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THE EMERGENCE OF JUTE AS A VITAL TEXTILE FIBER

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ABSTRACT

Consumer preferences have shifted from clothing to items like blankets, carpets, and rugs, particularly when these products contain more than 30% jute. However, when blended fabrics contain over 50% jute, consumer satisfaction regarding the fabric's texture, shine, aesthetics, and resemblance to wool tends to diminish. Expanding the range of jute-based products available to the domestic market can unlock untapped potential in India.

Jute fiber does come with some inherent drawbacks, including its coarseness, inability to withstand washing, and limited resistance to wrinkling. These shortcomings can be addressed by blending jute with other fibers to create hybrid textiles. Practical experience has revealed that jute has favorable properties for specific end uses, and combining it with synthetic and natural fibers can yield products with advantageous characteristics. Not all end uses necessitate all the properties of jute and other fibers.

For the development of specific products tailored to particular end uses, it's essential to identify the right properties and appreciate the relative advantages of jute and synthetics through skillful blending. In certain cases, it might be fitting to manufacture union fabric or blends of jute and synthetics in a way that combines the strengths of synthetics and jute while compensating for their weaknesses. Therefore, it's high time for the jute industry to adopt a multifiber blending approach to diversify.

Acrylic fiber has a unique role in the knitting industry, and the blending of jute with acrylic enhances the knitting efficiency of jute. The expanded application of jute and the increased acceptance of its products, thanks to their eco-friendly nature, instill fresh optimism for fully harnessing its potential.

INTRODUCTION

Today, the textile industry is flooded with a plethora of blended yarns designed to meet the ever- growing demands of consumers. In a diverse country like India, where temperature and humidity extremes prevail, garments crafted from natural fibers or a fusion of synthetic and natural fibers are certainly favored over purely synthetic options, driven by environmental and health concerns. These blended fabrics not only cater to clothing needs but also offer a touch of elegance, fashion, and functionality. A key factor propelling the dominance of blended fabrics in the textile industry is their capacity to set trends in textile fashion and provide superior utility performance. Blending synthetic and natural fibers addresses the raw material shortage of natural fibers, offering a cost- effective alternative, which is particularly critical in the phase of a rising population.

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Historically, knitted fabrics relied heavily on pure wool, which comes at a steep cost. The woollen industry faces various challenges, including a shortage of high-quality wool fiber, skilled technicians, and high production costs. Hence, experiments are underway to discover more cost- effective alternatives for knitted fabrics, with acrylic emerging as a promising substitute.

Acrylic's contribution to the knitting industry is distinctive. As a member of the synthetic fiber family, acrylic boasts a wool-like handle, high resilience, and strength, making it suitable for knitting and weaving applications across various textile products. Acrylic's cost-effectiveness has led to its adoption, replacing wool in many applications. An estimated 60 percent of all acrylic fibers are employed in knitting, 29 percent in weaving, and 11 percent in carpets. Acrylic fiber finds applications in hand-knitting yarns, hosiery, blankets, and woven suitings in India (Sharma and Mishra, 1984). Over the years, India has witnessed a remarkable increase in acrylic fiber production, from 7,890 tonnes in 1980 to 80,000 tonnes in 1990. Acrylic fibers are valued for their warmth, softness, bulk, and pile qualities, similar to wool, yet they offer better resistance to abrasion, chemical exposure, and heat and light degradation (Bajaj and Kumari, 1987).

Jute, as a textile fiber, possesses certain inherent limitations for functional end-uses. However, blending endeavors are underway to overcome these shortcomings and produce quality products that cater to the functional needs of both domestic and export markets. It is now established that jute can be an integral component of fabrics, garments, and furnishings. The expanded utilization of jute, coupled with its wider acceptance due to its eco-friendly characteristics, kindles hope for fully unlocking its potential. The golden fiber may indeed have a golden future if intensive research can address its weaknesses and make it appealing to a broader range of consumers.

Currently, jute, blended, and union fabrics are gaining momentum in both national and international markets for unconventional applications. The incorporation of jute into clothing, furnishings, luggage, and fashion garments may open up new avenues for jute consumption. As the blending of natural and synthetic fibers yields products with a broader range of new fashion and functionality, Jute-Acrylic combinations hold significant promise. Although jute-synthetic fiber blends have shown potential in diversifying end products, garnering interest among buyers of jute products, limited research has been conducted on Jute-Acrylic blending. Furthermore, blending jute with other fibers enhances its knitting efficiency.

Despite extensive research by various institutes to incorporate jute into non-conventional and hosiery products, there remains room for further research with recent technological advancements to develop a wider range of jute-based products. Success in testing blended yarns is often gauged by the improvement in one or more characteristics of the material,

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leading to the production of suitable blended yarns, making testing a sound policy to explore different proportions for further production processes.

