

Adoption of Production Technologies among Jute Growers in West Bengal

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ABSTRACT

Adoption of improved jute production technologies are crucial to increase the farm production and income level of the jute growing communities. A study in North 24 Parganas district of West Bengal was conducted during 2015-16. It was revealed that majority of the respondents had medium level of adoption followed by low and high adoption level. Most of them had equally adopted weed management through herbicide and balanced application of fertilizer. Sources of information utilization, social participation and scientific orientation of the respondents had shown significant relationship with extent of adoption of improved cultivation practices of jute at 5% and 1% level, respectively. While analyzing constraints as perceived by the respondents revealed that non-availability of inputs (RBQ 92.30), low minimum support price (RBQ76.06) and high wages of labour (RBQ76.06) were major constraints faced by them in adoption of improved jute production technologies. The implications of the study may guide in solving the field level problems which could pave the way for the higher adoption of improved technologies by the jute growers.

Keywords: Adoption, Correlation co-efficient, Jute production, Rank Based Quotient, Technologies

INTRODUCTION

Jute is an important commercial crop in Eastern India. It occupies about 1.0 mha area and provides livelihood to about 6.0 million people directly or indirectly. The demand of jute and jute products are likely to increase tremendously because of environmental consciousness around the globe. To fulfill the increasing demand of jute, it is inevitable to increase the productivity of jute fibre as the area under jute is hovering around 9 lakh hectares since last 10 years. Although the productivity of jute has increased from 1138 kg/ha (1947) to 2300 kg/ha (2009-10). The difference between realizable potential and current productivity is about 2000 kg/ha. This yield gap can be narrowed down through faster adoption of improved agricultural technologies (Ghorai *et al.*, 2013). Our country earns Rs. 1200 crore/annum through export of jute goods. Moreover, jute industry employs over two lakh workers and accounts for another 27 lakh in ancillary activities (Anon, 2006). Hence it plays a vital role both in rural as well as

industrial economy. West Bengal contributes about 80 percent of total jute production from more than 70 percent area of the country. The economy of the small (25%) and marginal farmers (65%) of the state is more or less dependent on jute cultivation. Around 30% of annual agricultural income of these farmers comes from cultivation of jute (Das *et al.*, 2006). Even in jute growing districts there is a wide variation in yield levels. Adoption of all the recommended technologies by large number of jute growers is considered as quick method of enhancing productivity in such areas.

Adoption studies attempt to analyze and understand the observed adoption patterns and depict individual behaviour towards use of a new innovation. In a social system, farmers' decisions to adopt a new farm technology depends on various criteria such as simplicity, cost effectiveness and relative advantage. Studies have indicated that the adoption of recommended jute production technologies has the potential of higher yield and more income to the farmers (Jha *et al.*, 2008). Higher

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extension gap was identified in jute growing areas (Chapke *et al.*, 2009) indicated that solution lies in adoption of recent jute production technologies.

ICAR-Central Research Institute for Jute and Allied Fibres (CRIJAF), Barrack pore is a pioneer institute for the development of jute and allied fibre crops production technologies. It has transferred technical know-how on better management of jute and allied fibre crops to enhance productivity. In the district of North 24 Parganas field demonstrations and trainings were conducted during 2008-12. An attempt was made to assess how far participating jute growers have been able to adopt the improved practices of jute production transferred to them.

MATERIALS AND METHODS

The study was purposively conducted during 2015-16 at Goidah village of Swarnapnagar block of North 24 Parganas district of West Bengal. North 24 Parganas district is a major jute producing district of the state. This district has 61,274 ha area under jute crop with production of 8,52,203 bales (1 bale = 180 kg) and productivity 16.62 bales/ha (Anon, 2015). A sample of 52 jute growers was drawn randomly from the list of beneficiaries participated in different training and demonstration programmes executed by Agricultural Extension Section of ICAR-CRIJAF, Barrackpore. To assess the extent of adoption of selected technologies namely, improved varieties, multi row seed drill, CRIJAF Sona, weed management through herbicides, weed management through CRIJAF Nail weeder and balanced fertilizer application were taken up. All the selected respondents were interviewed personally using well-structured interview schedule. The first part of the schedule was associated with the collection of general information, personal and socio-economic variables of the respondents. The second part was regarding extent of adoption of selected recommended jute cultivation practice and constraints. The pre-testing of schedule was done to overcome the weaknesses of the schedule and necessary modifications were made accordingly. Descriptive and analytical statistics were used for analysis of collected data.

