Original Research Paper

Volume-9 | Issue-3 | March-2019 | PRINT ISSN - 2249-555X

Social Science

ASSESSMENT OF SEWABILITY PARAMETERS OF AHIMSA AND CONVENTIONAL SILK UNION FABRICS

Neelam Sharma — Research Scholar, Department of Fashion and Textiles, IIS (Deemed to be University), Jaipur

Dr. Minakshi Jain* — Associate Professor, Govt. Girls College, Chomu, Jaipur *Corresponding Author

Dr. Radha Kashyap — Professor, Department Fashion and Textiles, IIS (Deemed to be University), Jaipur

ABSTRACT Sustainability and eco-friendliness are the two important aspects of today's fashion industry. Ahimsa silk (Eri Silk) and hand spun cotton yarn confirm these aspects. Comparison of sewability parameters of Ahimsa silk (Eri) and Conventional Silk (Muga, Tussar) union fabrics has been accomplished in this research. Objective of the study was to compare sewability parameters of union fabrics. These fabrics were tested for their seam strength, seam slippage and seam efficiency. Union fabrics were prepared from 3 types of silk yarns – Ahimsa silk (Eri), Conventional silk (Muga and Tussar) with hand spun cotton yarn in three different ratios, viz. 33:67, 50:50 and 67:33. The results indicate that union fabrics produced by Ahimsa silk with cotton were compatible to the union fabrics produced by conventional silk with cotton yarns in their sewability parameters, so these should be preferred for construction of various fashion garments and textile products.

KEYWORDS : Ahimsa silk, conventional silk, hand spun cotton, sewability, union fabrics.

INTRODUCTION

Silk is the fine thread with which a silkworm spins its cocoon. The silkworm pupates in its cocoon and emerges as a moth. The thread which is produced by the spinning glands of the silkworm is the finest and strongest natural fiber in the world. Silk is wrinkle and tear resistant, and dries quickly and its smooth surface resists soil. Ahimsa silk fabric comely knows as Eri silk is strong and durable with a typical texture. Ahimsa silk fabric is similar to cotton fibre and has unique aesthetic appeal. As silk possesses excellent thermal property, closer to wool, silk is mainly utilized for manufacture of shawls, jackets and blankets. It offers good blending possibilities with other fibres like wool, rayon and polyester (Kulkarni, 2007). Muga silk is one of the unique and rarest silk found only in Assam. Muga silk thread is derived which is rare with its texture, luster and durability. Tussar silk is valued for its rich texture and natural deep gold color. It is obtained from silk worms that do not breed on mulberry trees. Tussar silk less expensive and durable. Cotton fabric is one of the world's oldest known fabrics. Cotton fabrics wrinkle very easily, are comfortable to wear and have good absorbency. It is known for its softness, shrinkage, versatility and lightness (Goff, 2017).

Union fabrics are the fabrics where in the fibre content of warp is different from that of weft. (http://mytextilenotes.blogspot.com/, 2011). Blends or union fabrics can be created with variegated novelty effect that caters to the fashion world today. Weaving of such fabrics has opened a new era with limitless possibilities in the field of textile, in turn in the fashion world. Thus considering the properties of Ahimsa (Eri) and conventional silk (Muga and Tussar) and the cost of hand spun cotton yarn, an attempt is made in the present study to weave hand spun cotton yarn with Eri, Muga and Tussar silk yarns and assess its properties so that even a common person can enjoy the unique richness of silk with cotton fabric.

Seaming is the most valuable technique for joining two or more piece of fabrics. Consumer evaluates seam quality as the seam appearance and durability after wear, however, the manufacturer evaluates the seam quality during product development. The quality of seam depends on seam strength, seam efficiency and seam slippage.
The Ahimsa and conventional silk union fabrics obtained will offer flexibility in choosing varieties of fabric with cost effective yet attractive fabric. Therefore, the combination of the cotton with Ahimsa silk and Conventional silk will reduce the cost of fabric as well as weight to the fabric.

OBJECTIVES OF THE STUDY

The Objectives Of The Present Study Are:

- To prepare union fabric of Ahimsa silk (Eri) and conventional silk (Muga and Tussar) yarns with hand spun cotton yarn in different ratios.
- To assess and compare the sewability parameters of the prepared Ahimsa and Conventional silk union fabrics.

REVIEW OF LITERATURE

The literature review is a critical step in the research process. A literature is reviewed by the researcher, which gives an idea of the work done in the field of the study and help in keeping in touch with the recent developments.

Gautamand Goel (2014) found the properties of Eri silk and yak hair blended fabrics. Objective of the study, assess the physical properties of pure and blended Eri silk and yak hair and the suitability of blended yarn for increased luster and strength and as a fabric. In this study, hand spun yarn of pure and blended Eri silk and yak hair were used in the ratio of 65:35, 50:50 and 35:65 to prepare woven fabric on hand loom. Kumauni shuttle loom was used for twill weaving the fabric. The result revealed that fabric thickness was 0.55, 1.56, 1.02, 1.02 and 0.73 mm respectively. Value indicates that with the increase in proportion of yak fibers. This may be due to the fact that yak fibers are fluffy in nature. The combination of Eri silk: yak hair (50:50) was found ideal as it resulted in easy blending with proportionate properties of both the fibers at a moderate cost. The blending of Eri silk with yak hair can be utilized to manufacture diversified products. The fact that cotton is a natural fiber and it has good moisture absorbency.

