PROFITABILITY ANALYSIS AND RESOURCE USE EFFICIENCY OF JUTE IN SOME SELECTED AREAS OF GOPALGANJ DISTRICT IN BANGLADESH

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CERTIFICATE

This is to certify that the thesis entitled **PROFITABILITY ANALYSIS AND RESOURCE USE EFFICIENCY OF JUTE OF GOPALGANJ DISTRICT IN BANGLADESH** submitted to the department of Development and Poverty Studies, Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka in partial fulfillment of the requirements for the degree of Master of Science (M.S.) in Development and Poverty Studies, embodies the result of a piece of bona fide research work carried out by **SONYA, Registration No. 12-05200** 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, as has been availed of during the course of this investigation has been duly acknowledged by the Author.

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Dated:

Dhaka, Bangladesh

DEDICATED TO

MY

BELOVED PARENTS

PROFITABILITY ANALYSIS AND RESOURCE USE EFFICIENCY OF JUTE IN SOME SELECTED AREAS OF GOPALGANJ DISDRICT IN BANGLADESH

Abstract

Jute has always played an important role in the economy of Bangladesh.The objectives of the present study to determine the socioeconomic condition, profitability, resource use efficiency, problems of the farmers. The present study was conducted at Muksudpur Upazilla of Gopalganj district of Bangladesh. Simple random sampling was used to select the respondents. To achieve the purpose of the study total 60 respondents were selected. The amount of human labor used for jute cultivation was 115 man days per hectare. Total cost of human labor amounted to Tk. 40250 per hectare. Total variable cost was Tk 57735 per hectare for jute production. Per hectare interest on operating capital was Tk 1924.5. The study revealed that total cost, gross return and net return of the jute production is Tk. 77659.5, Tk. 96,016.50 as well as Tk. 18357 respectively. It was evident from the study that the benefit cost ratio of jute farming was 1.24. In the study area, use of insecticide, fertilizer and seed for jute farming was under used as well as labour and cowdung were over used. To determine the factors that affecting the production and gross return Cobb Douglas Production function was used where labor, seed, as well as fertilizer were statistically significant. In the study area various problems which were faced by farmers such as lack of capital, high price of fertilizers and insecticides, scarcity of good quality seeds, attack by pest and disease, lack of training, lack of adequate transport facilities, lack of storage facilities, lack of marketing facilities, and lack of market information. To solve the problems some recommendations were made.

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DEDICATED

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PARENTS

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Jute (*Corchorus sp*) is regarded by Bangladesh as the main cash crop, and almost everywhere, it grows but the quality of jute varies depending on the soil type and conditions of rearing (Uddin *et al*., 2014). It accounts for approximately 4.14% of the total area cultivated and contributes about 16% of the total currency by exporting crude jute and jute (BBS, 2010). Jute, known as the golden fiber, is an important traditional cash crop in Bangladesh. In fact, jute is the second most important natural fiber in terms of global consumption after cotton. Although the rare more than 40 species of jute available, only two species are cultivated commercially, namely, *Corchorus capsularis L*. (commonly known as white jute) and *C. olitorius L*. (commonly known as Tossa/traditional jute).

Bangladesh is the world's second largest producer of jute fiber, with only India producing more. In Bangladesh, around 30% of global jute yields and exports produce about 40% of total jute yields. Fiber is still used in large part as fabric material to manufacture sheets, mattresses, tapestries, bags, and other handcrafts for the packaging sector (Islam and de silva, 2011). Jute is biodegradable natural fibre whose traditional use was confined in packaging industry. Today nontraditional or diversified uses of jute as jute yarn, jute geo textile, jute pulp & paper, jute composites and other jute diversified products seems to be the main driving force for the future development of raw jute, pushing demand and consequently increasing raw jute. Besides, jute fibre and jute sticks are largely used for different domestic purposes such as cooking fuel and fencing of homestead area (Ghimire and Thakur 2013; Roy, 2014). In addition, jute plants improved soil productivity because of its massive leaf fall and root proliferation in the field.

The untraditional use of Jute in Bangladesh is being increased. The leading producers of Jute, Kenaf and Roselle fiber currently include India, Bangladesh, China, Myanmar, Nepal and Thailand. The major producers were India, Bangladesh and China. Climate The cultivation of Jute calls for particular soil and climate. This calls for early precipitation during the months of March, May and June and subsequent intermittent rain and sunshine until August, temperature from 28 to 35 degrees C and humidity from 70 to 90%. The weather is between 30 ° north and the south of the earth and this sort of climate is possible.

Kenaf and Roselle grow almost throughout the world both in tropical and temperate areas. Soil conducive to producing jute is of three types: Loamy soil, clayey soil and Sandy soil Loamy soil usually produces the best fibre. The clayey soil yields a short crop. Also plants grown on clayey soil do not ret uniformly. The sandy soil makes gross fabric. High yielding varieties the various Jute and Allied Fiber (JAF) research centres, in the various jute production countries, have produced a large number of high yielding varieties. Such varieties are named after these countries.The Jute and Allied Fibers (JAF) growing regions are manufactured in many countries. The main producing countries are India, Bangladesh, China, Thailand, Myanmar and Nepal. They jointly produce about 95% of JAF's world production.

1.2 Importance of jute in the economy of Bangladesh

In the current 148 jute mills Bangladesh generates 5.5-60.0 million (55-60 lakh) bales of raw jute every year, some 3.2 million (32 lakh) of which are used (Uddin *et al*. 2014). Bangladesh's economic contribution to the jute sector is massive. State exports jute at Taka 9.77 million (977 crores), worth 2.4 million (24 lakh) bales of crude jute. Overall, by exporting raw jute and jute products, Bangladesh has earned Taka 29,395 billion (2939,5 crore). The jute industry contributed 1.3% of Bangladesh's GDP in 2016-17.

According to the - Agriculture Sample Survey of Bangladesh 2015-16, approximately 1.1 million households were involved in jute cultivation while around 0.3 million

additional persons are involved in the manufacture of jute products. The total demand for jute goods in the international market is 0.75 million (7.50 lakh) tonnes. Bangladesh exports 0.46 million (4.60 lakh) tonnes of jute goods in the international market. Dhaka controls 62 per cent share of the total jute goods market of the world and earn Taka 20.125 billion (2012.5 crore) by exporting jute goods (Deb and Bairagi, 2009). In Bangladesh, though jute jute increased three folds in last 10 years, the maximum increase took place during the last 3-4 years. Eventually, with the increase in jute of jute, production system has not changed significantly (Uddin et al., 2014). It is expected that technological change required at the farmer level for the improvement of this sector. However, the demand of raw jute within the country has increasing trend over the years. National average productivity of jute fibre in Bangladesh is 1.93 t/ha, which is lower than the India (2.1 t/ha) (BBS, 2010). It may be attributed to uncertainty of raw jute , low options of high yielding jute genotypes, use of low-quality jute seed, lack of motivation about modern jute production technology, poor knowledge about grading of jute and weed management, etc. In Bangladesh, around 75% farmers are using uncertified seed. Though Bangladesh has developed a number of high yielding varieties of jute seed, these have not yet reached the doorstep of all the jute farmers. It is estimated that the introduction of HYV seed can increase the production of jute by 25% (Mollah et al., 2008; Yusuf, 2007). As jute crop is economically an important crop of Bangladesh, any problem this crop faces should be studied carefully and should be removed as early as possible. At present, the jute farmer faces some serious problem both in fibre and in seed sector. Since two years, jute has been passing through a crisis due to low and unstable jute at the growers' level. We also note that recent seminars, symposium and published articles in newspapers on the present plight on raw jute output and commodities were organized by various organizations. Everything concern how this problem can be resolved and how the jute industry can be saved (Yusuf, 2007). The present study is therefore carried out to determine the current status and practices of the jute farming and to determine the existing limitations preventing the jute growers.

1.2.1 Estimation of total area of jute crop

From the table it is evident that the area of cultivation and production of jure is increasing every year. In 2010-11 the area was 708723 hectares and the production were 78.02 lakh bales of 180 kg each and in 2016-17 the production was 82.46 lakh bales of 180 kg each.

Table 1.2.1 Area and production of jute in Bangladesh

Year	Area (ha)	Production (in Lakh Bales of 180kg each)
2010-11	708723	78.02
2011-12	760089	78.05
2012-13	681034	75.72
2013-14	665743	75.22
2014-15	672615	75.89
2015-16	677678	75.59
2016 -17	737770	82.46

Source: BBS, 2018.

1.2.2 Export of raw jute

The following figure 1 showed that in 2009-10 the amount of exporting jute was 15.99 lakh bales of 180 kg each. In 2012-13 amount of exporting jute was 20.56 lakh bales of 180 kg each but in 2013-14 and 2014-15 it has decreased drastically due to political unrest.