The extent of adoption score of the each respondent regarding each of the selected technology was calculated by giving 2 score for full adoption, 1

score for partial adoption and zero (0) for non adoption. The extent of adoption score of each respondent for all the technologies of jute cultivation was calculated as Equation no. 1:

$$E_s = \frac{\sum O_s}{\sum O_{pm}} \times 100$$

E_s = Extent of adoption for a respondent

$\sum O_s$ = sum of score obtained by a respondent for n cultivation practices

$\sum O_{pm}$ = sum of maximum possible score obtained by a respondent for n cultivation practices

On the basis of the computed score the respondents were classified into three categories viz. low, medium and high. Satisfaction level of jute growers with respect to selected technologies was calculated by addition of scores assigned by jute growers on a 0-5 continuum. Constraints in adoption of jute production technologies were ranked using Rank Based Quotient (R.B.Q.) technique (Sabarathnam, 1998) as given in the following formula:

$$RBQ = [\sum f_i (n+1-i) / N n] \times 100$$

Where in,

f_i = Frequency of respondents for the i^{th} rank of a constraint,

N = number of respondents

n = number of constraints

RESULTS AND DISCUSSION

Socio-economic and psychological profile of jute grower: In order to know the socio-economic and psychological profile of the respondents, eleven socio-economic and psychological variables were studied using appropriate tools. Perusal of Table 1 showed that most of the respondents belonged to middle age group (36-55 years). While with regards to literacy level, the highest proportion of the respondents (26.92%) had education upto high school level followed by middle school (25%). Only 7.69% respondents were graduate. With regard to land holding, majority of the respondents (86.42 %) had <0.5 ha area. Majority (88.32%) of the respondents had low annual income (<Rs.2 lakh) followed by 7.69% middle income (Rs. 2-

Table 1: Socio-economic and psychological profile of respondents (n= 52)

Variables	Number of respondents	%	Mean	S.D.
Age				
Young (<35 years)	3	5.76	49	8.98
Middle (36-55 years)	37	71.15		
Old (>56 years)	12	23.07		
Education				
Can read and write	11	21.15	3	1.28
Primary school	7	13.46		
Middle school	13	25.00		
High school	14	26.92		
Intermediate	2	3.84		
Graduate and above	4	7.69		
Land holding (ha)				
Low (Mean- S.D.)	29	55.76	0.55	0.2
Medium (Mean \pm S.D.)	16	30.76		
High (Mean + S.D.)	7	13.46		
Annual income (Rs. lakh / annum)				
Low (<Rs. 2 lakh)	46	88.32	3.13	1.96
Medium (Rs. 2-5 lakh)	4	7.69		
High (>Rs. 5 lakh)	2	3.84		
Farming experience (Years)				
Less (Mean- S.D.)	9	17.30	34	9.00
Medium (Mean \pm S.D.)	32	61.53		
High (Mean + S.D.)	11	21.15		
Family size				
Low (Mean- S.D.)	3	3.84	4	2.00
Medium (Mean \pm S.D.)	47	90.38		
High (Mean + S.D.)	3	5.76		
Sources of information utilization				
Low (Mean- S.D.)	-	-	4	2.47
Medium (Mean \pm S.D.)	62	75.60		
High (Mean + S.D.)	20	24.40		
Social participation				
Low (Mean- S.D.)	-	-	3	2.5
Medium (Mean \pm S.D.)	39	75.00		
High (Mean + S.D.)	13	25.00		
Risk orientation				
Low (Mean- S.D.)	11	21.15	8.5	1.05
Medium (Mean \pm S.D.)	34	65.38		
High (Mean + S.D.)	7	13.46		
Scientific orientation				
Low (Mean- S.D.)	7	13.46	21	3.60
Medium (Mean \pm S.D.)	33	63.46		
High (Mean + S.D.)	12	23.07		
Marketing facilities				
Low (Mean- S.D.)	3	5.76	7	0.23
Medium (Mean \pm S.D.)	49	94.23		
High (Mean + S.D.)	-	-		

