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RESEARCH NOTE

Perceived Attributes of CRIJAF Multi-Row Seed Drill for Line Sowing of Jute in West Bengal

Devayan Chatterjee[1], Manik Lal Roy[2] and Sagar Mondal[3]

1. Ph.D Scholar,
3. Professor,
Department of Agricultural Extension, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal
2. Sr. Scientist, Agricultural Extension, ICAR-Central Research Institute for Jute and Allied Fibers, Barrackpore, West Bengal, India
Corresponding author e-mail: devayanchatterjee@ymail.com

ABSTRACT

CAR-Central Research Institute for Jute and Allied Fibers had developed an innovative technology i.e., manually operated Multirow seed drill that could enable line sowing of jute and helps in reducing the seed rate as well as the labour requirement for weeding and thinning. The study was conducted during 2021 at the villages of North 24 Parganas and Nadia Districts of West Bengal by personal interviewing 80 farmers who had already adopted the CRIJAF Multirow seed drill. It was found that the intervention was relatively more advantageous, compatible with the existing culture and agroclimatic conditions, exhibits prominently observable results and relatively less complex in operation. Hence being a proven technology, the seed drill needs to be popularised in those areas where it has not been utilized yet. The adoption of the seed drill would further improve the efficiency of jute cultivation by decreasing the cost of cultivation and increasing fibre productivity.

Key words *: Perceived attributes; Multirow seed drill; Innovative jute technology.*

Jute (*Corchorus olitorious*) is one of the major commercial crops and is the second most important eco-friendly textile fibre next to cotton in India. Jute is predominantly cultivated in the eastern and north eastern regions of India after rice as the soil and climate are most conducive for jute cultivation. Jute is being cultivated in 87 districts of India and most of the prominent jute growing districts are located in West Bengal viz. Murshidabad, Nadia, North 24 parganas, Hoogly, Maldah, Howrah etc. (*Jha et al., 2022*). Jute cultivation provides employment to 10 million mandays and supports the livelihood of about 5.5 million households (*Mahapatra et al., 2012*). The jute crop is predominantly cultivated mainly by the small and marginal farmers that comprises of 25 per cent and 65 per cent of the total jute growers respectively (*Chapke, 2009*). Therefore, high cost of cultivation and using sophisticated farm implements are not economically and technically feasible in the farming systems.

The conventional broadcast sowing method involves more human labour for thinning and weeding operations, much higher seed rate viz. 7-8 kg/ha to maintain optimum plant population and also does not ensure proper depth of placement of the seed into the soil. (*Naik and Karmakar, 2016*). Therefore, a manually operated multirow seed drill for sowing of jute seeds was developed by ICAR-Central Research Institute for Jute and Allied Fibers (CRIJAF) and disseminated among the practicing farmers of West Bengal to reduce the cost of cultivation and drudgery. Only extension efforts are not sufficient to transfer the technologies of any crop to the farmers. The perceived attributes of technology are also the important factors that affect the transfer of technology process (*Jamanal and Sadaqath, 2018*).

The attributes of any technology refer to its typical characteristics that determines its position, its relation with the existing beliefs and values in any social system and thus differentiates it from other innovations in terms of its adoption and sustenance. Therefore, farmers' perception of the attributes about any technology is very important for the extension experts/ researchers. The attributes of an innovation affect its rate of adoption as well as its sustainability (*Rogers, 2003*). Assessment of the perceived attributes of a technology should be done before its commercial

dissemination to increase its rate of adoption (*Chavan et al., 2017*). In this context present study has been taken up to measure the perception of the jute growers towards the innovative technology of multirow seed drill developed by CRIJAF for sowing of jute.

METHODOLOGY

The present study was conducted in Kumra village under Habra Block in North 24 Parganas District and Brahmapur village under Haringhata Block in Nadia District where ICAR-CRIJAF has disseminated the innovative technology of manually operated CRIJAF multirow seed drill to the practicing jute cultivators since 2013-14. Forty jute growers from each village who had adopted the technology of multirow seed drill were selected through random sampling method; thus, comprising of a sample size of total 80 respondents. Exploratory research design was followed to carry out the present study as the study aim to determine the extent to which the jute growers perceived the technology.

Perception has been operationalized in the present study as practical understanding of the jute growers regarding the utility and interpretation of various aspects of the manually driven multirow seed drill during its adoption. The way how the attributes of a technology is perceived by a farmer is classified into five attributes i.e., relative advantage (the degree to which an innovation is perceived as being better than the idea it supersedes), compatibility (the degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters), complexity (the degree to which an innovation is perceived as relatively difficult to understand or use), observability (degree to which the results of an innovation are prominently visible to others) and trialability (the degree to which an innovation could be experimented on a limited basis). These five attributes affect the rate of adoption in a social system.

