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# QUALITY ASSESSMENT OF TOSSA JUTE OF BANGLADESH IN RELATION TO FIBRE FINENESS

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**ABSTRACT**

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The study performed on the basis of instrumental determination of fibre finesse of tossa jute grown in different areas of Bangladesh to draw a comparative pen picture along with its growing area for benefit of those persons related to jute. The major jute growing area Faridpur, Shariatpur, Khunna, Jessore, Rangpur, Naugaon, Keshorgong, Jamalpur and Chandpur of Bangladesh; were selected as the field of sample Collection. The samples were examined in the laboratory of Textile Physical Division under Bangladesh Jute Research Institute during the year 2003-2009 for the instrumental determination of fibre fineness. The average fineness of tossa jute fibre was found ranging from 36.25 to 45.00µ. Making an allowance for all the individual results established from this study it could be concluded that the jute fibre grown in Faridpur area is finer than that of others. But considering all the five results obtained of each area, it was established that samples of shariatpur area appeared to be better amongst the enter samples under test.

***Key words:*** *jute, fibre, fineness, assessment and quality*

## INTRODUCTION

Jute is the cheapest cellulosic natural fibre next to cotton. The golden fibre, jute, has a great socio economic importance in Bangladesh as it gives subsistence to the national economy as well as to the farmers attached to it in various contexts. After cotton jute is the most important natural fibre based on the criteria-availability, production, global consumption and usages. As jute fibre is biodegradable, the diverse use is increasing remarkably in the world market. The jute fibre is used in (i) Traditional (ii) Home textile (iii) Geo-textile (iv) Agro-textile (v) Medicare textile (vi) Industrial textile where Physical properties play a vital role. The functional properties of jute fibre, strength and finesse have a bigger part in manufacturing system.

In a fibre, the ratio or relationship of length to width or cross- sectional area is expressed as its fineness. Fibre fineness is one of the main criteria of jute fibre to produce fine and regular yarns. Only fine fibre can produce fine yarns (Kar 1954).

Two main variety *Corcorus olitorius* and *Corcorus capsularis* grow abundantly in Bangladesh. Raw jute is graded into six different grades at the time of marketing. Strength and lustre are given more importance for the assessment fibre quality. Another important parameter, which must be well considered in the grading of jute, is its diameter (Saha *et al.* 1997). But still now in conventional jute grading system fineness is not given due importance. The subjective judgment of jute fibre is still in serious errors, largely because the importance of fibre fineness is not receiving proper attention. The finest and strongest fibre constitutes good quality jute fibre (Hannan *et al.* 1993).

Yarn quality mostly depends on fibre fineness and length. In the determination of the merit of a material for spinning the fibre length is often taken as the criterion whereas for many purposes the fineness of the fibre is of equal or sometimes of greater importance (Booth 1968). The quality ratio of yarn is very much dependent on the fineness and indicative of better quality fibre (Mia *et al.* 2007). Yarns of certain qualities are expected from certain fibre grade, although jute is not always what it is supposed to be. The fineness of a fibre is recognised in all branches of the textile industry as one of the major physical properties determining the degree of levelness of a yarn. The yarn winding breakage rate is determined, almost entirely, the geometry of the fibres composing it, i.e. their staple length and diameter.

For yarn quality prediction, deviation in fibre fineness is two or three times more important than deviation in bursting energy (Mather 1967).

Much research reported in journals has demonstrated the effect of fibre dimensions on processing and on ultimate fabric and garments properties. As a consequence of this, the price of fibres, particularly in the natural fibres, is highly correlated with one or more of their dimensional properties (Anderson 1977). If fibre finesse is known, the yarn manufacturer can easily design proper batch composition as he/she need and then production of yarn of definite quality with effective cost will be easier.

The weather of Bangladesh consists of six seasons. The soil, climate and weather are favourable for the cultivation of jute. Qualities of jute fibre depend on natural climates. So, jute produced in different areas of Bangladesh need to examine its physical properties.

This study was performed to determine the fibre fineness of jute grown in different selected area of Bangladesh to compare with each other and to identify whether there are any significant differences. For determining fibre fineness, airflow method was chosen, as the method is the single most widely used commercial method and has achieved international standardisation for wool, Cotton and jute. The samples were collected from the district of Faridpur, Shariatpur, Khulna, Jesore, Rangpur, Naogaon, Jamalpur, Kishorgonj and chandpur. The results obtained ranging from 36.25 to 45.00µ.

