PROFITABILITY ANALYSIS OF JUTE CULTIVATION AND ROLES ON INCOME GENERATION IN SOME SELECTED AREAS OF TANGAIL DISTRICT

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CERTIFICATE

This is to certify that the thesis entitled "**PROFITABILITY ANALYSIS OF JUTE CULTIVATION AND ROLES ON INCOME GENERATION IN SOME SELECTED AREAS OF TANGAIL DISTRICT**" submitted to the Department of Development and Poverty studies, Sher-e-Bangla Agricultural University, Dhaka-1207, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (MS) in DEVELOPMENT AND POVERTY STUDIES**, embodies the result of a piece of bona fide research work carried out by **ARPITA BAISNOB**, Registration No. **14-06062** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated:

Dhaka, Bangladesh

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DEDICATED
TO
MY BELOVED
PARENTS

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ABSTRACT

The purpose of the study was to document the socio-economic characteristics of the jute cultivars; to estimate the costs, returns and profitability of jute production; to estimate the major factors affecting profitability of jute production; to identify the major problems faced by the farmers and suggest some policy recommendations. The study was undertaken purposively in Mirzapur upazilla under Tangail district. Validated and well-structured interview schedule was used to collect data from 60 jute cultivars during 1st March to 1st May, 2021. Per hectare gross return of jute cultivation was Tk. 174135. Per hectare gross margin was Tk. 85737. Total net return was estimated Tk. 73843.09 per hectare. Benefit Cost Ratio (BCR) was 1.74. Cobb-Douglas production function analysis was carried out for examining the factors affecting the profitability of input use. In most of the cases the coefficients of seed cost, Urea cost, TSP cost and MoP cost had significant positive effect on profitability of jute cultivation. The value of the coefficient of multiple determination of jute cultivation was 0.75 which implied that about 75 percent of the total variation in the gross return could be explained by the included explanatory variables of the model. From the study the average household income from jute cultivation was 47803.28 tk. High price of inputs was the 1st problems in the study and lack of irrigation facility was the last problem.

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ABBREVIATIONS

BARI	Bangladesh Agricultural Research Institute
BB	Bangladesh Bank
BBS	Bangladesh Bureau of Statistics
BCR	Benefit Cost Ratio
BJRI	Bangladesh Jute Research Institute
DTW	Deep Tube Well
GDP	Gross Domestic Product
ha	Hectare
HYV	High Yielding Variety
IOC	Interest on Operating Capital
Kg	Kilogram
LUC	Land Used Cost
MP	Muriate of Potash
NGOs	Non-Governmental Organizations
NR	Net Return
RTS	Return to Scale
SPSS	Statistical Package for Social Science
STW	Shallow Tube Well
TSP	Triple Super Phosphate
TVC	Total Variable Cost

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Bangladesh is a small developing country with mostly an agro-based economy. Agricultural sector plays an important role in the overall economic development and food security of this highly populated country. Historically, agricultural sector is prominent for a long time in Bangladesh (Molla *et al.,* 2015*).* The agricultural sector (crops, animal farming, forests and fishing) contributes 13.10% to the country's total GDP and it remains as the largest employment sector in Bangladesh economy with about 45.1% of the labor force engaged in agriculture (BBS, 2021). Agriculture is a major source of rural jobs in Bangladesh as over 87% rural people derive at least some income from agriculture (BBS, 2021). The contribution of agriculture to the GDP of Bangladesh is presented in table 1.1.

Table 1.1 Share of agriculture to GDP (%) of Bangladesh

Year	2011	2012	2013	2014	2015	2016	2017	2018	1019	2020
Agriculture	16.81	16.18	15.49	15.35	14.78	14.05	13.41	13.35	13.17	13.10

(Source: BBS, 2021)

Major agricultural crops include rice (73.94%), wheat (4.45%), jute (3.91%), rape and mustard (3.08%), lentil (1.54%), potato (1.13%), sugarcane (1.12%) and chili (1.05%) of total GCA dominate the cropping pattern (BBS, 2021). Rice and wheat are mainly grown for domestic consumption whereas jute and tea are grown for export purpose. Bangladesh is the fourth biggest rice producer in the world after China, India and Indonesia (DAM, 2017). Rice production is one of the main sources of revenue for the country’s economy whereas jute and jute goods are one of the major export earners of agricultural sector in Bangladesh (Rahman, 2017). The significant contribution of rice

and jute in Bangladesh economy makes these crops very important among all agricultural crops.

1.2 Jute production in Bangladesh

Bangladesh is rated as second in the production of jute fiber worldwide (Hassan *et al.*, 2018). The major locations where best quality jute i.e. the jat type is produced are Kushtia, Jessore, Khulna, Rajshahi, Pabna and Dhaka which is also known as the jat region is prevalent for its capacity to create the most astounding nature of jute on the planet (Bepari, 2018). Jute is basically self-pollinated and cultivated in the rainy season. Sowing for the most part begins toward the finish of February and proceeds up to the finish of May. Jute strands are utilized in hessians and gunnies, rug and floor coverings, paper, canvas, covering and painstaking work. Dundi (UK), Belgium, Italy, USA, South America are the purchasers of unrivaled quality jute particularly high class white and tossa jute (Molla *et al.*, 2015). Bangladesh exports about 70% of their harvested jute and this makes it one of the leading jute producing countries in the world (DAM, 2017). The yearly generation of jute in Bangladesh is assessed to be 80.20 lakh tons which is comparable to 42% of the worldwide production (BBS, 2021). Jute production has increased on average by 8.87% every year from 2015 to 2017 (DAM, 2017). Owing to reasonable market prices, favorable weather conditions, and availability of water, jute cultivation increased remarkably over the last few years.

Table 1.2 Year wise area, production and yield of jute in Bangladesh

Fiscal Year	Area (lakh hectares)	Production (lakh tons)
2019-20	8.02	87.45
2018-19	7.96	85.65
2017-18	7.89	80.20
2016-17	7.38	82.47
2015-16	7.21	77.95

(Source: BBS, 2021)

1.3 Economic importance of jute in Bangladesh

Bangladeshi jute is popular around the world due to its excellent fiber quality. Bangladesh is the second largest jute producer in the world. The yearly production of jute in Bangladesh is assessed to be 80.20 lakh tons which is comparable to 42% of the worldwide production (BBS, 2017). Bangladesh exports about 70% of their total harvested jute and this makes it one of the leading jute producing countries in the world (Hassan et al., 2018). Dhaka controls over 62% of the global jute market and earns Tk. 2,012.5 crore by exporting jute products (Rahman, 2017). The total demand for jute products in the international market have been estimated at 7.50 lakh tons (Rahman, 2017). Bangladesh earned Tk. 2,939.5 crore by exporting raw jute and jute products in the fiscal year of 2017-18 (BBS, 2017). At present 160,000 people are directly employed in jute mills (Sarkar, 2018). The value addition of export is almost 100% and the farmers are beneficiary of export (Sarkar, 2018). Jute plant also improves soil condition as a result of its huge leaf fall and root multiplication in the field. Per ton jute fiber can bring $3,000-$10,000 to the economy of Bangladesh by enhancing the quality of jute items (Rahman, 2017). Jute is a noteworthy money crop for more than three million little homestead family units, the biggest business, delivering around 33% of assembling yield, and the biggest agricultural export item in Bangladesh (Bepari, 2018). The livelihood of about 25 million people is dependent on jute related activities in agriculture, domestic marketing, manufacturing and trade (Nahar et al., 2017). Jute is accounted for 4.9% to the gross domestic product (GDP) in FY 2017-18 (BBS, 2017). It is one of only a handful couple of harvests which can be developed in the monsoon season, and can be pivoted with rice to reestablish the richness and structure. The leaves of jute plants enrich the fertility of the soil for sustained agriculture, and have good nutrition value as vegetables (Rab, 2017). Jute fiber is 100% bio-degradable and recyclable and along these lines naturally well disposed (Siddique, 2011).

1.4 Present status of jute production in Bangladesh

Jute is being cultivated from the ancient times in Bangladesh. In Bangladesh, sacks and saris made of jute were commonly used in the middle age (Sinha *et al.*, 2014). The leaves and roots of jute are utilized as a natural drug and vegetable by the neighborhood individuals. Bangladesh used to enjoy almost a monopoly of jute production and marketing commercially during 1950 and 1960s (Hoque *et al.*, 2014). After the independence in 1971, Bangladesh government took over all the abandoned jute mills and nationalized under BJMC those owned by the citizen's (Sikder *et al.*, 2009). In the early 80's, over 50% of the mills (35 out of 66) were privatized again (Mandal, 2014). Its share in the export market was 80% in 1947- 48 but in 1975-76 it fell to only 25% which caused a big financial loss (Mandal, 2014). In 1993, government focused on the jute sector problems by taking a restructuring program supported by World Bank's JSRP and this program included closing the 9 out of 29 worst performing mills but the losses continued (Nahar *et al.*, 2017). In 2002, Government closed Adamjee jute mills that decreased BJMC's losses from tk. 3.9 billion to tk. 2.1 billion in 2003 but his led to a loss of 25000 permanent jobs and 5000 temporary jobs (Nahar *et al.*, 2017). In the fiscal year of 2016-17 the production rose over 82 lakh bales and Bangladesh earned $962.42 million from jute exports as compared to $ 918 million in FY 2015-16 (BBS, 2017). The country spent $701 million on the import of jute pulp in 2017 (Hassan *et al.*, 2018). The increased production came mostly from better breeds and farm management of jute rather than acreage expansion. While jute acreage increased marginally over the past four decades, the yield remarkably rose due to better crop management, inputs, better breeds and quality seeds. Bangladesh is currently producing 42% of the total jute in the world and exports 70% of the raw jute produced (Hassan *et al.*, 2018).

