**Keywords**

Jute,
Research Strategy,
Product,
Diversification,
Problem,
Prospect

Received: October 23, 2017

Accepted: November 19, 2017

Published: January 4, 2018

Economic Importance of Jute in Bangladesh: Production, Research Achievements and Diversification

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Citation

Md. Mahbubul Islam, Md. Saheb Ali. Economic Importance of Jute in Bangladesh: Production, Research Achievements and Diversification. *International Journal of Economic Theory and Application*. Vol. 4, No. 6, 2017, pp. 45-57.

Abstract

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.

1. Introduction

Jute (*Corchorus* spp.) is now universally recognized that jute is the English version of the current bengali word 'Pat', a kind of fibre which is obtained from two species (annual and short day plants) of the genus *Corchorus* belonging to the family *Tiliaceae*. It is a common term used both for plant and the fibre obtained from the bark of the plants, *Corchorus capsularis* L. and *Corchorus olitorius* L. There are over 30 species, which belongs to the genus *Corchorus*. Jute (*Corchorus capsularis* & *Corchorus olitorius*), Kenaf (*Hibiscus cannabinus*) and Roselle (*H. sabdariffa* var. *Altissima*) are vegetable bast fibre plants next to cotton in importance. In the trade there are usually two names of jute, White and Tossa. *Corchorus capsularis* is called White Jute and *Corchorus olitorius* is called Tossa Jute. In India & Bangladesh Roselle is usually called Mesta. Jute fibres are finer and stronger than Mesta and are, therefore, better in quality. Depending on demand, price and climate, the annual production of jute and allied fibres in the world remains around 3 million tonnes. The fibre finds its use in the producing as well as in consuming countries in the agricultural, industrial, commercial and domestic fields. Sacking and Hessians (Burlap) constitute the bulk of the manufactured products. Sacking is commonly used as packaging material for various agricultural commodities viz., rice, wheat, vegetables, corn, coffee beans etc. Sacking and Hessian Cloth are also used as packing materials in the cement and fertilizer manufacturing industries.

The fibres are used alone or blended with other types of fibres to make twine and rope. Jute butts, the coarse ends of the plants, are used to make inexpensive cloth. Conversely, very fine threads of jute can be separated out and made into *imitation silk*. As jute fibres

are also being used to make pulp and paper, and with increasing concern over forest destruction for the wood pulp used to make most paper, the importance of jute for this purpose may increase. Jute has a long history of use in the sackings, carpets, wrapping fabrics (cotton bale), and construction fabric manufacturing industry [1]. Traditionally jute was used in traditional textile machineries as textile fibres having cellulose (vegetable fibre content) and lignin (wood fibre content). But, the major breakthrough came when the automobile, pulp and paper, and the furniture and bedding industries started to use jute and its allied fibres with their non-woven and composite technology to manufacture nonwovens, technical textiles and composites. Therefore, jute has changed its textile fibre outlook and steadily heading towards its newer identity, i.e. wood fibre. As a textile fibre, jute has reached its peak from where there is no hope of progress, but as a wood fibre jute has many promising features. With these view the study was undertaken to see the past and future of jute in Bangladesh, its production, research achievements and diversification as well.

Once jute was our main exporting good, the golden days of that fiber have gone. Bangladesh earned huge foreign currency by exporting jute. Before the 70s till the readymade garments appeared we earned a fabulous sum of foreign currency from jute. Owing to mismanagement and lack of foresight we have already lost our golden age of jute. The present condition of jute as a cash crop in Bangladesh is very miserable. Why is it so? What are the reasons behind it? I have tried my level best to look into the above matter in my following study. Jute being the most important commercial crop plays a major role in our agriculture. Various development projects of Bangladesh are financed by the foreign exchange earnings from jute. Jute also holds an important position in the industrial sector of the economy of Bangladesh. Jute is a versatile and environment-friendly bio-degradable natural fibre widely grown in Asia, particularly in Bangladesh, India and China. It is an important cash crop in Bangladesh and India, which together accounts for about 84% of world production of jute fibre [2].

2. Materials and Methods

The study was based on secondary data. The secondary information used was collected from different sources of the Library of Bangladesh Jute Research Institute, Dhaka during the period from May to till October, 2015. The data sources were International Jute Study Group (IJSG) reports, IJSG website, BJRI reports, Bangladesh Journal of Jute and Fibre Research; Jute and Jute fabrics, Bangladesh. Department of Agricultural Extension, Food and Agriculture Organization statistics, different books, direct communications with related office and persons, accessing internet and using different national and international journals.

3. Results and Discussion

The history of jute cultivation in Bangladesh

Jute had been cultivated in the Bengal delta from time immemorial but no one can say when or from where it came. It is interesting to note that it was in emperor Akber's time that jute became an important feature of the economic life of Bengal. There are about 40 species of jute out of which only two, i.e. corchorus olitorius (Tos jute) and corcours capsularies (white jute) are widely used. The name of species of jute is Tiliace and genus is corchors. Best fibres of similar nature are also used commercially. These are called mesta, kenaf or allied fibres. The early cultivation of olitories was in Khulna and 2/1 pargana of west Bengal. After a lot of debate, there seems to be an agreement that White Jute originated in the Indo-Burma region and Tossa Jute in Africa. Kenaf originated in Angola in Africa and Roselle originated in Sudan of Africa. China is also considered as one of the places of origin of Jute. According to some scholars, some provinces of the southern parts of China are the secondary centres of origin of Tossa and White Jute.

