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ASSESSING PHYSICAL AND COMFORT PROPERTIES OF THE UNION FABRICS PREPARED FROM NON-CONVENTIONAL (ERI AS AHIMSA) SILK AND CONVENTIONAL (MUGA AND TUSSAR) SILK YARNS

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ABSTRACT

Nowadays, the fashion business places a premium on long-term viability and environmental friendliness. These qualities are what set apart the Ahimsa silk (Eri Silk) and the hand spun cotton yarn. Suitability characteristics of Ahimsa silk (Eri) union textiles were compared to those of conventional silk (Muga, Tussar) union fabrics. Consequently, Khadi cotton, ahimsa silk (Eri Silk), and conventional Silk threads were woven together to create union textiles (Muga Silk and Tussar silk). Khadi cotton, Ahimsa silk, and conventional silk union textiles were evaluated for their physical attributes. The purpose of the experiment was to create three different proportions of union textiles. Comparison of the physical qualities of Eri*Cotton in the blends of 33:67, 50:50, and 67:33. Ahimsa silk is made in a sustainable, animal-friendly, and environmentally-friendly way. Another kind of eco-friendly fabric is one made from cotton that has been hand-spun and woven. Thus, three different ratios of 33:67, 50:50, and 67:33 cotton to Ahimsa (Eri) silk to Conventional silk were used to weave union textiles.

KEYWORDS: Ahimsa silk, conventional silk, cotton, sewability parameters and union fabrics.

INTRODUCTION

The textile industry can only continue to thrive if its final products are diversified to satisfy both domestic and foreign markets. A blend, union, or mixture is a textile material composed of two or more different types of textile fibers. To create a material with a certain physical property, to reduce raw material costs, to change and impart aesthetic characteristics, or a combination of these are all possible motivations for the creation of such union textiles.

Union fabric is a kind of fabric in which the warp and weft threads are both distinct from one another. Modern fashion trends may be accommodated by obtaining union fabric with a variety of unique effects. The silk known as Eri may be found in India. Mulberry silk, Muga silk, Tussar silk, and Eri silk are the four types of silk produced in India. Eri fibers may be readily combined with wool due to their similar fineness (14-16 microns). Since Eri is superior to wool in these qualities, it is often blended with wool to increase the fabric's softness, sheen, durability, dimensional stability, pilling characteristics, and crease resistance. Since the price of raw silk has risen, there has been a rise in demand for textiles made from silk blends and other silk mixes. Silk may be combined with cheaper fibers to create a fabric with all the desired characteristics at a lower price.

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The fiber has a staple length of around 57 mm. It may be used as a replacement for wool due to its high thermal efficiency. Eri silk is the most crystalline of all silks that aren't made from mulberries. It blends very well with wool and other fibers. The fashion industry currently benefits from the ability to develop blends or union textiles with a plethora of unique effects. Ere silk yarn, which is courser and more irregular in texture, is best suited for handloom industry and works well as shot weft. Ahimsa silk's compatibility with wool makes it a game-changer for the industry. More tensile strength and improved elongation, as well as resistance to abrasion and superior hand-feel qualities, were seen in these union made-ups.

Due to its exceptional warmth, superb drape, high absorbency, amazing stretchability, excellent resilience, water repellence, flame resistance, crispness, and superior compressional recovery, wool is in a class of its own among textile fibers.

Silk and wool blends improve the look of woolen fabrics and expand the versatility of silk fabrics. The yarn is ideal for making fleece and other warm garments. It is possible to obtain the desired effect of merging the warmth and comfort of wool with the high strength, luster, and excellent hand characteristic of silk. Since they are both derived from animals, silk and wool have many of the same chemical characteristics. Silk is a superior fiber over wool because to its fineness, luster, and strength.

LITREATURE REVIEW

Manjula Harapanahalli (2016) India has a long and illustrious history in the textile industry. Its origins are deeply rooted in the Vedic era. India has long been renowned as a source of the world's best cottons, including muslins, pashmina wool, and dazzling silks. Throughout the beginning of time, people have admired the quality of our woven goods and the skill of our weavers. The textile industry has long supported India's economy and society. Many natural fibers may be found in this nation because to its favorable climate and rich biodiversity. We've started using alternative fibers because of the growing interest in organic materials and environmentally responsible production methods. One such natural fiber that is gaining popularity among both fashion designers and vegans is Eri silk. The purpose of this essay is to learn as much as possible about Eri silk, particularly how its qualities stack up against those of the industry standard, mulberry silk.

