



EVALUATION OF JUTE-ACRYLIC BLENDED FABRICS

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ABSTRACT

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, lustre, aesthetic appeal and woollen 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.

INTRODUCTION

Traditionally, pure wool was used for knitted fabrics. The cost of wool is very high. Therefore experiments are carried out to find some low priced substitutes for knitted fabrics and Jute-Acrylic can be one of the substitutes. Like wool, acrylic fibres are valued for their warmth, softness of hand, good bulk and pile qualities. Whereas, jute as a textile fibre has inherent drawbacks for functional end uses, but a drive like blending may overcome these drawbacks and produce quality products to promote functionally acceptable merchandise in domestic and export markets. It will be economical also, as jute- acrylic blend will have low cost as compared to the pure wool & acrylic. Therefore, this study will provide a blend with an important role in the woollen industry by using jute, a cheap, natural and eco- friendly fibre.

REVIEW OF LITERATURE

1. Vaidya (1985) conducted a study on 'Recent developments in the modification of acrylic fibres'. His findings revealed that acrylic fibre has become popular because of its wool like feel, bulking value, chemical inertness and resistance to weathering. moulds and bacteria. Biocomponent acrylic fibres are now well established for the preparation of knitwears, carpets, imitation furs.
2. Sett and Sur (1992) reported that jute is now being considered for other uses wherein cotton, wool and synthetic fibres are used. Dref-2 spinning system appeared to be suitable for spinning jute blended yarns-jute/cotton (70/30) and jute-viscose (60/40). The chief merits of these yarns were- high rate of production, lower cost of production, better regularity, less hairiness, better fabric appearance, higher bulk, better feel and greater breaking extension. Thus Dref spinning system was much more suitable for production of jute blended yarn with much superior quality and for production of value added jute blended yarns and fabric for diverse end uses.
3. 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.
4. Aditya et al. (1996) stated that when jute was blended with viscose rayon in different proportions of 80:20 and 50:50, spun in conventional jute and cotton systems, lower tenacity of the jute-blended yarns was observed which was due to the wide difference in the loading elongation, behaviour of the jute and viscose rayon components. Jute blended yarn produced in the new ring spinning technology system were found to be well comparable with the cotton yarns of similar counts.
5. Arya, N. et al (2014) assessed the influence of the yarn properties and dimensional properties of cotton /polyester blends in on tightness factor of the fabric. Blend influence on dimensional properties of weft knitted fabrics in different ratios was studied. The P/C blended yarn in the proportions 0:100, 20:80, 40:60, 50:50, 60:40, 80:20 and 100:0 was produced by OE spinning system. The yarns produced in different ratios were used to study various yarn parameters i.e.

yarn diameter, yarn tenacity and elongation and blended knitted fabric was produced to study the dimensional properties such as loop length, stitch density, tightness factor, loop shape factor and area shrinkage. The study revealed that blending of cotton with polyester in different ratios was found to improve certain properties of cotton as well as polyester yarn. The dimensional properties- Loop length and area shrinkage decreased significantly where as stitch density and tightness factor increased significantly with the increased proportion of polyester in the blend.

6. Iqbal, M.A., Chowdhury, N., Ali, M.T. and Akter, S (2019) Fabrics constructed with jute- acrylic blended yarns are good for clothing used for winter wears. Necessary chemical treatments are given to modify their chemical properties. Knitted fabric with the commercially available jute and acrylic yarn and chemically modify the fabric in order to improve its properties and appearance, mainly its crease resistance, drape, bursting strength and thermal conductivity and to interpret the results as well as to sew the garment.

Materials and methods

Blended yarns (of 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 & tear (ASTM D 1175-64), flexural rigidity (ASTM D 1388-64), crease recovery (ASTM D 1295-67), moisture regain (ASTM D 2654-67) and shrinkage at TITS, Bhiwani, Haryana. Subjective evaluation from 30 experts was undertaken to assess the consumer acceptability (Preference) regarding fabric samples. Three point scale was made as a tool for subjective evaluation to assess the characteristics including texture, lustre, aesthetic appeal and woollen feel. The preferences given by the respondents were assigned 3, 2 and 1 scores as good, medium and poor respectively. Mean Score was calculated for the consumer preference.

