

## Economic production of jute under different weeding regimes condition

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**Abstract:** An experiment was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh during March to August 2006 to find out the economic production of jute under different weeding regimes. Two factors- (i) two jute species viz. deshi jute (CVL-1) and tosha jute (O-4) and (ii) eight weeding regimes viz. W<sub>0</sub> (no weeding), W<sub>1</sub> (one hand weeding at 15 DAS), W<sub>2</sub> (two hand weedings at 15 and 30 DAS), W<sub>3</sub> (three hand weedings at 15, 30 and 45 DAS), W<sub>4</sub> (one hand raking at 15 DAS and one hand weeding at 30 DAS), W<sub>5</sub> (two hand rakings at 15 and 30 DAS and one hand weeding at 45 DAS), W<sub>6</sub> (pre-emergence herbicide), and W<sub>7</sub> (weed free) were included in the experiment. The experiment was carried out in a randomized complete block design (RCBD) with three replications. Results revealed that the highest cost of production per hectare for weed free condition was found to be Tk. 39106 for deshi jute (CVL-1) and the lowest cost of production per hectare for no weeding conditions were found to be Tk. 29929 for deshi jute (CVL-1). The highest net return per hectare accruing from weed free condition was Tk. 16141 for tosha jute (O-4) and the lowest net return from no weeding condition was Tk.4097. In no weeding condition, the loss of price Tk. 3143 was obtained in deshi jute (CVL-1) and Tk.2075 was obtained in tosha jute (O-4).

**Key words:** Economic production, Weeding regime, jute.

### Introduction

Jute (*Corchorus* spp) is an important long fiber in the world and is suppressed only by cotton. Though, the situation of jute market is now cloudy, yet it is the leading cash crop of Bangladesh and jute alone contributes about 12% to the GDP. Bangladesh are the second largest producer of jute and produce the best quality fiber and lead the export market. Jute covers about 0.5-0.6 million hectares of land in Bangladesh and accounts for about 10.80% of her export earnings (BBS, 2004). Weed is the most important natural enemy in most field crops and also a serious problem to jute crop. Weeds compete with crop plants and reduce yield and quality of crop. It increases the cost of production and ultimately reduces the net return (Gaffer, 1987). It is estimated that about one third of the total cost of production is spent for controlling weeds (Talukder and Waseqwe, 1978). In Bangladesh, the traditional weeding operation is done with nirani in the jute field and other weeding operations such as raking, hoeing, hand picking are done either to suppress the growth or to remove the growing weeds from the jute field. The cost of hand weeding in controlling weeds comes out as high as 33% of the total cost of production in jute. About 35 to 40% of total man-days and 22 to 27% of total cost of jute cultivation is required for weeding and thinning (Hashim *et al.* 1978). Conventionally jute is sown in the broadcast method, where the scope of using machinery or other improved implements in controlling weeds is extremely difficult. Again, the adverse climatic condition and scarcity of labours limit the use of machinery in weeding. Sometimes cause the total damage of the crop. Timely weed control is considered to be of paramount importance to reduce yield loss. Removing weeds in the first six weeks after sowing eliminates early competition of weeds and subsequent weed growth is hindered by the growth of jute. So, it is important to introduce a speedier and effective method of weed control in the jute to same time and to reduce the cost of production without hampering the yield. Farmers of Bangladesh do not keep any record of expenditure made in the production of crops. In reality they do not even feel the necessity of keeping such record. The cost data in respect of all heads of expenditure and production operations

could also guide the crop growers to modify and reorient their farming enterprises and methods to earn the most. In fact, nothing else than cost data can guide the farmer better in farming. Correct costing of crops to determine the costs involve under different heads of expenditure, production operations, total input cost, total of production per unit of product in this crops is necessary for the national planning in respect of fixing prices of the agricultural commodities for home and foreign markets (Mian and Bhuiya, 1977).