1.5 Prospect of jute in Bangladesh

Jute is one of the major cash crops in Bangladesh (DAM, 2017). Bangladesh is under challenge from other producers such as India, China, Uzbekistan, and Nepal (Molla *et al.*, 2015). However, it is still the second largest producer of jute and jute goods with around 42% of the total world production (BBS, 2017). Globally, people are becoming conscious about the consequences of using artificial and synthetic products like polythene, poly-propylene etc. One of the environmentally friendly ways to replace these artificial fibers is using jute products. Individuals worldwide are maintaining a strategic distance from harmful polythene in their day by day lives while business visionaries in the nation are contributing on jute and jute products. As a result, the demand for jute goods is increasing. Although jute is branded as the 'golden fiber', it was not documented as the agricultural product in the past (Rab, 2017). The present government has at this point announced jute and jute items as agrarian items with the goal that the maker could get government subsidy (Bepari *et al.*, 2018). Bangladesh government has already made jute sacks use mandatory for packing major items like rice, wheat, fertilizer, sugar (Bepari *et al.*, 2018). The world market for jute bags will reach $2.6 billion in 2022 and Bangladesh can use this opportunity (Bepari *et al.*, 2018). The administration gave out endowment on broadening of jute merchandise. The development of "GENOME SEQUENCE" by Maksudul Alam has opened another gateway for jute production (Hoque *et al.*, 2014). It is helping to invent new varieties of jute with better quality and production. Bangladesh should go for more research on diversified products of jute with collaboration of private sector entrepreneurs. Furthermore, government of Bangladesh may also shut down the non-viable and sick jute mills in both government and private sector and encourage setting up new jute mill with advanced technology for diversified jute products.

1.6 Rationale/justification of the study

Rice and jute are the main cultivated crops all over Bangladesh. Rice is the major cereal crop in Bangladesh and highly related with food security. On the other hand Jute is called the golden fiber. However, many substitute like polythene and plastic have reduced the demand of jute production. In recent years, international community is very conscious about environmental pollution and global warming caused by these artificial plastic products. Bangladesh is now focusing highly on producing eco- friendly products like -jute bags for reducing the climate impact and saving the nature. Farmers are now coming back to jute production as the price of jute is increasing day by day. The market of jute is expanding widely. Thus, it would be interesting to study profitability of jute production in Bangladesh.

1.7 Objectives of the study

The specific objectives of this study are-

i. To investigate the socio-economic characteristics of the jute cultivars;
ii. To determine the costs, returns and profitability of jute production;
iii. To estimate the major factors affecting profitability of jute production;
iv. To estimate the contribution of jute in household income generation; and
v. To identify the major problems faced by the farmers.

1.8 Structure of the Study

The study consists of five chapters which have been organized in the following sequence. First chapter gives a brief introduction of the study. Chapter two presents a brief review of literatures related to the study. Chapter three gives an insight of the methodology used to complete the study. Chapter four describes the results of the study. Lastly, chapter five presents the summary, conclusion and recommendation.

CHAPTER II

REVIEW OF LITERATURE

Review of literature is a crucial part as it gives an insight of the previous research work which provides knowledge and information related to proposed research. This information and knowledge give a guideline in designing and validating the future problems and existing findings. Past literature works related to the present study have been reviewed for this purpose in this chapter.

2.1 Profitability of jute production

Uddin *et al.* (2021), the objective of their study was to investigate the cost and return structures of white jute seed cultivation in Bangladesh. That 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 tk. ha^{-1}) and output (123502 tk. ha^{-1}) was higher in Tangail than Manikganj. Lowest cost of production (80252 tk. ha^{-1}) was recorded in 2013 in Manikganj and maximum (102470 tk. ha^{-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 was almost same in two zones and by product yield was also important in case of white jute seed production.

Tahmina (2019) conducted a study and Cobb- Douglas production function was used for analyzing data. From that study, it was estimated that the average per hectare cost for jute production was Tk. 89909.82. Additionally, per hectare total gross return of jute was found Tk. 136701.5. The net return per hectare and gross margin from jute

was Tk. 46791.68 and Tk. 56052.5 respectively. Not only that, the benefit cost ratio of jute was found 1.52. The research was conducted against boro rice. and found that jute was more profitable than boro rice in the study area. The result also revealed that jute seed and fertilizer showed positive and significant effect whereas human labor and power tiller showed negative but significant effect on gross return of jute production.

Molla *et al.* (2015) the study was aimed to analyze the financial and economic profitability of jute and its main alternative crop Aus including an assessment of comparative advantage using Policy Analysis Matrix. Both primary and secondary data were used considering the period from July 2010 through June 2011. It is found that jute production was more profitable financially in the study period than Aus in the selected areas of Bangladesh. Economic profitability showed that the government protective policies affect positively and negatively to the producer incentives in case of jute and Aus crops, respectively. Relative divergences reflect that the jute producer obtained higher price than the world prices and the Aus producer obtained lower price than the world prices. Relative divergences between private and social prices of tradable inputs illustrated that domestic producer bought the imported inputs at fewer prices than the world price for producing jute and Aus crops. Net policy divergences or net transfer of these crops showed that the productions were more profitable socially than privately. The study revealed that Bangladesh had a comparative advantage for import substitutions for these crops. Hence, government should continue the existing policy support for these crops in a market economy condition.

Khatun *et al.* (2014), this study was designed to estimate the costs, returns and relative profitability of White and Tossa jute production in at the Ullahpara upazila in Sirajganj district. Primary data were collected from 60 farmers, selected by random sampling techniques, of which 30 from each of the white and tossa jute producing farmers through a pre-tested interview schedule during the period from August to September 2010. Descriptive statistics were used for achieving the main objectives of the study. Average farm size of white and Tossa jute growers was 1.12 ha and 1.29 ha,

respectively in the study area. Considering all cash and non- cash expenses, it was found that full cost for White jute was Tk. 79871.02 and this was Tk. 81120.50 for Tossa jute which was higher by Tk. 1249.48. Per hectare net return for White jute were Tk. 18988.00 and Tk. 38832.00 for Tossa jute which was much higher compared to White jute. Insufficient water availability for jute retting was acute problem among the farmers. Therefore, solving the existing constraints is main concern to sustain jute sector in Bangladesh.

Hossain *et al*. (2014) the economic performance of jute cultivation was conducted at farm level of Manikganj, Jessore, Rangpur and Faridpur using pre-tested interview schedule through face-to-face interview method to know the existing agronomic practices, profitability and socio-economic constraints of jute cultivation during 2011-12. The farmers of Jessore prepared their land by the highest (3.40 nos.) number of ploughings. It was observed that most of the farmers used thinning and weeding in two to three times for jute crop. Jute farmers used 214 man-days of human labour per hectare of which 30% were family supplied. It was also found that about 86% farmers used purchased seed and the rest 14% used own seed. Farmers of Jessore used more TSP and MoP fertilizers than Rangpur. The major share in total cost was human labour (65%), followed by land use value (11%), land preparation (8.7%) and fertilizers (7%). It was found the highest gross return per hectare in Faridpur (Tk. 98330) compared to Rangpur (Tk. 90219), Jessore (Tk. 81767) and Manikganj (Tk. 79557). Gross margin was found to be the highest in Faridpur (Tk. 32544 ha^{-1}) and the lowest in Jessore (Tk. 10206 ha^{-1}). The average benefit cost ratios (BCR) were 1.28 on full cost and 1.83 on variable cost basis. Low market price (69%), lack of technical knowledge (59%), unavailability of retting facility (55%), non-availability of quality seed (50.75%) and insects and diseases infestations (43%) were the major problem in study areas.

Hussain *et al.* (2014) an analysis of productivity and profitability of jute under improved management practices showed distinctly higher benefit over farmer's traditional practices at sadar Upazila of Rangpur district during 2007-2009. Fibre yield

and gross margin generated under improved management were 16.94% and 63.33% higher over traditional practice. Marginal rate of return of the improved management also increased over time and it was 494% on average. From the productivity and profitability, it can be said that farmers did not follow the recommended improved agronomic management practices in cultivation of jute in the area under study. So, farmers should be motivated to practice improved management and agronomic practice of jute cultivation which would be helpful in obtaining productivity and profitability.

Sheheli and Roy (2014) studied on profitability, constraints and opportunities of raw jute production in Kishoregonj district with a sample of 100 farmers using Cobb-Douglas production function and found that jute cultivation was profitable and medium farmers had the highest profit than small and large farmers.

Kumar *et al.* (2014) studied on system productivity, profitability and resource use efficiency of white and tossa jute production in the eastern Indo-gangetic plain in India with a sample of 120 farmers using Cobb-Douglas production function and found that tossa jute had the highest profitability, system productivity and energy productivity than white jute.

Chakraborty and Bera (2014) studied on the economic viability of white and tossa jute production in West Bengal with a sample of 60 farmers using Cobb-Douglas production function and found that tossa jute had higher total return than white jute.

Sinha *et al.* (2014) studied on crop diversification for profitability in jute and allied fiber crops in Jessore district by considering Cobb-Douglas production function with a sample of 80 jute farmers and found that high transportation cost, high labor cost, lack of storage facilities, natural disaster, high input cost and attack of pests were the major problems.