Importance of jute in the economy of Bangladesh

Jute has always played an important role in the economy of Bangladesh. In the 1970s Bangladesh earned huge foreign currency by exporting raw jute, jute goods, arts and crafts made of jute fibre. That's why it was called the 'Golden Fibre of Bangladesh'. In recent few years Bangladesh Government is trying to promote the jute industry and to get back the lost position in the world market. The Government is trying to initiate a revolution in the jute industry and the current government policy is one of inducement and facilitation for promotion of investment and export of jute products. Subsequently, it has become an industrial raw material for production of packaging materials. Jute the 'Golden fibre' of Bangladesh has been considered as the major source of foreign exchange earnings of the country. It provides livelihood for millions of farmers, industrial workers. Cultivation of jute in the country has been drastically reduced from 25.42 lakh acres of land with production of 13.44 lakh tonnes jute fibre and 30.91 lakh tonnes of jute sticks in 1969-70 to 9.6 lakh acres of land with production of 10.35 lakh tonnes jute fibre and 16.72 tonnes jute stick in the year 2004-05. On an average, jute was cultivated between 10.00 to 11.85 lakh acres producing almost 53 to 57.5 lakh bales of raw jute in the country. The export market tried to sustain a steady trend showing positive and promising signal for jute. Jute sector could contribute to creation of huge employment opportunities, wide scale income generation and poverty alleviation, and ultimately higher contribution to GDP [2].

Cultivation and marketing of jute as well as the manufacturing of jute goods provide employment for lakhs of people. Bangladesh government earns revenue both from raw jute and jute goods. Jute also plays a major part in the development of banking and insurance in the country. The Sonali Bank originally known as the National Bank during

Pakistan period was established especially for financing jute trade. The welfare of the rural people which depends directly on agriculture is intimately bound up with the production and trade of jute. Import of various goods and services is a prime necessity for the economic development of Bangladesh. All these imports depend on the quantity and value of exportable surplus to which jute is the main contributor. In fact, jute is foreign trade and the financial barometer of the country [3]. Jute has an important bearing on employment. Jute farming, jute trade and industry provides about 10 percent of the total employment in the country, contributes approximately 12 percent to GDP [4]. At farm level, jute is a labor intensive activity and demands more laborers than most other major crops that are grown in Bangladesh. When jute is exported and/or used for local manufacturing, many laborers are involved at different stages of the crop and the business through which income distribution takes place. Therefore, jute is an economic issue bearing a social dimension as well. Bangladesh is the second largest raw jute producers accounting for about 30% of world production. About two-third of raw jute was processed domestically in 74 jute mills, producing mainly packaging fabric as hessian and sacking and carpet backing cloth [3]. Emission of green house gases into the atmosphere has lead to Global warming. That caused glaciers melting, raising sea levels, cyclones, tornados, flood, drought Tsunami etc. Incremental raising of the temperature these calamities intensified many folds and causing havoc to life and properties. Bangladesh is facing the reality of climate change due to global warming. It will impact on the composition of atmosphere, hydrology, geomorphology, ecology, soil, land use, biodiversity, vegetation etc. As a result many natural ecosystem may be changed. Emergence of climate change would affect Bangladesh in two ways in two major contrasting regions. First one, the southern region would be in drainage congestion with rise of sea level and intrusion of saline water. Secondly the north-western part will be subjected to scarcity of water leading to drought condition; both will impaired the agro-ecosystem of the country. Agriculture is the main concern due to changes in climatic factors such as temperature, humidity, precipitation, wind flow, solar radiation; evaporation etc has direct effect on the production of crop. Jute is a fibre crop belongs to genus *Chorchorus* of the Tiliaceae family with two cultivated species—*C. capsularis* L. *C. olitorius* L. Fibre is extracted from the bark of the plants. It grows under an abundant range of climatic factors. Among the climatic factors, temperature, humidity rainfall, sunshine are the dominating component for the growth of jute plant. In 1970-80 decades about 15-16 lac hectare of the total cultivable land was occupied by jute has now been reduced to 4.50 to 5.0 lac hectare. Still jute is contributing to national economy. Its present contribution to GDP is about 5.5% [5].

Traditional use of jute

Jute is to-day a textile fibre of great commercial importance. In ancient time jute was probably a garden plant a “pot herb” whose leaves were used for vegetable and medicinal purposes. Later on jute became a field crop,

farmers learnt the process of extracting the fibre and of spinning it into yarn by hand. This yarn was used for making ropes and twines for domestic agricultural and navigation purpose. This was followed by the process of interlacing of the yarn into strips of narrow fabrics by means of primitive hand looms. These were used by farmers for various household purposes including bedding, matting or even garments. Sometimes they tiered several strips together to make containers or wrappers for agricultural products. It was for discovery of making bags out of the jute fabrics which brought about a turning point in the history of the fibre and when it responded to the mechanical processes of spinning and weaving, it assumed a leading position as a textile of supreme importance in the commercial world [6]. The hand-woven jute bags of Bangladesh has already earned a reputation in the Asian and American markets, and when the flax spinners of Dundee took to jute during the early thirties of the 19th century, they were also first interested in the manufacture of bags for packaging purpose from a much finer fabric called “Hessian” which became very popular in the markets of America and Europe. By the time the first jute mill was established in India. India made the Dundee industry explore the possibilities of new uses of jute. The progress in this direction was at first slow but as research activities advanced in the fields of production and technology, a large variety of profitable new uses were discovered. Being coarse and rough jute is not suitable for apparel purposes, but its use as packing and in industrial field is predominant. Its largest usage is for packaging purposes. Jute is used for manufacturing other industrial products such as wind screens, roofing fabrics, cordage, electric cables etc. It is also an important raw material used for preparation of tents, rifle pull-through, sand bags, netting and stip, water-bag etc. The jute fabric is further used as a base for linoleum and furniture and for failer’s padding 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 [7].

