PROJECT COMPILATION REPORT (PCR) - Compiled

Project ID No-(FRP): TF 11-C (2013)

Project Title with code: **Validation and up scaling of off-season jute seed production Technologies in different jute growing areas of Bangladesh (**TF 11-C (2013)

Project Duration: 37 months; From: 25th August/2013 to 30th September /2016.

CGP Project: KGF BKGET 1st Call

Submitted to:
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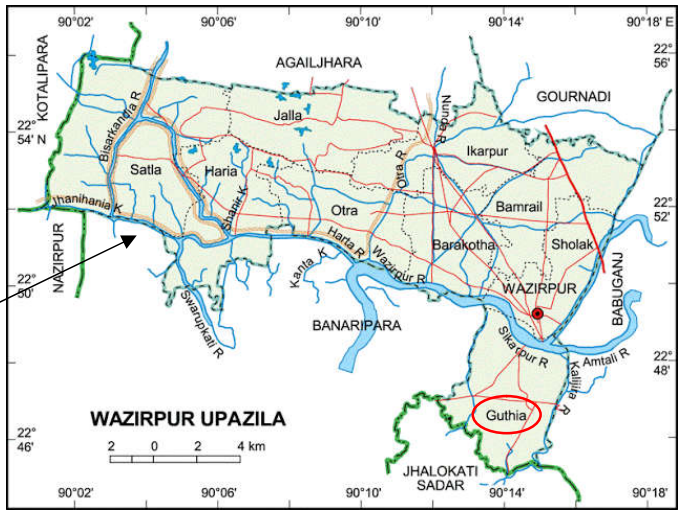
Full name of Abreactions and Acronyms used in the report:

MT	:	Metric Ton
HYV	:	High Yielding Variety
BJRI	:	Bangladesh Jute Research Institute
BCR	:	Benefit Cost Ratio
PSO	:	Principal Scientific officer
CSO	:	Chief Scientific officer
SSO	:	Senior Scientific officer
DAE	:	Department of Agricultural Extension
TSP	:	Tripple Super Phosphate
MOP	:	Muriate of Potash
RCBD	:	Randomized Complete Block Design
DMRT	:	Duncan Multiple Range Test
BC	:	Broad cast
L	:	Line
ha	:	hectare



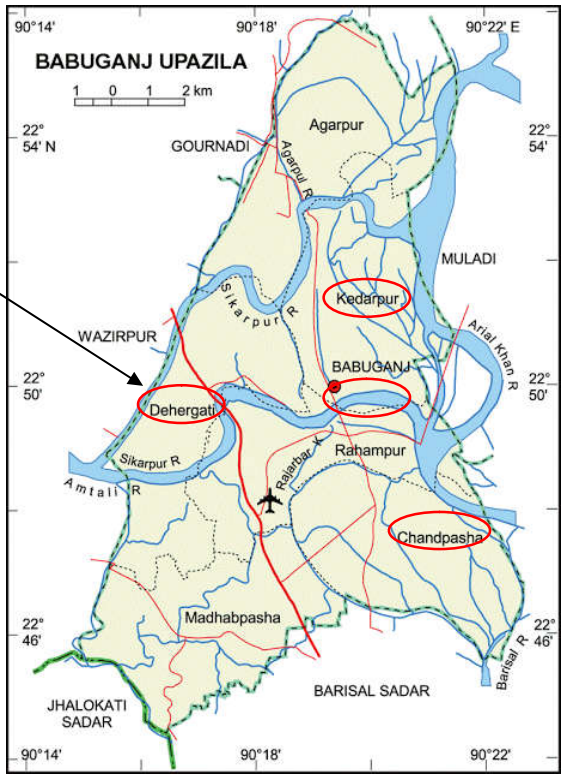


Fig. 1: District MAP of Barisal sowing the project sites- Wazirpur and Babuganj Upazilla.
Red circled areas expresses experiment conduction sites.

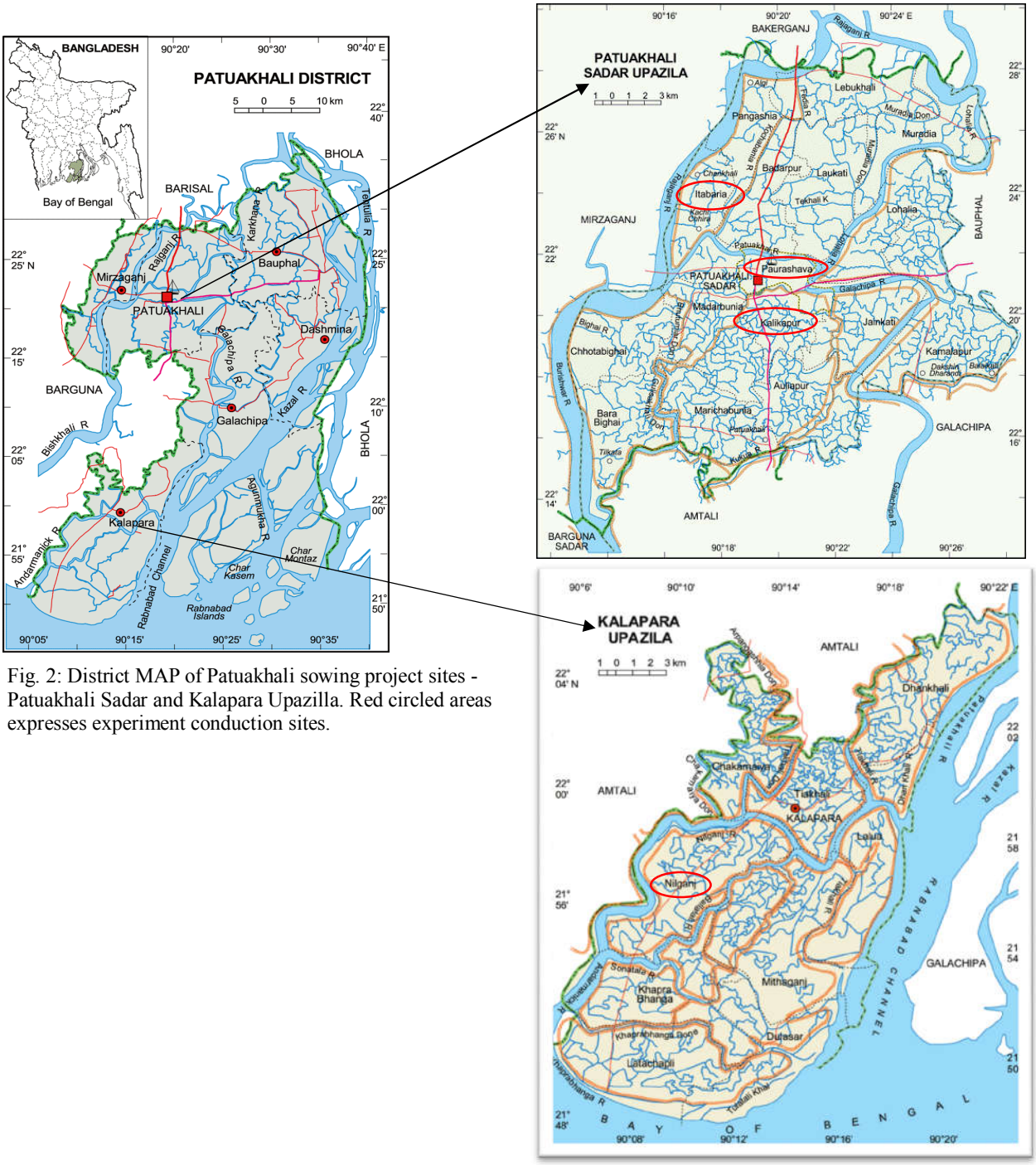


Fig. 2: District MAP of Patuakhali sowing project sites - Patuakhali Sadar and Kalapara Upazilla. Red circled areas expresses experiment conduction sites.

Project Compilation Report on "Validation and up- scaling of off-season jute seed production Technologies in different jute growing areas of Bangladesh"

CGP Project: KGF BKGET 1st Call

Project Duration: 37 months; From: 25th August/2013 to 30th September /2016.

A. Basic Project Information:

i.	Project ID Number (FRP)	:	TF 11-C (2013)
ii.	Project Title	:	**Validation and up- scaling of off-season jute seed production Technologies in different jute growing areas of Bangladesh**
iii.	Name of Coordinator (if applicable)	:	Not applicable
iv.	Name of Principal Investigator	:	Dr. Md. Abdul Alim
v.	Name of Co-investigator /s	:	(i) Dr. M. Mahbubul Islam, CSO, Agronomy Division
		:	(ii) Md. Shafiqul Hasan, SSO. Jute Farming System Research Division
vi.	Name of the applying organization with address	:	Bangladesh Jute Research Institute (BJRI), Manikmia Avenue, Dhaka-1207.
vii.	Name of associate/collaborating organization (s)	:	Not applicable
viii.	Project duration (months)	:	37 months; 25th August/2013 to 30th September /2016
ix.	Project commencement date (As per MoU)	:	25.08.2013
x.	Project Locations/Sites with name	:	Barisal (Wazirpur and Babuganj) and Patuakhali (Kalapara and Patuakhali Sadar). Two upazilla /year will be brought under research activities).
xi.	Project size (no. of participatory farmers/land areas (ha) included in project activities per site)	:	100 farmers/year (50 farmers/location /year) each with 15 decimal land (in an average) i.e. 1500 decimals of land i.e. 6 ha/year (3 ha/location/year) for research activities in jute seed production season. Same amount of land (3ha/location/year) will be taken for conducting jute fibre production experiments.
xii.	Project cost (total)	:	TK 67.30 Lakh (Year-1: TK 2417.4 thousand, Year-2: TK 2051.4 thousand, Year-3: TK 2261.2 thousand)
xiii.	Fund status	:	Fund received in Tk. 65, 19,588.00 & expenditure made in TK. 65, 00,290.39 (99.71 %) during the reporting period.

B. Summary/Executive Summary:

Jute is the main cash crop of Bangladesh. She needs about 5500 to 6000 M. tons of jute seeds to produce fibre at 7.00 to 7.50 lac ha of land. But there prevails many problems and constraints in jute sector, such as lower acreage yield, shortage of HYV jute seeds, lower yield and shelf life of the produced seeds, intrusion of low quality jute seeds from other countries at a cheap price, lack of knowledge about modern method and technique in cultivation of jute fibre and seed etc. and other incidental information at farmers' level. Bangladesh Jute Research Institute has already developed different technologies to cope up with the problem. Hence, to overcome the problems the project "Validation and up scaling of off-season jute seed production Technologies in different jute growing areas of Bangladesh ", has been undertaken to (i) validate and up-scale the off-season jute seed advanced technologies at farm levels, (ii) increase quality seed and fibre production and thereby increase farmers income and (iii) improve knowledge and skill of farmers and related personnel for quality seed and fibre production. The project has total approved budget Taka_67, 30,000.00 among which so far 65, 19,588.00 has been released and 65, 00,290.39 (99.70 %) taka has been expensed. Four locations Kalapara and Wazirpur in first year and in second and third year Patuakhali Sadar and Babuganj were selected for conducting project activities. At the onset a survey programme was conducted with 200 participating farmers among which 100 was of Patuakhali and 100 of Barisal district. It was found that twelve percent (12%) farmer of Patuakhali and 48% farmer of Barisal cultivate jute fibre for their self use. No farmer cultivates jute seed in both the location. Six batches farmers' training containing 50 farmers in each batch and six batches Sub-Assistant Agriculture and equivalent Officers' training containing 40 participants in each batch and twelve field days comprising 100 farmers in each field day were conducted @ 4 field days/year in two location and in two cropping like Kharif-1 and Rabi season. Two workshop-inception and closing workshop were conducted at Patuakhali and Barisal. Hundred farmers with in total 1500 decimals of land were selected in each year for jute seed production with winter vegetables. Five winter vegetables like red amaranthus, radish, turnip, brinjal and tomato were intercropped with jute seed production in different combinations. The soil salinity status of farmers' plots was measured and it was 1.29 -5.71 dS/m, 0.63 to 9.42 dS/m, 0.74 -1.62 and 0.69 to 5.92 dS/m at Kalapara, Patuakhali Sadar, Wazirpur and Babuganj, respectively indicating the soil was non saline to moderately saline soil. Jute seed production was damaged in soil of salinity having $\geq$ 8 dS/m. Three tossa jute varieties O-795, O-72 and O-9897 were considered for seed production in all the 4 locations. The varietal performance, best seed production method, yield and economics of jute seeds production with winter vegetables, performance of farmers produced jute seeds obtaining from intercropping with winter vegetables were evaluated at the aforesaid four locations at farm level of southern areas of Bangladesh. Three deshi jute varieties CVL-1, BJC-2197 and CVE-3 along with tossa jute varieties were also tested at Kalapara and Patuakhali Sadar Upazilla for fibre production. The tossa jute varieties were found produceable for seed production with winter vegetables in all the location as its yield, income and seed quality were good. The intercropping system was more profitable than sole crop system in case of jute seed production. Jute seed production with winter vegetables was found always remunerative especially when Tomato is intercropped in seed production system and when the crops are grown in 40 cm apart line. The highest benefit was recorded from the practice of two line jute then two line Tomato and red amaranthus in between two crop line and radish in border as this inter cropping system exerted the BCR, 2-73-3.13 in the three year research period. The highest seed production in this system was 1.75 kg/decimal i.e. 434kg/ha sowing on 30th September. Intercropping of turnip instead of tomato was the 2nd choice of farmers in jute seed production. The seed quality of the farmers produced seeds were germination $\geq$88.5%, 1000 seed weight $\geq$2.00 g and vigour $\geq$70.15. The Kalapara and Sadar Upazilla of Patuakhali were found better than that of Wazirpur and Babuganj for producing jute seeds in late season (up to mid October) and the variety O-795 was found promising for producing seeds in all the location whether cultivating as single or in combination with winter vegetables. Least income was always achieved in sole jute seed production and its BCR was 0.35-0.61. In case of fibre production all the deshi jute variety CVL-1, BJC-2197 and CVE-3 was found suitable at Kalapara and Patuakhali Sadar in broadcast method and the yield was 2.59 to 2.73 t/ha and at

line sowing it was 2.34 to 2.55 t/ha. Tossa jute varieties O-72, O-9897 and O-795 were found to perform well in all the location in any sowing method but at Kalapara line sowing of tossa jute varieties were found better. Somewhat increased yield 2.68 to 9.92 % at Babuganj and Wazirpur over Kalapara and Patuakhali Sadar depending upon variety and sowing method was found. The yield of the varieties at Babuganj and Wazirpur were 2.46 to 2.78 t/ha in broadcast method and in line sowing it was 2.68 to 2.92 t/ha. The variety O-9897 performed better in both the location and its highest fibre yield was 2.92 t/ha and 2.83 t/ha at Wazirpur and Babuganj, respectively. The use of farmers' self produced tossa jute seed recorded more or less similar performance with BJRI supplied seeds as it exerted yield reduction, 0 to 4.56% at Patuakhali Sadar over farmers' seed. But at Babuganj the fibre yield was somewhat increased 0.77 to 13.28 % with farmers' sedds. In grand total 51.30 ton of jute fibre was produced from 19.85 ha of land.

C. Introduction

Jute (*Corchorus spp*.), the second most important natural fibre crop of Bangladesh, is the main cash crop and has a great influence on socio-economic condition of the farmers. In Bangladesh jute is mainly grown for fibre rather than seed. In 2011-2012, 145.2 lakh bales of jute was produced from 7.6 lakh hectares of land which covered 8.92% of the total cropped area and 5.56% of the net cropped area (BBS, 2012). In Bangladesh exporting of raw jute and jute goods accounts of about 4.82% of the foreign exchange earnings (Bangladesh Bank, 2013). Bangladesh needs about 5500 – 6000 M. Tons of jute seed for its cultivation of jute among which only 12% to 15% is produced and supplied by Bangladesh Agricultural Development Corporation. Rest of the jute seed is produced or managed through importing by expending our valuable foreign currencies.

Jute, as a bast fibre quality seed and quality fibre cannot be obtained from the same plant. Some earlier evidence indicates that sowing of jute seed in the autumn (August- September) provides excellent seed yield (Hossain *et al*., 1994b; Hussain *et al*., 1995; Khan *et al*., 1997). Bangladesh Jute Research Institute (BJRI) is also advocating for switching over of planting time of jute seed crop from March-April to August - September. But at the sowing season the farmers are also facing different problems in jute seed production like scarcity of high land, because of high rainfall sometimes sowing are impossible for absent of dry land. Moreover, low seed yield per unit area, lower availability of jute seeds in sowing season, lower seed quality of the available seeds, high cost of production but poor return as compared to other competing cereal crops and the farmers are less interested in jute seeds production and thus they avoid/discard/reject jute seeds production process.

Recently, the demand of jute has increased due to increasing awareness that synthetic fibre creates a lot of natural hazard or environmental pollution and launching the mandatory packaging act by the government for using jute in packaging the goods. Now it is the need of time to increase the production of jute fibre in Bangladesh. The main problem for increasing jute cultivation in Bangladesh is the unavailability of quality seed at the proper time of sowing (Sarker, 2014). High quality seed is a prerequisite for higher yield of any crop as quality seed of a good variety itself provides about 20% additional yields (Hossain *et al*., 1994b). Unless the seed has ample viability, vigour and yield potential, the use of other inputs and technology for crop production is meaningless. So, adequate amount of quality seeds are necessary for producing jute fibre.

In most of the time, the farmers depend on poor quality market seed or smuggled seeds of outside of the country. These seeds are not of good quality and characterized with branching habit in early sowing and lower fibre strength. Hence, local production of quality jute seed is very much essential. To cope up with the problems, Bangladesh Jute Research Institute has developed various modern jute varieties along with different production technologies some which are very much cost effective and quality seed producible such as jute seed production with winter vegetables. Different production methods viz. direct seeding,

seedling transplanting and top cutting are also developed by the institute. But the farmers are not aware of the developed technologies. In recent studies, the research results reveals that the quality of the jute seeds produced from the southern areas are better than those of northern areas especially in late season (Alim *et al*., 2013). So, the present project work has been undertaken to investigate extensively the production potential of off-season jute seed cultivation by different varieties with different production methods integrating jute seed production with winter vegetables at farm level, at the southern region under Bangladesh context.

D. Specific Project Objective(s): (As per FRP/PIR)

(a) To validate and upscale the off-season jute seed advanced technologies at farm levels and aware the seed farmers about production, preservation and distribution of jute seed in different jute growing areas of Bangladesh.

(b) To increase quality seed and fibre production and thereby increase farmers income

(c) To improve knowledge and skill of farmers and related personnel for quality seed and fibre production.

E. Detailed Technical Report:

a. Statement of the reserachable problem

Bangladesh Jute Research Institute (BJRI) is working relentlessly from its very establishment in 1951 on jute and allieds seed production and they have so far successfully improved/developed a good number of varieties of seeds of both ***capsularis*** and ***olitorius.*** BJRI's **O-9897 and CVL-1** HYV seed is found to be very successful in production and its marketing at farmers' level.

Bangladesh has now around 7.00-7.50 lakh hectares (18-20 lakh acres) of land left for jute cultivation and it needs 5500-6000 MT jute seeds. Out of this, Bangladesh Agriculture Development Corporation (BADC) supplies 500-600 MT of HYV jute seeds. Besides, the listed growers of an on-going project of the "Directorate of Jute" produce about 150-200 MT of HYV jute seeds. In this way it can supply about 14-15% of the total demand of jute seeds and remaining demands are met from growers' own production and uncertified imported seeds especially of tossa jute seeds.

The seeds coming from other countries are said to be responsible for deterioration of fibre qualities and consequently in the quality of jute goods manufactured by the jute industry. In a survey study conducted by Bangladesh Jute Mills Corporation (BJMC) and Bangladesh Jute Spinners Association (BJSA), it has been observed that the Indian jute fibre is coarse, weak, and poor in quality and the jute sticks are soft. The jute fibres produced by the local jute seeds are much better than the fibre produced from foreign seeds. To increase supply of good quality jute fibre which has drastically reduced during the last years and save the country's jute industry from the unwanted critical situation, it has been strongly recommended to go for free distribution of quality seeds of high quality fibre among the jute growers for the next few years.

In the Jute Policy of the Government (2002), 11 problems and constraints have been identified in raw jute sector, some of which are reproduced below:

i. Production per acre is low;
ii. Lack of knowledge about modern jute retting technology;
iii. Shortage or scarcity of HYV jute seeds;
iv. Intrusion of low quality jute seeds from other countries at a cheaper price;
v. Lack of knowledge about modern method and technique in cultivation of jute;
vi. Lack of knowledge about grading of jute among the growers;
vii. Lack of dissemination of information relating to market price and other incidental information at farmers' level.

In the strategy for implementation of the jute policy it has been said that the existing programme for ensuring supply of HYV jute seeds in sufficient quantities should be strengthened and extended. The Programme for production of high quality jute, increase of per acre yield, reduction of production cost and extension of the same to the rest of the jute growing areas of the country should be continued gradually.

It may be mentioned here that HYV jute seeds lose their viability after 3/4 years. As a result, with a view to delivering the good quality pure HYV jute seeds to the farmers continuously, it needs to implement a project on setting up production system of HYV jute seeds. Besides, BJRI is working tirelessly for development of new varieties of HYV jute seeds which needs to be transferred to farmers through a special project.

b. Research Approaches and Methodologies: [The approaches and methodologies used or research work to overcome the stated problem during the reporting period should be briefly described]

i) Approaches: [Make clear statement on the ways/steps followed as well as institutional arrangements made for the implementation of the project, such as, collaborative/participatory/on-station/on-farm/lab. etc. along with institutional support and supervision.]

The jute varieties have been grown on farmer's field through adaptive research program by BJRI scientists and with co-operation of Department of Agriculture Extension (DAE) at field level of the project site Wazirpur and Babuganj Upazilla of Barisal district and Kalapara and Sadar Upazilla of Patuakhali district. Quality seeds (Breeder seed) of jute varieties have been used in trial. Use of quality seed, tillage operation required, proper fertilizer application plant population stand, plant protection measures, proper time and method of harvest, drying and storing of seed have been ensured to minimize yield loss and quality seed production. Both the production knowledge and the inputs required have been supplied free of cost to the growers prior to crop production and followed production procedure step by step during the whole cropping period for optimum crop stand to achieve maximum levels of outputs of the used technologies including varietal yield at farmer's field. With a vision to verify the package of production technologies of Off-season jute seed production, the farmer's co-operations have been sought for trial in each of the four upazilla of the selected districts (Barisal and Patuakhali). The technologies have been adaptively-tested and demonstrated in large-blocks (50 farmers /location/ year). Each farmer has demonstrated 08 to 30 decimals in an average 15

decimals of land for jute depending upon land availability and experimental need and volume. After completion of three years research activities farmers are capable to produce jute seeds by themselves involving the modern technologies.

ii) **Methodologies**: [Give stepwise clear statement on the research activities (experiments/studies) undertaken along with materials and methods used and the statistical tools applied for the implementation of the project.

a. Methods

(i) **Site and farmers selection**: Two experimental locations - Barisal and Patuakhali with four Upazilla (Wazirpur and Babuganj of Barisal and Kalapara and Patuakhali Sadar of Patuakhali district) and 50 participating farmers/upazilla/year has been selected in three year of project period.

(ii) **Adaptive trials:**

The experiments to accomplish the current year project activities were: (a.) Varietal performance evaluation of Olitorius jute for seed production with winter vegetables (**b**.) Performance evaluation of tossa jute cultivars for seed production at Barisal and Patuakhali. (c.) Validation of off season jute seed production techniques with winter vegetables. (d) Establishment adaptive trial of deshi and tossa jute varieties for jute fibre production at farmers' level. (e) Performance of farmers' self produced tossa jute seed for fibre production at field level in Patuakhali and Barisal. In total 100 farmers (50 per location)/year/crop have been selected with the plot size about 8 - 30 decimals in an average of 15 decimals among which 94 farmers cultivate the jute cultivars O-9897, O-72 and O-795 for seed production and 6 farmers/location cultivate the deshi jute variety CVL-1, BJC-2197 and CVE-3 for fibre production at Kalapara and Sadar Upazilla of Patuakhali. Randomized Complete Block Design (RCBD) has been followed with 6 to 44 replications in each experiment with availability of land and interested farmers. Farmers have been provided seeds and necessary amounts of fertilizers and pesticides. Standard agronomic practices have been followed with direct supervision of BJRI scientists and related project personnel. Data have been recorded and analyzed for analysis of variance (ANOVA).

