

Production and Profitability Study of White Jute Seed at Farmer's Level in Different Areas of Bangladesh

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Abstract

The objective of this study was to investigate the cost and return structures of white jute seed cultivation in Bangladesh. This study was conducted in two locations in three consecutive years 2013-15). The sample included 120 farmers selected using a purposive sampling method, consisting of 60 from each district. Sample size was same for three years. Survey questionnaires were used as the main instrument for data collection. Descriptive statistics and cost and return analysis were used for data analysis. The results indicate that the cost of production (99175 tkha⁻¹) and output (123502 tkha⁻¹) was higher in Tangail than Manikganj. Lowest cost of production (80252 tkha⁻¹) was recorded in 2013 in Manikganj and maximum (102470 tkha⁻¹) in 2014 in Tangail. Average BCR of white jute seed production of two locations was 1.25. Cost of production varies year to year and place to place due to variation in land rent value, labour wages, land preparation cost etc. This result indicates that profitability of jute seed production is almost same in two zones and by product yield is also important in case of white jute seed production.

Keywords: White jute, Seed yield, Fibre yield, Stick yield, BCR, Profitability.

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INTRODUCTION

Jute (*Corchorus* spp) is the most important natural fibre crop next to cotton grown in the humid tropical climate mainly under rain fed condition predominantly by marginal and small farmers of Indo-Bangladesh subcontinent [1]. Jute alone contributes about 1.58% to GDP without involving any foreign investment [2]. The genus *Corchorus* belongs to the family Malvaceae, which is composed of approximately 100 species [3]. Of these, two species (*Corchorus olitorius* L. and *Corchorus capsularis* L.) are widely cultivated for natural fiber in areas distributed throughout the tropical and sub-tropical regions of the world, particularly in Asia, Africa and Latin America [4]. In Bangladesh *Corchorus capsularis* L. is known as white jute. About 9% of total jute cultivable areas are covered by white jute [5].

Quality seed is the prerequisite for increasing the yield and sustainable production of any crop [6]. Seed is an input could increase crop production by 10-15% [7]. Jute cultivation area was 10% of agricultural land area. Jute production was 26% as of all agricultural crops [23]. Bangladesh requires about 5500-6000 tons jute seeds in every year, of which only 10-15% is

produced and distributed by the BADC [8]. In every year Bangladesh require about 800 metric tons white jute which is totally produced in our country [9]. Farmers show less interest to produce jute seed due to jute seed growing season maximum land were occupied by T. Aman rice and high value vegetables. Encouraging farmers to venture into jute seed production requires relevant information to support their farming decisions. One business tool that provides this information is "cost and return analysis." This crucial tool is used to analyze alternative farming enterprises that can be employed, thereby helping farmers solve practical problems [10]. The cost of production is an important economic indicator that determines farm production performance [11]. This indicator can help farmers with decision making because it considers methods of solving risks associated with agricultural production [12-14]. With the above circumstances, the present study has been undertaken to assess the cost and return of white jute seed production at farm level.

MATERIAL AND METHODS

Study area

The survey was made in 4 upazilla of two districts where white jute seed grown intensively.

Sample size

The sample consisted of 120 farmers (30 from each location) selected through a purposive sampling technique.

DATA COLLECTION

Data collection involved personal interviews with the sampled farmers using structured questionnaires. The survey instrument consisted cost and return data associated with jute seed production during the 2013-15 cropping years.

DATA ANALYSIS

Data analysis consisted of cost and return analysis of white jute seed production, which was divided into 3 parts as follows:

Cost and return analysis

Cost and return analysis (CRA) is a type of economic analysis that considers costs (both implicit and explicit) incurred by farmers [11, 12]. The concepts of Ciaian *et al.* [11] and Preedasak [15] were followed in this study and are presented as follows:

Cost (i) Total cost (TC) represents the final value of all inputs (cash and noncash) a farm uses in a given period and is the sum of variable and fixed costs.

(ii) Fixed costs (FCs) are independent of the production level.

(iii) Variable costs (VCs) change with the production level.

Both FC and VC can be classified into the explicit costs (cash) and implicit costs (noncash). Explicit costs are the actual expenses incurred, while implicit costs are not associated with the actual expenditure payments.

Return Total revenue (TR) represents the total income that farmers receive from selling agricultural products and by-products per season.

Profit (gross margin): Net profit is the difference between the TR and TC.

In terms of implicit costs, this study adopted the estimation guidelines from Ciaian *et al.* [11] and Khunthongjan [16]:

(i) Household labor. This represents the cost of hired labor, which was determined using the prevailing market wage rate in the study area, which was varying from 300-350 taka per day.

(ii) Land rent. Farmers' land was assessed on the basis of a local rental rate.

