FINANCIAL PROFITABILITY AND TECHNICAL EFFICIENCY ANALYSIS OF JUTE PRODUCTION IN SOME SELECTED AREAS OF MYMENSINGH DISTRICT

A Thesis

By

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CERTIFICATE

This is to certify that the thesis entitled ***"FINANCIAL PROFITABILITY* AND TECHNICAL EFFICIENCY *ANALYSIS OF JUTE PRODUCTION IN SOME SELECTED AREAS OF MYMENSINGH DISTRICT"*** *submitted to the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of* ***MASTER OF SCIENCE in AGICULTURAL ECONOMICS,*** *embodies the result of a piece of bona fide research work carried out by* **ISRAT JAHAN DALIA**, *Registration No.* **12-05153** *under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.

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DEDICATED TO

MY BELOVED

PARENTS

ABSTRACT

The present study was conducted to estimate the financial profitability of jute production in Gafargaon and Trishal Upazilla of Mymensingh district of Bangladesh. Three villages from each Upazilla were purposively selected for this study. In total, 80 jute farmers were selected purposively for the study. Out of 80 samples, 40 were from Gafargaon Upazilla and 40 were from Trishal Upazilla. Primary data were collected during August to September of 2019 through field visit. The required data were collected through structured interview schedule from the 80 jute farmers. The secondary information sources were IJSG reports, BJRI reports, BJSA report, Bangladesh economic review, BBS, different journals, newspaper, relevant websites etc. Descriptive statistics and Cobb-Douglas production function model were used to address the main objectives of the study. The results of the study showed that, per hectare average total cost for producing jute was Tk. 96170.77. Per hectare gross returns above cash cost from jute production was estimated Tk. 122201.62 and per hectare average net return of jute production was Tk. 26030.85. It was also revealed that net return was higher at Trishal upazilla. The study considered human labor cost, land preparation cost, seed cost, fertilizer cost, manure cost and pesticide cost, these six variables. The study revealed that land preparation cost, fertilizer cost and human labor cost had significant impact on jute production. The study also identified that jute producers were facing some problems such as: low price of jute, high labor cost, unavailability of human labor, want of retting place etc. If these problems could be solved within the shortest possible time, all the jute producers could be able to earn a much higher profit than the existing level. On the basis of findings, some recommendations were made for the development of jute sector in Bangladesh.

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The Author

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ACRONYMS AND ABBREVIATIONS

BBS	: Bangladesh Bureau of Statistics
BER	: Bangladesh Economic Review
BCR	: Benefit Cost Ratio
BJMA	: Bangladesh Jute Mills Association
BJMC	: Bangladesh Jute Mills Corporation
BJRI	: Bangladesh Jute Research institute
BJSA	: Bangladesh Jute Spinners Association
et al	: et alia (and others)
etc.	: Etcetra, (and others)
eg.	: Exempli gratia; for example (in English)
FAO	: Food and Agriculture Organization
Fig.	: Figure
GDP	: Gross Domestic Product
Ha	: hectare
HYV	: High Yielding Variety
i.e.	: That is
IOC	: Interest on Operating Capital
JDPC	: Jute Diversification Promotion Center
Kg	: Kilogram
Km^2	: Square Kilometer
Ln	: Natural Log
MoP	: Muriate of Potash
No.	: Number
Tk.	: Taka (Bangladeshi Currency)
TSP	: Triple Super Phosphate
°C	: Degree Celsius
%	: Percentage

Chapter 1

INTRODUCTION

1.1 Background of the study

Jute is a biodegradable and natural fiber widely grown in Asia, particularly in Bangladesh, India, China, Indonesia and Thailand. It is known as the golden fiber of Bangladesh. Jute is the second important fiber crop of the world after cotton and the most important cash crop of the country. The land of Bangladesh is very suitable for jute cultivation. The best quality of jute fibers of the world are produced in Bangladesh. (BJRI 2018). Bangladesh is an agricultural country which has a population of 163.7 million (BER 2019). Agriculture sector has a great importance in the economy of Bangladesh contributing 13.60% to the GDP (BER 2019) and agriculture is the source of employment for the majority of inhabitants of the country. Jute sector has immense contribution to the economy of Bangladesh. The contribution of jute in GDP is 0.26 percent. It covers 1.4% of agricultural GDP. 4.5% of total export earnings come from jute export. Export promotion Bureau data says that jute and jute goods fetched USD 773.57 million in the financial year 2018-19 (EPB-2019).

This sector has been generating employment to a large segment of total labor force directly or indirectly. Jute and jute manufacturing industry is substantially labor incentive.12.5% of total labor force are involved in jute cultivation and jute processing activities eg. storing, transportation, industrialization etc. There are 4 million jute farmers in Bangladesh. 1 lac 65 thousands labors are working in jute industry, 60% of which are employed by BJMA and BJSA. Remaining 40% labors are employed by government organization BJMC. At present, jute is not only produced for traditional uses (i.e. packaging materials). Besides, it has become the raw material for the production of other value-added products such as, paper, pulp, plastic molded products, home textiles, shoes, fancy bags, floor mat, curtains, lamp shade, wrapping papers, clothes etc. Jute sticks are used as fuel in rural areas. It has also industrial use to get modified products. Jute made products have the advantages of low cost, and biodegradability (Kundu 2010). Jute is an

agricultural product as well as industrial product at the same time. The finest jute fiber can be used for making artificial silk. Sonali bags are now being produced from jute which is one of the environment friendly products from jute. Sonali bag has created huge prospect for the country's jute sector. Jute is such a produce nothing of which is wasted. Proper attention to this sector may result huge return without incurring any loss. "Jute Export Policy 2018-21" has already been declared by the government. (The Daily Star-March 2019). At the jute product fair 2019, National jute award was handed over by honorable Prime Minister among 14 individuals and organizations for their contribution to jute sector development.

There are 49 varieties of jute in Bangladesh (BJRI 2018). Out of which only two species have got its main real commercial value as well as industrial use. Of the several species of jute, one is called *Corchorus capsularis* (white jute) and the other *Corchorus olitorius* (both tossa and deshi jute). The third type is known as Mestha which is the natural substitute of jute. The farmers of Bangladesh commercially grows only two species of jute named *Corchorus olitorius* (Tossa jute) and *Corchorus capsularis* (White jute). Another jute variety named Kenaf which is locally called Mesta is produced at negligible amount.

1.2 Properties of jute

Jute is a natural fiber popularly known as the golden fiber. It is an annual herbaceous plant which belongs to the genus Corchorus and has been classified in the family Tiliaceae. A plain alluvial soil and standing water is required for jute cultivation. Jute is a long, soft and shiny vegetable fiber which is one of the cheapest and strongest of all natural fibers. It is the cheapest vegetable fiber procured from the bast or skin of the plant's stem and the second most important vegetable fiber after cotton in terms of usage, availability and global consumption. It is a natural coarse fiber, made from the stems of a tropical plant. In terms of usage, it has high tensile strength, low extensibility, and ensures better breath ability of fabrics. Jute fiber is 100% recyclable and thereby it's usage are environment-friendly. Jute fiber is composed of cellulose and lignin. That's why it is a lingo-cellulosic fiber that is partially textile fiber and partially wood. Jute has

the ability to be blended with wood and other fiber, both natural and synthetic. The appearance of jute can be improved by treating with caustic soda, crimp and pliability. Jute fibers are off white, brown or golden in color and have a length of 3-12 feet. Jute crop add sufficient amount of organic matter to the soil through leaf shedding and root decaying. Deep root system can break the hard pan of soil. Thus it improves the chemical, physical and biological condition of the soil. It is one of the most versatile natural fibers that has been used in raw materials for packaging, textiles, non-textile, construction, and agricultural sectors. Jute is a strong natural fiber. It's quality is determined by its luster. The more it shines, the better the quality.

1.3 Uses of jute

i) Jute has diversified uses. It is mainly used in household work, for packaging agricultural and industrial commodities as sacks, packs, bags, wrapping, etc. Jute is very suitable for agricultural commodity bulk packaging as it has the property of low extensibility and better breathability of fabrics. It helps to make better quality fabric, net, industrial yarn and sacks.

ii) Geo-jute is coming to light as the world is looking for natural options to save the environment. Geo-jute is used to prevent soil erosion in road and embankments. The distinguishing features that make jute more and more eco-friendly are high moisture absorption capacity, flexibility and drainage properties. Geo-jute offers the advantage of abundant availability, greater moisture retention capacity and lower cost compared to synthetic geo-textiles.

iii) Jute is used in pharmaceutical aid or auxiliary substance to manufacture medicines. Jute leaves are consumed in various parts of the world including Bangladesh. The dry jute stick is a very good fuel which is used for cooking in rural areas. Jute sticks are also very useful material for various purposes as fencing and roofing material for making sheds. These are also used as important industrial raw materials for making particle board whose demand is increasing in national and international market.

iv) Low grade jute and green jute plants are used as raw material for paper and pulp production. Jute reinforced plastic is a new composite material used in silver cans, furniture, grain seed silos, water storage tanks and boats.

v) The world is going green. Hence most of the developed and also the developing countries have banned or going to ban the use of polythene bags as it is too harmful for a sustainable environment. Eco-concerns drive demand for biodegradable bags on the global market, giving rise to the exports of shopping jute bags from Bangladesh, the finest jute grower of the world.

1.4 Present status of jute production in Bangladesh

Global awareness about environment friendly jute fiber as a natural fiber is increasing to protect the environment. The government is enacted 'Compulsory Use of Jute Fiber Packaging Act 2010' and 'Rules for Compulsory Use of Jute Fiber Packaging 2013'. According to this rule, jute fiber packaging is compulsory for 17 items. As a result demand of jute fiber is increasing in home and abroad. Production of jute is also increasing. Bangladesh produces, as of 2018, 33 percent of the total world production of jute. The market price of raw jute in the recent years might play key role in growing interest of farmers to increase area and production. Year wise area, production and yield of jute are given below:

Table 1.1 Year wise area, production and yield of jute in Bangladesh

Year	Area ("000" ha)	Production ("000" tons)	Yield (kg/ha)
2010-11	709	1523	2148
2011-12	760	1452	1911
2012-13	681	1378	2023
2013-14	666	1346	2021
2014-15	673	1358	2018
2015-16	678	1367	2016
2016-17	738	1493	2023
2017-18	758	1610	2124

Source: BBS 2018

Table 1.2 show the present status of market price of raw jute. Price of both kutcha bales and pucca bales are specified for the last few years.

