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Impact of Frontline Demonstrations on Jute (*Corchorus olitorius*)

Rajendra R. Chapke

Agricultural Extension, Central Research Institute for Jute and Allied Fibres (CRIJAF)
Barrackpore, Kolkata, West Bengal, India
E-mail: chapkes@yahoo.com

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ABSTRACT In order to increase production and productivity of jute (*Corchorus olitorius*) by adopting improved production technologies, several frontline demonstrations (FLDs) on jute with package technologies were conducted by Central Research Institute for Jute and Allied Fibres (CRIJAF), Barrackpore during 1996 to 2005 in eight different villages of North 24-Parganas and Hooghly districts of West Bengal. A study on impact of the demonstrations on the farmers' behaviour was conducted. Results of the study revealed that demonstrated technologies increased the fibre yield of jute by 4.45 q ha^{-1} over the farmer's practice (25.10 q ha^{-1}), the post-demonstration yield was 29.55 q ha^{-1} as the farmers adopted many components of the technology package that were used in demonstrations. Economic surplus from increased production of jute fibre by about 4.45 q ha^{-1} provided additional Rs. 5570 ha^{-1} to the farmers. The results further indicated that additional income that accrued due to increased harvest of jute by adopting improved practices was utilized by the farmers by increasing expenditure by about 50%, on food, health care of the family members, education of children, and purchase of farm implements or essential items and attending social and entertainment programmes. Impact of the demonstrated technologies to increase fibre yield of jute by contact farmers up to 3 q ha^{-1} in nearby villages within radius of three to seven km distance from the adopted villages was also found. A definite impact of the FLDs was thus observed.

INTRODUCTION

Jute (*Corchorus olitorius*) is an important fibre cash crop mainly cultivated by small and marginal farmers of West Bengal (W. B.). West Bengal is a major jute growing state in India contributing about 80 per cent national production of jute (Saha and Hazra 2008). About 60 per cent of the raw jute in the world is produced in India. Being biodegradable and non-polluting, jute fibre crop is environment friendly, suitable for promoting in the wake of global warming in our country. Central Research Institute for Jute and Allied Fibres (CRIJAF), Barrackpore (W. B.) has been instrumental in improving the production and productivity of jute and allied fibres in India for more than fifty years.

Demonstration is one of the most powerful extension tools in communication of new ideas, methods and techniques in agricultural development. It helps to convince the farmers faster than any other method through the process of observing, hearing, learning by doing and experiencing things (Pathak 1999). Several frontline demonstrations (FLDs) on jute with package technologies were conducted over years by CRIJAF in different locations of West Bengal. It was, therefore, felt essential to assess the impact of the demonstrations and accordingly this study was conducted.

Address for correspondence:
Directorate of Sorghum Research,
Hyderabad 500 030, Andhra Pradesh, India

METHODOLOGY

The study was conducted in eight villages adopted by CRIJAF where the FLDs on jute with package technologies were conducted on the farmers' fields during 1996 to 2005. The demonstrations were conducted with five high yielding jute (*Corchorus olitorius*) varieties viz., JRO-524, JRO-8432, JRO-66, JRO-128 and S-19. Since 2003, JRO-524E (rice necrosis mosaic virus inoculated seeds of JRO-524) with recommendation of N:20, P_2O_5:10, K_2O:10 kg. ha^{-1} fertilizer dose and without use of plant protection chemicals was also introduced. Sowing was done in the month of April-May, while harvesting in the month of August. Fertilizer schedule was N:60, P_2O_5:30, K_2O:30 kg ha^{-1} for all the varieties except for JRO-524E. Need-based plant protection chemicals were used to control the insect-pests. Farmers were changed within the same villages after certain intervals for conducting the demonstrations on their lands. One hundred twenty (120) beneficiary farmers, 15 from each village viz., *Devok, Koirapur, Masunda, Iswarigacha,*

Geedha and *Teghoria* of North 24 Parganas district, and *Kamarkundu*-I and II villages of Hoogly district of West Bengal, those who were well responsive and maintained records of cultivation, were selected for this study. They were categorized in three stages, viz., pre-demonstration, during demonstration and post-demonstration (after withdrawal from FLD) for the purpose of evaluating impact of demonstrations in socio-cultural and economical context. It was emphasized on assessment of the impact of FLDs on the farmers in terms of knowledge gain, change in attitude by observing yield difference, seed exchange, if any, component-wise adoption of the technologies, spread of technology, change in economic status and utilization of additional income.