This comparative study on fineness of tossa jute fibre would be helpful to the manufacturer to produce yarn and the whole jute sector would be benefited there by.

## MATERIALS AND METHODS

Jute fibre of *Corcorus olitorus* variety of different quality was collected from major jute growing areas Faridpur, Shariatpur, Khulna , Jesore, Rangpur, Naogaon, Jamalpur, Kishorgonj and chandpur respectively. The samples were examined following British Jute Trade Research Association (BJTRA) mettod using Airflow fineness tester to determine the fibre fineness. The Airflow method is widely used in bulk determination of fineness (Sinkle 1949). The samples were prepared suitably and the test was performed.

### *Fineness Test*

A both end open cylindrical cell of 6 inches long and approximately 3.3 cm internal diameter was used first. The crop end of a bundle of sample was introduced into it, as it remain 18 inches distance from the cut end. The two ends of the elongated fibres were then cut by a special type of cutter attached with the machine. After cutting the bundle of this section was made up on a balance to weight as 54.2g. Each bundle was tied at one end by a loop of strong yarn, which was sufficiently long to be threaded through the 3 inches long cell. The bundle was drawn into the cell leaving 1.5 inches of jute elongated from each end to be cut off by the same cutter. This cut reduced the sample to 3 inches long. Then the 3 inches long cell filled with jute fibre, which was called the test specimen, was inserted into the cell holder of the Air Flow Meter. A pump was then switched on to draw air through the wad of fibre in the cell. The flow meter floats then indicate the average diameter of the fibre subjected to that the weight of the sample specimen remains as 27.1g. If the of the sample specimen become lower than 27.1g then the difference will be subtracted and if the weight become more than 27.1g then the difference will be added with the flow meter float reading to get the fineness of the sample. Thus specimen was prepared and inserted into the sample holder of the machine and the reading was taken.

## RESULTS AND DISCUSSION

Table 1. An analytical view of fibre fineness grown in Faridpur district

| ID. No. | Place | Range | Min. | Max. | Mean | S.E. | SD. Div. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0001 | Kanaipur | 1.00 | 39.00 | 40.00 | 39.50 | 0.50 | 0.707 | 1.790 |
| 0002 | Modhukhali | 0.10 | 40.00 | 40.10 | 40.05 | 0.05 | 0.070 | 1.174 |
| 0003 | Talma | 0.50 | 36.00 | 36.50 | 36.25 | 0.25 | 0.353 | 0.974 |
| 0004 | Nakulhati | 0.50 | 37.70 | 38.20 | 37.95 | 0.25 | 0.353 | 0.930 |
| 0005 | Pukuria | 1.10 | 38.00 | 39.10 | 38.55 | 0.55 | 0.777 | 2.015 |

Table 2. An analytical view of fibre fineness grown in Shariatpur district

| ID.No. | Place | Range | Min. | Max. | Mean | S.E. | SD. Div. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0006 | Dogri | 1.00 | 37.50 | 38.50 | 38.00 | 0.50 | 0.707 | 1.860 |
| 0007 | Dogri | 1.50 | 37.00 | 38.50 | 37.75 | 0.75 | 1.060 | 2.808 |
| 0008 | ere | 0.50 | 38.50 | 39.00 | 38.75 | 0.25 | 0.353 | 0.910 |
| 0009 | Bhajeswere | 0.40 | 36.60 | 37.00 | 36.80 | 0.20 | 0.282 | 0.766 |
| 0010 | Bhajeswere | 0.60 | 37.00 | 37.60 | 37.30 | 0.30 | 0.424 | 1.136 |

Table 3. An analytical view of fibre fineness grown in Jamalpur district

| ID.No. | Place | Range | Min. | Max. | Mean | S.E. | SD. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0011 | Aramnagar | 2.50 | 37.00 | 39.50 | 38.25 | 1.25 | 1.767 | 4.619 |
| 0012 | Aramnagar | 1.40 | 38.00 | 39.40 | 38.70 | .70 | 0.989 | 2.555 |
| 0013 | Aramnagar | 0.20 | 39.10 | 39.30 | 39.20 | 0.10 | 0.141 | 0.359 |
| 0014 | Bawshi | 1.60 | 39.00 | 40.60 | 39.80 | 0.80 | 1.131 | 2.841 |
| 0015 | Bawshi | 0.50 | 36.50 | 37.00 | 36.75 | 0.25 | 0.353 | 0.960 |