Ghimire and Thakur (2013) in Nepal, the area and production of land has decreased in jute production due to several obstacles such as unstable and low price of raw jute,

unavailability of quality seed, labor shortage during peak season, weed problem, irrigation at sowing period and disease complex (wilt) etc.

Siddique (2011) studied on profitability analysis of jute growing farmers in Mymensingh district with a sample of 60 farmers considering Cobb-Douglas production function and found that jute production had higher gross return than total cost and medium farmers had the highest profit than small and large farmers.

Kundu (2011) studied on profitability of jute production and value addition activities of jute products in Madaripur district with a sample of 73 jute farmers using Cobb-Douglas production function and found that jute cultivation was profitable and medium farmers had the highest profit.

Khatun (2010) studied on economic analysis of white and tossa jute production in Sirajgonj district with a sample of 60 farmers using Cobb-Douglas production function and found that tossa jute had higher net return than white jute production. Anonymous (2010) found that the jute sector of Bangladesh is hindered by lack of availability of quality seed, retting problems, mill efficiency, product diversification issues and market linkages.

Rahman and Bala (2009) studied on ecological and environmental sustainability of jute production system in Bangladesh by using life cycle assessment method with a sample of 130 jute farmers and found that high input cost, lack of storage facilities, high transportation cost, high labor cost were the major obstacles of jute production.

Islam *et al.* (2009) undertook a study on genetic diversity and relationships of different jute species in Kushtia with a sample of 130 jute farmers by considering Cobb-Douglas production function and found that human labor, fertilizer, insecticides and power tiller showed significant impact on jute production.

Yasmin (2009) studied on profitability and value addition activities of jute production in Jessore district with a sample of 60 jute farmers by considering Cobb-Douglas

production function and found that cost of seed, fertilizer, human labor and power tiller showed significant effect on profitability of jute.

Dev and Bairagi (2008) studied on profitability and marketing of jute in 12 jute producing districts with a sample of 360 jute farmers by considering Cobb- Douglas production function and found that cost of labor, pesticide, power tiller and fertilizer showed significant impact on profitability of jute production.

Hussain et al. (2002) investigated various problems in producing jute likely low market price, low demand of jute, farias influence of government purchasers, and inadequate grading knowledge of the farmers etc.

Hossain et al. (2002) found that agricultural knowledge and attitude are significantly related and these directly impact in farmer's decisions making.

Raw jute has been passing through challenges due to low and unstable price at the growers' level (Dass, 1999).

According to Skidar and Banerjee (1990) jute farmers face several obstacles such as insufficient irrigation facilities, high inputs price, insufficient credit facilities, and lack of market and particularly scarcity of clean water for jute retting in their study. For retting, farmers usually have to go away from his house; it will incur the cultivation cost.

Another scholar has also found different constraints in jute producing such as physical (limited water availability etc) technologically (lack of more productive technical knowledge and know how) etc. (Hussain, 1969).

2.2 Research gap

The above reviews show that different studies were conducted on jute production in Bangladesh where few researches were done on comparative profitability of jute

production. Jute is the number one cash crop in Bangladesh and Bangladesh earns a lot of foreign currency by exporting jute and jute goods. This crop is highly related with rural economy. It would be very fruitful and interesting to study on economic analysis of jute. Thus, the present study has been undertaken to make an in-depth study to fill the knowledge gap to determine the profitability of jute production and help farmers and policy makers in decision making by providing information of jute production.

CHAPTER III

METHODOLOGY

3.1 Introduction

Farm management research depends on the implementation of appropriate methodology and the accuracy of the primary data. The objectives of the study determine the nature of primary data to be collected. There are various methods of data collection. Survey method was used in this study for collecting primary data for the following reasons.

- Survey method is relatively easy to administer.
- Can be created in less time contrasted with other information gathering techniques.
- Cost-effective, practical and has extensive applicability.
- Equipped for gathering information from a large number of respondents.

This method of data collection has some drawback like the investigator has to rely on the memory of farmers which create some problem. Most farmers are illiterate and they do not keep any record of information. Repeated visit was made to the study area and to the farmers to obtain the missing information and to reduce the severity of any misinformation. The methodology involved in this study is described below in chronological order.

3.2 Selection of the study area

Farm level research requires selection of an area where the research data is collected and the research is done. This research was conducted in Mirzapur upazilla under Tangail district considering the researcher familiarity and easy access to the local farmers. Four villages namely Sinjuri, Badarpasha, Kabirajpur and Kawaljani of Bhatgram union under Mirzapur upazila were selected. The farmers were randomly selected for data collection purpose. The main reasons for selecting the area for data

collection purpose were-

a. There was not any study done on this research topic in that area.
b. The second main crop of the area was jute.
c. The selected villages had similar physical characteristics like- topography, soil and climatic conditions for producing jute.
d. As most of the farmers were involved in jute production, it was expected that reliable data would be successfully obtained from that area.
e. Easy accessibility and good communication facilities in the area.

3.3 Sampling technique and sample size

Two factors were considered in selecting samples for a study area. The sample size should be large enough to follow for adequate degrees of freedom in the statistical analysis. Administration of field research, processing and analysis of data should be manageable within the limited resource available. The districts of Bangladesh are divided into sub-districts called upazillas (Sarker 2010). The upazilla named Mirzapur under Tangail district was selected intentionally. It was impossible to include all the farmers in Mirzapur upazilla because they were randomly scattered in a huge area. Money and time were also limited for the study. After rapport establishment with Upazilla Agricultural Officer and Sub Assistant Agriculture Officers of given upazilla, a list of jute producing area was provided for facilitating the selection of study area. Among the unions of Mirzapur upazilla, a union named Bhatgram was selected randomly due to the limited resource available. Four villages namely Sinjuri, Badarpasha, Kabirajpur and Kawaljani of the union under Mirzapur upazila were selected by using simple random sampling technique. From the list of jute producing farmers, supplied by Upazilla Agricultural Office 60 farmers were selected randomly by using same technique.

3.4 Preparation of the survey schedule

A draft questionnaire was prepared for collecting data from the sample respondents by keeping the objectives in mind. The questionnaire was pre-tested by interviewing some farmers who cultivated jute. Necessary modifications, additions and alternations were made and then the draft questionnaire was finalized. The final questionnaire had three categories of information. The first part was prepared to collect socio-economic information. The second part contained information about costs and returns of jute. The third part contained questions related to constraints and problems faced by the farmers in producing jute in the selected area.

3.5 Period of the study

Data were collected during the period of 1st March to 31th May in 2021 through direct interview with the farmers. Data relating to inputs and outputs were obtained by making time to time visit in the study area.

3.6 Data collection method

Required data were collected through field survey by interviewing the jute growers. The relevant information was collected from the jute farmers who were selected. The selected farmers were contacted first so that they could be interviewed according to their convenient time. During interview, the researcher systematically asked questions and explained the purpose of the study for better understanding. The interviewer told the farmers the study was properly academic. When interview was over, the interview schedule was rechecked to ensure that each of the required information was collected properly.