Data pertaining to the year 2006 were collected, which was post demonstration period, through personal interviews, group discussion and empirical observations with the help of pre-tested, semi-structured interview schedule and field records of frontline demonstration plots. The data were analyzed with frequencies and percentage basis.

RESULTS AND DISCUSSION

Frontline demonstrations are effective educational tools in introducing various new technologies to the farmers and its adoption by building confidence on the basis of results obtained on their fields. The demonstrations could convince the farmers of the respective localities that high crop yield is within their reach by adopting feasible package of practices. An impact assessment of the FLDs was made and the results have been placed initiating with the fibre yields of jute, which earned the monetary benefits.

Effect of Improved Jute Cultivation on Fibre Yield of Jute

Farmers' economical condition depends much on their agricultural production. High productivity of their crops resulted in more benefits in case of cash crop, which has influenced their socio-personal status. Quantity of fibre production has a major role to play in its profitability. The fibre yield production status of the beneficiary farmers was analyzed (Table 1).

On an average, the fibre yield of jute obtained by the farmers was 25.10 q ha^{-1} before adoption for the demonstrations. The demonstrated yield of jute fibre obtained by the farmers during adoption was 28.27 q ha^{-1}, which was enhanced or maintained by the farmers after withdrawal from the demonstrations (29.55 q ha^{-1}). The fibre yield increase during post -demonstration period was by 4.45 q ha^{-1} over the period of interval. This was possible due to adoption of the demonstrated technologies with implementation of timely management practices (Table 2). Fibre yield and cost of cultivation (inputs cost) were found to be independent of size of farm. The post-demonstration period falls mostly under the year 2005 and 2006 in which the market price of the jute fibre was higher as compared to other years with an average of Rs. 1250 per quintal (100 kg). The increased fibre yield during the post-demonstration period at *Kamarkandu-II* and *Teghoria* villages was quite more. It may be due to application of limited irrigation to the crop during dry spells and heavy textured soil, which retained moisture for longer time. Though, jute is a rainfed crop, water stress situation occurs at times at critical growth period resulting in lower fibre yield. Therefore, life saving irrigation is essential during the same period, wherever possible.

Table 1: Impact of frontline demonstrations on fibre yield obtained by the participatory farmers during 1996-2006

		Fibre yield (q ha^{-1})				
S.No.	*Village*	*Pre-demonstration*	*Demonstration*	*Post-demonstration*	*Average yield increase over pre-demonstration stage*	*Additional monetary gain (Rs. ha^{-1})**
	1	2	3	4	5(4-2)	6
1	Koirapur	24.78	26.37	27.99	+ 3.21	4013
2	Devok	24.61	30.00	29.52	+ 4.91	6138
3	Iswarigachia	27.45	29.83	31.25	+ 3.80	4750
4	Teghoria	25.41	29.34	30.58	+ 5.17	6463
5	Masunda	25.95	28.72	30.17	+ 4.22	5275
6	Geedah	25.16	28.45	29.29	+ 4.13	5163
7	Kamarkandu-I	23.50	26.12	28.34	+ 4.84	6050
8	Kamarkandu-II	23.91	27.33	29.28	+ 5.37	6713
	Mean	25.10	28.27	29.55	+ 4.45	5570

* Average market price of jute fibre during 2005 and 2006 was Rs. 1250 per quintal (100 kg).

It was observed that the farmers were keeping about 10 per cent of good quality fibre at home for their own use. It was utilized to prepare hand-made diversified products by the women and preparation of thin ropes for different farm and non-farm uses. However, they didn't bother for fibre quality because of non-availability of grading system in the market.

Economic Surplus

Increased production of jute fibre by about 4.45 q ha^{-1} provided advantage to the farmers by about Rs. 5570 per ha (Table 1). Marginal size of land holding of the majority farmers was the most important limiting factor in production of jute. Eventually, the monetary benefit was not much visible, if it was not estimated on hectare basis. The monetary gain depends on the market price of the fibres, which are highly fluctuating year to year due to lack of a regularized market system. It was recorded that a few farmers made money by selling surplus jute sticks at very cheap rate that ranged between Rs. 50 and Rs. 100 per quintal, which was part of economic gain but not a regular income source. Sometimes, trucks of jute sticks are taken out from this area, which indicate its commercial importance.