Table 4. An analytical view of fibre fineness grown in Kishorgonj district

| ID.No. | Place | Range | Min. | Max. | Mean | S.E. | SD. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0016 | Karimgonj | 0.84 | 39.46 | 40.30 | 39.88 | 0.42 | 0.593 | 1.487 |
| 0017 | Karimgonj | 1.70 | 38.00 | 39.70 | 38.85 | 0.85 | 1.202 | 3.094 |
| 0018 | Karimgonj | 1.00 | 36.50 | 37.50 | 37.00 | 0.50 | 0.707 | 1.911 |
| 0019 | | 2.00 | 44.00 | 46.00 | 45.00 | 1.00 | 1.414 | 3.142 |
| 0020 | Katiadi | 1.00 | 44.50 | 45.50 | 45.00 | 0.50 | 0.707 | 1.571 |

Table 5. An analytical view of fibre fineness grown in Jessore district

| ID.No. | Place | Range | Min. | Max. | Mean | S.E. | SD. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0021 | Jhikorgacha | 3.40 | 37.20 | 40.60 | 38.90 | 1.70 | 2.404 | 6.180 |
| 0022 | Jhikorgacha | 0.90 | 38.10 | 39.00 | 38.55 | 0.45 | 0.636 | 1.650 |
| 0023 | Kashobpur | 1.30 | 39.50 | 40.80 | 40.15 | 0.65 | 0.919 | 2.289 |
| 0024 | Kashobpur | 00 | 38.50 | 38.50 | 38.50 | 00 | 00 | 00 |
| 0025 | Noapara | 1.30 | 40.20 | 41.50 | 40.85 | 0.65 | 0.919 | 2.250 |

Table 6. An analytical view of fibre fineness grown in Khulna district

| ID.No. | Place | Range | Min. | Max. | Mean | S.E. | Std.Div. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0026 | Dawlatpur | 0.40 | 39.20 | 39.60 | 39.40 | 0.20 | 0.282 | 0.716 |
| 0027 | Dawlatpur | 0.60 | 39.60 | 40.20 | 39.90 | 0.30 | 0.424 | 1.063 |
| 0028 | Dumuria | 1.20 | 38.80 | 40.00 | 39.40 | 0.60 | 0.848 | 2.152 |
| 0029 | Dumuria | 0.30 | 38.70 | 39.00 | 38.85 | 0.15 | 0.212 | 0.546 |
| 0030 | Chuknagar | 0.80 | 37.70 | 38.50 | 38.10 | 0.40 | 0.565 | 1.483 |

Table 7. An analytical view of fibre fineness grown in Naogaon district

| ID.No. | Place | Range | Min. | Max. | Mean | S.E. | SD. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0031 | Pajhorebhanga | 1.50 | 39.00 | 40.50 | 39.75 | 0.75 | 1.060 | 2.667 |
| 0032 | Pajhorebhanga | 0.50 | 40.00 | 40.50 | 40.25 | 0.25 | 0.353 | 0.877 |
| 0033 | Kirtipur | 0.40 | 36.80 | 37.20 | 37.00 | 0.20 | 0.282 | 0.762 |
| 0034 | Satihat | 0.80 | 39.50 | 40.30 | 39.90 | 0.40 | 0.565 | 1.416 |
| 0035 | | 0.50 | 37.50 | 38.00 | 37.75 | 0.25 | 0.353 | 0.935 |

Table 8. An analytical view of fibre fineness grown in Rangpur district

| ID.No. | Place | Range | Min. | Max. | Mean | S.E. | SD. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0036 | Bairuti | 0.20 | 37.80 | 38.00 | 37.90 | 0.10 | 0.141 | 0.372 |
| 0037 | Kawnia | 0.10 | 39.00 | 39.10 | 39.05 | 0.05 | 0.070 | 0.179 |
| 0038 | Jagihat | 0.50 | 40.00 | 40.50 | 40.25 | 0.25 | 0.353 | 0.877 |
| 0039 | Satibari | 1.90 | 39.10 | 41.00 | 40.05 | 0.95 | 1.343 | 3.353 |
| 0040 | Kamorpur | 0.40 | 39.60 | 40.00 | 39.80 | 0.20 | 0.282 | 0.708 |