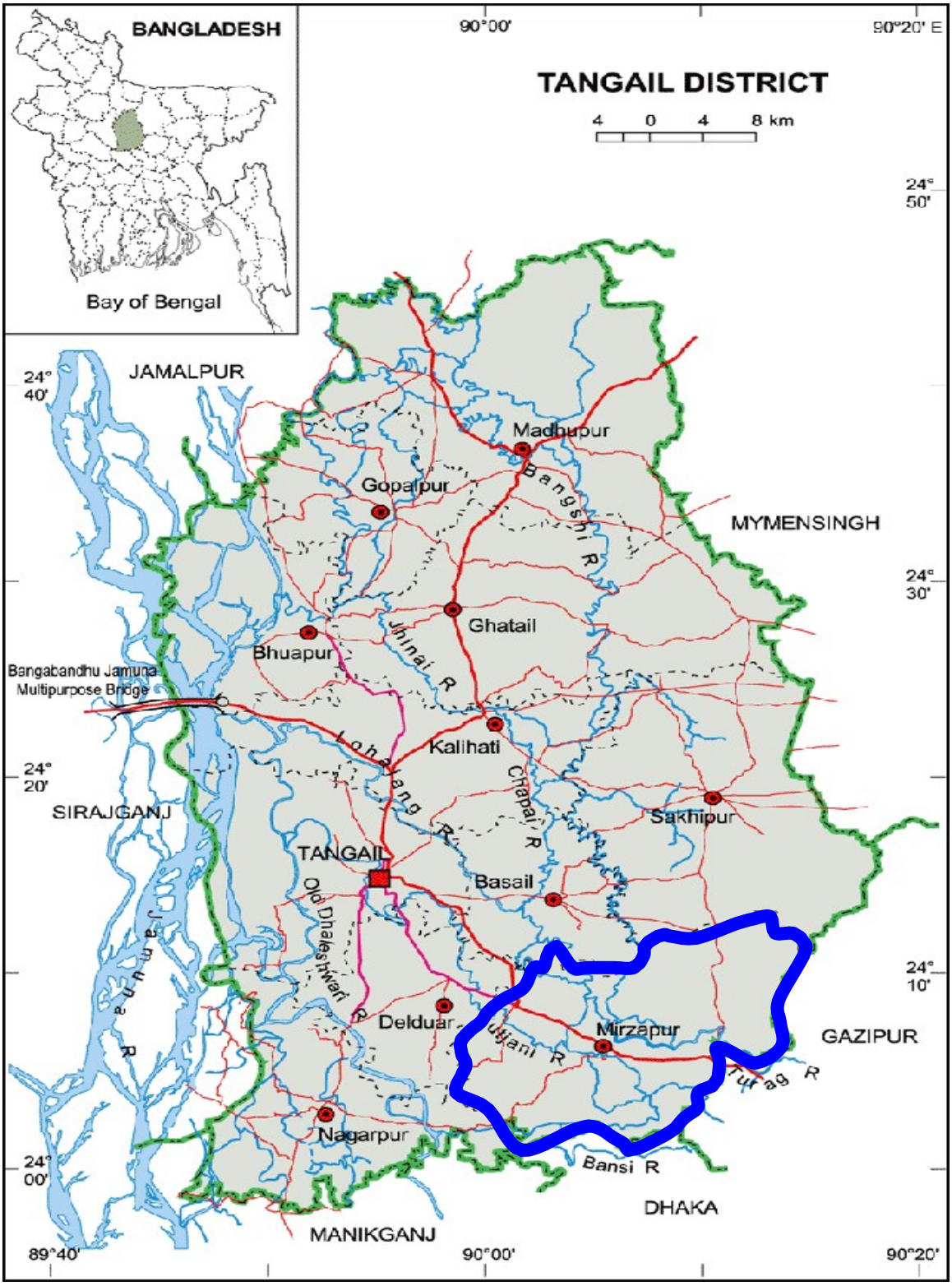

Figure 3.1. A map of Tangail district showing Mirzapur upazila

Figure 3.2. A map of Mirzapur upazila showing study area

3.7 Processing, tabulation and analysis of data

The collected data were coded and edited manually. After that all the collected data were scrutinized and summarized very carefully. Data entry was done in computer and analysis was done accordingly in computer. The information was first collected in local units and then it was converted into international standard units.

3.8 Procedure for computation of costs

The farmers producing Jute had to incur cost for different inputs used in the production process. The input items were valued at the prevailing market price and sometime at government price in the area during survey period, or at the priced at which farmers bought. Sometimes, the farmers purchased hired labor, seed, fertilizer, manure and pesticide from the market and it was easy to pricing these items. But farmers did not pay cash for some input such as family labor, manure etc. So, it was very difficult to calculate the cost of production of these inputs. In this case opportunity cost principle was used. In calculating the production cost, the following components of cost were considered in this study area:

- Human labor
- Land preparation/Mechanical power cost
- Seed
- Manure
- Fertilizer
- Pesticide's cost
- Interest on operating capital and
- Land use

3.8.1 Cost of human labor

Human labor cost was one of the most important and largest cost items of jute production in the study area. It is required for different farm operations like land

preparation, weeding, application of fertilizer and insecticide, harvesting, jute retting and carrying etc. Mainly two types of human labor used in the study area; such as family labor and hired labor. Family labor includes the operator himself, the adult male and female as well as children of a farmer's family and the permanently hired labor. To determine the costs of unpaid family labor, the opportunity cost concept was used. In this study the opportunity cost of family labor was assumed to be market wage rate, i.e., the wage rate that the farmers actually paid to the hired labor. The labor that was appointed permanently was considered as a family labor in this study. In computing the cost of hired labor, actual wages were paid and charged in case where the hired labors were provided with meals; the money value of such payment was added to the cash paid. The labor has been measured in a man-day unit, which usually consisted of 8 hours a day.

In producing Jute human labor were used for the following operations:

- Land preparation/ploughing/laddering
- Fertilizing, weeding and irrigation
- Pest control
- Harvesting, stacking, retting, storing and marketing

3.8.2 Cost of Power Tiller and Laddering

Human labor and mechanical power were jointly used for land preparation. Power tiller and laddering cost was the summation of hired draft power and human labor. Hired power tiller and laddering cost were calculated by the prevailing market prices that were actually paid by the farmers.

3.8.3 Cost of seeds

The costs of seed were calculated at the actual price paid by the farmers. It may be marked here that there was a variation in the cost of per kilogram (kg.) seed in the study area.

3.8.4 Cost of manure

Manure may be used from through purchased. The value of purchased cow dung was calculated at the prevailing market price.

3.8.5 Cost of fertilizer

It is very important for jute cultivation to use the fertilizer in recommended dose. In the study area, farmers used mainly three types of chemical fertilizer i.e., Urea, TSP (Triple Super Phosphate), MoP (Muriate of Potash) for growing jute cultivation. Fertilizer cost was calculated according to the actual price paid by the farmers.

3.8.6 Cost of pesticide

Most of the sample farmers used Vittaku, Sunforan, Rijent, Dithane M-45, Thiovit 80wp and Rovral 50wp for jute. The cost of these insecticides was calculated by the prices paid by farmers.

3.8.7 Interest on operating capital

Interest cost was computed at the rate of 9% per annum. It was assumed that if farmers would take loans from a bank, they would have to pay interest at the above-mentioned rate. Since all expenses were not incurred it the beginning of the production process, rather they were spent throughout the whole production period the cost of operating was, therefore, computed by using the following formula:

$$\text{Interest on operating capital} = \frac{\text{Operating Capital X Rate of Interest X Time}}{2}$$

This actually represented the average operating costs over the period because all costs were not incurred at the beginning or at any fixed time. The cost was charged for a period of 6 months at the rate of Tk. 9 per annum.

3.8.8 Land use cost

The price of land was different for different plots depending upon location and topography of the soil. The cost of land used was estimated by the cash rental value of land. In calculating land use cost, average rental value of land per hectare for a particular year. In computing rental value of land of the land used cost (LUC), it was calculated according to farmer's statement.

3.9 Analytical technique

Several analytical techniques were used to meet particular research objectives. The collected data was analyzed using Microsoft Excel and SPSS because they are very popular and widely used. Eventually, econometric technique such as Cobb-Douglas production function was used to examine the effects of the independent variables on the dependent variables in the production function of jute. Thus, analysis of data was categorized in two parts -

a. Descriptive statistics
b. Cobb-Douglas production function

3.9.1. Descriptive statistics

The descriptive statistics is a tool that was used through SPSS software for the sum, average and percentage of total costs, gross returns, net returns and profitability of jute growing farmers. It was also used for analyzing the socio- economic conditions and problems faced by the jute growers.

3.9.2. Cobb-Douglas production function

Cobb-Douglas production function that was used to estimate the effects of major factors in the returns of jute production was as follows:

$$Y= aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}X_7^{b7}u_i$$

The function was transformed into the following log linear form

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + u_i$$

Where,

Dependent variable, Y = Gross return (Tk/ha) Independent variables,

X_1 = human labor cost (Tk/ha)

X_2 = Power tiller cost (Tk/ha)

X_3 = seed/seedlings cost (Tk/ha)

X_4 = Urea cost (Tk/ha)

X_5 = TSP cost (Tk/ha)

X_6 = MoP cost (Tk/ha)

X_7 = Manure cost (Tk/ha)

a = constant or intercept term

b_1 to b_7 = production coefficients of respective input variables to be estimated

u_i = Error term

ln = Natural logarithm

3.10 Profitability Analysis

Cost and return analysis is the most common method of determining and comparing the profitability of different farm household. In the present study, the profitability of jute cultivation is calculated by the following way-

3.10.1. Calculation of Gross Return

Per hectare gross return was calculated by multiplying the total amount of product their respective per unit prices.

$$\text{Gross Return} = \text{Quantity of the product} \times \text{Average price of the product} + \text{by products}$$

3.10.2. Calculation of Gross Margin

Gross margin is defined as the difference between gross return and variable costs. Generally, farmers want maximum return over variable cost of production. The argument for using the gross margin analysis is that the farmers are interested to get returns over variable cost. Gross margin was calculated on TVC basis. Per hectare gross margin was obtained by subtracting variable costs from gross return. That is,

Gross margin = Gross return – Total variable cost.

3.10.3. Calculation of Net Return

Net return or profit was calculated by deducting the total production cost from the total return or gross return. That is,

Net return = Gross return – Total cost.

The following conventional profit equation was applied to examine farmer's profitability level of jute producing farms in the study areas.

Net profit, $\pi = \Sigma P_m Q_m + \Sigma P_f Q_f - \Sigma(P_{xi} X_i) - TFC$.

Where,

π = Net profit/Net return from jute cultivation (Tk./ha);

P_m = Per unit price of jute (Tk./kg);

Q_m = Total quantity of the jute cultivation (kg/ha);

P_f = Per unit price of other relevant jute (Tk./kg);

Q_f = Total quantity of other relevant jute (kg/ha);

P_{xi} = Per unit price of i^{th} inputs (Tk.);

X_i = Quantity of the i^{th} inputs (kg/ha);

TFC = Total fixed cost (Tk.) and

i = 1, 2, 3,. .....,n (number of inputs).

3.10.4. Undiscounted Benefit Cost Ratio (BCR)

Average return to each taka spent on production is an important criterion for measuring profitability. Undiscounted BCR was estimated as the ratio of gross return to total cost per hectare.

$$\text{BCR} = \frac{\text{Gross Return}}{\text{Total Cost}}$$

3.10.5. Return to scale (RTS)

The return to scale can be obtained by summing up the regression coefficients of all explanatory variables in Cobb-Douglas production function. This can be conveyed as-

Return to scale, RTS= bi

Where,

n= number of regressions, and bi= regression coefficients.

If, RTS=1 then it is constant return to scale

RTS>1 then it is increasing return to scale

RTS<1 then it is decreasing return to scale.

3.11 Limitations of the study

This present study was conducted regarding jute production and the data was collected in rural areas. There were some problems during data collection. Some of the problems were-

a. Researcher had to conduct this study in a limited time period which was not enough to conduct an in-depth study.
b. Researcher also did not have any funding for this research. For this reason, it was not possible to cover big area.

c. During the interview, the researcher found it difficult to avoid the interruption of others as interviews took place in farmer's field or in their houses.