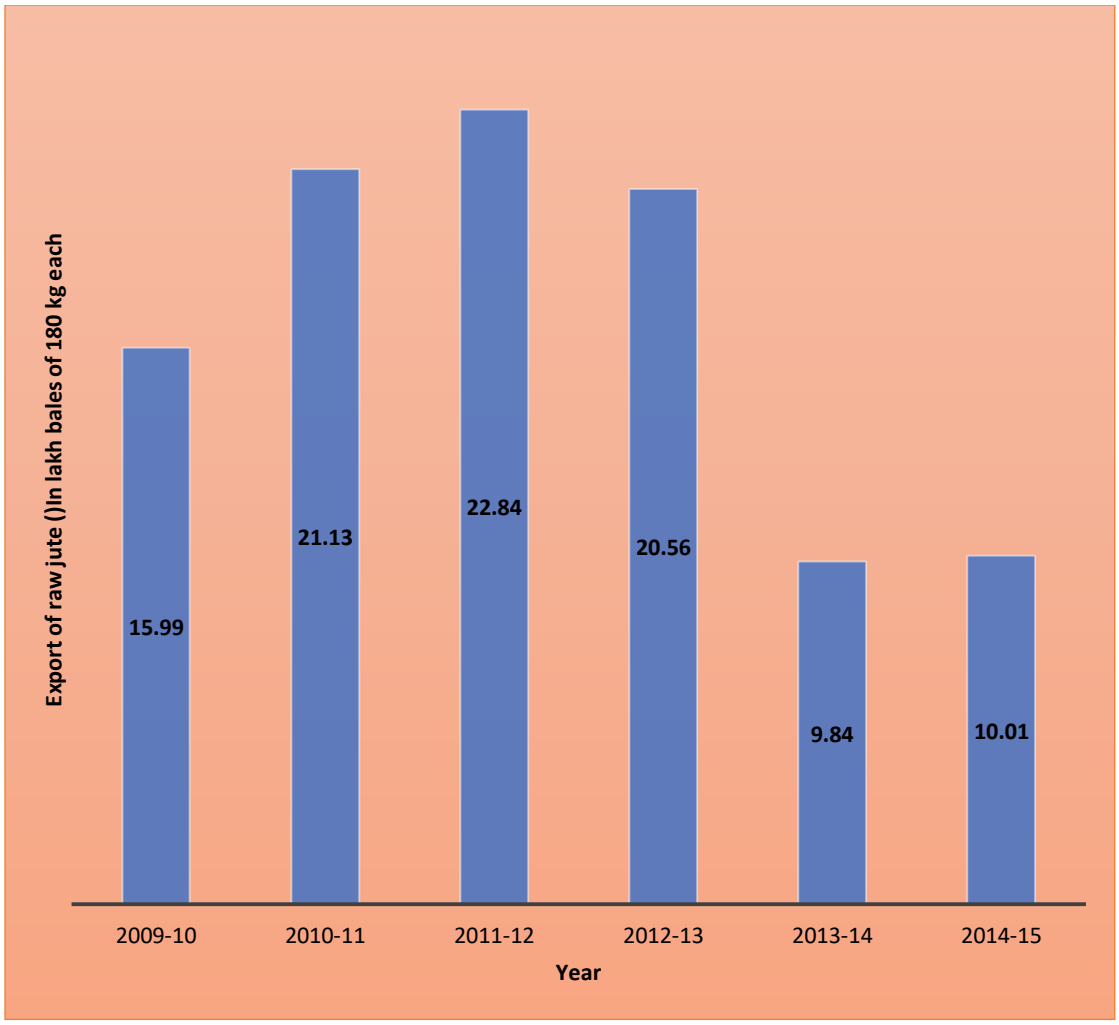
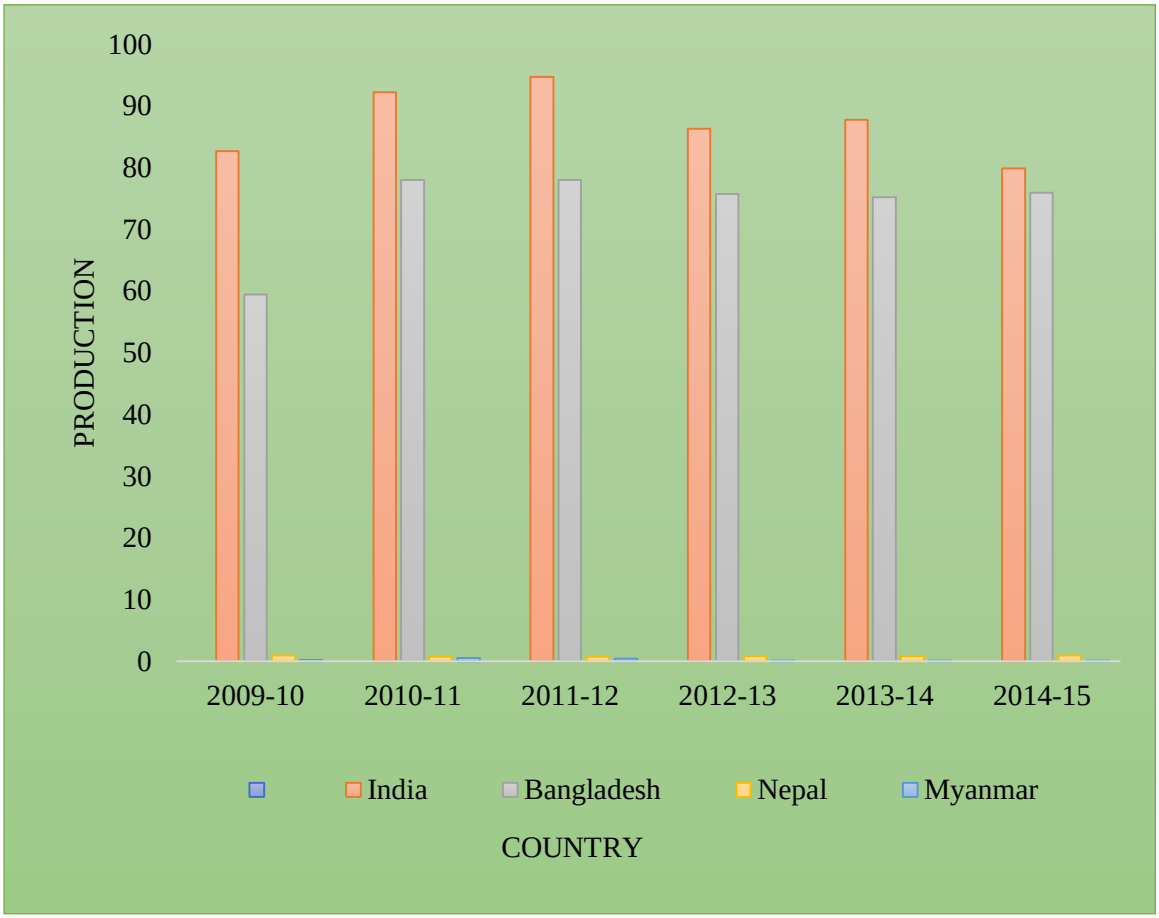


Figure 1: Export of jute

Source: FAO Statistics, December 2016

1.2.3 Jute production of Asian countries

Among the Asian countries India captured the top position of jute production. Bangladesh is the second position to production of jute. Other countries, they produce a negligible percentage compare to Bangladesh and India.



Source : FAO Statistics, December 2015

1.3 Modern use of jute

Perhaps a garden plant was a "pot weed" in ancient times, whose leaves were used for vegetable and medicinal purposes. Jute is used to manufacture other products, such as wind turbines, cordage, electric cables, etc. Jute is a result of industrial designs. The materials used for the preparation of tents, rifle sweepers, sandbags, netting, stip, water bags, etc. are also of particular importance. The jute fabric is used as a base for linoleum and furniture as well as for padding failers etc. In addition, there are specialty manufactures such as union fabrics, dyed and printed furnishing fabrics, water and rot resistant jute goods, fire resistant brattice cloth, bituminized materials, suitable for roofing, needled felts and laminated materials made from jute in combination with natural and synthetic resins (Karim *et al*. 1996).

In recent years the use of synthetic fibre products, because of their preferential jute over jute goods, dominated global market. This dominance of synthetic goods has adverse effects on jute market and resulted in lower jute day by day. Researchers and scientists of the Bangladesh Jute Research Institute (BJRI) and Bangladesh Council for Scientific and Industrial Research (BCSIR) undertook various experiments to innovate new products from jute. Jute reinforced plastic is a new composite material. It is cheaper than fibre glass. Jute reinforced plastic is suitable for use of silver cans, furniture, grain seed, soil, water storage tanks and boats. With the help of the renowned jute technologists and scientist Jute Diversification Promotion Centre (JDPC) has identified a big list of diversified jute product and technologies for these products are readily available in country. The goods are also manufactured using jute fibers like paper, plastic, replacements, medicare textiles, cellulose, floor tiles, tiles, boards, dyed yearn, polioted yarn, multiple yearns, shikha, shoe, tape, union tissue, print tissue, scrim fabric, drilling, clothing fabrics, pillow covers, carrying bags, laundry bags, toys, etc. Novocel wool was successfully made from jute by scientists in Bangladesh. The wool blanket of Novocel is now very popular with home market buyers. The nursery pot made from polythene has proved dangerous. The polythene kitchen bags needed to be removed during planting because they are not biodegradable.

1.4 Justification of the study

In contrast with other countries in the world, Bangladesh's population density is much higher. Due to the limited cultivable area there is little room for further cultivation of land. With rising infrastructure and construction activities, the cultivable land is being reduced and reduced. With this in mind, the Bangladeshi Government has put a strong emphasis on jute production to increase employment and farmers ' income. Appropriate and adequate information is necessary at farm level prior to emphasizing jute production on different aspects of jute production. Such knowledge of production is also necessary to make appropriate decision by the growers especially when several alternatives are open to them. However, some systematic economic investigations on

this jute production may have undertaken either by the government or private organization in order to satisfy the demand of extension workers, policy makers, research personnel, NGO officials and the farmers. The present study is an attempt to analyze the profitability of jute production and to identify the main factors that affect the yields. This research would therefore benefit individual farmers for their farm production and management. The results of this study enable the planner to make an effective and sensible plan. The study will allow researchers to carry out similar studies and to extend staff involved directly in various agricultural development programmes. They can therefore offer farmers different aspects of jute production. They can offer them suggestions. It will also help policy-makers who are central to farmers ' policy, decision-making and planning at macro level.