C. Results and Benefits:

(i): List objective-wise activities clearly, resulting in specific output(s)-

Specific objective(s)	Planned activities to be performed to achieve the specific objective	Activities performed for accomplishing the objectives
1. To up-scale the off-season jute seed advanced technologies at farm levels and aware the seed farmers about production, preservation and distribution of jute seed in different jute growing areas of Bangladesh.	1.1. Selection of tossa jute varieties. 1.2. Front line demonstration of jute seed production techniques. 1.3. Adaptive trial of jute seed production techniques. 1.4. Post harvest processing and quality control approaches for jute seed crop.	1.1 Three tossa jute varieties e.g. O-9897, O-72 and O-795 were selected for experimentation 1.2 Modern jute variety, jute production technique with winter vegetables were evaluated in front line demonstration 1.3 At each location in an average eight adaptive trials for varietal performance, six trials for evaluation of production methods and 36 trials for jute seed production with winter vegetables were conducted. 1.4 The produced seeds were tested for germination, 1000 seed weight and seed vigour and stored in plastic drum/pot supplied from the project.
2. To produce enough HYV jute seeds and jute fibre and thereby increase farmers income.	2.1. Varietal performance evaluation of tossa jute for seed production with winter vegetables at farmers' level. 2.2. Performance evaluation of jute seed production methods at farmers' level. 2.3. Establishment of inter-cropping/mixed cropping with jute seed crop with winter vegetables. 2.4 Establishment adaptive trial of deshi and tossa jute varieties for jute fibre production at farmers' level. 2.5. Performance evaluation adaptive trial of farmers self produced tossa jute seeds at field level.	
3. To impart training to the farmers and field level concerned persons on improved method and technique of cultivation of HYV truthfully labeled jute seeds.	3.1. Conduct training programme of farmers and other related personnel on advanced technologies for jute seed production 3.2 Conducting field days	3.1 Three hundred (300) farmers in six batches (50 participants/batch) and 240 Sub Assistant Agriculture and equivalent Officers' have been trained (40 participants/training) in six batches on improved methods an techniques of cultivation of HYV jute seeds and jute fibre. 3.2 Twelve field days comprising 1200 farmers (100 farmers/field day) were conducted for visualizing the applied technological output for jute seed production with winter vegetables and varietal performance for fibre production at field level.

The research experiments conducted under the objectives 2 were as follows:

2.1 Varietal performance evaluation of tossa jute for seed production with winter vegetables at farmers' level.

Background and objectives: Annually Bangladesh needs about 6000 metric tons of jute seed for its cultivation of 7.50 Lakh ha of land and which only 12% to 15% is produced and supplied by Bangladesh Agricultural Development Corporation (Salim *et al*., 1998). Rest of the jute seed is solely produced or managed/imported and utilized by the farmers themselves. No separate seed crop is grown where the principles and practices of seed production could be attained. Generally jute seed produced in traditional method where seeds are sown in the month of March-April. Some earlier evidence indicates that sowing of jute seed in the autumn (August-September) provides excellent seed yield (Hossain *et al*., 1994b; Hussain *et al*., 1995; Khan *et al*., 1997). It further indicates that one of the devices to increase seed yield is to check vegetative growth of jute plant by late seeding (Choudhury and Ali, 1962). There is also evidence that jute

seed can be sown in the month of December for producing seeds of the following season (Mian and Gani, 1971).

For higher yield and seed quality late jute seed production technique is introduced by Bangladesh Jute Research Institute (BJRI) but this crop are facing immense competition with winter crops in terms of sharing lands and relative profitability. Besides, the country faces acute shortage of winter crops viz., pulses, oil seeds, spices and vegetables and farmers are very much reluctant to spare of their limited land resources for separate jute seed crop for its high cost of production, poor return and low seed yield as compared to other competing crops (Hussain *et al*., 1995). BJRI has also developed a number of jute varieties which are not familiar enough to the farmers' level except O-98907. Farmers were interviewed about the performance of BJRI jute varieties and they stated as the BJRI varieties performed better in fibre production and they are motivated to cultivate BJRI jute varieties (Rahmman *et al.*, 2012). Haque (1995) carried out experiments with a view to see the varietal suitability on seed production under late planting technique. The author reported that there were significant variations in seed yield among different varieties of jute sown as late seed crop.

In the present agro-economic situation late jute seed crop needs to be fitted into suitable cropping system to make it feasible and economically viable to the farmers. Inter crop practice is an important means of increasing vertical productivity. Higher economic return through intercrop practices of jute seed crop with some other crops was also reported previously (Hossain *et al.*, 1984 and Islam *et al*., 1992). Evidences indicate that seed yield of jute affected substantially in different regions of Bangladesh especially sown in late condition (Alim, 2013). Significant variations in seed yield among different varieties of jute sown as late seed crop is observed (Haque, 1995). In this regard, late jute seed crop in the form of inter crop was undertaken to find out the best variety which will perform well with winter vegetables viz. radish, red amaranthus, tomato, brinjal for seed production in the southern region of Bangladesh.

Materials and methods:

Location: 4 (Wazirpur and Babuganj Upazilla of Barisal and Kalapara and Sadar Upazilla of Patuakhali district).

Area cultivated per farmer: In an average 10.0 decimals at Kalapara, 13.67 decimals at Sadar Upazilla of Patuakhali and 11.4 decimals at Wazirpur and 13.0 decimals at Babuganj Upazilla of Barisal.

Design: RCBD
Treatment: 3 (Three jute variety: O-9897, O-72 and O- 795) and winter vegetables: 3 (Red Amaranthus, Turnip and Tomato.

Methods of crop sowing/transplanting: The land of a farmer was divided into three subplots (3-5 decimals) for three jute variety. Jute seeds were sown at 40 cm apart line leaving after 15 cm at border of the plots and after two line jute two line vacant space (@ 40 cm apart line) were kept for turnip transplantation. Red amaranthus were sown in between of jute lines i.e. at the vacant space of turnip at 20 cm apart line. After harvest of red amaranthus turnip was transplanted in two lines at its place and Tomato were transplanted at the border of each plots of every variety.

Replication: 8 (no. of disperse farmers/location) (Appendix Table 1, 2, 3 and 4).

Date of sowing: 12.09.2013 to 30.10.2013 (Table 3)

Soil salinity: The soil salinity of the experimental plots (farmers plot) were determined and presented in the Table 1.

Fertilizer application: Urea, TSP, MOP, Gypsum, Zinc sulphate (monohydrate) and Solubor were used as per recommended dose and methods for seed production.

Intercultural operations: Weeding (3 times), thinning (2 times), drainage (1 time), irrigation (2 times) and gap filling (one time) were done in due time if necessary.

Table 1: Variety, seed rate, date of sowing and harvest of jute seed production with winter vegetables

SL	Location	Land (Decimals)	Salinity (dS/m)	Jute variety	Seed rate (/decimal)	Date of sowing/ Planting	Date of harvest
01	Kalapara (Patuakhali)	82	1.29 -5.71	O-9897 O-72 O-795	Jute -15 g Red A.-50 g Turnip (Seedling)-240 Nos. Tomato (Seedling)-120 Nos.	15.09.13 - 30.10.13 Turnip: 17.11.13 – 09.12.13	Jute seed: 11.01.14 - 23.02.14 Vegetables: R A.: 15.10.13-15.11.14 Tur : 07.01.13-30.01.14 T : 20.10.13-10.02.14
02	Wazirpur (Barisal)	78	0.74 -1.62	O-9897 O-72 O-795			
03	Sadar Upazilla, Patuakhali	82	0.65 -3.76	O-9897 O-72 O-795	Jute -15 g Red A.-50 g Turnip (Seedling)-240 Nos. Tomato (Seedling)-120 Nos.	12.09.14 - 28.10.14 Turnip: 10.11.14 – 01.12.14	Jute seed: 10.01.15 - 27.01.15 Vegetables: R A.: 05.10.14-10.11.14 Tur : 22.12.14-30.01.14 T : 18.10.14-28.02.15
04	Babuganj Upazilla, Barisal	78	0.84 -1.67	O-9897 O-72 O-795			
		160	Tomato one seedling/hill ; R.A.= Red Amaranthus; T= Tomato				
R.A=Red amaranthus, Tur=Turnip, T.=Tomato, Jute and Red amaranthus were direct seeding and tomato and turnip seedling were (0-2 dS/m= non saline, 2-4 dS/m= very slightly saline, 4-8 dS/m slightly saline and 8-15 dS/m moderately saline soil)							

Determination of seed quality attributes:

Seed moisture content:

Seed moisture was tested following the oven dry method. About 2 grams of seeds of each plot were taken and kept in the oven for 24 hours at 100 o C. The ratio between the loss of seed weight and the original weight were found out and multiplied by 100 to estimate seed moisture content.

1000 seed weight:

One thousand seeds of jute were randomly counted from each treatment/variety and weighed in an electric balance (Model-PC-180). Thus 1000 seed weight were determined for two years.

Germination:

One hundred seeds with four replications were evenly distributed on the top of four filter papers placed in four glass petri-dishes. The seeds and filter papers were kept moist throughout the test period by adding distilled water. Seeds germinated were counted and recorded daily till fifth day. A seed was considered to be germinated as seed coat ruptured

and radicle came out up to 0.2 cm or more length. Germination percentage was calculated using the following formula (Krishnasamy and Seshu, 1990).

$$\text{Germination (\%)} = \frac{\text{Number of seeds germinated}}{\text{Number of seeds tested}} \times 100$$

Seed vigour (speed of germination):

The vigour performances were conducted in the laboratory with same procedure as that of laboratory standard germination test. Vigour (Vigour value) was calculated by following the method of Jain and Saha (1971).

$$V = \frac{a}{1} + \frac{b}{2} + \frac{c}{3} + \ldots$$

Where, V = Vigour and a, b, c are the number of seeds that germinated after 1st, 2nd, and 3rd days from the start of germination test. The final count was made at the end of 5th day.

Results:

In seed yield performance evaluation test in southern areas shows that among the locations Sadar Upazilla Patuakhali out yielded the jute seed with all the varieties O-9897, O-72 and O-795 over all other locations (Table 2). The seed yield was 178.33, 160.66 and 191.50 kgha^{-1} with the variety O-9897, O-72 and O-795, respectively. At Kalapara the seed yield were 159.96, 136.52 and 167.40 kg ha^{-1} whereas it was 82.90, 68.14 and 88.07 kg ha^{-1} at Wazirpur, and 173.16, 158.50 and 183.16 kgha^{-1} at Babuganj, respectively. Significant seed yield difference was observed with the variety O-9897 and O-795 over O-72. The variety O-795 performed better in all the location at late season but it was insignificant to O-9897. Sole cropping of jute for seed production resulted higher seed yield but income were low. Among the varieties O-795 may be less photosensitive and more tolerant to cold that might have resulted higher seed yield (Khan *et al*., 1997). The findings was at par with Hussain *et al*., 1995 where they reported that intercropping of late jute seed crop with winter vegetables did not affected the growth and yield parameters of jute seed crop and also reported maximum income with the variety O-9897.

Table 2: Yield of jute seed and component crops (winter vegetables) in different location

SL	Location	Jute variety	Red Ama. (kg/ha)	Turnip (kg/ha)	Tomato (kg/ha)	Jute seed (kg/ha)
01	Kalapara (Patuakhali)	O-9897	636.62 bc	603.38 ab	644.80 e	159.96 ab
		O-72	735.82 a	677.78 a	562.22 f	136.52 bc
		O-795	644.80 b	644.80 ab	587.02 ef	167.40 a
02	Wazirpur (Barisal)	O-9897	440.37 f	521.50 de	1460.19 ab	82.90 de
		O-72	498.32 e	614.21 bc	1529.72 a	68.14 e
		O-795	446.17 ef	533.08 d	1413.83 ab	88.07 d
03	Sadar Upazilla (Patuakhali)	O-9897	740.75 cd	621.50 bc	1440.00 ab	178.33 bc
		O-72	898.30 a	607.25 c	1429.50 ab	160.66 cd
		O-795	716.00 d	633.08 ab	1419.60 ab	191.50 a
04	Babuganj (Barisal)	O-9897	696.50 de	623.50 ab	1444.00 a	173.16 bc
		O-72	835.40 b	637.00 a	1392.25 bc	158.50 d
		O-795	674.80 de	625.00 ab	1427.00 ab	183.16 ab

Income from jute seed production was low. It ranged from Tk. 11583.80 to Tk. 28458.00. But including winter vegetables manifolds the income and reveals the practice remunerative (Table 3) as evident in its BCR 1.88-1.90, 1.95 -2.01, 1-9.1-1.95 and 1.97-2.06 at Kalapara, Patuakhali Sadar, Wazirpur and Babuganj, respectively.

Table 3: Income of jute cultivars growing with winter vegetables in different location

SL	Location	Jute variety	Gross return from jute seed (Tk/ha)	Gross Return of the practice (Tk/ha)	TVC (Tk/ha)	BCR
01	Kalapara (Patuakhali)	O-9897	25593.60	51731.92	27516.98 a	1.88 ab
		O-72	21843.20	51181.58	27516.98 a	1.86 ab
		O-795	26784.00	52282.26	27516.98 a	1.90 ab
02	Wazirpur (Barisal)	O-9897	13264.00	51756.00	26853.52 ab	1.93 ab
		O-72	10902.40	51421.70	26853.52 ab	1.91 ab
		O-795	14091.20	52273.20	26853.52 ab	1.95 a
03	Sadar Upazilla (Patuakhali)	O-9897	31207.75	55876.00 ab	27723.00 ab	2.02 ab
		O-72	28115.50	54301.70 ab	27553.00 ab	1.97 ab
		O-795	33512.50	57983.20 a	28153.00 ab	2.06 a
04	Babuganj (Barisal)	O-9897	30303.00	56891.92 ab	28596.00 ab	1.99 ab
		O-72	27737.50	54341.58 ab	27910.00 ab	1.95 ab
		O-795	32053.00	57572.26 ab	28619.00 a	2.01 ab
Jute seed Tk. 160/kg (2013), Tk. 170(2014) and Tk. 180 (2015)						

In quality attributes of jute seed there was no significant difference among the varieties (Table 4). The jute seed produced in four locations like Kalapara, Wazirpur, Patuakhali Sadar and Babuganj recorded germination with all the varieties ≥89.2%, 1000 seed weight ≥2.00 g and vigour ≥70.17 which indicates that quality seed was produced with winter vegetables in Off-season in all the location (Table 4). The seed quality in respect of 1000 seed weight, germination and vigour of the produced jute seeds of all the varieties of Patuakhali Sadar Upazilla was more qualitative than all other locations.

Table 4: Varietal variation of jute seed quality produced in Off-season with winter vegetables

Location	Variety	Seed moisture (%)	1000 seed weight (g)	Germination (%)	Vigour
Kalapara (Patuakhali)	O-9897	9.03	2.31	91.4 ab	88.56 a
	O-72	9.22	2.25	89.2 bc	82.18 b
	O-795	9.10	2.10	92.3 a	88.50 a
Wazirpur (Barisal)	O-9897	9.10	2.28	91.4 ab	81.00 bc
	O-72	9.37	2.20	90.8 bc	78.17 cd
	O-795	9.30	2.05	91.2 abc	79.50 bcd
Sadar Upazilla (Patuakhali)	O-9897	9.13	2.13	98.5 a	77.33 a
	O-72	9.25	2.15	90.4 ef	72.83 bc
	O-795	9.15	1.99	97.5 ab	76.33 ab
Babuganj (Barisal)	O-9897	9.20	2.08	97.6 ab	74.00 ab
	O-72	9.19	2.00	90.5 ef	70.15 cd
	O-795	9.36	2.08	97.3 ab	72.50 bc
Means within column followed by common /without letters are not significantly different at 5% level of DMRT					

Fig. 3: Jute variety O-795 in intercropping with turnip at Babuganj

Fig. 4: Jute variety O-9897 in intercropping with Brinjal at Babuganj

Fig. 5: Jute variety O-795 in intercropping with turnip at Patuakhali Sadar

Fig. 6: Jute variety O-9897 in intercropping with tomato at Patuakhali Sadar

2.2 Name of the experiment: Performance evaluation of jute seed production methods at farmers' level.

Background and objectives: Jute as a bast fibre crop quality seed and quality fibre cannot be obtained from the same plant. Besides, jute seed cultivated through conventional method (sowing at March-April) take very long period for harvest and produces less quality jute seeds. This seed crop covers two important cropping seasons (Jute/Aus-Aman) but return from the crop is not good enough. As a result, farmers do not want to produce jute seed by themselves. The result revealed that the quantity of seeds produced by top cutting was almost double than the quantity produced by uncut branches of mother plant (Rahman and Choudhury, 1978). Jute seed yield by this late sowing technology is 2-3 times higher than the conventional method (Begum *et al.* 1997).

There are several methods for production of jute seed such as direct seeding (line sowing, broadcasting), top cutting, seedling transplanting etc. But there are very few experiments regarding the effect of sowing/planting methods on jute seed yield & quality. For higher yield and better seed quality late jute seed sowing technology is of a great opportunity to meet the farmers demand. However, it faces a number of problems including lack of availability of suitable lands due to heavy rainfall which ultimately causes problem in land preparation and

also of seed germination and plant establishment. There also prevails excessive moisture in the field which causes serious weed problem. If there is heavy rainfall and no dry land for setting jute seed production programme through direct seed sowing then top cut method (slant cuttings of 9 inch long top of jute plants inserted to soil with 45^0 angle) can be used but if there is heavy rainfall and if there is no jute plant in farmers hand for top cut than another method of jute seed production i.e. seedling transplanting can be an effective alternative method for jute seed production. In these method seeds are sown in a small raised seed bed (if necessary polyethylene sheet cover is used for protecting seedlings damaging from heavy rainfall) and seedling of 30-40 days old are transplanted to farm land from seed bed. By the seedlings of one decimal of seed bed 60 decimals of land can be planted for jute seed production.

Off-season jute seed production with top cutting method is an effective technology to produce more jute seed than that of other methods (Sarker, 2014). The seedling transplanting, a promising another method of seed production exerts different effect on seed production in different location and recorded seed yield of 1523, 872 and 443 kg ha^{-1} at the Central Station, Dhaka and 476, 459 and 313 kg ha^{-1} at Rangpur Station of the Bangladesh Jute Research Institute when 40-day old seedling of jute were transplanted on 1, 15 and 30 September, respectively (Hossain and Iqbal, 1992). Hossain *et al*. (1994) suggested that jute seed should not be planted beyond the first week of September at Rangpur, mid September at Jessore and end of September at Faridpur, Manikgonj and Kishoregonj, and first week of October at Comilla regions of Bangladesh. In off-season the short photoperiod effect on different jute seed production method may vary particularly in southern areas of the country. Hence, to find out the suitable method for quality jute seed production in off-season at southern region of Bangladesh this research programme has been undertaken.

Materials and methods:

Jute varieties: The jute variety O-9897 and O-795

Location, salinity, Seed rate, land size, Sowing and Harvest time are sown in Table 5.

Table 5: Soil salinity, seed rate, variety and sowing and harvest time in seed production

Location	Soil Salinity (dS/m)	Seed Rate /decimal	Variety	Land Size (Decimal)	Sowing Date	Date of harvest
Sadar Upazilla (Patuakhali)	0.69 - 4.15	20 g seed in broad cast sowing, 15 g seed in line sowing, 935 pieces top cutting from 120 days old mother plant and 935nos. seedling of 30 days old	O-9897, O-795	82	02-09-14 - 22-09-14	03.01.15 - 18.01.15
Babuganj (Barisal)	1.30 - 5.92		O-9897, O-795	72	07-09-14 - 29-09-14	03.01.15 - 26.01.15
2 dS/m= non saline, 2-4 dS/m= very slightly saline, 4-8 dS/m slightly saline and 8-15 dS/m moderately saline soil)						

Design: RCBD

Treatment: 4; the production methods are termed as treatment and the methods were-

(i) Broadcasting (ii) Line sowing, (iii) Top Cutting and (iv) Seedling transplanting

Replication: 6 (no. of disperse farmers/location) (Appendix Table 1 and 2).

Fertilizer application: Urea, TSP, MOP, Gypsum, Zinc sulphate (monohydrate) and Solubor were used as per recommended dose and methods for seed production.

Intercultural operations: Weeding (3 times), thinning (1 time), drainage (1 time), irrigation (2 times) and gap filling (one time) were done as and when necessary.

Results:

Different sowing methods exerted significant different effect on yield and yield attributes of jute seeds production. Highest reading of all the yield contributing characters like plant heights, no. of branch per plant, no. of pod per plant, no. of seeds per pod except plant population were recorded with line sowing method in both the variety and location (Table 6). Highest plant population was recorded with broadcast method. The performance order of the method was seedling transplanting > top cutting > Broadcast > Line sowing method. The highest plant population was counted in broadcast method and the lowest was in seedling transplanting method. The highest plant population in broadcast method may be due to closer placement of seeds and as such closer spacing of the plants, it was possible to accommodate higher number of plants m^{-2} than the row spacing (line sowing) in other methods. In seedling transplanting method lower population may be due to lower survival of seedlings after transplanting as farmers are not enough experienced with this method. Similar trend of results were also stated by Khan *et al*., 2009 and Sarker (2014).

Table 6: Off-season jute seed production as influenced by different production methods

Production Method	Plant population (L/ha)	Plant height (m)	No. of branch / plant	No. of pod / plant	No. of seed /pod	Seed Yield (Kg/ha)
Broad casting	1.48 a	1.07	2.48	9.08 b	156.50 b	140.80 b
Line sowing	1.29 b	1.23	3.30	21.38 a	164.70 a	175.70 a
Top Cutting	0.81 c	1.2	2.45	12.74 b	159.00 b	98.67 c
Seedling transplanting	0.51 d	0.91	2.51	08.59 b	157.50 b	61.81 d
Means within column followed by common letters are not significantly different at 5% level of DMRT						

At Sadar Upazilla (Patuakhali) and the variety O-795 recorded the highest seed yield (190.50 kg/ha) of jute than Babuganj Upazilla and the variety O-9897 (161.83) in all the methods (Table 7). The line sowing method recorded significant yield increase among other methods in both the location at late season following broad casting, top cutting and seedling transplanting method at farm level of Patuakhali and Babuganj.

Table 7: Interaction effect of location, variety and method on jute seed production

Location	Variety	Production Method	Plant population (L/ha)	Plant height (m)	No. of branch / plant	No. of pod / plant	No. of seed /pod	Seed Yield (Kg/ha)
Sadar Upazilla (Patuakhali)	O-9897	Broad casting	1.49 b	1.07	2.50	10.22 bcde	138.0 ef	145.33 f
		Line sowing	1.20 e	1.21	3.30	25.97 a	146.5 ab	183.33 b
		Top Cutting	0.73 i	1.26	2.11	10.36 bcde	140.0 cde	91.00 i
		Seedling transplanting	0.55 k	0.91	2.94	08.85 de	138.3 def	62.00 k
	O-795	Broad casting	1.54 a	1.17	2.60	10.11 bcde	137.0 efg	156.00 e
		Line sowing	1.35 d	1.28	3.20	25.07 a	140.8 cde	190.50 a
		Top Cutting	0.87 g	1.32	2.13	10.50 bcde	142.0 cd	100.00 h
		Seedling transplanting	0.52 l	1.50	2.98	09.55 cde	148.0 a	75.00 j
Babuganj (Barisal)	O-9897	Broad casting	1.44 c	1.00	2.40	08.50 de	137.0 efg	130.50 g
		Line sowing	1.19 ef	1.20	3.30	17.00 bc	143.3 bc	161.83 d
		Top Cutting	0.72 j	1.21	2.79	15.50 bcd	139.4 de	100.33 h
		Seedling transplanting	0.51 m	0.79	2.08	08.20 de	130.9 i	56.55 l
	O-795	Broad casting	1.48 b	1.02	2.42	07.50 e	134.0 ghi	131.33 g
		Line sowing	1.19 f	1.23	3.40	17.47 b	148.3 a	167.33 c
		Top Cutting	0.75 h	1.26	2.77	14.62 bcde	135.4 fgh	103.33 h
		Seedling transplanting	0.48 n	0.82	2.01	07.23 e	132.9 hi	53.67 l
Means within column followed by common letters are not significantly different at 5% level of DMRT								

The Patuakhali is closer to the Bay of Bengal than Barisal and there may exists higher temperature than Barisal at very much late sowing condition (September to October) and the variety O-795 may be more cold tolerant than O-9897 which might induced higher yield at Patuakhali with the variety O-795. Good performance for cutting method require moist condition and in late condition the environment was dry, cutting survival was low and in both cutting and seedling transplanting method it required higher time for plant establishment than broadcast and line sowing of direct seeding. In line sowing method it allowed more aeration and sunlight to plants than broad cast method. Early/ initial plant establishment with better environment resulted higher growth of jute plants in line sowing method as evidenced in this experiment and the ultimate outcome was higher seed yield. Insufficient vegetative growth resulted short stature of plant which was responsible for the less number of branches plant^{-1}, pods plant^{-1} and seeds pod^{-1} which ultimately reduced seed yield. Battacharjee *et al*. (2000) and *Alam et al*. (2009a) opined that jute seed yield primarily depends on the number of pods bearing branches plant-1 and other yield contributing characters of the crop.