Table 9. An analytical view of fibre fineness grown in Chandpur district

| ID.No. | Place | Range | Minimum | Maximum | Mean | S.E. | SD. | CV% |
|---|---|---|---|---|---|---|---|---|
| 0041 | Hazigonj | 1.00 | 40.60 | 41.60 | 41.10 | 0.50 | 0.707 | 1.720 |
| 0042 | Hazigonj | 1.00 | 41.60 | 42.60 | 42.10 | 0.50 | 0.707 | 1.679 |
| 0043 | Hazigonj | 0.50 | 38.00 | 38.50 | 38.25 | 0.25 | 0.353 | 0.923 |
| 0044 | Katuan | 0.30 | 40.50 | 40.80 | 40.65 | 0.15 | 0.212 | 0.521 |

S.E.= Standard error of mean, SD= Standard Deviation, CV%= Co-efficient of Variation.

The obtained results demonstrated in table 1 to 9 in the result section attributed significant differences of fineness along with growing areas. Comparing the averages of five mean values of each nine districts, it was found that the average of mean of Shariatpur area (as 37.72µ) was better than others.

The results of the samples collected from Faridpur were illustrated in table 1. It was shown that ID. No. 0003 sample from Tlma area possessed the lower numerical value, which indicates the finest fibre than other areas. The sample ID.No.0002, was found coarser than others. The samples collected from Faridpur district hold the second position next to Shariatpur bearing average of mean values of fineness 38.46µ. But the finest one amongst the enter samples under test was found from Faridpur area.

Table 2 was furnished for Shariatpur district. It is notable that fineness of all the five samples of Shariatpur district varying within the range 36.80µ to 38.78µ. The samples of Shariatpur possessed better fineness than that of other district. Comparatively high land and abundant water for retting may be the cause of producing fine fibre.

It was found from table 3 that the samples of Jamalpur district established the fineness similar to the results of the above-said two districts. But the CV% of the samples of Jamalpur illustrated in table 3 is much higher than the samples of Faridpur shown in table 1.

From table 4, it was shown that the samples bearing ID.No.0019 & 20 collected from Katiadi of Kishorgonj appeared to be the coarsest fibre as they established the highest numerical fineness values i.e. 45.0 micron. Evaluating the results in both way i.e. single or average fineness Kishorgonj district appeared to be the producer of tossa jute of highest fineness, which means the coarsest fibre.

Table 5, 6, 7 & 8 were illustrated for the samples of Jessore, Khulna, Naogaon and Rangpur. The samples collected from Jessore, Khulna, Naogaon and Rangpur were found of near about same fineness. But the samples of Khulna district were found some extent better than that of others. No remarkable differences could be noted between the result of Jessore and Rangpur district plotted in table 5 & 7.

From table 9 it was seen that the sample of ID.No.0043 collected from Hazigonj, Chandpur was found finer than that of others with better CV%. The results of the rest samples established almost similar figure and appeared to be coarser.

Making an allowance for the results of the single sample, ID No.0003 sample of Faridpur area was found as the finest one and ID No. 0019 & 20 samples of Kishorgonj were found as the coarsest fibre. Pointing on this view Faridpur district is the producer of the finest tossa jute fibre and Kishorgonj district is the producer the most unwell fibre caused by attaining the single highest fineness as 45µ.

Now, it is very difficult to make a precise comparison between Faridpur and Shariatpur district. Faridpur district is more famous for quality jute fibre than shariatpur district. The real cause of the variation on fibre fineness was not determined in this study. Here one thing, seed is to be considered, probably seed quality may be the cause of fibre fineness. The farmers of Bangladesh do not get sufficient jute seed at the time of seedling. So they often use Indian jute seed for jute cultivation. It is a great demand for further research to find out the real cause of fibre fineness.

## CONCLUSION

The variation of fibre fineness of tossa jute fibre grown in different part of Bangladesh established. The sample of ID.No. 0003 collected from Talma, Faridpur attain 36.25µ and the sample with ID. No. 0019 & 20 of Katiadi, Kishorgonj established 45.0µ. The fibre quality in relation to fibre fineness of Faridpur area including Shariatpur is significantly higher than all other district. So, it bears good news to the manufacturer of fine product from jute as they can use jute grown in Faridpur/Shariatpur areas. Thus the study will be helpful to the users.

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