

Performance of Jute Viscose/Polyester and Cotton Blended: Yarns for Apparel Use

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ABSTRACT During the investigation, a quaternary blended fabric was prepared and also studied their utility and mechanical properties. Under these properties Weight per Unit Area, Crease Recovery, Abrasion Resistance, Pilling, Water Absorbency, Water – Vapor – Permeability, Drapeability, Stiffness properties were assessed. The plain woven union fabrics have been prepared from three different ratios of blended yarns of jute viscose/ polyester with cotton (ratio 30/70, 50/50, 70/30). The fabric construction was done by using plain weave. Jute viscose/polyester used 30/70, 50/50, 70/30 ratio in the filling direction and 100% cotton was used in warp direction. It was observe that 30/70 jute viscose/polyester union fabric is better than other ratio and it also reduce the cost of the product. But crease recovery and water absorbency of this fabric was poor but in this fabric cotton was used in warp direction so it overcame this property.

INTRODUCTION

There is no perfect fiber. All fibers have well, far and poor characteristics so blending is the technique to combine fibers which emphasizes the good qualities and minimizes poor qualities of the fibers. Blending also makes the fabric manufacturing process economical. The price of man-made is much more stable. In blends of polyester/ viscose jute blend with cotton, the synthetic fibers provide crease recovery dimensional stability, tensile strength, abrasion resistance moisture absorption drape ability (Choudhary 2006). Jute also has some favorable properties like high tensile strength, bulk, and good dye ability. Jute also has some drawbacks such as brittleness, harshness to fell, hairiness, rugged appearance, inextensibility and fiber-shedding. When the blending of jute and viscose, it may provide cheaper substitute for apparel use, decorative, furnishing and other end-use. Similarly, Mann et al. (1998) did a study on jute/acrylic fibers blended yarns with different ratio of both fibers, 100/0, 10/90; 20/80, 30/70, 40/60, 50/50. They concluded that the blending of jute with acrylic fibers.

Add to the strength, tenacity and elongation of blended yarn. Jute being much coarser when blended with viscose which has wider choice of fineness will improve the resultant yarn in different parameter including aesthetic values, blending will help diversification of fabric goods (Vatsala 2003).

Polyester is known for its wrinkle – free appearance and easy care. The strength, durability, abrasion resistance, wrinkle resistance shape and size retention of these blended fabrics increase due to polyester (Coabman 1983). Similarly, Padam et al. (1994) concluded that blending silk with polyester and acrylic it reduce the cost and also increase the durability.

Cotton is a cool, soft comfortable and is the principle clothing fiber of the world. This fabric absorbs and release perspiration quickly, thus allowing the fabric to “breathe.” Cotton provides absorbency and consequent comfort ([www.fabrics.net/amy.cotton. asp](http://www.fabrics.net/amy.cotton.asp)).

METHODOLOGY

Preparation of Fabric Samples

Prepared a blended yarn with jute 50% viscose 50%, polyester 100% used and make a yarn with three different ratio jute/viscose and polyester used 70/30, 50/50, 30/70. Prepared a quaternary blended fabric with three different ratio jute viscose/polyester were used in weft direction and cotton was used in warp direction. Fabric constructed handloom with plain weaving (Gohl 1983).

Test Method

Weight per Unit Area: Five specimen of size 5 x 4, were cut and conditioned for 24 hours.

All the 5 samples were weighed together on an analytical balance. Reading was taken and weight /unit area was calculated.

Weight in ounce/ square yard = $w/454$ (36×36) / Total area of the samples. Where 'w' is the weight in grams of the specimen (Booth 1968).

Crease Recovery: 'SHIRLY' Crease recovery testers were used to test the crease recovery of both fabrics in both warp and weft directions.

The instrument consists of a circular dial which carries the clamp for holding the specimen. Directly under the centre of the dial is a knife edge and index line for measuring the recovery angle. The scale of the instrument and engraved on the dial. A specimen was cut from the fabric with template 2" long by 1" wide. It was are fully creased by folding in half, placing under 2 kg weight for 1 minute. Specimen was transferred to the fabric, clamp on the instrument and allowed to recover from the crease. As it recovered the dial of the instrument was rotated to keep the free edge of the specimen in line with knife edge. At the end of the time period allowed for recovery angle in degree was read on the engraved scale (Booth 1968).