5 lakh) and 3.84% high annual income (>Rs.5 lakh). Most of the respondents had medium level of farming experience. In case of family size, around 90% respondents had 4-5 family members. For sources of information utilization, majority of respondents (75.60%) were in medium category. Similarly, social participation of the majority respondents (75.00 %) were also in medium category. Only 13.46 % of the respondents had high risk orientation. Majority of them possessed (63.46%) medium level of scientific orientation while, 23.07 % of the respondents possessed high level of scientific orientation. Regarding marketing facilities available for selling of jute fibres, majority of the respondents (94.24%) fell in medium level category followed by low level (5.76%).

Distribution of the jute growers according to adoption level of selected technologies: The responses of respondents were collected on six improved technologies of jute production (Table 2). Majority of the respondents (76.92%) completely adopted weed management through herbicide. The possible reason for adoption of weed management through herbicides may be the quick action of the pre and post emergence herbicides, saving of time, simple in application and reduction in labour cost and easy to adopt. The possible reason for non-adoption of this intervention might be less weed population, low soil moisture, location of field and lack of knowledge about herbicides. Similarly, with regard to application of balanced use of fertilizer, most of the respondents (76.92%) followed it. It might be due to easy availability of fertilizers in the local market. In case of application of Urea and Farm Yard Manure (FYM) partial adoption (23.07%) was observed. Very few respondents followed recommended dose of FYM because of less availability of FYM in the market and thin population of livestock in the area. CRIJAF Nail

weeder, is a mechanical device, which can be operated in broadcasted and line sown jute field. It can save Rs. 10,000-15,000/ha by managing 80-85% composite weed population. It was adopted by 40.38% respondents. The limiting factor for non-adoption might be specific field condition (clay soil having big clods and lack of proper soil moisture) of the respondents. CRIJAF Sona, a microbial consortium is developed by ICAR-CRIJAF, Barrack pore for enhancing the retting process was adopted by only, 23.07% respondents. These respondents regularly procured it on time through personal efforts from the institute. In general, advantages of improved seed were known to all of the respondents. Local availability of seed in time has a major in adoption of recent varieties. Hardly, any respondents needed more than three kg of seed because of their small land holding (recommended seed rate is 3-4 kg/ha). Only one fourth of the respondents (25.00%) were very much responsive. They took special initiative and ensured regular procurement of seed (such as JRO 204, CO 58, and JRO 2407 etc.) from stipulated location by proportionate sharing of cost and time involved in it. While 15.38% respondents partially adopted. They used when they got it and abandoned when did not get it. Majority of the respondents (59.61%) did not use seeds of improved CRIJAF varieties due to its non-availability in the local market. As per them, it was time consuming and costly affair to personally visit research institutions and State Agricultural Universities before the crop season. Regarding multi row seed drill, only 25% respondents adopted it. Majority of them (59.61%) could not adopt it because of lack of proper soil moisture. Dependence on onset of monsoon restricted the use multi row seed drill in a larger area. While, 15.38% respondents partially adopted it. Similar findings have been reported by Mondal *et al.* (2012) where majority of jute growers did

Table 2: Distribution of respondents according to adoption level of selected jute production technologies (n=52)

Particulars	Level of adoption					
	Complete		Partial		Non	
	F	%	F	%	F	%
Improved CRIJAF varieties	13	25	8	15.38	31	59.61
Multi row seed drill	13	25	8	15.38	31	59.61
CRIJAF Sona	12	23.07	-	-	40	76.92
Weed management through herbicides	40	76.92	-	-	12	23.07
Weed management through CRIJAF Nail weeder	21	40.38	-	-	31	59.61
Balanced fertilizer application	40	76.92	12	23.07	-	-

not adopt line sowing through seed drill in Nadia district of West Bengal.

Extent of adoption of improved production practices of jute: The level of adoption with respect to improved production of jute has been presented in Table 3.