Modern use of jute

In recent years the use of synthetic fibre products, because of their preferential price over jute goods, dominated global market. This dominance of synthetic goods has adverse effects on jute market and resulted in lower price 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. Jute-plastic blended boat has already been commissioned in Bangladesh with the assistance of two Norwegian naval architects. The cost of 28 feet long jute plastic boat is taka 200000. Export market of jute plastic boat has tremendous prospects to Norway and Sweden [4]. It is very encouraging that a wide

range of diversified jute products can be manufactured with multi-fibre concept through vertical and horizontal extension for divergent end uses. 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. Like paper, plastic, substitutes, medicare textiles, cellulose, floor tiles, panels, dyed yarn, polished yarn, multiplied yarn, shikha, shoe, tape, lakhe, union fabric, printed fabric, scrim cloth, drill, dress materials, pillow cover, carry bags, laundry bags, vanity bags, toys etc are also produced using jute fibre [2]. Bangladeshi scientists have successfully produced Novocel wool from jute. The Novocel wool blanket is now popular among the buyers in the home market. Polythene made nursery pot has proved to be harmful. At the time of plantation of the sapling polythene nursery bags needed to be removed as it is not bio-degradable. But jute nursery pot is bio-degradable and need not be removed. Bangladesh is trying to increase the non-traditional use of jute.

Major Producers

India, Bangladesh, China, Myanmar, Nepal and Thailand are at present the major producers of Jute, Kenaf and Roselle fibres. India, Bangladesh and China are the large producers.

Climate

Jute cultivation requires specific climate and land. It requires early rains in March, May and June and intermittent rain and sunlight thereafter till August, temperature between 28°C and 35°C and humidity between 70% and 90%. This type of climate is available in areas between 30° Latitude North and South of the earth. Kenaf and Roselle grow almost throughout the world both in tropical and temperate areas.

Soil

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 produces coarse fibre.

High Yielding Varieties

A large number of high yielding varieties of Jute and Allied Fibres (JAF) have been evolved at the different research centres of the jute producing countries. The names of these varieties are given below against the names of these countries.

Growing Regions

Jute and Allied Fibres (JAF) are produced in many countries. India, Bangladesh, China, Thailand, Myanmar & Nepal are the major producing countries. Together they produce about 95% of the global production of JAF. India and Bangladesh produce mostly jute; China produces mostly kenaf while Thailand produces kenaf and roselle.

In Nepal, Jute is grown in about 11000 ha in Tarai belt of Eastern part of Nepal. In Thailand JAF are cultivated in about 20,000 ha. In India Jute and Kenaf are grown in about 1,000,000 hectares. Most of the production comes from the States of West Bengal, Bihar, Assam, Orissa, Andhra Pradesh & Tripura. Bangladesh grows mainly jute, only about 10%

kenaf and roselle in 500,000 hectares. China grows mainly kenaf and only about 10% jute in about 56,000 hectares. In Indonesia JAF are grown in 10,000-20,000 hectares. Among jute growing areas in Bangladesh the quality fibre produced in Faridpur Talma region.



Figure 1. Observation of regional yield trial for advanced line (*C. olitorius*) at Talma area, Faridpur, Bangladesh.

Table 1. Area and yield of jute and allied fibre production in major producing countries.

Country	Area (2002/2003) ('000ha)	Yield (1998 / 99-2002/03) (mt/ha)
Bangladesh	500	1.79
China	56	2.53
India	1000	1.86
Myanmar	58	0.85
Nepal	11	1.13
Thailand	19	1.54

Bangladesh: *C. olitorius*: O-4, O-9897 & OM-1; *C. capsularis*: D-154, CVL- 1, CVE-3, CC-45 & BJC-7370; *H. cannabinus*: HC-2 and HC-95 and *H. sabdariffa*: HS-24.

China: *C. olitorius*: Kuan Ye 075-22; *C. capsularis*: Ye Yuan No. 5; *H. cannabinus*: gingpi No. 3 and 722, 7804.

India: *C. olitorius*: JRO-878, JRO-632, JRO-7835, JRO-524, JRO-66, JRO-8432, and JRO-128; *C. capsularis*: JRC-7447, JRC-321, JRC-212, JRC-698 and JRC-"Hybrid C"; *H. cannabinus*: HC-583 and AMC-108 and *H. sabdariffa*: HS-4288, HS-7910, AMV-1, AMV-2, AMV-3 and AMV-4.

Indonesia: *C. capsularis*: CC-15 and CC-22; *H. cannabinus*: H- 33, HC-48, HC-G4 and HC-GR5 and *H. sabdariffa*: HS-40.

Thailand: *C. olitorius*: NS-1; *C. capsularis*: JRC-212; *H. cannabinus*: 977-044, Big Green and NS-2. Present situation of jute in Bangladesh

Year wise area and production of jute

Recently, jute is facing a stiff competition at the farm level also. This is due to the fact that jute land is equally suited for growing rice, and rice is commanding a record high price in the home market. Moreover, the production of high yielding varieties along with modern inputs and practices has further increased the possibilities of increasing profitability of rice over jute. The farmers are quickly adjusting their production plans accordingly and taking the advantage of the high price of rice. The price of jute was not very attractive compared to other competitive crops.

Table 2. Total area and production of jute in Bangladesh.