Table 1.2 Market price (f.o.b.) of raw jute of Narayangonj

Period	**White Middle (Kutcha bales) (Tk. per 100 kg)**	**Bangladesh White A (Pucca bales) (Tk. Per 182.25 kg)**
2011	5938	13850
2012	5833	13600
2013	5375	12500
2014	5375	12500
2015	5771	13650
2016	6375	15100
2017	6375	15100
2018	6375	15100

Source: Bangladesh Jute Association

1.5 Major jute growing areas in Bangladesh

In Bangladesh, raw jute yield is the highest in Dhaka division, which was 106.33 thousand tonnes in 2016-17. The highest jute producing district at 2016-17 was Faridpur, yielding 138.65 thousand tonnes of jute. Highest area coverage of jute cultivation was also by Faridpur district which was 77114 hectares of land. Mymensingh division is at the 5th position in Bangladesh in jute production according to yield per bale. Total production in Mymensingh division at 2016-17 was 117.89 thousand tonnes, 14.4 thousand tonnes was from Mymensingh district (BBS, 2018). The total production was about 1609.95 thousand tonnes from an area of 7.58 lakh hectare in FY2017-18 (MoF 2018). 10 major jute growing districts of Bangladesh are listed below.

Table 1.3 Major jute growing areas of Bangladesh

Districts	**Production (thousand tonnes)**					
	2011-12	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**
Faridpur	142	126	131	133	132	139
Rajbari	74	71	72	75	83	92
Pabna	66	72	73	79	81	86
Jamalpur	88	83	72	74	75	85
Kushtia	70	75	73	71	79	85
Magura	61	63	57	65	64	74
Jashore	64	52	54	54	54	62
Madaripur	6	50	45	45	60	60
Meherpur	66	55	63	57	56	57
Chuadanga	53	50	46	43	45	56

Source: BBS 2017

1.6 Economic importance of jute in Bangladesh

Jute has always played an important role in the economy of Bangladesh. In the 1970s Bangladesh earned huge foreign currency by exporting raw jute, jute goods, arts and

crafts made of jute fiber. That's why it was called the Golden Fiber of Bangladesh. Its present contribution to GDP is 5.5% (Sikder *et al* 2008) Bangladesh once enjoyed the monopoly in production and marketing of jute and jute goods in the world market. The importance of the jute sector to the Bangladesh economy could not be over-stated. Jute is a major cash crop for over three million small farm households, the largest industry producing about one-third of manufacturing output and the largest agricultural export commodity in Bangladesh. There are many organizations, agencies and associations which have been working for the promotion of jute and jute goods production and trade in the country and in abroad. They are: Department of Jute (DJ), Department of Agricultural Extension (DAE), Bangladesh Jute Mills Corporation (BJMC), Bangladesh Jute Mills Association (BJMA), Bangladesh Jute Spinners Association (BJSA), Bangladesh Agricultural Development Corporation (BADC), Bangladesh Jute Goods Association (BJGA), Bangladesh Jute Research Institute (BJRI), Jute Diversified Promotion Centre (JDPC), International Jute Study Group (IJSG) etc. Export earnings from jute sector for last few years is given below.

Table: 1.4 Export of raw jute from Bangladesh

Period	Raw jute export earnings (Taka in crore)	Total export earnings (Taka in crore)	Percentage of raw jute export
2010-11	1888	144431	1.3
2011-12	1866	180313	1.04
2012-13	1699	189437	0.90
2013-14	948	213374	0.44
2014-15	856	226486	0.38
2015-16	1257	236802	0.53
2016-17	1381	239656	0.58
2017-18	1161	267178	0.43

Source: Statistics Department, Bangladesh Bank

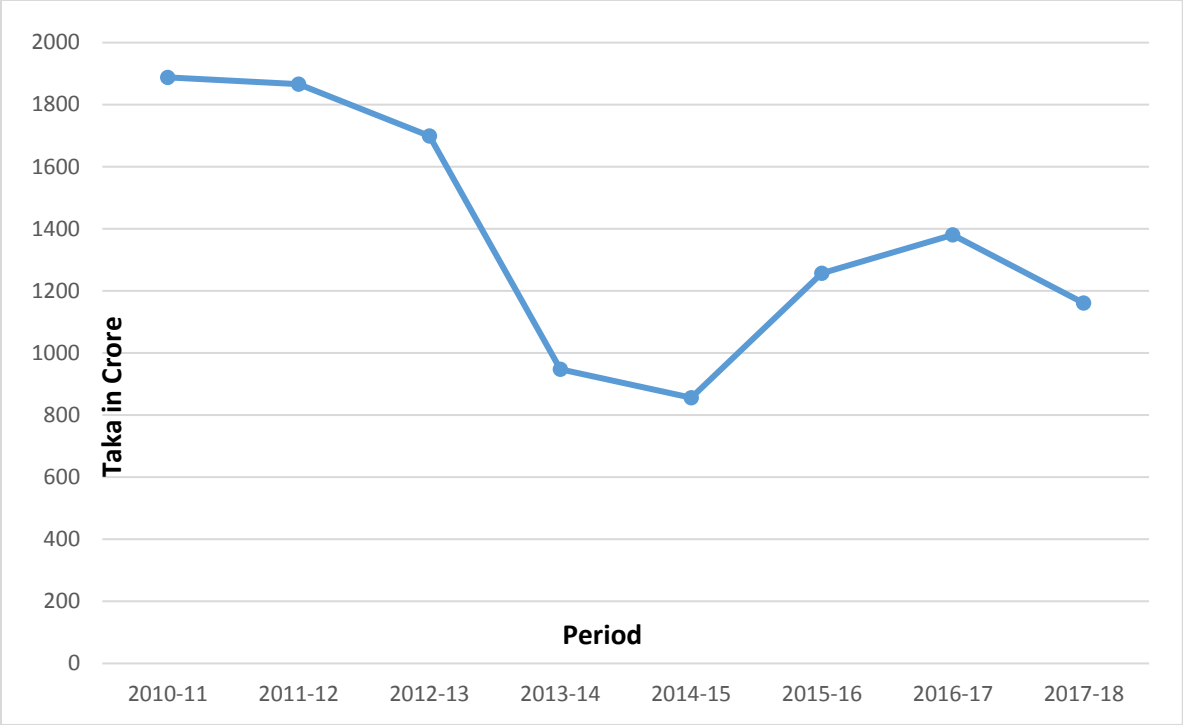

Fig: 1.1 Trends of export earnings from raw jute in Bangladesh

Jute as a source of fibrous raw material

Bangladesh chemical industries corporation (BCIC) is the major user of fibrous raw materials in the country in the form of bamboo, wood baggage for production of pulp and paper in Karnaphuli Paper Mill (KPM), North Bengal Paper mill (NBPM), Khulna Newsprint Mill (KNM) and Sylhet Pulp and Paper Mill (SPPM). These industrial units need around 1.44 lakhs tons Gewa wood annually. Due to pressure of the growing population there has been a steady decline in the forest resources. BCIC is facing acute shortage of these fibrous raw materials due to decrease in the availability of traditional fibrous raw materials like bamboo and wood. BCIC was seriously thinking about the economics of alternative raw materials. It may be recalled that the utility of jute containing cellulose material has been confirmed at different laboratories at home and abroad. Jute can be an easy replacement for those fibrous raw materials.

1.7 World production of jute and allied fibers

Main fiber crop of Bangladesh is jute. Many countries produce kenaf and other allied fibers as their fiber crop. Status of jute and allied fiber production of some major fiber producing countries of the world is presented at table 1.5.

Table 1.5 Major jute and allied fiber producing countries in the world

Countries	Quantity (Thousand tonnes)					
	2010-11	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
India	1800	1845	1674	1620	1296	1440
Bangladesh	1404	1405	1363	1338.5	1350	1360
China	75.2	68.5	68.5	61.12	56	60
Arica	12.1	13.8	14.7	14.6	14.6	14.6
Nepal	21	14.4	15	15.7	16	16

Source: FAO 2017

1.8 Justification of the study

Jute is the principle cash crop of Bangladesh. The contribution of jute sector to the economy of Bangladesh is enormous. Jute sector is vital for the poor rural community of the country and create direct employment for huge number of people. Jute cultivation is generally low cost and low technology intensive. Therefore poor communities have access to jute cultivation which provides them a vital source of food and cash security. Jute sector has a good potential to earn a lots of foreign currencies for Bangladesh. The aim of the study is to focus on profitability, input use efficiency and socio economic profile of the farmers. The study will offer a scope to estimate per unit cost and return from jute. It will provide valuable information for farmers, policy makers and related agencies. Individual farmers will get help for effective operation and farm management through pointing some drawbacks. The study will be helpful for the planners for proper planning and policy making. The policymakers will also get information about the

profitability level and factors hindering the profitability of farmers. Owing to environmental degradation, scarcity of arable land, high input cost, high profitability of modern jute varieties of food crops and unstable jute price, jute at present tends to cultivated at less productive land (Rahman and Khaled 2011). So, comprehensive plan is needed to make the crop popular and sustainable. No recent study of this type was conducted in the study area, for this a good number of researchers are needed in this area. This study may bring socio-economic benefit to policy makers, individual farmer, jute traders and jute manufacturers. Besides it may be used as a basis for further study on jute.

1.9 Objectives of the study

The overall objective of this study is to analyze financial profitability of jute production in the selected areas. The specific objectives are as follows:

i) To know the socio-economic status of jute farmers in the study area.

ii) To estimate cost and returns of jute cultivation.

iii) To determine input use efficiency of jute production.

iv) To identify major problems faced by farmers in producing jute.

1.10 Outline of the study

The study is divided into 8 distinct chapters. Chapter 1 deals with the introduction of the study. The introductory chapter gives justification and outline of the study. Following the introduction, a brief review of related research works has been presented in chapter 2. Chapter 3 provides the methodology of the study that is how the study was conducted. Chapter 4 contains some socio economic characteristics of the jute farmers. Cost and return analysis of jute production are illustrated in chapter 5. Chapter 6 deals with the Production Function analysis. The major problems faced by the jute growers are presented in chapter 7. Finally, the summary, conclusion and some recommendations are given in chapter 8.

Chapter 2

REVIEW OF LITERATURE

Review of literature generally provides the relevant works done previously. The main purpose of this chapter is to review the available past research works that are that are related to the present study. Literature reviewed in this study is obtained from different websites and libraries. In recent years a good number of studies have been conducted on economics of jute production in Bangladesh. Review of some research works relevant to the present study are briefly discussed below.

Sarkar (2017) conducted a study on ‘’Profitability analysis of jute production in some selected areas of Pabna District in Bangladesh.” He conducted the study by dividing total population into three segments: Small, Medium and large farmers. In this study, he found that, per hectare total cost of jute production was TK 146561.42 for small farmer, TK 151294.72 for medium farmer and TK 150664.26 for large farmer. Per hectare net return for jute production were calculated TK 23428 for small farmer, TK 20233.65 for medium farmer and TK 26628.22 for large farmer respectively. This study concluded that jute is a profitable crop in Pabna district but there are some variation in the profitability among small, medium and large farmer.