Abrasion Resistance: "WIER CARPET ABRISON MACHINE" was used. The machine essentially consists of a duo-aluminum plate supported by 3 pillars. On the top of each pillar is a ball cater, which carries a steel ball in it. These allow the top plate to glide about easily. The top plate has four slots in it and each slot being filter with a sample holder clamp perpendicular the plate. The mushroom shaped sample holders are able to slide vertical in the horizontal movement on the plate. Each of the sample holders rests upon one of the four small abrading tables whose surface are also flat and parallel to the plate therefore each rubbed on one of these surface. Abrading material emery paper was cut to size of 5x5 squares using the template and was fixed on abrading tables. One specimen from both fabrics was cut to a size of 1½ by using a temperature and was fixed in mushroom shaped holder. Each mushroom shaped holder weights about 200 gm. This weight acts as a pressure to the sample while being abraded. The machine was set on the numbers of cycles and as the machine ran the numbers were decreased.

Thickness of Fabric: Thickness of the fabric was estimated by using the apparatus WIRA CARPET THICKNESS GAZUE. The fabric

specimen was placed on the anvil and its upper foot was lowered by rotating the knobs until the indicator glowed read. The reading was taken at 0.01 pound weight. This indicates that the upper foot has touched the fabric. The reading was noted down from the GAUZE DIAL.

Water Absorbency: Water absorbency is a quality of fabric to absorb water. It is a method for measuring the total amount of water that a fabric wills absorb. The circular test specimen of 8 cm. Diameter was immersed in distilled water until it was uniformly wetted out and left overnight sandwiched between two wetted sponges. The original mass and the mass of the specimen after 24 hours was recorded the absorbed expressed as the % of original mass of specimen (Booth 1968).

Water- Vapor- Permeability: The water-vapor- permeability was the cup method. The specimen under test was sealed own the open mouth of a cup containing water. Evaporating the open mouth of a cup containing takes places under standard atmospheric condition and loss in weight of cup after 24 hours was measured and then converted in term of water- vapor - permeability. The water -vapor- permeability of the specimen was then expressed as the percentages of water vapour expressed of reference fabric.

Drapeability: The experimental method generally involves hanging fabric specimen of 15cm radius over suppurating disc of 9 cm radius unsupported area drapes down under down its own weight .drape is measured as drape co-efficient which theoretical varies between o and 100 .Circular fabric specimen of 30 cm diameter were cut from each fabric using template circular tracing paper of the some diameter were placed on hard board disc and used for making shadows of draped specimen. Hard board disc was raised close to the top disc (diameter 15 cm) specimen to the top disc in such a way that centre of specimen coin sided with centre of disc. The second disc was placed over the fabric so as to hold the specimen in position. The hard board disc as slowly taken down on the clamp thus allowing the specimen to drape under its own cut with the help of narrow light, show down of the draped specimen was obtained area was cut out with scissors and weighed on analytical balance weight per unit area of paper was also determine (Josheph 1986).

Serviceability: "Sasmira Laundero Meter" was used. To test serviceability all the fabric were

washed in washing machine. Total 40 washing were given on the whole, to each of the sample. After 10,20,30,40, washing stiffness strength, weigh per unit area were tested for washing I.S.O test No. 3 was used. The fabrics laundered in soap solution 5 gm soap per litre of water and 2 gm of sodium carbonate. The temperature of the solutions was 60°C. Each cycle of washing was done for 45 minutes.

RESULTS AND DISCUSSION

Weight per Unit Area: Table 1 indicates that weight gradually increased with the percentage of polyester was increased in the sample. Jute viscose and polyester (30/70) had maximum weight that is, 0.95gm as compared to the other two blends ratio that jute viscose/polyester (70/30) was obtained 0.75gm and jute viscose and polyester (50/50) have got 0.82gm. So, it can be concluded that weight of jute/viscose and polyester (30/70) was more than the other.

Table 1: Weight of the fabric (gm)

S. No.	Jute/Viscose ratio	Polyester ratio	Weight (Gm)
1	70%	30%	.75
2	50%	50%	.82
3	30%	70%	.95

Crease Recovery: It was found the crease recovery angle 106 in weft direction was more

than in 89 warp directions. Crease recovery angle of jute viscose and polyester (70/30) was better than jute viscose and polyester (50/50) and jute viscose and polyester (30/70). Figure 1 reveals that the crease recovery angle increased with the increase in jute viscose ratio. Similar study was performed by Tarafder and Kauser (1996) on “Stiffness and crease recovery” on five different shirting materials viz., 100 per cent polyester, 64/36 polyester/cotton, 58/45 polyester cotton 45/55 polyester/Viscose and 100 per cent cotton to know the effect of sampling on drape and crease behaviour of the fabrics. A trend of decrease in drape quality was observed with increase in the polyester content and crease recovery of the fabrics depending on the material characteristics in terms of least or most prone to creasing.