T Sathish Kumar (2020) Silk is widely used because it contains a high-quality protein fiber. It is used for delicate purposes in many regions, including sarees, suits, drapes, and opulent decor. Choosing the amount of comfort provided by an active cloth's texture relies heavily on its functional attribute. The textile business relies heavily on the fabric's thermal properties to determine how cozy a certain cloth will be. In this article, we provide a literature review on the topic of evaluating the thermal, physical, moisture, and handling qualities of both pure silk and silk blends. The significant differences in functionality between pure silk and silk-mixed materials are highlighted, along with the resulting differences in fabric functionality. The correlation between silk and silk blends' physical, thermal, moisture, and handling qualities was also explored. Silk mixed fabric is compared to 100% silk in this review article for some of the functional features; the silk blended fabric provides more calculable results compared to the 100% s.

Mamoni Probha Borah (2018), Union fabric is a kind of fabric in which the warp and weft threads are both distinct from one another. Adding Eri silk and wool to a woolen fabric improves its visual appeal while also expanding the garment's practicality. Compared to other types of Eri, we discovered that those made from wool union fabrics had superior physio-mechanical qualities. The fly shuttle loom produced the 130 GSM and 186 GSM plain weave union textiles, and the 85 GSM Eri silk fabric. Bending lengths of 2.16cm (warp) and 2.47 cm (weft) were observed for EWU and 3.90 cm (warp) and 2.98 cm (weft) were seen for EWU1. As compared to Eri silk, both crease recovery and bending length have been trending downward. Both union textiles and Eri silk have a high UPF, however the former has a higher brightness index.

Bhardwaj, S. and Juneja S. (2012). A quaternary mixed fabric was created, and its practicality and mechanical qualities were examined throughout the experiment. These characteristics included the material's weight per square inch, crease recovery, abrasion resistance, pilling, absorbency, vapor permeability, drape, and stiffness. Weaving together jute, viscose, and polyester with cotton, we developed plain-woven union textiles in three distinct mix ratios (30/70, 50/50, and 70/30). Plain weave was used in the production of the cloth. There was 100% cotton in the warp direction and fillings of 30/70, 50/50, and 70/30 jute viscose/polyester. The cost of the product may be reduced and quality improved by using a union fabric made of 30 percent jute viscose and 70 percent polyester. Nonetheless, cotton's usage in the warp direction helped this fabric overcome its low crease recovery and water absorbency.

Gamal M. A., Hassouna A. (2014) Fabric digitization is the process of entering material data into 3D software. Given the importance of virtual fashion design in the garment business, it is imperative that the virtual environment accurately reflect the features of the fabric used to construct the garment. Sample garment assembly is a time- and resource-intensive process. Collaboration in this study suggests a strategy for determining the fabric qualities of a garment sample. This technique is an experiment meant to replicate the look of cloth being draped over a human form. Six textiles of varying weights and materials were selected at random from Egyptian markets and placed into one of two structural categories. The materials in question were draped and tested using the FAST technique, and the drape coefficient was determined in the conventional manner. The textiles were scanned into CLO3D software using the program's default settings for the study methods. Flared skirts were used digitally as fabric samples for the investigation. The example flared skirt was constructed using the angle flared skirt assembly technique at two different angles, 1800 and 900, and two different lengths, 54cm and 67 cm. Virtually built flared skirts were taken and generated in three distinct postures using CLO3D software (front, side and bottom view). As a result, all of the recorded skirts have the same simulation attributes and render values. The cloth swatch, in the shape of a voluminous skirt, was held in place by a digital mannequin.