Molla *et al.* (2014) conducted a study on “Financial and Economic Profitability of Jute in Bangladesh: A Comparative Assessment.” The study was aimed to analyze the financial and economic profitability of jute and its main alternative crop Aus rice. The study estimated the comparative advantage by using policy analysis matrix. This study covered the time from July 2010 to June 2011. Five major jute producing districts namely, Faridpur, Kurigram, Kustia, Jashore and Jamalpur were selected. The study was conducted by dividing total sample into three categories, small, medium and large farmers. It was revealed from the study that, Aus was a main alternative of jute that can

be grown on land used for jute cultivation. Efficiency in production of jute and Aus paddy was measured in terms of gross return, net return, BCR etc. The study found that production cost was higher for jute than Aus. Gross return of jute and Aus per hectare were Tk. 114392 and Tk. 50577 respectively. The higher gross return for jute was mainly due to higher price of fiber during the study period compared to Aus. The BCR on full cost basis was also higher for jute (1.53) compared to Aus production (1.06). The study concluded that jute production was more profitable than Aus rice in the study area.

Khatun (2010) conducted a study on "A comparative economic analysis on White and Tossa jute production in selected area of Sirajgonj district." In this study she found that per hectare total cost for White and Tossa jute were Tk. 79871 and Tk. 81120 respectively. The gross return from White and Tossa jute were Tk. 988559 and Tk. 119953 respectively. Per hectare net return for White jute was Tk. 18988 and Tk. 38832 for Tossa. It appears from the above review that a good number of studies have been conducted on comparative economic analysis of aus rice and jute. But a little study have been carried out on jute seed production. Since jute seed is the prime impact in jute production and there has been a dearth of quality jute seed in Bangladesh, the present study. Therefore, be considered as a pioneering work in this field.

Rahman and Bala (2009) carried out a study on ecological and environmental sustainability of jute production system in Bangladesh. Two important studies on jute production systems were conducted through field experimentations for the two consecutive jute growing seasons in 2006 and 2007 to enumerate the ecological sustainability and the environmental consistency indicators of the system. Life Cycle Assessment (LCA) is one of the methods to assess the environmental consistency and ecological health indicators affected by the production systems. LCA of jute production system presents the emissions and extractions of nutrients to and from the soil and water as well as some important biogases to the air considering inputs and outputs to and from the production system boundary to the environment. Two distinct retting methodologies (conventional whole plant and improved ribbon retting) and jute production system as a

whole were assessed for the environmental and ecological health consequences. The weighted emissions values of Global Warming Potential (GWP), Chemical Oxygen Demand (COD), Nitrification and Human toxicity: air according to the environmental themes indicated that the improved rating practice showed better performance and more environment-friendly characteristics than the conventional one. At the same time jute productions as a whole showed better performance considering environment than the other allied fiber productions systems. This revealed that the jute production system in Bangladesh as a whole is an environment friendly production system.

Sinha *et al.* (2009) conducted a study on crop diversification for profitability in jute and allied fibre crops. The findings of the study showed that raw jute (jute and mesta) farming, industry and trade provide livelihood support to about 5 million people in India and is grown in an area of about 1.0 million hectare. Despite a two-fold increase in the productivity of jute since independence, the area is stagnant for last two decades. The acreage of other fibre crops like ramie and sisal has not increased substantially though ramie and sisal fibres are costlier than raw jute, sunnhemp and cotton. The interested cost of cultivation of jute and the fluctuating market price often affects the farmers. So to enhance the profitability of jute and allied fibre farming, we have to introduce high value crops as components of jute-based cropping systems besides extending their cultivation to non-traditional areas. Ramie has shown a good growth and yield at Nilgiri hills, Goa, Maharastra while sisal has a great potential in the dry areas like western Orissa, Madhya Pradesh, Jharkhand. Diversification and value addition to the end products is needed as there is wide scope in the global market and the part of the additional profit must reach the farmers to motivate them. Jute (*Corchorus capsularis L.* & *C. olitorius L.*) is the main commercial crop of the eastern and north eastern India providing livelihood security to about 5.0 million people (4.0 m farmers. 0.25 million mill workers and 0.50 million people engaged in jute based ancillary sectors). It is grown in an area of little over 0.8 million hectare; producing nearly 10 million bales (1 bale 180 kg) of fibre, which is about 40% of the world's production. Mesta is grown in an area of 0.15 million hectare with a production of 1.0 million bales. Mc major jute growing states were West Bengal,

Bihar. Assam, Orissa, Uttar Pradesh, Meghalaya and Tripura while mesta was mostly cultivated in Andhra Pradesh, Maharastra, Orissa and Bihar. Sunnhemp ((Crotalaria juncea L.) was cultivated mostly in Bihar, Uttar Pradesh, Madhya Pradesh, Rajasthan, Maharastra and Tamil Nadu.

Mollah *et al.* (2009) conducted a study on a precise comparison on luster variation of white jute fiber of Bangladesh. This study was based on area based luster (Brightness) variation of Corchorus capsularis variety (White jute) fiber that had not been treated with any brightening agent in view of considerable number of analytical data originated from instrumental determination studied. Forty raw jute samples were collected from different local jute markets of major jute growing districts of Bangladesh during 2006 to 2008. Luster (brightness) of those samples was ascertained using digital photo volt meter as per standard method. A precise comparison of the luster behavior of white jute in these experiments was accomplished with in respect of their growing area. Result denoted the average brightness value within the range of 16.23 to 39.47. Making an allowance for individual findings, sample no. 0001 collected from Kanaipur of Faridpur district had the highest brightness value i.e. 39.47 and sample no. 0035 collected from Noapara, Jessore showed the lowest brightness value amongst all. The white jute of Faridpur district had distinctly higher luster value appeared to the better than all other districts taken under the study.

Gani *et al* (2009) estimated the effect of saw dust on traditional jute seed production and soil fertility during the year 2006-08 at Manikganj farm of Bangladesh Jute Research Institute (BJRI).The study showed that seed yield and yield contributing characteristics (Plant height, base diameter, weight of 1000 seed, number of pod, number of seed yield) were interested significantly with over control nutrient content of soil (OM, N, P and K) found highest with the incorporation of saw dust @ 5 ton/hectare. The growth and seed yield were reducing trends with incremental dose of saw dust @ 5 ton/hectare. Seed produced with saw dust showed more capability to get quality fiber than control and chemical fertilizer treatment. Highest luster (22.80%), bundle strength (11.51 lb/mg) and

finniest fiber (34.70u) found with seed produced applied saw dust @ 4 ton/hectare. It reveals that saw dust @ 4-5 ton/hectare may be a suitable for producing the traditional jute seed, enhancing the soil fertility and fiber quality. Study also creates evidence that saw dust will be an alternative new organic material source for crop production.

Yasmin (2009) studied a supply response growth of jute in Bangladesh. The study estimated the growth rate of area, yield. Production and real price of jute crop in Bangladesh. The time series data was used for this purpose. This study covered the time period of 1980/81 to 2005/06. Supply response was estimated for jute crop in terms of Nerlovian price expectations model. The long run price elasticity was 0.38. Growth rates of area. Production, yield and real price of jute crop were estimated by fitting exponential trend function. Growth rates of area and production of jute had declined significantly at the rate of 2.26 and 0.95 percent, respectively over the whole period.

Dev and Bairagi (2008) conducted a research on profitability and marketing of jute in Bangladesh. This study is based on field survey conducted during Nov'07-Jan'08 and related to the jute situation in 2007. Three hundred and sixty jute farmers from 12 villages of 12 jute producing districts were interviewed through structured questionnaire. They reported five villages of Faridpur, Jessore. Magura, Meherpur and Rajbari districts where 91.80 percent of total cultivated area where under intensive jute cultivation. Three villages of Munshiganj. Rajshahi and Sharitpur districts where 52.38 percent of total cultivated area where under Semi-intensive jute cultivation. Four villages of Satkhira, Manikganj. Dhaka and Tangail districts where 29.10 percent of total cultivated area were under “not intensive” jute cultivation. Among the sample farmers, jute covered about 90 percent of the area under fiber crops and Mesta covered about 10 percent area. Share of Deshi jute was about 10 percent of total area under fiber crops while fossa jute was cultivated in 80 percent of total area under fiber crops. Total cost for producing Tossa jute was Tk 42,708 and for Deshi it was about Tk 43,595. Per hectare yield of jute was 1,960 kg for Deshi and 2,340 kg for Tossa. Per hectare net return from Deshi jute was Tk 6,424 (net loss) and for Tossa it was Tk 723.0 (net profit).

Karim (1996) conducted a comparative economic study on production of green and fibre jute in an area of Pubna district. He examined the economic performance of White, Tossa and Mesta type of green jute. lie found that per hectare costs of White. Tossa and Mesta green jute were Tk 6503, Tk 17478 and Tk 11391 on full cost basis. On the cash cost basis these were 1k 10183. 11 11134 and Tk 6753, respectively. The gross return were estimated at Tk 22374, Tk 20549 and Tk 13354 and net returns were Tk 5871, Tk 3071 and Tk 1964 on full cost basis, respectively. The net returns on cash cost basis were Tk 1291. Tk 9415 and Tk 6602 for White. Tossa and Mesta types of jute and received the price Tk 643/ton, Tk 670/ton and Tk 589/ton for White, Tossa and Mesta types of green jute though the procurement price was TI(804/ton. In comparison between green and fibre jute, all types of green jute farmers incurred loss. The highest loss was found in Tossa green jute followed by mesta green jute. For White green jute, losses were 11 1188/ha and Tk 1180/ha on full and cash cost basis and were statistically insignificant. In fact, by considering procurement price. the farmers were deprived from an income of Tk 4409/ha and 11 4418/ha on full cost and cash cost basis. In case of Tossa green jute, the farmers incurred statistically significant losses to the extent of Tk 10422/ha on full and cost basis. By selling Mesta green jute, the farmers incurred losses to the extent of Tk 1406/ha and Tk 1403/ha, respectively. In fact, the farmers were deprived of income Tk 2462/ha and Tk 2465/ha on full and cash basis from Mesta green jute according to the mill gate price.

Rabbany and Islam (1996) studied on the growth and yield of jute when intercropped in different crop combinations and row arrangements and found that the jute fiber yield was not significantly reduced in mixtures except when intercropped with stem amaranthus. This was attributable to a similar trend in dry matter production, leaf area development and other yield components of intercropped jute. Seed, fodder and vegetative yield of mungbean, cowpea and stem amaranthus, were significantly reduced in mixtures and when intercropped with paired rows of these crops.