Years	Area (000 acres)	Decade average (000 acres)	Production (000 tones)	Decade average (000 tones)
70s Decade 1972-73	2214.70		1181.00	
1973-74	2196.40		1088.00	
1974-75	1416.55		630.00	
1975-76	1277.34		714.00	
1976-77	1603.45		873.00	
1977-78	1805.27		973.00	
1978-79	2051.58		1150.00	
1979-80	1874.31		1065.00	
1980-81	1568.77	1778.71	897.00	952.33
80s Decade 1981-82	1411.85		842.00	
1982-83	1425.44		886.00	
1983-84	1435.12		946.00	
1984-85	1484.20		928.00	
1985-86	2614.00		1571.00	
1986-87	1908.00		1221.00	
1987-88	1244.88		780.80	
1988-89	1269.58		799.40	
1989-90	1338.49		835.00	
1990-91	1461.50	1559.31	914.10	972.33
90s Decade 1991-92	1449.39		945.10	
1992-93	1235.49		885.60	
1993-94	1287.61		782.30	
1994-95	1402.47		929.50	
1995-96	1355.55		910.35	
1996-97	1253.00		883.00	
1997-98	1427.00		1057.00	
1998-99	1181.00		821.00	
1999-00	1008.00		711.00	
2000-01	1107.00	1270.65	821.00	874.59
2000s Decade 2001-02	1128.00		859.00	
2002-03	1079.00		800.00	
2003-04	1008.00		794.00	
2004-05	965.00		1035.00	
2005-06	500.00		990.00	
2006-07	500.00	863.33	990.00	911.33

Source: [8-12]

Year wise area and production of jute

Recently, Jute is facing a hard competition. Jute sector is crossing a miserable situation in the economy of Bangladesh. This is due to the fact that jute land is equally suited for growing rice, and rice is commanding a record high price in the local market. Moreover, the different hybrid varieties of rice have further increased the possibilities of increasing cultivation of rice over jute. The farmers are quickly adjusting their production plans accordingly and taking the advantage of the high price of rice. The price of jute was never stable. That is why farmers like to produce other crops rather than jute. As a result the area of production of jute was decreased over the year. The area and production situations of jute in Bangladesh were between 1972-73 and 2006-2007. There have been considerable variations in jute areas and production over the years. However there is a clear downward trend (Table 2). The area of jute production reduced to 965 thousand acres in 2004-05 from 2214.70 thousand acres in 1972-73. Table 3 also shows that the production of jute reduced to 1035 thousand tones in 2004-05 from 1181 thousand tones in 1972-73. The production of jute were 794 thousand tones and 800 thousand tones in 2003-04

and 2002-03 respectively while the areas of jute production were 1008 thousand acres and 1079 thousand acres in 2003-04 and 2002-03, respectively. The total jute acreage in 1972-73 was 2214.70 thousand acre and the production was 1181.00 thousand tones. It was 1908.00 thousand acres in 1986-87 and the area gone down to 500.00 thousand acres in 2006-07 from where producing 1221.00 and 990.00 thousand tones of jute fibre, respectively (Table 2). The jute production area decreased gradually during the decades from 70s to 2000s. It was observed the average cultivation areas (1778.71 thousand acres) in 70s. In contrast it was decreased up to 863.33 thousand acres in 2000s decade. On the other hand, the average production was found 952.33 thousand tons in 70s decade was increased up to 972.33 thousand tons in 80s, however, it was decreased 874.59 thousand tons in 90s and 911.33 thousand tons in 2000s (Table 2). It might be happened for day by day getting pressure of food crop production, change of jute cultivation zones, cultivation ratio of tossa and white jute etc [13].

Economic Performance of Jute

Jute (*Corchorus* spp.) is one of the most important biodegradable natural fibre and cash crop of Bangladesh.

Next to rice, jute has historically been an important crop playing a very vital role in economy of the country. In 2010-2011, about 1523.59 thousands metric of raw jute have been produced from 708.72 thousand hectares of land in Bangladesh. Currently, raw jute and jute goods occupy second position in foreign earnings of the country. In 2009-2010, about 1087 thousands metric of raw jute and jute goods have been exported from about 53961.28 million taka in Bangladesh [14]. About 5.08% of the foreign exchange is earned in Bangladesh during 2011-12 by exporting raw jute and jute materials [15]. Millions of people earn their livelihood from agricultural and industrial activities based on jute and allied fibres. Moreover, beyond the farmland and factory, jute and jute goods keep alive transport sector, servicing sectors like banks, insurance, and agro-industrial job market. Jute crop also greatly improve the soil fertility status by incorporating organic matter to the soil through

decomposition of shaded leaves and plant residues and helps in breaking plough-pans by its long tap root system. Again, jute and jute goods have recognized as being friendly to the environment [16]. Though cultivation of jute in the country has drastically reduced from earlier but for the last 3-4 years, the situation has conspicuously improved and recorded an increasing trend. Higher yield is not the main determinant for the success and variability of any crop production. The profitability is an important consideration in any crop production which dictates and influences the decision making process of the entrepreneurs in favour of accepting or rejecting a particular farming practices [17]. Studies on some aspects of cultural practices and economics of jute production have been made [18], but limited information is available concerning the labour utilization, input use pattern, profitability and socio-economic constraints of jute production under different cultural practices and areas.

Table 3. Annual average price, total area, production and yield of jute in Bangladesh.