### Materials and Methods

The experiment was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University Mymensingh during the period from March to August 2006. The experiment land was medium high land with moderate drained condition. The soil was silty loam in texture having a soil pH value of 6.43 and moderate in organic matter content. Two jute species namely, I) Deshi jute (CVL-1) and Tasha jute (O-4) and (II) eight weeding regimes viz. W<sub>0</sub> (no weeding), W<sub>1</sub> (one hand weeding at 15 DAS), W<sub>2</sub> (two hand weedings at 15 and 30 DAS), W<sub>3</sub> (three hand weedings at 15, 30 and 45 DAS), W<sub>4</sub> (one hand raking at 15 DAS and one hand weeding at 30 DAS), W<sub>5</sub> (two hand rakings at 15 and 30 DAS and one hand weeding at 45 DAS), W<sub>6</sub> (pre-emergence herbicide), and W<sub>7</sub> (weed free) were included in the experiment. The two-factor experiment was laid out in randomized complete block design (RCBD) with three replications. The area of a unit plot was 4.0m x 2.5m. The land was fertilized with urea, TSP, MP, gypsum and zinc sulphate at the rate of 100, 30, 45, 45, 11 Kg ha<sup>-1</sup>. The entire amount of TSP, MP, gypsum, zinc sulphate and one third of urea were applied at the time of final land preparation. The two-third of urea was top dressed in two equal splits at 30 and 45 days after sowing. Seeds were sown on 28th March 2006 at the rate of 7 kg ha<sup>-1</sup> following line sowing. Lines to line and plant to plant distances were 30cm and 10 cm, respectively. Different intercultural operations such as thinning, water management and Pest management were done properly in time. Weeding management was used as per treatment. The crop was harvested on 18 August 2006 when the crop reached at 50% flowering stage. From the beginning to end of the experiment, costs of all individual heads were

recorded carefully and classified input cost (Non-material input, material inputs, overhead cost, gross return and benefit-cost ratio according to Mian and Bhuiya (1977).

### Results and Discussion

The economics of production of the two species of jute under study namely deshi jute (CVL-1) and tosha jute (O-4) have been presented in Table 1. The operation-wise break up of non-material input cost (labour) has been shown in Table 2. And break up of material and non-

material input cost have been shown in Table 3 & 4. It is shown from Table 1 that the cost of production for the two species were more or less similar. Because the input costs were about same for both the varieties. The difference in total cost of production was mainly due to the variation in overhead costs. However, the cost of production was higher for the species deshi jute (Tk.37909 ha<sup>-1</sup>) and the species tosha jute incurred the lower production cost (Tk.37877 ha<sup>-1</sup>) (Table 1).

**Table 1.** Cost of production per hectare of jute at the Agronomy Field Laboratory, BAU, Mymensingh, 2006

Heads of cost of production	Tosha jute (O-4)	Deshi jute (CVL-1)
	Cost (Tk ha <sup>-1</sup> )	Cost (Tk ha <sup>-1</sup> )
I. Input cost (IC)		
A. Non- material input cost		
1. Labour	15490 (40.89 %) *	15490 (40.86%) *
B. Material input cost		
2. Seed	240 (0.68%)	140 (0.36%)
3. Fertilizer	2505 (6.61%)	2505 (6.60%)
4. Water	-	-
5. Herbicide	1000 (2.64%)	1000 (2.63%)
Total material input cost	4745 (12.52%)	4645 (12.25 %)
Total input cost (Tk/ha)	19235 (50.78%)	19135 (50.47%)
II. Overhead cost (OC)		
6. Interest on input cost for 5-6 months @ 8.5% **	681	813
7. Interest on value of land for 6 months @ 8.5% ** (Land value Tk.4 lakh ha <sup>-1</sup> )	17000	17000
8. Miscellaneous overhead cost (5% of total input cost)	961	961
Total overhead cost (OC)	18642 (49.21%)	18774 (49.52%)
Total cost of production (TCP)	37877	37909

\*= Figure in the parenthesis indicate the percent of total cost of production., \*\* = Rate of interest charged by Bangladesh Krishi Bank on loans.

**Table 2.** Operation wise break-up of non-material input cost (Labour) for jute production at Agronomy Field Laboratory, BAU, Mymensingh 2006

Operation	Human labour			Animal labour			Mechanical labour			Total Tk.
	Man-day	Tk.man-day <sup>-1</sup>	Total Tk.	Anim al-day	Tk.anim al-day <sup>-1</sup>	Total Tk.	Tillers-day	Tk.tiller-day <sup>-1</sup>	Total Tk.	
1. Land preparation	9	70	630	9	100	900	2	960	1920	3450 (22.27%)
2. land fertilization	3	70	210							210 (1.35%)
3. Seeding	4	70	280							280 (1.8%)
4. Weeding and thinning	120	70	8400							8400 (54.22%)
5. Irrigation	-	-	-	-	-	-	-	-	-	-
6. Herbicide	3	70	210							210 (1.35%)
7. Harvesting	16	70	1120							1120 (7.23%)
8. Carrying	10	70	700							700 (4.52%)
9. Retting, cleaning and drying	16	70	1120							1120 (7.23%)
Total labour cost			12670			900			1920	15490