All the methods and varieties (O-9897 and O-795) produced good quality seeds in both the location as it recorded germination 90.5-99.0%, 1000 seed weight 2.0-2.27 g, vigour 70.33-80.33 (Table 8) as it meet well above the standard. It may be mentioned that the minimum standard of germination percent fixed by the National Seed Board is 80%. The highest germination, 1000

seed weight and vigour were recorded with cutting method with both the variety in both the location. The germination and the seed vigour were more or less similar to other methods except cutting method. But the lowest 1000 seed weight was recorded with line sowing method which may be due to growth dilution effect. It might have been due to the insufficient vegetative growth of the plant. These results were also supported by the findings of Ali (2008) and More *et al.* (2005).Yang *et al.* (2009) reported that use of balanced fertilizer improved the accumulation of seed dry matter in early stages of seed development and substance transport from pod wall to seed in later stages.

Table 8: Off-season jute seed quality as influenced by different production methods

Location	Variety	Production method	Seed moisture (%)	1000 seed weight (g)	Germination (%)	Vigour
Sadar Upazilla (Patuakhali)	O-9897	Broad casting	9.13	2.15	90.5 h	70.33 ab
		Line sowing	9.25	2.10	97.5 ab	72.33 cd
		Top Cutting	9.20	2.23	99.0 a	80.33 a
		Seedling transplanting	9.15	2.09	97.5 b	76.33 ab
	O-795	Broad casting	9.11	2.19	90.00	72.83
		Line sowing	9.18	2.11	98.50	76.33
		Top Cutting	9.19	2.21	99.00	81.00
		Seedling transplanting	9.16	2.25	96.50	79.33
Babuganj (Barisal)	O-9897	Broad casting	9.17	2.17	88.50	68.83
		Line sowing	9.22	2.14	96.00	74.00
		Top Cutting	9.17	2.27	98.50	80.33
		Seedling transplanting	9.14	2.22	98.00	79.33
	O-795	Broad casting	9.20	2.13	90.5 h	73.50 bc
		Line sowing	9.19	2.00	96.5 bc	70.33 cd
		Top Cutting	9.17	2.20	98.5 ab	79.83 ab
		Seedling transplanting	9.18	2.16	95.3 cd	72.50 cd
Means within column followed by common /without letters are not significantly different at 5% level of DMRT						

Fig. 7: Jute seed production in broadcast sowing at Patuakhali

Fig. 8: Jute seed production in line sowing at Patuakhali

Fig.9: Top/stem cutting method of jute seed production at Patuakhali

Fig. 10: Jute seed production in seedling transplanting method at Patuakhali

2.3 Name of the experiment: Establishment of inter-cropping/mixed cropping with jute seed crop with winter vegetables.

Background and objectives: In southern areas the land suitable for crop production is estimated to be a little over 9 million hectares. With the growth in population and other infrastructure development, the cropped areas have been steadily declining. To ensure food

and nutrition for the ever increasing population and sustaining agricultural growth emphasizing and stimulating crop diversification are the key strategies to be pursued in future. Recent researches suggest good quality jute seeds may be produced in southern region in late sown condition and which would be a new crop of the area and will increase cropping intensity as well as farmers' income. For jute production Bangladesh requires an annual jute seed crop of about 25,000 ha of land for the production of 6000 M. tons of jute seed to be sown for fibre production in about 7.5 lakh ha of land. Availability of HYV jute seeds is an important aspect to fulfill the national objectives of producing more jute in reduced area to release more land for food crops. High quality seed is the key to successful agriculture and often jute production hampered mainly lack of quality seed. Jute seed production at farm level on full cost basis is a losing concern and occurred due to lower price of seed (Uddin *et al*., 2012). Late jute seed production technology has been advocated seriously in the recent years to face the seed demand. Due to unavailability of quality seed at sowing period, low quality jute seeds come from neighbouring country and control the local market. Farmers of our country are also habituated to buy this low quality seed and sometime they face the crop failure (Rahman *et al*., 2012).

Now a day's farmers are always shaping her farming practices for more economically viable and locally feasible cropping system instead of traditional cropping so that it can give more production vis-a-vis profit to him. Farmers are very much reluctant to produce jute seed by sacrificing their land at the cost of rabi crops as these crops are much payable then jute seed crop. Late jute seed crop is normally grown from mid August to mid September and harvested at the 1st week of January. As a result the crop cannot be fitted in any pattern with rabi crops (Alam *et al*., 2011). In this method as direct seeding or seedling transplanting rabi crops can easily be produced with jute seed crop as inter crops.

Research findings suggest that late jute seed and winter crops can be grown simultaneously as intercropping (Alim *et al*., 2012). Intercropping implies growing two or more crops in the same area in rows of definite geometrical pattern. It reduces the risk of dependence upon a single crop. Intercropping has the opportunity to increase the productivity of arable land. It can reduce the adverse effect of diseases, insects and weeds, provide higher return and protect soil against erosion. These merits of intercropping have been maintained by (1) additional income from the companion crop (2) insurance against the failure of the main crop and (3) quick growing companion crops tend to suppress weed. The need for identification of suitable genotypes in mixed or intercropping has been indicated as to select genotypes of better compatibility for higher productivity and greater returns (Sobhan, 1983). But no agronomic information on the intercropping practice of these crops with jute seed in rabi season especially in southern region is available. So, for maximizing the land utilization and return from intercropping system, and to find out the best inter-crop combination of jute and winter vegetables which will produce quality jute seed and will offer more profit to farmers, this experiment has been undertaken in southern areas under Bangladesh context.

Materials and methods:

Location, Variety, Replication (no. of disperse farmer), Area per famer, Seed rate, Date of sowing and Date of harvest: Is sown in Table 9.

Production method: Line sowing method

Table 9: Variety, seed rate, date of sowing and harvest of jute seed production with winter vegetables

SL	Location	Year of conduction	Replication/ no. of farmers	Area (decimal)/ farmer	Salinity (dS/m)	Jute variety	Seed rate (/decimal)	Date of sowing/ Planting	Date of harvest
01	Kalapara Upazilla	2013	30	13.30	0.63 - 8.78	O-795	Jute -15 g Red A.-50 g Turnip (Seedling)-240 Nos. Tomato (Seedling)-120 Nos. Brinjal (Seedling)-120 Nos.	17.09.13 - 22.10.13 Turnip: 20.11.13 – 02.12.13	Jute seed: 01.02.14 - 21.02.14 Vegetables: R.A.= 21.11.13-30.11.13 Tur = 01.01.14-14.02.14 T = 05.12.13-20.02.14 B = 17.12.13-22.02.14
02	Wazirpur Upazilla	2013	30	14.24	0.72 - 1.92				
03	Sadar Upazilla	2014	38	13.03	0.69 - 4.15		Jute -15 g Red A.-50 g Turnip (Seedling)-240 Nos. Tomato (Seedling)-120 Nos. Brinjal (Seedling)-120 Nos.	04.09.14 - 30.09.14 Turnip: 15.11.14 – 05.12.14	Jute seed: 01.01.14 - 28.01.15 Vegetables: R A.:10.10.14-15.11.14 Tur. : 25.12.14-30.01.15 T : 25.10.14-10.02.15 B : 01.11.14-28.02.15
		2015	36	15.00					
04	Babuganj Upazilla	2014	38	11.09	1.30 - 5.92				
		2015	36	15.00					
Tomato and brinjal one seedling/hill and Turnip 2 seedlings/hill; Tur. = Turnip, T= Tomato and B=brinjal									

List of farmers are sown in Appendix table 5 and 6.

Design: RCBD

Treatment: 6

T1: Jute in 40 cm apart line,

T2: Jute in 40 cm apart line and red amaranthus in between two jute lines and Tomato in border

T3: Jute in 40 cm apart line and two line jute then one line Tomato and red amaranthus in between two crop lines and radish in border.

T4**:** Jute in 40 cm apart line and then two line jute then two line Brinjal and red amaranthus in between two crop lines and Turnip in border.

T5: Jute in 40 cm apart line and two line jute then two line Turnip and red amaranthus in between two crop lines and Brinjal in border.

T6: Jute in 40 cm apart line and two line jute then two line Tomato and red amaranthus in between two crop lines and radish in border.

The varieties of winter vegetables were: Red amaranthus: BARI Lalshak-1, Turnip: Early white, Tomato: BARITomato-14, Brinjal: BARI Begun -10 and Radish: Torki (Japani)

Fertilizer application: One and half times recommended dose of fertilizers were used. One third of urea and full dose of TSP, MOP, Gypsum, zinc sulphate (monohydrate) and Solubor were used as basal at final land preparation. The second dose of urea (one third) was top dressed at 20 DAS (Days after sowing) and the rest one third of urea was top dressed after harvesting of Lalshak (at 35-45 DAS), the plots were weeding and pulverizing the soils by spading. The urea was top dressed at afternoon.

Intercultural operations: Weeding (3 times), thinning (2 times), drainage (1 time), irrigation (2 times) and gap filling (2 times) were done in due time.

EER: To evaluate the income advantages of intercrops EER (Earning (in price) Equivalent Ratio) was calculated using following formula:

$$\text{EER: } \frac{\text{Intercrop earning of component crops + Intercrop earning of jute seed crop}}{\text{Sole crop earning of jute seed crop}}$$

BCR: Benefit cost ratio (BCR) was calculated as follows**:**

$$\text{BCR} = \frac{\text{Gross return}}{\text{Cost of cultivation}}$$

Results:

The maximum jute seed production in all the location was achieved in T1 treatment i.e. sole late jute crop than that of intercrop. The T1 treatment recorded highest jute seed production 141.04 $kgha^{-1}$ at Kalapara, 156.32 kg ha^{-1} at Wazirpur in 2013-14, 213 kg ha^{-1} at Patuakhali Sadar Upazilla, 196.00 kg ha^{-1} at Babuganj Upazilla in 2014-15 and 255 kg ha^{-1} at Patuakhali Sadar Upazilla, 246.00 kg ha^{-1} at Babuganj Upazilla in 2015-16 (Table 10, 11 and 12). It was mainly due to higher plant stand at harvest. The plant stand of jute seed crop under intercropping decreased proportionately due to lower plant stand at harvest and this lower plant stand was the resultant effect of planting pattern and accommodation of winter vegetables in between jute crops. The yield of jute seed and component crop was satisfactory which indicates its better agronomic adaptability. Considerable yields and returns of jute seed as well as component crop grown under intercropping were also reported by many scientists (IRRI, 1974; Wahab, 1984; Islam *et al*., 1993; Hussain *et al*., 1995 and Hossain *et al*., 1996).

Table 10: Yield and income of jute seed production in intercropping with winter vegetables in 2013-14

Location	Treat.	Red Amaranthus (kg/ha)	Radish (kg/ha)	Tomato (kg/ha)	Turnip (kg/ha)	Brinjal (kg/ha)	Jute seed (kg/ha)	Earning Equivalent Ratio (EER)	Gross Return (Tk/ha)	Cost (Tk/ha)	BCR
Kalapara Upazilla	T1	-	-	-	-	-	141.06 a	1.00	23619.05 f	67093.84 d	0.35 d
	T2	2755.56	-	2755.56	-	-	114.16 b	3.91	111516.00 c	97439.07 ab	1.15 bc
	T3	2755.56	3214.82	5396.30	-	-	89.22 c	7.73	197444.10 a	112338.80 a	1.76 a
	T4	2867.05		3055.00	-	4828.90	124.72 b	3.14	216120.00 bc	114956.76 bc	1.88 b
	T5	2957.35	-	-	5264.92	2736.46	103.11 b	3.31	95498.51 bc	89163.67 bc	1.07 bc
	T6	2710.80	4034.50	9623.00	-	-	73.11 e	8.86	224958.00 a	10 6459.70 a	2.11 a
Wazirpur Upazilla	T1				-		156.32 a	1.00	26363.15 h	43560.82 g	0.61 d
	T2	2885.82	-	4509.09	-		138.28 ab	3.79	123068.10 e	107671.10 ab	1.14 c
	T3	2765.58	3832.73	9018.18	-		105.21 c	8.19	233570.90 a	124708.20 a	1.87 a
	T4	2991.03		5088.00	-	3038.12	81.16 d	7.76	218119.80 ab	120074.10 a	1.82 ab
	T5	1998.68	-	-	8385.53	3362.92	75.67 c	6.90	194486.80 a	120928.10 a	1.61 a
	T6	2628.80	5095.27	16368.00	-	-	50.59 d	11.79	367040.00 a	117447.80 a	3.13 a
Means within column followed by common/without letters are not significantly different at 5% level of DMRT											

Table 11: Yield and income of jute seed production in intercropping with winter vegetables in 2014-15

Location	Treat.	Red Amaranthus (kg/ha)	Radish (kg/ha)	Tomato (kg/ha)	Turnip (kg/ha)	Brinjal (kg/ha)	Jute seed (kg/ha)	Earning Equivalent Ratio (EER)	Gross Return (Tk/ha)	Cost (Tk/ha)	BCR
Patuakhali Sadar Upazilla	T1	-	-	-		-	213.00 a	1.00	37210.00 gh	67095.00 d	0.55 fg
	T2	2890.00	-	3455.00		-	164.00 bc	2.01	103516.00 ef	74600.00 cd	1.39 de
	T3	2795.00	3538.00	5390.00		-	127.00 cd	3.47	151424.00 d	81380.00 bcd	1.93 c
	T4	2700.00	-	9180.00		6500.00	109.00 d	6.21	249950.00 bc	101250.00 bc	2.47 ab
	T5	2820.00	-	-	7500.00	3350.00	112.00 cd	4.77	197240.00 cd	101250.00 bc	1.95 bc
	T6	2798.00	2790.00	15560.00	-	-	107.00 de	8.05	308540.00 bc	101250.00 bc	3.05 bc
Babuganj Upazilla	T1	-					196.00 ab	1.00	34320.00 h	67145.00 d	0.51 g
	T2	2895.00	-	4707.00		-	159.00 bc	2.88	126585.00 e	75340.00 cd	1.68 cd
	T3	2845.00	3460.00	7018.00		-	105.00 d	4.69	179250.00 cd	97150.00 bc	1.94 c
	T4	2911.00	-	13018.00		8290.00	89.00 e	9.67	347310.00 a	127240.00 a	2.73 a
	T5	2880.00	-	-	1600.00	5420.00	101.00 de	6.86	253200.00 bc	127240.00 a	1.99 bc
	T6	2780.00	5390.00	15200.00	-	-	99.00 de	9.28	327520.00 b	127240.00 a	2.57 bc
Means within column followed by common/without letters are not significantly different at 5% level of DMRT											

Table 12: Yield and income of jute seed production in intercropping with winter vegetables in 2015-16

Location	Treat.	Red Amaranthus (kg/ha)	Radish (kg/ha)	Tomato (kg/ha)	Turnip (kg/ha)	Brinjal (kg/ha)	Jute seed (kg/ha)	Earning Equivalent Ratio (EER)	Gross Return (Tk/ha)	Cost (Tk/ha)	BCR
Patuakhali Sadar Upazilla	T1	-	-	-		-	255.00 a	1.00	45900.00 h	62070.00 e	0.74 g
	T2	2890.00	-	4000.00		-	205.00 bc	1.94	125800.00 ef	73600.00 d	1.71 de
	T3	2825.00	3738.00	4370.00		-	137.00 cd	2.86	155840.00 cd	86300.00 bc	1.81 c
	T4	2790.00	-	3900.00		4170.00	105.00 e	3.25	167850.00 bcd	90250.00 ab	1.86 bc
	T5	2900.00	-	-	7800.00	2290.00	132.00 cd	4.36	224110.00 bc	95300.00 ab	2.35 bc
	T6	2898.00	3540.00	10560.00	-	-	112.00 de	5.73	282940.00 ab	102250.00 ab	2.77 ab
Babuganj Upazilla	T1						246.00 ab	1.00	61500.00 gh	65250.00 de	0.94 f
	T2	2985.00	-	4208.00		-	199.00 bc	1.74	142720.00 e	75340.00 cd	1.89 cd
	T3	2875.00	3690.00	4718.00		-	130.00 d	2.37	168920.00 cd	90150.00 bc	1.87 c
	T4	2900.00	-	3998.00		4270.00	105.00 e	2.61	179270.00 bc	91440.00 ab	1.96 bc
	T5	2890.00	-	-	7600.00	2440.00	125.00 d	3.39	230750.00 b	96440.00 ab	2.39 bc
	T6	2980.00	3850.00	11300.00	-	-	109.00 de	4.48	295050.00 a	103840.00 a	2.84 a
Means within column followed by common/without letters are not significantly different at 5% level of DMRT											

Cost and return analysis indicated that the Earning Equivalent Ratio (EER, income advantages of intercrops over sole cropping of the main crop), gross benefit and benefit cost ratio were considerably higher with intercrop system. The maximum EER, gross benefit and BCR were achieved by T6 in first and third year, in all the location and in all the cropping year (Table 10, 11 and 12). The higher EER with T_6 indicates that intercropping of late jute seed crop as having 40 cm apart line, two line jute then two lines Tomato and red amaranthus in between two crop lines and radish in border provides income advantages over sole crop of jute seed cultivation per unit area. The next economically viable intercrop system was T_5 i.e. two line jute then two line Brinjal and red amaranthus in between two crop lines and Turnip in border. The higher economic return from tomato and brinjal included intercropping system was mainly due to higher per unit yield and commodity price. In addition to agronomic suitability, the prices of commodities at different localities warrant the acceptability of crop combinations in intercrop practices. In a particular area where a specific crop enterprise possesses higher demand, inclusion of that

crop in the cropping system generates higher income to the farmers for that area. Hence, higher EER i.e. income advantages stand as a general approach for acceptability of crop enterprises as intercrop practices.

The quality of the produced jute seed in intercrop system was at par with that sole jute crop in respect of 1000 seed weight (≥ 2.03 g), germination (≥ 88.5%,) and vigour (≥ 70.33) (Table 13, 14 and 15) in all the location and in all the research conducting year indicating that quality jute seed can be grown in intercropping with winter vegetables for achieving more profit during jute seed production. It seems that vegetable crops which are dwarf in nature did not affect the growth of jute seed crop under intercrop situations (Hussain *et al*., 1995).

Table 13: Quality status of jute seeds produced in intercropping with winter vegetables in 2013-14

Location	Treatment	Seed moisture (%)	1000 seed weight (g)	Germination (%)	Vigour
Kalapara Upazilla	T1	9.06	2.11	91.83	81.39
	T2	9.13	2.22	92.67	80.50
	T3	9.11	2.22	91.67	76.55
	T4	9.10	2.18	92.06	79.48
	T5	9.04	2.20	88.00	78.05
	T6	9.08	2.26	91.00	79.33
Wazirpur Upazilla	T1	9.25	2.21	91.66	81.66
	T2	9.30	2.23	90.00	77.66
	T3	9.28	2.24	90.33	78.00
	T4	9.27	2.22	90.66	79.10
	T5	9.17	2.22	92.33	80.83
	T6	9.10	2.24	91.33	81.16
Means within column followed by common/without letters are not significantly different at 5% level of DMRT					

Table 14: Quality status of jute seeds produced in intercropping with winter vegetables in 2014-15

Sadar Upazilla (Patuakhali)	T1	9.10	2.17 ab	93.5 a	76.33 a
	T2	9.14	2.15 ab	89.5 c	71.83 cd
	T3	9.15	2.13 ab	92.5 ab	73.33 bcd
	T4	9.10	2.09 ab	91.0 bc	72.00 cd
	T5	9.20	2.10 ab	90.0 bc	70.33 de
	T6	9.17	2.18 a	92.5 ab	70.50 de
Babuganj (Barisal)	T1	9.33	2.03 b	91.5 b	75.33 ab
	T2	9.22	2.11 ab	88.5 cd	73.83 abc
	T3	9.25	1.98 c	93.5 a	74.33 b
	T4	9.30	2.11 ab	92.0 bc	70.00 e
	T5	9.29	2.00 bc	87.5 d	70.33 de
	T6	9.30	2.07 ab	90.3 bc	70.50 de
Means within column followed by common/without letters are not significantly different at 5% level of DMRT					

Table 15: Quality status of jute seeds produced in intercropping with winter vegetables in 2015-16

Location	Treatment	Seed moisture (%)	1000 seed weight (g)	Germination (%)	Vigour
Sadar Upazilla (Patuakhali)	T1	9.10	2.25 a	99.5 ab	87.33 ab
	T2	9.14	2.15 ab	96.5 c	85.83 bc
	T3	9.15	2.03 ab	98.5 ab	86.33 bc
	T4	9.10	2.02 ab	99.0 ab	88.00 ab
	T5	9.20	2.10 ab	97.0 bc	87.00 b
	T6	9.17	2.15 ab	98.5 ab	87.50 ab
Babuganj (Barisal)	T1	9.33	2.22 a	99.0 ab	89.33 ab
	T2	9.22	2.17 ab	98.5 cd	86.83 bc
	T3	9.25	1.92 b	97.5 b	84.33 c
	T4	9.30	2.11 ab	100.0 a	90.00 a
	T5	9.29	2.06 ab	99.5 ab	87.83 ab
	T6	9.30	2.11 ab	97.5 b	87.50 ab
Means within column followed by common/without letters are not significantly different at 5% level of DMRT					

Fig. 11: Jute seed production in intercropping with turnip along with red amaranthus and tomato in border at Patuakhali Sadar

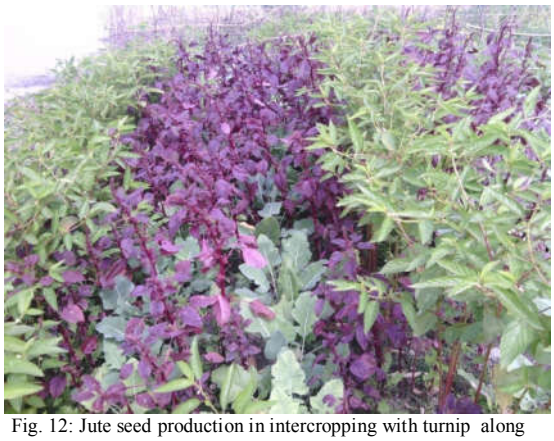


Fig. 12: Jute seed production in intercropping with turnip along with red amaranthus and tomato at border at Babuganj

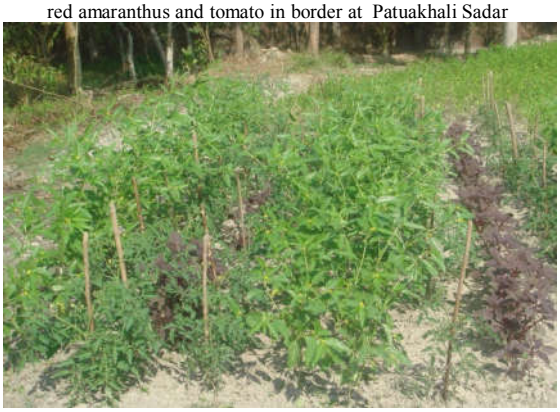


Fig. 13: Jute seed production in intercropping with tomato and brinjal at border at Patuakhali

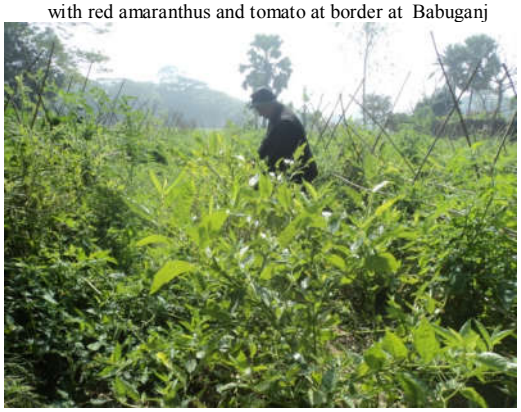


Fig. 14: Jute seed production in intercropping with tomato and brinjal at border at Babuganj

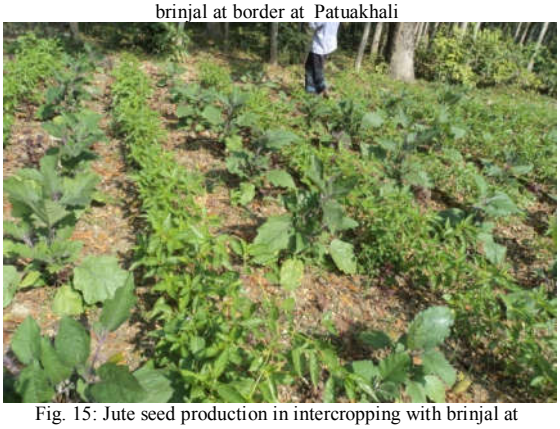


Fig. 15: Jute seed production in intercropping with brinjal at Patuakhali

Fig. 16: Jute seed production in intercropping with brinjal at Babuganj

Fig. 17: Jute seed production in intercropping with turnip and tomato in border at Patuakhali Sadar

Fig. 18: Jute seed production in intercropping with turnip and tomato at border at Babuganj

2.4 **Name of the experiment:** Establishment adaptive trial of deshi and tossa jute varieties for jute fibre production at farmers' level.