1.5 Objectives of the study

The objectives of the study are given bellow:

- To know the socioeconomic characteristics of the jute producing farmers.
- To determine the profitability of the jute producing farmers.
- To assess factors affecting the gross return of the jute producing farmers.
- To identify the major problems associated with jute production.

1.6 Outline of the study

The study consists of nine chapters. Chapter 1 describes introduction of the study, Chapter 2 relevant of literature. Chapter 3 deals with the methodology of the study. In Chapter 4, a brief description of socio-economic characteristics of the sample farmers are presented. In Chapter 5 estimated and analysis the costs and returns of the jute production. The results of Cobb- Douglas production function analysis are given in Chapter 6. Chapter 7 is designed to identify production problems of the jute growers. Finally, conclusion and recommendations of the study are presented in Chapter 8.

CHAPTER TWO

REVIEW OF LITERATURE

2.1. Introduction

Review of literature in any research is essential because it provides opportunities for reviewing the stocks of knowledge and information for the researcher which give a guideline in designing the future research problems. The purpose of this chapter is to review the results of some previously completed researches related to the present study. This study is concerned with the profitability and resource use efficiency of jute production. The economic studies on jute are limited in Bangladesh. However, some of the important works regarding present study are viewed here.

2.2. Profitability and economics analysis on different crops

Jahan (2018) studied on environmental benefits of jute to gain sustainable development as a natural fiber. Along with that, the economic benefits from the jute industry and value-added diversified products are also examined. To narrow down this study, Bangladesh has been chosen to find out the economic prospects and social factors there, considering Bangladesh is the second largest producer of jute and its emerging economic condition. However, the main goal of this study is to consider the environmental, economic and social factors of jute as a whole and jute's contribution to sustainable development.

Islam *et al*. (2018) studied on economic importance of jute cultivation in Bangladesh. The secondary information sources were IJSG reports, BJRI reports, Bangladesh Journal of Jute and Fibre Research; Jute and Jute fabrics, Bangladesh, DAE, FAO statistics, different books, direct communications with related office and persons. Jute was found grown in Bangladesh almost solely as a rainfed crop without any irrigation or drainage provisions. The status of jute as a cash crop of Bangladesh was not at all satisfactory. Millions of people of Bangladesh depend on all affairs of jute crop. Lack of proper government policy on jute, lack of production of jute, random closures of jute mills, failure to modernize the cultivation system and manufacturing units,

mismanagement and malpractice, fall of demand of jute in world market, use of alternative source to jute etc. were found as problems in the development of jute fibre in Bangladesh. Proper Government policy could solve the problems in jute sector of Bangladesh

Rahman *et al.* (2017) assessed the future potential of the jute sector in Bangladesh by examining its growth performance, international competitiveness, profitability, and production efficiency using national time-series data of over the period 1973–2013 and farm survey data from 289 farmers from two major jute growing areas of Bangladesh. Results revealed that the jute sector has experienced substantial growth in area, production, productivity, jutes, and exports. However, productivity has stagnated during the latter10-year period (2004–2013), while it grew at a rate of 1.3% per annum (p.a.) during the first 31-year period (1973–2003). Only traditional jute production is globally competitive, although financial profitability of white jute is relatively higher (benefit cost ratio = 1.24 and 1.17, respectively). Land, labor, and irrigation are the main productivity drivers for jute. The mean production efficiency of jute is estimated at 75% indicating substantial scope to improve yield by eliminating inefficiency. Marginal farmers are relatively inefficient.

Pavel *et al*. (2017) conducted a study on bio plastic jute poly bag. Bangladeshi scientist invented jute poly bag using jute cellulose that is bio-degradable and bio-plastic in nature, which is substitute of conventional poly bag. It will play a significant role in concern with environment, temperature, air, soil and sea pollution as well as the opportunity to retain the glory of Bangladeshi jute in international market and farmers to keep smile. They analyzed international marketing strategy, product positioning, competitiveness and potentiality in international market through SOWT, marketing mix & porter's five forces analysis. Their observation that newly invented jute biodegradable poly bag will gain market share in international plastic & bioplastic industry as well as the potential market for exporting all over the world and especially in Europe and North America. Bangladesh has both absolute and comparative advantages in producing jute poly bags.

Ferdous *et al.* (2017) reviewed the prospective utilization of natural fibres e.g. jute, kenaf and allied fibres in the technical production of automobiles and infrastructure sectors as a sustainable substitute over expensive synthetic fibres e.g. carbon, aramid, glass etc. Jute fibre (density 1.4 g/cc) being lighter than glass fibre (density 2.5 g/cc) offers additional advantages as regards specially in fuel efficiency in automobiles and lighter weight in infrastructures. The cost of natural fibre as raw material is also remarkably lower-jute than any synthetic fibres being utilized for manufacturing the reinforced products. Renowned car manufacturers e.g. Mercedes Benz, Daimler Chrysler, Ford Motors, Toyota, Hyundai, Volkswagen and Suzuki have already started using 10 to 20 kg of natural fibres to make interior body parts of automobiles as a part of their commitments for taking action against CO2 emissions, thus making greener world. It is estimated that the market size of NFC will increase from the level of USD 2.1 billion in 2010 to USD 3.8 billion in 2016 which is wide open for more eco-friendly and economic jute/ kenaf fibres to tap.

Mohiuddin (2015) analysed on green marketing of jute and jute products. Bangladesh controls 62% share of the total jute goods market of the world and earn Taka 20.125 billion by exporting jute goods. Bangladesh is the only exporter of raw jute. In recent year the country exported 2.4 million bales of raw jute valued at Taka 9.77million. Bangladesh's jute sector started to face a critical time since 1990s, as jute started to face increasing competitive pressure from synthetic substitutes, failure to follow modern marketing procedure and international trade practices, lack of significant efforts and required investment towards product development and diversification, inability to undertake the technological transformation undermined jutes prospects as fiber. All these had adverse impact on production & marketing.

Chowdhury *et al.* (2015) depicted on present and future prospects of jute. The study revealed the comparative growth and development of jute production of Bangladesh with other major jute producing countries to avail the opportunities of jute growing demand in the world market. The results indicated that both world jute production and production area has decreased with fluctuating trend over the period. The total

production of jute and yield of Bangladesh has increased with fluctuating trend, whereas the cultivation area of jute has decreased slightly with fluctuating trend over the period. At the end, the paper made number of recommendations for the growth and development of jute production of Bangladesh.

Sheheli *et al.* (2014) conducted to investigate the existing status and practices of jute cultivation. The study confirmed that most farmers have improved their socio-economic conditions through jute cultivation. The impact analysis of jute cultivation on livelihood of jute farmers shows that overall 61% jute farmers have increased overall livelihood from jute cultivation during the last four years (2011-2014). Deshi variety of jute has been widely grown across the region due to its wider adaptability and quality fiber. Jute area has been increased and some jute field has been replaced by jute due to its high demand in country. In addition, farmers are motivated to cultivate jute. But study revealed that productivity ranged from 750 kg to 1022 kg per hectare that are lower than other jute growing areas of Bangladesh. Average cost of production of fiber was estimated at Tk 15/kg.

Uddin *et al*. (2014) conducted a study on present condition on jute sector of Bangladesh. Jute is a vital sector from economical, agricultural, industrial, and commercial point of view in Bangladesh. Once upon a time jute was called the 'Golden Fibre' of Bangladesh. But due to continuous loss every year, the present and future prosperity and growth of this industry is in a vulnerable condition. There are different causes behind this situation. This sector has a good potential to earn a lot of foreign currencies for Bangladesh. Because at present, people are very cautious about environment and jute is an environment friendly product.

Awal (2013) summarized the economic proficiency of jute and carrot production in Mymensingh district where per hectare gross cost of jute was higher compared to carrot but per hectare net return of carrot production was Tk. 105720.66 which was higher than that of jute Tk. 195350.86. It was observed that gross returns were significantly influenced by the use of inputs such as human labor, tillage operation, seed, fertilizers,

irrigation, insecticides and manure where lack of capital, high jute of fertilizers and insecticides etc. were major constraints faced by farmers.

Nasrin (2013) evaluated the financial profitability of jute production and its impacts on livelihood of Tangail district farmers. Per hectare net return was estimated at Tk. 31366.9 and undiscounted BCR of jute production was 1.61. Cobb-Douglas production function analysis revealed that human labor, seed, fertilizer, power tiller and irrigation had significant impact and insecticides had insignificant impact on the per hectare output of aromatic jute production. It was found that through jute production 60 percent farmers in the study area experienced good health condition, better schooling and education, and increasing saving.

Islam *et al.* (2012) examined the impacts of jute on environment. It is taken the data of production area, of Jute for 19 years of Bangladesh. The jutes increase the fertility of land, preserve the ozone layer by absorbing CO2 and clean the air by emitting O2. The jute is used as vegetable, geotextile, biogas, biodegradable products which have impact on the environment. The recommended issues are to use the scientific method of cultivation, to implement the law for using jute rather synthetic, to make jute policy, to enhance the application area of jute, to develop the awareness of Jute as environment friendly fibre, and to develop the research institutions etc.

Molla *et al.* studied on (2008) socio-economic performance of Tosa Jute seed growers was conducted during February to March, 2005 in Rangpur and Natore district. Farmers of Rangpur area used animal power for both land preparation and carrying jute. The farmers in the study areas used traditional practices of using inputs. The farmers of Rangpur received higher yield than the farmers of Natore. The total variable cost per hectare was higher in Natore (Tk. 24604/ha) than that of Rangpur (Tk. 22118/ha). The major cost items was human lobour (56%) followed by animal and mechanical power (31%). About 50% of total cost was spent in cash for jute cultivation which indicated the credit need for poor farmers. However, Tossa jute seed production appeared promising at farm level but there is a member of constraints which greatly influenced the jute seed production.