Year	Total area ('000'ha)	Total production (lac bales)	Yield (kg/ha ⁻¹)	Average price (Tk.kg ⁻¹)
2007-08	441	46.22	1900	16.76
2008-09	421	46.78	2020	24.50
2009-10	416	50.89	2220	20.84
2010-11	709	83.96	2150	55.40
Last ten years average	449	49.42	1990	17.97

Source: Price data from Directorate of Agriculture Marketing (DAM); Area, Production and Yield Data from various issues of Yearbook of Agricultural Statistics

Foreign exchange earning

Economic development of Bangladesh is largely dependent on the availability of foreign exchange. Bangladesh has to develop her industrial and agricultural sectors very rapidly. For this reason she needs to import goods from foreign countries. The quantum of foreign exchange she can have from the export of the traditional items such as jute, tea, leather etc. is not at all sufficient and Bangladesh has to depend on foreign grants and loan.

Therefore, foreign exchange is a very scarce resource and the contribution of jute in earning this scarce foreign exchange has been traditionally very vital and this trend is not likely to change in future. Unfortunately, jute is facing problems in the international markets. In the world market, Bangladeshi jute has to compete with Indian jute on the one hand, and on the other hand, the importing countries reducing the import of jute goods (Table 3). The use of the synthetic fibre in the importing countries has also increased tremendously.

Table 4. Foreign exchange earnings from jute and jute goods (Taka in crore).

Year	Jute goods	Raw jute and mesta	Total earning from jute and jute goods	Total foreign exchange earning	Percentage of the total foreign exchange earning
1998-99	1168	270	1438	20851	6.90
1999-00	1131	370	1501	24923	6.02
2000-01	1274	402	1676	32419	5.17
2001-02	1398	379	1777	30934	5.74
2002-03	1272	401	1673	33242	5.03
2003-04	1271	454	1725	40581	4.25
2004-05	1677	564	2241	50835	4.41
2005-06	2159	860	3019	62608	4.82

Source: Economic Trend,[19]

Table 4 shows that the country's yearly total export earnings from jute and jute goods was 3019 crore taka in 2005-06 of which 860 crore taka was obtained from raw jute and 2159 crore taka from jute goods. The percentage of total export earnings from jute and jute goods was 4.82 in 2005-2006 while 4.41 percent, 4.25 percent were in 2004-2005, and 2003-2004, respectively. It appears that the total export earnings from jute and jute goods had increased since 1998-99, but its share of total foreign exchange earnings is falling.

Jute as a source of fibrous raw material

Bangladesh chemical industries corporation (BCIC) is the major user of fibrous raw materials in the country in the form of bamboo, wood baggage for production of pulp and paper in Karnaphuli Paper Mill (KPM), North Bengal Paper mill (NBPM), Khulna Newsprint Mill (KNM) and Sylhet Pulp and Paper Mill (SPPM). These industrial units need around 1.44 lakhs tonnes gewa wood annually. Due to pressure of the growing population there has been a steady decline in the

forest resources. BCIC is facing acute shortage of these fibrous raw materials in order to ensure sustained production in this mill with sharp decrease in the availability of traditional/conventional fibrous raw materials (Bamboo/wood etc.) and the tremendous increase in the requirement of packing materials for the export oriented industries. BCIC was seriously thinking about the economics of alternative raw materials. It may be recalled that the utility of jute containing cellulose material has been confirmed at different laboratories at home and abroad. But this laboratory finding has been put to industrial use at a commercial scale [7].

Consumption of jute in Bangladesh

Jute is the cheapest and the most widely used fibre in the world. Nearly 20 percent of the world's annual output of natural industrial fibres consists of jute. The demand for jute is a derived demand as an input to the jute manufacturing industry. Jute is used for the production of Hessian, sack, carpet backing, yarn, gunny bags, fabrics etc. It is also used for rope making and handicrafts. Jute is second only to cotton in terms of production, consumption and quantity traded of natural fibers.

Table 5. Consumption of jute and jute goods.

Year	Raw jute consumption (lakh bales)	Jute goods		Internal consumption of jute goods ('000'tonnes)	Export overseas ('000'tonnes)
		Production ('000'tonnes)	Closing stock ('000'tonnes)		
1995-96	23.23	405.1	23.7	65.9	325.1
1996-97	23.39	410.5	37.3	76.4	293.4
1997-98	22.83	381.1	116.7	91.7	230.7
1998-99	21.13	365.3	93.3	79.5	303.0
1999-00	19.38	336.2	76.3	74.9	276.4
2000-01	18.92	325.6	54.8	75.7	265.9
2001-02	15.64	319.4	40.4	43.7	230.6

Source: Economic Trend, [19]

Table 5 shows that raw jute consumption reduced to 15.64 lakh bales in 2001-02 from 23.23 lakh bales in 1995-96. Table 5 also shows that inter consumption of jute goods reduced to 43.7 thousand tonnes in 2001-02 from 65.9 thousand tonnes in 1995-96. Jute is equally important both as agricultural product and industrial raw material in the economy. In spite of great importance of jute as a commercial crop, research studies on jute marketing in Bangladesh remains scanty.

Physical compositions of different Jute & Allied Fibre (JAF) plants

The ribbons, fibres, leaves and stick contents of different JAF plants vary considerably. The fibre content of *C. olitorius* jute plant is the highest and that of *H. sabdariffa* is the lowest. The green leaf content of *H. sabdariffa* plant is the highest. The dry ribbon contents of both *C. capsularis* and *C. olitorius* plants are higher than those of *H. cannabinus*.

Table 6. Physical compositions of different Jute & Allied Fibre.