Background and objectives:

The southern region lags behind the country in terms of intensity of agricultural land use i.e. crop cultivation (50% of the country's average (Petersen & Shireen, 2001). Out of 2.85 million hectares of the coastal and offshore areas about 0.83 millions hectares are arable lands, which cover over 30% of the total cultivable lands of Bangladesh. The region has 1.056 million ha. of land affected by soil salinity in various degree which mainly limits the crop production resulting lower cropping intensity. Saline soils are managed through crop and soil manipulation. Lands are predominantly single (50%) cropped and the cropping intensity being 159% compared to 176% in Bangladesh. About 60% of the total cultivable land is either fallow or single cropped. Most of the land remains fallow during Kharif-1 season, which may be occupied by jute crop. The existing varieties of white jute (*Corchorus capsularis*) and kenaf (*Hibiscus cannabinus*) can be grown in saline areas up to a certain level of salinity (6.0 dS m^{-1}) if water is ensured at the time of sowing (March-April). Bangladesh Jute Research Institute (BJRI) has developed high yielding different tossa jute varieties including salt tolerant deshi jute (*Corchorus capsularis*) variety named BJC-2197 which can be grown upto moderate level of soil salinity (9.00 dS m^{-1}). The jute is being shifted to marginal land as lands have to release for food and feed supply of teeming millions of Bangladeshis'. By introducing these jute varieties along with existing deshi jute varieties, the jute cultivation will be increased which will contribute to increase the cropping intensity of southern areas. So, there is a huge potential to increase cropping intensity by introducing jute cultivation in the southern region of the country. Moreover, BJRI has develop fibre production techniques, improved pest and disease management techniques, late jute seed production techniques, modern retting practices, variety wise fertilizer recommendation and agronomic practices for increased yield and quality of jute fibre.
Therefore, the evolved agricultural technologies need to be updated and field evaluation should be done at farmers' level to improve socio-economic condition of the farmers involved in JAF crop production. Hence, in this respect, to find out the suitable deshi or tossa jute variety for fibre production in the southern region of Bangladesh this experiment has been undertaken.

Materials and methods:
Design: RCBD

Treatment: Deshi jute variety-3 (Jute variety CVL-1, BJC-2197 and CVE-3) and tossa jute variety-3 (O-9897, O-72 and O-795).

Sowing methods: 2 (Line sowing and broad cast sowing).
Fertilizer application: Urea, TSP, MOP and Gypsum were used as per recommended dose and methods for seed production.

Intercultural operations: Weeding (2 times, thinning (2 times), irrigation (2-3 times, particularly at Kalapara) and gap filling (one time) were done in due time.

Location, soil salinity, Replication (no. of disperse farmers), Lands per farmer, Jute variety, Date of sowing and Date of Harvest were sown in Table 16:

Table 16: Variety, seed rate, date of sowing and harvest of deshi and tossa jute fibre production

SL	Location	Conducting Year	Salinity (dS/m)	Replication / No. of farmers	Lands /Farmer (decimal)	Jute variety		Seed rate (kg/ha)	Date of sowing	Date of harvest
01	Kalapara Upazilla	2014	1.22-7.42	30	19.13	Deshi jute	CVL-1 CVE-3 BJC-2197	10	05.04.14 to 13.05.14	04.08.14 To 10.09.14
				11	17.45	Tossa jute	O-9897 O-72 O-795	8	07.04.14 to 13.05.14	07.08.14 to 14.09.14
02	Wazirpur Upazilla, Barisal	2014	0.74-1.62	43	20.33	Tossa jute	O-9897 O-72 O-795	8	07.04.14 to 09.05.14	06.08.14 - 08.09.14
03	Sadar Upazilla, Patuakhali	2015	1.29 - 5.71	7	21.00	Deshi jute	CVL-1 CVE-3 BJC-2197	10	18.04.15 to 09.05.15	11.08.15 To 03.09.15
				37	17.84	Tossa jute	O-9897 O-72 O-795	8	15.04.15 to 09.05.15	10.08.15 - 15.09.15
04	Babuganj Upazilla, Barisal	2015	0.67-2.13	44	18.68	Tossa jute	O-9897 O-72 O-795	8	07.04.15 to 09.05.15	07.08.15 to 14.09.15

Results:

Among the deshi jute varieties significant yield difference was observed and the BJC-2197 (Deshi pat-8) performed better over other varieties at both the location Kalapara and Patuakhali Sadar Upazilla. The broadcast method performed better over line sowing in first year (2014-15) at Kalapara (Table 17) whereas in 2nd year (2015-16) line sowing method exerted higher yield over broadcast method in all the three varieties at Sadar Upazilla Patuakhali (Table 18). The yield recorded by the varieties was 2.34-2.73 tha^{-1} at Kalapara and at Sadar Upazilla it was 2.38 to 2.68 t ha^{-1}. This was at par with findings of Begum *et at*., 1991. The variety BJC-2197 was resulted higher even in broad cast method over other two varieties CVL-1 and CVE-3 (Table 18). The increased yield by the variety BJC-2197 may be for the resultant effect of plant population, higher plant height and base diameter as evidenced in Table 17 and 18. The highest fibre yield (2.68 t/ha) was achieved with BJC-2197 followed by CVL-1 and CVE-3. The yield order were BJC-2197 (Broad cast)>CVL-1 (Broad cast)>CVE-3 (Broad cast)> BJC-2197 (Line sowing)>CVL-1 (Line sowing)>CVE-3 (Line sowing) (Table 17 and 18). The fibre production over national average (2.12 t ha^{-1}) indicates that that deshi jute variety can be produced successfully in any method at Patuakhali region and among the varieties BJC-2197 will be more acceptable for fibre production in the region.

Table 17: Yield of deshi jute varieties for fibre production at Kalapara Upazilla, Patuakhali in 2014-15.

Variety	Sowing methods	Plant Pop (Lakh/ha)	Plant height (m)	Base diameter (mm)	Green wt with leaves (t/ha)	Green wt without leaves (t/ha)	Fibre wt. (t/ha)	Stick wt (t/ha)
CVL-1	Broadcast	3.28 ab	2.74 ab	16.96 abc	21.87 bc	16.93 cd	2.62 ab	5.24 ab
	Line	2.80 bc	2.79 ab	13.76 d	20.60 d	15.54 d	2.34 b	4.91 b
BJC-2197	Broadcast	3.41 a	2.85 a	16.20 bc	23.96 a	19.79 a	2.73 a	5.52 a
	Line	2.47 d	2.75 ab	16.72 bc	22.81 ab	18.31 abc	2.50 ab	5.25 ab
CVE-3	Broadcast	2.61 bcd	2.38 b	17.98 a	21.37 bcd	16.98 cd	2.49 ab	5.18 ab
	Line	2.53 cd	2.74 ab	16.18 c	23.00 ab	17.67 bc	2.55 ab	5.41 ab
Means within column followed by common/without letters are not significantly different at 5% level of DMRT								

Table 18: Yield of deshi jute varieties for fibre production at Sadar Upazilla, Patuakhali in 2015-16.

Variety	Sowing methods	Plant Pop (Lakh/ha)	Plant height (m)	Base diameter (mm)	Green wt with leaves (t/ha)	Green wt without leaves (t/ha)	Fibre wt. (t/ha)	Stick wt (t/ha)
CVL-1	Broadcast	3.18 ab	2.74 bc	16.92 e	15.24 de	13.26 de	2.42 bc	5.20 ab
	Line	2.60 bc	3.15 ab	19.39 b	16.80 cd	14.34 cd	2.53 ab	5.39 a
BJC-2197	Broadcast	3.29 a	3.27 a	21.83 a	21.06 a	18.48 a	2.59 ab	5.21 ab
	Line	2.74 bc	3.15 ab	19.44 b	17.40 bc	15.24 c	2.68 a	5.26 ab
CVE-3	Broadcast	3.11 ab	2.96 b	16.75 d	16.44 cd	13.86 d	2.38 c	4.97 bc
	Line	2.53 bc	2.77 bc	17.05 cd	15.03 e	13.02 e	2.46 bc	5.06 b
Means within column followed by common/without letters are not significantly different at 5% level of DMRT								

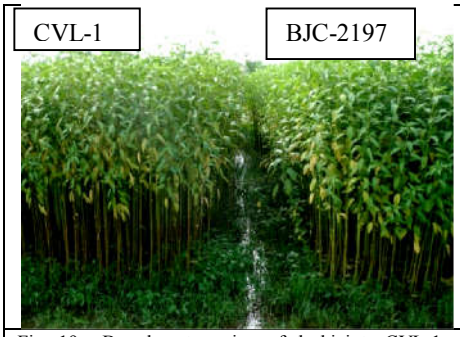


Fig. 19: Broad cast sowing of deshi jute CVL-1 and BJC-2197 Sadar Upazilla, Patuakhali

Fig. 20: Line sowing of deshi jute CVL-1 at Sadar Upazilla, Patuakhali

The highest fibre yield (2.83 t/ha) was obtained with O-9897 variety in line sowing method at Babuganj (Barisal). It may be for higher population, plant height and base diameter as evidenced in Table 10. The yield order were O-9897 (Line sowing)> O-9897 (Broad cast)> O-795 (Line sowing)> O-795 (Broad cast)> O-72 (Line sowing)> O-72 (Broad cast). In this context it may be concluded that all the varieties may be grown at Babuganj (Barisal) in any sowing method but at Patuakhali Sadar line sowing is preferable for production jute fibre in the southern areas of Bangladesh.

All the varieties recorded higher fibre yield at Wazirpur over Kalapara in 2014-15 (Table 19) and in 2015-16 the varieties recorded somewhat higher fibre yield at Babuganj over Patuakhali Sadar (Table 20). The fibre yield of tossa jute variety was recorded 1.49 - 1.80 tha^{-1} at Kalapara, 2.69-2.92 tha^{-1} at Wazirpur, 2.33-2.68 tha^{-1} at Patuakhali Sadar and 2.46 – 2.83 tha^{-1} at Babuganj. The line sowing method sowed better fibre yield at Kalapara, Patuakhali Sadar Upazilla and Babuganj whereas the broad cast method demonstrated higher yield at Wazirpur (Barisal). The fibre yield increased 49.44 to 93.38% was observed at Wazirpur over Kalapara (Table 19) and it was 2.58 to 9.92% at Babuganj over Patuakhali Sadar depending upon variety and sowing method (Table 20). The variety O-9897 was found superior as it recorded the highest yield at all the location and the highest fibre yield (2.92 t/ha) in broad cast method at Wazirpur (Table 19). The abrupt decreased fibre yield recorded at Kalapara may be due to decreased seed quality of farmers produced seeds as far as it is known that the farmers' self produced seeds were not properly stored at farm level which resulted lower fibre yield. The increased fibre yield of O-9897 may be for its higher plant height and base diameter as evidenced in Table 19. The yield order were O-9897 (Broad cast, 2.92 tha^{-1})> O-795 (Broad cast, 2.91 tha^{-1})> O-72 (Broad cast, 2.88 tha^{-1})> O-9897 (Line sowing, 2.83 tha^{-1})> O-795 (Line sowing, 2.77 tha^{-1}) > O-72 (Line sowing, 2.73 tha^{-1}) (Table 19 and 20). Similar trend of results of the variety O-9897 were reported with Sobhan *et al*., 1993 and Islam *et al*., 1997. In this context it may be concluded that all the varieties may be grown at Wazirpur,

Babuganj and Patuakhali Sadar in any sowing method but at Kalapara line sowing is preferable for production tossa jute fibre.

Table 19: Yield of tossa jute varieties for fibre production at Kalapara and Wazirpur in 2014-15

Location	Variety	Methods	PP (L/ha)	PH (m)	BD (mm)	GWL (t/ha)	G LW (t/ha)	Fibre wt. (t/ha)	Stick wt (t/ha)
Kalapara	O-72	Broadcast	2.76 c	2.57 c	15.73 ab	21.99 bc	4.08 cd	1.49 e	3.03 g
		Line	2.87 bc	2.62 bc	15.10 ab	23.28 bc	4.38 cd	1.77 de	4.07 cd
	O-9897	Broadcast	2.84 bc	2.60 bc	16.10 a	24.20 bc	4.32 cd	1.51 e	3.09 fg
		Line	2.93 bc	2.85 bc	15.64 ab	25.78 ab	4.86 ab	1.80 de	4.14 bc
	O-795	Broadcast	2.78 c	2.67 bc	14.76 bc	23.71 bc	4.25 cd	1.54 de	3.45 ef
		Line	2.85 bc	2.59 c	14.60 bcd	23.07 bc	4.69 bc	1.64 de	3.82 ef
Wazirpur	O-72	Broadcast	2.93 bc	3.22 a	12.84 de	20.03 cd	3.95 d	2.88 ab (93.29)	5.75 ab
		Line	3.22 a	3.10 ab	12.69 de	24.11 bc	4.58 bc	2.73 ab (49.44)	5.45 ab
	O-9897	Broadcast	2.94 bc	3.24 a	12.85 de	19.94 cd	3.68 e	2.92 a (93.38)	5.90 a
		Line	3.24 a	3.12 ab	12.53 de	26.79 a	5.20 a	2.69 abc (49.44)	5.39 b
	O-795	Broadcast	2.93 bc	3.26 a	12.39 de	19.66 d	3.74 de	2.91 a (88.96)	5.87 a
		Line	3.19 a	3.15 ab	12.04 e	23.24 bc	4.61 bc	2.70 ab (64.63)	5.46 ab
GWL=Green weight with leaves, GLW= Green leaves weight, PP=Plant population, L= Lakh, PH=Plant height, BD= Base diameter									
Parenthesis indicates percent increase of fibre yield at Wazirpur over respective variety and sowing method of Kalapara									
Total Land: 1054 decimals		Means within column followed by common / letters are not significantly different at 5% level of DMRT							

Table 20: Yield of tossa jute varieties for fibre production at Patuakhali and Babuganj 2015

Location	Variety	Sowing methods	PP (L/ha)	PH (m)	BD (mm)	GW+LW (t/ha)	G W-LW (t/ha)	Fibre wt. (t/ha)	Stick wt (t/ha)
Patuakhali Sadar	O-72	Broadcast	2.76 cd	2.78 bc	15.45 de	12.48 de	11.22 gh	2.33 bc	4.97 c
		Line	2.87 bc	2.75 cd	15.60 de	15.18 c	12.48 de	2.61 ab	5.60 ab
	O-9897	Broadcast	2.84 bc	2.72 cd	15.56 de	13.80 cd	11.28 gh	2.45 bc	5.04 bc
		Line	2.93 bc	2.77 c	15.37 de	15.96 ab	14.58 a	2.68 ab	5.12 bc
	O-795	Broadcast	2.78 cd	2.70 cd	14.58 f	12.42 d	10.92 hi	2.48 bc	5.15 b
		Line	2.85 bc	2.74 cd	14.93 ef	13.14 cd	11.64 fgh	2.52 bc	5.39 ab
Babuganj	O-72	Broadcast	2.93 bc	3.04 ab	18.25 ab	16.38 a	14.56 ab	2.46 bc (5.58)	5.00 bc
		Line	3.22 ab	3.11 ab	18.16 ab	15.48 ab	13.74 abc	2.68 bc (2.68)	5.51 ab
	O-9897	Broadcast	2.94 bc	3.01 ab	17.81 bc	13.84 cd	12.10 ef	2.78 ab (9.39)	5.75 ab
		Line	3.24 a	3.12 a	17.95 bc	11.62 f	10.32 j	2.83 a (5.60)	5.79 a
	O-795	Broadcast	2.93 bc	2.94 b	18.45 a	16.15 ab	14.13 ab	2.70 ab (8.87)	5.59 ab
		Line	3.19 ab	3.06 ab	17.88 bc	15.88 ab	14.32 ab	2.77 ab (9.92)	5.62 ab
No. of Expt.: Total Land: 1482 decimals, Fibre Yield: 15801 kg		Means within column followed by common / letters are not significantly different at 5% level of DMRT							
Parenthesis indicates percent increase of fibre yield at Wazirpur over respective variety and sowing method of Kalapara GWL=Green weight with leaves, GLW= Green leaves weight, PP=Plant population, L= Lakh, PH=Plant height, BD= Base diameter									

Fig. 21: Line sowing of tossa jute O-795 at Babuganj (Barisal)

Fig. 22: Broad cast sowing of tossa jute O-72 and O-9897 at Babuganj

Fig. 23: Broad cast sowing of O-9897 at Sadar Upazilla, Patuakhali

Fig. 24: Line sowing of O-9897 at Sadar Upazilla, Patuakhali

Fig. 25: Broad cast sowing of O-795 at Babuganj, Barisal

Fig. 26: Line cast sowing of O-795 at Babuganj, Barisal

Fig. 27: Line sowing of tossa jute O-72 at Sadar Upazilla, Patuakhali

Fig. 28: Broad cast sowing of O-795 at Sadar Upazilla, Patuakhali

2.5 **Name of the experiment: Performance evaluation adaptive trial of farmers self produced tossa jute seeds at field level.**

Background and objectives:

Jute seed production with winter vegetables is a separate and an economic practice of jute in which farmers can produce seeds with one or more winter vegetables at late season of jute fibre production. Late jute seed crop also produces higher seed yield in comparison to that of traditional jute seed crop (BJRI, 1990). Jute seed production with winter vegetables ensure higher income of the farmers and meet the demand of family nutrition at the same time. And farmers are very much interested in this method of seed production if high lands are available in the sowing season i.e. in the month of August and September. Researches show that jute seeds production is agronomically suitable and economically viable in late season with lentil and chilli and the seed quality is also of good quality ((Hossain *et al*., 1996). But the seeds' performance for jute fibre production obtaining from intercropping with winter vegetables is still unknown. Moreover, the seed production and fibre production of jute both are very much new in the southern area. So, it is obliged to know the farmers' self produced jute seeds' obtaining from intercropping with winter vegetables is good enough for attaining growth and yield of jute. Hence, this experiment has been undertaken to find out the performance of farmers self produced tossa jute seeds especially in southern region for fibre production.

Materials and methods:

Location, Conducting year, Replication, Area /farmer, Treatment, Sowing and Harvest date are sowing in the Table 21. : Four (Kalapara, Patuakhali Sadar, Wazirpur and Babuganj Upazilla)
Design: RCBD

Sowing method: Line sowing.

Table 21: Variety, seed rate, date of sowing and harvest of deshi and tossa jute fibre production

SL	Location	Conducting Year	Replication / No. of farmers	Lands /Farmer (decimal)	Jute variety/ Treatment	Seed rate (kg/ha)	Date of sowing	Date of harvest
01	Kalapara Upazilla, Patuakhali	2014-15	11	17.45	O-72 O-9897 O-795	8	20.04.14 - 15.05.14	19.08.14 - 10.09.14
02	Wazirpur Upazilla, Barisal	2014-15	43	20.33	O-72 O-9897 O-795	8	06.04.14 - 07.05.14	05.08.14 - 05.09.14
03	Sadar Upazilla, Patuakhali	2015-16	37	17.84	O-72 O-9897 O-795	8	15.04.15 - 08.05.15	11.08.15 - 10.09.15
04	Babuganj Upazilla, Barisal	2015-16	44	18.68	O-72 O-9897 O-795	8	16.04.15 - 24.04.15	15.08.15 - 25.09.15
05	Sadar Upazilla, Patuakhali	2016-17	36	15.00	O-72 O-9897 O-795	8	10.04.16 - 10.05.16	07.08.15 - 10.09.15
06	Babuganj Upazilla, Barisal	2016-17	36	15.00	O-72 O-9897 O-795	8	07.04.16 - 10.05.16	05.08.16 - 06.09.16

Seed sources: 2 (BJRI supplied and Farmers self produced seeds)

Fertilizer application: Urea, TSP, MOP and Gypsum were used as per recommended dose and methods for seed production.

Intercultural operations: Weeding (2 times, thinning (2 times), irrigation (2-3 times, particularly at Patuakhali Sadar) and gap filling (one time) were done in due time.

Results:

The farmers produced jute seeds of different varieties exerted more or less same result with BJRI supplied seeds in all the locations except Kalapara. The highest recorded fibre yield was 2.89 tha^{-1} at Babuganj, 2.57 tha^{-1} at Patuakhali Sadar, 2.57 tha^{-1} at Wazirpur and 1.92 tha^{-1} at Kalapara with the variety O-9897, O-795, O-9897 and O-9897, respectively with the farmers' self produced seeds (Table 22, 23). At Kalapara and at Wazirpur the fibre yield reduction of farmers' seeds 1.54 to 14.91% and 21.54 to 47.82 % was noticed, respectively. The BJRI supplied seeds resulted fibre yield 1.61 tha^{-1} to 2.92 t ha^{-1} (Table 22, 23). But at Babuganj (Barisal) and Patuakhali Sadar (Patuakhali) the fibre yield was somewhat increased. The fibre yield increase was 0.75 to 10.76 % at Babuganj and 0 to 1.98 % at Patuakhali Sadar against BJRI supplied seeds depending upon variety (Table 22, 23). As far it was known that the fermers' seeds produced was not properly dried and stored and the resultant effect was 1.54 to 47.2 yield reductions over BJRI supplied seeds. But at Patuakhali Sadar and Babuganj the maximum fibre yield was observed with farmers' seeds indicating that farmers seeds if produced with necessary care and precautions it may be used for fibre production successfully.