Hossen *et al*. (2008) conducted a study at three different villages such as Kamairbag, Panchkitta and Raicho of Comilla to investigate on late jute seed production by the farmers of the villages. Forty farmers of each village were selected and 50% of them were trained by seed production technology and other 50% were not trained. Significant effect found on seed production in three different villages. Trained farmers produced significantly higher yield of quality jute seed. Percent of jute seed yield increase 41.18% to 47.58% and more profit obtained 59.18% to 69.70% by trained farmers compared to non-trained farmers. The ratio of benefit cost was found higher for trained farmer than non-trained. High yield of quality jute seed production will be influenced for diversified uses because, jute seed having percentage of valuable oil 7.9-12.9%.

Abedullah *et al.* (2006) did a study on "Technical Efficiency and its Determinants in Jute Production, Evidence from Punjab, Pakistan" using Cobb-Douglas stochastic production frontier approach. The result showed that jute farmers are 84 percent technical efficiency implying significant potential in jute production that can be developed. There was high correlation between irrigation of the jute crop and technical efficiency. However, it is different in terms of type of dataset used, focus area, some regressions used as well as geographical location.

Obwona (2006) estimated a translog production function to determine technical efficiency differentials between small- and medium-scale jute farmers in Uganda using a stochastic frontier approach. The results showed that, credit accessibility extension services and farm assets contribute positively towards the improvement of efficiency. One major drawback of this study is the inability of the author to show in clear terms whether there is any differential in efficiency between the two groups of farmers. The estimated efficiencies were explained by socioeconomic and demographic factors. The results showed that, credit accessibility extension services and farm assets contribute positively towards the improvement of efficiency. One major drawback of this study is the inability of the author to show in clear terms whether there is any differential in efficiency between the two groups of farmers.

Reza (2003) designed a study to assess the input output relationship and technical efficiency of jute production in Gazipur district. The findings of the study revealed that most of the sampled farmers belonged to owner-cum-tenant category. Human labor cost, and animal power cost was highest for large farmer than small and medium farmer and gross return and net return was also highest for large farmers. It was found that human labor cost, draft cost, land cost, seed cost, and mancha preparation cost significantly increased jute production where large farmers scored highest technical efficiency.

2.2 Research gaps

From the above discussion it is clear that several studies were conducted in Bangladesh concerning the issue related to profitability and resource use efficiency of jute. But no studies were accomplished in my study area to focus on the effects of input to the production process and on the resource use efficiency of different inputs used. Therefore, this study has attempts to analyze the profitability, input output relationship, and resource use efficiency of jute in the study area. It is believe that the present study will contribute significantly to generate new knowledge in the field of jute cultivation.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

In order to select the best method for achieving the research goals, the procedure of the experiment is followed in various steps. Methodology is a collection of methods rather than a method. Each section covers the procedure that was utilized in the research, including choice of the field of study, selection of specimens, data collection, and analysis. In the farm management study, information is generally gathered from individual farmers. The quality of scientific research largely depends on the appropriate research methodology. The layout of each study is determined primarily by its purpose, priorities and goals. This study was based on field level data where primary data were collected from different jute producers. There are several methods of collecting this basic information. For the present study farm survey method was adopted for collecting the primary data. The word "survey" refers to a method of study in which an overall picture of a given universe is obtained by systematic collection of all available data on the subject. There are three methods by which farm survey data can be gathered (Dillon and Hardaker 1993). These are:

i. Direct observation

ii. Interviewing respondents, and

iii. Records kept by the respondents

Since farmers in Bangladesh do not generally keep records and accounts of their farm activities, the second way to meet the aims of this study was pursued. In comparison with other methods, this method has advantages. This is a less expensive approach and has a much wider scope. The survey form is, however, not free of inconvenience. The downside of this system is to rely on the individual's memory. Repeated visits to the study area were carried out to collect information and the farmers were checked for

incomplete and/or correct information in the event of omissions or inconsistencies. The selection of the study area, period of the study, sampling technique and sample size, preparation of the survey schedule, data entry and processing, and analytical techniques are given in the following section:

3.2. Topography of Bangladesh

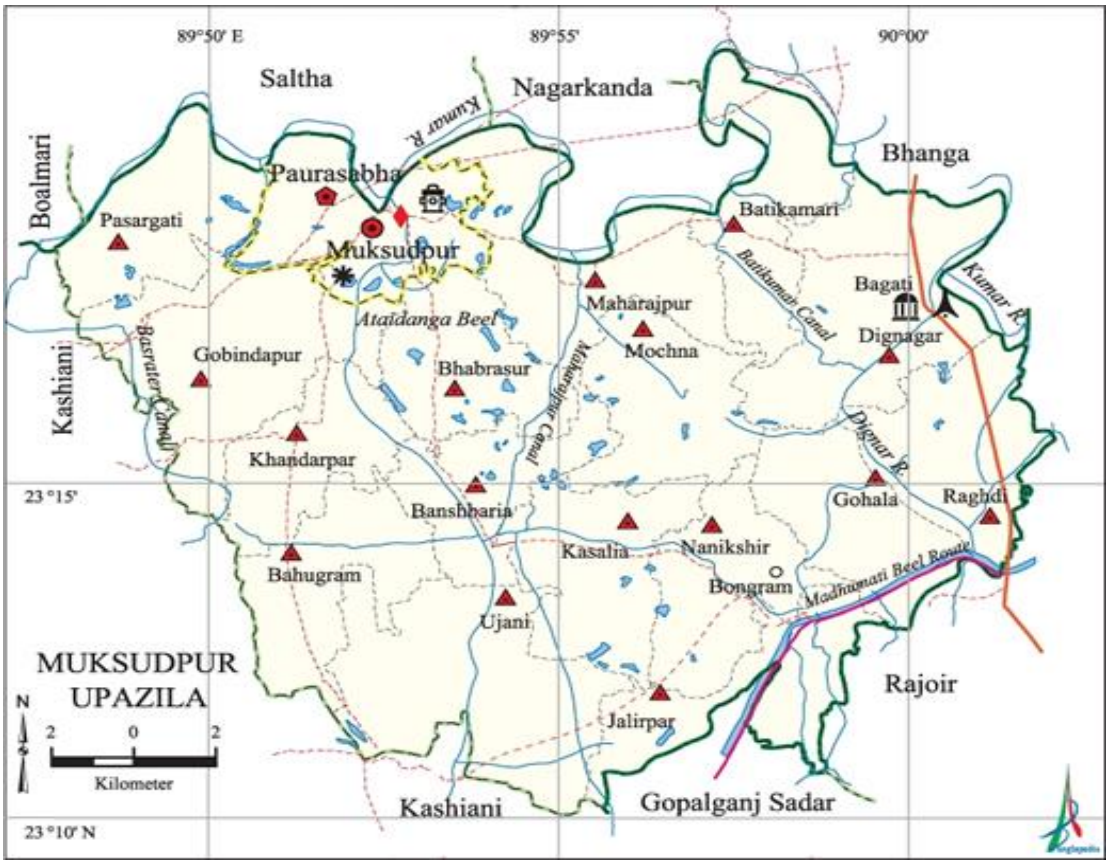
The location of the country in South Asia is between 20º34' and 26º 38' north latitude and 88º01' and 92º41' east longitude (BBS, 2017). Bangladesh is a subtropical monsoon country. The average winter temperature is 17-20.6ºC, average summer temperature remains at 26.9-31.1ºC and average rainfall varies across regions (Shahid, 2010; Shahid and Behrawan, 2008).

Agriculture is the predominant source of livelihood in rural areas and contributing 11.70% in GDP and employing 42.7% of labour force (BBS, 2017). Bangladesh is the fourth largest jute producing country in the world. In 2015-2016 financial year, 51.804 million metric tons of jute was produced (BBS, 2017). Average size of farm holdings was 3.1 acres in 1960 (Rashid, 1978) and it reduced to 123 acres/person in 2014 (WB, 2015). Land holdings are largely fragmented and there is a predominance of small and marginal farmers. There has been also significant land use change by bringing crop diversification from double to triple crops (Islam, 2003). In the year 2014-2015, jute was cultivated in 48.44% and boro was 42.40% of land (BBS, 2014). Jute is a rainfed crop and in other two seasons, irrigation is the source of water. Approximately, 60% of the cultivated area is under irrigation coverage (FAO, 2013) and jute accounts for 75.01% area of total cultivated area (BBS, 2014).

However, Bangladesh confronted loss in jute production in changing climate (GAIN, 2015) and jute season jute faces the most production losses due to natural hazards like floods, heavy downpour and water rush (BBS, 2014).

3.3 Selection of the Study Area

The selection of the study area is an important step for farm management or production economics study and such a study usually requires selection of an area for collecting data in accordance with the objectives set for the study. The area in which a farm business study is to be made depends on the particular purposes of the survey and possible cooperation from the farmers.



Source: www.banglapedia.com/muksukpur

The present study was conducted in of Gopalganj district. Three villages of Muksudpur upazilla under Gopalganj district namely Chak mazi gati,Gobindopur and Patgati were selected. The main reasons for selecting the villages were as follows:

i. These villages had some identical characteristics e.g. homogeneous soil type, topographical and climatic conditions those are favorable for producing jute.

ii. The study areas were well communicated with researcher's house that helped her in data collection. It was also easier and less expensive to collect data from that area

iii. The large number of respondents and reliable sources of data were expected to obtain under these study areas

iv. Accessibility to the area is good due to developed communication system.