Adoption of Demonstrated Technologies by the Farmers

Implementation of timely package of practices with systematic management mostly lead to achieving higher productivity of agricultural crops provided favorable climate existed. FLDs provide ample opportunity to the participatory farmers for learning by implementing new ideas, methods and techniques. The impact of the FLDs on the farmers knowledge and attitude change about improved package of practices of jute were assessed and placed in Table 2.

It was recorded that the farmers were using jute varieties JRO-632 and JRO-524 before demonstration period. JRO-524, JRO-8432, JRO-66, JRO-128 and JRO-524E were demonstrated to them. However, they continued with the variety, JRO-524 and recommended seed rate after withdrawal from the demonstrations. It was found to be more suitable to cultivate in the jute area and yield was better (Chapke et al. 2006a). Non-availability of certified seeds of the demonstrated varieties in local market was the limiting factor for their adoption. Discontinuation of the line sowing by two row seed drill was due to practical problem in its operation. Regarding fertilizers application, the farmers continued with almost balanced fertilizer use (N:56, P_2O_5:29, K_2O:31 kg ha^{-1}) after withdrawal from the demonstration, whereas, they used to apply imbalanced fertilizer dose (N:34, P_2O_5:16, K_2O:16 kg ha^{-1}) earlier. However, light fertilizers dose was used, that is, (N:28, P_2O_5:11, K_2O:11 kg ha^{-1}) in potato area (Hooghly district) through mixed fertilizer (*Sufala*), and urea, before demonstration period. Need-based use of pesticides for controlling insects and diseases was taken after demonstration, which were neglected or limited up to two times earlier. Since no technology on weeding and retting were demonstrated during the period under report, the farmers followed traditional practices.

Table 2: Practice-wise adoption of jute production technology

S. No.	*Technology*	*Adoption*		
		Pre-demonstration	*Demonstration*	*Post-demonstration*
1	Variety	JRO-632 and JRO-524	JRO-524, JRO-8432, JRO-66, JRO-128 and JRO-524E	JRO-524
2	Seed rate (Kg ha^{-1})	7.5	Broadcasting=6.00 Line sowing=4.5	6.49
3	Sowing method	Broadcasting	Broadcastingand line sowing	Broadcasting Manual
4	Weeding	Manual	Manual	
5	Fertilizer application			
	FYM (q ha^{-1})	-	-	19.17
	Nitrogen (Kg ha^{-1})	34.08	60	56.11
	P_2O_5 (Kg ha^{-1})	16.63	30	29.63
	K_2O (Kg ha^{-1})	16.52	30	31.53
6	Plant protection	2 times	Need-based	Need-based
7	Retting	Traditional	Traditional	Traditional

The high yielding jute variety (JRO-524) with recommended seed rate @ 6 kg ha^{-1}, almost balanced fertilizer use and timely management practices as indicated in the demonstration package resulted in increase of about 4.45 q ha^{-1} fibre yield after withdrawal from the demonstrations. The same may be demonstrated in different locations and agro-climatic areas of jute for its wide adoption.

Income Utilization Pattern of Jute Farmers

Additional profit in terms of cash received from jute fibres was spent in different ways by the farmers. Details of the additional income utilization was investigated and narrated (Table 3).

Table 3: Utilization of additional income from jute cultivation

S. No.	*Human need / Item*	*Frequency (N=120)*	*%*
1	Increased expenses on food items by 50%	99	81
2	Increased expenses on health by 50%	97	80
3	Increased expenses on children education by 50%	95	79
4	Purchasing inputs for next crop cultivation	91	76
5	Attending social functions	75	63
6	Purchasing of sprayer or bicycle	50	42
7	Spending on recreation	44	37

From data on utilization of additional income (Table 3), it is revealed that the farmers' could spend more up to 50 per cent than earlier on human needs and purchase of essential items. As per their opinion, they spent 50 per cent more money on essential needs such as food (81 per cent), health of the family members (80 per cent) and education of the children (79 per cent). They elaborated that they used to spend Rs. 500 on health, the additional income makes them spend Rs. 750, which was 50 per cent more than earlier. Similarly, expenditure was enhanced in case of food and education of the children. No additional expenditure was recorded on purchase of clothes, however, which was being done usually from this money during the time of *pooja* (Goddess/God worship festivals). Most of the farmers utilized the income to purchase the inputs for next crop, that is, paddy (76 per cent). Sixty- three per cent of the farmers could attend social functions better such as marriage functions and birth ceremonies. A few of them (42 per cent) purchased at least one essential item, either sprayer or bicycle. Similarly, they (33 per cent) could spend on recreation such as, viewing cinema, participating in fairs / *melas* at town or city places, which was not observed in Hooghly district.

