

# Adoption of Jute Production Technology in West Bengal

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## Abstract

Jute being crop is an important source of income of growers of West Bengal. In jute cultivation requires a considerable amount of cash investment, an average grown has to face a number of socio-economic and technological problems. A study was conducted on adoption of jute production technology in West Bengal. The objective of this study is to measure the knowledge level adoption index to some important jute production technologies and to find out nature of influence of some of the socio-personal characteristics of the jute growers on their knowledge and adoption of modern jute technologies. Villages were selected as progressive and non-progressive with regard to agro-technological criteria of jute cultivation. The members were selected randomly and total numbers of respondents were 112. The data were processed into mean, median, standard deviation and correlation co-efficient. The factors like mass media exposure, personal cosmopolite sources, age, education and extra village contact are found to have influenced to significant extent the knowledge where the investigation was carried out.

**Keywords:** Technology, adoption, cosmopolite, correlation co-efficient.

Jute is one of the important commercial crops in India next to cotton. In trade and industry however, in term used as raw jute. Raw jute plays an important role in country's economy, particularly in the eastern and north eastern state. West Bengal is the major jute growing state sharing about three- fourth of the country's production. Jute caddies in combination with other agro-residues viz., rice husk, saw dust, jute stick can be briquetted at optimum moisture condition of 10-15%. The gross calorific value of jute caddies briquettes was found to be is 3000-3200 kcal kg<sup>-1</sup> (Anonymous, 2006). Considering the calorific value of coal as 5200 kcal kg<sup>-1</sup> and mineral oil as 10,000 kcal kg<sup>-1</sup>, 1 kg of jute caddies briquette is equivalent to 0.635 kg of coal or 0.33 kg of mineral oil (Nayak *et al.*, 2011). Jute was initially regarded as "Golden Fibre" considering its national importance. Considering the global awareness of

environmental pollution, the crop is again coming the fore-front and reviving its importance. Jute being an annual renewable natural source of energy and environment friendly as well as costly plant species used for the same purpose, particularly in the textile and paper industries. People are now getting more concerned about the environment pollution and prefer to use natural products instead of man-made synthetic substitutes which are non-biodegradable. Consequently, diversification of various types of jute and jute coated products have brought about a new dimension in the changing scenario in the jute and allied fibre-sector.

Data on area, production and productivity of jute in different jute growing countries are presented in Table 1.

**Table 1. Country-wise production of jute in 2005-2006**

Country	Production in thousand M.T
Bangladesh	990.00
China	90.00
India	1575.00
Myanmar	43.26
Nepal	17.66
Thailand	36.00
Vietnam	15.00

FAO Statistics, June 2006

## Materials and Methods

Jute is important and main cash crop of West Bengal. Jute is important source of income of jute growers of West Bengal. Jute requires a considerable amount of cash investment, an average grower has to face a number of difficulties as well as lack of adoption of jute production technology and socio-economic environment in which he likes. Methodology issues of this investigation try to address to these problems to some extent.

The study was conducted nine villages of Nadia district in West Bengal. The villages were selected randomly. The total numbers of respondents were 112.

## Variables of the Study

- (1) **Socio-economic Status:** The adoption of any innovation is largely regulated by socio-economic condition of the individual of the society or community. Here also socio-economic status of the respondents in this study may have enduring on the adoption of technologies of jute cultivation.

For measurement of socio-economic status of the farmer the total score obtained by the application of Pareek and Trivedi scale (1963) was considered as socio-economic status score of individual.

- (2) **Mass Media Exposure:** Mass Media played an important role in adoption of any innovation. The mass media exposure is measured on the basis of respondents, answer, such as score “3” for a response “most often”, ‘2’ for often ‘1’ for the response some times. Sometimes mass media exposure is measured with references to the exposure to the media like Radio, television, news paper, farm publication, poster, demonstration, field trips, exhibition, krishi mela.
- (3) **Personal Cosmopolite Source:** personal cosmopolite helps to spreading the improved practices to the farmers and sometimes it invites the farmers to adopt improve the techniques in their farm. In case of setting of jute farmers used earlier banana stem or mud. But now they can use one stone, bricks, wood etc. They are motivated by extensions on Agricultural personnel. The personal cosmopolite source provides a pattern of acquired characteristics of a farmer by which he can express his opinion and discuss freely his problems. The personal cosmopolite source is measured on the basis of respondent score such as “3” for responses like most often, “2” for often and “1” for some times. Most of the Agricultural person i.e. Agricultural Development Officer (ADO), Subject Matter Specialist (SMS), Krishi Prajukti Sahayak (KPS), university research personnel and field staff are being considered to help on times the farmers with reference to cultivation of seasonal crops including jute.
- (4) **Extra Village Contact:** A farmer can get improved knowledge of cultivation practices from other villages and their surrounding locality. These helps to spreading the innovation in his area and can be called as having obtained extra village contact.

