

## COMBINATION OF JUTE-ACRYLIC BLEND

RITU HOODA\*

\*Asst. Prof. Dept. of Home Science, Govt. College for Women, Lakhamajra, Rohtak, Haryana, India

### Abstract

Jute fibre has inherent drawbacks like low breaking extension and being coarser, but also has certain desirable properties like bulkiness and eco-friendliness. Whereas Acrylics have improved characteristics like fineness, breaking extension and warmth. Therefore, Jute-Acrylic blend can be one of substitute of wool. Blending of jute with acrylic fibre adds to the strength, tenacity and elongation of the blended yarns. Jute-Acrylic blended fabric showed improvement in bursting strength and crease recovery after mixing with acrylic. Mixing of jute increased the stiffness and abrasion. Blends were found to be good in texture, luster, aesthetic appeal and woolen feel. Based on cost, the subjective evaluation and laboratory tests, jute-acrylic blend (20:80 followed by 30:70) were found to have good overall appearance and serviceability.

**Keywords:** Jute –Acrylic blend, American Society for Testing & Materials, Constructional Parameters, Fabric Properties.

### Introduction:

Today, the textile industry is flooded with a number of blended yarns for the production of textiles to meet the growing need of the customers (Booth, 1968). Blended fabrics satisfy not only clothing needs, but also elegant clothing, fashions and assets. An important factor which has projected the blended fabrics as dominant textile fabrics, in creating textile fashions and comparatively better utility performance of the fabrics (Parikh and Aiyer, 1980). Traditionally, pure wool was used for knitted fabrics. The cost of wool is very high. Moreover, woollen industry is facing problems like short supply of quality wool fibre, trained technician, high cost of production etc. Therefore, experiments are carried out to find some low priced substitutes for knitted fabrics and acrylic can be one of the substitutes (Vasantha and Jacob, 1993).

Being cheaper, acrylic fibre is fast replacing wool in many applications. It is estimated that of all the acrylic fibres used, 60 per cent goes into knitting, 29 per cent into weaving and 11 per cent into carpets. End use pattern of acrylic fibres is seen as hand knitting yarns and hosiery, blankets, woven suitings (Sharma and Mishra, 1984). Much of the growth

in acrylic fibre usage has come from the replacement of wool. Like wool, acrylic fibre are valued for their warmth, softness of hand, good bulk and pile qualities. At the same time, acrylic fibres are more resistant to abrasion and chemical attack, and more stable towards degradation from heat and light (Bajaj and Kumari, 1987).

Jute as a textile fibre has inherent drawbacks for functional end-uses, but a drive like blending is on to overcome these drawbacks and produce quality products to promote functionally acceptable merchandise in domestic and export markets. So, jute and acrylic may be blended to produce hosiery products. It will be economical also, as jute-acrylic blend will have low cost as compared to the pure wool and acrylic. Therefore, this study will provide a blend with an important role in the woollen industry, minimizing the raw material crisis of wool and using of a cheap natural and eco-friendly fibre.

#### **Review of Literature:**

1. Vasantha and Jacob (1993) conducted a study on blending of jute with polypropylene and acrylic and concluded that the blended sample of jute and acrylic at the ratio 20:80 was found to be comparable with pure woollen sample in respect of texture, thickness and overall appearance at a reasonable cost. The yarn strength of this sample was found to be greater than woollen yarn. They also found that blending of jute with acrylic is economical.
2. Roy *et al* (1994) investigated the influence of different twists (3,4,5 and 6 TPI) and blend compositions to achieve optimum bulk property of jute-acrylic blended yarn in proportions of 30:70, 40:60, 50:50, 60:40 jute-acrylic (high shrink) and found that optimum blend composition and twists levels of high bulked yarns were 40/60 and 3 TPI respectively, considering the diameter, extension and strength properties. They added that Jute/HAS high bulk yarn had immense scope to develop various value added products like wrapper's cloth, warm garments, shawls.
3. Salaskar and Bandyopadhyay (1997) reported that eco-friendly fibres and fabrics are gradually gaining importance in recent times due to environmentalist throughout the world and added that jute is the most biodegradable of all natural fibres. With the advent of new technologies in mechanical and chemical processing of jute with other fibres like cotton, viscose, polypropylene, wool, acrylic to produce blended fabrics. Such fabrics are useful for end uses such as apparel, fashion garments and is opening up new areas of consumption.