**Table 3.** Break-up of the material input cost of jute production at Agronomy Field Laboratory, BAU, Mymensingh 2006

Material	Tosha jute (O-4)			Deshi jute (CVL-1)		
	Quantity (Tk. ha <sup>-1</sup> )	(Tk. ha <sup>-1</sup> )	Total cost (Tk. ha <sup>-1</sup> )	Quantity (Tk. ha <sup>-1</sup> )	(Tk. ha <sup>-1</sup> )	Total cost (Tk. ha <sup>-1</sup> )
1. Seeds	6	40	240	7	20	140
2. Fertilizers						
a. Urea	100	8.80	880	100	8.80	880
b. TSP	30	14.00	420.0	30	14.00	4200
c. MOP	45	12	540	45	12	540
d. Gypsum	45	5	225	45	5	225
e. Zinc sulphate	11	40	440	11	40	440
3. Herbicide			1000			1000
Total material cost			3745			3645

The total input cost was Tk.19235 contributing 50.78% of the total cost of production (TCP) for the species tosha jute and Tk.19135 contributing 50.47% of the total cost of production (TCP) for the species deshi jute. The overhead cost was the highest among the items of total cost of production and the interest in land value was the highest among all the heads of expenditure. It could be due to high land value in the study area. The overhead cost of jute

production constituted 50.47% to 50.78% of the TCP. Higher overhead cost was for the species deshi jute (49.21% of the TCP) and lower was for tosha jute (45.11% of the TCP). The overhead cost was similar in tosha jute (O-4) and deshi jute (CVL-1). The interest on input cost and land value were also less for tosha jute (O-4) than deshi jute (CVL-1) species. Thus the difference in the total costs was mainly due to the difference in

overhead costs (Table 1) As the production operations were same in both the species, the non-material input costs were the same (Tk.15490). The total material input costs of the species were about similar (Tk.4745 and 4645) representing approximately 12.52% to 12.25% of the TCP. The costs for seed, fertilizer and herbicide were about similar in both the jute cultivars because the same seed and fertilizer rate was used of the jute crops (Table 1). The operation-wise break-up of non-material input cost

(labour cost) has been presented in Table 2. Among the different production operations, weeding was labour consuming and hence most expensive. Weeding and tinning demanded a total of 120 labourers and constituted about 54.22% of the total input cost, land preparation, harvesting and retting, cleaning-drying-weighing consumed 22.27%, 7.23% and 7.23% of the labour costs, respectively. The break-up of the input cost has been presented in Table 4.

**Table 4.** Analysis of cost and return per hectare of jute production at the Agronomy Field Lab. BAU, Mymensingh, 2006

Heads of cost of production	Tosha jute (O-4)	Deshi jute (CVL-1)
Total cost of production (Tk. ha <sup>-1</sup> )	37877	37909
Yield (ha <sup>-1</sup> )		
A)Product (Fiber)	1.473	1.797
B)By-product (Stick)	1.641	2.394
Cost of production per kg of product (Kg)		
(TCP/YP)	25.71	21.09
(TCP- VB)/YP	22.37	17.09
Gross income (Tk. ha <sup>-1</sup> )		
Due to product	38298	31447
Due to by-product	4923	7182
Total (Tk.)	43221	38629
Net income (Tk.)	5344	720
Benefit – Cost ratio	1:1.14	1: 1.01

TCP = Total cost of production (Tk.), YP = Yield of product (Kg ha<sup>-1</sup>), VB = Value of By-product (Tk ha<sup>-1</sup>), Based on rates: Deshi jute (CVL-1) (Fiber) = Tk.17.50 kg<sup>-1</sup>, Tosha jute (O-4) (Fiber) = Tk.26.00 kg<sup>-1</sup>, Stick of jute = Tk.3.00 kg<sup>-1</sup>