The extra village contact is measured on the basis of respondents score as “3” for respondents like most often, “2” for often and “1” for sometimes. It is expected that various types of contact also associated with adoption of jute cultivation technologies.

## Dependent Variable

### *Knowledge*

Knowledge is a power which helps to change an individual attitudes as well as his overt behavior towards desired direction. Knowledge provides base of structure for solving various problems of daily life. Farmers can acquired knowledge by various literature in the form of leaflets, flashcard, bulletin, journal in a large scale. A literate farmer by acquiring the information contained in leaflet of scientific jute cultivation which are supplied by the Agricultural department of similar organization can know the scientific procedure followed in raising or growing the jute crop. Education in this case complements the farmers’ knowledge.

For this study knowledge score is measures on the basis of attributing score “1” to correct answer given by the respondent to each question and score “0” to incorrect answer to each question concerning the study.

**Adoption of Jute**

Here the dependent variable of the study is adoption of jute production technology by the farmers of Nadia district in West Bengal. The central and state Government through their respective departments has brought many economically viable innovations to the jute growers.

Agriculture is the base of rural economy. Some improved varieties of jute have remonstrated to the farmers for economic development.

Regarding this study adoption is measures in the following way. Marks “8” have been assigned to five items of which ‘2’ to line sowing ‘3’ to retting technique. ‘1’ to each of rest three items i.e. improved variety.

The score of the respondent in percentage regarding jute cultivation is calculated by multiplying hundred by the ratio of the score obtained by the respondent to the total weight point i.e. 8.

Statistical technique:

$$\text{Mean} = \frac{\sum x}{n}$$

where,  $x$  = observation regarding a variable

$n$  = number of respondents

$$\text{Median} = L + (N/2 - F) / f_m \times h$$

$L$  = lower class boundary of the median class

$N/2$  = half of the total number of score

$F$  = cumulative frequency preceding the median class

$f_m$  = frequency of the median class

$$\text{Standard deviation } (\sigma) = \sqrt{\sum X^2 / N - (\bar{X})^2}$$

where,  $X^2$  = square values of each measurement

$N$  = number of measurement of scores

$\bar{X}$  = mean value of the scores

Correlation Co-efficient

$$(r) = \frac{N \sum XY - \sum X \cdot \sum Y}{\sqrt{\{N \sum X^2 - (\sum X)^2\} \{N \sum Y^2 - (\sum Y)^2\}}}$$

where,  $N$  = number of measurement of score.

$\sum XY$  = Sum of product of independent variable (X) and dependent variables (Y).

$\sum X$  = sum of each independent variables (X).

$\sum Y$  = sum of each dependent variables (Y)

$\sum X^2$ = Sum of square of each independent variables(X)

$\sum Y^2$ = Sum of square of each dependent variables(Y)

r= Correlation Co-efficient between each independent variables(X) and dependent variables(Y)

## Results and Discussion

The present study is mainly concerned with dependent variables i.e.  $Y_1$  and  $Y_2$  (measured in terms of knowledge score and adoption index) and independent variable i.e. ( $X_1$ =Age,  $X_2$ =Education,  $X_3$ =Occupation,  $X_4$ =Socio-economic status,  $X_5$ =Mass media exposure,  $X_6$ =Personal cosmopolite sources and  $X_7$ =Extra village contact). Actually, in course of analysis the relationship between independent and dependent variables as well as the influences of the farmer on the later were explored.

Hence for the purpose of statistical analysis of the data, 't' test was mainly done from correlation and regression coefficients with 9x9 matrix. The opinion with regard to the four groups of different categories of farmer's i.e. small, marginal, progressive and non-progressive on the basis of jute cultivation were treated as basic data.

**Table 2. Correlation and regression Co-efficient involving knowledge score ( $y_1$ ) level of small farmers and their Socio-personal characteristics.**

Dependent variable- knowledge score ( $y_1$ )

Independent Variables ( $X_i$ )	r (value)	$\beta$ (Value)	t (value)
$X_1$	0.1312	0.4026	1.1308
$X_2$	0.3601	0.1265	2.7564**
$X_3$	0.3621	0.1701	2.8965**
$X_4$	0.2015	0.4067	1.504
$X_5$	0.3541	0.3134	2.729**
$X_6$	0.1496	0.1914	1.113
$X_7$	0.1004	0.0525	0.7410

$R^2=0.4187$  DF=54

\*\* Significant at ( $t_{.0154} = 2.6732$ ), level

\*\* Significant at ( $t_{.0554} = 2.0063$ ), level

The \*\* marked values being greater than tabulated 't' with 54 degrees of freedom at 1% level of significant i.e. for the corresponding the  $X_i$  are dependent on  $Y_1$  i.e. Education ( $X_2$ ), Occupation ( $X_3$ ), Socio-economic status ( $X_4$ ), mass media exposure ( $X_5$ ), personal cosmopolite sources( $X_6$ ) and extra village contact ( $X_7$ ) of variables are not correlated with knowledge score ( $Y_1$ ).