Hossain (1995) conducted a study on a economic investigation on jute growing farmers in Tangail District. He examined the profitability of growing jute from the view point of small, medium and large farmers. The medium farmers received the highest net return per hectare in jute cultivation due to proper use of inputs than small and large farm size groups. The average net return of jute production was Tk. 5044.13, Tk. 5369.86 and Tk. 4908.08 per hectare and their corresponding BCR (undiscounted measure) were 1.34, 1.31 and 1.28, respectively. Cobb-Douglas production functional analysis showed that production coefficient of using human labor, seeds and fertilizers were significant at 1 percent level of confidence.

Talukder el al. **(1993)** conducted a study on relative profitability of Aus paddy and jute production in selected areas of Tangail district in Bangladesh. Tossa jute offered more gross margin compared to both Aus and white jute in Tangail district irrespective of locations. Both replacement and break-even budgeting gave similar results. This Tossa jute as a crop enterprise would be more profitable compared to Aus or White jute in Tangail district.

Asaduzzaman et al. (1992) conducted a study on pilot production of a low cost package technology for sustainable jute farming in Bangladesh. A pilot production program was conducted at Boalmari Upazila of Faridpur district during the early kharif season of 1989 to evaluate the low cost technology for jute cultivation in the potato field for sustainable jute farming in Bangladesh. The programmer was carried out with minimum land preparation practices, lower seed rate and without application of any fertilizers. Another five jute plots under farmers own management condition was compared with the low cost technology_ it was found that the low cost technology reduced 50 percent production cost and gave 72 percent additional yield of jute fiber. The low cost technology gave 41 Percent higher gross return and gross margin, respectively. It also gave 6.73 benefit cost ratio (BCR). So, it may be concluded that when jute grown in the potato field with low Cost package technology its production cost would be reduced and BCR will be increased.

Talukder et al. (1991) conducted a study on constraints to jute cultivation and choice of alternate crops in Tangail district in Bangladesh. The farm survey conducted in 198889 crop season in 8 jute growing Upazillas of Tangail district, revealed that jute production practices has changed with growing demand of HYV seeds. Planting has shifted to infertile lower lands. Besides jute, other minor fibre crops namely mesta, kenaf and sun hemp were grown in the study location. Low market price of jute and high cost of cultivation was further increased by the shortage of agricultural labor in kharif season. The withdrawal of subsidy for fertilizer and insecticides was also considered to contribute in higher cost of jute cultivation.

Remarks

The above review of literature revels that some studies have already been conducted on jute production in Bangladesh. All the above studies reviewed and provided valuable information in pursuit of the present study. The present study is expected to provide some basic information on jute production and aims to examine profitability of jute production in some selected areas of Mymensingh district. There was not any related research conducted before in the selected locations. Policy makers will get information about the profitability level of raw jute production through this study. Thus, this study may bring benefits to policy makers and individual farmers.

Chapter 3

METHODOLOGY OF THE STUDY

3.1 Introduction

This chapter provides a discussion on Methodology applied in this study. Proper methodology is a prerequisite of a good research. The credibility of a scientific research depends to a great extent on the appropriate methodology used in the research. Using an inappropriate methodology may lead to an erroneous result. A researcher has to give a careful consideration in following a scientific and logical methodology for carrying out any scientific research. Selection of a particular method depends on many considerations, such as, nature and scope of the research, availability of literature and primary information, availability of funds, time etc. Survey method has been used in the present study because it is thought to have some advantages over the other methods. This method enables quick investigation, the result achieved has wider applicability and the method is usually more comprehensive. However, survey method has also some drawbacks.

3.2 Selection of the study area

The selection of the study area is an important step in a farm management research. It largely depends on the objectives of the study. It is necessary to select an area where a particular set of objectives can he fulfilled. Once Mymensingh district was a major jute growing area of Bangladesh. Jute production was gradually decreasing here for the last decade. But recently, the farmers of Mymensingh district are being interested to grow jute. Considering the objectives of the study, three villages of Gafargaon and three villages of Trishal Upazila of Mymensingh district were selected purposively.

The reasons behind the selection of these areas are:

i. The study area is accessible to the researcher, who is familiar with the local dialects.

ii. The villages of the two Upazillas were found to be good jute growing areas.

iii. Expected better co-operation from the farmers.

iv. It was easier to communicate with expected respondents of these areas.

v. No recent study of this type was conducted in the study area.

3.2.1 Location

Mymensingh district was established in 1 May, 1787. Mymensingh District, with a latitude of 24.75 (24° 45' 0 N) and a longitude of 90.4 (90° 24' 0 E), is situated 93 kilometers North East (26°) of the approximate center of Bangladesh and 114 kilometers North (0°) to the capital city Dhaka. The study areas are Gafargaon and Trishal upazillas of Mymensingh district. The area of Gafargaon upazilla is 401.16 km2 and area of Trishal upazilla is 338.98 km2.

3.2.2 Topography and soil type

The soil texture of Mymensingh district is flood plain, grey piedmont, hill brown and terrace. The old Brahmaputra River flows along the Eastern side of Gafargaon Upazila, which is one of the survey areas. The soil feature was mostly loamy in the villages of Gafargaon. It varies from sandy loam to loam with grey to dark grey color at Trishal Upazilla. The land of the study area was fertile and suitable for jute cultivation.

Fig: 3.1 A map of Mymensingh District

3.3 Sampling technique and selection of sample

Two factors need to be taken into consideration in selecting samples. The sample size should be large enough to allow for adequate degrees of freedom in statistical analysis. On the other hand, administration of field research, processing and analysis of data should be manageable within the limitations imposed by physical, human and financial resources (Mannan 2001). Due to limitations of time and resources it was not possible to interview all the jute growing farmers in the study area. For this reason a reasonable size of sample was taken. Total 80 farmers, 40 from each Upazilla, were selected for the study. Among the sample farmers, 20 farmers were from Lamkain village, 12 from Jatrasiddhi village, 8 from Konyamondol village, 17 from Bir Rampur village, 16 from Balipara village and 7 from Taltola village were selected. A purposive sampling technique was followed to select the sample farmers.

Table 3.1 Distribution of sample farmers

Upazilla	Union	Villages	Jute farmers
Gafargaon	Pachbag	Lamkain	20
	Datter Bazar	Jatrsiddhi	12
		Konyamondol	8
Trishal	Balipara	Bir Rampur	17
		Balipara	16
	Kanihari	Taltola	7
Total			**80**

Source: Field survey (2019)

3.4 Preparation of interview schedule

A draft questionnaire was prepared in order to collect relevant information from the selected farmers. The interview schedule was formulated in such a way that it covered all the information needed in the analysis and all aspects associated with the objectives could

be included. The questions were included logically and in appropriate sequence to ensure that they could easily be understood by the informants and their responses could be quicker. The questionnaire was pre tested by interviewing some jute farmers and then necessary modification and additions were made and then the draft questionnaire was finalized. The final questionnaire contained three types of information about the sample farmers, their socio-economic condition, cost and return from jute cultivation and the problems faced by them.

3.5 Period of the study

Jute is grown in this country only in kharif 1 season (Mid March to mid July). Data were collected during the period of August to September in 2019 through direct interview with the jute farmers. Data relating to inputs and outputs were collected by making time to time visits in the study area during this period.

3.6 Data collection methods

For the present study, data were collected from primary sources through field survey and its collection was accomplished by direct interviews with the farmers. Researcher herself collected the relevant data from the selected jute growers. At the time of interview, the researcher asked questions systematically and a brief introduction about the aims and objectives of the study was given to each respondent. The questions were asked in a very simple manner and information was recorded on the interview schedule. It was explained to the Farmers that the study was purely academic. Each time, when interview was over, the interview schedule was checked again to ensure that these were correct and properly recorded.

3.7 Processing, editing and tabulation of data

The collected data were manually coded and edited. Then all the collected data were scrutinized and summarized carefully. Data were processed and transfer to Excel sheets

to facilitating in order to meet the objectives of the study. Moreover, data entry was made in computer and analyses were done using the concerned software Microsoft Excel.

3.8 Analytical technique

Data were analyzed in order to arrive at a meaningful result and achieving the objectives of the study. Descriptive statistics and profitability analysis as well as Cobb-Douglas production function model were chosen for this study.

3.8.1 Descriptive statistics

The descriptive statistic is a technique commonly used for the sum, average, and percentage of costs, gross returns, net returns and profitability of jute growing farmers. It is also used for analyzing socioeconomic conditions like, age, income, literacy, occupation etc and problems faced by the jute growers.

3.8.2 Profitability analysis

Per hectare net return was determined by subtracting per hectare total costs (variable and fixed cost) of production from per hectare total return. The following profit equation was used to assess the profitability of jute production.

$\pi = TR-TC$

Or, $\pi = TR- (VC+FC)$

Or, $\pi = \sum Qf.Pf + \sum Qs.Ps - \sum(X_i.PX_i) - TFC$

Where,

π =Net return from jute production (Tk./ha)

P_f = Per unit price of jute fiber (Tk./kg)

Q_f = Quantity of jute fiber (kg/ha)

P_s = Per unit price of jute stick (Tk./bundle)

Q_s = Number of bundles of jute stick (bundle/ha)

PX_i = Per unit price of the relevant ith inputs used for jute production. i = 1, 2, 3,…..n

TFC = Total fixed cost involved in production.

3.8.3 Cobb-Douglas production function model

The Cobb-Douglas form of production function model was used to estimate the effects of key variables to the production of jute. Cobb-Douglas production function has the following characteristics:

i. The function is linear in logs.

ii. The exponents are the elasticity's of production and can be used directly.

iii. Total variations in the output explained by the selected inputs are measured by co-efficient of multiple determination.

iv. The individual co-efficient represents relative factor share if there is constant return to scale.

v. It has the greatest use to diagnostic analysis because it gives marginal resource productivity at mean level of inputs.

The specification of the Cobb-Douglas production for jute was as follows:

$Yi = aX_1b_1\ X_2b_2\ X_3b_3\ X_4b_4\ X_5b_5\ eu_i$…….. (i)

In the Linear form it can be written as follows:

$\text{In } Y = \text{lna} + b_1 \text{ In } X_1 + b_2 \text{ In} X_2 + b_3 \text{ In } X_3 + b_4 \text{ In } X_4 + b_5 \text{ In } X_5 + U_i$…… (ii)

Where,

Y = Gross Return (TK/ha)

X_1 = Land preparation cost (TK/ha)

X_2 = Fertilizer cost (TK/ha)

X_3 = Seed cost (TK/ha)

X_4 = Human labor cost (TK/ha)

X_5 = Manure cost (TK/ha)

a = Intercept/ constant

b_1, b_2, b_3, b_4, b_5 = Production Co-efficient

U_i = Error term

3.9 Problems faced in collecting data

There are some problems and difficulties faced by the researcher during the period of data collection. Data were collected within shortest possible time, due to limited fund. Most of the respondents did not keep any accurate records of cost and returns, so the researcher had to depend solely on the memory of the respondents for collecting necessary information. Morever, the farmers always tried to avoid providing proper information relating to the actual size of holding income accrued from jute production. In a few cases, the farmers were not found at home. This needed two or three visits to conduct even a single interview. To overcome all these problems and to obtain accurate information, it required a good deal of patience of the researcher.