Testing may help consumers access new blends in the world of fashion, offering potential relief to the Indian woollen industry. Jute may be considered not only a significant textile fiber but also a raw material for environment friendly products that contribute to maintaining ecological balance.

Importantly, Jute-Acrylic blends can be economical, offering a lower cost alternative compared to wool and acrylic. Techno-economic analysis reveals that jute and jute blended fabrics, as well as diversified products, can be 5 to 25 percent cheaper than conventional products made from cotton, wool, and polypropylene. This cost difference is primarily driven by the lower manufacturing cost of jute yarn compared to other fibers, thus influencing the overall cost of the end product (Prem and Kansal, 1993). Blending Jute with Acrylic can also provide new opportunities for farming families engaged in jute-related activities, offering livelihood options. Therefore, research on Jute-Acrylic blending may have a significant role to play in the woollen industry, alleviating raw material shortages and promoting the use of eco-friendly fibers.

Materials and methods

Blended yarns (jute white variety grade 2 and acrylic fibre) were procured from the 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 with 9" diameter (without dial) at TTTS Jute Extension Centre, Ludhiana (Punjab).

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/over- all appearance and woollen feel.

The preferences given by the respondents were assigned 3, 2 and 1 scores as good, medium and poor respectively. To assess the suitability of fabrics for different uses, respondents were asked to give their order of preference. The highly preferred fabric was assigned a score of 7, followed by 6, 5, 4, 3, 2, and the least preferred was scored as 1. Mean score was calculated for the consumer preference.

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Table 1. Consumer's acceptability of fabrics

Fabric Code	Test Fabrics J:A	Texture WMS	Lustre WMS	Aesthetic appeal WMS	Woollen 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

WMS= Weighted mean
score 0-1.0= Poor
1.0-2.0= Medium
2.0-3.0= Good

Results and discussion

Data on consumer acceptability and consumer preference have been presented in the tables. It is evident from the table 1 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. Based on consumer preference, it was found that with the increase of acrylic proportion, the blends were found to be suitable for sweater, scarf, muffler, woollen blouse, woollen shirt/phiran, woollen gown, slex, socks, undershirt and shawl. But with the increase in jute proportion (more than 30%), the preference shifted from apparels to blanket, carpet and rugs.

Based on subjective evaluation and laboratory tests, jute-acrylic blends, (20:80 followed by 30:70) were found to have good overall appearance and serviceability. These blends were found to be suitable for sweater, scarf, muffler, slex, shawl and socks due to their warmth, lustre, texture and aesthetic appeal.

Blending of jute with acrylic was found suit- able for hosiery purposes. Jute- acrylic blends can be a substitute for wool and are economical too. The consumer will have new blends in the fashion race which further may provide a great relief to the Indian woollen industry. Jute, then will be looked upon not only as a major textile fibre, but also as a raw material for manufacturing products which help environment and maintain ecological balance.

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Table 2. Suitability of blends for different uses: consumer preference

Items	A	B	C	D	E	F	G
Sweater	7.0	6.6	6.2	4.6	2.4	2.5	1.0
Scarf	7.0	6.8	6.5	4.5	4.2	2.0	1.0
Muffler	7.0	6.8	6.5	4.5	4.2	2.5	1.0
Jacket	7.0	5.0	6.2	5.5	6.0	5.1	2.0
Woollen shirt/phiran	7.0	6.6	6.2	5.8	5.1	2.0	1.0
Woollen blouse	7.0	6.6	2.0	2.6	2.2	1.0	1.0
Woollen gown	7.0	6.6	6.0	5.7	4.5	1.0	1.0
Slex	7.0	6.5	6.5	4.0	2.5	1.0	1.0
Socks	7.0	6.8	6.0	4.2	4.2	1.0	1.0
Undershirt	7.0	4.0	1.0	1.0	1.0	1.0	1.0
Shawl	7.0	6.8	4.8	4.8	4.5	1.0	1.0
Carpet	1.0	1.0	1.0	1.0	1.0	6.0	5.7
Rugs	1.0	1.0	1.0	1.0	1.0	6.0	7.0
Blankets	1.0	1.0	1.0	1.0	1.0	7.0	1.0
Curtains	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sofa Cover	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cushion Cover	1.0	1.0	1.0	1.0	1.0	1.0	2.0

1.0-3.0= Not suitable
3.0-5.0= Suitable
5.0-7.0= Most suitable
A= 100% acrylic
B= 10:90 (J:A)
C= 20:80 (J:A)
D= 30:70 (J:A)
E= 40:60 (J:A)
F= 50:50 (J:A)
G= 100% jute

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