Study location stated that the area of cultivation and production of jute is increasing every year. In 2010-11 the area was 20216 hectares and the production was 264262 m.tons and in 2016-17 the production was 2281487m.tons.

Table 3.2 Estimation of total area and production of jute crop of study area**.**

Year	Area	Production
2010-11	20216	264262
2011-12	20187	189559
2012-13	18706	250072
2013-14	22260	259078
2014-15	21949	232134
2015-16	23191	215478
2016 -17	24429	228187

Source: BBS,2018

3.4 Selection of Sampling Technique

The main purpose of the sample is to select a small group that is fairly true to the population. Two factors must be considered when selecting samples for a study. The sample size should be as large as possible in statistical analysis to allow for more independence. On the other hand it should be within the limits imposed by physical, human and financial resources that field testing, storage and evaluation should be conducted (Mannan, 2001). During the time of any conclusion, many numbers of the population need to be drafted due to the heterogeneity in the scientific and human climate. Therefore, the purpose of sampling is to select a sub-set of the population that

is representative of the population (Rahman, 1993). The term 'population' refers to the households, the farms etc. where a sample is representative under a study.

In this study a purposive random sampling technique was applied. At first, Gopalganj district was selected purposively. After that, among 5 upazilas in Gopalganj district, Muksudpur upazila was selected through purposive random sampling. Muksudpur upazila is divided into 9 unions. Union wise information for the specified jute of each union have been taken from the upazila office of the DAE for selecting the union. The unions have also been selected based on the highest concentration of jute was randomly selected. Finally, among most concentrated selected jute produced villages three villages were randomly selected from those unions. The villages were Chak Mazi Gati Gobindopur, and Patgati.

3.5 Sample Size

All farmers could not be included in the study because of time, resources and personnel constraints. A fair sample size was taken into consideration in order to achieve the study objectives. A maximum of 60 farmers have been selected for the ultimate goal of the study. The list of jute producers from the agricultural extension officer of the selected agricultural upazila office was first collected to obtain the desired sample. 200 farmers were found to be growing jute in the region selected for the study. The next task was to identify small farmers (having land 0.05 to 2.49 acres) who cultivated jute minimum for three years. Out of 200 farmers 100 farmers were identified as small farmer who cultivated jute minimum for 3 years. Then a total of 60 farmers were randomly selected from the selected villages.

3.6 Preparation of Survey Schedule and Pre-testing

Preparation of the survey schedule is very important in any farm management or production economics study (Amin, 2013). The main consideration in this respect is to obtain reliable data from the respondents for the preparation of a suitable survey schedule. In conformity with the objective of the study a draft survey schedule was prepared in such a way that reliable data could be collected from the farmers. Then the

draft schedule was tested and attention was paid for inclusion of new information which was not included in the draft schedule. The draft survey schedule was pre-tested by researcher herself. The draft survey was conducted among 5 jute producers of small farmers in selected area. Thus the draft schedule was improved, rearranged and modified in the light of the actual and practical experience gained during the pre-test.

After making necessary adjustment a final survey schedule was developed in logical sequence. The final schedule included the following information parts:

i. General information of jute grower
ii. Jute growers socio demographafic information
iii. Respondent's opinion

3.7 Period of the Study

The researcher herself collected necessary data through personal interviews with the selected farmers. Data were collected during the period from 1st August to 15th August 2019. Data relating to inputs and outputs involved in the production of jute were collected by visiting the study area during this period.

3.8 Collection of Data and Accuracy of Data

It is not easy to collect accurate and reliable data and other information from the sector. The quality of the survey depends on the accuracy of data. it should be done correctly. Through face to face interviews, the researcher collected the relevant data from the farmers. The data were gathered from the structured questionnaire, with paper and pencil conducting face-to-face interviews. The scientist remained in the respective area and collected the principal data from the individual households after setting the survey schedule. Initially, the farmers hesitated to answer the questions but when they were assured that the study was purely an academic one and it would not affect them adversely then they were cooperative with the researcher. Farmers were requested to provide correct information as far as possible. Usually, the respondents do not keep

records of daily/ annual transactions of their activities. Hence, it was very difficult to collect actual data and the researcher has to rely on the memory of the respondents. Questions were asked systematically in a simple manner and explanation was made whenever felt necessary. After each interview was over, the schedule was checked so as to ensure that information to each item had properly recorded. If there were such items which was over looked or contradictory were corrected by another interview. In order to minimize the errors, data were collected in local unit and later those were converted into standard international units. In the case of any inconsistency and lapses, the neighboring farmers were asked for necessary verification and data were checked and corrected through repeated visits.

3.9 Entry and Processing of Data

For the sake of consistency and completeness each survey schedule was verified after data collection. For proper editing the filled interview schedules were sorted, scrutinized and checked to avoid inconsistency. The data were then transferred from the interview schedule to MS Excel sheet and analysis was done by using STATA and SPSS 11.5.

3.10 Analytical Techniques

Data were analyzed with the purpose of fulfilling the objectives of the study. Both descriptive and statistical analysis was used for analyzing the data.

3.10.1 Descriptive Analysis

Tabular technique of analysis was generally used to find out the socio-demographic profile of the respondent, to determine the cost, returns and profitability of jute farm enterprises. It is simple in calculation, widely used and easy to understand. It was used to get the simple measures like average, percentage etc.

3.10.2 Production Function Analysis

The production function represents the technological relationship between output and factor inputs. To estimate the production function, one requires development of its properties leading to specification of an explicit functional form. One of the most widely used production function for empirical estimation is the Cobb Douglas production. This function was originally used by C.W. Cobb and P.H. Douglas in twenties to estimate the marginal productivities of labor and capital in American manufacturing industries. Their main purpose was to estimate the shares of labor and capital in total product; hence they used this function with the constraint that the sum of elasticities or regression coefficients should total one. Later on, they relaxed this restraint. Cobb and Douglas originally fitted the function to time series 1930s and 1940s; the same form was used for cross section of industries. This form of the function was subsequently used in many production function studies for technical units (crops, livestock) and farm-firms in agricultures. The popularity of this function is because of the following characteristics of the function:

(i) It directly provides the elasticities of production with respect to inputs;

(ii) It allows more degrees of freedom than other algebraic forms (like quadratic function) which allow increasing or decreasing marginal productivities, and

(iii) It simplifies the calculations by reducing the number of regression to be handled in regression analysis. The original form used by Cobb and Douglas was

$$\mathbf{Q = aL^{\beta}K^{1-\beta}U}$$

This forces sum of elasticities to one. Their later modification was

$$\mathbf{Q = aL^{\alpha}K^{\beta}U}$$

Where, $\boldsymbol{\alpha} + \boldsymbol{\beta}$ need not equal one. In agriculture, this form of function has not been used in its original form. Neither the sum of elasticities is kept equal to one nor is the number of variables limited to two. Even then as the basic idea of functional form was provided by Cobb and Douglas, various forms of this function have continued to be

called as Cobb-Douglas production function. The Cobb–Douglas production function, in its stochastic form, may be expressed as $Yi = \beta_1 X_{2i}^{\beta 2} X_{3i}^{\beta 3} e^{ui}$ …….. (3.1)

Where,

Y = output

X_2 = labor input

X_3 = Capital input

u = stochastic disturbance term,

e = base of natural logarithm.

From Eq. (3.1) it is clear that the relationship between output and the two inputs is nonlinear. However, if we log-transform this model, we obtain:

$$\ln Y_i = \ln\beta_1 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + u_i$$

$$= \beta_0 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + u_i \text{ …….. (3.2)}$$

Where $\beta_0 = \ln\beta_1$.

Thus written, the model is linear in the parameters β_0, β_2, and β_3

The properties of the Cobb–Douglas production function are quite well known and is therefore a linear regression model. Notice, though, it is nonlinear in the variables Y and X but linear in the logs of these variables. In short, (3.2) is a log-log, double-log, or loglinear model, the multiple regression counter part of the two-variable log-linear model.

The properties of the Cobb–Douglas production function are quite well known:

1. β_2 is the (partial) elasticity of output with respect to the labor input, that is, it measures the percentage change in output for, say, a 1 percent change in the labor input, holding the capital input constant.

2. β_3 is the (partial) elasticity of output with respect to the capital input, holding the labor input constant.

3. The sum (β_2+ β_3) gives information about the returns to scale, that is, the response of output to a proportionate change in the inputs. If this sum is 1, then there are constant returns to scale, that is, doubling the inputs will double the output, tripling the inputs will triple the output, and so on. If the sum is less than 1, there are decreasing returns to scale—doubling the inputs will less than double the output. Finally, if the sum is greater than 1, there are increasing returns to scale— doubling the inputs will more than double the output.

Before proceeding further, note that whenever you have a log–linear regression model involving any number of variables the coefficient of each of the X variables measures the (partial) elasticity of the dependent variable Y with respect to that variable. Thus, if you have a k-variable log-linear model:

$\ln Y_i = \beta_0 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \dots \dots + \beta_k \ln X_{ki} + u_i$ …….. (3.3)

Each of the (partial) regression coefficients, β_2 through β_k, is the (partial) elasticity of Y with respect to variables X_2 through X_k. Assuming that the model (3.2) satisfies the assumptions of the classical linear regression model; we obtained the regression by the OLS. (Acharaya, 1988).

3.10.3 Specification of the Cobb-Douglas Production Function

The input-output relationships in jute farming was analyzed with the help of Cobb-Douglas production function approach. To determine the contribution of the most important variables in the production process of jute farming, the following specification of the model was used.

$Y = aX_1\ b_1X_2\ b_2X_3\ b_3X_4\ b_4X_5\ b_5\ e^{ui}$ …….. (3.4).