3.10 Limitations of the study

The present study provides some useful information for researcher, farmers and decision makers regarding jute production. However, there are some limitations of the study, the main limitations are as follows:

i) The present study was conducted on a small sample size and in a specific geographic area (Gafargaon and Trishal Upazilla of Mymensingh District) of Bangladesh due to shortage of time and fund. Observation of only 80 samples may be inadequate to represent actual situation. The result might be more accurate and reliable if data were collected from large sample covering a large area.

ii) In rural Bangladesh, most of the farmers are illiterate or have a few years formal education, they do not keep any records of farm transactions, that's why it was difficult to get reliable information. As a result, the accuracy of data entirely depends upon their memories and sincerity. Hence, there may be possibility of data errors.

iii) Some farmers at first did not show interest to give information as there was no direct benefit for them.

iv) There was difference in data of cost and return collected from different farmers having same amount of area under jute production. It created some confusing situations.

Chapter 4

SOCIOECONOMIC CHARACTERISTICS OF SAMPLE FARMERS

4.1 Introduction

The purpose of this chapter is to discuss the socioeconomic characteristics of the farmer producing jute. Socio-economic characteristics of any decision maker are very important for overall farm decision, as crop selection, production pattern and technology adoption are largely influenced by individual's socio-economic characteristics. People differ from one another in many aspects, because there are numerous interrelated and constituent attributes that determine the development of behavior and personality. Some important features of the socio-economic profiles such as age, education, family size, farm size, occupation, income, etc. of the sample farmers are presented below.

4.2 Age

The selected jute farmers were grouped into four categories according to their age. The different age groups of the jute farm owners from two locations, eg. Gafargaon and Trishal upazillas are given in Table 4.1. It is revealed from the Table that the highest number of farmer (42.5 percent) came from age group 46-55 years and the lowest (3.75 percent) came from age group less than 31 years. It is also presented that 41.25% of the jute farmers fell into the 31-45 years age group and remaining 12.5% fell into above 55 years age group. The study revealed that majority of the farmers were of middle age to old age group.

Table 4.1 Age distribution status of the respondents

Age Range	(no of farmers)			Percentage
	Gafargaon	Trishal	All farmers	
Below 31 years	2	1	3	3.75
31-45 years	14	19	33	41.25
46-55 years	18	16	34	42.5
Above 55 years	6	4	10	12.5
Total			**80**	**100**

Source: Field survey (2019)

4.3 Family size of the selected farmers

Family is a primary social group that consists of parents and their offspring, the principle function of which is provision for its members. Family size in the study area has been defined as total number of persons living together and taking meals from the same kitchen. Table 4.2 shows the family size of respondents of the two locations. Majority of the sample farmers' families (67.5%) were small size; consisted of 1-5 members. About 26% families were medium families and only 6.25% were large families consisting of above 7 members. The findings show that the number of small families is higher at location1 (Gafargaon upazilla). Average family size of the sample farmers contains 5.16 members.

Table 4.2 Family size of sample farmers in the study area

Family size (no)	Location		All	Percentage
	Gafargaon	Trishal		
Small (1-5)	29	25	54	67.5
Medium (6-7)	9	12	21	26.25
Large (above 7)	2	3	5	6.25
Total			**80**	**100**

Source: Field survey (2019)

4.4 Level of literacy

Education may be defined as the ability of an individual to read and write or formal literacy received up to a certain standard. It creates the power of understanding and analyzing fact and situations. Educated farmers have more access to improved cultivation procedure and they are able to make rational economic decisions. Education helps to develop production process and to keep accurate account of production costs and returns. Literacy status of both locations, Gafargaon and Trishal Upazilla, is represented in the table. From the educational point of view, all members in the study area are categorized into five groups. i.e. illiterate and can sign only, up to primary, up to secondary, up to higher secondary and graduation. The above categories are followed for displaying literacy level of sample farmers at Table 4.3. There was a little difference of literacy level between two locations.

Table 4.3 Level of literacy among jute farmers in the study area

Level of Education	Farmers (no)		All	Percentage
	Gafargaon	Trishal		
Illiterate and can sign only	11	12	23	28.75
Up to primary	11	6	17	21.25
Up to Secondary	10	8	18	22.5
Up to Higher Secondary	4	10	14	17.5
Graduate	4	4	8	10
Total			**80**	**100**

Source: Field survey (2019)

4.5 Occupational status of the selected respondents

Agriculture was the main occupation and major source of livelihood of most of the selected household in both locations of the study areas. Beside agriculture, a few numbers of farmers were engaged in business, service and others as their main occupation. Table 4.4 shows the occupation status of the sample farmers. It is showed that farming was the main occupation of about 84% of the sample farmers. More than 6% farmers were engaged in business and 10% in service, who had taken agriculture as subsidiary occupation. At Trishal upazilla, many farmers were engaged in fruits and vegetables gardening along with jute production. Occupational diversity was comparatively less at Gafargaon upazilla.

Table 4.4 Occupational status of sample farmers

Occupation	Gafargaon		Trishal	
	Main occupation (no)	Subsidiary occupation (no)	Main occupation (no)	Subsidiary occupation (no)
Agriculture	35	5	32	8
Business	1	9	4	14
Service	4	6	4	2

Source: Field survey (2019)

4.6 Land ownership pattern and farm size

Land is the most important asset of crop farming. Farm size refers to the entire land operated by the farmers during study period, whether it is their own land or obtained from others by rented in. The farm size was measured by using following formula:

Farm Size = Homestead Area + Owned cultivable land + Rented in - Rented out

Table 4.5 presents the land holding, utilization pattern and farm size of the selected sample Farmers.

Table 4.5 Average land distribution of the sample farmers

Categories of land	Average Area (ha)			Percentage
	Gafargaon	Trishal	All farmers	
Own cultivable land	0.44	0.78	0.61	73.49
Homestead area	0.08	0.10	0.09	10.85
Rented in	0.05	0.09	0.07	8.43
Rented out	0.10	0.02	0.06	7.23
Total	**0.67**	**0.99**	**0.83**	**100**

Source: Field survey (2019)

Table 4.5 represents that the average cultivable land of the sample farmers is 0.61 hectare and their average total land holding is 0.83 hectare. It was revealed that, own cultivable land and total farm size of the farmers belonging Trishal upazilla was larger than that of Gafargaon. The study found that average land holding of the farmers of Gafargaon upazilla was 0.67 hactare and in Trishal upazilla it was 0.99 hectare.

4.7 Level of income of the sample farmers

Annual family income refers to the total earning by the respondents and their family members in a year through farming, business, job or other service works. Annual income of the jute farmers at the study area is presented at table 4.6. Majority of the sample farmers had an annual family income of less than 1.5 lacks which was less than the national per capita income ($1909).

Table 4.6 Yearly income status of the sample farmers

Level of Income (Tk.)	Gafargaon	Trishal	All	Percentage
Less than 1.5 lacks	23	18	41	51.25
1.5 lacks to 2.5 lacks	15	18	33	41.25
Above 2.5 lacks	2	4	6	7.5

Source: Field survey (2019)

4.8 Conclusion

It is clear from the above discussion that socio-economic characteristics differ among farmers. There was many socio-economic differences between two locations. Mainly there was notable variation in land ownership pattern and occupation.

Chapter 5

COSTS AND RETURNS OF JUTE CULTIVATION

5.1 Introduction

This chapter attempts to estimate the cost, return and profitability of jute cultivators of the study area. Cost of input used has a vital role on producer's decision making. So, clarification of cost items is needed to calculate profit or loss. All the components of costs and returns of jute production are discussed in this chapter. The following cost components of jute production were considered:

i. Cost of land preparation

ii. Cost of human labor

iii. Cost of seed

iv. Cost of manures and fertilizers

v. Cost of pesticides

vi. Cost of irrigation

vii. Interest on operating capital

viii. Land use cost

5.2 Cost of land preparation

Power tiller has been widely used for tillage operation in the study area. Almost all farmers used power tiller for land preparation. There was a fixed rent of power tiller for per local unit of land. Per hectare land preparation cost at Gafargaon upazilla was Tk. 8691.27 and Tk. 6545.97 at Trishal Upazilla. Per hectare average cost of land preparation was Tk. 7618.62, which was 7.93% of total cost of jute cultivation.

5.3 Cost of human labor

The larger portion of jute production cost was the cost of human labor. It was the most important and largely used input of jute production. Human labor required for different operations of jute production such as land preparation, operating power tiller, seed sowing, fertilizer and manure application, weeding, pesticides application, cutting and carrying jute for retting, ribboning fiber and drying, etc. In the study area, some farmers and their family members worked as family labor, besides hiring purchased labor. In the present study, human labor was measured in terms of man-days unit, which usually consisted of eight hours of work by an adult man. Female labor wage was calculated as 1 man-day is equal to 1.5 times of female labor man-day. Average cost of per man-days was 340.57 in the study area, which ranged from Tk. 300 to Tk. 500. Total hired labor cost of per hectare land was Tk. 58206.65 and family labor cost was Tk. 6157.12. From the table 5.1, it was found that per hectare hired labor cost was higher in Trishal upazilla and cost of family labor was higher at Gafargaon. The reason behind this was, farmers of Trishal needed more hired labor for farming operation and farmers of Gafargaon got more family labor.

5.4 Cost of seed

All of the farmers used purchased seed collected from local market, in the study area. Cost of jute seed varied in the study area depending upon the quality and availability of seeds. Average price of one kg seed was Tk. 251. The average quantity of jute seed used by the farmer was 10.61 kg/ha. Per hectare seed cost was higher in location 1 than location 2. Cost of seed per hectare was calculated Tk. 2663.11, which was 2.77% of total cost.

5.5 Cost of fertilizer and manure

Mainly three kinds of inorganic fertilizers namely Urea, Triple Super Phosphate (TSP), and Muriate of Potash (MOP) are applied by most of the farmers in the study area.

Optimum amount of fertilizer application is very important for a good yield. Farmers also used manure eg. cowdung in their jute field. All fertilizers were bought from local market and manure was mostly collected from their own household. The average price of manure was 2Tk./kg. This cost was determined at the prevailing market rate. The average price of Urea, TSP and MoP was 18.5 Tk./kg, 28.62 Tk./kg and 31 Tk./kg respectively. Per hectare cost of Urea, TSP, and MOP were Tk. 2145.2, Tk. 1326.1 and Tk. 1542.27 respectively. Per hectare fertilizer cost and manure cost was Tk. 5013.57 and Tk. 2923.37 respectively.