**Table 5.** Cost of production per hectare of jute at the Agronomy Field Laboratory, BAU, Mymensingh 2006

Heads of cost of production	W <sub>0</sub>		W <sub>1</sub>		W <sub>2</sub>		W <sub>3</sub>	
	Tosha jute (O-4)	Deshi jute (CVL-1)						
I. Input cost (IC)								
A. Non-material input cost								
1. Labour	9190	9190	11290	11290	13390	13390	15490	15490
B. Material input cost								
2. Seed	240	140	240	140	240	140	240	140
3. Fertilizer	2505	2505	2505	2505	2505	2505	2505	2505
4. Water	-	-	-	-	-	-	-	-
5. Herbicide	-	-	-	-	-	-	-	-
Total material input cost	2745	2645	2745	2645	2745	2645	2745	2645
Total input cost (Tk/ha)	11935	11835	14035	13935	16135	16035	18235	18135
II. Overhead cost (OC)								
6. Interest on input cost for 5-6 months @ 8.5% **	423 *	502 *	497 *	592 *	571 *	681 *	645 *	770 *
7. Interest on value of land for 5-6 months @ 8.5% **	17000	17000	17000	17000	17000	17000	17000	17000
8. Miscellaneous overhead cost	597	592	702	697	807	802	912	907
Total overhead cost	18020	18094	18199	18289	18378	18483	18557	18677
Total cost of production	29955	29929	32234	32224	34513	34518	36792	36812

Continued

Heads of cost of production	W <sub>4</sub>		W <sub>5</sub>		W <sub>6</sub>		W <sub>7</sub>	
	Tosha jute (O-4)	Deshi jute (CVL-1)						
I. Input cost (IC)								
A. Non-material input cost								
1. Labour	13390	13390	15490	15490	9400	9400	17590	17590
B. Material input cost								
2. Seed	240	140	240	140	240	140	240	140
3. Fertilizer	2505	2505	2505	2505	2505	2505	2505	2505
4. Water	-	-	-	-	-	-	-	-
5. Herbicide	-	-	-	-	1000	1000	-	-
Total material input cost	2745	2645	2745	2645	3745	3645	2745	2645
Total input cost (Tk/ha)	16135	16035	18235	18135	13145	13045	20335	20235
II. Overhead cost (OC)								
6. Interest on input cost for 5-6 months @ 8.5% **	571 *	681 *	645 *	770 *	465 *	554 *	720 *	859 *
7. Interest on value of land for 5-6 months @ 8.5% **	17000	17000	17000	17000	17000	17000	17000	17000
8. Miscellaneous overhead cost	807	802	912	907	657	652	1017	1012
Total overhead cost	18378	18483	18557	18677	18122	18206	18737	18871
Total cost of production	34513	34518	36792	36812	31267	31251	39072	39106

\*\* = Rate of interest charged by Bangladesh Krishi Bank. \* =Costs under these items were rounded up

**Table 6.** ANOVA of cost and return per hectare of jute production at the Agronomy Field Lab., BAU, Mymensingh 2006

Head of cost of production	W <sub>0</sub>		W <sub>1</sub>		W <sub>2</sub>		W <sub>3</sub>	
	Tosha jute (O-4)	Deshi jute (CVL-1)						
Total cost of production (Tk ha <sup>-1</sup> )	29955	29929	32234	32224	34513	34518	36792	36812
Yield (Tk ha <sup>-1</sup> )								
Product (Fiber)	956	1249	1337	1679	1539	1891	1760	2104
By-product (Stick)	1008	1643	1582	2313	1772	2520	1940	2770
Cost of prodn. per Kg of product (Kg)								
(TCP/YP)	31.33	23.96	24.10	19.19	22.42	18.25	20.90	17.49
(TCP-VB)/YP	28.17	20.01	20.55	15.05	18.97	14.25	17.59	13.54
Gross income (Tk ha <sup>-1</sup> )								
Due to product	24856	21857	34762	29382	40014	33092	45760	36820
Due to By-product	3024	4929	4746	6939	5316	7560	5829	8310
Total (Tk.)	27880	26786	39508	36321	45330	40652	51589	45130
Net income (Tk ha <sup>-1</sup> )	2075 (loss)	3143 (loss)	7274	4097	10817	6134	14797	8318
Benefit : Cost ratio	1:0.93	1:0.89	1:1.22	1:1.12	1:1.31	1:1.17	1:1.40	1:1.22