The Cobb-Douglas production function was transformed into following logarithmic form so that it could be solved by ordinary least squares (OLS) method.

$\ln Y = \ln a + \beta_1 \text{In} X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + U_i$ …….(3.5)

Where, Y= Gross income from year round jute (Tk/ha);

Y= Return per hectare (Tk/ha)

Ina= Intercept of the function

X_1= Cost of human labor (Tk/ha)

X_2= Cost of seed (Tk/ha)

X_3= Cost of cow dung (Tk/ha)

X_4= Cost of fertilizer (Tk/ha)

X_5 = Cost of insecticide (Tk/ha);

b_1, b_2. . ….. b_5 = Coefficients of the respective input to be estimated; and

U_i = Error term. Coefficient of the respective variable; i= 1, 2,…….5

3.11 Measurement of Resource Use Efficiency

In order to test the efficiency, the ratio of Marginal Value Product (MVP) to the Marginal Factor Cost (MFC) for each input were computed and tested for its equality to 1. i.e.,

MVP/MFC = 1.

The marginal productivity of a particular resource represents the additional to gross returns in value term caused by an additional one unit of that resource, while other inputs are held constant.

When the marginal physical product (MPP) is multiplied by the product jute per unit, the MVP is obtained. The most reliable, perhaps the most useful estimate of MVP is obtained by taking resources (Xi) as well as gross return (Y) at their geometric means.

In this study the MPP and the corresponding values of MVP were obtained as follows:

MPPxi*Pyi = MFC,

Where,

MPPxi *Pyi=MVP

But, MPP = bi*(Y/Xi),

So, MVP = bi* (Y/Xi) Pyi

Y = Mean output

bi = regression coefficient per resource

Xi = Mean value of inputs

Pyi= jute of output

MFC = jute per unit of input.

3.12 Decision Criteria:

The decision criteria for choosing efficiency will be-

*When the ratio of MVP and MFC is equal to unity indicates that the resource is efficiently used.

*When the ratio of MVP and MFC is more than unity implying the resource is underutilized.

*When the ratio of MVP and MFC is less than unity implying the resource is overused.

3.13 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 farming was calculated by the following way

3.13.1 Calculation of Gross Return

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

Gross Return= Quantity of the product * Average jute of the product + Value of byproduct.

3.13.2 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 – Variable cost.

3.13.3 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 = Total return – Total production cost.

The following conventional profit equation was applied to examine farmer's profitability level of the 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 farming (Tk/ha);

P_m = Per unit jute of jute (Tk/kg); Q_m = Total quantity of the jute production (kg/ha);

Q_f = Per unit jute of other relevant jute (Tk/kg);

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

P_{xi} = Per unit jute of i-th inputs (Tk);

TFC = Total fixed cost (Tk); and

X_i = Quantity of the i-th inputs (kg/ha);

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

3.13.4 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 total return to total cost per hectare.

BCR= Total Return /Total Cost

CHAPTER FOUR
SOCIO-ECONOMIC CHARACTERISTICS

4.1. Age Distribution

It is evident from the table 4.1 that most of the farmers were middle aged in the study area. Out of the total sample farmers 21.00 percent belonged to the age group of 20-30 years, 53 percent belonged to the age group of 31-50 years and 26 percent fell into the age group of above 51. This finding imply that majority of the sample farmers were in the most active age group of 31-50 years indicating that they provided more physical efforts for farming.

Table 4.1. Age Distribution

Age category	Percent (%)
20-30 years	21
31-50 years	53
Above 51 years	26

Source: Field Survey, 2019.

4.2. Educational status

Table 4.2 shows 9 percent farmers were illiterate, 52 percent farmers had primary education, 32 percent farmers had completed J.S.C level education, 7 percent farmers had completed their secondary level education.

Table 4.2. Educational status

Level of education	**Percent (%)**
Illiterate	9
Primary school certificate	52
Junior school certificate	32
Secondary School Certificate	7

Source: Field Survey, 2019.

4.3. Occupational Status

In the study area, the selected farmers were engaged with various types of occupation along with jute cultivation. It was observed that, as a main source of income, agriculture was the main occupation for jute farmers. Some of them had opportunity to be engaged in other activities. Occupational status of farmers is shown in the following table 4.3. It is evident from the figure that 71 percent farmers were involved in agriculture and 12 percent farmers were involved in fisheries.

Table 4.3. Occupational status

Types of occupation	Percent (%)
Agriculture	71
Fisheries	12
Livestock, poultry and duck	8
Others (Rickshaw, van pulling, Business etc)	9

Source: Field Survey, 2019.

4.4. Gender and marital status

Table 4.4 depicts that 95 percent of farmers were male and 5 percent were female. In the study area 98 percent of the farmers were married and 2 percent were unmarried.

Table 4.4. Gender and marital status

Particulars	Percent (%)
Male	95
Female	5
Married	98
Unmarried	2

Source: Field Survey, 2019.

4.5. Farm size and ownership

The study farmers are categorized as: landless farmers (less than 49 decimal), small farmer (50-249 decimal), medium farmer (250-749 decimal) and large farmer (above 750 decimal) (GOB, 2009). The table 4.5 shows that in the sample, 16.26 percent were landless farmer, 69.39 percent were small farmer, 11.88 percent were medium farmer and only 2.47 percent were large farmer.

Table 4.5: Farm size and ownership

Types of farmers	Percentage (%)
Land less (less than 49 decimal)	16.26
Small Farmer (50-249 decimal)	69.39
Medium Farmer (250-749 decimal)	11.88
Large Farmer (above 750 decimal)	2.47

Source: Field Survey, 2019.

4.6. Income status

In the study area, the incomes of jute farmers were categorized as follows: less than 150,000, from 150,000 to 250,000 and above 250,000. It is evident from the table 4.6 that most of the farmer's yearly income belonged to the category of 150,000 to 250,000. About 55.73 percent of the jute farmers were earned Tk. 150,000 to 250,000 per year, 39.53 percent of the farmers were earned Tk. less than 150,000 per year and 5.06 percent farmers were earned Tk. Above 250,000 per year.

Table 4.6.: Income status

Level of income	Percent(%)
Less than 150,000 Tk.	39.41
151,000-250,000 Tk.	55.53
Above 251,000 Tk.	5.06

Source: Field Survey, 2019.

4.7 Dependency Ratio

The dependency ratio in the fields of economics, geography and demography is an age-to-population proportion of those who are generally not employed (the dependent part) and those who are generally employed (the productive part). The true (or effective) dependence ratio examines the ratio between economically active and inactive workers. The successful dependency ratio is not only about the age group, but also about whether or not people are involved economically. The calculation of the strain on the active population is used. As the ratio increases there may be an increased burden on the productive part of the population to maintain the upbringing and pensions of the economically dependent. This results in direct impacts on financial expenditures on things like social security, as well as many indirect consequences. Each and every family is rationally composed of both income earners and dependents.

*

Table 4.7 present the depending members per income earner. In this present study the average dependency ratio was found 1.64.

Types of farmers	Percentage (%)
Dependent members	61
Earning members	39
Total family members	100
Dependency ratio	1.64

Source: Field Survey, 2019.

4.8 Sources of Credit Facilities of the Respondent

The sources of credit facilities for the jute producing farmers include Banks, NGOs, Relatives and also their own funding. About 16.30 percent farmers were taken loan from Banks, 32.70 percent farmers were taken credit from NGOs and 16.55 percent farmers were taken loan from their relatives as reported by the sample farmers. And 34.45 percent farmers were used their own funding (Table 4.8).

Table 4.8 Sources of Credit Facilities of the Sample Farmers

Items No.	Percent (%)
Bank	16.30
NGOs	32.70
Relatives	16.55
Own	34.45

4.9 Involvement of Women

Women are deprived in our country, but the situation is slowly changing. About half of our country's population is women. Therefore, it is not possible for our country to grow totally socially and economically without them. The present study divided the participation of women in jute agriculture into three categories: one participation of women, two participation of women and three participation of women. It is evident from the table 4.9 that 26.42 percent farmers used 1women labor in their farm, 17.13 percent farmers u.sed 2 women labor in their farm and. So the result implies that involvement of women in jute farming activities were very small. About 56.45 percent farmers did not use women labor in their farm.

Table 4.9: Involvement of Women

Items No.	Percent (%)
No women involvement	56.45
One women involvement	26.42
Two women involvement	17.13

Source: Field Survey, 2019.

4.10 Size of Land Holdings of the Sample Farmers

The size of the farmers growing jute is categorized in different categories in this study. Size of land holdings includes homestead area, orchard, pond, cultivated land, fellow land, leased in, leased out and mortgage in as reported by the sample farmers. It is evident from the table 4.10 that the average area 17.25 decimal, 82.36 decimal, 17.17 decimal, 25.10 decimal were homestead area, cultivated land, leased out and leased in area respectively hold by the sample farmers on an average.

Table 4.10 Size of Land Holdings of the Sample Farmers

Types of land	Average area (Decimal)
Homestead	**17.25**
Orchard	**4.50**
Pond	**6.23**
Cultivated land	**82.36**
Fellow land	**0.53**
Leased in	**25.10**
Leased out	**17.17**
Mortgage in	**20.14**
Total	**173.28**

Source: Field survey, 2014

CHAPTER FIVE
COST AND RETURN OF JUTE FARMERS

5.1 Introduction

The main purpose of this chapter is to assess the costs and returns through jute production. Moreover, an attempt has been made to compare the costs and returns of growing per hectare jute. Hence, costs and returns of jute are estimated in this chapter. For calculating the costs and returns of jute production, the costs items were classified in to two groups: (1) variable cost; and (2) fixed cost. Variable cost included the cost of all variable factors like human labor, tillage, seed, fertilizer, manure and oil cake, irrigation water, and insecticides. On the other hand, fixed cost was calculated for interest on operating capital. On the return side net return and undiscounted benefit cost ratio (BCR) were determined in this chapter.