Abrasion Resistance: It was observed that maximum weight loss was seen 0.168 gm in jute viscose/ polyester (50/50) and minimum weight loss was seen 0.195 gm in jute viscose/ polyester (30/70) after 2000 cycles as shown as Figure 2. Thus it can be generalize that when number of cycles increased then weight loss also increased continuously. Abrasion resistance of blend fabric produced with higher polyester content was better. In similar context De and Mitra (2005) studied “A comparative study on some mechanical properties of Eri and cotton fabrics” and concluded that between four different sets of fabrics, each of Eri silk and cotton with var-

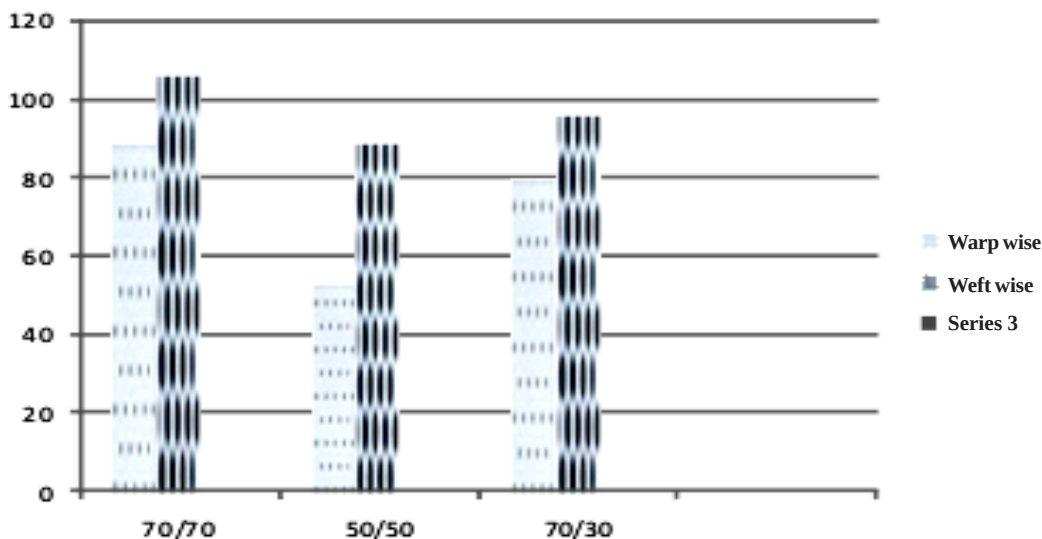


Fig. 1. Crease recovery (angle) of the fabric

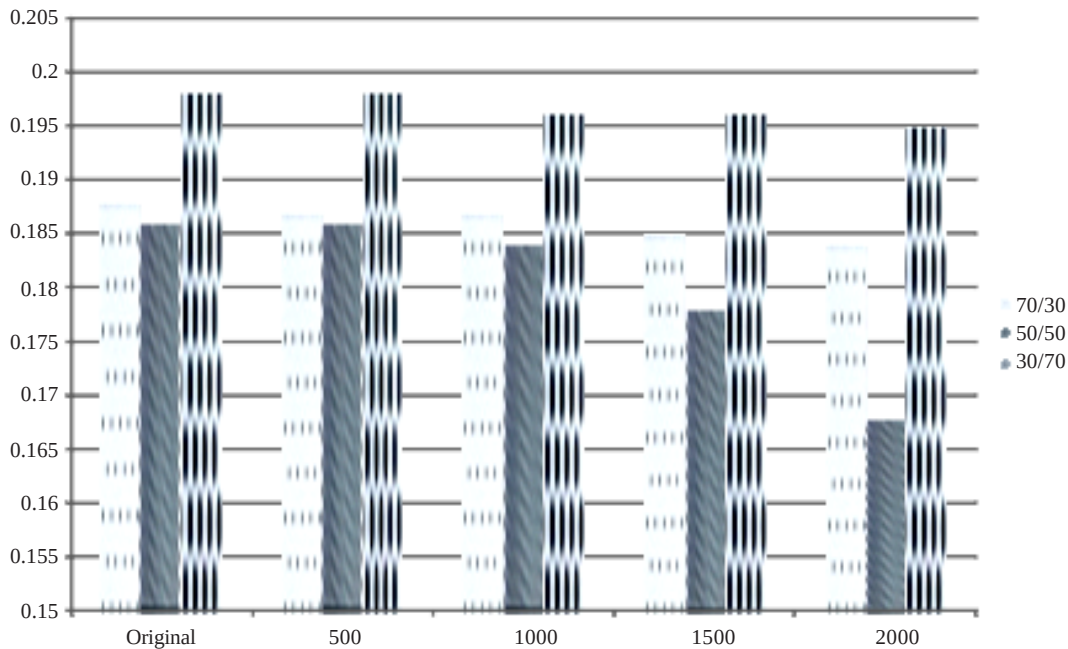


Fig. 2. Abrasion resistance of the fabric: No. of cycles (gm)

ied construction were used. It was found that percentage weight loss during abrasion is lower in case of Eri fabric.

