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Cost Cutting Technological Interventions to Improve Jute Profitability

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ABSTRACT

In rainfed condition, majority of the jute growers follow broadcast method of sowing resulting non judicious use of their limited resouces. Line sowing of jute has several advantages over broadcast method of sowing. The present study was carried out by ICAR-CRIJAF in the farmer's field of North 24 Parganas district of West Bengal during 2017-19 to evaluate the performance of line sowing of jute by CRIJAF multi-row seed drill. Line Sowing of jute seed resulted 8.20 percent more fibre yields over broadcast method of sowing. The extension gap, technology gap and technology indexwas 2.41 q/ha, 7.05 q/ha and 18.11 percent, respectively. In comparison to broadcast method of sowing, total cost of cultivation by line sowing was reduced by 13.86 percent. The gross return and net return and B:C increased by 9.67 percent,51.77 percent and 26.99 percent respectively. It showed that higher profitability in jute cultivation can be achieved by labour saving through CRIJAF multi-row seed drill.

Keywords: CRIJAF multi row seed drill, Extension gap, Frontline demonstration, Line sowing of jute, Technology gap, Technology index, Yield gap.

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INTRODUCTION

Optimum plant population is very much essential to realize the full potential yield of any agricultural crop. It is also true for the jute (*Chorchorus* species) crop. It is generally grown as rainfed crop in North Eastern part of India. Majority of the farmers follow broadcast method of sowing of jute seed. Though it is an easy, quick and cheap method but suffers inherent limitations like application of higher seed rate, non-uniform distribution, placement in non-uniform depth of soil, failure to provide soil cover etc. This age old practice causes non-judicious use of their limited resources in the form of land, labour, capital, time and critical inputs. Broadcast method of sowing used to consume about 30 per cent of total cost of production in the weeding and thinning operation. In recent years, due to gradual increase in the price of agro-inputs the profitability of jute cultivation has become questionable. ICAR-Central Research Institute for Jute and Allied Fibres (ICAR-CRIJAF), Barrackpore has developed a manually operated Multi Row Seed Drill (MRSD) in order to sort out the farmer's problem and minimize the cost of jute cultivation. CRIJAF-MRSD has numerous benefits over traditional method of broadcasting like saving of seed and labour, unform germination, proper crop stand, faicilating intercultural operations (Shambhu, 2014; Naik and Karmakar, 2016).

We all know about the importance of demonstration which is widely acknowledged as a powerful method/process to convince a farmer regarding latest farm innovations because it involves them in the process of observation, hearing, learning by doing and experiencing things at first hand. There is substantial impact of training and demonstrations over the existing knowledge and adoption of the beneficiary farmers than the non-beneficiary farmers regarding jute production technology (Sadat *et al.*, 2017). In this line, a number of Front-Line Demonstrations (FLDs) on line sowing of jute by CRIJAF-MRSD had been conducted by the institute through extension centres in the district of North 24 Parganas, a pre-dominant jute growing district of West Bengal under National Food Security Mission (Commercial Crop) Jute [NFSM (CC) Jute] programme to motivate the farmers for adoption of this technology. The results of these FLDs need to be evaluated in order to see the performance/feasibility of this technology in farmers' fields and its superiority over the farmers' practice. Hence, this study was planned with the objective to evaluate the performance of FLDs on line sowing of jute by CRIJAF-MRSD in terms of yield increase, yield gap and economics of production.

MATERIALS AND METHODS

The district of North 24 Parganas has 2,25,000 ha net sown area and jute crop is cultivated in 61,274 ha with production of

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8,52,203 bales (1 bale =180 kg) and productivity 16.62 bales/ha (Anon, 2015). Major jute growing blocks of the district are Swarupnagr, Bongaon, Gaighata, Baduria, Bashirhat II, Bashirhat I and Habra I. Before selection of the demonstration sites different jute growing villages were surveyed. Finally, looking the responses of the jute growers, Kumra village of Habra I development block was purposively selected for Frontline Demonstration on cluster basis. An area of 0.40 ha for each CFLD was allocated for the participating farmers. The selected demonstration plots were located near to the roadside with irrigation facility. The soils were sandy loam and clay loam in texture with medium to low in NPK. All the field operations were carried out under the direct supervision of scientists and technical personnel of the institute (Fig. 1-4).

