years may be attributed to variation in market price, price of inputs (mostly seed and fertilizers) as well as fibre yield. In demonstration plots, increased yield under improved management practice with marginal increase in production cost resulted in higher B-C ratio.

The technology gap ranged from 8.51 q/ha to 6.48 q/ha with an average of 7.29 q/ha. The technology gap may be attributed to variability in micro agro-climatic and weather condition of the trial in scientists controlled environment from where the data on potential yield had been recorded, and that in real farm situation.

The extension gap varied from 5.49 q/ha to 6.02 q/ha with an average of 5.71 q/ha. The trend over the successive three years

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of farmers</th>
<th>No. of demonstration</th>
<th>Fibre Yield (q/ha)</th>
<th>Potential Dem.</th>
<th>Technology gap (q/ha)</th>
<th>Extension gap (q/ha)</th>
<th>Technology index (%)</th>
<th>Benefit-Cost Ratio*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>43</td>
<td>10</td>
<td>35.00</td>
<td>26.49</td>
<td>21.00</td>
<td>26.14</td>
<td>8.51</td>
<td>5.49</td>
</tr>
<tr>
<td>2007</td>
<td>48</td>
<td>14</td>
<td>35.00</td>
<td>28.11</td>
<td>22.50</td>
<td>24.93</td>
<td>6.89</td>
<td>5.61</td>
</tr>
<tr>
<td>2008</td>
<td>58</td>
<td>12</td>
<td>35.00</td>
<td>28.52</td>
<td>22.50</td>
<td>26.75</td>
<td>6.48</td>
<td>6.02</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td>35.00</td>
<td>27.71</td>
<td>22.00</td>
<td>25.95</td>
<td>7.29</td>
<td>5.71</td>
</tr>
</tbody>
</table>

N.B. (*)B-C ratio was calculated with sale price of jute fibre@ Rs. 1000.00/q, input price for fertilizer as per govt. prices, seed @ Rs. 150.00/kg and labour wages @ Rs. 75.10/labour/day
reveals that there is an increase in the gap, which calls for educating more numbers of farmers through FLD and other extension methods in order to reverse the trend of wide extension gap.

The technology index varied from 24.32 per cent to 18.51 per cent with an average of 20.83 per cent. There is a decrease in technology index over the successive years. It reflects the feasibility of the demonstrated technology at the farmers’ field. The lower the value of technology index, more is the feasibility of the technology demonstrated (Sagar and Chandra, 2004).

**CONCLUSIONS**

It can be concluded that there is an enhanced scope for increasing the productivity of jute in the terai region as the agro-ecological environment is very much suitable for the cultivation of the crop. Further, the frontline demonstration will help in accelerating the adoption of the demonstrated technology in the study area in particular and similar area in general. Hence, wide scale dissemination of the technology will substantially increase the income as well as the livelihood of the farming community. Moreover, the participatory approach in planning and executing the demonstration will definitely add to the wider adoption of the technology by the farmers.

**REFERENCES**