Thickness of Fabric: It was observed that thickness of jute viscose and polyester (70/30) was 0.064 mm and thickness was found in jute viscose and polyester (30/70) was 0.066mm and jute viscose and polyester (50/50) was also 0.66 mm.

So, it can be generalized that jute viscose and polyester (30/70) union fabric was found more thickness than other two blends. Table 2 depicts that addition of percentage of polyester was increased in the union fabric than the thickness was also increased.

Table 2: Thickness of the fabric (mm)

S. No.	Jute/Viscose ratio	Polyester ratio	Thickness (Mm)
1	70%	30%	.75
2	50%	50%	.82
3	30%	70%	.95

Water Absorbency: It was found that maximum water absorbency was 247.9ml in jute viscose/ polyester (30/70) and minimum was found in 267.7ml jute viscose/ polyester (70/30).

It can be conclude that fabric jute/viscose and polyester (70/30) had more water absorbency

than other two blends. Table 3 reveals that polyester was found to be more water absorbent than jute/viscose.

Table 3: Water absorbency of the fabric (ml)

S. No.	Jute/Viscose ratio	Polyester ratio	Water absorbency
1	70%	30%	267.8
2	50%	50%	247.7
3	30%	70%	247.9

Water–Vapour–Permeability: The data in the Table 4 indicates that the water permeability 5 was higher in jute viscose/ polyester (70/30).

Table 4: Water– vapour- permeability of the fabric (ml)

S. No.	Jute/Viscose ratio	Polyester ratio	Water permeability
1	70%	30%	5
2	50%	50%	4.25
3	30%	70%	2.5

So, it was conclude that water permeability of 2.5 jute viscose/ polyester (30/70) was less than both the blends.

Serviceability

Tearing Strength of the Fabric: Figure 3 reveals that Tearing Strength of all the fabrics

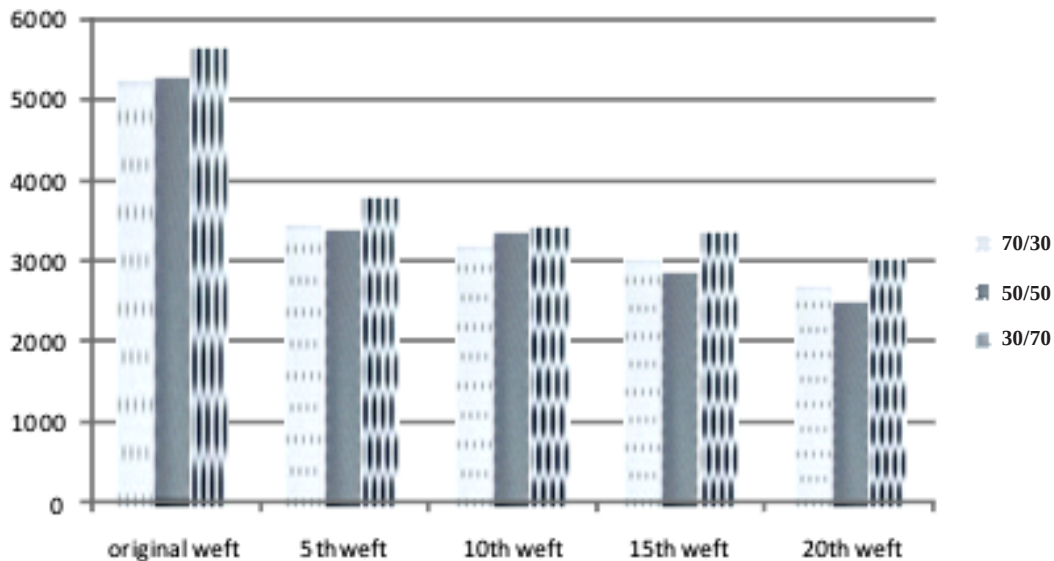


Fig. 3. Tearing strength of the fabric (gm)

after 5,10,15,20 washing was decreased. After laundering, maximum loss in tearing strength was observed in warp – 3040 gm, weft – 2720 gm jute viscose/polyester (70/30) and minimum loss was observed in warp-3520gm,weft-3040 gm jute viscose/ polyester (30/70). So, it can be deduced that Tearing Strength of jute viscose/ polyester (30/70) union fabric was better than other two blends.