3.12 Ethical issues

Researcher tried to follow all the ethical issues related to the study. Researcher booked an appointment before interviews of the farmers and farmers were well informed about the purpose of the study. Additionally, farmers were ensured that their information would be used only for the completion of thesis paper and would not be used for other purposes. The collected data were preserved in a password protected device.

CHAPTER-IV

SOCIO-ECONOMIC CHARACTERISTICS OF JUTE FARMERS

The socio-economic characteristics of the sample farmer are an essential part of research because these characteristics can affect their production decision and production pattern. The socio-economic characteristics of the sample farmers that was considered in the study area involved farmers age, family size and composition, education status, marital status, occupation level, farming experience and farm holdings of the farmer.

4.1. Age structure of the sample farmers

The respondents of jute cultivars were classified into four categories such as 21-30 years, 31-40 years, 41-50 years and 51years and above. Table 4.1 shows that out of total jute cultivars 16.67% fall into 21-30 years, 31.67% are between 31-40 years, 38.33% fall into 41-50 years and 13.33% farmers belong to between 51years and above age group.

Table 4.1. Distribution of the farmers according to their age

Farmer's age (Years)	Jute cultivars	
	Frequency	Percent
21-30	10	16.67
31-40	19	31.67
41-50	23	38.33
Above 50	8	13.33
Total	60	100

(Source: Field survey, 2021)

4.2. Education structure of the sample farmers

Education helps individuals to develop the capacity of understanding their environment and improve rational insight of life. Education influences farmers to adopt the modern technology and use scarce resources efficiently which contribute in earning higher profit. The farmers were classified into four categories such as illiterate, primary, secondary, higher secondary and graduate/post graduate for research purpose. Literacy of farmers were coded for analyzing purpose as Illiterate = 1, primary = 2, Secondary = 3, Higher secondary = 4. Table 4.2 shows that among jute farmers 13.33% are illiterate, 26.67% have primary education, 43.33% have secondary education and 16.67% have higher secondary education but no farmer has graduate/ post graduate degree.

Table 4.2. Educational status of the respondents

Educational Status	Jute cultivars	
	Frequency	Percent
Illiterate	8	13.33
Primary	16	26.67
Secondary	26	43.33
Higher Secondary	10	16.67
Total	60	100

(Source: Field survey, 2021)

4.3. Occupational structure

In the study area, farmers were engaged in various types of occupation like crop cultivation, private service, public job, small business, poultry and livestock rearing and fish culture. Farmers were classified for research purpose into four groups such as agriculture, business, service, others as almost all farmers were involved in at least one of these 28 categories. The agriculture category consists of crop cultivation, fish culture, fishing, poultry and livestock rearing. The occupation of respondents was also

classified into two broad groups such as main and subsidiary. Farmers were coded as agriculture = 1, business = 2, service = 3 and others = 4. Table 4.7 reveals that 90% of jute producers are involved in agriculture, 1.67% into business and 3.33% in service as their main occupationand 5% in others occupation.

Table 4.3. Occupational status of the sample farmers

Occupational Status	Jute growers	
	Frequency	Percent
Agriculture	54	90
Business	1	1.67
Service	2	3.33
Others	3	5
Total	60	100

(Source: Field survey, 2021)

4.4. Family size of the sample farmers

Family is an important social institution which creates a strong social bond between family members. Family size plays crucial role in the social and economic life of farmers. In this study, family size has been defined as the total number of persons living together under the administration of the head of the family. Family size includes farmer himself, children, wife, father, mother, sisters and brothers. A large family has more labor to earn through different activities but it requires higher costs to fulfill the daily needs of the family members. Table 4.4 reveals that out of total jute cultivars 53.33% families consist of 1-5 members, 30% have 6-8 members and 16.67% have above 8 family members.

Table 4.4. Distribution of the farmers by family size

No. of family members	Jute cultivars	
	Frequency	Percent
1-5 members	32	53.33
6-8 members	18	30
Above 8 members	10	16.67
Total	60	100

(Source: Field survey, 2021)

4.5. Farming experience

Experience is a vital tool for operating agricultural activities. An experienced farmer knows how to till land correctly, spray pesticide and optimum doses of fertilizers than an inexperienced farmer. The farmers in the study area were divided into four groups based on their year of farming experience. Table 4.5 reveals that out of total jute growers 11.67% farmers have 1-10 years, 51.67% have 11-20 years, 25% have 21-30 years and 11.66% have 31-40 years.

Table 4.5 Distribution of sample farmers according to farming experience

Experience Status	Jute growers	
	Frequency	Percent
1-10 years	7	11.67
11-20 years	31	51.67
21-30 years	15	25
31-40 years	7	11.66
Total	60	100

(Source: Field survey, 2021)

4.6. Experience in jute cultivation

Experience is a vital tool for operating agricultural activities. An experienced farmer knows how to till land correctly, spray pesticide and optimum doses of fertilizers than an inexperienced farmer. The farmers in the study area were divided into three groups based on their year of experience in jute cultivation. Table 4.6 reveals that out of total jute growers 50% farmers have 1-10 years, 36.67% have 11-20 years and 13.33% have 21-30 years.

Table 4.6 Distribution of farmers according to jute cultivation experience

Experience	Jute growers	
	Frequency	Percent
1-10 years	30	50
11-20 years	22	36.67
21-30 years	8	13.33
Total	60	100

(Source: Field survey, 2021)

4.7. Marital status

Marital status of the respondent is a significant factor that affects the lifestyle and economic activities of a family. Farmers were coded as Married = 1, Unmarried = 2, divorced =3 and Widow/widower = 4 for analysis purpose. Table 4.7 shows that 88.33% jute growers are married, 10% are unmarried no one was found divorced and 1.67% falls into widow/ widower category in the study area.

Table 4.7 Marital status of the sample farmers

Marital Status	Jute growers	
	Frequency	Percent
Married	53	88.33
Unmarried	6	10
Divorced	0	0
Widow/Widower	1	1.67
Total	60	100

(Source: Field survey, 2021)

4.8. Societal Membership

Societal membership score of the respondents were found to be varying from 0 to 1. Based on their score, the farmers were classified into two categories as shown in Table 4.8. Table 4.8 indicates that the majority (88.33%) of the farmers had no societal membership and only 11.67 percent farmers have societal membership.

Table 4.8 Distribution of the farmers according to their societal membership

Societal Membership	Jute growers	
	Frequency	Percent
No	53	88.33
Yes	7	11.67
Total	60	100

(Source: Field survey, 2021)

4.9. Farm holdings pattern of the respondents

Farm holding is the entire land owned by the farmers and is used by the farmers for any agricultural purpose. Farmers were classified into three categories- small (0.02-2.49 acre), medium (2.50-7.49 acre) and large farmers (>7.50 acre) based on the farm holding

size. Farmers were coded as small farmer = 1, Medium farmer = 2, Large farmer = 3. Table 4.9 shows that out of total jute growers, 71.67% are small, 16.67% are medium and 11.66% are large farmers in the study area.

Table: 4.9 Classification of the respondents according to farm holding size

Land holding	Jute growers	
	Frequency	Percent
Small farmers (0.02-2.49)	43	71.67
Medium farmers (2.50-7.49)	10	16.67
Large farmers (7.50-above)	7	11.66
Total	60	100

(Source: Field survey, 2021)

4.10. Annual income of the respondents

The yearly income of the jute farmers differs from one another. In the present study, the incomes of the jute farmers were categorized as follows: Tk. 50000-100000, Tk. 100001-150000, Tk. 150001-200000, Tk. 200001- 250000 and Tk. above 250000. It is evident from the Table 4.10 show that most of the farmer's yearly income belonged to the category of Tk. 50,000 to Tk. 100,000. About 45 percent of the jute producer's farmers were earned Tk. 50,000 to Tk. 100,000 per year, 25 percent of the farmers were earned Tk. 100,001 to 150000 per year, 15% of the farmers were earned Tk. 150001 to 200000, 10% of the farmers were earned Tk. 200001-250000 and only 5 percent farmers were earned above Tk. 250,000 per year.

Table 4.10 Classification of the respondents according to income

Income (,000 TK)	Jute growers	
	Frequency	Percent
50000-100000 Tk.	27	45
100001-150000 Tk.	15	25
150001-200000 Tk.	9	15
200001-250000 Tk.	6	10
Above 250000 Tk.	3	5
Total	60	100

(Source: Field survey, 2021)

CHAPTER-V

PROFITABILITY ANALYSIS OF JUTE PRODUCTION

The costs, returns and profitability of producing jute are briefly described in this chapter. The variable and fixed costs were considered to estimate the total cost of production of jute. Variable costs include cost of human labor, power tiller, animal labor, mechanical labor, seed, fertilizer, manure and pesticide. Fixed costs include land use cost and Interest on operating capital. The total return includes return from main product and by product.

5.1. Estimation of variable costs

Variable costs include the costs of using all variable inputs. There are some costs that vary with the level of production such as cost of seed, fertilizer, human labor, manure, power tiller and insecticide. These inputs are essential in production. Thus, the costs have to be estimated for calculating the total production costs. Variable costs for jute production are discussed below.