5.2 Variable cost

5.2. l Cost of human labor

The most important and widely used input in jute production was human labour. It contributed a big share of the total production cost of jute. Different activities such as land preparation, weeding, fertilization, insecticides, herbicides, harvesting etc are necessary for human labor. In the area of study, there were two origins of human work, one was family work and the other work. The assessment of hired work was done in accordance with the nominal cash payments to farmers. It can be seen from Table 5.1 that the amount of human labour used for jute cultivation was 115 man days per hectare. Total cost of human labour amounted to Tk. 40250 per hectare. The valuation of family supplied labour was done as the average wage of the hired labour was taken as the opportunity cost of the family supplied labour. It can be observed that jute growers used on an average 115 man-days/ha total human labour where on an average 35 man-days/ha was family supplied labour. In the study area on an average wage rate was Tk 350.00 per man-day. So, total cost of family supplied labour for jute amounted to Tk 40250 per hectare. Group based jute cultivation in the selected area plays vital role for

the reduction of the poverty at Muksudpur thana in Gopalgonj district.

5.2.2 Cost of tillage

For jute production the average per hectare tillage cost was Tk 2800 (Table 5.1)

5.2.3 Cost of seeds

In the study area, farmers have been found to use both seeds shipped and bought at home. For the production of jute, the total amount of seed per hectare was 9.5 kg / ha. The average seed price was Tk.190 per kg. The overall seed value for jute production was Tk. 1805 shown in Table 5.1. The high yield verity of the output must be preserved. Such seeds are very efficiently produced.

5.2.3 Cost of fertilizers

It was found that farmers used different types of fertilizer in producing jute. Such as Urea, MOP, TSP and Gypsum. The total cost of fertilizer was Tk 4880 per hectare.

5.2.4 Cost of cowdung

Farmers also used cow dung and oil cake as manure. In this study total manure and oil cake cost was Tk 6000 per hectare when per unit manure and oil cake cost was 3.00 Tk (Table 5.1).

5.2.5 Cost of insecticides

In the study area, farmers applied insecticides to protect from the attack of pests and diseases. Total cost of insecticides amounted to Tk 2000 per hectare for jute (Table 5.1).

Table 5.1 : Variable cost

Items of returns/costs	Unit	Quantity	Price per unit (Tk)	Total value (Tk)
Human (hired) labor	Man-day	80	350	28000
Human (family) labor	Man-day	35	350	12250
Labor (Total cost)		-	-	40250
Tillage	Tk	-	-	2800
Seeds	Kg	9.5	190	1805
Urea	Kg	125	22	2750
TSP	Kg	60	25	1500
MOP	Kg	42	15	630
Fertilizer (Total cost)				4880
Cowdung	Kg	2000	3	6000
Insecticides	Tk	n.a	-	2000
Total	Tk	-	-	57735

Source: Field Survey, 2019

5.2.6 Total variable cost

Summation of the costs of variable inputs gave the total variable costs which were Tk 57735 per hectare for jute production.(Table 5.1)

5.3 Total Fixed Cost

5.3.1 Interest on operating capital

Interest on operating capital was calculated by taking into account all the operating costs incurred during the production period of jute. Per hectare interest on operating capital was Tk 1924.5 for jute production.

Table 5.2: Fixed cost

Items of returns/costs	Unit	Quantity	jute per unit (Tk)	Total value (Tk)
Interest on OC	Tk	57735	@10%	1924.5
Rental value	Tk	18000	1	18000
Total	Tk	_	_	19924.5

5.4 Total cost

In order to estimate total cost per hectare all the resources used in jute production has been recapture together. Per hectare total cost of jute production was Tk.77659.5 (Tables 5.3).

Table 5.3: Total cost (Variable cost + Fixed cost)

Items of returns/costs	Unit	Variable cost	Fixed cost	Total (Tk)
Total cost	Tk	57735	19924.5	77659.5

Source: Field Survey, 2019

5.5 Gross returns

Here gross returns of the jute production is= (Main product+ By-product). In case of jute production return of by products in very difficult . The valuation of by-product of jute is very little. Total value of by products was Tk. 9000. The quantity of main product was 2853 Kg. If the jute of the jute per unit is 30.50 then it becomes the total value of jute main product was Tk. 87016.5. So, the gross return of the jute production was= (87016.5 + 9000) = 96016.50. If the gross return of the jute production is increased and the production cost of jute decrease then we will get highest rate of return through jute cultivation.

Table 5.4 : Gross returns

Items of returns/cost	Unit	Quantity	jute per unit (TK)	Total value(Tk)
Main product	Kg	2853.00	30.5	87,016.5
By-product	TK	n.a	-	9000.00
Total returns	TK	-	-	96,016.5

Source: Field Survey, 2019

5.6 Net return

Here

Net return= Gross return – Total cost

So the net return (Tk.18357) of jute production is depending on both gross return and total cost of the jute production.

Table 5.5: Net return

Items of returns/costs	Unit	Gross Return	Total cost	Total value (Tk)
Net return	Tk	96,016.5	77659.5	18357

Source: Field Survey, 2019

5.7 Undiscounted BCR

The benefit cost ratio has been determined by gross profit divided by marginal value or total cost. It requires an investment in return per taka. This helps the study of the farm's financial performance. The study showed that the benefit-cost ratio of jute production was 1.24 which implies that Tk 1.24 would be earned by investing Tk 1.00 for jute production. Jute farming was therefore found to be beneficial to farmers (Table 5.6).

Table 5.6: Undiscounted BCR

Items of returns/cost	Gross Return	Total cost	Ratio
Undiscounted BCR	96,016.5	77659.5	1.24

Source: Field Survey, 2019

CHAPTER SIX

FACTORS AFFECTING OF JUTE PRODUCTION

6.1 Introduction

An attempt has been made this chapter to identify and measure the effects of the major variables on jute production. Cobb-Douglas production function was chosen to estimate the contribution of key variables on the production process of jute farming. The estimated values of the model are presented in Table 6.1.

6.2 Functional Analysis for Measuring Production Efficiency

Production function is a relation or a mathematical function specifying the maximum output that can be produced with given inputs for a given level of technology. Keeping in mind the objectives of the study and considering the effect of explanatory variables on output of jute farming, six explanatory variables were chosen to estimate the quantitative effect of inputs on output.

Management factor was not included in the model because specification and measurement of management factor is almost impossible particularly in the present study, where a farm operator **is** both a labor and manager.

Production function is a relation or math function that specifies the maximum output to be obtained by specified inputs at a certain technical level. In order to estimate the quantitative effect of inputs on performance, taking into account the study objectives and the influence from explanatory variables on the production of yields, six explanatory variables were chosen. The management factor was not included in the model because it is almost impossible, in particular in this study, to specify and measure the management factor, where both work and manage is a farmer. Other independent variables like water quality, soil condition, time etc., which might have affected production of farm enterprises, were excluded from the model on the basis of some preliminary estimation. A brief description is presented here about the explanatory variables included in the model.

6.3 Estimated Values of the Production Function Analysis

- F-value was used to measure the goodness of fit for different types of inputs
  .
- The coefficient of multiple determinations (R^2) indicates the total variations of output explained by the independent variables included in the model.
- Coefficients having sufficient degrees of freedom were tested for significance level at 1 percent, 5 percent and 10 percent levels of significant.

- ❖ Stage of production was estimated by returns to scale which was the summation of all the production elasticity of various inputs.

- ❖ The estimated coefficients and related statistics of the Cobb-Douglas production function for jute production are shown in Table 6.1.

Table 6.1 Estimated Values of Coefficients and Related Statistics of Cobb-Douglas Production Function Model for jute.

Explanatory variables	Values of coefficients	Standard error	P-value
Intercept	6.277	1.146	3.452
Labour	0.224**	0.085	0.041
Seed	0.128**	0.046	0.037
Cowdung	-0.022	0.032	2.214
Fertilizer	0.196***	0.081	0.001
Insecticide	0.062	0.045	4.012
F-value		27.30***	
R^2		0.7615	
Returns to scale		0.661	

Note:

*p< 0.10

**p< 0.05

***p< 0.001

Source: Authors Estimation

6.4 Interpretation of the results

Labor cost (X1). The magnitude regression coefficient of labor cost was 0.224 for jute. It was positive and was significant at five percent probability level. This indicates that an increase in one percent labor cost, remaining other factors constant, would result in an increase in the gross return by 0.224 percent.

Seed cost (X2). The magnitude of the regression coefficient of seed cost was 0.128 with a positive sign. It was highly significant at five percent probability level. It implies that one percent increase of seed cost, keeping other factors constant, would lead to an increase in the gross return by 0.128 percent for jute (Table 6.1).

Cost of fertilizer (X_3): The fertilizer used for jute farming included the category of Urea, TSP, MOP etc. The regression coefficient of fertilizer cost was 0.196 and significant at one percent level for jute farming. It indicates that ten percent probability increase in cost of fertilizer, remaining other factors constant, would increase gross returns by 0.196 percent

Remaining others two variable like cowdung and Manure cost is statistically insignificant so it would not be explained.

Coefficient of multiple determinations (R^2). It is evident from Table 6.1 that the value of the coefficient of multiple determinations (R^2) was 0.76 for jute. It indicates that about 76 percent of the total of the gross returns are explained by the explanatory variables included in the model.

Goodness of fit (F - value). The F-value was 27.30 for jute, which implies good fit of the model. That is, all the explanatory variables included in the model were important for explaining variation of jute production.