Bending Length (cm) of the Fabric: Figure 4 depicts that Bending length of jute viscose/ polyester union fabric. Bending length decreased significantly after 5,10,15,20 washing. Maximum stiffness found warp - 2.5 cm, weft - 2.5cm was in jute viscose/ polyester (30/70) and minimum stiffness was found warp - 2.5 cm, weft - 2.5 cm in jute viscose /polyester (70/30).

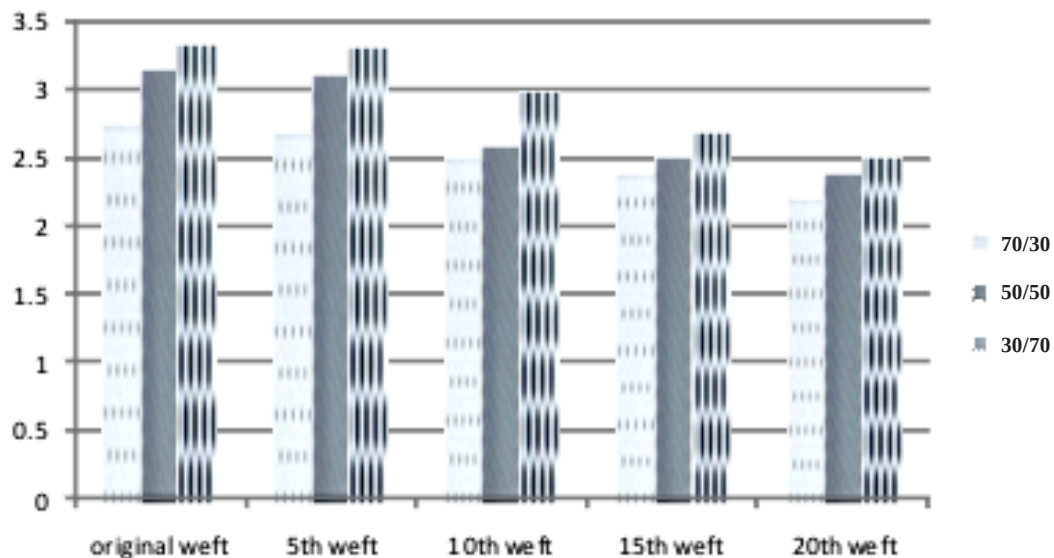


Fig. 4. Bending length (cm) of the fabric

Polyester is known for its wrinkle – free appearance and easy care. The strength, durability, abrasion resistance, wrinkle resistance shape and size retention of these blended fabrics increase due to polyester (Coabman 1983).

Drapeability: The data in the Table 5 indicate that the percentage drape co-efficient was higher in the fabric have high percentage of polyester.

Table 5: Drapeability of the fabric

S. No.	Jute/Viscose ratio	Polyester ratio	% Co-efficient
1	70%	30%	.64
2	50%	50%	.59
3	30%	70%	.69

So, it was concluded that drape coefficient ratio 0.59 in jute/viscose (50/50) was less than both the blends. However, Tarafder et al. (1998) was conducted “A study of the Drapeability of P/V blended woven fabrics” by. In the present study six different polyester/Viscose blended fabrics viz., 100:0, 80:20, 70:30, 65:35, 55:45 and 48:52 were assessed for drape behavior. It was observed that 70:30 polyester/Viscose fabric had greater drape co-efficient that is, 59.70 per cent when compared to other five fabric samples. Minimum drape coefficient of 29.60 per cent was found to be with 48:52 polyester/Viscose blended fabric.

It can be generalized that jute/viscose and polyester 30/70 union fabric was more than other two blends.

CONCLUSION

The quaternary blends can be used for the production of yarn with fancy effects after processing with great skill on part of dyer. Quaternary blends are normally used for the reasons of economy by explaining name of prestigious fibres or for styling and obtaining special ef-

fect. From this study it was concluded that jute/viscose and polyester (30/70) ratio union fabric was better than other union fabrics. But crease recovery and water absorbency was poor of this fabric but in this fabric cotton was used in warp direction so can be overcome this property. Similarly, in the study (Yardi et al. 2001) stated that tertiary blends was used in cotton, polyester and viscose fiber and found the finer properties are compatible higher strength was obtained with the increase of stronger fibers proportions.

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