Hence, from these above calculations it is conferred that the variables i.e. education ( $X_2$ ), Occupation( $X_3$ ) and Mass media exposure ( $X_5$ ) influences the knowledge level for increasing more production per hectare with high quality of fibre.

The R<sup>2</sup> values being 0.4187, it was to conclude that all seven casual variable put together, 41.87% of the variance in the consequent variables had been explained this would rightly suggested to include more contextual variables in the present contingency to escalate the level of explicitly.

**Table 3. Correlation and regression co-efficient involving Adoption index (Y<sub>2</sub>) of small famers and their socio-personal characteristics.**

Dependent variable-Adoption index (Y<sub>2</sub>)

Independent Variables (X <sub>i</sub> )	r (value)	β (Value)	t (value)
X <sub>1</sub>	0.1427	0.1213	1.061
X <sub>2</sub>	0.3169	0.0335	2.4577*
X <sub>3</sub>	0.1571	0.0019	1.1702
X <sub>4</sub>	0.3511	0.2301	2.7571**
X <sub>5</sub>	0.3580	0.1021	2.8183**
X <sub>6</sub>	0.3667	0.1545	2.9901**
X <sub>7</sub>	0.2011	0.0335	1.4995

R<sup>2</sup>=0.5836 DF=54

\*\* Significant at (t<sub>.0154</sub> = 2.6732) level

\*\* Significant at (t<sub>.0554</sub> = 2.0063) level

The \*\* marked values being greater than tabulated ‘t’ with 54 degrees of freedom at 1% level of significant i.e. for the corresponding the X<sub>i</sub> are dependent on adoption index (Y<sub>2</sub>) i.e. Socio-economic status(X<sub>4</sub>), mass media exposure(X<sub>5</sub>) and personal cosmopolite sources(X<sub>6</sub>) and also another \* marked value being greater than tabulated ‘t’ with 54 degrees of freedom at 5% level of significant on adoption index (Y<sub>2</sub>) i.e. age (X<sub>1</sub>), occupation(X<sub>3</sub>) and extra village contact(X<sub>7</sub>) are not co-related with adoption index (Y<sub>2</sub>).

Hence from the Table 3 we can draw inference that the variables i.e. socio-economic status, media exposure and personal cosmopolite source influence strongly an adoption level. And another variables i.e. education also influences to the adoption index although not so strongly.

The R<sup>2</sup> values being 0.5836, it was to conclude that all seven casual variable put together, 58.36% of the variance in the consequent variables had been explained this would rightly suggested to include more contextual variables in the present contingency to escalate the level of explicitly.

**Table 4. Correlation and regression co-efficient involving Adoption index (Y<sub>2</sub>) and some socio-personal characteristics farmers belonging to non progressive village.**

Dependent variable- Adoption index (Y<sub>2</sub>)

Independent Variables (X <sub>i</sub> )	r (value)	β (Value)	t (value)
X <sub>1</sub>	0.1205	0.1869	0.8925
X <sub>2</sub>	0.1403	0.0158	1.0421
X <sub>3</sub>	0.1185	0.0194	1.8782

$X_4$	0.1274	0.0741	0.9425
$X_5$	0.2841	0.0848	2.1728*
$X_6$	0.3618	0.1415	2.8548**
$X_7$	0.2695	0.0421	2.0579*

$R^2=0.3995$   $DF=54$

\*\* Significant at ( $t_{0.01,54} = 2.6732$ ) level

\*\* Significant at ( $t_{0.05,54} = 2.0063$ ) level

The \*\* marked values being greater than tabulated 't' with 54 degrees of freedom at 1% level of significant i.e. for the corresponding the  $X_1$  are dependent on adoption index ( $Y_2$ ) i.e. personal cosmopolite sources ( $X_6$ ) and also another \* marked value being greater than tabulated 't' with 54 degrees of freedom at 5% level of significant i.e. for these corresponding  $X_1$ 's are also dependent on adoption index ( $Y_2$ ) i.e. mass media exposure( $X_5$ ), and extra village contact( $X_7$ ) and rest of variables i.e. age ( $X_1$ ), education ( $X_2$ ), occupation( $X_3$ ) and socio-economic status( $X_4$ ), are not co-related with adoption index ( $Y_2$ ).

From the result explicit in the Table 4 it is clear that the variable i.e. personal cosmopolite source influences strongly and the variables i.e. mass media exposure and extra village contact influence to some extent the adoption level of the growers in non- progressive areas.