Fig. 1: Scientist explaining about the functioning of CRIJAF-MRSD

Fig. 2: Scientist explaining about the functioning of CRIJAF-MRSD.

Fig. 3: One month old line sown jute crop

Fig. 4: Monitoring of line sown jute field

All the participating jute growers were provided with critical inputs. They sowed the jute seeds @ 3-4 kg/ha (spacing of 10-15 cm. X 25 cm) in line during last week of March-mid April by using CRIJAF-MRSD. In the demonstration plots chemical fertilizer (NPK) was applied @ 60:30:30 kg/ha. Appropriate plant protection measures were also taken as per the need. The nearby plots of demonstration plots where conventional method *i.e.* broadcast sowing had been followed were taken as the control plots. After completion of the every jute season (2017-19) the fibre yield and other economic data of FLDs were collected from the demonstrating farmers and control farmers, respectively. The data were compiled and analyzed to get final FLDs results with regard to total cost of cultivation, gross return, net return and benefit-cost ratio. Further data were used to calculate the parameters like the per cent increase in yield, Extension gap, Technology gap and Technology index for evaluation of the performance of these FLDs.

Extensions gap referred to the difference between yield in demonstration plot and yield under farmer's existing practice. Technology gap referred to the difference between the

potential yield of the variety and yield of that variety in demonstration plot. The jute variety grown in the demonstration as well as in the control plots was JRO 204 (*Suren*) and its potential yield was 38.90 q/ha (Anon, ICAR-CRIJAF Profile). Technology index referred to the ratio between technology gap and potential yield expressed in percentage. It illustrates the feasibility and performance of the demonstrated technology at the farmers' fields. The lower the value of technology index, more is the feasibility of the technology demonstrated. Calculation of the said parameter were done by using the formula given below:

1. Extension gap = Yield in demonstration plot- Yield under farmer's practice
2. Technology ga = Potential yield– Yield in demonstration plot
3. Technology index (%) = (Technology gap / Potential yield) × 100

RESULTS AND DISCUSSION

Extension gap, Technology gap and Technology index of the FLDs on line sowing of jute by CRIJAF Multi Row Seed Drill

Application of CRIJAF-MRSD for line sowing of seed provided favourable condition for the growth of the jute plants resulting in better fibre yield. A comparison of the extension gap, technology gap and technology index between Front Line Demonstrations and local practices is shown in Table 1. The new method resulted the fibre yield in the range of 31.07 q/ha to 32.70 q/ha. However, the range of fibre yield under farmers' practices was found to be 28.91 q/ha to 30.43 q/ha. Thus the extension gap was found to be 2.16-2.81 q/ha (7.45-9.69 %) over the broadcast method of sowing. These findings corroborate the findings reported by Roy *et al.* (2022) who found 7.97-9.00% fibre yield gain over broadcast method of sowing in Hooghly district of West Bengal. In the initial period during year 2017 the extension gap was the highest (2.81 q/ha). It might be due to poor technological awareness of the jute growers. It shows the need of making the farmers aware about the latest jute production technology. During cluster FLDs, application of advanced extension strategies like field days, farmers-scientist interactions, kisan gosthi was followed to reduce this gap. As a result which the gap was narrowed down. The effect of above efforts is gradually noticeable where this gap (year 2017 vs.2019) was further lessened by 30%.