MATERIAL AND METHOD

The purpose of this research was to compare three different ratios of Ahimsa silk to conventional silk to Cotton hand spun yarns: 33:67, 50:50, and 67:33. M/s. B. Corporation in Raipur, Chhattisgarh, was the source for both the Ahimsa silk and the conventional silk strands. The yarn was then used to create three distinct sets of union

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fabrics (33:67, 50:50 and 67:33). Hand spun cotton yarns combined with either Ahimsa (Eri) silk or conventional (Muga or Tussar) silk. For these 48 reeds count plain weave fabric, the yarns were woven in three different ratios: 33:67, 50:50, and 67:33. The weaver's services center woven the silk-Khadi cotton union textiles. Ahimsa (Eri) silk and Conventional (Muga and Tussar) silk union fabric's sewability was evaluated. Before beginning seam manufacturing, the quality of cotton with Ahimsa (Eri) silk and conventional (Muga and Tussar) silk union textiles was evaluated. The sewability criteria were examined by stitching the textiles. The following sewability factors were:

Table 1: Methods of measuring sewability

Sewability parameters	Standard test Methods
Seam puckering	ASTM 1683 -04
Seam stiffness	DIN EN ISO
Seam thickness	DIN EN ISO

For the seam strength test, the ASTM 1683-04 technique requires a minimum fabric weight of 270 g/m2 for both Ahimsa silk and Conventional silk union textiles, a minimum thread density of 12+1/2 stitches per inch, and a minimum needle size of 14.

Table 2: Union Fabrics

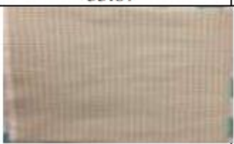
Samples and Ratios	33:67	50:50	67:33
Muga*Cotton			
Tussar*Cotton			
Eri*Cotton			

Table 2 displays the research examples of union textiles created using 33:67, 50:50, and 67:33 ratios of Ahimsa and Conventional silk yarns with Cotton hand spun yarns.

DATA ANALYSIS

Table 3: Seam Puckering of Prepared Union Fabrics

Seam puckering (%)			
Union fabrics/Blend ratio	**33:67**	**50:50**	**67:33**
Cotton : Eri	4.98	4.85	0.42
Cotton : Muga	6.42	5.43	0.91
Cotton : Tussar	10.45	6.85	6.04

The findings reveal that seam puckering is lowest (0.42%) for Cotton: Eri67:33 and highest (10.45%) for Cotton: Tussar33:67. Cotton: Eri, being heavier than Cotton: Muga and Cotton: Tussar union fabrics, suffers less from seam puckering. Seams are less likely to pucker when using a heavier weight cloth.

Table 4: Seam Stiffness of the prepared Union Fabrics

Seam stiffness (cm)			
Union fabrics/Blend ratio	**33:67**	**50:50**	**67:33**
Cotton : Eri	21.58	23.56	25.22
Cotton : Muga	29.60	29.60	21.44
Cotton : Tussar	26.87	29.84	27.64

The preceding data demonstrates that the seam stiffness of Cotton: Tussar 50:50 is the greatest of all the fabrics tested (29.84cm). Cotton: Muga 67:33 has the softest seam stiffness rating (21.44cm). Cotton: Tussar and Cotton: Muga point to greater seam stiffness due to fabric weight. Cotton: Eri is heavier than other union materials, which is why its seams aren't as rigid.

Table 5: Seam Thickness of the Prepared Union Fabrics

Seam thickness (mm)			
Union fabrics/Blend ratio	**33:67**	**50:50**	**67:33**
Cotton : Eri	1.07	1.03	1.04
Cotton : Muga	0.94	0.93	0.98
Cotton : Tussar	0.89	0.92	0.89

The seam width of all the ready-made union fabrics is shown in the above table. Consistent strands Cotton: Eri 33:67 had a seam thickness of 1.07mm, Cotton: Muga 67:33 was 0.89mm, and Cotton: Tussar 33:67 was also 0.89mm.