5.1.1. Cost of human labor

Human labor is a vital input for producing jute. Human labor includes both family labor and hired labor. In case of jute production, Table 5.1 shows that the total labor requirement per hectare is 148.1 man-days in which 39.5 man-days are family labor and 108.6 man-days are hired labor. Average wage rate was estimated as Tk. 500 at the time of data collection in the study area. Table 4.11 also shows that per hectare total labor cost is estimated as Tk. 69080 per hectare for jute production. This table also showed that labor cost for land preparation, seed sowing, weeding, fertilizing; harvesting, carrying; retting, washing and drying was 5.50%, 36.78%, 20.62% and 37.10% of total labor cost respectively.

Table 5.1. Per hectare operation wise average human labor cost for jute production

Operation	Labor (man-days)		Total labor (man- days)	Unit Cost (Tk.)	Total Cost (Tk.)	% of total labor cost
	Family Labor	Hired Labor				
Land preparation and sowing seeds	2.3	7.2	9.5	400	3800	5.50
Weeding and fertilizing	17.2	46.3	63.5	400	25400	36.78
Harvesting and carrying	9.6	18.9	28.5	500	14250	20.62
Retting, washing and drying	10.4	36.2	46.6	550	25630	37.10
Total	39.5	108.6	148.1		69080	100

(Source: Field survey, 2021)

5.1.2. Cost of seed

For any agricultural crop production seed is the basic input. Yield of any agricultural production is highly dependent on the quality of seed. High quality of seed can yield high production and bad quality can produce low rate of production. Table 5.2 shows that farmers of jute use 9.27 kg seed per hectare. Per unit cost of seed for jute was Tk. 170 during data collection. Total cost of seed for jute was estimated as Tk. 1576 per hectare in which seed cost of jute was 8.66% of total material input costs.

5.1.3. Cost of fertilizer

In the study area farmers used three types of chemical fertilizer namely, Urea, Triple Supper Phosphate (TSP), Muriate of Potash (MoP). These chemical fertilizers were

charged at the rate of price paid by the farmers. Per hectare costs of Urea was Tk. 1780 and their percentages of total cost of production was 9.78 percent. Per hectare costs of TSP was Tk. 1200 and their percentages of total cost of production was 6.60 percent. Per hectare costs of MoP was Tk. 1102 and their percentages of total cost of production was 6.06 percent.

5.1.4. Manure cost

Per hectare cost of manure for jute farmers were Tk. 2250 and their percentages of total cost of production was 12.36 percent (Table 5.2).

5.1.5. Cost of pesticides

The pesticides used by the farmers in the study area were Vittaku, Sunforan, Rijent, Dithane M-45, Thiovit 80wp and Rovral 50wp, etc. Table 5.2 reveals that per hector cost of pesticides were Tk. 860 and their percentages of total cost of production was 4.73 percent (Table 5.2).

Table 5.2. Per hectare cost of inputs for jute production

Various inputs	Units	Quantity	Unit price (Tk.)	Total Cost (Tk.)	% of total Cost
Seed	Kg	9.27	170	1576	8.66
Fertilizer	Kg				
Urea	Kg	89	20	1780	9.78
TSP	Kg	48	25	1200	6.60
MoP	Kg	58	19	1102	6.06
Total fertilizer cost	Tk.			5658	31.10
Manure	Kg	750	3	2250	12.36
Power tiller	Tk.			7175	39.44
Transportation	Tk.			2250	12.36
Pesticide	Tk.			860	4.73
Total Cost				18193	100

(Source: Field survey, 2021)

5.1.6. Cost of mechanical power

In the study area, power tiller was mainly used for land preparation. Power tiller was used on contact basis. Most of the farmer used animal labor for leveling their land. By adding power tiller cost and animal labor cost total cost of animal labor and power tiller was found. Table 5.2 indicates that per hectare animal labor and power tiller cost for jute production were Tk. 7175 and their percentages of total cost of production was 39.44 percent (Table 5.2).

5.1.7. Cost of transportation

In the study area, transportation cost of jute production is 2250 tk. & percentage of total cost is 12.36 %. (Table 5.2)

5.2. Estimation of fixed costs

Fixed costs are those expenses that are not dependent on the level of output and does not change with an increase or decrease with the level of output change. The producers have to bear the expense even if the production is not undertaken. Fixed costs include land use cost and interest on operating capital which is described below.

5.2.1. Land use cost

Most of the farmers in the study area had own land for producing jute. Land use cost was a fixed cost for the producers. Table 5.3 shows that the land use cost per hectare is estimated at Tk. 7916 which is similar for jute production. The land use cost for jute was 7.89% of total production cost.

5.2.2. Interest on operating capital (IOC)

Interest on operating capital was calculated for 6 months for jute. Interest rate of 9% per annum for jute was considered for calculation. Interest on operating capital was calculated based on this formula-

Interest on Operating Capital (IOC) = AI×i×t

Where,

AI = (Total investment)/2

i = Rate of interest

t = Length of crop period in months

Table 5.3 shows that interest on operating capital calculated for jute is Tk. 3977.91 per hectare. IOC of 3.97% of total production cost respectively.

5.3. Total cost

The total cost was estimated by summing up the variable and fixed cost for jute production. Table 5.3 shows that total variable cost for jute is Tk. 88398 (88.14% of total cost) and total fixed cost for jute was Tk. 11893.91 (11.86%). The total cost per hectare estimated for jute production was Tk. 100291.91.

Table 5.3. Per hectare total cost of jute production

Items	Jute (TK.)	% of total Cost
A. Variable cost		
Human labor cost	69080	68.89
Seed cost	1425	1.42
Fertilizer cost	5658	5.64
Power tiller	7175	7.15
Pesticide	860	0.85
Transportation	2250	2.24
Manure	2250	2.24
Total Variable Cost	88398	88.14
B. Fixed Cost		
Land use cost	7916	7.89
Interest on operating Capital	3977.91	3.97
Total Fixed Cost	11893.91	11.86
Total Cost (A+B)	100291.91	100

(Source: Field survey, 2021)

5.4. Gross return

Gross return is the total revenue earned from the production which includes return from the main product and by-product. Table 5.4 shows that per hectare return from main

and by-product of Tk. 144495 and 29640 respectively i.e. the total gross return per hectare was estimated as Tk. 174135 for jute (Table 5.5).

5.5. Net return

In general net return is termed as entrepreneur's income. To evaluate the profitability of jute production, net return is an important aspect. Net return is the difference between gross return and total costs. Per ha net return was estimated at Tk. 73843.09 which indicates that jute production is profitable business for the farmers (Table 5.5).

5.6. Gross margin

Farmers usually want to gain maximum return over variable cost of production. The probable reason is that estimation of fixed cost of production is difficult to determine. Thus the gross margin analysis has been taken into account to calculate the relative profitability of jute cultivation. The gross margin of jute cultivation was estimated at Tk. 85737 (Table 5.5).

Table 5.4 Per hectare gross returns from jute

Name of the crop	Value of Main product			Value of the by-product (Tk.)	Gross Return (Tk./ha)
	Quantity (kg/ha)	Price (Tk./kg)	Value (Tk.)		
Jute	1926.6	75.00	144495	29640	174135

(Source: Field survey, 2021)

5.7. Profitability of jute production

The profitability of jute cultivation is presented in the Table 5.5. The gross return per hectare from Table 5.5 shows that the total gross return per hectare of jute is Tk. 174135, total variable cost per hectare is Tk. 88398, fixed costs per hectare is Tk. 11893.91. The total cost per hectare of jute was estimated at Tk. 100291.91. Gross

margin per hectare of jute was estimated at Tk. 85737 and net return per hectare was Tk. 73843.09. The benefit cost ratio of jute was 1.74 which means that by investing Tk. 1.00, farmers would earn Tk. 1.74 in return. On the basis of cash cost the benefit cost ratio was 1.96, which indicates that, by investing tk. 1, farmer would earn tk. 1.96 in return.

Table 5.5. Profitability of per hectare jute production

Items	Amount
A. Gross Return	174135.00
B. Total Variable Cost	88398.00
C. Total Fixed Cost	11893.91
D. Total Cost	100291.91
E. Gross Margin (A-B)	85737.00
F. Net Return (A-D)	73843.09
G. BCR (A/D)	1.74
H. BCR (A/B)	1.96

(Source: Field survey, 2021)

CHAPTER VI

FACTORS AFFECTING PROFITABILITY OF JUTE PRODUCTION

Cobb-Douglas production function model was chosen to determine the effects of different inputs on the profitability of jute production because of its best fit. The significant effects of using various inputs on returns from jute cultivation can be estimated by analyzing the production function of this crop. This model enables to analyze the production function easily. Seven independent variables such as power tiller cost, human labor cost, seed cost, urea, TSP, MoP and manure cost were taken into consideration as they were likely to have an impact on gross return of jute production. Several variables such as irrigation, rainfall, soil condition and topography were not considered as there were problems of specification of those variables.

6.1. Estimation of jute production function

Cobb-Douglas production function model was chosen to determine the effects of different inputs for the production of jute because of its best fit and significant effects of using various inputs on returns from jute cultivation. The estimated values of co-efficient and related statistics were shown in Table 6.1.

6.2. Interpretation of the results

Seven variables such as power tiller cost, human labor cost, seed cost, urea cost, TSP cost, MoP cost and manure cost were taken under consideration. The first seven variables were considered for jute but the variable irrigation cost was not considered because jute was mainly sown in rainy season and did not need that much irrigation. The impact of each variable on gross return for producing jute is interpreted next.

6.2.1. Land preparation cost (X_1)

The regression coefficient of land preparation cost (X_1) was positive in jute production and insignificant. This indicates that land preparation cost had no significant effect on the gross return of jute (Table 6.1).

6.2.2. Human labor cost (X_2)

Table 6.1 shows that the regression coefficient of human labor cost for jute is 0.007 which is positive and non-significant. This indicates that human labor cost had no significant effect on the gross return of jute.