Table 1: Extension gap, Technology gap and Technology index of the FLDs on line sowing of jute by CRIJAF MRSD in North 24 Parganas during 2017-2019

Year	FLD Area (ha)	Yield (kg/ha)*		YI (q/ha)	YI (%)	TG (q/ha)	EG (q/ha)	TI (%)
		DP	FP					
2017	9.43	31.78	28.97	2.81	9.69	7.12	2.81	18.30
2018	20.53	32.70	30.43	2.27	7.45	6.20	2.27	15.93
2019	12.43	31.07	28.91	2.16	7.47	7.83	2.16	20.12
Mean	14.13	31.85	29.43	2.41	8.20	7.05	2.41	18.11

Extension gap, Technology gap and Technology index of the FLDs on line sowing of jute by CRIJAF MRSD in North 24 Parganas during 2017-2019

Technology gaps varied from 6.20-7.83 q/ha. Better adaptability of line sowing technology at the demonstration site might have been understood by the demonstrating farmers due to presence of the lowest technology gap (6.20 q/ha) during the year 2018. Technology gaps increased in the year 2017 and 2019 which might be due to variation in rainfall distribution, disease pest infestation, weed intensity, soil fertility status of the fields etc.The technology index indicates the viability of line sowing technology of jute at the farmer's field. It is in the range of 15.93- 20.12 per cent. The lower the value of technology index, more was the feasibility of the technology demonstrated. These findings are in conformity with the findings of Mitra and Samajdar (2013) to a considerable extent.

Economics of demonstration plot and farmer's practice

Cost of cultivation of jute depends on the price of the inputs like seeds, fertilizers, plant protection chemicals, hiring charges of agricultural machineries and labourers, irrigation cost etc. Jute is a labourintensive crop. As a result, comparatively more amount is spent on human labour (around 75 %) for weeding, retting and fibre extraction which causes reduction in the profitability. Labour charges mainly depend on the demand and the availability. It can be inferred from Table 2 that total cost of cultivation in demonstration plot was lesser than farmer's practice. The total cost of cultivation in demonstration plots varied from Rs. 66,959/ha-Rs.74,703/ha. In the case of farmer's practice, it ranged from Rs. 75,597/ha-Rs. 87,824/ha. It can also be observed from the table that the gross return from demonstration plot was more (Rs. 1,31,569/ ha - Rs. 1,51,746/ha) than farmer's practice (Rs. 1,14,142/ha - Rs. 1,48,620/ha).

Table 2: Economics of demonstration plot and farmer's practice in North 24 Parganas during 2017-2019

Year	Economics of Demonstration Plot* (Rs/ha)				Economics of Farmer's Practice* (Rs/ha)			
	TCC	GR	NR	BCR	TCC	GR	NR	BCR
2017	66,959	1,31,569	64,610	1.96	75,597	1,14,142	38,545	1.51
2018	71,146	1,59,733	88,587	2.25	83,642	1,48,620	64,978	1.78
2019	74,703	1,51,746	77,043	2.03	87,824	1,41,189	53,365	1.61
Mean	70,936	1,47,683	76,747	2.08	82,354	1,34,650	52,296	1.63

* Source: Annual Reports of ICAR-CRIJAF: 2017-18, 2018-19, 2019

TCC= Total cost of cultivation, GR= Gross return, NR= Net return, BCR= Benefit-cost ratio

It has been observed that due to less competition amongst plant population for the uptaking of plant nutrients, soil moisture, air movement in the field and less insect- pest attack the growth of the plants has been found viogorous and taller in comparison to broadcast sown jute fcrop. Proper spacing of plants within and between the rows facilitated intercultural operations. As the new method resulted reducing the total cost of cultivation and higher gross return in comaparison to broadcast method of sowing. Naturally, higher net return from demonstration plots (Rs. 64,610/ha - Rs. 88,587/ha) were observed over farmer's practice (Rs. 38,545/ha-Rs. 64,978/ha). The benefit-cost ratio of demonstration plots showed range from 1.96 to 2.25 whereas, under the farmer's practice, it varied between 1.51-1.78 only. Thus benefit-cost from following of line sowing of jute by CRIJAF-MRSD was in upper side than the broadcast method of sowing. These findings are in line with the results of Mitra and Samajdar (2013) who reported higher range of benefit-cost ratios (1.91-2.05) in demonstration plots as compared to control plots (1.32-1.46). The variations found in economics of jute cultivation during successive years might be associated to variations in prevailing market price of jute fibre, cost of inputs (seed, fertilizer, plant protection chemicals, labour etc.) and fibre yield.

