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STUDY ON THE DETERMINATION OF SUITABLE COUNT OF A BLENDED YARN WITH THE MAXIMUM UTILIZATION OF JUTE IN THE BLEND

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ABSTRACT

Blending is an important factor for producing a particular count of quality yarn. A study on the jute cotton blended yarn of different ratios viz., jute: cotton /40:60, jute: cotton / 50: 50, jute: cotton / 60:40, jute: cotton / 70: 30 and jute: cotton/ 80: 20 was performed. Of different counts of yarn (20^s, 15^s & 10^s), it was observed that the 10^s yarn of jute : cotton/ 50 : 50 ratio gave better results than that of the other two types of yarns of the same blend ratios.

Key words: Physical properties, rotor, blended yarn, count, hairiness yarn, irregularities.

INTRODUCTION

Jute is a hard lingo cellulosic bast fabric. This limits the use of jute in thread, bag, sack, Hessian, carpet, carpet backing cloth (CBC) etc. Various attempts have been taken to blend jute with the cotton in the mechanical processing (Hunter, 1952; Nudding, 1952). But it could not achieve the goal due to the brittleness of jute. Thus, a prerequisite demand for blending with cotton is the softness of jute. When the proportion of jute will increase in the blend then the cost of the ultimate product will decrease in a certain level. The interesting feature of jute is the softness and whiteness for blending with cotton (Ali *et al.,* 1995). Limited work has been done to use jute in cotton processing system (Van Langenhove, 1995; Zurek *et al.,* 1979). Generally jute is used in traditional jute processing system to produce the conventional products (Hafizuddin, 1967; Atkinson, 1964). This traditional system is one of the barriers for diversification use of jute. The present work has been taken on two aspects. One is to maximize utilization of jute in the cotton processing system and the other is to find out the suitable count of blended yarn when maximum portion of jute is used in the blend. To achieve the goal, the work plan was as follows

(i) Preparation of stapled jute.
(ii) Chemical modification of jute fiber.
(iii) Blending of jute fiber with the cotton as per required ratio.
(iv) Preparation of different count of yarn.
(v) Compare the properties of the blended yarn and determine the suitable count when maximum amount of jute is used in the blend.

MATERIALS AND METHODS

The materials used in this experiment were jute and cotton. The BWB (Bangladesh White B) jute fiber was collected from Narayangonj of Bangladesh. The cotton fiber of one inch staple length was collected from the Cotton Development Board, Bangladesh. At first the BWB jute fiber was stapled in to 1.5 inch in a cutting machine. Then the cut/stapled jute was chemically modified (softened and whitened) in the chemical modification at Jute and Textile Product Development Centre (JTPDC) in Bangladesh Jute Research Institute (BJRI), Dhaka. The chemically modified jute was dried and opened by the drying machine and opening machine respectively. Thus the chemically modified jute is ready for blending with cotton. The jute cotton blend of required ratio was performed in the blow room section. Before entering the blending chamber a stack mixing process is carried out for homogeneous blending of jute and cotton. Then the sliver were prepared for the individual count (20^s, 15^s, 10^s) of blended yarn by the carding machine of JTPDC. Subsequently, the slivers were passed through the Drawing frame to reduce the irregularity of the slivers. Thus the slivers were ready for producing three different count of yarn. Three types (20^s, 15^s, 10^s) of blended yarn are produced in open end spinning frame of a private Textile Mill named ALRAJI TEXTILE LTD, Katchpur, Dhaka, Bangladesh. The blend ratios of jute: cotton were 40:60, 50:50, 60: 40, 70: 30 and 80: 20 respectively for each type of blended yarn. Yarn properties like strength, thick and thin

places, twist per inch (TPI), count strength product (CSP) etc were determined in the testing department of BJRI and Bangladesh Textile Mills Corporation (BTMC) in Bangladesh. All the tests were performed under standard testing atmosphere i.e. 20 ± 2oC temperature and 65± 2% relative humidity).