Table 3: Distribution of respondents according to overall adoption of selected jute production technologies (n=52)

Categories	Number of respondents	%
Low	4	7.69
Medium	37	71.15
High	11	21.15
Total	52	100

It was revealed that majority of the respondents (71.15%) had medium level of adoption of jute production technologies. A negligible percentage of the respondents i.e. 7.69 per cent and 21.15 per cent had low and high adoption level, respectively. It can be inferred that respondent's inclination towards scientific rationality and their social participation coupled with sources of information utilization might have helped in adoption of improved production practices of jute.

Satisfaction level of jute growers regarding technologies: Jute being a labour intensive crop, high expenditure is required to complete various intercultural operations. A study on satisfaction level of respondents' regarding benefit accrued from individual selected technologies are presented in Table 4.

Table 4: Satisfaction level of respondents regarding selected jute production technologies (n=52)

Particulars	Score	Rank
Weed management through herbicides	4.96	I
CRIJAF Sona	4.38	II
Weed management through CRIJAF Nail weeder	3.88	III
Multi row seed drill	3.31	IV
Improved CRIJAF varieties	3.12	V
Balanced fertilizer application	2.38	VI

Farmers could get maximum satisfaction with the adoption of weed management through herbicide technology and it was ranked first. As per the respondents, its operational cost was less and it could save time (1.5-2 ha/day) in controlling of composite and specific types of weed flora such as *Trianthemasp*, *Phalaris*

minor, *Cynodon dactylon* etc. In monetary term, maximum benefit was derived from its adoption. Second best technology was application of CRIJAF Sona. As it reduces the time of retting by one week in comparison to conventional retting and it also upgraded the quality and colour of jute fibre (1-2 grade) resulting in more selling price. Weed management through CRIJAF Nail weeder was ranked III. It could be used in both broadcasted and line sown jute crops, and is eco-friendly and efficient as compared to manual weeding. Thinning and soil mulching were also possible at the time of weeding. There was labour and cost saving in all the three best rated technologies and hence respondents felt more satisfaction by adopting those technologies. Lesser degree of satisfaction was perceived from use of multi row seed drill (Rank IV), CRIJAF varieties (Rank V) and balanced fertilizer application (Rank VI).

Socio-economic characteristics of jute grower vis-à-vis extent of adoption of improved production practices of jute: Socio-economic factors play an important role in adoption process which has been widely acknowledged through various studies, therefore it has been attempted here too. Data presented in Table 5 revealed that sources of information utilization ($r=0.282$), social participation ($r=0.279$) and scientific orientation ($r=0.391$) of the respondents had significant association with extent of adoption of improved cultivation practices of jute. But age, education, annual income, farming experience, land holding size and family size have no such significant relationship with extent of adoption.

Table 5: Correlation co-efficient of independent variables of respondents with their adoption level of selected jute production technologies

Variables	r value
Age	-0.209
Education	0.255
Farm size	0.271
Annual income	0.018
Farming experience	-0.159
Family size	-0.024
Sources of information utilization	0.282*
Social participation	0.279*
Risk orientation	0.092
Scientific orientation	0.391**
Marketing facilities	-0.057

*Significant at 5% level and **Significant at 1% level

It can be inferred from the above findings that with the increase in sources of information *i.e.* personal cosmopolite and localite, indigenous sources of communication (religious group/village meeting, talk at tea stall) there were chances of increase in the extent of adoption of improved production practices of jute. Penetration of mobile phone and television channel (Doordarshan/ETV Bangla) at village level had multiplied this possibility. Further, it was found that neighbours/friends were the most credible sources of information. This finding is in agreement with a study done by (Mondal and Bandopadhyay, 2014) on jute growers of West Bengal, where sources of information utilization had significant relationship with level of adoption. Similarly, increase in social participation offers more opportunities to gather and process the information and it has also played a significant role on the extent of adoption. Their habit of frequent contacts with local jute growers having more scientific outlook might have helped in understanding the importance of science and technology. A study on potato growers of Jammu and Kashmir (Peer *et al.*, 2014) has also reported similar findings. Scientific orientation makes an individual to systematically proceed from problem identification to a solution, thus making the decision making effective. It seems that scientific orientation might have prompted the respondents to adopt latest technologies for solution of their field problems. The findings are in agreement with a similar study conducted by Chouhan *et al.* (2013) on sugarcane cultivators of Madhya Pradesh.