Economic gain over farmer's practice

Cost of cultivation plays a vital role in profitability of the jute cultivation. A farmer always attempts to maximize the return from jute crop. Economic gain from line sowing (Table 3) of jute by CRIJAF-MRSD was the foremost reason for adoption of the technology by the farming communities. It was found that there was reduction in total cost of cultivation (Rs. 8,638/ha - Rs. 13,121/ha) over broadcast method of saving. On an average this new method of sowing reduced the total cost of cultivation by 13.86%. The reason was obvious as less number of manual labourers were required in later stages to complete the intercultural operations. Similarly, there was increases in gross return (Rs. 10,557/ha - Rs. 17,427/ha) and net return (Rs. 23,609/ha - Rs. 28,765/ha) due to more fibre yield as well as jute sticks produced by the line sown jute plots. On an average, line sown plots gave 9.67 percent and 51.77 percent more gross return and net return respectively over the broadcast sown jute plots. In the demonstration plots, benefit-cost ratio varied 0.42-0.47 and it was 26.99 percent more over the broadcast method of sowing (1.51-1.78). These findings are in line with the results reported by by Roy *et al.,* (2022) who found line sowing of jute in Hooghly district of West Bengal reduced the cost of cultivation by 12.25%. The jute growers had received 10.95 percent, 54.14 percent and 25.80 percent more gross return, net return and benefit-cost ratio, respectively. The findings also get the support of Jha *et al.,* (2019) who found that CRIJAF MRSD was ideal for sowing of jute in line, saving of seed and labour.

Table 3: Economic gain of demonstration over farmer's practice

Year	Economic gain of Demonstration Plot over Farmer Practice (Rs/ha)			
	TCC	GR	NR	BCR
2017	-8,638	17,427	28,765	0.45
2018	-12,496	11,113	23,609	0.47
2019	-13,121	10,557	23,678	0.42
Mean	-11,418	13,032	25,351	0.44

TCC= Total cost of cultivation, GR= Gross return, NR= Net return, BCR= Benefit-cost ratio

CONCLUSION

The findings of FLDs highlight the superiority of line sowing over the broadcasting method of sowing. Maintenance of optimum plant population ensured proper growth of the plant and intercultural operations. Application of CRIJAF-MRSD has given encouraging results in terms of more fibre yield and saving in total cost of cultivation. There was lesser use of human labour as well as saving of seed. It ensured higher net return, gross return and B:C. The outcome would certainly motivate the other jute growers to discontinue the conventional practice of broadcasting and accept line sowing for achieving the better economics of scale in jute production. Popularization of this technology in mass scale will significantly enhance the chances of adoption of this technology and enhance the farm income as well as upgrade the livelihood of the jute farming community.

Farmers' observation:

One added advantage of CRIJAF-MRSD was reported by farmers. Farmers reported that "সারতি বে ানা পাটরে জমতি পাট কাটার পর পাটরে বাণ্ডলি বয়ে নয়িে সারা ধরে যাবার সময় পায়ে জমতি কাটার পর থাকা পাটরে কাণ্ডরে আঘাত কম লাগে" (There was less incidence of foot-injuiry due to jute stubbles during carrying of the jute bundles from field after harvesting in line sown jute field).

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CONFLICT OF INTEREST

All the author both individually and collectively, affirms that they do not possess any conflicts of interest either directly or indirectly related to the research being reported in the publication.

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