Table 22: Farmers' self produced Tossa jute seeds effect on fibre production in 2014-15

Location	Seed sources	Variety	PP (Lakh/ha)	PH (m)	BD (mm)	GWL (t/ha)	GLW (t/ha)	Fibre wt. (t/ha)	Stick wt. (t/ha)
Kalapara (Patuakhali)	BJRI seed	O-72	2.89 bc	2.66 cd	15.13 ab	23.29 bc	4.74 abc	1.96 cd	4.57 c
		O-9897	2.94 bc	2.84 bc	15.62 a	25.76 ab	4.88 ab	1.95 cd	4.44 cd
		O-795	2.84 c	2.62 cd	14.57 bc	23.09 bc	4.71 abc	1.61 f	3.80 de
	Farmers' seed	O-72	2.82 bc	2.63 cd	14.38 c	23.11 bc	4.32 cd	1.91 e (-3.02)	4.33 cd
		O-9897	2.95 bc	2.49 de	13.72 cde	21.78 cd	4.18 d	1.92 e (-1.54)	4.42 cd
		O-795	2.80 bc	2.35 e	13.00 ef	17.91 def	4.33 cd	1.37 g (-14.91)	3.04 f
Wazirpur (Barisal)	BJRI seed	O-72	3.26 a	3.13 a	12.79 f	24.21 abc	4.55 bc	2.79 a	5.58 a
		O-9897	3.23 a	3.14 a	12.64 fg	26.83 a	5.20 a	2.74 ab	5.50 ab
		O-795	3.21 ab	3.14 a	12.14 gh	23.25 bc	4.68 bc	2.75 ab	5.50 ab
	Farmers' seed	O-72	3.05 ab	2.74 c	10.87 h	18.91 de	4.44 bc	2.22 cd (-28.64)	5.11 ab
		O-9897	3.21 ab	2.96 bc	12.28 gh	21.32 cd	4.44 bc	2.32 c (-21.54)	5.17 ab
		O-795	2.90 bc	2.33 e	12.70 fg	17.09 f	4.32 cd	1.98 de (-47.82)	4.61 bc
Means within column followed by common / letters are not significantly different at 5% level of DMRT									

Table 23: Farmers' self produced Tossa jute seeds effect on fibre production in 2015-16

Location	Seed sources	Variety	PP (Lakh/ha)	PH (m)	BD (mm)	GWL (t/ha)	GLW (t/ha)	Fibre wt. (t/ha)	Stick wt. (t/ha)
Patuakhali Sadar Upazilla	BJRI seed	O-72	2.85 bc	2.78 bc	15.07 de	14.43 def	11.88 efg	2.55 cd	5.18 bc
		O-9897	3.01 ab	2.86 b	15.40 de	15.08 cde	13.00 cde	2.5 cd	4.84 d
		O-795	2.95 bc	2.97 ab	18.20 ab	16.07 bc	14.30 bc	2.52 cd	5.17 bc
	Farmers' seed	O-72	2.76 c	2.55 cd	15.22 de	14.31 def	11.2 fg	2.55 cd (0)	5.15 bc
		O-9897	2.98 b	2.73 bc	16.05 d	14.05 def	11.84 efg	2.46 (-1.6)	5.04 bcd
		O-795	2.81 bc	2.67 bc	15.31 de	11.44 gh	9.41 i	2.57 (1.98)	5.24 bc
Babuganj Upazilla	BJRI seed	O-72	3.06 ab	3.05 ab	19.23 a	15.46 cde	13.93 bcd	2.65 bc	5.61 ab
		O-9897	3.29 a	2.84 bc	17.41 cd	14.91 cde	13.52 cd	2.86 ab	5.37 bc
		O-795	3.16 ab	3.04 ab	19.07 ab	16.42 bc	14.45 bc	2.51 cd	5.22 bc
	Farmers' seed	O-72	3.1 ab	3.09 ab	17.88 bc	16.11 cd	14.28 bc	2.67 bc(0.75)	5.28 bc
		O-9897	3.26 ab	3.11 a	18.34 ab	18.05 a	15.86 a	2.89 a (1.05)	6.00 a
		O-795	2.96 bc	2.99 ab	18.21 ab	16.66 bc	14.74 bc	2.78 ab (10.76)	5.67 ab
Means within column followed by common / letters are not significantly different at 5% level of DMRT									

Fig. 29: Line sowing of farmers' self produced tossa jute seed O-9897 at Sadar Upazilla, Patuakhali

Fig. 30: Performance of farmers' produced tossa jute seed O-9897 in line sowing at Babuganj (Barisal)

(ii) Outputs/Results:

01. In total 1552 kg jute seed was produced in 3080 decimals of land from inception to reporting period in inter cropping with winter vegetables.
02. All the tossa varieties O-795, O-72 and O-9897 are found produceable with winter vegetables in all the location –Kalapara, Patuakhali Sadar, Wazirpur and Babuganj, as its income and seed quality were good.
03. The germination ≥88.5%, 1000 seed weight ≥2.00 g and vigour ≥70.15 considering the two locations and two years research activities.
04. Seed production was higher at Kalapara and Sadar Upazilla, Patuakhali and among the varieties O-795 performed better in the very late sown (up to mid October) condition.
05. The intercropping system was always more profitable than sole crop system in case of jute seed production in both the location. The BCR of inter crop system of jute seed production was 0.88-3.13. The intercropping of two line jute then two line Tomato and red amaranthus in between two crop line and radish in border exerted the highest BCR, 2-73-3.13. The highest seed production in this system was 1.75 kg/decimal i.e. 434kg/ha sowing on 30th September.
06. Least income was always achieved in sole jute seed production and its BCR was 0.35-0.61.
07. In case of fibre production of deshi jute (CVL-1, BJC-2197 and CVE-3) was found suitable at Kalapara (Patuakhali) in broadcast method and fibre yield was 2.59 to 2.73 t/ha.
08. Fibre yield of tossa jute was higher (2.68 to 9.92 %) depending upon variety at Barisal than Patuakhali and the yield was 2.88 to 2.92 t/ha in broad cast method at Barisal.
09. The farmers' self produced tossa jute seed recorded insignificant fibre yield reduction, 0 to 4.56% over BJRI seed at Patuakhali Sadar but at Babuganj the fibre yield was somewhat increased 0.77 to 13.28 %. The yield of fibre using farmers seed was 2.62, 2.73 and 2.88 t/ha with the jute variety O-72, O-9897 and O-795, respectively at Babuganj.
10. In grand total 51.30 ton of jute fibre was produced from 19.85 ha of land.

b. **Benefits/Outcomes:** The farmers of project area are now capable of growing jute seeds in improved method with winter vegetables in an economic way. Skilled and trained farmers (300 nos.) and a number of professionals (nos. 360, GO/NGO) has been added to jute seed sector for growing and nursing this industry. Twelve hundred (1200) farmers has been visualized the technological performances through 12 field days in the project period.
In a nutshell -

i) Popularization of the six BJRI variety (three deshi jute variety-CVL-1, CVE-3 and BJC-2197 and 3 tossa jute varieties O-72, O-9897 and O-795), 4 seed production methods-broadcast, line, cutting and seedling transplanting method, has been popularized to the farmers and extension workers, jute seed production in different combination in tercropping system and adoption of jute seed production techniques has been enhanced.
ii) Capacity building of farmers and extension workers has been developed
iii) Overall increase in jute cultivation in new areas of Bangladesh.
iv) Scope of increased production and supply of BJRI HYV jute seeds has been created in project areas.
v) Increased income (as much as 3 times income over single cropping of jute seed production) through increased seed and winter vegetables production as intercropping has been ensured.

d. Technology Validated:

i.) Six BJRI varieties (three deshi jute variety-CVL-1, CVE-3 and BJC-2197 and 3 tossa jute varieties O-72, O-9897 and O-795)
ii) Four seed production methods-broadcast, line, cutting and seedling transplanting method,
iii) Intercropping system of jute seed production with winter vegetables
iv) Two fibre production method-broadcast and line sowing method has been validated at field level at Patuakhali and Barisal region for jute seed and fibre production.

e. Publication made/under process:

Four scientific articles /paper are under process of publication. The papers are:

(1) Varietal response of Olitorius jute at southern region of Bangladesh for seed production
(2) Yield and quality of jute seeds as influenced by production methods at Barisal and Patuakhali and
(3) Yield and economics of jute seed production with winter vegetables.
(4) Study on growth and yield of different deshi and tossa jute varieties for fibre production at Patuakhali and Barisal region.

f. Training/workshop organized: Six batch farmers' training (50 participants/batch), six batch SAAO/NGO/equivalent officers training (40 participants/batch) and 4 workshop (30 participants/workshop, 2 inception and 2 closing workshop in 2 location Patuakhali and Barisal) has been conducted.

g. Graduate studies: Not applicable

h. Linkages Developed: Farmers and seed dealers of Patuakhali and Barisal region has been aquaintenced with each other through training programme and field days.

i. Equipment/Appliances Purchased:

SL.	Items	Number	Cost (Taka)
01.	Desktop computer with printer	1 set	2,09,600.00
02.	Seed moisture meter	2	
03.	Knapsack sprayer	3	
04.	Seed packing/ceiling machine (manual)	3	

F. Highlight of Research Findings:

Jute seed production with winter vegetables is always remunerative especially when Tomato is intercropped in seed production system when the crops are grown in 40 cm apart line. The highest benefit was recorded from the practice of two line jute then two line Tomato and red amaranthus in between two crop line and radish in border as this inter cropping system exerted the BCR, 2-73-3.13 in the three year research period. The highest seed production in this system was 1.75 kg/decimal i.e. 434kg/ha sowing on 30th September. Intercropping of turnip instead of tomato was the 2nd choice of farmers in jute seed production. Among the 4 methods of jute seed productions-broadcast, line sowing, cutting and seedling transplanting method, line sowing method recorded the best performance at farm level.

The qualitative jute seeds were produced in inter-cropping system with winter vegetables. The seeds produced in the four research location like Kalapara, Patuakhali Sadar, Wazirpur and Babuganj upazilla recorded germination ≥88.5%, 1000 seed weight ≥2.00 g and vigour ≥70.15. The Kalapara and Sadar Upazilla of Patuakhali was found better than that of Wazirpur and Babuganj for producing jute seeds in late season (up to mid October) and the variety O-795 was found promising for producing seeds whether cultivating as single or in combination with winter vegetables in all the locations. Jute seed production may not be possible in the salinity area above slightly saline soil i.e. 8 dS/m.

It was found that the deshi jute varieties always recorded the fibre yield ≥ 2.38 t/ha whether cultivating in line or broadcast method at Kalapara and Sadar Upazilla Patuakhali. The highest fibre yield recorded with the deshi jute variety BJC-2197, CVL-1 and CVE-3 was 2.73, 2.62 and

2.59 t/ha in broad cast method at Kalapara indicating that deshi jute may be grown successfully in any method in the southern areas of Bangladesh.

In case of tossa jute fibre production, the line sowing method performed better at Kalapara, Sadar Upazilla Patuakhali and Babuganj Upazilla whereas the broad cast method demonstrated higher yield at Wazirpur (Barisal). The fibre yield was recorded 2.68-2.92, 2.52-2.91 and 2.61-2.88 t/ha with the variety O-9897, O-795 and O-72, respectively which indicates that at Patuakhali line sowing is preferable for tossa jute production but at Barisal jute can be grown in any sowing method.

The farmers' self produced seeds from the practice in inter-cropping system with winter vegetables resulted more or less same fibre production with BJRI supplied seeds when seeds were dried and stored well at farm level. The fibre yield using farmers self produced jute seeds was 2.54, 2.32 and 2.51 t/ha at Patuakhali and at Babuganj the yield was 2.68, 2.83 and 2.77 t/ha, respectively with jute variety O-72, O-9897 and O-795. Recorded fibre yield and seed quality indicates that farmers' jute seeds can be used successfully for fibre production in southern region of Bangladesh.

G. Conclusion:

The suitable olitorius jute variety for seed production in off-season (up to mid October) in southern region of Bangladesh is O-795 (tossa pat-5) following O-9897 and O-72 (tossa pat-4). Line sowing method gives higher (24.79%) seed yield over broadcast method. Intercropping of jute seed with winter vegetables was found always remunerative than sole cropping of jute seed. Two line jute then two line tomatoes in 40 cm apart line and red amaranthus in between two crop lines and radish in border recorded up to 1.75 kg jute seed/decimal and maximum BCR 3.13. All the deshi jute variety CVL-1, CVE-3 and BJC-2197 (deshi pat-8) and tossa jute variety O-9897, O-795 and O-72 was found producible in southern region of Bangladesh. The deshi jute variety BJC-2197 recorded higher fibre yield following CVL-1 and CVE-3. The tossa jute variety O-9897 recorded higher fibre yield followed by O-795 and O-72. It indicates that jute seed as well as fibre production can be done successfully in southern region of Bangladesh.

H. Recommendation:

01. In off-season in southern region of Bangladesh the tossa jute variety O-795 (tossa pat-5) and O-9897 can be cultivated up to mid October for successful jute seed production.
02. The line sowing method for sole or intercropping system of jute seed production can be followed at farm level in southern region of Bangladesh. Foe sole cropping of jute seed 30cm apart line and in intercropping system 40cm apart line should be exercised.
03. Two line jute then two line tomatoes in 40 cm apart line and red amaranthus in between two crop lines and radish in border can be followed in intercropping system for earning maximum yield and income and quality jute seed production.
04. The deshi jute variety BJC-2197(deshi pat-8) and CVL-1 can be grown in any method of line sowing or broadcast method at Patuakhali region.
05. The tossa jute variety O-9897 and O-795 (tossa pat-5) can be cultivated any method of line sowing or broadcast method at Patuakhali and Barisal region for successful fibre production.
06. Research should be done on fertilizer management for off-season jute seed production with winter vegetables particularly in southern region for problematic nature of the soil.
07. Research should be done on dry land seedling transplanting method (like pepper seedling transplanting for pepper production) for jute seed cultivation because the farmers are not interested in ongoing seedling transplanting method of wet land condition though this method has amplified scope for seed production in very late sown condition.

I. Financial Statement: Fund received and Expenditure made during the reporting as well as project period.

I.1 Summary statement: The total budget of the project is Tk. 67, 30,000.00. The fund released Tk. 65, 19,588.00. The expenditure made so far Tk. 65, 00,405.39 (99.71%). The unreleased fund Tk. 2, 29, 494.61.

I.2 Component wise budget and SoE

(in thousand Tk)

Particulars/Line Items	Actual Fig. in Tk.
A. Fund Received in Installment	

1st install.	2nd Install.	3rd install.	4th Install.	5th install.	6th install.	7th install.	8th install.	9th install.	10th install.	Total
4,83,480.00	7,25,220.00	9,66,960.00	980016.00	612510.00	857514.00	841720.00	500,000.00	3,41,738.00	2,10,430.00	65,19,588.00

	Item of expenditure	Approved Total Budget (TK)	Exp. Upto previous report on 19.05.16	Current Exp. From 20.05.16 to 18.10.16	Cumulative Exp.	Rest of Budgeted Amount
A	**Recurring (Operational cost)**	1	2	3	4=(2+3)	5=(1-4)
1.	1.1 Remuneration for Contractual Staff (Field Asstt.)	979340.00	747133.32	94600.00	841733.32	137606.68
	1.2.1 Remuneration of Accounting /Typing Support Service, if any (part time basis-consolidated)	97650.00	90774.18	9000.00	99774.18	-2124.18
2.	Research & Development (R&D) related cost i.e. all inputs, lab./ farm chemicals & other necessary supplies etc.	3246410.00	3104648.80	138950.00	3243598.8	2811.20
3.	Maintenance and repairing of lab. /field equipment, etc.	-	-			
4.	4.1 Training	483000.00	477868.00	00	477868.00	5132.00
	4.2 Field days	360000.00	299000.00	61000.00	360000.00	00
5.	Workshop/Seminar/Meeting etc.	260000.00	130000.00	130000.00	260,000.00	00
6.	6.1 Travel expenses (TA/DA) as per own organizational rules (Public Sector) or as per KGF Rules (Non-govt.Org).	370800.00	327989.99	39350.00	367339.99	3460.01
	6.2 Vehicle hiring/oil & fuel for organization's vehicle for travel, if justified.	326000.00	265352.50	51300.00	316652.50	9347.50
7.	Office supplies and contingency (not exceeding 15% of the total cost for stationeries, publications, printing of reports, internet, service, mailing etc.)	396800.00	294163.60	30750.00	324913.60	71886.40
8.	Any other items (please specify with justification)	-				
9.	Institutional Overhead Charge (if any, max 10% of total operating cost)	-				
	B.I. Sub-total B.I (1-9)	***65,20,000.00***	***57,36,930.39***	***5,54,950.00***	***62,91,880.39***	***2,28,119.61***
B. II:	**Non-recurring (Capital cost)**					
10.	Equipment & Appliances (upon approval of KGF)					
	10.1. Lab. and Field Equipment	145000.00	144723.81	00	144723.81	276.09
	10.2. Office Equipment	65000.00	64876.19	00	64876.19	123.81
	B.II. Sub-total (10)	***2,10,000.00***	***209600.00***		***209600.00***	***400.00***
Grand Total Expenditure: GT(B.I+B.II)		***67,30,000.00***	***59,46,530.39***	***5,53,875.00***	***65,00,405.39***	***2,28,519.61***

Balance (A-GT)= 18,107.61 as per Bank Statement

Bank Reconciliation (if necessary).

.....

Signature of PI with seal

Bank statement is enclosed-Annexure-II

Note: [Financial statement must be accompanied with Bank reconciliation statement for the period]

Financial Progress:

(a) Fund received in TK.: 6519588.00 (b) Fund utilized as per SoE in TK.: 6500405.39

% achieved = 99.71%

J. Self Assessment of the project:

1. Have you been able to achieve all specific objectives of your project?
   Answer: Yes
2. Who is/are the largest beneficiary group/s of your project output/result? /Policy makers
   Answer: Farmer
3. How the project outputs/results obtained would benefit the target beneficiary group/s? and how these could be Transferred to that / that target group/s?

   Answer: The project outputs are the results of the technological field demonstration or adoption in a locality. The technical knowhow of a technology is demonstrated and farmers engaged in the project activities are experienced with it and the other farmers will also be able to perceive the technology through observing the demonstrated farmers' plot/activity and using this field proven/verified technology or information and they will be able to produce jute seeds and fibre with their self knowledge or experience. The results may be transferred to target beneficiaries (farmers) through farmers training and distributing printed 'Projukti Barta' to the farmers prior to cropping season, farmers' group may be formed through amalgamating the experienced and non experienced farmers of the technology and block demonstrations and conducting field days through DAE in their regular program to the relevant areas.

4. Do you think that you have successfully completed the project? If yes, please provide one pages success story brief to your project with relevant picture where applicable.

   Answer: Yes. I think I have completed the project successfully.

Success story: Md. Delowar Khan, S/O, Md. Asman Khan, a progressive farmer of Dhankhali village of Etabaria Union under Patuakhali Sadar Upazilla conducted an experiment in 2014 and 2015 of jute seed production in intercropping with winter vegetables Red amaranthus, radish, turnip and tomato. The jute variety was O-795 (tossa pat-5). Two line jute then two line turnip and red amaranthus in between two crop lines and radish were sown in border in 2014 but in 2015 instead of two line one line of each crop were produced. He also transplanted tomato in the border in the midst of radish line @ 5o cm-100 cm distance in both the year. The area of the land was 15 decimals in 2014 and it was 35 decimals 2015. The vagetables' varieties were red amaranthus: BARI Lalshak-1, turnip: Devgreen, radish: Torki (Japani), Tomato: BARI tomato-14. The experiment was set on 17th September 2014 and 4th September 2015. He also produced jute fibre with with the variety O-795. In 2015 he divided his seed plot into 4 equal parts. The seed production efficiency was 1.60 kg/decimal i.e. 396 kg/ha in 2014 and his total seed production was 24 kg and in 2015 it was 1.77kg/decimal i.e. 438 kg/ha and his total seed production was 62 kg. His different crop production and benefit was as follows:

Name of farmer	Conducting year	Land (Decimals)	Jute seed (kg)	Red amaranthus (kg)	Radish (kg)	Pat Shak (kg)	Turnip (kg)	Tomato (kg)	Gross return (Tk.)	Variable cost (Tk.)	BCR
Md. Delowar Khan S/O, Md Asman Khan Dhankhali, Patuakhali Sadar Upazilla	2014	15	24.00 (396 kg/ha)	192.00	345.00	60.00	550.00	200.00	23560.00	9275.00	2.54
	2015	35	62.00 (438 kg/ha)	470.00	840.00	125.00	1200.00	450.00	55485.00	21420.00	2.59
Price of products(Tk./kg)	Red amaranthus: 15.00, Radish: 10.00, Jute leaves: 15.00; Turnip: 15.00, Tomato: 20.00, Jute seed 170.00 Tk in 2014 and 180.00 Tk. in 2015										
Variable cost (Tk.)	Jute seed: 75.00 (2014) and 120.00 (2015), Red amaranthus: 15.00/decimal, Radish: 15.00/decimal, Turnip seedling: Tk 0.50/seedling, Tomato seedling: Tk 0.60/seedling, Fertilizer: Tk. 60.00/decimal, Labour for intercultural operations: One man day/decimal (Tk.300.00 /day) and Irrigation: Tk. 50.00/decimal); Pesticide: 200.00-300.00 (Lumpsum), Required turnip seedling in 200/decimal and tomato seedling 100/decimal.										

Mr. Khan earned 2.54-2.59 times to his investment in jute seed production in intercropping with winter vegetables. He also cultivated jute fibre and his fibre yield was good 2.89 t ha^{-1}. The best part of his activities was he communicated to the seed dealer of Patuakhali Sadar Upazilla and sold his seeds @ Tk. 170.00-180.00/kg to him. Moreover, at fibre crop season he collected the fibres from his neighbouring farmers and sold to a Jute Mill in Gopalganj @ Tk.2200.00/maund. I thank him for his cordeal efforts for being successful in jute seed production in a remote area of Patuakhali.

Fig: 31: Mr. Delowar khan in his seed plot

Fig. 32: Mr. Delowar's 1st year seed plot

Fig. 33:Sign board of Mr. Delowar's seed plot

5. Please describe briefly the outcome/benefit and likely impact of your project on the productivity, policy, Society, economy and environment.

Answer:

Through the project activities popularization of the six BJRI variety (three deshi jute variety CVL-1, CVE-3 and BJC-2197 and 3 tossa jute varieties O-72, O-9897 and O-795), 4 seed production methods-broadcast, line, cutting and seedling transplanting method, jute seed production in different combination of intercropping system with winter vegetables has been popularized to the farmers and extension workers, and adoption of jute seed production techniques has been enhanced. Capacity building of farmers and extension workers has been developed through rendering training services to 300 farmers and 360 nos. of GO/NGO professionals and conducting 12 field days with 1200 farmers on ongoing demonstrated tecghnology. Overall scope of increasing in jute cultivation in new areas of Bangladesh has been created. Scope of increased production and supply of BJRI HYV jute seeds has been created in project areas. The jute seed production in intercropping system was as much as 1.77 kg/decimal i.e. 438kg/ha which has broken down the traditional yield of 200kg to 300kg/ha in intercropping system. Increased income (as much as 2-3 times

income over single cropping of jute seed production) through increased seed and winter vegetables production as intercropping has been ensured.

Increased yield of jute seeds and winter vegetables were found in small scale area production as it is seay to a farmer to take care of and bearing the input costs. In our country the jute seeds production should also be in small area of land so that a farmer can meet his demand of jute seeds through his self production. Because, the jute seeds' sell price is not proportionate to the production costs and farmers are reluctant to jute seed production. In this case we should follow the motto, "Nijer beez nije kori". If farmers follow intercropping systems of jute seed production thay will be economically viable as well as family nutrition will be ensured and self required jute seed will also be produced. It has been noticed that in our country only 2-5 kg jute seeds /farmer are requird to 80% of farmers. So, 2 to 5 decimals are enough to meet his seeds demand and it is easy to take care of and to supply the inputs in jute seeds production by farmer himself.

In jute seed production about 6.50 ton of CO_2 and in jute fibre production 14.0 ton of CO_2 is absorbed from the air and 11.ton of O_2 is supplied to nature per ha of land in its life cycle. Moreover, the jute crop offers about 8.0 ton of crop residues to soil which nourishes the soil health. So, jute cultivation either in seed or fibre, it is very much congenial to soil, nature and environment.

K. Acknowledgement:

I acknowledge and pay my gratitude to the KGF authority to select me to run the project and also thak them for funding the project. I thank BJRI authority to support me in running the project and also for extending their technical and administrative hands to be successful the project activities.

K. Endorsement:

Head of Applying Organization/Authorized Person

Name: Dr. Md. Monjurul Alam

Signature:

Seal:

Date:

[Note: *I. For coordinated projects, progress report (physical, technical and financial) for the reporting period and activity plan for this next 6 months should be given component wise and coordinator will compile and summarize where necessary.*
II Statements within [ ] are the guidelines/instructions which may be ignored during report preparation.

