



A Study on the Quality of Blended Jute Yarn through Two Different Process Line

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ABSTRACT

Jute is golden fiber of Bangladesh. It was the main export item of Bangladesh till 1971. At present, jute is the third foreign currency earner next to the garments and manpower sectors. There are about 80 jute mills in the country. They are using conventional jute machinery and are producing conventional jute products. Most of the jute mills have slip draft spinning machine. A large number of the machines are lying at idle condition due to the unavailability of spare parts and few of them are producing yarn thicker than 241 tex. So, it is most essential to produce blended yarn by identifying the specific blending techniques through an extensive study. Therefore, the aim of this investigation was a study to select an appropriate blending technique to produce blended jute yarn in slip draft spinning machine. In jute processing system, feeding technique of jute in breaker card machine blended with other synthetic fibers is an important factor for quality-blended yarn. If blending is occurred more perfectly, the blended yarn will be more regular. To produce quality-blended yarn, two techniques were followed in slip draft spinning frame. One process was through Hopper feeder and Teaser Card blending with jute fiber cutting as staple form and another process was through Breaker Card feed lattice blending with long jute. Among the processes, the produced yarn from blending with long jute through Breaker Card feed lattice was found better of the yarn of 241 tex (7 lbs/spy) than that of blending through Hopper feeder and Teaser Card blending with jute fiber cutting as staple form.

Keywords: Quality, Spinning, Yarn, Tex, Blend and Fibre.

1. INTRODUCTION

Jute is golden fiber of Bangladesh. It was the main export item of Bangladesh till 1971. At present, jute is the third foreign currency earner next to the garments and manpower sectors. There are about 80 jute mills in the country. They are using

conventional jute machinery and are producing conventional jute products. Most of the jute mills have apron draft spinning machine. A large number of the machines are lying at idle condition due to the unavailability of spare parts and few of them are producing yarn thicker than 170 tex [4].

The conventional jute products are facing tough opposition with synthetics in the world market. Industries are steadily losing their productivity and very rationally less efforts are given to pick up the productivity [3]. The research was carried out to identify the blending technique to produce better value jute yarn with higher efficiency. There is a potential market for blended jute yarn in the world. The produced yarn will be used in furnishing fabric, decorative fabric, shopping bag, blanket etc. As a result, diversified uses of jute will be greater than before.

So, it is most indispensable to produce blended yarn by identifying the specific blending techniques through an extensive study. Therefore, the aim of this investigation was a study to select an appropriate blending technique to produce blended jute yarn in apron draft spinning machine.

2. METHODS AND ANALYSIS

Jute fiber of grade BWB and synthetic (acrylic, polyester, rayon) fiber, the component fibers of the blend, were first procured. To convert the processed fibers into yarns of 241 tex (nominal count), the following sequences were completed of conventional jute processing system.

For blending, jute and synthetic (acrylic, polyester, rayon) fibers were first taken by weight as per blend ratio (Jute/synthetic fiber: 80/20). Then the jute fiber was softened by the application of emulsion in softener machine and piled for 48 hours [1].

Different blending technique i) Blending with Hopper feeder and Teaser Card along with jute fiber cutting as staple form and ii) Blending with Breaker Card and machine along with long jute on the feed lattice for processing in the modified apron draft spinning frame, were followed [2]. The synthetic (acrylic, polyester, rayon) fibers were separated and opened up manually by hand teasing and tufts of certain weights were made. After that the blending was carried out by spreading the component fibers i.e. jute and synthetic fiber (acrylic, polyester, rayon) in desired proportion 80:20 ratio by weight over the Breaker card lattice. The delivered slivers from breaker card were then processed through normal jute processing system and spun into yarns of 241 tex [5].

The obtained blended yarns were studied to assess their physical properties e.g. actual count, twist, CV% and quality ratio etc. The above properties were determined by using standard testing equipment as per standard methods of testing. The component fibers of the blends i.e. BWB jute and synthetic (acrylic, polyester, rayon) fiber were characterized microscopically. The fineness of the fibers was determined by gravimetric method.

3. RESULTS AND OBSERVATIONS

The component fibers of the blends i.e. BWB grade jute and acrylic, polyester, Rayon fibers as characterized microscopically or other methods are shown in the Table 1.

Table 1: Fiber characteristics:

Fiber	Length inch	Fineness micron
BWB jute	6.00(cut jute)	15-17
Polyester	4.2	2.7-3.2
Rayon	4.0	1.8-2.2
Acrylic	4.1	1.5-2.1

The test results in respect of quality and tensile properties of the 241 tex jute (acrylic, polyester, rayon) blended yarns in 80:20 ratio is given in Tables 2 and 3.