Table 6.1 Estimated values of coefficient of Cobb-Douglas production function

Explanatory variable	Co-efficient	t-value	p-value
Intercept	2.872	7.430	0.000
Land preparation cost (X1)	0.022	1.250	0.215
Human labor cost (X2)	0.007	0.138	0.891
Seed cost (X3)	0.303*	2.053	0.044
Urea cost (X4)	0.346**	4.199	0.000
TSP cost (X5)	0.352*	2.487	0.016
MoP cost (X6)	0.447*	2.877	0.006
Manure cost (X7)	-0.404	-1.511	0.137
R2	0.759		
Adjusted R2	0.692		
F-value	14.416***		

Note: ** and * indicate significant at 1% level and 5% level respectively.

(Source: Field survey, 2021)

6.2.3. Seed cost (X_3)

The regression coefficient of seed cost (X_3) was positive in jute production and significant at 5 percent level. It reveals that one Taka increase in the cost of seed, keeping other factors constant, would increase gross return of jute cultivation production by 0.303 Taka (Table 6.1).

6.2.4. Urea cost (X_4)

The regression coefficient of urea cost (X_4) was positive in jute production and significant at 1 percent level indicating that one Taka increase in the cost of urea, keeping other factors constant, would increase gross return of jute production by 0.346 Taka (Table 6.1).

6.2.5. TSP cost (X_5)

The regression coefficient of TSP cost (X_5) was positive in jute production and significant at 5% level indicating that one Taka increase in the cost of TSP, keeping other factors constant, would increase gross return of jute production by 0.352 Taka (Table 6.1).

6.2.6. MoP cost (X_6)

In jute cultivation, the estimated coefficient of the variable MoP cost (X_6) was positive in jute cultivation and significant at 1 percent level. It shows that one Taka increase the cost of MoP, keeping other factors constant, would increase gross return of jute production by 0.447 Taka (Table 6.1).

6.2.7. Manure cost (X_7)

The regression coefficient of manure cost (X_7) was negative in jute production and insignificant. This indicates that land preparation cost had no significant effect on the gross return of jute (Table 6.1).

6.3. Overall performance of the model (R^2, adjusted R^2 and F value)

The coefficient of determination (R^2) is the summary of how well the sample regression line fits the data. Table 6.1 shows that the R^2 value for jute is 0.759 which means that 75.9% variation in the gross return of jute was explained by the independent variables included in the model respectively. The values of adjusted R^2 were 0. 692 for jute. This means that after taking into account the degrees of freedom (df), independent variables in the model still explained 69.2% of the variation in the gross return of jute. The F value for jute was found 14.416 which were highly significant at 1% level indicating the good fit of the model (Table 6.1).

6.4. Return to scale (RTS)

The total elasticity of production when equal to 1, it refers to constant returns to scale. If total elasticity is greater than 1, it indicates increasing return to scale and when it is less than 1, it refers to decreasing return to scale. Table 6.1 show that the return to scale of jute was 1.073 which is greater than 1. It was obvious that jute had increasing return to scale. It implied that jute farmers were operating in the rational zone of production. It implies that an increase in all the variables would lead to a greater than proportional increase in gross return. From Table 6.1 it was obvious all the variables were increased by 1%, the gross return of jute would increase by 1.07%.

CHAPTER VII

CONTRIBUTION OF JUTE IN HOUSEHOLD INCOME GENERATION

Descriptive statistics method was chosen to determine the contribution of jute in household income generation because of its best fit. Dependent variables such as household income except jute cultivation and household income from jute cultivation were taken into consideration as they were likely to have an impact on income generation. To find household income except jute cultivation the income from other crop cultivation such as rice, wheat, maize, vegetables etc., animal farming, poultry raring were considered. To satisfy the purpose of obtaining the contribution of jute in household income generation the formula of average was used.

$$\text{Household income (average)} = \frac{\text{Sum of income of the respondents}}{\text{Number of respondents}}$$

7.1. Jute cultivation roles on income generation activities

This study had an objective to estimate the contribution of jute in household income generation. To serve the purpose the respondents were asked about their income from jute cultivation as well as their income from other household activities except jute cultivation. Other household activities include rice cultivation, wheat cultivation, vegetable cultivation, animal production, poultry farming etc. The findings from the respondents were furnished and analyzed. The result indicates that, the average household income except jute cultivation was 262049.2 Tk., the average household income from jute cultivation was 47803.28 Tk., and the average total income (Household income except jute cultivation (Tk.) + Household income from jute cultivation (Tk.) was 309852.5 Tk.

Table 7.1 Household income except jute cultivation, household income from jute cultivation and total income

Household income except jute cultivation (Tk.)	Household income except jute cultivation (%)	Household income from jute cultivation (Tk.)	Household income from jute cultivation (%)	Total income (Tk.)	Total income (%)
262049.2	81.65	47803.28	18.35	309852.5	100%

CHAPTER VIII

PROBLEMS FACED BY THE FARMERS IN JUTE CULTIVATION

It is well known that farmers in Bangladesh face various problems associated with jute production. This chapter attempts to identify and analyze the problems concerned with the jute production and ranked the problems according to their responses. Problem of jute production experience says that farmers in Bangladesh cannot get the required quantity of inputs and technical supports and finally the optimum price of their products. They do not have enough funds for jute cultivation due to their subsistence farming. The major problems of the selected farmers in Tangail district were identified and their responses were represented in.

8.1. Problems faced by the farmers in jute cultivation

There were many problems in the study area that affected production as well as profitability of jute production. Farmers were asked about the important problems they face often during production of jute production. Those problems were then ranked and arranged in order based on the priority of the problem. The problems faced by the respondents of jute farmers which were arranged in descending order are shown in Table 8.1.

8.1.1. High price of inputs

Based on farmers' opinion, another top-ranking constraint was high price and spot scarcity of fertilizers. Majority (90.48%) of the farmers mentioned that they faced the problem of high price and spot scarcity of one or more of the chemical fertilizers in jute growing season. Such problem led some of the farmers to apply fewer amounts of some of the fertilizers which further aggravated the imbalanced use of chemical fertilizers. This problem was ranked 1st for jute growers (Table 8.1).

8.1.2. Shortage of human labor at the critical stage

Shortage of human labor at the critical stage is a seasonal problem and generally occurs in peak period of jute production. Shortage of human labor hampered different intercultural management and delayed harvesting which ultimately reduced yield. About 84.41 percent of jute growers faced the problem of shortage of human labor. This problem ranked 2nd position for jute cultivation. (Table 8.1)

8.1.3. Lack of good quality seed

Though all the farmers were found to produce high yielding varieties of jute, 72.21 percent of them mentioned that they had lacking of good quality seed and this constraint ranked 3rd among the constraints (Table 8.1). Most of the own preserved seeds and the seeds collected from local markets or neighbors where not good quality seeds as their germination was poor.

8.1.4. Lack of storage facilities

There was a lack of storage facility for jute growers was the major problem in the study areas. Most of the products were sold just after harvest at a low price due to lack of proper storage facilities. About 69.28% of the farmers in Tangail district reported that lack of storage facilities and high charge for storage discouraged them to produce more jute. In the rank order, problem of lack of storage facility was the 4th in Tangail district. (Table 8.1)

Table 8.1 Rank order of the problems faced by jute growers

Problems	Percentage of jute growers	Rank
High price of inputs	90.48	1
Shortage of human labor at the critical stage	84.41	2
Lack of good quality seed	72.21	3
Lack of storage facilities	69.28	4
Lack of credit facility	66.54	5
High transportation cost	60.75	6
Lack of pesticide	54.65	7
Disease attack	50.57	8
Natural Calamities	43.43	9
Lack of government attention	35.56	10
Lack of irrigation facility	28.74	11

(Source: Field survey, 2021)

8.1.5. Lack of credit facility

One of the major constraints in agricultural production systems in Bangladesh is low input supply due to lack of money. As the farmers did not possess adequate amount of money for purchasing inputs they had to borrow from others. Sometimes it requires high interest rate. The jute growers of the study areas reported that lack of fund was a big problem of jute cultivation. On an average 66.54% of the farmers from Tangail district faced this problem. The credit need of the poor farmers is mostly meeting from non-institutional sources at prohibitive rates of interest. The result also showed that the credit was necessary mostly for purchasing seed and paying water charge. In the rank order, problem lack of creditfacility was the 5^{th} in the Tangail districts.

8.1.6. High transportation cost

High transportation cost was another problem of the farmer to jute production and marketing. For higher transportation cost farmers could not accumulate all types of input and could not get better price to sale jute. So ultimately profit becomes low. About 60.75% of the farmers in Tangail district mention that high transportation cost was another problem of the farmer to jute production and marketing, which ranked 6th position. (Table 8.1)

8.1.7. Lack of pesticide

Some areas in the study area farmers claim that some pesticides were not available to them. So, they bought pesticides in the market which was far from village. Lack of pesticide was the problem for the farmers in Tangail district. In Tangail district 54.65% of the farmers claim this problem.

8.1.8. Disease attack

Problem of attack by pest and disease in the study areas are the main problem for jute cultivation. When disease attract in the field, it damaged large portion of levees. It is a big loss for the jute farmers. About 50.57% of the farmers in Tangail district claim that yield become lower because of disease attack. In the rank order, disease attack was the 8th problem in Tangail district.

8.1.9. Natural Calamities

Farmers reported that natural hazards, such as haze weather in sowing or planting period, rainfall and flood during harvesting period hampered proper production and quality. On an average, 43.43% of the farmers in Tangail district famers reported that large number of jute were damaged due to flood.