(iii) Depreciation of agricultural machinery. This represents costs accounting for the declining value of farm assets computed using the straight-line method.

Break-even analysis: Break-even analysis is "a technique used to analyze cost information" [17]. It involves the investigation of the level of sales at which a company would make zero profit [18], and it is one of the many techniques that have been developed to aid in management activities such as planning, coordinating, and controlling business operations toward desired success [19]. For this study, break-even analyses of yield and price were adopted from Dillon [20], presented as follows:

Price: Given a known yield and cost, at what market price would the farm "break even" (costs equal income)

$$\text{Output price (Pi)} = \frac{VC_i + FC_i + \pi_i}{Y_i}$$

Yield: Given a known price and cost, at what level of production (yield) would the farm break even (costs equal income)

$$\text{Yield (Yi)} = \frac{VC_i + FC_i + \pi_i}{P_i}$$

Where:

Pi is the output prices of commodity i;

Yi is the yield of output i;

VCi represents the variable costs incurred in the production of commodity i;

FCi represents the fixed costs for the production of commodity i.

Break-even considerations in just covering costs can be investigated by setting profits (π_i) equal to zero. The profit, in this case, was not reflected.

Benefit-cost ratio

Benefit cost ratio is the proportion of net return (benefit) and total cost of production [20]. The B-C ratio was calculated by dividing the gross margin by the total variable production cost.

RESULT AND DISCUSSION

Cost of white jute seed production

Cost items for jute seed production were divided into variable and fixed costs (Table 1 and 2). The average total cost of jute seed production in Manikganj was 86024 tkha⁻¹, where in total variable and fixed cost accounted for 80.2 and 19.8% of the overall cost, respectively. Labor cost associated 66% of total variable cost and land rent cover 19.4% of total cost. Noncash labor cost was also estimated from the prevailing labor wage as a shadow price for family labor. Findings showed that land rent responsible for maximum amount of fixed cost and 19.4% of total cost. Pesticide, seed, irrigation and depreciation cost account for negligible amount considering the total cost. Fertilizer and land preparation were two important facts those cover 5.6% and 7.2% of total cost respectively.

For white Jute seed production irrigation cost is very low in Manikganj it is less than 1%. Most of the jute seed production farmers in the Manikganj used their own land in farming and land rent was low because for white jute seed production farmers mainly use their marginal land. Result showed that depreciation cost was very marginal because farmer used very small amount of machinery for white jute seed production.

The average output of the jute seed was 608 kg/ha, with a prevailing market price of 100 tkkg⁻¹, allowing farmers to have a revenue of 60800 tkha⁻¹. In white jute seed production fibre and stick are two important by-products. By-product yield in the study presented as seed equivalent yield. Total yield containing seed equivalent yield of fibre and stick was 1008 kgha⁻¹, allowing farmers to have return of 100800 tkha⁻¹. Average benefit cost ratio for white jute production was found 1.17 in Manikganj. BCR was below the expectation level because of low seed yield and value. Break even analysis indicates that average price of white seed should be minimum 85.34 tkkg⁻¹ in Manikganj.

In Tangail the average total cost of white jute seed production was recorded 99175 tkha⁻¹. Labor cost was the major cost for white jute seed production that associated 57.85% of total variable cost and land rent cover 24.91% of total cost. Noncash labor cost was also estimated from the prevailing labor wage as a shadow price for family labor. Among fixed cost land rent was account for major portion whereas depreciation covers only very little amount because farmer use only a few machinery for white jute seed production. Pesticide, seed, and irrigation cost account for negligible amount considering the total cost. Some farmers used their own seed that consider as non-cash cost. Most of the jute seed cultivars in Tangail utilized their own land in farming that value was considered as non-cash cost and land rent was low because for white jute seed production farmers mainly make use of their marginal land.

This study exposed the seed yield of white jute in three consecutive years in Tangail fluctuated from 620 to 678 kgha⁻¹ and in average it was 647 kgha⁻¹ with a prevailing average market price of 98.33 tkkg⁻¹, allowing farmers to have a revenue of 63619 tkha⁻¹. Considering the seed equivalent yield of fibre and stick total seed equivalent yield of white jute was 1256 kgha⁻¹ in Tangail. Average benefit cost ratio for white jute production was 1.25. Break even analysis indicates that average price white seed should be minimum 78.4 tk/kg in Tangail.