4. A K Sinha & G Basu (2001) have prepared various blend ratios of Jute-shrinkable acrylic blended bulked yarns by relaxing shrinkable component of the yarns using different methods of thermal treatments. It is observed that all the methods produce bulked yarns having more or less same value of specific volume. Since the boiling water method is easier, convenient and economical, this method is adopted for detail study. Flexural rigidity of yarns decreases remarkably after bulking and shows a decreasing trend with the increase in percentage of acrylic up to 80%. Breaking strength and breaking extension of non-bulked yarn increase with the increase in percentage of acrylic. The extensibility further increases remarkably after bulking but the breaking stress of parent yarn decreases remarkably on bulking. The loss of tenacity is more when percentage of jute is more in the blends.
5. S.Sengupta & S.Debnath (2010) presented a new approach to make jute based yarn by blending polypropylene in jute (30:70) in jute finisher drawing. Fabric has been made in specially modified handloom. Developed fabric showed higher area density, thickness and weft crimp, tenacity and rigidity and it was cheap than commercial fabric. It was dimensionally and quality wise stable after wash and showed no visible deterioration including surface texture, when used as table cloth and bed cover for two months.
6. S.Sengupta & S.Debnath (2012) have developed two types of jute based blended yarns from jute-polypropylene-hollow polyester and jute-shrinkable acrylic-hollow polyester in the conventional jute spinning system. Such ternary blended yarn can be used successfully to produce home textiles. Jute-shrinkable acrylic-hollow polyester have been blended in 50:30:20 proportion to produce bulk yarn for warm garments. Similarly, jute-polypropylene-hollow polyester blended yarn in 50:25:25 proportion can be used in cushion cloth, mattress cloth, table cloth, bed sheet, etc. Such blending not only gives better yarn but also produces more regular yarn. The fabric out of this yarn in weft is cheaper, heavier and more rigid in weft direction compared to commercial sample. The developed fabric is dimensionally and quality wise stable in washing.
7. E.Datta, S.Rahman & M.M. Hussain (2016) concluded that now-a-days people get concerned regarding non-biodegradable and synthetic manmade fibres. Re-establishment of natural fibre is necessary for the environment. As jute is the golden fibre as well as second common natural fibre of the world after cotton. So to achieve

more profits from jute fibre and jute blended products, appropriate commercially feasible techniques must be developed to overcome the problems associated with the processing of jute and jute blended products

### Materials and Methods:

Blended yarns (Jute white variety grade 2 and acrylic fibre) were procured from National Institute of Research on Jute and Allied Fibres, Calcutta. Five blended (J:a) yarns of proportions 10:90, 20:80, 30:70, 40:60 and 50:50 were selected along with pure jute and acrylic yarns. Yarns were plain knitted on round Machine (9" diameter, without dial) at TITS Jute Extension Centre, Ludhiana (Punjab). Fabrics were tested for fabric count weight per unit area (ASTM D 3776-90) thickness (ASTM D 1777-64), bursting strength (ASTM D 3786-87), abrasion/wear and tear (ASTM D 1175-64), flexural rigidity (ASTM D1388-64, crease recovery (ASTM D1295-67, moisture regain (ASTMD 2654-67) and shrinkage at TITS, Bhiwani (Haryana).

Fabric code	Fabric type Jute: Acrylic	Knit (Stitch)	Fabric count courses	Wales	Fabric thickness (mm)	Fabric weight (g/m <sup>2</sup> )
A	0:100	Plain	16	13	9.4	242
B	10:90	Plain	15	11	10.5	256
C	20:80	Plain	14	11	10.9	266
D	30:70	Plain	13	11	11.6	280
E	40:60	Plain	12	11	12.2	300
F	50:50	Plain	10	9	14.0	339
G	100:0	Plain	8	7	15.0	413

### Results and Discussion

The effect of blend composition on various fabric properties have been given in Table 1 and 2. Fabric count, bursting strength, abrasion/wear, tear value and crease recovery were found to be maximum for 100% acrylic and decreased with the addition of jute and being least for 100% jute. This is due to acrylic being finer, stronger and has more elongation as compared to jute. Fabric thickness, weight, flexural rigidity, moisture regain and shrinkage were found to be maximum for 100% jute and least for 100% acrylic. This is due to jute being coarser and stiffer fibre with low extension.

**Conclusion:**

It is clear from results that blending of jute with acrylic was found to improve certain properties of jute and that of acrylic. Jute-acrylic blend of proportion (20:80) followed by (30:70) are found best of knitted apparels. On the basis of laboratory test, these blends were found to have good strength, wear and tear value, crease recovery, flexural rigidity, moisture regain and having less shrinkage.

Fabric code	Blend Composition	Bursting strength	Flexural rigidity	Abrasion/wear & tear (cycles)		Crease recover (°)		Moisture	Area shrinkage
				Course	Wales	course	wales		
	J:A	(kg/cm <sup>2</sup> )	(mg cm)					%	%
A	0:100	17.0	32.90	505	490	150	150	1.96	0.00
B	10:90	15.5	38.43	699	650	145	140	3.28	0.25
C	20:80	12.8	61.17	800	790	135	130	4.18	0.56
D	30:70	10.5	98.10	855	840	125	125	5.22	0.90
E	40:60	8.6	139.59	969	950	120	115	6.06	1.02
F	50:50	6.0	321.48	1000	975	110	105	9.09	1.44
G	100:0	3.2	460.79	1300	1265	95	90	11.09	5.00
<b>Calculated</b>		6.02*	2.83*	9.90*	9.76*	18.40*	16.89*	5.15*	2.2

J=Jute; A=Acrylic ; \*= Significant at 5 per cent level

These blends when assessed for subjective evaluation were found to be good in texture, luster, aesthetic appeal and woollen feel. With the addition of more than 30 per cent jute, preference of blends for apparels decreased and increased for blanket, carpet and rugs. The calculated cost of these blends (20:80 and 30:70) on the basis of raw fibres was Rs.84 and Rs.76/KG respectively. Hence, these were recommended as best blends on the basis of the study conducted.

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