Crop	Whole (100%)	Ribbons %		Leaf %		Sticks %		Fibres %
	Plant (t/ha)	Green	Dry	Green	Dry	Green	Dry	Dry
<i>C. olitorius</i>	46	38.7	11.7	11.0	2.7	50.3	16.6	6.8
<i>C. capsularis</i>	34	40.2	11.2	15.9	3.9	44.2	12.5	5.9
<i>H. sabdariffa</i>	48	35.2	9.6	16.3	3.6	48.5	15.0	4.8
<i>H. cannabinus</i>	36	34.0	9.5	14.2	3.3	57.8	15.9	4.9
Approx. Avg.	40	37.0	10.3	14.2	3.3	48.8	15.15	5.5

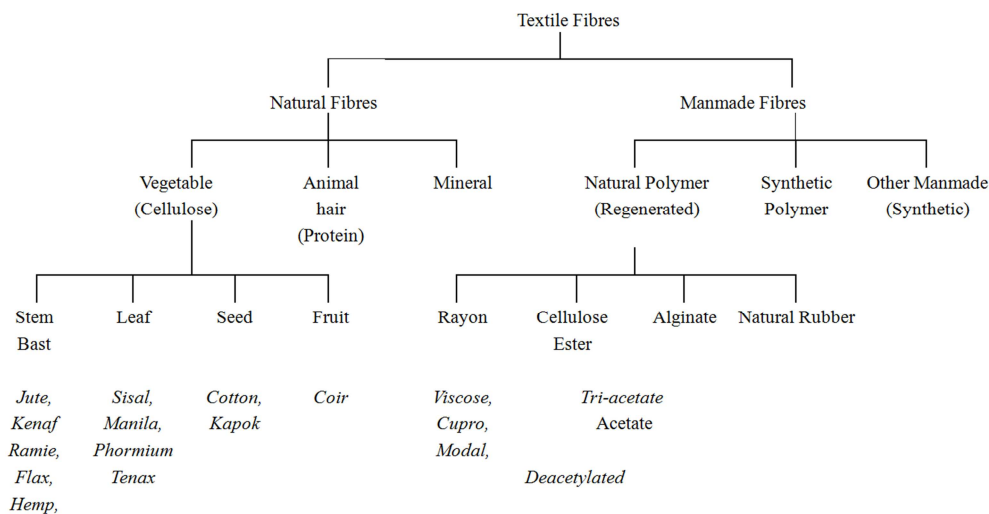


Figure 2. Jute in Textiles.

Table 7. Estimated Supplies, domestic requirements, exports and imports in Major Producing Countries (in '000 Tonnes).

	Bangladesh 2004-2005	Bangladesh 2003-2004	Bangladesh 2002-2003	Bangladesh 2001-2002
Opening Stock	58.3	1.8	262.5	166.14
Production	810	963	793.4	924.66
Imports	0	0	0	0
Total Supply	868.3	964.8	1055.9	1090.8
Mill Consumption	522	522	555.7	520.38
Village Consumption	39.7	54	45	54
Loss/Damage	0	0	0	0
Closing Stocks	0	64.8	1.8	262.47
Total Domestic Requirements	561.7	640.8	602.5	836.85
Exports	306.6	324	453.4	253.95

Table 8. Estimated Supplies, domestic requirements, exports and imports in Major Producing Countries (in '000 Tonnes).

	India 2004-2005	India 2003-2004	India 2002-2003	India 2001-2002
Opening Stock	605.5	617.8	258.1	76.5
Production	1350	1977.3	2060.6	1949.76
Imports	91.4	97.6	151.9	62.64
Total Supply	2046.9	2692.7	2470.6	2088.9
Mill Consumption	1330	1568.2	1681.9	1656.72
Village Consumption	144	171	171	144
Loss/Damage	0	0	0	0
Closing Stocks	272.3	953.5	617.8	288.18
Total Domestic Requirements	1746.3	2692.7	2470.7	2088.9
Exports	0	0	0	0

Research Achievements of jute and allied in Bangladesh

Systematic operations with continuous endeavor are Research. The objectives and directions of research are changed with changes of different requirements. The achievements establish as beneficial only when those are appropriately transferred or disseminate to and practiced by the target people. A brief description of the achievements of BJRI which have either been already adopted or have proved potential for adoption may be of interest to all concerned. The achievements of BJRI are being stated under two

different subheadings i.e. Agricultural and Technological Researches on Jute and allied crops considering the distinct difference in the nature and usefulness of researches.

*Agricultural Researches on Jute**Development of improved varieties*

It has always been regarded as the most important and continuous function is high yielding or high performed variety developed and released 36 jute and allied crop varieties to suit different agro-ecological zones of the country since inception.

Table 9. HYVs developed and released and are under cultivation at present.

Spices	Varieties
<i>Corchorus capsularis</i> L.(Deshi jute)	D-154, CVL-1, CVE-3, CC-45, BJC-83, BJC-7370 & BJC-2142
<i>Corchorus olitorius</i> L.(Tossa jute)	O-4, O-9897, OM-1, O-72 & O-795
<i>Hibiscus cannabinus</i> (Kenaf)	HC-2 & HC-95
<i>Hibiscus sabdariffa</i> (Mesta)	HS-24

Source: [13]

Improved cultural practices

It has developed and extended a production technology package in respect to appropriate sowing time, land preparation, seeding rate, intercropping management, harvest time etc which have been proven potential to yield and quality of jute and allied fibre at farm level. Moreover, through manipulation of management practices cost effective technologies have been evolved to reduce the production cost. The present status of jute and jute seed can be overcome in two ways. One way is increasing the production of jute fibre per unit area through minimizing the cost, and the 2nd is

demand of good quality jute seed at sowing time. Involving jute, appropriate profitable three crop patterns in different areas and land types of the country have been identified and always tested with the newly developed and released jute varieties at different agro ecological areas. At present the jute growers may go for fibre cultivation without hampering major food crops as a means to increase net annual profit. Short day and low temperature tolerant jute varieties having shorter field life, may be now regarded as complementary crop in any existing three crop pattern and as well developed soil fertility [13].