Continued

Head of cost of production	W <sub>4</sub>		W <sub>5</sub>		W <sub>6</sub>		W <sub>7</sub>	
	Tosha jute (O-4)	Deshi jute (CVL-1)						
Total cost of production (Tk ha <sup>-1</sup> )	34513	34518	36792	36812	31267	31251	39072	39106
Yield (Tk ha <sup>-1</sup> )								
Product (Fiber)	1443	1796	1649	2058	1222	1397	1883	2205
By-product (Stick)	1637	2419	1892	2710	1212	1943	2085	2836
Cost of prodn. per Kg of product (Kg)								
(TCP/YP)	23.91	19.21	22.31	17.88	25.58	22.37	20.74	17.73
(TCP-VB)/YP	20.51	15.17	18.86	13.93	22.61	18.19	17.42	13.87
Gross income (Tk ha <sup>-1</sup> )								
Due to product	37518	31430	42874	36015	31772	24447	48958	38587
Due to By-product	4911	7257	5676	8130	3636	5829	6255	8508
Total (Tk.)	42429	38687	48550	44145	35408	40276	55213	47095
Net income (Tk ha <sup>-1</sup> )	7916	4169	11758	7333	4141	975 (Loss)	16141	7989
Benefit : Cost ratio	1:1.22	1:1.12	1:1.31	1:1.19	1:1.13	1:0.96	1:1.41	1:1.20

TCP = Total cost of production (Tk.), YP = Yield of product (Kg ha<sup>-1</sup>), VB = Value of By-product (Tk ha<sup>-1</sup>), Based on rates: Deshi jute (CVL-1) (Fiber) = Tk.17.50 kg<sup>-1</sup>, Tosha jute (O-4) (Fiber) = Tk.26.00 kg<sup>-1</sup>, Stick of jute = Tk.3.00 kg<sup>-1</sup>

From the Table 4, it shows that labour was the most costly input, which constituted 80.54% and 80.96% for tosha jute and deshi jute, respectively. The second costly input was fertilizer sharing 13.02% for tosha jute and 13.09% for deshi jute of total input cost, which is supported by Mannan *et al.* (1995). Seeds required 1.24% to 0.73% for tosha jute and deshi jute, respectively. Herbicide required similar for tosha jute (5.20%) and deshi jute (5.22%) of the input cost (Table 2). The analysis of cost and return per hectare of jute production have been shown in Table 5. The fiber yields were 1.473 t ha<sup>-1</sup> and 1.191 t ha<sup>-1</sup> in tosha jute (O-4) and deshi jute (CVL-1), respectively, which contributed Tk.37877 and Tk.37909 ha<sup>-1</sup> at the rate of Tk. 26 Kg<sup>-1</sup> for tosha jute and Tk. 17.50 Kg<sup>-1</sup> for deshi jute. The highest fiber yield (1.79 t/ha) was obtained from deshi jute (CVL-1) which was followed by tosha jute (O-4) (1.47 t/ha). This result is an agreement to the findings of Hossain *et al.* (1994) and Mannan *et al.* (1995). The by-product (stick) was roughly 1.64 to 2.39 t ha<sup>-1</sup>, which contributed Tk. 4923 to 7182 ha<sup>-1</sup> at the rate of Tk. 3.00 Kg<sup>-1</sup> (Table 5). The cost of production of per kg fiber was determined by dividing the TCP by the per hectare yield of fiber in kg. Depending on the species, the costs for per kg fiber were 25.71 and 21.09. When the cost was calculated by deducting the value of by product from TCP, the costs of production per kg of fiber were Tk. 22.37 and Tk. 17.09 (Table 5). The variation in the production cost of per kg fiber was due to the variation in the yield of fiber and stick. The highest gross income (Tk.43221) and net income of (Tk.5344) came from the species tosha jute (O-

4). The gross income of the deshi jute (CVL-1) was Tk. 38629, which lead to net income Tk. 720 ha<sup>-1</sup>. The benefit cost ratio was 1: 1.01 in deshi jute (CVL-1) and 1: 1.14 in tosha jute (O-4). Therefore, the species tosha jute (O-4) had the higher net income because of higher selling price of fiber than deshi jute (CVL-1). This finding is supported by Hossain *et al.* (1994). From the result, it may be inferred that cultivation of jute is profitable and it is more so with tosha jute (O-4) than with deshi jute (CVL-1).

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