An index was developed to measure the perceived attributes of CRIJAF multirow seed drill. Initially 37 items were collected after elaborate discussion with experts, extension specialists, scientists of ICAR-CRIJAF and available relevant literature. The statements were then scrutinized and edited as per criteria developed by *Edwards (1969)* and 31 items were selected. Then all the 31 items were mailed to 50 judges who were agricultural experts, extension specialists, and relevant experts of research institutes and agricultural universities. The judges were requested to rate the statements on the basis of its relevancy in a 3-point continuum viz. most relevant, relevant and not relevant. Out of 50 judges 33 replied back and finally, 24 items related to perceived attributes of CRIJAF multirow seed drill that felt most relevant by the experts were selected for final administration those which had an inter-rater reliability of more than equal to 60 per cent. Out of 24 items, 9 items selected relating to relative advantage and 5 items each in compatibility, complexity, observability. These statements were administered to all the 80 jute growers in a 3-point continuum i.e., agree, undecided and disagree with scores of 3, 2 and 1 respectively to measure their perception about the machinery i.e., CRIJAF multirow seed drill. The total perception score for individual respondent was calculated by summing up of individual score in each sub items elicited by the individual farmer.

$$\text{PAT index} = \frac{\text{Sum of actual score obtained}}{\text{Sum of maximum possible score}} \times 100$$

Where, PAT index = Perceived attributes of each technology index

Technology effectiveness is operationalized as the average perceived attributes of the technology that determines its rate of adoption in positive way.

$$\text{Technology Effectiveness} = \frac{RA + CO + NC + Ob}{5}$$

Where, RA=Relative advantage; CO=Compatibility; NC=Non-complexity; Ob=obsevability.

The data were collected during April-June 2021 by personal interview method using structured interview schedule. The responses were recorded and tabulated in order to carry out the statistical analysis. The findings were appropriately interpreted and the conclusions and inferences were drawn.

RESULTS AND DISCUSSION

The Relative Advantage of CRIJAF Multi-row Seed-drill as perceived by the jute growers : A perusal of table 1 reveals that all the respondents agreed upon the effectiveness of the seed drill in line sowing; they also perceived the reduction of seed requirement for the cultivation of jute per unit area. The seed rate reduced to 2.50 to 2.75 kg/ha against 6-7 kg/ha in broadcast sowing (*Shambhu, 2020*). Majority (85 %) of the respondents felt that seed drill places the seed to adequate depth for proper germination of seeds.

The depth of the seed placement varied from 27 mm to 32 mm depending upon the uniformity of the seed bed preparation (*Shambhu, 2020*). The second relative advantage is that the line sowing helped in reduction of man power requirement for different farming operations carried out for the jute cultivation (86.25 %). As per 87.5 per cent of jute growers, this equipment actually maintains the plant population uniformly to a great extent. About 95 % respondents reported that the cost of cultivation of jute crop has also reduced to a great extent. There is also reduction in the requirement of thinning operations due to the use of the implement according to 96.25 per cent of the respondents. The sowing of jute seeds using seed drill showed reduction in manual labour (87 mandays/ha) for weeding and thinning as compared to 135 mandays/ha in broadcast fields (*Naik et al., 2017*). Whereas, only 48.75 per cent respondents informed that adequate subsidy on the machinery has been supplied to them. Apart from this, cent per cent of the respondents perceived the increment of their fibre production due to the adoption of the technology. Using this technology farmers had got 10-15 per cent more fibre yield (*Naik et al., 2017*).

The compatibility of CRIJAF Multi Row Seed-drill as perceived by the jute growers : It is clear from the Table 1 that the seed drill is well compatible with the different types and species of crops that have small seed size like jute as reported by 67.5 per cent respondents. Line sowing, maintaining proper plant population, reduced cost of sowing, weeding and thinning of small seeds like mustard, sesame, black cumin etc. would be possible by using this machinery (*Shambhu and Thakur, 2019*). About 45 per cent of them felt that the implement is compatible with the different types of soil where they used to cultivate jute crops. The optimum soil for operation of the machinery is sandy loam soil having sand, silt and clay in the ratio of 74.80: 13.30: 11.90 (*Shambhu and Thakur, 2018*). All the respondents agreed upon the statement that the machinery is well compatible with the existing culture and social system of the village. Majority (92.5 %) reported that this tool could be also used to meet the needs of a wide range of farmers including large, medium and small farmers. Whereas, 60 per cent respondents agreed that the machinery is economically compatible and affordable. The cost of manually operated seed drill was Rs. 3650/- with an operating cost of Rs. 29 per hour, hence there was saving of Rs. 15000-17000 per ha in line sowing method (*Naik et al., 2017*).