Figure 3. Field visit (A&B) and intercultural operations (C&D).

Fertilizer Management

BJRI developed variety wise fertilizer recommendation. For all white and tossa jute varieties about 100-25-45-45-11 kg/ha Urea-TSP-MP-Gypsum-Zinc sulphate are recommended for fibre production in major jute growing areas. Only for Falguni tossa (O-9897) variety 200 kg/ha Urea recommended. Addition of organic matter to soil is

beneficial for all kinds of jute fibre and stick production. Gypsum and Zinc sulphate is needed only when soil is deficient in sulphur and Zinc. For jute seed production the recommended doses are 80-40-16-40-4 of Urea+ TSP, MP, Gypsum and Zinc sulphate for tossa jute and 70-20-12-18-4 for deshi jute [13].



Figure 4. Fertilizer management before sowing.

Management of Pest and Disease

Ten faugal, one viral and one nematode infected disease for jute (White and Tossa) and 18 different diseases for kenaf and mesta have identified which also causes by different fungus, virus and nematode. Among the diseases 10 for jute, 5 for kenaf and 3 for mesta were isolated as send born. There evolved jute and allied crop varieties have different resistant reactions against different disease. Jute seed dressing materials vilavax-200 (0.4%) and garlic paste foliar sprays of Dithane M-45 (20%) and Manner M45 (2.0%) have recommended. Infestation of root-knot diseases can be reduced by amendment of soil with lime, poultry litter, and mustard cake etc. and *Crotolaria juncea* could be a trap crop against root-knot disease. Besides chemical control cultural, mechanical, physical and biological measures have also been recommended [13].



Figure 5. Inspection of jute field status.

Jute Retting

Fibre yield and quality always depends on proper retting. Different operations of this important post harvest agriculture technology of jute have been identified and transferred to the end users. Good retting water quality, hastening and improving



Figure 7. Supervision for quality jute seed production.

Industrial Achievements of research in Bangladesh Development of existing Apron Draft Spinning Machine

retting by incorporation of Urea, washing fibre by tamarind solution (Urea acid solution) are some of the important techniques relating to conventional retting. In water scarce areas ribbon-retting technology is really a remarkable one to solve the problem of jute plant retting. It is now possible to get good quality fibre by retting the pecked barks (ribbons) in very shallow ditches or even in big earthen pots.



Figure 6. Demonstration of ribbon-retting technology.

Seed production from separated sub crop

Quality seed is a prerequisite to successful crop production. Conventionally jute seed production involving sowing in the monsoon has not proved dependable to meet the national seed demand for natural calamitous like flood, pest and diseases and occupation of land for a long duration. It has developed improved jute seed production technology in Bangladesh, in which seed sown at Rabi season as separate crop. Through these techniques seed can be produced by direct seeding, transplantation of top and stem cutting; and seedling of 30-40 days of age. These would ensure good quality and higher yield of jute seed within a very short period (about 3-4 months) during dry season. Proper use of these jute seed production technology could stopped the entrance of huge amount of bad quality low-grade jute seed in the country [13].

The existing Apron Draft Spinning Machine has been developed by adapting ring and Traveler at its delivery end.

Fine jute yarn between 60-150 tex can be spun through the developed system with higher productivity and acceptable textile properties. The conventional Apron Draft Spinning machine cannot produce yarn below 150 tex. The different machine components were changed for this modification. The optimization of different parameters are varies with variation of linear density of produced yarn. In this system optimization were done for 100 tex jute yarn. By using this information the Jute Mills of Bangladesh can be able to produce fine count jute yarn. The produced yarn will be used in decorative and fine fabrics.

Fine Jute Yarn

The method for the production of fine jute yarn (3-5 lb/spy) was developed in this division. In this method fine jute yarn can be produced by modification of existing apron draft spinning frame. The machine was converted in ring spinning system from original flyer spinning system. Speed of the machine was increased upto 8000 rpm which increase the productivity of the machine.

Technique for the production of blended yarn

With the blending method, jute fibre was blended with three different man-made fibers, acrylic, rayon & polyester of different dimensions, each in the ratio of 90/10, 80/20 and 70/30. Then yarns of nominal counts 5 and 7.5 lbs/spy have been processed out of the above blends. Physico-mechanical properties, quality and spinning performance of the yarns have been studied. Simultaneously, dyeability and colour-fastness properties of the blended fibers, chemically processed and dyed were also studied. Finally, a range of diversified jute blended products out of the above gray, bleached and dyed blended yarns were produced. It has been possible to blend jute successfully with the man-made fibers, like acrylic, polyester and rayon in the conventional jute (long staple) spinning system.

Light Weight Low Cost Shopping Bag

The fabrics were woven with rapier loom and then scoured, bleached, dyed in jigger machine and dried through stenter machine for manufacturing of light and low cost shopping bags. These bags are used as a substitute of polyethylene bags. It is environment friendly, bio-degradable, free from hydrocarbon and health hazards. The weights of the bags are 50-100gms according to the shape and size. 10 to 15 kgs goods are easily carriable with these bags. It can be used several times through washing. Maximum cost per bags Tk. 5-10/= according to size and shape.