RESULTS AND DISCUSSION

After determining the yarn properties of three different count of yarns, $20^{s,}$ 15^{s} & 10^{s}, the properties of each count of yarn are given in Table 1, 2 & 3 respectively. From the Table-1, it is observed that the properties like thick and thin places, cv%, hairiness, are very high in comparison to the properties of jute: cotton/ 40:60 of 20^{s} cotton yarn. At the same time, the properties like TPI, strength and CSP are also low, in comparison to the jute: cotton/ 40:60 blended yarns. Here, all the properties are increasing with the increase of cotton in the blend.

Table 1. Relation between blend ratio and irregularities of 20^{s} yarn

Blend ratio Jute:Cotton	Thick (km^{-1})	Thin(km^{-1})	CV%	Hairiness (km^{-1})	TPI	Strength	CSP
80 : 20	460	135	22	450	13	57	1140
70 : 30	440	118	21	427	14	68	1360
60 : 40	441	108	20	409	14	69	1380
50 : 50	322	91	21	320	15	81	1620
40 : 60	403	97	20	404	15	82	1640

Table 2. Relation between blend ratio and irregularities of 15^{s} yarn

Blend ratio/ Jute :Cotton	Thick (km^{-1})	Thin (km^{-1})	CV%	Hairiness(km^{-1})	TPI	Strength	CSP
80 : 20	602	280	20	470	15	87	1305
70 : 30	506	246	18	428	15	88	1320
60 : 40	470	180	17	401	16	87	1305
50 : 50	350	102	17	270	16	91	1365
40 : 60	511	191	17	316	16	96	1440

Table 3. Relation between blend ratio and irregularities of 10^{s} yarn

Blend ratio/ Jute :Cotton	Thick (km^{-1})	Thin (km^{-1})	CV%	Hairiness (km^{-1})	TPI	Strength	CSP
80 : 20	340	140	20	310	14	136	1360
70 : 30	332	109	19	300	15	138	1380
60 : 40	308	102	19	286	15	148	1480
50 : 50	247	76	18	250	15	149	1490
40 : 60	287	90	18	260	15	148	1480

From the Table-2, it is observed that the properties like thick and thin places, cv% and hairiness are also higher than the jute : cotton/ 40:60 of 15^{s} blended yarn but the irregularities are decreasing in a befitting manner with the increase of cotton in the blend. On the other hand, all though the properties like TPI, strength and CSP are lower than the properties of jute : cotton/ 40:60 blended yarn but has an increasing tendency when the amount of cotton increase in the blend.

From the Table-3, it is seen that all the properties like thick and thin places, cv%, hairiness , TPI, strength and CSP are very nearer to the properties of jute : cotton/ 50:50 of 10^{s} blended yarn although the amount of jute is increases in the blend. Here all the properties for blend ratio of 60: 40 / jute: cotton and 50: 50 / jute: cotton is nearer to each other and very nearer and comparable to the 80: 20/ jute: cotton blended yarn. So, all the properties of 10^{s} blended yarn has decreased a little with the maximum use of jute in the blend.

To determine the physical properties of a particular type of yarn blending is an important issue in the Industrial sector as well as for the users (Kiekens, 1995). If the users became well known about the using

yarn then they can forecast which type of fabric will be suitable for that particular type of yarn (Jabbar and Rahman, 1990; Hoffman and Reterson, 1958). As the aim of this work is to use the maximum amount of jute in the blend that is why the blend is performed from jute: cotton / 40: 60 to jute: cotton / 80: 20. It is seen that the minimum amount of jute in the blend shows very similar property to 100% cotton yarn (Azad, *et al.,* 1995 Jabbar and Rahman, 1990). On the other hand, jute is non toxic, bio degradable and eco friendly fiber. The amount of jute in the blend is also free from health hazard. In that respect, the maximum utilization of jute with the cotton will definitely increase the diversified use of jute. It is possible to produce various types of diversified product from the jute cotton blended yarn. The higher percentage of jute in the blend will definitely reduce the cost of the products. There is an open market for jute based cost effective value added products all over the world. Through this experimental result, it is clear that yarn of coarser count shows very comparable and acceptable properties than that of finer count. Further investigations are essential to find out which types of ultimate products are suitable and useable for the coarser count of blended yarn.

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