Constraints in adoption: Constraint is a limiting factor which restricts to achieve the potential with reference to a goal. The constraints as perceived and prioritized by the respondents have been worked out. These were focused on technology, market, retting and labour related factors (Table 6).

Non-availability of inputs (92.30) such as seeds of high yielding varieties, CRIJAF Sona, was the most serious constraint. Low support price (76.06), high wages of labour (76.06) and water for retting were other major constraints. High labour cost was a major constraint especially in the case of fibre extraction. Distress sale (57.69), non-availability of labour (49.50), lack of regulated market (40.49), weak extension activities (30.76) and complexity of new practices (30.34) were some other constraints perceived by the respondents.

Table 6: Constraints faced by respondents in adoption of selected jute production technologies (n=52)

Factors	RBQ	Rank
Technology related		
Non availability of inputs	92.30	I
Complexity of new practices	30.34	VIII
Market related		
Distress sale	57.69	IV
Low support price	76.06	II
Lack of regulated market	40.59	VI
Retting related		
Water for retting	75.21	III
Labour related		
High wages of labour	76.06	II
Non availability of labour	49.50	V
Others		
Weak extension activities	30.76	VII

CONCLUSION

Based on above discussion, it was concluded that majority of the jute growers of the study area were selective to adopt the improved technologies and belonged to medium adopter category. Their wider acceptability for weed management through herbicides and balanced fertilizer application reflect their wisdom to apply improved technologies for their benefit. Their acquaintance with inputs and its availability in nearby market persuaded them to continue the same. Non-availability of inputs in nearby market were the reason of poor adoption level of improved jute varieties and CRIJAF Sona. Sources of information utilization, social participation and scientific orientation of the respondents had significant association with extent of adoption of improved production technologies of jute. These factors should be taken care of by the service/input providing agencies to redesign the activities of transfer of technologies in jute growing areas having similar kind of socio-economic situation. It is assumed that higher adoption of the improved jute production technologies will accelerate the production, which in turn will lead to the sustainable livelihood of the jute growers.

REFERENCES

- Anonymous. 2015. Directorate of Agriculture, Govt. of West Bengal, Kolkata, West Bengal.
- Anonymous. 2006. Technological evaluation through frontline demonstration and its impact, CRIJAF, Barrack pore, Kolkata, West Bengal.

- Chapke, R.R.; S.K. Das; C.R. Biswas and S.K. Jha. 2009. On-Farm assessment of technological innovations of jute. *Indian Journal of Extension Education*, 45(1&2): 102-104.
- Chouhan, S.; S.R.K. Singh; A.K. Pande and U.S. Gautam. 2013. Adoption dynamics of improved sugarcane cultivation in Madhya Pradesh. *Indian Research Journal of Extension Education*, 13(2): 26-30.
- Das S.K.; R.R. Chapke; S.K. Jha and D. Ghosri. 2006. Technology transfer for jute-retrospect and prospect. Bulletin No. 23/2008, CRIJAF, Barrackpore.
- Ghosri A.K.; H. Chowdhury; M. Kumar and S. Kumar. 2013. Technology for weed management in jute. *Indian Farming*, 63(6): 12-14.
- Jha S.K.; D.K. Ghosri; F.H. Rahman; M.K. Sinha and B.S. Mahapatra. 2008. Towards food and economic security through enterprise diversification, Bulletin No. 23/2008, CRIJAF, Barrackpore.
- Mondal, D. and A.K. Bandopadhyay. 2014. Adoption of jute production technology in West Bengal. *Economic Affairs*, 59: 701-709.
- Mondal, D.; S.N. Panchabhai; K.K. Goswami; K.K. Roy and P.K. Pal. 2012. A micro-level study on farmers' approach towards jute cultivation in some selected area of Nadia district of West Bengal, India. *Journal of Crop and Weed*, 8(1): 44-46.
- Peer, Q.J.A.; M.A. Dar; H.A. Malik and J. Kamr. 2014. Multiple regression analysis for adoption studies of potato growers in Jammu division. *Journal of Applied and Natural Sciences*, 6(2): 664-671.
- Sabarathnam, V.E. 1988. Manual of field experience training of ARS scientist, National Academy of Agricultural Research Management, Hyderabad, pp. 41-48.

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