5.6 Cost of irrigation

None of the sample farmers in this study used irrigation for their cultivation. The respondents said that, irrigation was not needed as sufficient rain water was available during jute cultivation period in the study area.

5.7 Cost of pesticides

Jute growers used various pesticides to protect their crops from pest attack and diseases. Per hectare pesticide cost in jute cultivation in the study area was Tk. 604.78 per hectare.

5.8 Interest on operating capital

All operating costs such as the costs of power tiller, human labor, seeds, fertilizers, manure etc. were taken into consideration to calculate the interest on operating capital. It was estimated on the average operating cost over the production period because all costs were not incurred at the beginning or at any fixed time. In this study, interest on operating capital was charged for the duration of four months and at the rate of 10 percent per annum assuming that, if the growers borrowed that money from bank, they had to pay interest at the same rate. It was estimated by the following formula (Miah 1987).

Interest on Operating Capital $= \frac{\text{Al x i x t}}{2}$

Where,

Al = Total operating capital

i = Interest rate per year (%) and

t = Length of the jute production period (month)

In this study, interest on operating capital was charged at the rate of 10 percent per annum and was estimated for the duration of 4 months. Average Interest on operating capital was calculated Tk. 1291.21 per hectare in the study area.

5.9 Land use cost

Land use cost usually varies depending on location, accessibility and fertility of land. Duration of four months was considered as the cropping period of jute production in the study area and the land rent was estimated at a prevailing rate. Per hectare average rental value of land in both location was estimated Tk. 11692.34 for the cropping period, considering all the sample farmers. It is noted that there was a little variation of fixed cost among farmers according to their land holding.

5.10 Total cost

Total cost is a sum of total variable cost and total fixed cost. Costs of all resources used in production were added together in order to estimate per hectare total cost. Land use cost, cost of family labor and cost of IOC were added as fixed cost. Per hectare total cost was estimated Tk. 96170.77 for the jute farmers in the study area.

Table 5.1: Level of input use per hectare of jute cultivation

Particulars	Gafargaon	Trishal	All farms	Price (Tk/unit)
Human Labor (Man Days)				
Hired	153	188	170	340
Family	21	15	18	340
Seed (kg)	10.2	11	10.61	251
Urea (kg)	110	122	116	18
TSP (kg)	44	50	47	28
MoP (kg)	48	52	50	31
Manure (kg)	1500	1424	1462	2

Source: Field survey (2019)

Per hectare cost of the sample farmers are given bellow:

Table 5.2: Per hectare cost of jute production in the study Location

Items		**Gafargaon (Tk./ha)**	**Trishal (Tk./ha)**	**Total cost (Tk./ha)**	**Percentage**
Variable Cost					
Land preparation		8691.27	6545.97	7618.62	7.93
Hired Labor		52137.64	64275.66	58206.65	60.52
Seed		2768.65	2557.57	2663.11	2.77
Fertilizers	Urea	1922.23	2368.17	2145.2	5.21
	TSP	1225.3	1426.9	1326.1	
	MoP	1462.15	1622.39	1542.27	
Manure		3261.21	2585.53	2923.37	3.04
Pesticides		502.13	707.43	604.78	0.63
Total Variable Cost (TVC)		**71970.58**	**82090.62**	**77030.1**	**80.10**
Fixed Cost					
Family labor		7152.25	5161.99	6157.12	6.40
Land use cost		11692.34	11692.34	11692.34	12.16
Interest on operating capital (10% for 4 months)		1209.64	1372.78	1291.21	1.34
Total Fixed Cost (TFC)		**20054.23**	**18227.11**	**19140.67**	**19.90**
Total Cost (TVC+TFC)		**92024.81**	**100317.73**	**96170.77**	**100**

Source: Field survey (2019)

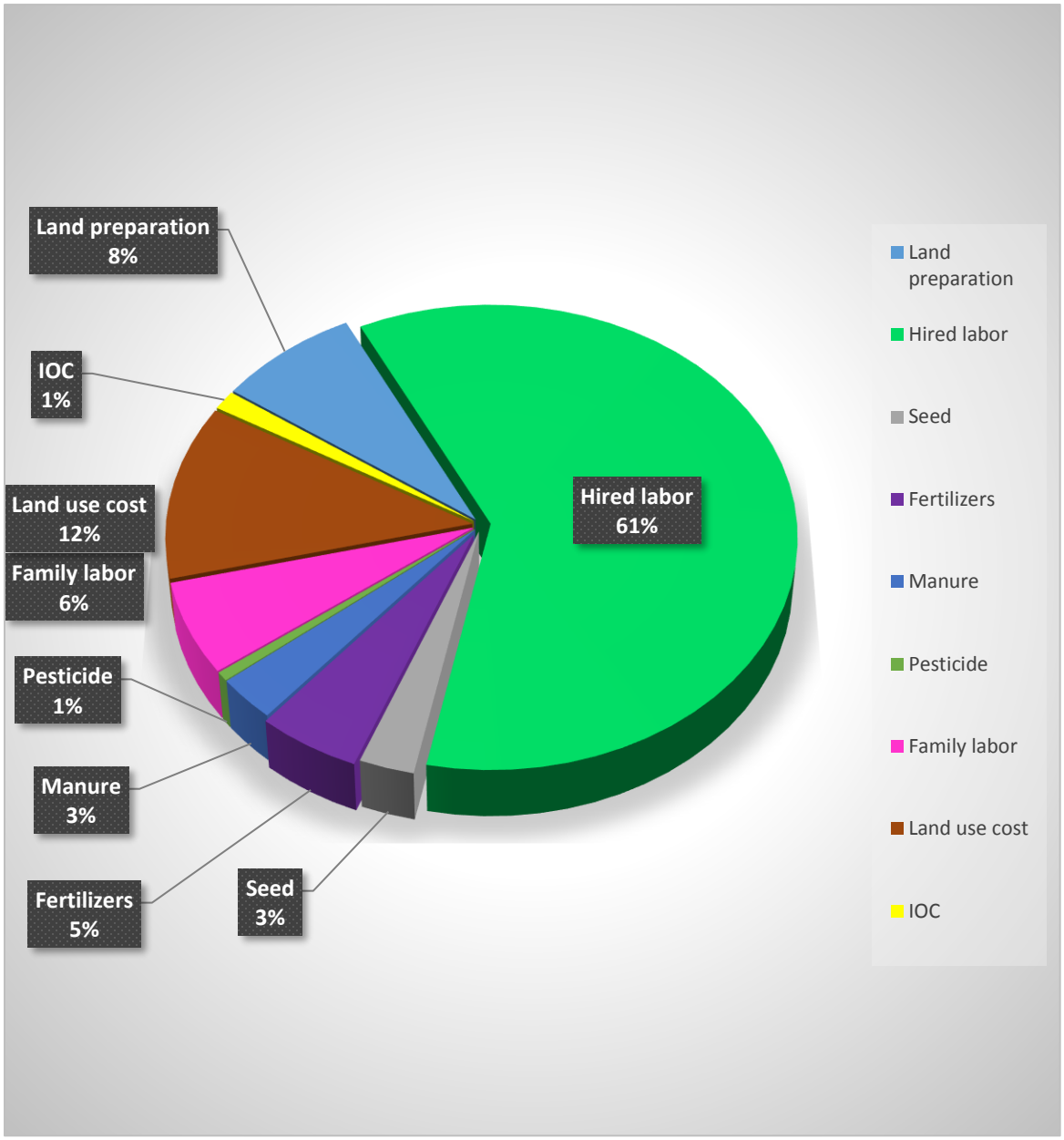

Fig 5.1 Percentage share of total cost of jute production for the sample farmers

5.11 Gross return

Gross return from jute production is the sum of monetary value obtained from jute fiber and jute stick. Output of jute cultivation includes the physical quantities of main products and by products. Total return was calculated by multiplying the total amount of main product and by product with their respective market prices. Per hectare jute yield was 2800.31 kg. Average market price of one kg jute fiber was Tk. 34.5 at harvesting period. Per hectare gross return from jute production was Tk. 106328.46 and Tk. 138520.26 at Gafargaon and Trishal upazilla respectively.

Table 5.3 Per hectare return of jute production in the study area

Particulars	**Gafargaon (Tk.)**	**Trishal (Tk.)**	**All (Tk.)**
Jute fiber (kg)	2396.3	3205.68	2800.31
Average Price (Tk./kg)	34	35	34.5
Total price of fiber	81474.2	112198.8	96610.69
Jute Stick (bundles)	2259.48	2924.6	2559.09
Price (Tk./bundle)	11	9	10
Total price of jute sticks	24854.26	26321.46	25590.93
Gross return	106328.46	138520.26	122201.62
Total Variable Cost	71970.58	82090.62	77030.1
Total cost	92024.81	100317.73	96170.77
Net return	14303.65	38202.53	26030.85
BCR on TVC basis	1.48	1.69	1.57
BCR on Total Cost basis	1.16	1.38	1.27

Source: Field survey (2019)

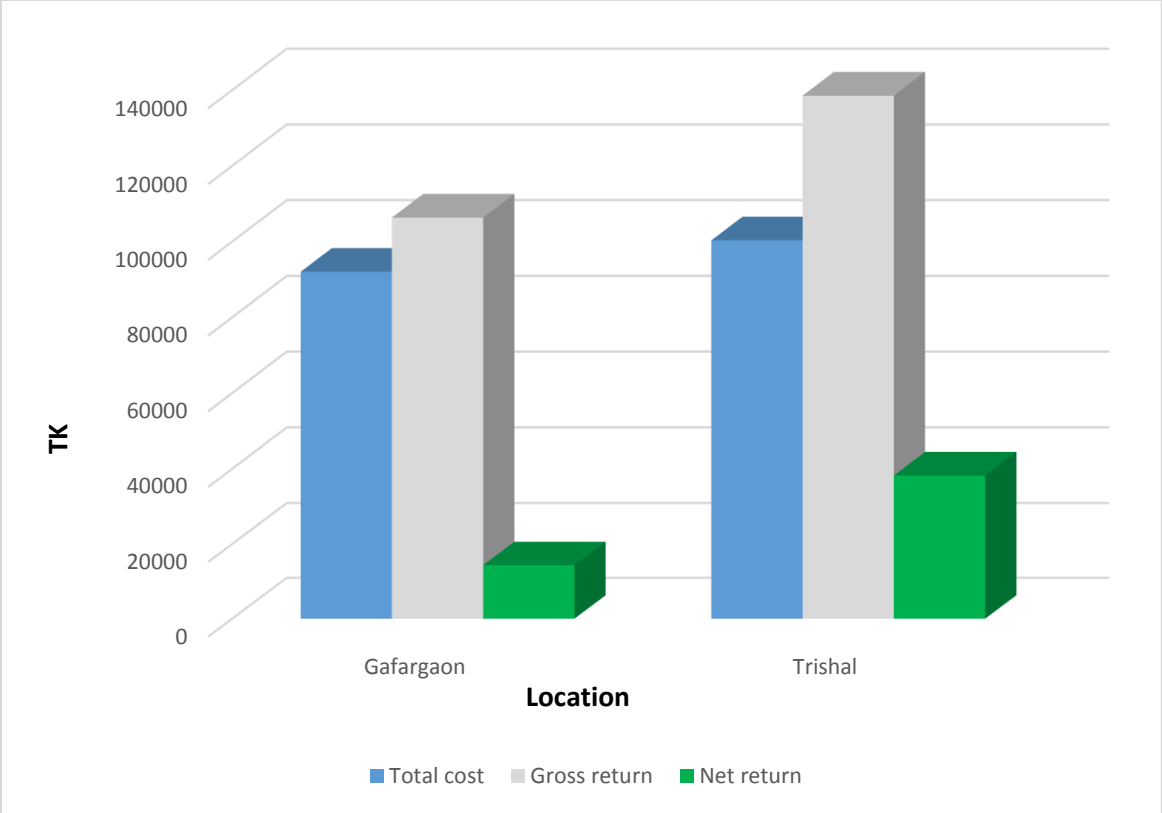

Fig 5.2: Per hectare total cost, gross return and net return in jute cultivation for the farmers of two locations.