III. Two copies (spiral binding) of the progress report need to be submitted within 7 days after the end of the project half year]

Appendix Table 1: Varietal performance of seed production with winter vegetables at Kalapara Upazilla

Location	No.	Farmers' Name and address	Land (deci)	Salinity (dS/m)	Date of Sowing /Planting	Variety		Date of harvest	
						Jute seed	Vegetables	Jute Seed	Vegetables
Kalapara (Patuakhali)	01	Md. Asadul Islam S/O, Abdur Razzak, Kumirmara, Nilganj, Kalapara, Patuakhali	9	1.29	15.09.13 T:17.11.13	O-9897 O-72 O-795	BARI Lalshak-1 Turnip: Early white BARITomato-14	11.01.14	R.A.*:15.10.13-16.11.13 Tur: 27.12.13-05.01.14 Tom: 20.10.13-05.01.14
	02	Osman Howlader S/O, Hafez Howlader, Amirabad, Nilganj, Kalapara, Patuakhali	12	5.71	16.09.13 T:17.11.13			14.01.14	R.A.*:15.10.13-16.11.13 Tur: 29.12.13-07.01.14 Tom: 20.10.13-07.01.14
	03	Chunnu Mia S/O, Abdul Khalek Munsi Pankhimara, Nilganj, Kalapara, Patuakhali	9	4.12	12.10.13 T:18.11.13			04.02.14	R.A.*:03.11.13-17.11.13 Tur: 30.12.13-10.01.14 Tom: 08.11.13-10.01.14

Appendix Table 2: Varietal performance of seed production with winter vegetables at Wazirpur Upazilla

Location	No.	Farmers' Name and address	Land (deci)	Salinity (dS/m)	Date of Sowing /Planting	Variety		Date of harvest	
						Jute seed	Vegetables	Jute Seed	Vegetables
Wazirpur (Barisal)	01	Md. Wajed Ali Shikder S/O, Mafez Uddin Shikder, Haridrapur, Ujirpur, Barisal	30	1.28	30.10.13 T:09.12.13	O-9897 O-72 O-795	BARI Lalshak-1 Turnip: Early white BARITomato-14	23.02.14	R.A.*:24.11.13-08.12.13 Tur: 20.01.14-30.01.14 Tom: 30.11.13-30.01.14
	02	Md. Mahabul Khan S/O, Satter Khan South Sikarpur, Ujirpur, Barisal	24	0.74	30.10.13 T:09.12.13			22.02.14	R.A.*:24.11.13-08.12.13 Tur: 20.01.14-30.01.14 Tom: 30.11.13-30.01.14
	03	Md. Kashem Ali Shikder S/O, Mafez Uddin Shikder Haridrapur, Ujirpur, Barisal	14	1.62	18.10.13 T:02.12.13			11.02.14	R.A.*:16.11.13-01.12.13 Tur: 13.01.14-25.01.14 Tom: 22.11.13-25.01.14
	04	Abdur Rab Tamider S/O, Asmat Ali Tamider, Othia, Ujirpur, Barisal	24	1.41	15.10.13 T:27.11.13			10.02.14	R.A.*:12.11.13-26.11.13 Tur: 07.01.14-18.01.14 Tom: 17.11.13-18.01.14
	05	Md. Moniruzzaman Kabir S/O, Karim Howlader West Nayana, Ujirpur, Barisal	15	1.43	10.10.13 T:21.11.13			03.02.14	R.A.*:05.11.13-20.11.13 Tur: 01.12.13-20.01.14 Tom: 10.11.13-20.01.14
		* R.A.= Red – Amaranthus, T/Tur.=Turnip, Tom.=Tomato, Jute and Red amaranthus were direct seeding and tomato seedling were transplanted in the same day and Turnip was also transplanted in the field at mentioned dates							

Appendix Table 3: Varietal performance of seed production with winter vegetables at Patuakhali Sadar Upazilla

Sl.	Farmer's Name & Address	Soil salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Date of harvest	Seed Yield (Kg/ha)
01.	Md. Hashem Howlader S/o, Md. Eunus Howlader Tastakhali, Etabaria, Patuakhali Sadar	1.29	O-9897 O-795 O-72	09	16-09-14	15.01.15	187 195 158
02.	Md. Harun Howlader S/o, Md. Hashem Howlader Tastakhali, Etabaria, Patuakhali Sadar	2.06	O-9897 O-795 O-72	12	25-09-14	23.01.15	180 198 163
03.	Md. Masum Pada S/o, Md. Zoni Mridha Uttar Bazar Ghona, Morichbunia, P. Sadar	1.13	O-9897 O-795 O-72	15	03-09-14	02.01.15	170 189 168
04.	Md. Mahabub Sikder S/o, Md. Sahammod Sikder Vill.- Dhankhali, Patuakhali Sadar	3.76	O-9897 O-795 O-72	15	14-09-14	16.01.15	157 172 119
05.	Md. Forkan Mridha S/o, Zobed Ali Mridha Vill.- Kalikapur, Patuakhali Sadar	0.65	O-9897 O-795 O-72	18	05-09-14	02.01.15	197 214 178
06.	Md. Nasir Mridha S/o, Md. Awal Mridha Vill.- Awaliapur, Patuakhali	1.51	O-9897 O-795	12	02-09-14	02.01.15	179 181

	Sadar		O-72				166
Total:				82			
(0-2 dS/m= non saline, 2-4 dS/m= very slightly saline, 4-8 dS/m slightly saline and 8-15 dS/m moderately saline soil)							

Appendix Table 4: Varietal performance of seed production with winter vegetables at Babuganj Upazilla, Barisal

Sl. No.	Farmer's Name & Address	Soil salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Date of harvest	Seed Yield (Kg/ha)
01.	Md. Helal Howlader S/o, A. Kader Howlader Vill.- North Rahamatpur Babugonj, Barisal	0.82	O-9897, O-795 & O-72	12	21-09-14	20.01.15	179 180 158
02	Md. Jamal Howlader S/o, A. Kader Howlader Vill.- North Rahamatpur Babugonj, Barisal	1.20		15	21-09-14	21.01.15	178 196 164
03.	Md. Abul Hossen S/o, Md. Hasen Ali Vill.-Baherchar, Babugonj, Barisal	1.67		12	27-09-14	25.01.15	163 177 156
04.	Md. Nur Alam Khan S/o, Md. Rupa Khan Vill.-Baherchar, Babugonj, Barisal	1.60		15	28-09-14	27.01.15	167 183 147
05.	Md. Alauddin S/o, Adom Ali Vill.- North Rahamatpur, Babugonj, Barisal	0.84		12	19-09-14	20.01.15	182 189 166
06.	Md. Nayon S/o, Md. Fazlu Master Vill:- East Bhutherdia, Babugonj, Barisal	1.28		12	12-09-14	10.01.15	170 193 160
Total:				78			

Appendix Table 5: Jute seed yield as affected by different seed production method at Patuakhali Sadar Upazilla.

Sl.	Farmer's Name & Address	Soil Salinity (dS/m)	Variety	Production Method	Land Size (Deci.)	Sowing Date	Date of harvest	Seed Yield (Kg/ha)
01.	Nur Nehar H/b, Md. Masum Pada Uttar Bazar Ghona, Morichbunia, Patuakhali Sadar	2.76	O-9897	Broad casting Line sowing Top Cutting Seedling transplanting	16	05-09-14	03.01.15	140 168 136 0
02.	Md. Khaleq Sarder S/o, Alamoddin Sarder Kalatala Bazar, Kalikapur, Patuakhali Sadar	0.89	O-9897	Broad casting Line sowing Top Cutting Seedling transplanting	12	02-09-14	31.12.14	144 189 129 77
03.	Kashem Master S/o, Md. Kodom Ali Patuakhali Sadar	2.22	O-9897	Broad casting Line sowing Top Cutting Seedling transplanting	16	12-09-14	03.01.15	151 178 101 0
04.	Forkan Mridha S/o, Seraj Mridha Sonali Bank Shakha, Patuakhali Sadar	2.31	O-9897	Broad casting Line sowing Top Cutting Seedling transplanting	10	12-09-14	08.01.15	149 193 113 0
05.	Md. Ruhul Amin Matubbor S/o, Sekandar Matubbor 2 No. Bandh Gath, Patuakhali Sadar	0.69	O-9897	Broad casting Line sowing Top Cutting Seedling transplanting	16	02-09-14	03.01.15	155 184 98 126
06.	Md. Mizanur Howlader S/o, Kader Howlader Town Balgasia, Patuakhali Sadar	4.15	O-9897	Broad casting Line sowing Top Cutting Seedling transplanting	12	04-09-14	05.01.15	133 188 67 32

Total:				82			
(0-2 dS/m= non saline, 2-4 dS/m= very slightly saline, 4-8 dS/m slightly saline and 8-15 dS/m moderately saline soil)							

Appendix Table 6: Jute seed yield as affected by different seed production method at Babuganj Upazilla, Barisal.

Sl.	Farmer's Name & Address	Soil Salinity (dS/m)	Variety	Production Method	Land Size (Deci.)	Sowing Date	Date of harvest	Seed Yield (Kg/ha)
01.	Md Abul Basher South Bhutherdia, Babugonj, Barisal	1.37	O-795	Broad casting Line sowing Top Cutting Seedling transplanting	12	15-09-14	13.01.15	131 149 119 47
02.	Md. A. Rahim Howlader Kedarpur, Babugonj, Barisal	1.38	O-795	Broad casting Line sowing Top Cutting Seedling transplanting	08	17-09-14	17.01.15	129 157 129 0
03.	Ali Akbar Khan North Rahamatpur, Babugonj, Barisal	2.33	O-795	Broad casting Line sowing Top Cutting Seedling transplanting	12	08-09-14	06.01.15	138 158 61 0
04.	Md. Hiron Mollah Vill.- Baherchar, Babugonj, Barisal	2.13	O-795	Broad casting Line sowing Top Cutting Seedling transplanting	20	29-09-14	26.01.15	119 163 43 0
05.	Md. Ashraful Howlader Vill.- Kesmot Chandpasha, Babugonj, Barisal	5.92	O-795	Broad casting Line sowing Top Cutting Seedling transplanting	10	07-09-14	03.01.15	132 189 179 68
06.	Md. Mofizul Islam Vill:- East Bhutherdia, Babugonj, Barisal	1.30	O-795	Broad casting Line sowing Top Cutting Seedling transplanting	12	11-09-14	12.01.15	139 187 89 0
Total:					72			

Appendix Table 7: List of farmers producing jute seed with winter vegetables at Patuakhali Sadar Upazilla

Sl.	Farmer's Name & Address	Soil salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Harvest Date	Seed Yield (Kg)	Seed Yield (Kg/ha)
01.	Mrs. Nasima Begum H/b. Md. Forkan Mridha Vill.- Kalikapur, Patuakhali Sadar	1.78	O-795	12	04-09-2014	01-01-2015	5.2	107.50
02.	Md. Rasel Sikder S/o, Md. Harun or Rashid Vill.- Dhankhali, Patuakhali Sadar	2.06	O-9897	10	04-09-2014	03-01-2015	4.6	114.00
03.	Md. Bellal Khan S/o, Md. Asman Khan Vill.- Dhankhali, Patuakhali Sadar	2.34	O-9897	14	04-09-2014	02-01-2015	8.0	142.00
04.	Md. Sydul Sikder S/o, Md. Bazlur Rahaman Vill.- Dhankhali, Patuakhali Sadar	2.51	O-9798	15	12-09-2014	15-01-2015	9.2	152.00
05.	Md. Zalal Khan S/o, Md. Asman Khan Vill.- Dhankhali, Patuakhali Sadar	2.16	O-9897	12	12-09-2014	15-01-2015	4.7	97.00
06.	Md. Chnnu Khan S/o, Md. Rashid Khan, Vill.- Dhankhali, Patuakhali Sadar	2.45	O-9897	09	12-09-2014	15-01-2015	5.0	138.00
07.	Md. Abdur Rob Howlader S/o, Md. Motahar Howlader Vill.- Dhankhali, Patuakhali Sadar	3.57	O-9897	12	19-09-2014	20-01-2015	5.6	116.00
08.	Md. Delower Khan S/o, Md. Asman Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	1.88	O-795	15	17-09-2014	20-01-2015	24.0	396.00
09.	Md. Hafez Howlader S/o, Md. Ishak Howlader	1.36	O-795	09	13-09-2014	12-01-2015	5.3	146.00

	Vill.- Etabaria, Patuakhali Sadar							
10.	Md. Zashim Howlader S/o, Ali Akbor Howlader Vill.- Etabaria, Patuakhali Sadar	1.29	O-795	10	13-09-2014	15-01-2015	6.0	149.00
11.	Md. Bashir Howlader S/o, Md. Ibrahim Howlader Vill.- Etabaria, Patuakhali Sadar	1.28	O-795	18	19-09-2014	20-01-2015	8.4	116.00
12.	Md. Moti Howlader S/o, Md Rustum Howlader Vill.- Etabaria, Patuakhali Sadar	1.13	O-795	19	15-09-2014	17-01-2015	9.7	127.00
13.	Md.Amzed Howlader S/o, Md. Tozam Howlader Vill.- Etabaria, Patuakhali Sadar	1.19	O-795	10	15-09-2014	18-01-2015	5.5	136.00
14.	Md. Zalal Howlader S/o, Md. Tozam Howlader Vill.- Dhankhali, Patuakhali Sadar	2.39	O-795	08	10-09-2014	15-01-2015	5.2	161.00
15.	Md. Sattar Howlader S/o, Md. Azim uddin Howlader Vill.- Etabaria, Patuakhali Sadar	1.21	O-795	12	22-09-2014	25-01-2015	6.4	132.00
16.	Md. Al-Amin Howlader S/o, Md. Moti Howlader Vill.- Dhankhali, Patuakhali Sadar	0.69	O-795	15	23-09-2014	25-01-2015	7.0	116.00
17.	Md. Zalil Howlader S/o, Md. Seraj Ali Howlader Vill.- Dhankhali, Patuakhali Sadar	2.32	O-795	09	23-09-2014	25-01-2015	3.8	105.00
18.	Md. Barek Howlader S/o, Md Azahar Howlader Vill.- Dhankhali, Patuakhali Sadar	2.12	O-795	10	16-09-2014	20-01-2015	6.1	151.00
19.	Md. Zahangir Akon S/o, Charag Ali Akon Vill.- Dhankhali, Patuakhali Sadar	2.37	O-795	15	02-09-2014	05-01-2015	9.0	149.00
20.	Md. Khaleque Akon S/o, Charag Ali Akon Vill.- Dhankhali, Patuakhali Sadar	0.89	O-9897	09	20-09-2014	25-01-2015	4.2	116.00
21.	Md. Sahin Akon S/o, Charag Ali Akon Vill.- Dhankhali, Patuakhali Sadar	0.68	O-9897	20	06-09-2014	09-01-2015	12.4	154.00
22.	Md. Hazrat Howlader S/o, Md. Khabir Howlader Vill.- Etabaria, Patuakhali Sadar	1.41	O-9897	12	28-09-2014	01-02-2015	5.0	103.00
23.	Md. Forkan Howlader S/o, Md. Anech Howlader Vill.- Dhankhali, Patuakhali Sadar	2.46	O-9897	08	25-09-2014	25-01-2015	4.2	130.00
24.	Md. Kibria Howlader S/o, Md. Kalam Howlader Vill.- Etabaria, Patuakhali Sadar	1.07	O-9897	16	15-09-2014	26-01-2015	6.8	105.00
25.	Md. Habib Howlader S/o, Serali Howlader Vill.- Dhankhali, Patuakhali Sadar	2.27	O-9897	10	12-09-2014	15-01-2015	4.3	107.00
26.	Md. Abul Kalam S/o, Md. Montaz Akon Vill.- Etabaria, Patuakhali Sadar	1.26	O-9897	08	12-09-2014	15-01-2015	4.7	146.00
27.	M. A. Zabbar Pada S/o, Md. Sekandar Pada Vill.- Awaliapur, Patuakhali Sadar	1.76	O-9897	10	03-10-2014	07-02-2015	4.7	117.00
28.	Sanjoy Shill S/o, Sunil Shil Bashak Bazar, Patuakhali Sadar	1.54	O-9897	12	25-09-2014	25-01-2015	5.2	107.00
29.	Md. Rashid Howlader S/o, Md Rustum Ali Howlader Vill.- Dhankhali, Patuakhali Sadar	3.53	O-9897	16	14-09-2014	-	Damaged	-
30.	Md. Zobbar Zomodder S/o, Md. Mokles Zomodder Town Bolgasia, Patuakhali Sadar	1.71	O-9897	18	24-09-2014	20-01-2015	7.0	96.00
31.	Md. Abul Kalam S/o, Md. Abdur Razzak Kalikapur, Patuakhali Sadar	1.68	O-9897	12	12-09-2014	15-01-2015	4.4	91.00
32.	Sohagh Kanti Ball S/o, Rakhal Kanti Ball	1.89	O-9897	10	10-09-2014	10-01-2015	5.6	139.00

	Govt. Housing, Patuakhali Sadar							
33.	Md. Sazahan S/o, Manan Khondokar Govt. Housing, Patuakhali Sadar	1.81	O-9897	15	20-09-2014	19-01-2015	6.5	107.00
34.	Rezaul Sarder S/o, Khaleq Sarder Kalatala Housing, Patuakhali Sadar	1.67	O-9897	10	24-09-2014	25-01-2015	5.0	124.00
35.	Md. Sahalam S/o, Md. Raze Ali Howlader Town Balgasia, Patuakhali Sadar	1.97	O-9897	10	28-09-2014	30-01-2015	5.8	144.00
36.	Md. Khalil Akon S/o, CharagAli Akon Vill.- Dhankhali, Etabaria, Patuakhali Sadar	3.49	O-9897	12	28-09-2014	-	Damaged	-
37.	Md. Zobbar Zomoddar S/o, Md. Mokles Zomoddar 2 No, Bandh Gath, P. Sadar	1.78	O-9897	07	30-09-2014	-	Damaged	-
38.	M. A. Satter S/o, Yeamin Howlader, Kalikapur Square, Patuakhali Sadar	1.82	O-9897	13	29-09-2014	30-01-2015	7.0	134.00
Total:				455			200.4	-

Appendix Table 8: List of farmers producing jute seed with winter vegetables at Babuganj Upazilla, Barisal

Sl.	Farmer's Name & Address	Salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Harvest Date	Seed Yield (Kg)	Seed Yield (Kg/ha)
01.	Md. Sohel Rana Vill:-Kedarpur,Babugonj, Barisal	1.45	O-9897	10	13-09-2014	10-01-2015	4.3	107.00
02.	Md. Sohel Rana Vill:- East Bhutherdia, Babugonj, Barisal	1.29	O-9897	10	12-09-2014	15-01-2015	4.7	117.00
03.	Md. Milon Vill:- East Bhutherdia, Babugonj, Barisal	1.33	O-9897	12	12-09-2014	10-01-2015	4.4	91.00
04.	Md. Edris Kobiraz Vill:- East Bhutherdia, Babugonj, Barisal	1.31	O-9897	10	12-09-2014	11-01-2015	5.6	139.00
05.	Md. Sirajul Haque Choukider Vill:- East Bhutherdia, Babugonj, Barisal	1.30	O-72	15	17-09-2014	15-01-2015	5.7	94.00
06.	Mrs. Runu Begum Vill:- East Bhutherdia, Babugonj, Barisal	1.31	O-9897	12	17-09-2014	15-01-2015	7.8	149.00
07.	Md. Riad Hossen Vill:- East Bhutherdia, Babugonj, Barisal	1.36	O-72	12	17-09-2014	20-01-2015	4.6	95.00
08.	Md. Anis Howlader Vill.- Kedarpur, Babugonj, Barisal	1.55	O-795	08	19-09-2014	20-01-2015	3.3	102.00
09.	Md. Babul Howlader Vill.- Kedarpur, Babugonj, Barisal	1.51	O-795	08	19-09-2014	20-01-2015	4.2	130.00
10.	Md. Kamal Howlader Vill.- Kedarpur, Babugonj, Barisal	1.37	O-72	10	20-09-2014	-	Damaged	-
11.	Md. Kamal Howlader Vill.- North Rahamatpur,Babugonj, Barisal	0.77	O-72	08	22-09-2014	20-01-2015	4.5	140.00
12.	Md. A. Ahamadf Emon Vill:- Bhutherdia, Babugonj, Barisal	1.36	O-72	12	23-09-2014	25-01-2015	4.8	99.00
13.	Md. Golam Sorower Vill:- Bhutherdia, Babugonj, Barisal	1.32	O-72	10	23-09-2014	20-01-2015	4.2	104.00
14.	Md. Ibrahim Vill.- Baherchar, Babugonj, Barisal	1.78	O-9897	08	27-09-2014	29-01-2015	2.9	90.00
15.	Md. Azahar Seikh Vill.- Baherchar, Babugonj, Barisal	1.64	O-72	14	07-09-2014	05-01-2015	6.0	106.00
16.	Md. Khokon Sheikh Vill.- Baherchar, Babugonj, Barisal	1.63	O-72	14	29-09-2014	-	Damaged	-
17.	Md. Rejaul Karim Vill.- Baherchar, Babugonj, Barisal	1.64	O-72	10	30-09-2014	29-01-2015	5.6	136.00
18.	Md. Harun Vill.- Baherchar, Babugonj, Barisal	1.67	O-72	08	30-09-2014	31-01-2015	3.1	96.00
19.	Md. Saha Alam Khan Vill.- Baherchar, Babugonj, Barisal	1.60	O-72	12	29-09-2014	-	Damaged	-

20.	Md. Montu Howlader Vill.-Baherchari, Babugonj, Barisal	1.77	O-72	14	29-09-2014	28-01-2015	4.8	85.00
21.	Md. Full Sharif Baherchar Khudrakati, Babugonj, Barisal	1.67	O-795	08	01-10-2014	01-02-2015	5.3	164.00
22.	Md. Fahim Howlader Vill.-KesmotChandpasha,Babugonj, Barisal	5.92	O-795	10	07-10-2014	-	Damaged	-
23.	Md Liton Howlader Vill.- Chandipur, Babugonj, Barisal	1.15	O-795	10	07-10-2014	06-02-2015	3.9	97.00
24.	Md. Tuhin Howlader Vill.-Chandipur, Babugonj, Barisal	1.21	O-72	10	06-09-2014	08-01-2015	5.8	144.00
25.	Kabir Hossen Sentu Vill.- North Rahamatpur, Babugonj, Barisal	0.93	O-795	10	04-10-2014	05-02-2015	3.7	92.00
26.	Mst. Rezia Begum Vill.- North Rahamatpur, Babugonj, Barisal	0.79	O-795	08	04-09-2014	-	Damaged	-
27.	Md. Momin Howlader S/o, Nur Mohammad Howlader Vill.- North Rahamatpur, Babugonj, Barisal	0.87	O-795	10	06-09-2014	05-01-2015	3.6	89.00
28.	Md. Kamrul Howlader Vill.- North Rahamatpur, Babugonj, Barisal	0.92	O-795	08	06-09-2014	05-01-2015	5.2	161.00
29.	Md. Mehedi Hasan Vill.- North Rahamatpur, Babugonj, Barisal	0.81	O-795	08	04-09-2014	04-01-2015	3.1	96.00
30.	Md. Rakib Hossen Vill.- Rahamatpur, Babugonj, Barisal	0.91	O-9897	10	14-09-2014	15-01-2015	5.3	131.00
31.	Md. Mokter Hossen Vill.- Chandipur, Babugonj, Barisal	1.21	O-72	10	07-09-2014	05-01-2015	4.5	112.00
32.	Md. Faruk Mazhi Vill:- East Bhutherdia, Babugonj, Barisal	1.33	O-9897	12	18-09-2014	20-01-2015	7.0	145.00
33.	Md. Alamgir Mal Vill:- Middel Bhutherdia, Babugonj, Barisal	1.23	O-72	09	24-09-2014	22-01-2015	3.2	88.00
34.	Md. Kamal Mal Vill:- Middel Bhutherdia, Babugonj, Barisal	1.27	O-72	10	24-09-2014	-	Damaged	-
35.	Md. Delower Dhali Vill.- Rampotti, Babugonj, Barisal	1.42	O-72	10	15-09-2014	18-01-2015	4.0	99.00
36.	Md. Kamal Hossen Vill.- Rampotti, Babugonj, Barisal	1.37	O-72	08	15-09-2014	15-01-2015	3.8	118.00
37.	Md. Selim Dhali Vill.- Rampotti, Babugonj, Barisal	1.42	O-9897	07	15-09-2014	17-01-2015	3.00	106.00
38.	Mr. Zogen Mistri Vill.- Rahamatpur, Babugonj, Barisal	1.39	O-72	10	11-09-2014	15-01-2015	4.4	109.00
				366			143.0	

Appendix Table 9: List of farmers producing deshi jute fibre at Sadar Upazilla, Patuakhali

	Farmer's Name & Address	Salinity (dS/m)	Variety	Land Size (Deci.)	Sowing Date	Sowing method	Harvest Date	Fibre Yield (Kg)	Fibre Yield (ton/ha)
01	Md. Zakir Mridha East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.70	BJC-2197 CVE-3 CVL-1	30	18.04.15	Line and Broad cast	17.08.15	307	2.54
02	Md. Zafar Khan Dhan Khali, Eit baria, Patuakhali Sadar	2.79		30	19.04.15		18.08.15	332	2.74
03	Shahin Akon Dhan Khali, Eit baria, Patuakhali Sadar	2.21		15	08.05.15		05.09.15	147	2.43
04	Mizanur Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.72		12	07.05.15		05.09.15	110	2.27
05	Md. Hazrat Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68		12	08.05.15		10.09.15	116	2.40
06	Md. Abdur Rob Howlader Dhan Khali, Eit baria, Patuakhali Sadar	2.42		15	08.05.15		07.09.15	160	2.65
07.	Md. Nasir Mridha Basak Bazar, Kalikapur, Patuakhali Sadar	1.82		12	09.05.15		08.09.15	100	2.07

				126				1272	

Appendix Table 10: List of farmers producing tossa jute fibre at Sadar Upazilla, Patuakhali