The complexity of CRIJAF Multi Row Seed-drill as perceived by the jute growers : The physical energy requirement for sowing using seed drill on the part of farmers was 3.2 per cent higher than the broadcasting method (*Shambhu, 2020*) therefore about one-third respondents (33.75 %) found difficulty in operating the seed drill in the different soil types of their farm. The optimum soil for operation of the machinery is sandy loam soil (*Shambhu, 2014*). As per the question of difficulty to understand the operation of this machine in the field conditions 98.75 per cent of the respondents disagreed upon the statement. About three-fourth respondents (73.75 %) reported no difficulty in availing

Table 1. Perceived attributes index of CRIJAF Multi-row seed drill (N=80)

Attributes perceived by the adopters	MPS	SD	PAI
Relative advantage			
Line sowing of jute plants	3.00	0.00	100.00
Low seed requirement	3.00	0.00	100.00
Adequate depth of seed placement	2.83	0.44	94.17
Less requirement of manpower	2.80	0.54	93.33
Maintenance of uniform plant population	2.86	0.38	95.42
Reduced cost of cultivation	2.93	0.35	97.5
Reduction in thinning operation	2.96	0.19	98.75
Subsidy	2.35	0.71	78.33
Increased yield	3.00	0.00	100.00
Average Relative Advantage Index = 95.28			
Compatibility			
Compatible with crops having small seeds i.e jute	2.55	0.71	85
Compatible with different soil types	2.11	0.89	70.42
Compatible with the existing culture and social system	3.00	0.00	100.00
Meet the needs of a wide range of farmers	2.93	0.27	97.5
Economically compatible	2.48	0.71	82.5
Average compatibility Index = 87.08			
Complexity			
Difficulty of operation in different soil types	1.88	0.89	62.5
Difficult to understand operation of machinery	1.01	0.11	33.75
Difficulty of availability and accessibility	1.48	0.78	49.17
Difficulty in operation in different crops field	1.43	0.73	47.50
Difficulties in taking precautions	1.33	0.67	44.17
Average Complexity Index =47.47			
Observability			
Smooth operation and usage	2.91	0.36	97.08
Reduction in man power requirement	2.89	0.42	96.25
Maintenance of row-to-row distance	3.00	0.00	100.00
Uniform dropping of seeds from seed box	2.68	0.63	89.17
Reduction of seed rate	3.00	0.00	100.00
Average Observability Index = 96.5			

MPS=Mean Perception Scores; PAI=Perceived Attributes Index; SD=Standard Deviation.

and accessing the implement during the sowing time. The machinery was relatively easy to operate in different crop fields also. The developed seed drill required only 75.16 N of draft for its operation i.e., within the capacity of an average man (*Shambhu and Thakur, 2019*). But, 31.25 per cent of the jute growers had difficulties in maintaining the precautions that should be taken care of before or during the operation of the machinery. It needs to be operated in soil with dry to field capacity level moist and well pulverized soil (*Shambhu, 2007*).

The observability of CRIJAF Multi Row Seed-drill as perceived by the jute growers : According to 93.75 per cent of respondents the seed drill works smoothly during its operation within their farm field conditions. About 92.50 per cent of the respondents clearly observed the reduction in the requirement of the man power due to the adoption of the machinery. Cent per cent of the respondents observed the maintenance of the row-to-row distances by using the implement during sowing of jute seeds. Most of the farmers i.e., 76.25 per cent of the respondents clearly observed the uniform dropping of seeds from the seed box during operation in their fields. Some sort of fluctuations was noticed in the seed rate at different seed box condition due to unequal size and shape of seeds. The mean discharge of seeds from the dispensers varies from 0.8 to 5.79 per cent and seed rate in farmer's field varies from 2.5 to 2.75 kg/ha (*Shambhu, 2020*). All the respondents perceived that the seed rate of the jute plant has actually decreased without affecting the proper plant germination and growth.

By studying all the above attributes of CRIJAF Multirow seed drill as perceived by the respondents the overall technology effectiveness was found to be 82.85 per cent. The technology has been perceived to be appropriate in terms of relative advantage, compatibility and observability. Hence considerable number of sample farmers prefer to take up the innovative machinery i.e., Multirow seed drill for the purpose of sowing of jute seeds.

Similar results have been observed in the study carried out by *Singh et al. (2006)* that the farm women had perceived the farm machineries like twin wheel hoe weeder, grubber weeder and fertilizer broadcaster in terms of relative advantage, compatibility, simplicity, trialability, observability, utility, cost effective and applicability. *Chavan et al., (2017)* identified that the dairy entrepreneurs perceived chaff cutter as relatively advantageous, compatible with the past experiences, can be easily adopted by taking trials and observed its effect on production.

CONCLUSION

It was concluded from the study that the improved technology of manual multirow seed drill was found to be relatively advantageous as it helps in line sowing of jute crops. Regarding compatibility, the technology was feasible and acceptable by the farmers in terms of their needs, beliefs, values and early experiences. In spite of the complexity factor, it can be used easily after taking trials as well as observing its effect on reduction of seed rate and labour requirement for weeding and thinning operations. The extension strategies should aim at reducing the complexity factor so that a greater number of farmers could have an access to the multirow seed drill. Government intervention is also required in form of incentives to promote the manufacturing of the machinery and subsidize its distribution among the farmers (*Chavan et al., 2017*). Besides providing all supports like financial, infrastructural and technical facilities, motivation of the jute growers is also very important to transfer the improved practices of cultivation to achieve better production and productivity of jute fibers.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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