5.12 Net return considering the harvest price

Net return was obtained by deducting total costs from gross return. Calculating net returns represents the performance of any enterprise. Per hectare net return of jute was calculated Tk. 14303.65 for Gafargaon upazilla and Tk. 38202.53 in Trishal upazilla. Net return was higher at Trishal upazilla because per hectare yield and yield price was higher at this location than Gafargaon upazilla. The results presented at the table 5.2 reveals that jute is a profitable crop in the study area.

5.13 Benefit cost ratio

BCR refers to undiscounted benefits and costs which was calculated by dividing gross return by gross cost. This measure helps to see the resource use efficiency. Benefit Cost Ratio on total cost basis was 1.27 which indicates that jute cultivation was profitable in the study area.

5.14 Concluding remarks

From the above result and discussion it is seen that there are some variation in the profitability of jute between two selected upazillas. Per hectare total cost and return was found higher at Trishal upazilla. Because most of the farmers of Gafargaon cultivated Mesta jute which requires less labor cost than Deshi or Tosha jute. BCR was also higher at Trishal upazilla. The findings show that jute cultivation in Trishal upazilla was more profitable than Gafargaon upazilla. It is clear from above mentioned discussion that in the study areas of Mymensingh district, jute cultivation was profitable.

Chapter 6

PRODUCTION FUNCTION ANALYSIS

6.1 Introduction

In this chapter, an attempt has been made to identify and measure the effects of the factors on gross return of jute production in the framework of production function analysis. Cobb-Douglas production function model was chosen. This analysis is expected to provide a more clear view about the productivity situation. Under jute production, five variables were identified as key contributor to the production process. These are land preparation cost (X_1), fertilizer cost (X_2), seed cost (X_3), labor cost (X_4), and manure cost (X_5). There are many other variables which affect the production process directly or indirectly. However, these were not considered in this study.

6.2 Functional relationship

Findings from a log-linear specification are measured in Table 6.1. The estimated Cobb-Douglas production function for jute was:

$$\ln Y = 3.26+0.34\ln X_1-0.10\ln X_2+0.09\ln X_3+0.66\ln X_4-0.01\ln X_5+U_i$$

Where,

Y = Gross Return (TK/ha)

X_1 = Land preparation cost (TK/ha)

X_2 = Fertilizer cost (TK/ha)

X_3 = Seed cost (TK/ha)

X_4 = Human labor cost (TK/ha)

X_5 = Manure cost (TK/ha)

U_i = Error term

6.3 Interpretation of the estimated model

Interpretations of the estimated coefficients and related statistics of the model are given below:

Table 6.1 Estimated values of Regression Coefficients and related statistics of Cobb-Douglas production function model

Explanatory variables	Coefficients	t-value	Standard error
Intercept	3.26	2.74	1.18
Land preparation cost (X_1)	0.34	2.01*	0.16
Fertilizer cost (X_2)	-0.10	-2.85**	0.03
Seed cost (X_3)	0.09	0.81	0.11
Human labor cost (X_4)	0.66	10.21***	0.06
Manure cost (X_5)	-0.01	-0.68	0.01
R^2	0.65		
F-value	26.96		
Return to scale	0.98		

Note: *Significant at 10 Percent level.

**Significant at 5 Percent level.

***Significant at 1 Percent level.

6.3.1 Constant or intercept term

The value of constant represents the composite impact of all other influencing variables that are excluded from the model. Five individual variables were taken into consideration for production analysis of jute.

6.3.2 Land preparation cost (X_1)

It can be seen from Table 6.1 that the estimated co-efficient of land preparation cost (X_1) was positive (0.34) for jute production which was significant at 10 percent. It indicated that holding other variables constant, one percent increase in land preparation cost would increase gross return by 0.34 percent.

6.3.3 Fertilizer cost (X_2)

The regression co-efficient of fertilizer cost (X4) was (-0.10) for jute production, which was significant at 5 percent level. There was a negative relationship between fertilizer cost and gross return. It indicated that considering all other factors constant, 1 percent increase in fertilizer cost would decrease gross return by 0.10 percent.

6.3.4 Seed cost (X_3)

The coefficient of seed cost (X_3) was estimated as 0.09 for jute production which was positive. It indicated a positive relationship between gross return and seed cost. That means 1 percent increase in seed cost would increase gross return by 0.09 percent, holding other variables constant, this cost item was not significant.

6.3.5 Human labor cost (X_4)

The regression coefficient of human labor cost (X4) for jute production was estimated 0.66 which was highly significant at 1 percent level of significance. Thus there was a

positive relationship between human labor cost and gross return. It indicated that considering all other variables constant, one percent increase in human labor cost, would increase gross return by 0.66 percent for jute production.

6.3.6 Manure cost (X_5)

The regression coefficient of manure cost (X_5) was negative (-0.01) and insignificant for jute production. It indicated that manure cost had no significant effect on production of jute.

6.4 Value of R^2

The estimated value of the goodness of fit, R^2 of the model was 0.65 for jute production. R^2 value of 0.65 indicated that about 65 percent of the total variations in gross returns under jute production have been explained by the variables included in the model. In other words. 35 percent of the total variation in the gross return is unexplained.

6.5 F Value

F-statistic was estimated for overall significance of the estimated model. The F-values of the model derived for jute production was 26.96 which was highly significant at 1 percent level of significance which implying that all the explanatory variables included in the model were important for explaining the variations in gross returns under jute production.

6.6 Returns to scale ($\sum b_i$)

Return to scale reflects the degree to which a proportional increase in all inputs increased the output. Constant returns to scale occurs when a proportional increase in all inputs results in the same proportional increase in output. Increasing and decreasing returns to scale occurs when proportional increase in all inputs results in more proportional increase in outputs than proportional increase in inputs and results a decrease in output,

respectively. The summation of all the regression co-efficient of the estimated model gives information about the returns to scale, that is, the response of output to a proportionate change in all inputs. In the present research. The value of returns to scale was estimated as 0.98 for jute production. It indicates that if all the inputs specified in the model were increased by 1 percent, the gross return of jute production would increase by 0.98 percent. That is, the production function exhibits decreasing returns to scale.

6.7 Input use efficiency in jute production

In order to identify the status of resource use efficiency, it was considered that a ratio equal to unity indicated the optimum use of that factor, a ratio more than unity indicated that the yield could be increased by using more of the resources. A value of less than unity indicated the unprofitable level of resource use, which should be decreased to minimized the losses because farmers over uses this variable. The negative value of MVP indicates the indiscriminate and inefficient use of resource.

The ratio of MVP and MFC of land preparation cost for jute production was positive (5.14) and more than one, which indicated that in the study area land preparation was under used. So farmer should increase the use of land preparation to attain efficiency considerably.

The ratio of MVP and MFC of fertilizer cost for jute production was negative and less than one, which indicated that in the study area fertilizer was over used in jute production. So farmer should decrease the use of fertilizer to attain efficiency.

It was revealed from table 6.2 that the ratio of MVP and MFC of seed cost for jute production was positive and more than one, which indicated that in the study area seed was under used in jute production. So farmer should increase the use of seed to attain efficiency.

The ratio of MVP and MFC of human labor cost for jute production was positive (1.23) and more than one, which indicated that in the study area human labor was under used.

So farmer should increase the use of human labor to attain efficiency in jute production considerably.

The ratio of MVP and MFC of manure cost for jute production was negative and less than one, which indicated that in the study area manure was over used in jute production. So farmer should decrease the use of manure to attain efficiency.

Table 6.2 Estimated input use efficiency in jute production

Variables	**Geometric mean (GM)**	**Y (GM)/Xi (GM)**	**Coefficient**	**MVP (Xi)**	**r=MVP/MFC**	**Decision rule**
Yield (Y)	15163.22					
Land preparation cost (X_1)	1002.43	15.12	0.34	5.14	5.14	Under-utilization
Fertilizer cost (X_2)	245.07	61.87	-0.10	-6.18	-6.18	Over-utilization
Seed cost (X_3)	470.98	32.19	0.09	2.89	2.89	Under-utilization
Human labor cost (X_4)	8084.76	1.87	0.66	1.23	1.23	Under-utilization
Manure cost (X_5)	329.49	40.02	-0.01	-0.40	-0.40	Over-utilization

Source: Field survey (2019)

Chapter 7

PROBLEMS FACED IN JUTE PRODUCTION

7.1 Introduction

This chapter highlights the major problems of the jute growers in conducting jute cultivation in the study area. Every respondent farmer was asked if there were any problems faced by them related to farming of jute. Their opinions were recorded by the researcher. There were multiple numbers of problem faced by the farmers, these problems confronted by the individual farmers were not identical for the production. All of these problems are briefly discussed below.

7.2 Low Price of jute

Jute is the main cash crop of the farmers. Many farmers family expect to meet their family needs by selling jute with a good return. So, low price of jute is a very big problem. Most of the time jute growers are deprived of a reasonable price. Only a few respondents said that they were satisfied with the selling price due to early harvest. More than 63% farmers complained that the market price was too low to cover the production cost. There was frequent fluctuation in the market price of jute.

7.3 Insufficient retting place

There was insufficient water availability for jute retting in the villages of both upazilla of this study. It is a major problem for the jute farmers during the harvesting period. The quality of fiber is ruined if retting is not carried out properly. The quality of jute fiber degrades because of proper retting facilities, which causes low market prices of jute fiber. Farmers have to ret their jute on small ponds or ditches besides home. But not all farmers had the facilities of short distance water source for retting. About 37% famers faced problem of insufficient water for retting and 65% farmers told that they had not their own

retting pond. Available water bodies for jute retting were at distant place for some farmers and they had to carry the jute bundles there. That increased the labor cost.