Sl.	Farmer's Name & Address	Salinity (dS/m)	Variety	Land Size (Deci.)	Sowing Date	Sowing method	Harvest Date	Fibre Yield (Kg)	Fibre Yield (ton/ha)
01	Md. Nuru Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.78	O-795	18	27-04-15	L*	26-08-15	138	1.90
02	Md. Rasel Sikder Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.06	O-795	10	19-04-15	L	18-08-15	136	3.37
03	Md. Hasem Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.71	O-795	20	08-05-15	L	10-09-15	197	2.44
04	Md. Mafez Howlader Vill.- Etabaria, Patuakhali Sadar	1.36	O-795	12	04-05-15	L	01-09-15	114	2.36
05	Md. Bashir Howlader Vill.- Etabaria, Patuakhali Sadar	1.28	O-795	18	20-04-15	L	16-08-15	215	2.96
06	Md. Sattar Howlader Vill.- Etabaria, Patuakhali Sadar	1.21	O-795	27	04-05-15	L	01-09-15	242	2.22
07	Md. Moti Khan Vill.- Etabaria, Patuakhali Sadar	1.13	O-795	22	20-04-15	B	20-08-15	253	2.85
08	Md. Sajahan Koltala, Pourshava, Patuakhali Sadar	1.81	O-9897	15	08-05-15	L	07-09-15	152	2.51
09	Abdul Zabbar Zamadder East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.89	O-9897	12	08-05-15	L	07-09-15	124	2.56
10	Md. Unuch Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68	O-9897	25	15-04-15	L	14-08-15	292	2.90
11	Md. Nasir Sikder East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68	O-9897	20	18-04-15	L	20-08-15	220	2.73
12	Abdul Satter How. Kalikapur Square, Patuakhali Sadar	1.82	O-72	11	07-05-15	L	02-09-15	110	2.48
13	Md. Mozibur Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.66	O-72	25	15-04-15	L	14-09-15	272	2.70
14	Md. Nuru Molla East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.71	O-72	25	18-04-15	L	15-08-15	281	2.79
15	Md. Jalil Gazi East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.71	O-72	30	18-04-15	L	15-08-15	326	2.70
16	Md. Ripon Mridha East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68	O-72	20	19-04-15	L	17-08-15	228	2.83
17	Md. Rashid Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	3.53	O-795	16	20-04-15	B*	22-08-15	188	2.91
18	Md. Abdul Khalek Khan Dhankhali, Etabaria, Patuakhali Sadar	1.29	O-795	16	20-04-15	B	22-08-15	183	2.84
19	Md. Delwar Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.34	O-795	15	24-04-15	L	20-08-15	175	2.89
20	Dholu Chandra Shil Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-795	15	07-05-15	B	-	Damaged	-
21	Md. Mijan Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.67	O-795	10	08-05-15	B	05-09-15	116	2.88
22	Md. Ayub Ali Sikder Dhankhali, Etabaria, Patuakhali Sadar	2.34	O-795	13	08-05-15	B	08-09-15	137	2.61
23	Md. Anwar Howlader Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-795	20	04-05-15	B	01-09-15	234	2.90
24	Bimal Chandra shil Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-795	15	07-05-15	B	05-09-15	154	2.55
25	Md. Bashir Mridha East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.81	O-795	10	08-05-15	B	10-09-15	110	2.73

26	Abdul Khaleque Sarder East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.67	O-9897	12	07-05-15	B	05-09-15	114	2.36
27	Md. Sydul Sikder Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.51	O-9897	22	20-04-15	B	20-08-15	224	2.53
28	Md. Abul Kalam Akon Vill.- Etabaria, Patuakhali Sadar	1.26	O-9897	12	08-05-15	B	07-09-15	107	2.21
29	Md. Mintu Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-9897	15	04-05-15	B	01-09-15	148	2.45
30	Abdur Rahim Khandker Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-9897	15	04-05-15	B	01-09-15	152	2.51
31	Sushil Chandra Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68	O-9897	30	19-04-15	B	20-08-15	294	2.43
32	Md. Faruk Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.34	O-9897	16	20-04-15	B	20-08-15	170	2.64
33	Md. Jalal Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.16	O-72	24	19-04-15	B	17-08-15	199	2.06
34	Abdul Zabbar Gazi East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.71	O-72	24	20-04-15	B	22-08-15	258	2.67
35	Md. Milon Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.45	O-72	20	20-04-15	B	219-08-15	212	2.63
36	Md. Razzak Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.67	O-72	15	09-05-15	B	12-09-15	146	2.41
37	Abdur Razzak Sikder Dhankhali, Etabaria, Patuakhali Sadar	3.57	O-72	15	09-05-15	B	07-09-15	149	2.46
Total:				660				6780 kg	

L*= Line sowing and B*= Broad cast sowing

Appendix Table 11: List of farmers producing tossa jute fibre at Babuganj Upazilla, Barisal

Sl.	Farmer's Name & Address	Salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Sowing method	Harvest Date	Fibre Yield (Kg)	Fibre Yield (ton/ha)
01.	Md. Saiful Chowkider Kedarpur, Babugonj, Barisal	1.30	O-795	20	08-04-15	Line	08-08-15	275	3.41
02	Md. Safiulla Chowkider South Bhutherdia, Babugonj, Barisal	1.37	O-795	15	08-04-15	Line	06-08-15	165	2.72
03	Md. Parvez Khan Baherchar Khudrakati, Babugonj, Barisal	1.66	O-795	15	07-04-15	Line	05-08-15	139	2.30
04	Md. Momin Howlader Dicrir Char, Chandpasa, Babugonj, Barisal	0.87	O-795	15	23-04-15	Line	20-08-15	144	2.38
05	Md. Ansar Howlader Baherchar Khudrakati, Babugonj, Barisal	1.54	O-795	10	05-05-15	Line	02-09-15	126	3.12
06	Md. Humayun Howlader Baherchar Khudrakati, Babugonj, Barisal	1.77	O-9897	12	18-04-15	Line	20-08-15	166	3.43
07	Md. Milon East Bhutherdia, Babugonj, Barisal	1.33	O-9897	25	16-04-15	Line	15-08-15	328	3.25
08	Md. Bazlu Khan Kedarpur, Babuganj, Barisal	1.30	O-9897	20	08-04-15	Line	10-08-15	280	3.47
09	Md. Abul Hossain Baherchar Khudrakati, Babugonj, Barisal	2.15	O-9897	14	07-04-15	Line	05-08-15	111	1.97
10	Md. Milon Sarif Chandpasa, Babugonj, Barisal	1.46	O-9897	20	27-04-15	Line	25-08-15	243	3.01
11	Md. Anwar Sikder Chandpasa, Babugonj, Barisal	1.42	O-9897	12	25-04-15	Line	24-08-15	98	2.03
12	Md. Alim Howlader Baherchar Khudrakathi, Babugonj, Barisal	1.63	O-9897	10	09-04-15	Line	10-08-15	100	2.48
13	Md. Abul Hossen Vill.-Baherchar, Babugonj, Barisal	1.67	O-9897	15	07-05-15	Line	04-09-15	111	1.84
14	Golam Mostafa Akon Dicrir Char, Chandpasa, Babugonj, Barisal	1.60	O-9897	20	16-04-15	Line	16-08-15	164	2.03
15	Md. Anis Akon Dicrir Char, Chandpasa, Babugonj, Barisal	1.60	O-9897	25	08-04-15	Line	07-08-15	327	3.24

16	Montu Chowkider East Bhutherdia, Babugonj, Barisal	1.33	O-72	12	08-04-15	Line	07-08-15	172	3.55
17	Sahin Howlader Kedarpur, Babugonj, Barisal	1.37	O-72	20	07-04-15	Line	06-08-15	224	2.78
18	Md. Amir Chowdhury Kedarpur, Babugonj, Barisal	1.45	O-72	20	07-04-15	Line	02-08-15	169	2.10
19	Md. Sydul Chowkidar Kedarpur, Babugonj, Barisal	1.45	O-72	16	07-04-15	Line	02-08-15	148	2.29
20	Md. Sahjahan Bapari Dicrir Char, Chandpasa, Babugonj, Barisal	1.33	O-72	20	09-04-15	Line	08-08-15	262	3.25
21	Md. Hiron Mollah Baherchar, Babugonj, Barisal	2.13	O-795	20	05-05-15	BC*	03-09-15	132	1.64
22	Md. Nur-E- Alam Khan Baherchar, Khudrakathi, Babugonj, Barisal	1.89	O-795	22	13-04-15	BC	12-08-15	265	2.99
23	Md. Siddik Sikder Chandpasa, Babugonj, Barisal	1.44	O-795	28	28-04-15	BC	25-08-15	351	3.11
24	Md. Montu Howlader Baherchar Khudrakati, Babugonj, Barisal	1.77	O-795	14	10-05-15	BC	12-09-15	120	2.13
25	Md. Samim Howlader North Rahmatpur, Babugonj, Barisal	0.81	O-795	20	13-04-15	BC	10-08-15	188	2.33
26	Md. Ibrahim Khan Kedarpur, Babugonj, Barisal	1.41	O-795	20	07-04-15	BC	05-08-15	178	2.21
27	Md. Azahar Seikh Baherchar, Babugonj, Barisal	1.64	O-9897	12	15-04-15	BC	15-08-15	103	2.13
28	Md. Helal Howlader North Rahamatpur, Babugonj, Barisal	0.82	O-9897	28	17-04-15	BC	15-08-15	414	3.67
29	Md. Hasib Hossen Singhakathi, Rahmatpur, Babugonj, Barisal	0.83	O-9897	25	26-04-15	BC	24-08-15	277	2.74
30	Md. Sahe Alam Khan Dicrir Char, Chandpasa, Babugonj, Barisal	1.87	O-9897	20	17-04-15	BC	15-08-15	180	2.23
31	Md. Monacef Bapari Dicrir Char, Chandpasa, Babugonj, Barisal	1.89	O-9897	20	08-04-15	BC	07-08-15	215	2.67
32	Md. Nazrul Islam Khan Kalikapur, Chandpasa, Babugonj, Barisal	1.44	O-9897	20	27-04-15	BC	24-08-15	296	3.67
33	Md. Habibur Rahman Khan Kedarpur, Babugonj, Barisal	1.41	O-9897	20	07-04-15	BC	05-08-15	222	2.75
34	Md. Monsur Ali North Rahmatpur, Babugonj, Barisal	0.87	O-9897	20	15-04-15	BC	13-08-15	229	2.84
35	Md. Abdul Hakim North Rahmatpur, Babugonj, Barisal	0.77	O-9897	20	09-04-15	BC	07-08-15	166	2.06
36	Md. Sahe Alam Khan Baherchar Khudrakati, Babugonj, Barisal	1.60	O-72	10	09-05-15	BC	06-09-15	95	2.36
37	Md. Rezaul Karim Akon Dicrir Char, Chandpasa, Babugonj, Barisal	1.63	O-72	20	16-04-15	BC	14-09-15	220	2.73
38	Md. Harun or Rashid Singhakathi, Rahmatpur, Babugonj, Barisal	1.67	O-72	20	26-04-15	BC	25-08-15	218	2.70
39	Md. Jasim Akon Dicrir Char, Chandpasa, Babuganj, Barisal	1.57	O-72	20	18-04-15	BC	18-08-15	162	2.01
40	Saiful Howlader Kedarpur, Babuganj, Barisal	1.33	O-72	26	07-04-15	BC	07-08-15	379	3.62
41	Mohsin Khan BaherChar,KhudraKathi, Babuganj, Barisal	1.60	O-72	16	09-05-15	BC	08-09-15	175	2.71
42	Md. Syed Ahmed North Rahmatpur, Babugonj, Barisal	0.67	O-72	20	10-04-15	BC	12-08-15	247	3.06
43	Md. Abdul Mannan Akon Dicrir Char, Chandpasa, Babugonj, Barisal	1.98	O-72	20	15-04-15	BC	12-08-15	206	2.55
44	Md. Monir Hossain North Rahmatpur, Babugonj, Barisal	0.72	O-72	25	15-04-15	BC	12-08-15	231	2.29
				822				9021	

* BC=Broad cast

Appendix Table-12: List of farmers of growing Olitorius jute (Tossa jute) with self produced seeds at Kalapara, Patuakhali.

Sl. No.	Farmer,s Name & Address	Land (Deci)	Variety	Date of Sowing	Date of harvest	Fibre Yield (t/ha)	
						BJRI seed	Farmers seed
01.	Nazmul Howlader Pakhimara, Kalapara	30	O-72, O-9897 & O-795	29/04/2014	28/08/2014	1.58, 1.94, 1.91	1.41, 1.90, 1.87
02.	Nasir Molick Kumirmara, Kalapara	21	O-72, O-9897 & O-795	21/04/2014	20/08/2014	1.64, 1.99, 2.01	1.40 ,2.01, 1.98
03.	Ashim Biswas Pakhimara,, Kalapara	28	O-72, O-9897 & O-795	22/04/2014	21/08/2014	1.55, 2.03, 2.07	1.44,1.97, 1.99
04.	Gaffer Howlader Pakhimara, Kalapara	12	O-72, O-9897 & O-795	26/04/2014	24/08/2014	1.57,1.89, 2.00	1.33, 2.00, 2.02
05.	Alauddin Mollick Amirabad, Kalapara	21	O-72, O-9897 & O-795	15/05/2014	10/09/2014	1.69, 1.95, 1.80	1.30, 1.87 , 1.83
06.	Sumon Chakroborti Pakhimara, Kalapara	10	O-72, O-9897 & O-795	08/05/2014	08/09/2014	1.70, 1.96, 1.95	1.38, 1.91, 1.97
07.	Shahidul Howlader, Mokimpur, Kalapara	33	O-72, O-9897 & O-795	14/05/2014	10/09/2014	1.67,1. 98, 1.91	1.40, 1.95, 1.91
08.	Abdur Rob Akon Mokimpur, Kalapara	14	O-72 & O-9897	08/05/2014	07/09/2014	1.51, 1.90	1.30, 1.85, 1.80
09.	Chunnu Munshi Pakhimara, Kalapara	20	O-9897	20/04/2014	19/08/2014	2.00	1.80
Total: 09 farmers		189					

Appendix Table-13: List of farmers of growing Olitorius jute (Tossa jute) with self produced seeds at Wazirpur, Barisal.

Sl. No.	Farmer,s Name & Address	Land (Deci)	Variety	Date of Sowing	Date of harvest	Fibre Yield (t/ha)	
						BJRI seed	Farmers seed
01	Md. Naim Khan	15	O-72 & O-9897	12/04/2014	11/08/2014	2.83, 2.71	2.20, 2.35
02	Md. Ibrahim Khan	14	O-72 & O-9897	07/05/2014	05/09/2014	2.80, 2.66	2.25, 2.19
03	Md. Sayed Abdullah	30	O-72, O-9897 & O-795	14/04/2014	13/08/2014	2.70, 2.60, 2.70	2.30, 2.47, 2.01
04	Md. Rob Tamidar	40	O-72, O-9897& O-795	06/04/2014	05/08/2014	2.83, 2.81, 2.79	2.17, 2.23, 1.95
05	Mohibul Tamidar	20	O-72 & O-9897	06/04/2014	05/08/2014	2.72, 2.77	2.26, 2.30
06	Mrs. Shanaz Parvin	20	O-72 & O-9897	06/04/2014	05/08/2014	2.96, 2.84	2.20, 2.27
07	Md. Alamin Sikder	15	O-72, O-9897 & O-795	25/04/2014	20/08/2014	2.69, 2.79, 2.76	2.24, 2.43, 1.98
Total: 7 farmers			154				

Appendix Table 14: List of farmers producing tossa jute fibre with farmers' self produced seed at Sadar Upazilla, Patuakhali

Sl.	Farmer's Name & Address	Salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Harvest Date	Fibre Yield (Kg)	Fibre Yield (ton/ha)
01.	Md. Ruhul Amin Matubbor 2 No. Bandh Gath, Patuakhali Sadar	0.69	O-9897	20	08-05-15	10-09-15	172	2.13
02.	Sanjoy Shill Bashak Bazar, Patuakhali Sadar	1.54	O-795	20	08-05-15	08-09-15	182	2.26
03.	Md. Mozibur Sikder East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68	O-9897	20	15-04-15	12-08-15	190	2.36
04.	Kishore Chandra Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.70	O-9897	15	04-05-15	04-09-15	125	2.07
05.	Md. Kuddus Khan Dhankhali, Etabaria, Patuakhali Sadar	3.43	O-795	30	04-05-15	06-09-15	257	2.12
06.	Md. Khalil khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	3.49	O-9897	16	20-04-15	20-08-15	154	2.39
				121 decimals			1080 kg	

Appendix Table 15: List of farmers producing tossa jute fibre with farmers' self produced seed at Babuganj Upazilla, Barisal

Sl.	Farmer's Name & Address	Salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Harvest Date	Fibre Yield (Kg)	Fibre Yield (ton/ha)
01.	Md. Nayan Mia Vill:- East Bhutherdia, Babugonj, Barisal	1.45	O-9897	25	16-04-15	16-08-15	312	3.01
02.	Md. Kamrul Hasan Dicrir Char, Chandpasa, Babuganj, Barisal	1.37	O-9897	15	23-04-15	25-08-15	180	2.98
03.	Md. Babul Howlader Vill.- Kedarpur, Babugonj, Barisal	1.51	O-795	08	17-04-15	20-08-15	64	1.99
04.	Ali Akbar Khan Vill.- North Rahamatpur, Babugonj, Barisal	2.33	O-795	25	24-04-15	23-08-15	225	2.23
05.	Md. Anis Howlader Kedarpur, Babugonj, Barisal	1.55	O-795	25	21-04-15	20-08-15	315	3.12
06.	Md. Idris Kabiraj Vill:- East Bhutherdia, Babugonj, Barisal	1.31	O-9897	12	19-04-15	20-08-15	144	2.98
				110 decimals			1242 kg	

Appendix Table 16: List of farmers in jute seed production with winter vegetables with their soil salinity, variety used, Date of sowing, Date of harvest and seed yield at Sadar Upazilla, Patuakhali in 15-16

Sl.	Farmer's Name & Address	Soil salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Harvest Date	Seed Yield (Kg/plot)	Seed Yield (Kg/ha)
01.	Md. Delower Khan Dhankhali, Patuakhali Sadar	1.78	O-795	35	04-09-2015	01-01-2016	62.0	437.54
02.	Md. Rasel Sikder Vill.- Dhankhali, Patuakhali Sadar	2.06	O-9897	20	04-09-2015	03-01-2016	15.6	193.44
03	Md. Sydul Sikder Vill.- Dhankhali, Patuakhali Sadar	1.78	O-795	15	04-09-2015	01-01-2016	8.2	135.57
04.	Md. Zalal Khan Vill.- Dhankhali, Patuakhali Sadar	2.51	O-795	15	12-09-2015	15-01-2016	8.2	135.57
05.	Md. Motiur Rahman Khan Dhan Khali, Patuakhali Sadar	2.16	O-9897	20	12-09-2015	15-01-2016	14.7	182.28
06	Md.Shahin Akon Dhan Khali, Patuakhali Sadar	1.78	O-795	16	12-09-2015	13-01-2016	9.0	139.50
07.	Md. Khaleq Akon Dhan Khali, Patuakhali Sadar	0.89	O-795	10	20-09-2015	25-01-2016	6.5	161.20
08.	Md. Lal Mia Dhan Khali, Patuakhali Sadar	1.26	O-9897	12	12-09-2015	15-01-2016	7.9	163.26
09.	Md. Hazrat Howlader Dhan Khali, Patuakhali Sadar	1.12	O-9897	15	12-09-2015	14-01-2016	8.5	140.53
10.	Md. Sattar Howlader Vill.- Dhan Khali, Patuakhali Sadar	3.57	O-9897	16	19-09-2015	20-01-2016	12.6	195.3
11.	Md. Forkan Howlader Vill.- Dhankhali, Patuakhali Sadar	1.80	O-9897	15	12-09-2015	15-01-2016	10.0	165.33
12.	Md. Zashim Howlader Vill.- Etabaria, Patuakhali Sadar	1.29	O-795	12	13-09-2015	15-01-2016	6.0	124.00
13.	Md. Moti Howlader Vill.- Dhan Khali, Patuakhali Sadar	1.13	O-9897	18	15-09-2015	17-01-2016	9.5	130.88
14.	Md. Mokbul Howlader Gilabunia, Patuakhali Sadar	1.21	O-795	10	22-09-2015	25-01-2016	8.5	210.80
15.	Md. Nasir Howlader Gilabunia, Patuakhali Sadar	2.51	O-9897	15	15-09-2015	16-01-2016	7.5	124.00
16.	Md. Kalam Akon Dhan Khali, Patuakhali Sadar	2.32	O-795	12	23-09-2015	25-01-2016	5.8	119.86
17.	Badal Sarder Nandipara, Patuakhali Sadar	1.98	O-9897	15	30-09-2015	25-01-2016	7.0	115.73
18.	Md. Mozibor Howlader SharikKhali, Patuakhali Sadar	2.37	O-9897	20	02-09-2015	05-01-2016	13.0	161.20
19.	Jasim Howlader Bandhghat, Patuakhali Sadar	2.46	O-9897	20	25-09-2015	25-01-2016	11.0	136.40
20.	Md. Kamal Talukder Bandhghat, Patuakhali Sadar	2.02	O-9897	20	23-09-2015	25-01-2016	10.5	130.20

21.	Md. Zalil Howlader Vill.- Dhankhali, Patuakhali Sadar	1.41	O-9897	12	28-09-2015	31-01-2016	5.0	103.33
22.	Md. Sajahan Sarder Kalikapur, Patuakhali Sadar	2.02	O-9897	13	30-09-2015	29-01-2016	7.0	133.53
23.	Md. Rezaul Kalatala, Patuakhali Sadar	2.39	O-795	12	10-09-2015	15-01-2016	5.8	119.86
24.	Md. Zahangir Vill.- Kalatala, Patuakhali Sadar	2.51	O-9897	10	02-09-2015	15-01-2016	5.2	128.96
25.	Md. Abdur Rob Howlader Kalatala, Patuakhali Sadar	2.46	O-9897	12	15-09-2015	15-01-2016	6.5	134.33
26.	Md. Satter Howlader Gilabunia, Patuakhali Sadar	2.37	O-795	10	23-09-2015	20-01-2016	5.0	124.00
27.	Md. Abdur Rob Howlader Gilabunia, Patuakhali Sadar	2.32	O-9897	15	30-09-2015	27-01-2016	7.0	115.73
28.	Md. Nasir Mridha Vill.- Sharikkhali, Patuakhali Sadar	2.32	O-9897	15	30-09-2015	25-01-2016	7.0	115.73
29.	Md. Rashid Talukder Bandhghat, Patuakhali Sadar	2.37	O-795	20	23-09-2015	27-01-2016	8.5	105.40
30.	Md. Jafar Khan Dhan Khali, Patuakhali Sadar	2.33	O-9897	15	15-09-2015	17-01-2016	8.2	135.57
31.	Md. Hashem Howlader Sharikkhali, Patuakhali Sadar	2.59	O-9897	10	23-09-2015	24-01-2016	4.5	111.60
32.	Md. Mizanur Rahman Sharikkhali, Patuakhali Sadar	3.53	O-9897	20	14-09-2015	15-01-2016	12.0	148.80

Sl.	Farmer's Name & Address	Soil salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Harvest Date	Seed Yield (Kg/plot)	Seed Yield (Kg/ha)
33.	Md. Zakir Mridha Sharikkhali, Patuakhali Sadar	1.88	O-9897	12	27-09-2015	30-01-2016	7.6	157.06
34.	Md. Jalil Khan Sharikkhali, Patuakhali Sadar	2.39	O-9897	16	27-09-2015	25-01-2016	9.0	139.5
35.	Md. Nasir Sikder Sharikkhali, Patuakhali Sadar	2.41	O-9897	15	02-09-2015	05-01-2016	10.0	165.33
36.	Md. Khaleque sarder Sharikkhali, Patuakhali Sadar	2.37	O-795	12	02-09-2015	01-01-2016	6.5	134.33
Total:				540			313.0	-

Appendix Table 17: List of farmers in jute seed production with winter vegetables with their soil salinity, variety used, Date of sowing, Date of harvest and seed yield Babuganj Upazilla, Barisal in 2015-16

Sl.	Farmer's Name & Address	Soil salinity (dS/)	Variety	Land Size (Decimal)	Sowing Date	Harvest Date	Seed Yield (Kg/plot)	Seed Yield (Kg/ha)
01.	Ali Akbar Khan North Rahamatpur, Babugonj, Barisal	2.33	O-795	15	02-09-2015	01-01-2016	8.5	140.53
02.	Md. Shifat Khan Baherchar Khudrakati, Babugonj, Barisal	1.66	O-795	13	07-09-2015	10-01-2016	6.3	120.18
03.	Md. Anis Akon Dicrir Char, Babugonj, Barisal	1.60	O-9897	16	13-09-2015	10-01-2016	8.3	128.65
04.	Md. Jasim Akon Dicrir Char, Babuganj, Barisal	1.30	O-795	10	08-09-2015	12-01-2016	4.3	106.64
05.	Md. Hanif Howlader Baherchar Khudrakati, Babugonj, Barisal	1.54	O-795	17	05-09-2015	05-01-2016	8.0	116.70
06.	Md. Rezaul Karim Dicrir Char, Babugonj, Barisal	1.63	O-9897	16	17-09-2015	15-01-2016	7.5	116.25
07.	Abdul Mannan Akon Dicrir Char, Babugonj, Barisal	0.67	O-9897	10	13-09-2015	13-01-2016	4.5	111.60
08.	Mejbahuddin Toky North Rahmatpur, Babugonj, Barisal	1.57	O-9897	12	24-09-2015	19-01-2016	5.3	109.53
09.	Md. Babul Howlader Vill.- Kedarpur, Babugonj, Barisal	1.51	O-795	15	19-09-2015	20-01-2016	8.2	135.57
10.	Md. Syful Chowkidar Kedarpur, Babugonj, Barisal	1.45	O-9897	10	13-09-2015	10-01-2016	4.3	106.64
11.	Md. Anis Howlader Vill.- Kedarpur, Babugonj, Barisal	1.55	O-795	16	19-09-2015	20-01-2016	8.0	124.00
12.	Md. Idris Kabiraj	1.31	O-9897	18	19-09-2015	19-01-2016	10.5	144.66