It was observed that jute fibre was mostly ready for marketing before *pooja* festival and the sale deeds were utilized by the farmers to purchase cloth and inputs for next crop cultivation. Marketing of the jute fibre is matched with the time of festivals, so this crop has its importance to meet their festive, essential and entertainment needs.

Employment Generation

Notably, the farmers engaged their family labour as their own resources in cultivation of jute. It was reported that ratio of the family and hired labour used in the jute cultivation was 40:60, which was reverse a decade ago. It may be due to the fact that the younger generation is not much interested to do drudgeries farm work; rather preferred to do work in non-agricultural sectors. Jute is a labour intensive crop, which consumed 77 per cent cost for human labour alone out of total cost of cultivation (Chapke et al. 2006b). However, jute cultivation provided employment in the form of family labour and saved the labour requirement up to 40 per cent. This draws attention to the need of introduction of mechanization in jute cultivation, wherever possible.

Technology Dissemination Pathway

The increase in fibre yield due to adoption of the improved jute cultivation practices by the beneficiary (adopted) farmers resulted into dissemination of the technologies also at nearby villages in addition to the same village. Technology dissemination flow was found from adopted farmers of the same village to non-adopted farmers of the same and nearby villages within the radius of 3 to 7 km distance. Reason to attract non-adopted farmers of the nearby village was due to obtaining more fibre yield, which ranged between 2.00 and 3.00 q ha^{-1} (Table 4). It was the strength of the technology, which enabled to build up confidence among the farmers to boost up adoption of the demonstrated technologies.

Table 4: Jute technologies dissemination through adopted farmers due to FLD impact

S. No.	*FLD village*	*No. of contacted farmers*	*Distance from the village of adopted farmer*	*Reason of contact increased more yield (q ha^{-1}) than earlier stage)*
1	Koirapur	1 to 4	3 km	2.00
2	Devok	1 to 4	2 km	3.00
3	Iswarigachia	2 to 6	3 km	3.00
4	Teghoria	1 to 4	3 km	2.00
5	Masunda	2 to 3	4 km	2.00
6	Geedah	1 to 12	7 km	3.00
7	Kamarkandu-I	2 to 3	2 km	2.00
8	Kamarkandu-II	2 to 3	2 km	3.00

Thus, three technology dissemination pathways were recorded, which were: (i) from the Institute to adopted farmers and non-adopted farmers of the same village, (ii) from the adopted farmers to non-adopted farmers of the same village, and (iii) from the adopted farmers of the same village to non-adopted farmers of the nearby villages (Fig. 1).

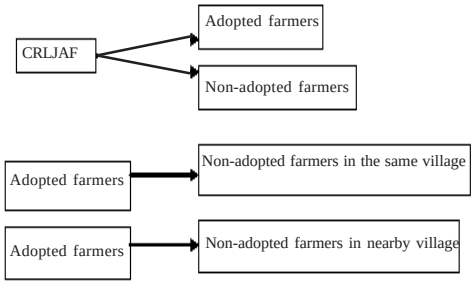

Fig. 1. Technology dissemination path ways

It shows that farmers have observed the merits and demerits of production potentialities of all the technologies involved, while adopting them in their own fields. The difference in attitudes could also be attributed to the potentiality of FLD, an effective educational tool in the field of extension. The FLD had very good impact on the farmers with respect to individual crop grown, package of practices followed and the approach of new technology adoption.

CONCLUSION

The results show that the increase in fibre yield during post-demonstration period was by 4.45 q ha^{-1}, which provided advantage to the farmers by about Rs. 5570 per ha. This was possible due to use of high yielding jute variety with recommended seed rate, almost balanced fertilizer use and timely management practices as indicated in the demonstration package. The additional economic return play significant role in the livelihood of small and marginal farmers by helping them to meet expenditure on their festive needs, purchase of cloths food items and inputs for next crop cultivation. Technology dissemination flow was found from adopted farmers of the same village to non-adopted farmers of the same and nearby village within radius of 3-7 km distance. The advantage of FLD has been the increased credibility of the institute as a source of information. The frontline demonstrations on promising technologies of jute need to be multiplied in different locations and agro-climatic areas of jute for its wider adoption. The non-adopted farmers should be included in various extension programmes on jute to a possible extend.

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