7.4 Labor shortage

Jute is a labor intensive crop. So, hired labors are needed for performing various operations of jute cultivation. According to many researchers, the highest percentage of production cost goes for labor wages. During the period of weeding and harvesting, shortage of human labor was found in the study area. Following the shortage of labor, wage increased significantly during the production season. About 20% sample farmers complained about unavailability of labor at due time.

7.5 High price of seed and fertilizer

Now a days, the price of inputs particularly fertilizers is higher than the government rates and its distribution channel is quite inefficient. Farmers said that price of jute seed was very high. The price of urea was reasonable but price of TSP and MoP fertilizer was higher than urea. Majority of the farmers of this study are small farmers and most of them can hardly afford proper dose of fertilizers.

7.6 Insect attack

A few farmers (26.25%) reported that, attack of insects eg yellow mites attack leads to a decrease in jute production.

7.7 Lack of Capital

Huge amount of cash money is needed in jute cultivation. Farmers need to purchase various inputs like seed, human labor, fertilizers and pesticides in proper time. Most of the sample farmers were not well off and they faced this financial constraint. About 47% farmers had lack of capital at different stage of cultivation.

7.8 Marketing cost

Farmers usually prefer to sell their product at farm gate in order to save the transportation cost. Most of the times, they sold their products to the paikers at a lower rate than village market. Some farmers sold their products at village market. It was observed that, selling at farm gate has the demerits of lower price and selling at market is transportation cost. About 14% farmers complained about transportation cost.

7.9 No storing facilities

Farmers need to store their jute fiber for future sale so that they can ensure a fair price. There was no jute storing facilities in the villages of the study area. Among the sample farmers, 17.5% complained about storing place. Farmers used to store jute at their own house and fibers were badly affected by insects and diseases.

7.10 Concluding remarks

Jute plays a crucial role in earning cash money for the farmers and also can earn foreign currency for the country. There are many internal and external problems faced by the farmers in producing jute. These problems are ruining the hope of growth of jute industry in the country. It can, therefore, be concluded that hectarage of jute production could possibly be increased to a large extent if the above mentioned problems can be solved immediately.

Table 7.1 Problems faced by the jute farmers in the study area

Types of problems	Rank	No of respondents	Percentage
Lack of retting pond	1	52	65
Low price of jute	2	51	63.75
Lack of capital	3	38	47.5
Insufficient retting water	4	30	37.5
Pest attack	5	21	26.25
Labor shortage	6	16	20
Lack of storing place	7	14	17.5
High price of fertilizers	8	12	15
Marketing cost	9	11	13.75

Source: Field survey (2019)

Chapter 8

SUMMARY, CONCLUSION AND RECOMMENDATIONS

8.1 Summary

The economy of Bangladesh depends largely on jute which earns a major share of its foreign exchange. Raw jute and jute product produced in Bangladesh are world famous for its quality like color, length, strength, luster, texture etc. So Bangladesh has strong dominance over other countries on jute industry. Jute was one of the most important export items till the end of 1980s. Jute is the golden fiber of Bangladesh and it plays a very important role in the economy of Bangladesh. At present, Bangladesh is the second largest producer of jute after India. Jute is being produced at about 55 districts of Bangladesh. This country has got relative advantage on growing best quality jute fiber of the world. Bangladesh is famous for jute and allied fibers, but garments industries have faster growth due to cheap labor cost comparing to jute industry. Jute industry may create a bright future if diversification of its limited resources is possible. Diversified products of jute are eco-friendly, non-plastic, non-toxic and biodegradable. These products help the environment from degradation. Jute Diversification Promotion Centre (JDPC) was established in Bangladesh in 2002 for the promotion of jute cultivation in Bangladesh. Cultivable land is decreasing day by day as a result of increasing population. Government of Bangladesh recognizes the significance of jute in the economy of the country, which provides sustenance of millions of people engaged in jute industry as farmer, manufacturer, businessman, labor, weaver etc. Jute is economically an important industry of the country, any problem of this industry should be studied carefully and should be solved as early as possible. Cost effective technologies should be developed for production and processing of jute so that production cost can be minimized and profit margin increases.

The present study has been undertaken considering the importance of jute sector in the economy of Bangladesh. It examines profitability and potential of jute production at the selected study area. The specific objectives of the study were as follows:

i) To know the socio-economic status of jute farmers in the study area.

ii) To estimate cost and returns of jute cultivation.

iii) To determine input use efficiency of jute production.

iv) To identify major problems faced by farmers in producing jute.

The present study was carried out in some villages under Gafargaon and Trishal Upazilla of Mymensingh district. The study areas were purposively selected. In total 80 farmers were selected, 40 from Gafargaon and 40 from Trishal Upazilla. In the present study, purposive sampling technique was followed for minimizing time and cost and to achieve the ultimate objectives of the study. Necessary primary and secondary data were collected for the study. The study is mainly based on primary data, which were collected through direct interview with the respondents by the researcher herself. Survey method was used for collecting relevant information regarding cost and return of jute per hectare by interviewing sample farmers. After necessary editing the data were tabulated and analyzed by using MS Excel.

Socio-economic characteristics of the sample farmers were identified in the present study. About 71 percent of the jute farmers were educated, among 80 farmers, 17 had primary level of education. 18 farmers have up to secondary level literacy, 14 were up to higher secondary level literacy and 8 farmers were Graduate. Average family size of the sample farmers consisted of 5.16 members. 67.5% families were small families among the sample farmers, consisting of 1 to 5 members. Only 3.75% farmers were under 31 years age group among the sample farmers. Majority of the farmers were at the age group 31 to 55 years, what refers to having more strength and experience of farming. 10 farmers among 80 were of above 55 years age. . Farming was the main occupation of 67 farmers among the 80 sample farmers. Others were engaged in business and various service sectors who took farming as subsidiary occupation. Average farm size was 0.83 hectare in this study.

Cost and return were calculated to know the income from jute cultivation. The cost items were human labor, fertilizer, manure, seed, pesticide, power tiller, family labor cost, interest on operating capital and land use cost. The analysis of cost and return revealed that human labor was important element for producing jute. Per hectare average cost of human labor was Tk. 340.57 per man-days. Per hectare total costs in producing jute was Tk. 96923.93. The findings of the study showed that the average yield of jute was 2800.31 kg per hectare. The gross return from selling fiber and by product was Tk. 122201.62 per hactare. The average net return per hectare was found to be Tk. 26030.85. BCR came out to be 1.27 for the study. Cobb-Douglas production function was used to examine the effects of the independent variables on the dependent variable in the production of jute. The chosen explanatory variables were human labor, land preparation, seed, fertilizer and manure. Estimated values of the relevant co-efficient revealed that among the included variables, Land preparation cost, fertilizer cost and human labor cost had significant impact on the output of jute. The value of R^2 was 0.65 that indicates 65 percent of the total variation of jute production could be explained by the independent variables. F-value of the production function was 26.96. It was significant at one percent level of significance, which implies good fit of the model. The study also identified the problems faced by the farmers during jute production. With regard to major problems, the finding revealed that high input price, input unavailability, insufficient water availability for jute retting, lack of rainfall in the sowing period, want of storage facilities etc. were the major obstacles of jute production in the study area. Supply of agricultural inputs at a lower cost may be effective to cope with input related problems of jute cultivation. It was observed in the study that, jute has great potential for product diversification. New opportunities should be created by adopting appropriate technologies by farming communities. The sustainability of jute production in Bangladesh depends on optimization of quality seed, planting time, balanced fertilizer management and soil fertility conservation.

8.2 Conclusion

Jute is relatively an old crop of Bangladesh. Where there is lack of irrigation, farmers can profitably produce jute than other competitive crops. It has an enormous market potential which can create great opportunities if modern cultivation practices can be made available for the farmers. In Bangladesh, marketing of jute follows a traditional trend which involves multiple intermediary levels. Global jute market is expanding, so jute marketing process of Bangladesh also needs to be developed. It is already discussed that jute and jute processed products have huge potential market. In order to convert the potential market to real market, proper promotional activities of market is needed. The present and future potential market and demand for jute should be determined through a comprehensive study in order to take up a well-planned jute production program at national level. Jute sector faced both opportunities and challenges for decades. This sector is passing through a critical path in the course of its record of development. At the same time, it has inherent weakness and strength for growth. Jute industry is beset with certain very serious problems, it is dependent on heavy subsidies from the government, there is growing feeling in the mind of the people that this industry which fed with locally produced indigenous raw materials should be able to stand on its own legs by effective and efficient husbanding of human and material resources. The failures of JSAC program tell us that privatization cannot be solution of situation. What we need to reestablish our jute industry is sincere effort from the side of employee as well as from the side of Government. This is, of course, beyond doubt that the first problem to be tackled is to formulate and affective and well-balanced jute policy. Because if we want to exercise controls over the industry of bring out operational efficiency we must have a workable jute policy. Above all sincerity, honesty, and integrity of the employee are the best panacea of the lot of management ills.

However, it was observed in the study area that jute production was profitable. So cultivation of jute can help in increasing farm income and employment status of farmers. Training, availability of input and better management of land through increases institutional and infrastructural support will help enhance jute production and to earn huge foreign currency.

8.3 Recommendations

On the basis of major findings of the study, the following important recommendation may be made for policy formulation to develop the jute sector of Bangladesh.

- The price uncertainty of yield largely affects the profitability of jute production. It is revealed from the study that farmers were dissatisfied with the market price. So, the study recommended for strengthening market system for a stable and handsome price of raw jute. The jute pricing policy should take the objective of providing a fair price to growers.

- The supply of seed should be ensured to the farmers at right time. Necessary steps should be taken by Government to extend the distribution of good quality certified seed among farmers. Quantity of raw jute yield depends largely on the quality of seed.

- Steps may be taken to establish a temporary purchasing center in the study area during the harvesting period for bulk purchase by the government from the farmers. This will ensure a fair price and profit of jute growers. This will encourage the jute growers for further cultivation and thus the hectarege of jute will increase gradually.

- Ribbon retting technologies should be developed and introduced to the jute farmers.

- Department of Agricultural Extension and NGOs can play role in extension program and to increase area under jute production. Improved production technology with easy access to the farmers should be made available.

- Government should take step to reform the prevailing canals so that jute farmers get sufficient water for retting.

- The study revealed that seed and manure were overused by the farmers. So, proper training should be provided about input use.

8.4 Scope for Further Research

The present study is not a comprehensive study. A broad-based study on jute production covering all topographical areas could be undertaken to examine various aspects of jute production. The present study might be helpful for further research to arrive at any plan for the development of the jute farmers. So, lots of research and development activities should be continued to increase yield, production and processing of raw jute.

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