The  $R^2$  values being 0.3995, it was to conclude that all seven casual variable put together, 39.95% of the variance in the consequent variables had been explained this would rightly suggested to include more contextual variables in the present contingency to escalate the level of explicitly.

### Pooled Analysis

**Table 5. Correlation and regression Co-efficient involving knowledge score ( $y_1$ ) and some socio-personal characteristics of all categories of farmers.**

Dependent variable- knowledge score ( $y_1$ )

Independent Variables ( $X_i$ )	r (value)	$\beta$ (Value)	t (value)
$X_1$	0.1162	0.4311	1.7334
$X_2$	0.1825	0.0675	2.7702**
$X_3$	0.1076	0.0634	1.6141
$X_4$	0.1122	0.2043	1.6812
$X_5$	0.1794	0.1614	2.7140*
$X_6$	0.1207	0.1701	1.8130
$X_7$	0.1097	0.0598	1.6459

$R^2=0.3315$   $DF=111$

\*\* Significant at ( $t_{0.01,111} = 2.576$ ) level

\* Significant at ( $t_{0.05,111} = 1.960$ ) level

The \*\* marked values being greater than tabulated 't' with 111 degrees of freedom at 1% level of significant i.e. for the corresponding the  $X_i$ 's are dependent on adoption index ( $Y_1$ ) i.e. Education ( $X_2$ ), Occupation( $X_3$ ), Socio-economic status( $X_4$ ), personal cosmopolite sources( $X_6$ ) and extra village contact( $X_7$ ) of variables are not correlated with knowledge score ( $Y_1$ ).

Hence, from the result manifested in table 5, it is clear that the variables i.e. education ( $X_2$ ), and Mass media exposure( $X_5$ ) influences very strongly the knowledge level of the jute growers of the entire area.

The  $R^2$  values being 0.3315, it was to conclude that all seven casual variable put together, 33.15% of the variance in the consequent variables had been explained this would rightly suggested to include more contextual variables in the present contingency to escalate the level of explicitly.

**Table 6: Correlation and regression co-efficient involving Adoption index ( $Y_2$ ) and level of some personal characteristics of all categories of famers.**

Dependent variable- Adoption index ( $Y_2$ )

Independent Variables ( $X_i$ )	r (value)	$\beta$ (Value)	t (value)
$X_1$	0.0931	0.0845	1.3931
$X_2$	0.1505	0.0189	2.2681*
$X_3$	0.0868	0.0165	1.2997
$X_4$	0.1194	0.0747	1.7873
$X_5$	0.1873	0.0577	2.8442**
$X_6$	0.1698	0.0821	2.5643*
$X_7$	0.0898	0.0167	1.3438

$R^2=0.4466$  DF=111

\*\* Significant at ( $t_{0.01, 111} = 2.576$ ) level

\* Significant at ( $t_{0.05, 111} = 1.960$ ) level

The \*\* marked values being greater than tabulated 't' with 111 degrees of freedom at 1% level of significant i.e. for the corresponding the  $X_i$ 's are dependent on adoption index ( $Y_2$ ) i.e. mass media exposure ( $X_5$ ) and another \* marked values being greater than tabulated 't' with 111 degrees of freedom at 5% level of significant i.e. for the corresponding ( $X_i$ ) are also dependent on adoption index ( $Y_2$ ) i.e. ( $X_2$  and  $X_6$ ) and rest of the variables i.e., age ( $X_1$ ) and Occupation( $X_3$ ), Socio-economic status( $X_4$ ) and extra village contact ( $X_7$ ) are not correlated with adoption index ( $Y_2$ ).

The  $R^2$  values being 0.4466, it was to conclude that all seven casual variable put together, 44.66% of the variance in the consequent variables had been explained this would rightly suggested to include more contextual variables in the present contingency to escalate the level of explicitly.

Table 6 reveals that the only one variable i.e. mass media exposure influence strongly the adoption level while two other variables i.e. education and personal cosmopolite sources also influence to some extent the adoption level of the jute growers of the area under study.

## Conclusion

Jute is one of the cheapest crops and used in the manufacture of different types of packing materials for various agricultural and industrial products. It deals with the conceptual newness in respect of adopting technologies improving the socio-economic condition of resource poor farmers along with neighbor and his community. In all cases analysis has been made in terms of 't' test from co-relation and regression co-efficient of different strategies of farmers the major finding relate to the socio-economic background of the farmers and their knowledge as well as adoption of statistical analysis involves the data collected from some small and marginal jute farmers from specific progressive as well as non-progressive jute growing areas of the Nadia district of West Bengal. As a process of agricultural development the adoption of innovation play to raise the socio-economic condition of farmers in the farming community. It is the farmers who is the real man to put the ideas into actions; to take the new technology to his field. The factors like mass media exposure, personal cosmopolite sources, age, education and extra village contact are found to have influenced to significant extent the knowledge where the investigation was carried out.

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