Table 1: Analysis of fabrics

Blend composition	Fabric count		Thickness (mm)	Weight (g/m²)	Bursting strength (kg/cm²)	Flexural rigidity (mg-cm)	Abrasion (cycles)	
	Courses	Wales					Course	Wales
0:100	16	13	9.4	121	17.0	32.90	505	490
10:90	15	11	10.5	256	15.5	38.43	699	650
20:80	14	11	10.9	266	12.8	61.17	800	790
30:70	13	11	11.6	280	10.5	98.10	855	840
40:60	12	11	12.2	300	8.6	139.59	969	950
50:50	10	9	14.0	339	6.0	231.48	1000	975
100:0	8	7	15.0	413	3.2	460.79	1300	1265

Blend composition	Crease recovery(*)		Moisture regain	Area shrinkage	Texture (wms)	Lustre (wms)	Aesthetic appeal	Woollen feel	Fibre Cost
	Courses	Wales	(%)	(%)			(wms)	(wms)	(Rs/kg)
0:100	150	150	1.96	0.00	3.0	2.8	3.0	3.0	100
10:90	145	140	3.28	0.25	2.8	2.8	3.0	2.8	92
20:80	135	130	4.18	0.56	2.6	2.7	3.0	2.6	84
30:70	125	125	5.22	0.90	2.5	2.6	3.0	2.5	76
40:60	120	115	6.06	1.02	2.0	2.5	2.8	2.0	68
50:50	110	105	9.09	1.44	1.2	1.9	1.9	1.5	60
100:0	95	90	11.09	5.00	1.0	1.6	1.5	1.0	20

Table 2

Consumer's acceptability of fabrics

Fabric code	st fabrics J:A	Texture WMS	Lustre WMS	Aesthetic appeal WMS	soollen feel WMS
A	0:100	3.0	2.8	3.0	3.0
B	10:90	2.8	2.8	3.0	2.8
C	20:80	2.6	2.7	3.0	2.6
D	30:70	2.5	2.6	3.0	2.5
E	40:60	2.0	2.5	2.8	2.0
F	50:50	1.2	1.9	1.9	1.5
G	100:0	1.0	1.6	1.5	1.0

J = Jute

A = Acrylic



Plate 1. Jute:Acrylic (20:80) fibre



Plate 2. Jute:Acrylic (30:70) fibre

Results and discussion

The effect of blend composition on various fabric properties have been given in Tables 1 and 2. Fabric count, bursting strength, abrasion/wear and tear value and crease recovery were found to be maximum for 100 per cent acrylic and decreased with the addition of jute and being least for 100 percent 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 per cent jute and least for 100 percent acrylic. This is due to jute being coarser and stiffer fibre with low extension. It is evident from table 2 that A(100% acrylic), B(J:A/10:90), C(J:A/20:80), D(J:A/30:70) and E(J:A/40:60) fabric samples were found to have good texture, lustre, aesthetic appeal and woollen feel whereas F fabric had poor texture and medium lustre, aesthetic appeal, woollen feel but G(100% Jute) had poor texture, lustre, aesthetic appeal and woollen feel.

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); Plate 1 & 2 respectively; were found to be best for knitted apparels. On the basis of laboratory tests, these blends were found to have good strength, wear and tear value, crease recovery, flexural rigidity, moisture regain and having less shrinkage. These blends when assessed for subjective evaluation were found to be good in texture, lustre, aesthetic appeal and woollen feel. The calculated cost of these blends (20:80) and (30:70) on the basis of raw fibres was Rs. 84 and Rs. 76 per kg respectively. Hence, these were recommended to be most suitable for hosiery.

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