	East Bhutherdia, Babugonj, Barisal							
13.	Salam Fakir Dicrir Char, Babugonj, Barisal	1.36	O-9897	16	17-09-2015	20-01-2016	8.3	128.65
14.	Md. Sajal Fakir Baherchar Khudrakati, Babugonj, Barisal	1.67	O-795	14	30-09-2015	31-01-2016	6.3	111.60
15.	Md. Jahangir Howlader Vill.- Kedarpur, Babugonj, Barisal	1.37	O-9897	12	13-09-2015	10-01-2016	5.3	109.53
16.	Md. Alamgir Howlader Middel Bhutherdia, Babugonj, Barisal	1.67	O-9897	25	13-09-2015	15-01-2016	17.0	168.64
17.	Md. Jamal Howlader North Rahamatpur,Babugonj, Barisal	0.77	O-9897	16	22-09-2015	20-01-2016	12.5	193.75
18.	Md. Harun Sarder Vill.- Baherchar, Babugonj, Barisal	1.67	O-9897	20	30-09-2015	31-01-2016	13.5	167.40
19.	Md Yakub Howlader Vill.- Chandipur, Babugonj, Barisal	1.15	O-795	10	07-10-2015	06-02-2016	3.9	96.72
20.	Golam Mostafa Dicrir Char, Babugonj, Barisal	1.60	O-9897	16	13-09-2015	12-01-2016	10.3	159.65
21.	Md. Helal Howlader North Rahamatpur, Babugonj, Barisal	0.82	O-795	12	12-09-2015	12-01-2016	4.8	99.20
22.	Md. Sahjahan Bapari Dicrir Char, Babugonj, Barisal	1.33	O-795	13	14-09-2015	15-01-2016	5.6	106.83
23.	Sahin Hossain Kedarpur, Babugonj, Barisal	1.37	O-795	12	30-09-2015	29-01-2016	7.6	157.06
24.	Md. Sultan Howlader KesmotChandpasha,Babugonj, Barisal	5.92	O-795	26	23-09-2015	30-01-2016	14.5	138.30

Sl.	Farmer's Name & Address	Soil salinity (dS/m)	Variety	Land Size (Decimal)	Sowing Date	Harvest Date	Seed Yield (Kg/plot)	Seed Yield (Kg/ha)
25.	Md. Milon Sarif Chandpasa, Babugonj, Barisal	1.23	O-9897	22	24-09-2015	22-01-2016	13.2	148.80
26.	Md. Siddik Sikder Chandpasa, Babugonj, Barisal	1.44	O-795	14	17-09-2015	17-01-2016	6.7	118.68
27.	Md. Anwar Sikder Chandpasa, Babugonj, Barisal	1.46	O-9897	12	12-09-2015	11-01-2016	4.3	88.86
28.	Md. Nazrul Islam Vill.- Baherchar, Babugonj, Barisal	1.78	O-9897	13	27-09-2015	29-01-2016	8.9	169.78
29.	Md. Rubel Howlader Vill.-Chandipur, Babugonj, Barisal	1.21	O-795	16	06-09-2015	08-01-2016	9.0	139.50
30.	Md. Montu Howlader Vill.-Baherchari, Babugonj, Barisal	1.77	O-9897	15	29-09-2015	29-01-2016	7.8	128.96
31.	Md. Shakhawat Howlader North Rahamatpur, Babugonj, Barisal	0.87	O-795	15	06-09-2015	05-01-2016	7.0	115.73
32.	Md. Momin Howlader Dicrir Char, Babugonj, Barisal	0.87	O-795	13	13-09-2015	15-01-2016	6.6	125.90
33.	Md. Kamrul Howlader North Rahamatpur, Babugonj, Barisal	0.92	O-9897	20	06-09-2015	05-01-2016	11.2	138.88
34.	Md. Sirajul Chowkider Kedarpur, Babugonj, Barisal	1.42	O-9897	10	18-09-2015	17-01-2016	4.3	106.64
35.	Md. Nayon Mia East Bhutherdia, Babugonj, Barisal	1.28	O-9897	15	12-09-2015	15-01-2016	7.7	127.30
36.	Md. Milon Kedarpur, Babugonj, Barisal	1.55	O-795	15	13-09-2015	15-01-2016	8.0	132.26
		1.98		540			289.0	

Appendix Table 18: List of farmers producing tossa jute fibre with self produced jute seeds at Sadar Upazilla, Patuakhali in 2016

Sl.	Farmer's Name & Address	Salinity (dS/m)	Variety	Land Size (Deci.)	Seed Source	Sowing Date	Harvest Date	Fibre Yield (Kg)	Fibre Yield (ton/ha)
01	Md. Zakir Mridha East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.78	O-9897	15	BJRI	18-04-16	17-08-16	159	2.62
02	Md. Delwar Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.34	O-9897	15	BJRI	28-04-16	27-08-16	174	2.87
03	Md. Sajahan Koltala, Pourshava, Patuakhali Sadar	1.81	O-9897	15	BJRI	08-05-16	07-09-16	157	2.59
04	Abdul Zabbar Zamadder	1.89	O-9897	10	BJRI	08-05-16	07-09-16	124	3.07

	East Sarikhkhali, Kalikapur, Patuakhali Sadar								
05	Md. Unuch Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68	O-9897	15	Farmer	15-04-16	14-08-16	160	2.64
06	Md. Nasir Sikder East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.89	O-9897	15	Farmer	08-04-16	07-08-16	163	2.69
07	Md.Mozibor sikder East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.26	O-9897	12	Farmer	08-05-16	07-09-16	107	2.21
08	Md. Mintu Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-9897	15	Farmer	07-05-16	05-09-16	148	2.44
09	Abdur Rahim Khandker Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-9897	15	Farmer	04-05-16	01-09-16	152	2.51
10	Sushil Chandra Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68	O-9897	20	Farmer	19-04-16	20-08-16	204	2.52
11	Md. Faruk Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.34	O-9897	12	Farmer	20-04-16	20-08-16	166	3.42
12	Abdul Khaleque Sarder East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.67	O-9897	12	Farmer	07-05-16	05-09-16	114	2.35
13	Md. Jasim Talukder Vill.- Hetalia, Patuakhali Sadar	1.41	O-795	10	BJRI	10-04-16	10-08-16	112	2.77
14	Md. Nuru Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.80	O-795	18	BJRI	17-04-16	15-08-16	184	2.53
15	Md. Rasel Sikder Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.06	O-795	12	BJRI	19-04-16	18-08-16	130	2.68
16	Md. Hasem Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.71	O-795	20	BJRI	09-05-16	10-09-16	207	2.56
17	Md. Mafez Howlader Vill.- Dhankhali, Patuakhali Sadar	1.36	O-795	15	Farmer	04-05-16	04-09-16	140	2.31
18	Md. Bashir Howlader Vill Dhankhali, Patuakhali Sadar	1.28	O-795	20	Farmer	20-04-16	20-08-16	215	2.66
19	Md. Abdul Khalek Khan Dhankhali, Etabaria, Patuakhali Sadar	1.29	O-795	16	Farmer	20-04-16	20-08-16	163	2.52
20	Nur Nehar Uttar Bazar Ghona, Patuakhali Sadar	1.13	O-795	20	Farmer	20-04-16	20-08-16	213	2.64
21	Md. Razzak Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	2.39	O-795	15	Farmer	07-05-16	18-08-16	172	2.84
22	Md. Mijan Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.67	O-795	15	Farmer	08-05-16	05-09-16	116	1.91
23	Md. Mozibur Howlader East Sarikhkhali, Kalikapur, Patuakhali Sadar	2.44	O-795	15	Farmer	19-04-16	18-08-16	156	2.57
24	Abdur Razzak Sikder Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-795	15	Farmer	07-05-16	05-09-16	154	2.54
25	Md. Bashir Mridha East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.81	O-795	10	Farmer	05-05-16	10-09-16	115	2.85
26	Md. Rashid Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	3.53	O-795	15	Farmer	10-04-16	12-08-16	188	3.1
27	Md. Ayub Ali Sikder Dhankhali, Etabaria, Patuakhali Sadar	2.34	O-795	13	Farmer	10-05-16	10-09-16	145	2.76
28	Md. Anwar Howlader Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.39	O-795	20	Farmer	04-05-16	01-09-16	224	2.77
29	Md. Jalal Khan Vill.- Dhankhali, Etabaria, Patuakhali Sadar	2.16	O-72	10	BJRI	19-04-16	17-08-16	119	2.94
30	Abdul Zabbar Gazi East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.71	O-72	20	BJRI	20-04-16	22-08-16	208	2.57
31	Bimal Chandra Sikder Vill East Sarikhkhali, Patuakhali	2.45	O-72	15	BJRI	20-04-16	19-08-16	142	2.34
32	Md. Nasir Mridha Basak Bazar, Patuakhali Sadar	1.66	O-72	20	BJRI	15-04-16	14-09-16	212	2.62
33	Abdul Satter How. Kalatala, Patuakhali Sadar	1.82	O-72	15	Farmer	10-04-16	07-08-16	152	2.51
34	Md. Nuru Molla East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.71	O-72	20	Farmer	18-04-16	15-08-16	201	2.49
35	Md. Jalil Gazi East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.71	O-72	10	Farmer	18-04-16	15-08-16	111	2.75
36	Md. Forkan Mridha East Sarikhkhali, Kalikapur, Patuakhali Sadar	1.68	O-72	10	Farmer	19-04-16	18-08-16	105	2.6
Total (Area and yield):				540				5694 kg	

Appendix Table 19: List of farmers producing tossa jute fibre with self produced jute seeds at Babuganj Upazilla, Barisal in 2016

Sl.	Farmer's Name & Address	Salinity (dS/m)	Variety	Land Size (Decimal)	Seed Source	Sowing Date	Harvest Date	Fibre Yield (Kg)	Fibre Yield (ton/ha)
01.	Md. Saiful Chowkider Kedarpur, Babugonj, Barisal	1.30	O-795	20	BJRI	09-04-16	08-08-16	235	2.91
02	Anjs Akon Dicrir Char, Babugonj, Barisal	1.37	O-795	15	BJRI	08-04-16	06-08-16	165	2.72
03	Md. Jahangir Howlader Khudrakanthi, Babugonj, Barisal	1.66	O-795	15	BJRI	07-04-16	05-08-16	139	2.29
04	Md. Ansar Howlader Baherchar Khudrakati, Babugonj, Barisal	0.87	O-795	15	BJRI	20-04-16	20-08-16	144	2.37
05	Md. Alamgir Howlader Khudrakanthi, Babugonj, Barisal	1.54	O-795	10	Farmer	01-05-16	02-09-16	126	3.12
06	Anis Howlader Kedarpur, Babuganj, Barisal	1.89	O-795	10	Farmer	13-04-16	12-08-16	106	2.62
07	Md. Amir Chowdhury Kedarpur, Babugonj, Barisal	1.44	O-795	10	Farmer	21-04-16	25-08-16	111	2.75
08	Md. Samim Howlader North Rahmatpur, Babugonj, Barisal	1.77	O-795	10	Farmer	10-05-16	12-09-16	120	2.97
09	Md. Abdul Mannan Akon Dicrir Char, Chandpasa, Babugonj, Barisal	0.81	O-795	10	Farmer	13-04-16	10-08-16	117	2.89
10	Md. Azahar Seikh Baherchar, Babugonj, Barisal	1.41	O-795	20	Farmer	07-04-16	05-08-16	222	2.75
11	Md. Jasim Akon Dicrir Char, Chandpasa, Babuganj, Barisal	2.13	O-795	20	Farmer	05-05-16	03-09-16	224	2.77
12	Md. Salam Fakir East Bhutherdia, Babugonj, Barisal	1.77	O-9897	10	BJRI	12-04-16	20-08-16	118	2.92
13	Md. Bazlu Howlader Kedarpur, Babuganj, Barisal	1.33	O-9897	20	BJRI	16-04-16	15-08-16	237	2.93
14	Md. Anis Sikder Dicrir Char, Chandpasa, Babugonj, Barisal	1.30	O-9897	10	BJRI	07-04-16	10-08-16	120	2.97
15	Md. Nazrul Islam Singhakathi, Babugonj, Barisal	2.15	O-9897	10	BJRI	07-04-16	05-08-16	115	2.85
16	Md. Babul Howlader Kedarpur, Babugonj, Barisal	1.46	O-9897	20	Farmer	29-04-16	25-08-16	243	3.06
17	Md. Abul Hossen Vill.-Baherchar, Babugonj, Barisal	1.42	O-9897	12	Farmer	26-04-16	24-08-16	144	2.97
18	Golam Mostafa Dicrir Char, Chandpasa, Babugonj, Barisal	1.63	O-9897	10	Farmer	09-04-16	10-08-16	132	3.26
19	Md. Idris Kabir East Bhutherdia, Babugonj, Barisal	1.67	O-9897	15	Farmer	07-05-16	04-09-16	175	2.89
20	Md. Sahjahan Bapari Dicrir Char, Chandpasa, Babugonj, Barisal	1.60	O-9897	20	Farmer	16-04-16	16-08-16	241	2.98
21	Md. Siddik Sikder Singhakathi, Babugonj, Barisal	1.60	O-9897	20	Farmer	08-04-16	07-08-16	237	2.93
22	Md. Helal Howlader North Rahamatpur, Babugonj, Barisal	1.64	O-9897	12	Farmer	15-04-16	15-08-16	125	2.58
23	Md. Hasib Hossen Singhakathi, Rahmatpur, Babugonj, Barisal	0.82	O-9897	20	Farmer	17-04-16	15-08-16	254	3.14
24	Md. Sahin Hossain Dicrir Char, Chandpasa, Babugonj, Barisal	0.83	O-9897	20	Farmer	26-04-16	24-08-16	207	2.56
25	Md. Monacef Bapari Dicrir Char, Chandpasa, Babugonj, Barisal	1.87	O-9897	14	Farmer	17-04-16	15-08-16	159	2.81
26	Md. Rezaul Karim Akon Dicrir Char, Chandpasa, Babugonj, Barisal	1.89	O-9897	20	Farmer	08-04-16	07-08-16	215	2.66
27	Md. Habibur Rahman Khan Kedarpur, Babugonj, Barisal	1.44	O-9897	10	Farmer	27-04-16	24-08-16	116	2.87
28	Md. Mejba Uddin Toki Dicrir Char, Babugonj, Barisal	1.41	O-9897	20	Farmer	07-04-16	05-08-16	248	3.07
29	Md. Syed Ahmed North Rahmatpur, Babugonj, Barisal	0.87	O-9897	15	Farmer	15-04-16	13-08-16	175	2.89

30	Mohsin Khan BaherChar,KhudraKathi, Babuganj, Barisal	0.77	O-9897	10	Farmer	09-04-16	07-08-16	119	2.94
31	Md. Yakub Howlader Khudrakathi, Babugonj, Barisal	1.33	O-72	12	BJRI	08-04-16	07-08-16	127	2.62
32	Md. Ali Akbar Khan North Rahmatpur, Babugonj, Barisal	1.37	O-72	20	BJRI	07-04-16	06-08-16	224	2.77
33	Md. Sifat Khan North Rahmatpur, Babugonj, Barisal	1.45	O-72	20	BJRI	07-04-16	02-08-16	217	2.84
34	Sahin Howlader Kedarpur, Babugonj, Barisal	1.45	O-72	10	Farmer	07-04-16	02-08-16	120	2.97
35	Md. Harun Sarder Khudrakanthi, Babugonj, Barisal	1.33	O-72	20	Farmer	09-04-16	08-08-16	227	2.81
36	Md. Milon Sarif Chandpasa, Babugonj, Barisal	1.60	O-72	15	Farmer	09-05-16	06-09-16	148	2.44
	Total (Area and yield):			540				6152kg	

Annexure-I

200 farmers were surveyed among which 100 were from Patuakhali (Kalapara-50 and Patuakhali Sadar-50) and 100 from Barisal (Wazirpur-50 and Babuganj-50).The survey findings were as follows:

Location	Education	Income	Land Type	Training	Jute fibre production		Seed Production	Fibre Yield	Marketing	Stick Marketing
					Merits	De-Merits				
Kalapara	i) illiterate-22% ii) 1 to Class v-40% iii) 6 to Class x-30% iv) S.S.C & Above-8%	46% sample farmers can bear their house hold expenses 6 to 9 Months with self income	High-0 2 % Medium High-52 % Medium Low-44 % Low-02 %	48%	12 % of sample farmer produce jute fibre. They produce jute for their self uses	cultivation cost high, irrigation problem and day labour is not available, Lack of local market & Faria	No farmers cultivate jute seed	1.24 t/ha to 2.47 t/ha	Local Market (1300 Tk/Mond)	Locally used
Patuakhali Sadar	i) illiterate- 20% ii) 1 to Class v-50% iii) 6 to Class x-20% iv) S.S.C & Above-12 %	40% sample farmers can bear house hold expenses 6 to 9 Months with self income	High-02 % Medium High-48 % Medium Low-44 % Low-6 %	0 %	No sample farmer produces jute fibre.	Not applicable	No farmers cultivate jute seed	Not applicable	Local Market (1400 Tk/Mond)	Not applicable
Wazirpur	i) illiterate-2% ii) 1 to Class v-48% iii) 6 to Class X-40% iv) S.S.C & Above-10%	56% sample farmers can bear house hold expenses 6 to 9 Months with self income	High-2 % Medium High-35 % Medium Low-51 % Low-12 %	2%	48% sample farmer produce jute fibre for self uses and marketing	cultivation cost high, initially irrigation problem and day labour is not available	No farmers cultivate jute seed	1.32 t/ha to 2.36 t/ha	Local Market and Faria (1200 Tk/Mond)	Locally used in bettle leaf cultivation
Babuganj	i) illiterate-20 % ii) 1 to Class v-20% iii) 6 to Class X-50% iv) S.S.C & Above-10%	60% sample farmers can bear house hold expenses 6 to 9 Months with self income	High-2 % Medium High-31 % Medium Low-50 % Low-17 %	0 %	96 % sample farmer produce jute fibre for self uses and marketing	cultivation cost high, irrigation problem and day labour is not available	No farmers cultivate jute seed	1.35 t/ha to 2.45 t/ha	Local Market and Faria (1200 Tk/Mond)	Locally used in bettle leaf cultivation

Some other pictorial view of project activities:

Fig. 34: Director (Agriculture), BJRI delivering speech in a farmers training at Patuakhali Sadar on 08.09.2014

Fig. 35: Partial view of farmers training at Babuganj on 10.09.2014

Fig. 36: DG, BJRI addressing farmers in a training at Babuganj, Barisal on 03.08.2015

Fig. 37: DG, BJRI addressing farmers in a training at Sadar Upazilla, Patuakhali on 05.08.2015

Fig. 38: Director (Agriculture), BJRI addressing farmers in a training at Sadar Upazilla, Patuakhali on 05.08.2015

Fig. 39: DD, DAE, Patuakhali addressing farmers in a training at Sadar Upazilla, Patuakhali on 05.08.2015

Fig. 40: Director (Agriculture), BJRI discussing with farmers during the field day at Patuakhali Sadar

Fig. 41: Director (Agriculture), BJRI visits a jute seed plot of intercropping with tomato during the field day at Babuganj

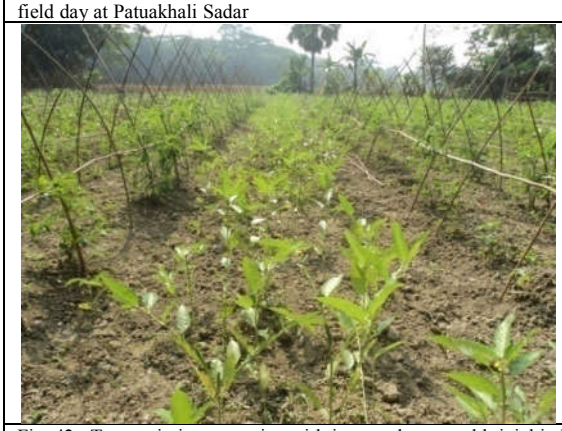


Fig. 42: Tomato in intercropping with jute seed crop and brinjal in border at Babuganj

Fig. 43: Jute seed production in intercropping with brinjal at Babuganj

Fig. 44: Radish in border of jute seed crop at Patuakhali Sadar Upazilla

Fig. 45: Jute seed production in inter cropping with Brinjal at Babuganj Upazilla

Fig. 46: Turnip in intercropping with jute seed crop and tomato in border at Patuakhali Sadar Upazilla

Fig. 47: Turnip in intercropping with jute seed crop and tomato in border at Babuganj Upazilla

Fig. 48: Tomato inter cropping with jute seed at Patuakhali Sadar Upazilla

Fig. 49: Turnip inter cropping with jute seed at Patuakhali Sadar Upazilla

Fig. 50: Sole jute seed production at Babuganj Upazilla

Fig. 51: Sole jute seed production at Patuakhali Sadar Upazilla

Fig. 52: Jute seed production in inter cropping with turnip at Babuganj Upazilla

Fig. 53: Jute seed production in inter cropping with tomato at Babuganj Upazilla

Fig. 54: Jute seed production in inter cropping with tomato and red amaranthus at Patuakhali Sadar Upazilla

Fig. 55: Jute seed production in inter cropping with turnip at Patuakhali Sadar Upazilla

Fig. 56: Jute fibre production of the variety O-795 with BJRI supplied seed at Babuganj Upazilla

Fig. 57: Jute fibre production of the variety O-795 with farmers self produced seed at Babuganj Upazilla

Fig. 58:Jute fibre production of the variety O-9897 at Patuakhali SadarUpazilla

Fig.59: Jute fibre production of the variety O-9897 at Babuganj Upazilla

Fig. 60: Jute fibre production with O-795 at Babuganj Upazilla

Fig. 61: Jute fibre production with O-795 at Patuakhali Sadar Upazilla

Fig. 62:Jute fibre production with O-9897 at Babuganj Upazilla

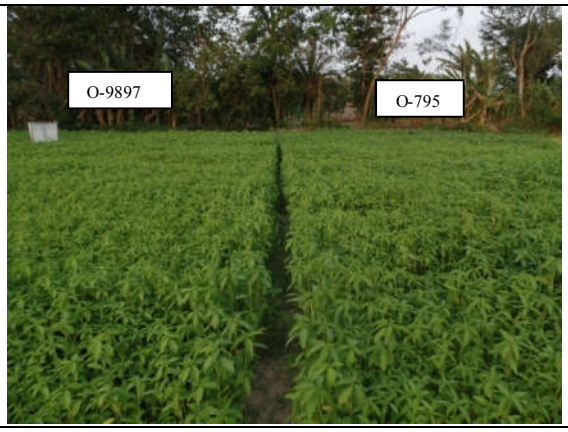


Fig. 63:Varietal performance study at Babuganj Upazilla

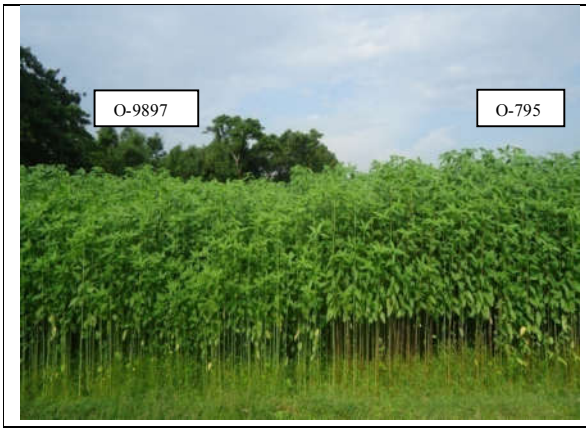


Fig. 64:Varietal performance study at Patuakhali Sadar Upazilla

Fig. 65: Harvesting of jute plants (var.O-9897) at Babuganj Upazilla on 30.08.2015

Fig. 66: Dipping of jute bundles at Babuganj Upazilla

Fig. 67:Women separating fibre from retted jute plants at Babuganj Upazilla

Fig. 68:Washed wet fibre at Babuganj Upazilla

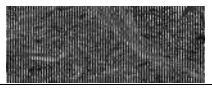


Fig. 69: Drying fibre in bamboo rack at Babuganj Upazilla

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