Quality Ratio: Quality ratio is the property of jute yarn which indicate the load at break (lbf)/count. A yarn of higher quality ratio indicates a yarn of higher strength. . So, it is

generally said that high tenacity at break causes maximum quality ratio of yarn. . In the experiment, produced yarn shows that tenacity of the yarn increased with the increase of quality ratio.

$$\text{Quality ratio: } \frac{\text{Load at break in lb}}{\text{Count of yarn}}$$

Table-2: Physical characteristics of 241 tex (7lbs/spy) in modified apron draft spinning frame through Hopper feeder and Teaser Card blending with jute fiber cutting as staple form.

Fiber Composition	Nominal Count tex (lbs/spy)	Actual Count tex (lbs/spy)	Twist tpm	Tensile strength kg (lbs)				Quality Ratio %	Reference value of Quality Ratio
				Mean	SD	CV%	Extension at break %		100% jute (cut)
Jute (BWB)/ Polyester, 80:20	241(7)	244 (7.08)	189	2.54 (5.59)	0.291	11.54	1.22	79.95	95
Jute (BWB)/ Acrylic, 80:20		246 (7.14)	189	2.89 (6.37)	0.430	14.87	1.29	89.21	95
Jute (BWB)/ Rayon, 80:20		239 (6.93)	189	2.20 (4.85)	0.454	20.45	1.27	69.98	95

It is shown from the experiment that quality ratio of 241 tex jute/acrylic yarn in staple form mixing at blend ratio 80:20 is 89.21, on the other hand for the jute/acrylic 80:20 blend with long jute the quality ratio of the yarn is 117.22. The quality ratios of both yarns are deferred more. In addition other textile properties such as CV%, extension at break are nearer for both the yarn [6]. Among the above group of blends, the jute/acrylic 80/20 blend seemed to have achieved a better balance of quality ratio and tensile strength in 241 tex yarn than that of

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through Hopper feeder and Teaser Card blending with jute fiber cutting as staple form.

Jute fiber length plays an important role on carding. Regular and uniform fiber length is necessary for quality-blended yarn in the spinning process. This fiber is naturally hard and brittle and breaks off with abrasion; resistance to mechanical wear is low and not durable especially on exposure to moist warm humid conditions.

Table -3: Physical characteristics of 241 tex (7lbs/spy) in the modified apron draft spinning frame through Breaker Card feed lattice blending with long jute.

Fiber Composition	Nominal Count tex (lbs/spy)	Actual Count tex (lbs/spy)	Twist tpm	Tensile strength kg (lbs)				Quality Ratio %	Reference value of Quality Ratio
				Mean	SD	CV%	Extension at break %		100% jute (long staple)
Jute (BWB)/ Polyester, 80:20	241(7)	244 (7.08)	189	3.09 (6.81)	0.260	8.41	0.98	96.21	110
Jute (BWB)/ Acrylic, 80:20		246 (7.14)	189	3.80 (8.37)	0.559	14.73	1.01	117.22	110
Jute (BWB)/ Rayon, 80:20		239 (6.93)	189	3.42 (7.53)	0.393	11.51	0.95	108.65	110

In jute spinning carding plays an important role on whole process. The object of carding is to break down and fleece-out the long strips of jute and to convert them into a continuous broad ribbon of line fibers called sliver. This sliver must be as uniform in size and texture as possible and it must have a definite weight for a definite length. Two main functions, which take place in carding, are (a) carding and (b) stripping. These two main functions are dependent for their activates upon the method of pinning number of pins per square inch, the manner in which the two active surfaces are placed in relation to each other and their surface speeds. As jute and synthetic fiber is fed in the breaker card machine, the pins of the faster moving cylinder split-up and vigorously comb away the ribbon of fibers so that it is fleeced out and carried on the cylinder. Pins of the cylinder are set at such an angle so that the material is being combed. This combing action plays a vital role for uniform carded sliver i.e., good quality yarn. But excessive speed of cylinder occurs damages of fibers.

Jute/synthetic (acrylic, rayon, polyester) blended yarns of 241 tex were produced at

the blend ratio of 80:20. Different textile properties including quality ratio were tested. It was found that textile properties differed with the variation of blending technique. Produced yarns were tested for analyzing the effect of acrylic fiber in jute/acrylic-blended yarn [7].

4. CONCLUSION

Blending technique is the important factor for proper blending of synthetic fiber with jute. Nowadays jute products are facing tough competition with synthetics in the world market. Industries are gradually losing their productivity due to less strength and very reasonably less efforts are given to improve the productivity. The investigation was carried out to identify the blending technique to produce better quality jute yarn with higher productivity. Here it is clearly noted that blending with long jute through Breaker Card feed lattice attain higher productivity with good quality. There is a prospective market for blended jute yarn in the world. The produced yarn will be used in furnishing fabric, decorative fabric, shopping bag, blanket etc. As a result, diversified uses of jute will be amplified.

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