In average white jute seed production of two locations expenses for labor and land rent were the highest (Table 3), accounting for 61.49 and 22.29% of the total production cost. Similar labor cost was also found by Islam and Uddin 2019. In Tangail land rent was higher compare to the Manikganj because Tangail is more agriculture dependent area than Manikganj and land productivity is higher. Fertilizer cost of white jute seed production is very low because jute is an eco-friendly crop [21] that needs very low dose of fertilizer additionally it's add organic matter to the soil. Land preparation cost was similar in both areas on an average it was 6.67% of the total cost. Pest management cost was very low (0.68%) percent of total cost because in direct seeding method pest infestation very low [22]. Total variable cost cover 77.27% cost that is almost about 3.5 times higher than total fixed cost. Average total fixed cost of two locations was 92599 tkha⁻¹. Total cash cost cover 59.27% of total cost of white jute seed production and in non-cash cost family labor cover 60.87% of total non-cash cost.

Seed price variation in two locations was very marginal, average seed price of two locations was 99.17 tkkg⁻¹. Seed production was higher in Tangail over Manikganj and average seed production of two locations was 627 kgha⁻¹. This yield is low compare to the yield obtain by karim et al. [9] and Islam et al. [22]. Average seed equivalent yield of jute fibre and jute stick was 505 kgha⁻¹. Normally value of white jute fibre varies from 42 to 55 tkkg⁻¹ but in case of seed production fibre is the by-product. That fibre is low quality fibre because crop remains in the field more than 120 day as result cuttings percentage increase for that reason its value is low. Average jute fibre price was 27.12 tkkg⁻¹. Considering the jute fibre and stick average gross return of two locations was 112260 tkha⁻¹. Gross return and gross margin was higher in Tnagail over Manikganj due to high jute seed and byproduct yield. This study found average breakeven price of white jute seed was 82 tkkg⁻¹ seed. The results regarding the breakeven price reflect the minimum price required to recover the unit cost of production. Result showed that BCR was higher in Tangail and average BCR of white jute seed production was 1.21. Islam and uddin [22] reported 1.25 BCR for white jute seed production. BCR for white jute seed production was low because farmer did not use update production technology for that cause seed yield was low moreover quality of was not up to the mark for that value of seed was low. Labor wages was higher in these locations that increased the cost of production.

Table-1: Cost and return of white jute seed production in Manikganj (2013-2015)

Items	2013			2014			2015			Average			
	Cash	Non Cash	Total	Cash	Non cash	Total	Cash	Non Cash	Total	Cash	Non Cash	Total	Percentage
1. Variable cost (VCs)*													
Labor	3375 0	2250 0	5625 0	35750	2125 0	5700 0	34960	2215 4	5711 4	34820	2196 8	5678 8	66
Seed	600	200	800	500	250	750	300	465	765	466	305	771	0.90
Land preparation	5500	600	6100	5600	650	6250	5750	560	6310	5616	603	6219	7.2
Fertilizer	4900	540	5440	3850	507	4357	4234	351	4585	4328	466	4794	5.60
Pesticide	62		62	500		500				187		187	0.22
Irrigation				750		750				250		250	0.30
Total Variable cost (TVC)	4481 2	2384 0	6865 2	46950	2265 7	6960 7	45244	2353 0	6877 4	45668	2334 2	6901 1	80.2
2.Fixed Cost (FCs)*													
Land rent	3000	8250	1125 0	4600	1415 0	1875 0	5200	1480 0	2000 0	4266	1240 0	1666 6	19.4
Depreciation cost		350	350		370	370		320	320		346	346	0.40
Total Fixed Cost (TFC)	3000	8600	1160 0	4600	1452 0	1912 0	5200	1512 0	2032 0	4266	1274 6	1701 2	19.8
Total cost (TVC + TFC)*	4781 2	3244 0	8025 2	51550	3717 7	8872 7	50444	3865 0	8909 4	49935	3608 9	8602 4	
Price of seed (p) (Tk/kg)	85			105			110			100			
Price of Fibre (Tk/kg)	20			30			30			26.67			
Price of stick (Tk/kg)	7			5			6			6			
Production (kg/ha)													
Seed (s)	625			610			590			608			
Fibre	1005			1100			1070			1058			
Stick	1900			2020			2010			1976			
Seed equivalent yield of fibre (f)	236			314			291			282			
Seed equivalent yield of stick (v)	156			96			109			118			
Total Seed equivalent yield (y) (s + f + v)	1017			1020			990			1008			
Gross Return (y*p)(Tk/ha)	8644 5			10710 0			10890 0			10080 0			
Gross margin (profit)	6193			18373			19806			14776			
Break-even quantity (kg/seed)	944			845			810			860			
Break-even price (tk/kg seed)	78.91			87			90			85.34			
Benefit-cost ratio (B:C)	1.08			1.21			1.22			1.17			

Table 2: Cost and return of white jute seed production in Tangail (2013-2015)