8.1.10. Lack of government attention

During the investigation, most of the farmers complained that they did not get enough support from the government. Only large farmers were benefited from the government institution. Input price should be reduced, proper training should be provided to the farmers. In the study area, about 35.56% of farmers are faced this problem. Lack of government attention was 10th problem among the farmers (Table 8.1).

8.1.11. Lack of irrigation facility

Irrigation water is one of the most important inputs for jute production. Yield of jute varied in the application of irrigation water. They took irrigation facility from other farmer by some rate of amount but it is a problem for timely supply of water. About 28.74% of the farmers in Tangail district reported that they were not received water timely and water charge was much higher for them. In the rank order, lack of irrigation facility was the 11th in Tangail district.

CHAPTER-IX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

In this chapter, major findings, conclusion and policy recommendations are highlighted. The findings and observation of jute growers on various issues related to the production like costs, returns and profitability along with the socio- economic condition of farmers are presented briefly in this chapter.

9.1. Summary

Bangladesh is a small developing country with mostly an agro-based economy. Agricultural sector plays an important role in the overall economic development and food security of this highly populated country. Historically, agricultural sector is prominent for a long time in Bangladesh. The agricultural sector (crops, animal farming, forests and fishing) contributes 13.10% to the country's total GDP and it remains as the largest employment sector in Bangladesh economy with about 45.1% of the labor force engaged in agriculture. Agriculture is a major source of rural jobs in Bangladesh as over 87% rural people derive at least some income from agriculture (BBS, 2021). Major agricultural crops include rice (73.94%), wheat (4.45%), jute (3.91%), rape and mustard (3.08%), lentil (1.54%), potato (1.13%), sugarcane (1.12%) and chili (1.05%) of total GCA dominate the cropping pattern. Rice and wheat are mainly grown for domestic consumption whereas jute and tea are grown for export purpose. Bangladesh is the fourth biggest rice producer in the world after China, India and Indonesia. Rice production is one of the main sources of revenue for the country’s economy whereas jute and jute goods are one of the major export earners of agricultural sector in Bangladesh. The significant contribution of rice and jute in Bangladesh economy makes these cropsvery important among all agricultural crops.

Bangladesh is rated as second in the production of jute fiber worldwide (Hassan *et al.*, 2018). The major locations where best quality jute i.e. the jat type is produced are Kushtia, Jessore, Khulna, Rajshahi, Pabna and Dhaka which is also known as the jat region is prevalent for its capacity to create the most astounding nature of jute on the planet. Jute is basically self-pollinated and cultivated in the rainy season. Sowing for the most part begins toward the finish of February and proceeds up to the finish of May. Jute strands are utilized in hessians and gunnies, rug and floor coverings, paper, canvas, covering and painstaking work. Dundi (UK), Belgium, Italy, USA, South America are the purchasers of unrivaled quality jute particularly high class white and tossa jute. Bangladesh exports about 70% of their harvested jute and this makes it one of the leading jute producing countries in the world. The yearly generation of jute in Bangladesh is assessed to be 80.20 lakh tons which is comparable to 42% of the worldwide production. Jute production has increased on average by 8.87% every year from 2015 to 2017. Owing to reasonable market prices, favorable weather conditions, and availability of water, jute cultivation increased remarkably over the last few years.

The specific objectives of this study were- to investigate the socio-economic characteristics of the jute cultivars; to determine the costs, returns and profitability of jute production; to estimate the major factors affecting profitability of jute production, to estimate the contribution of jute in household income generation and to identify the major problems faced by the farmers;

The present study had some specific objectives like analyzing the socio-economic characteristics, identifying major problems and comparing profitability of jute producing farmers. Keeping the objectives in mind, the present study was carried out in Mirzapur upazilla under Tangail district considering the researcher familiarity and easy access to the local farmers. Four villages namely Sinjuri, Badarpasha, Kabirajpur and Kawaljani of Bhatgram union under Mirzapur upazila were selected. The farmers were randomly selected for data collection purpose. Then all the collected data was stored

and scrutinized. The Cobb-Douglas production function was used to analyze the effects of the independent variable on the dependent variable.

Firstly, the socio-economic condition of farmer was analyzed. Different characteristics of farmer like- age, education, occupation, marital status, family size, farming experience, experience in jute cultivation, farm holdings and family income were taken under consideration during analyzing the socio-economic condition of farmers. It was seen that majority of jute growers (38.33%) fell into 41 to 50 years age group. The study revealed that majority of the jute farmers (47.5%) had secondary level of education. Moreover, most of the jute growers (53.33%) were found to have 1-5 members in their family. Most of the respondents (90.00%) were found to have agriculture as their main source of occupation. The study revealed that most of the jute farmers (51.67%) had 11-20 years of farming experience. The study revealed that most of the jute farmers (50%) had 1-10 years of experience in jute cultivation. Majority of jute growers (88.33%) was found married. Majority of jute growers (88.33%) had social membership. Additionally, it was also found in the study that farmer of jute cultivars had (71.67%) small farm.

Costs and returns were estimated to find out the profitability of jute production in the study area. Several variable input cost like- human labor, power tiller, animal and mechanical labor, seed, fertilizer, manure and pesticide cost was computed for jute production. The human labor cost was found as the most important factor because it had the highest percentage of total cost. Human labor cost per hectare for jute was Tk. 69080 (68.89%). Per hectare seed cost for jute was Tk. 1425. Fertilizer cost per hectare for jute was Tk. 5658. Power tiller cost per hectare was found to be Tk. 7175. Per hectare pesticide cost was estimated as Tk. 860 jute respectively. Transportation cost for jute was Tk. 2250 for carrying jute after harvest. Manure cost per hectare was Tk. 2250 jute production. Land use cost per hectare for jute was fixed and it was Tk. 7916. Interest on operating capital for per hectare jute was Tk. 3977.91. The average per hectare cost for jute was Tk.100291.91.

The average per hectare yield of jute was 1926.6 kg which was valued at Tk. 144495. The total gross return of jute per hectare was (Tk. 174135). Gross margin per hectare for jute was found (Tk. 85737). Net return from jute was Tk. 73843.09. The benefit cost ratio of jute was 1.74. From this above results, it was found that jute cultivation was profitable in the study area.

In this study, Cobb-Douglas production function model was used to determine the effects of independent variables on the gross return or output from jute. The independent variable that was considered was seed cost, urea cost, TSP cost and MoP cost. From the result, it was found that seed cost, urea cost, TSP cost and MoP cost showed positive significant effect on gross return of jute cultivation. The R^2 value for jute was 0.759 which means that 75.9% variation in the gross return of jute was explained by the independent variables included in the model respectively. The values of adjusted R^2 were 0.692 for jute. This means that after taking into account the degrees of freedom (df), independent variables in the model still explained 69.2% of the variation in the gross return of jute. The F value for jute was found 14.416 which were highly significant at 1% level indicating the good fit of the model. The return to scale for jute production was 1.073 which was greater than 1. It was obvious that jute had increasing return to scale. It implied that jute farmers were operating in the rational zone of production. In this case, if all the variables specified in the production function were increased by 1%, gross returns would increase by 1.07% for jute.

The present study identified some problems faced by the farmers in the study area. The top five major problems were high price of inputs, shortage of human labor at the critical stage, lack of good quality seed, lack of storage facilities and lack of credit facility.

9.2. Conclusion

The present study was conducted to the profitability of jute growers. The socio-economic characteristics of the farmer revealed that majority of the farmers of jute had

secondary level of education. It was found that most of the farmers of jute had 21-30 years of farming experience. The result revealed that jute was more profitable in the study area. High price of inputs, shortage of human labor at the critical stage, lack of good quality seed, lack of storage facilities and lack of credit facility affect the profit from jute production adversely.

9.3. Recommendations

The following recommendations can be suggested to overcome the constraints of jute cultivation faced by the farmers.

a. Majority of the respondents reported that costs of inputs of producing jute were high. For this reason, they could not provide the recommended dose of inputs during plantation of jute. Government should provide all possible help to supply required number of inputs and capital to the farmers. Inputs like seed, fertilizer and insecticides should be provided at subsidized rate.

b. Majority of farmers reported that labor was scarce in the rural area as they are gathering in Dhaka city and other urban areas for more earning. As a result, the wage rate was high which made the cultivation cost high. Government can take initiatives to make the rural sector more attractive to reduce the migration of labor. If the availability of labor in rural area becomes high, the wage rate will automatically reduce.

c. Many farmers faced the problem of lack of capital. For this reason, they could not provide the recommended dose of inputs during plantation of jute. Government can encourage private banks to provide loan at low interest rate to farmers.

d. Many farmers also faced the problem of high transportation cost. Unfavorable roads and transportation system was the reason for this high cost. More

infrastructure development like building new and construction of poor road and culvert can reduce the problem.

e. Farmers had lack of knowledge on modern agronomic practice. The agricultural extension officers should provide more training and information by field visit, arranging agricultural program. They can encourage farmers to apply new technologies and new method of cultivation by demonstrating directly to the farmers and telling the benefits of it.

f. Government should arrange more programs about controlling pest infestation by providing information about effective method of application of pesticide.

9.4. Scope for further research

This present study provides useful information for farmers, researchers and policy makers. However, there were some limitations of time, fund and resources. For this reason, researcher had to consider small sample size. The researcher could not represent any generalized view of economic analysis on profitability of jute production. Thus, further research can be undertaken by considering more sample size and make a generalized comment on this sector.

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