Jute Blanket

The blanket produced from jute have high strength, high abrasion resistance, high thermal insulation value (represented by conductivity) i.e. very warm. These blankets are not affected by moths and are cheaper than any other blanket made from cotton, wool or synthetic fibre. The blanket is washable, colour is fast to washing and free from health hazard.

Novotex Fabrics

The fabrics are woven using finer jute yarn as weft and cotton yarn as warp, are then chemically modified by hot wollenisation process, bleached and dyed in order to make

them soft, lustrous and light weight. Novotex fabrics are strong, durable, both light and colour fast, attractive and cheaper than any other fabrics made from other fibres. These are free from health hazard and naturally decomposable.

Wool substitute softening Yarn

Jute yarn is converted to have wool like appearance and feel by chemical modification, dyeing and finishing. It may be used for making sweater, cardigan, scarf, socks, etc. It is free from health hazard and also free from hydro-carbon. It is very warm comparable to wool but much cheaper than wool and synthetic fibres like acrylic, polyester etc.

Fire Proof Jute Fibre /Fabrics

Jute fabrics are made fire-proofed by treating them in a composite solution and mixed with some phosphate compounds, fulfils the requirement of flame-proof fabrics according to international standard. These fabrics are suitable for all specialized uses wherever fire proofing or insulation is desirable. The fire proof jute fibre may be used in Automobile industries for making interior parts of car/vehicles, mattresses, insulating materials etc.

Jute-Geo Textiles

Jute-geo textiles are flexible, foldable, less biodegradable and water resistant in nature, particularly suitable for reinforcement, flood affected climate condition. These may be used as geotechnical engineering products like fibre drain, separator, filter and reinforcing materials.

Improvement of Low Quality Jute

Low quality jute like SMR and jute cuttings may be improved by enhancing the growth of micro organism in the fibre or by the application of microbial enzymes. The technology provides opportunity for improving and using low grade jute for manufacturing different products while reducing the cost of raw materials.

Absorbent Cotton Substitute

Ideal absorbent cotton substitute can be produced from jute/jute wastes by scouring hot mercerizing, bleaching, activating and then blending with cotton/rayon. The absorbent cotton substitute can be used for making body napkin and sanitary napkin.

Prayer Mat

The jute prayer mat is comfortable, durable and attractive. The production cost is within the reach of general public. It will meet the local demand of the people with cheap and quality prayer mat. Moreover, the quality of the product is good as that of the imported products made of wool or synthetics.

Rot Proof Hessian Fabric

Jute Hessian can be made rot proof by chemical modification. Rot proofing agents containing copper gives the best rot proof finish. There are many diversified uses of rot proofing fabrics, such as, hessian squares, burlap, different types of tents (military tents, wedding tents etc.) nursery pot, sand bag, timbers, fishing nets and also in the cold countries to protect the trees from fog and snow. Nursery pot is one of the basic requirements for plantation. Presently, polythene bags are being used as nursery pot but it is not environment friendly. Rot proof jute based nursery pots

on the other hand are environment friendly, excess water can pass through the pots, so roots are not destroyed due to excess water in the soil. None of the chemicals used in treatment are health hazardous or has negative impact on the environment. In order to reduce the extent of pollution problem efforts have been made throughout the world to use rot-proofing Hessian for making nursery pot for seedling to solve global environment problem.

4. Conclusion

Jute price, target acreage, yield and production before sowing would be helpful to the farmers in allowing them to adjust their jute acreage. Jute production problems might be removed by ensuring supply of inputs, insecticides and pesticides and credit in proper time. 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. Government should provide training facility on grading, retting, practices of balanced use of fertilizer and assorting through DAE and BJRI. Preparation and implementation of proper jute policy was found necessary. Market information for the farmers should be provided by the government that the farmers could get the profitable price form jute. Diversified and new items from jute should be manufactured to cope with the present demand of the world market. 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.

Recommendations

Jute and the environment in Bangladesh are mutually supplementary to each other. However, there is no room for complacency because we are yet to fetch the real benefit from the match of jute and the environment in Bangladesh. On the basis of the findings of this study the following recommendations may be put forward for policy formulation with a view to improving the existing marketing system of raw jute. The jute agricultural research bodies could be given the additional function on training the jute farmers on the best methods of cultivation, harvesting and retting. Forecasting of jute price, target acreage, yield and production before sowing will be helpful to the farmers in allowing them to adjust their jute acreage. Proper jute policy should be prepared and implemented. Supply of good seeds for the farmers, timely supply of fertilizer must be ensured. Modern scientific method of jute cultivation should be implemented. Production cost of jute should be reduced into a minimum level so that we can compete with India in oversea market.

Honest and dedicated persons should be appointed at the jute factory. Labour politics should be controlled. Diversified and new items from jute should be manufactured to cope with the present demand of the world market.

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Biography



Md. Mahbul Islam (Corresponding Author) awarded PhD in 2008 from the Department of Agronomy of Bangladesh Agricultural University especially on Jute seed quality, plant establishment and yield. He had done his M.Sc. (Agriculture) in Agronomy and B.Sc. Agriculture (Hons.) from the same University. He is working at Bangladesh Jute Research Institute (BJRI) since 1989. At present he is serving as Chief Scientific Officer & Head of Agronomy Division. He has 6 books, 67 scientific papers and more than 70 popular articles published in international and national journals, newsletters etc. He visited United Kingdom, Malaysia, India for training, seminar, workshop purpose.