Items	2013			2014			2015			Average			Percent age
	Cash	Non Cash	Total	Cash	Non cash	Total	Cash	Non Cash	Total	Cash	Non Cash	Total	
1. Variable cost (VCs)*													
Labor	35100	24750	59850	34154	22155	56309	33960	21995	55955	34404	22967	57371	57.85
Seed	622.5	200	822	407	471	878	446.2	412	858	492	361	853	0.86
Land preparation	5550	510	6060	5864	310	6174	5960	297	6257	5791	372	6163	6.21
Fertilizer	8050		8050	8590		8590	7341		7341	7993		7993	8.06
Pesticide	1018		1018	1290		1290	900		900	1069		1069	1.08
Irrigation	336		336	-	-	-	1290		1290	542		542	0.55
Total Variable cost (TVC)	50679	25460	76139	50306	22937	73243	49897	22704	72601	50294	23700	73994	74.61
2. Fixed Cost (FCs)*													
Land rent	6009	12609	18618	12567	16183	28750	10029	16730	26759	9535	15174	24709	24.91
Depreciation cost		564	564		475	475		372	372		471	471	0.48
Total Fixed Cost (TFC)	6009	13173	19182	12567	16659	29226	10029	17103	27132	9535	15645	25180	25.39
Total cost (TVC + TFC)*	56688	38634	95322	62874	39596	102470	59927	39808	99735	59829	39346	99175	
Price of seed (p) (Tk/kg)	80			105			110			98.33			
Price of Fibre (Tk/kg)	20			31.67			31			27.56			
Price of stick (Tk/kg)	7			4			5			5.33			
Production (kg/ha)													
Seed (s)	643			678			620			647			
Fibre	1530			1573			1600			1567			
Stick	3323			2878			3250			3150			
Seed equivalent yield of fibre (f)	382			474			450			439			
Seed equivalent yield of stick (v)	290			109			147			170			
Total Seed equivalent yield (y) (s + f + v)	1315			1261			1217			1256			
Gross Return (y*p) (Tk/ha)	105200			132405			133870			123502			
Gross margin (profit)	9878			29935			34315			24327			
Break-even quantity (kg/ha)	1191			975			906			1008			
Break-even price (tk/kg fibre)	72.5			81.2			82			78.4			
Benefit–cost ratio (B:C)	1.10			1.29			1.34			1.25			

Table-3: Average cost and return of white jute seed production in Manikganj and Tangail

Items	Manikganj			Tangail			Average			Percentage
	Cash	Non Cash	Total	Cash	Non cash	Total	Cash	Non Cash	Total	
1. Variable cost (VCs)*										
Labor	34820	21968	56788	34404	22967	57371	34612	22467	57079	61.49
Seed	466	305	771	492	361	853	479	333	812	0.87
Land preparation	5616	603	6219	5791	372	6163	5703	487	6190	6.67
Fertilizer	4328	466	4794	7993		7993	6160	466	6626	7.13
Pesticide	187		187	1069		1069	628		628	0.68
Irrigation	250		250	542		542	396		396	0.43
Total Variable cost (TVC)	45668	23342	69011	50294	23700	73994	47978	23753	71731	77.27
2. Fixed Cost (FCs)*										
Land rent	4266	12400	16666	9535	15174	24709	6900	13787	20687	22.29
Depreciation cost		346	346		471	471		408	408	0.44
Total Fixed Cost (TFC)	4266	12746	17012	9535	15645	25180	6900	14195	21095	22.73
Total cost (TVC + TFC)*	49935	36089	86024	59829	39346	99175	54878	37948	92826	
Price of seed (p) (Tk/kg)	100			98.33			99.17			
Price of Fibre (Tk/kg)	26.67			27.56			27.12			
Price of stick (Tk/kg)	6			5.33			5.67			
Production (kg/ha)										
Seed (s)	608			647			627			
Fibre	1058			1567			1312			
Stick	1976			3150			2563			
Seed equivalent yield of fibre (f)	282			439			359			
Seed equivalent yield of stick (v)	118			170			146			
Total Seed equivalent yield (y) (s + f + v)	1008			1256			1132			
Gross Return (y*p)(Tk/ha)	100800			123502			112260			
Gross margin (profit)	14776			24327			19661			
Break-even quantity (kg/ha)	860			1008			933			
Break-even price (tk/kg fibre)	85.34			78.4			82			
Benefit–cost ratio (B:C)	1.17			1.25			1.21			

CONCLUSION

This study investigated the cost and return structure of white jute seed production systems in two location of Bangladesh. Higher variable costs were incurred in Tangail over Manikganj because more variable inputs were used during production. Labor costs represent the largest percentage share of variable costs in both locations. This study revealed that farmers received marginal amount of profit in white jute seed production. Seed production should be increased by using modern technology and use of machinery should increase to reduce the cost of production.

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