Returns to scale: The summation and elasticity of the estimated model of all regression

coefficient and/or manufacturing indicate the return to size in response to the output of all inputs. The total production coefficients of the jute production equations were 0.661 (Table 6.1).

6.5 Resource Use Efficiency in JuteProduction

A ratio equal to the unit indicated an optimal use of that variable to determine the status of the efficiency of resource use and a ratio greater than the unit indicated the output could be improved by the use of more resources. The unprofitable resource use was indicated by a value less than unit that should be reduced, to reduce losses, as farmers used this factor above. The adverse value of MVP shows that the resources have been used indiscriminately and ineffectively.

The ratio of MVP and MFC of labor (0. 535) for jute production was positive and less than one, which indicated that in the study area labor was over used (Table 6.2). So, farmers should decrease the use of labor to attain efficiency considerably.

Table 6.2 showed that the ratio of MVP and MFC of seed (6.786) for jute farming was positive and greater than one, which indicated that in the study area seed for jute production was under used. So, farmers should increase the use of seed to attain efficiency level.

The ratio of MVP and MFC of cowdung was found to be (-0.424) for jute farming was negative and less than one, which indicated that in the study area use of cowdung was over used (Table 6.2). So, farmers should decrease the use of cowdung for jute production to attain efficiency considerably.

Table 6.2 revealed that the ratios of MVP and MFC of fertilizer used for jute production was positive and more than one (3.142), which indicated that fertilizer application was underutilized. So, farmers should increase the use of fertilizer to attain efficiency in jute production.

It was evident from the table 6.2 that the ratio of MVP and MFC of insecticide (2.957) for jute farming was positive and more than one, which indicated that in the study area use of insecticide for jute farming was under used. So, farmers should increase the use of insecticide to attain efficiency in jute production.

Table 6.2 Estimated Resource Use Efficiency in Jute Production

Variables	Geometric mean (GM)	Y(GM)/Xi (GM)	Co-efficient	MPV (Xi)	MFC	r=MVP/MFC	Comment
Yeild	96,016.5						
Labour	40250	2.386	0.224	0.535	1	0.535	**Over utilized**
Seed	1805	53.195	0.128	6.786	1	6.786	**Under utilized**
Cowdung	4880	19.676	-0.022	-0.424	1	-0.424	**Over utilized**
Fertilizer	6000	16.003	0.196	3.142	1	3.142	**Underutilized**
Insecticide	2000	48.008	0.062	2.957	1	2.957	**Underutilized**

Source: Field survey, 2019

CHAPTER SEVEN
CONSTRAINTS ASSOCIATED WITH PRODUCTION OF JUTE

7.1 Introduction

Production of jute has a number of challenges in the study area such as seeds, fertilizers, pesticides, technological aids, and the desirable price of their goods. Because of the low capital base, they are economically unable to invest the amount they need to produce crops. Usually, farmers complain that government agencies do not provide sufficient support. It is also complained that farmers are not receiving the government's necessary technical and financial support. In this chapter, an attempt has been made to identify constraints faced by jute production.

7.2 Problems of Jute farmers

7.2.1 Lack of financial capital or institutional credit

In addition to special agricultural care, the production of jute needs adequate doses of fertilizer, irrigation water and insecticides, and jute growers need adequate funds to get the necessary inputs. Around 41.00 percent of all producers in the study area reported not having sufficient operating capital (Table 7.1). Many growers did not receive formal credit, and therefore had to borrow money at an exorbitant interest rate from their neighbors, families, banks and money lenders. Financial incapacity and the need to borrow cash from non-institutional sources were urgently necessary.

Table 7.1 Major problems faced by the farmers

Nature of problems	Percentage
Lack of capital or institution credit	47
High price of fertilizer and insecticides	43
Lack of training	39
Non availability of quality seed	54
Low market price of product during harvesting period	81
Storage problem	52
Carrying and handling problem	32
Attack by pest and diseases	53
High price of seed	37

Source: Field survey, 2019

7.2.2 High price of fertilizers and insecticides

Fertilizer and insecticides inputs are crucial to jute production. Over rising time both retail and wholesale distributors increased in the price of fertilizers and insecticides. There was a recorded high price level of fertilizers and insecticides in about 43 per cent of jute producers (Table 7.1).

7.2.3 Lack of Training

Training is very essential to increase productivity. Training develops the skill of farmers which ultimately increases the productivity. About 39 percent of the selected jute growers reported that the productivity of jute was hampered due to lack of training.

7.2.4 Non-availability of quality seeds

Another limiting factor in the production of jute was the lack of available improved seeds. This problem has been reported by around 54% of farmers (Table 7.1). They said HYV seeds were not available in the local market.

7.2.5 Low market price of product at harvesting period

Jute prices were found to be very low during the harvest period. Roughly 81% of the cultivators selected posted low jute prices for the harvest period and shortly after harvest (Table 7.1). Most farmers have been obliged to make panic sales to fulfill their daily cash needs–up to household expenses of the day, which resulted in the village market's supply being increased during the harvest period and thus decreased the selling price per unit.

7.2.6 Storage Problems

Around 52% of jute growers complained about the question of storage (Table 7.1). They did not get fair price for the lack of storage facilities.

7.2.7 Carrying and handling problems

The growers sold the commodity to' paikars' on the local markets and a few farmers had sold their goods at farm gates because of the question of carrying and handling. Approximately 32% of jute growers viewed transport and handling as a concern, according to Table 7.1. Also, farmers reported that due to a lack of transport and handling facilities, they cannot take advantage of the higher jute price on the remote market.

7.2.8 Attack by disease and pest

Jute farmers have noted that the attack of pests and diseases have lost large yields of jute. In the field of study, this problem was experienced by about 53% of jute farmers (Table 7.1).

CHAPTER EIGHT
CONCLUSION AND POLICY RECOMMENDATION

8.1 Introduction

This chapter attempts to summarize the major findings of the study. Section 8.2 presents a summary of the major findings of the study. Conclusion, policy recommendations, limitation and scope for the further study are given in Sections 8.3, 8.4, and 8.5 respectively.

8.2 Summary of the Study

The study revealed that out of the total sample farmers 53 percent belonged to the age group of 31-50 years, 52 percent farmers had primary education, 71 percent farmers were involved in agriculture, 95 percent of farmers were male, 16.26 percent were landless farmer, 69.39 percent were small farmer, 2.47 percent were large farmer, 55.53 percent of the jute farmers were earned Tk. 150,000 to 250,000 per year, the average area 17.25 decimal, 82.36 decimal, 17.17 decimal, 25.10 decimal were homestead area, cultivated land, leased out and leased in area respectively hold by the sample farmers on an average.

The amount of human labour used for jute cultivation was 115 man days per hectare. Total cost of human labour amounted to Tk. 40250 per hectare. The total cost of seeds for jute production was Tk. 1805. Summation of the costs of variable inputs gave the total variable costs which were Tk 57735 per hectare for jute production. Per hectare interest on operating capital was Tk 1925.5 for jute production. So, the gross return of the jute production was Tk 96016.5. Net return was Tk. 18357 of jute production is depending on both gross return and total cost of the jute production. It was evident from the study that the benefit cost ratio of jute farming was accounted for 1.24. In the study area use of insecticide, fertilizer and seed for jute farming was under used as well as labor and cowdung were over used. Labour, seed and fertilizer were statistically significant.

8.3 Conclusion

Bangladesh is mainly a farming state that paves the way for strong economic development. The jute sector plays a major role in Bangladesh's development. Jute production can be described as a major contributor in this economy to the growth of foreign exchange income and is an important part of the products exported from Bangladesh. Jute is grown in Bangladesh almost solely as a rainfed crop without any irrigation or drainage provisions. In this regards jute is better choice than its major competing crop Aus rice. Because jute is comparatively less affected by drought or stagnation of water. Moreover 3-4 thousands hectares of land in Bangladesh are suitable for growing no other crop but only jute in the kharif season (April-September). Most rarely jute sufferers total damage due to clamities like drought excessive rainfall or flood. It may be concluded that jute and the environment in Bangladesh are mutually supplementary to each other.

But in the study area various problems which were faced by farmers such as lack of capital, high price of fertilizers and insecticides, scarcity of good quality seeds, attack by pest and disease, lack of training, lack of adequate transport facilities, lack of storage facilities, lack of marketing facilities, and lack of market information. In order to increase the production of jute, these problems should be solved as far as possible.

8.4 Recommendations

Based on the findings of the study the following recommendations were concluded to improve the present production and marketing system.

- The jute agricultural research bodies could be given the additional function of establishing and administrating a programme of education and advice to farmers on the best methods of cultivation harvesting and retting.

- Extend the availability and improve the distribution of good quality certified seed

- Establishment of storage at the jute growing area which can be helpful to the farmers to store jute during peak period.

- Government should provide training facility on grading , retting , practices of balanced use of fertilizer and assorting through DAE & BJRI.

- In the study it was observed that some resource were over used and some under used. In this regard, the officials of DAE should make more meeting with farmers, celebrate campaign after a certain period of time through these activities farmers would be aware regarding using the resources.

- Modern scientific method of jute cultivation should be implemented.

- Market information for the farmers should be provided by the government so that the farmers can get the profitable price from jute.

- Insurance facility may be provided as the loss of jute production

8.5 Limitation of the study

The lack of funds and time spent on the research was a major obstacle. Because the funding is lacking and the time required to collect the required information from farmers cannot be covered by the study; only 60 farmers have been chosen to conduct the study. The researcher had to depend on the farmers ' memory to gather the information they required because many of them had no written record or kept partial records. The results of this study may provide farmers, extension workers, and researchers with valuable information, despite a few restrictions.

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