Table 6 Crease Recovery

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Union Fabrics		Muga*Cotton			Tussar*Cotton			Eri*Cotton		
Ratios		33:67	50:50	67:33	33:67	50:50	67:33	33:67	50:50	67:33
Properties	Crease Recovery	178.7	193.7	187.0	199.2	183.2	182.0	186.6	183.7	211.5

The ability to recover from creases after being ironed or laundered is a desirable quality in clothing. The crease recovery angles of all the prepared union fabrics were shown in the preceding table. Less upkeep is required because of the increased crease healing. Common threads the highest value of crease recovery was observed in Eri*Cotton (67:33), then Tussar*Cotton (33:67) with a value of 199.2, and the lowest value of crease recovery was revealed by Muga*Cotton (33:67). Statistical analysis revealed that the crease recovery of Eri*Cotton was superior to that of conventional silk (Muga*Cotton, Tussar*Cotton) union textiles.

Table 7 Pilling Resistance

Union Fabrics		Muga*Cotton			Tussar*Cotton			Eri*Cotton		
Ratios		33:67	50:50	67:33	33:67	50:50	67:33	33:67	50:50	67:33
Properties	Pilling 125 Rubs	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5
	Pilling 1000 Rubs	4	4	4	4-5	4-5	4-5	4	4	4
	Pilling 5000 Rubs	4-5	4-5	4-5	4	4	4	3-5	3-5	3-5

Performance, cleanliness, and longevity of use are all factors that benefit from textiles that resist pilling. Table 7 displays the pilling resistance of all man-made materials. Among the test samples, it is clear that all three ratios of Muga*Cotton, Tussar*Cotton, and Eri*Cotton exhibit considerable pilling, with values of 125 rubs, 4, and 5, respectively. The maximum value of pilling (4-5) was seen for Tussar*Cotton in all three ratios at 1000 rubs, while the lowest value was observed for Eri*Cotton at 5000 rubs. These findings suggest that all union fabrics are mutually compatible due to their increased pilling resistances.

Table 8 Drape Coefficient

Union Fabrics		Muga*Cotton			Tussar*Cotton			Eri*Cotton		
Ratios		33:67	50:50	67:33	33:67	50:50	67:33	33:67	50:50	67:33
Properties	Drape Coefficient Front	62.4	57.4	56.6	59.2	60.6	67.4	56.86	54.1	64.1
	Drape Coefficient Back	64.9	58.1	51.3	64.1	65.4	63.7	50.99	54.4	55.1

The overall result, the design's impact, and the way the garment drapes are all affected by the drape coefficient. As shown by the data, there is no statistically significant difference in the drape coefficients of Ahimsa silk and conventional silk union fabric, making it suitable for usage in fashion items.

Table 9 Assessment of seam strength of Union fabrics

Union Fabrics		Muga*Cotton			Tussar*Cotton			Eri*Cotton		
Ratios		33:67	50:50	67:33	33:67	50:50	67:33	33:67	50:50	67:33
Seam Strength	Warp direction	144.3	142.9	180.2	204.2	208.6	199.9	225.8	241.0	259.9
	Weft direction	159.0	155.6	213.7	198.7	204.0	217.0	189.3	177.7	249.7

The overall result, the design's impact, and the way the garment drapes are all affected by the drape coefficient. The front face of the Tussar*Cotton (67:33) fabric had the greatest drape coefficient (67.4), whereas the front face of the Eri*Cotton (67:33) fabric had the lowest (54.1). Tussar*Cotton (50:50) and Muga*Cotton (33:67) showed the maximum drape coefficient of 65.4 and 64.9, respectively, on the reverse side of the fabric, while the lowest value discovered was 51.3 for Muga*Cotton (33:67). As shown by the data, there is no statistically significant difference in the drape coefficients of Ahimsa silk and conventional silk union fabric, making it suitable for usage in fashion items.

CONCLUSION

The results of this research demonstrate that Eri*Cotton (67:33) had the best crease healing. Fabrics made from the Ahimsa silk-cotton union are manufactured in an environmentally sustainable manner; as a result, they are robust, comfortable to wear, and suitable for use throughout the year. Developed union textiles in the 33:67, 50:50, and 67:33 ratios show outcomes in terms of sewability criteria, as shown by the results. When compared to other union materials, Cotton: Muga and Cotton: Eri revealed the thickest seams. Seam pucker was also minimal in cotton Eri union fabrics. As compared to Cotton: Muga and Cotton: Tussar union fabrics, Cotton: Eri union textiles had better sewability metrics. Because of this, we can say that Cotton: Eri union fabrics perform better on all measures of sewability.

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