Pant and Jain (2014) analyzed the comfort and mechanical properties of cotton and cotton blended knitted Khadi fabrics are knitting in the study for Khadi cottage industry. Construct cotton and cotton: polyester (60:40) blended hand spun yarns of 20s count was purchased from the Khadi Gramodhyog of Kaladera, Jaipur. Fabrics were prepared on flatbed cotton hosiery machine. Result found that cotton yarn was found to be finer than cotton: polyester yarn. Cotton fabric shows less abrasion resistance than cotton polyester blended fabrics. Pilling tendency in cotton: polyester blend was highest than in pure cotton knit fabric. The cotton knit fabrics were lower thermal conductivity as compared to cotton: polyester knitted fabrics.

Hasan (2016) examined the effect of sewing thread count for different types of seam strength. 100% cotton fabric and twill fabric with polyester thread was used. High speed lockstitch machine selected for the fabric stitch. Results found that superimposed seam had maximum seam strength and seam strength of lapped seam was minimum. Sewing thread Tex-27 most suitable for the fabric stitch when sewn by super imposed seam and sewing thread Tex 27 was the worst with lapped seam for producing the seam. Bound seam shown maximum seam strength of fabric and lapped seam exhibited minimum seam strength when using Tex 60 sewing thread. Average seam strength for superimposed seam increases with the increment of sewing thread size. Sewing thread directly affects seam strength as well as seam quality. For better quality of seam strength of the product, selection of appropriate thread size and count is more important.

Shehata (2015) stated the effect of the juxtaposition of specific materials on some seam properties. Three different types of fabrics (satin, chiffon and tulle) were sewn together for wedding and soiree dresses. Seam strength, slippage, and bending length and other properties were assessed. Result showed that the highest seam strength shows by Satin x Chiffon fabric and Chiffon x Tulle fabric had lowest seam strength. Material plays an important role for the elongation. The maximum elongation was shown by sewing fabric Chiffon x Tulle with the increase in stitch density. Seam elongation is an important factor of seam durability. The seam pucker was higher for Satin x Chiffon and Satin x Tulle fabric type. Needle count and fabric thickness had significant effect on seam pucker. Suitable fabric density must be used to get good appearance and drape and to avoid seam puckering.

Akter and Khan (2015) assessed effect of stitch types and sewing thread types on seam strength and efficiency of cotton apparel. Objective of the study, investigate the performance of seams constructed with different sewing threads. Super imposed seam and 4 different threads were selected for the seam construction for the study. These threads are used in the apparel industry. Results indicated that the warp direction of fabrics is stronger as compare to weft direction and weft threads stretch more than warp threads. Stitch type 301 found with better seam strength than to stitch type 304. Polyester-wrapped thread with a polyester filament core and Polyester core spun with cotton wrap threads shows good seam strength as compare to Polyester core spun with cotton wrap and 100% Cotton. Stitch 301 and 304 shown maximum seam efficiency in warp direction then weft direction to stitch with Polyester-wrapped thread with a polyester filament core (4). All stitches shown higher seam strength and seam efficiency in warp direction as compared to weft filling direction. Polyester-wrapped thread with a polyester filament core thread found better in seam strength and seam efficiency, Polyester core spun with cotton wrap thread had average seam strength and seam efficiency and Polyester core spun with cotton wrap threads and 100% Cotton threads found poor in both stitch type.

Bharani, Shiyamaladevi and Gowda, (2012) investigated the characterization of seam strength and seam slippage on cotton fabric with woven structures. 100% cotton fabric was used for the study and weaving in different weaves of plain, twill and satin. Seam strength and seam slippage of samples were tested on an Instron for tensile characteristics. Result revealed that breaking load of unfinished samples had higher strength than the finished samples without seam opening. Plain weave sample showed greater seam performance than the twill and satin weave fabric.

Ghani, (2011) examined the performance of seam quality in term of seam appearance and seam strength of constructed with different sewing parameters. In this study, method included five different fabric categories like: light, light to medium, medium, medium to heavy and heavy weight. A total of 45 fabrics with different weave densities, fiber types and structures were used. Result indicated the usage of thicker threads did not always give better strength and the seam appearance was also poor. A combination of finer thread with moderate strength and a medium level of stitch density according to fabric weight category provided good result for both seam appearance and strength.

Sarhan (2011) experimented of seam performance of micro polyester woven fabrics. To assess seam characteristic like seam strength, seam elongation, seam efficiency and needle penetration force with different warp densities. In this study, total 27 Plain micro-polyester woven fabrics samples were chosen. Seam type Lsa-1, Ssa-1 and Ssn-1 selected to sew the fabric samples. Sewing thread of 100% continuous filament and lock stitch machine (Juki DL-5550) with three stitch densities 3, 5, and 7 stitches per cm (SPC) chosen for the sample sewn. Average speed of sewing machine was 2850 stitch/min. Statistical results reveal that the stitch density and weft density of fabric significantly influenced the seam strength for all type of seam (LSa-1, SSa-1 and SSn-1). Weft density of fabric shown positive effect on seam strength - with increase in weft density of fabric, seam strength also increased. Stitch density showed positive effect on seam elongation. Weft density and stitch density had significant effect on the seam efficiency. If stitch density was greater in a seam, seam efficiency was also greater. Seam efficiency of SSn seam type showed highest value as compare to seam type SSa and LSa. SSn seam type found highest penetration force than SSa. Results found that the SSn seam with stitch density 7stithes/cm was indicating best performance regarding the sewing of micro polyester fabrics.

Lapere, (2006) found the effects of different fabric types and seam designs on the seams efficiency. The investigation was focused on joining parameters of fabric using a standard sewing machine. Two different seam designs were investigated on three woven fabrics made from cotton, wool and silk. The highest weight of wool fabric shows the greatest strength of fabric as compared to silk and cotton fabric. Cotton fabric revealed highest seam efficiency as compare to silk and wool fabrics. This may be attributed to the higher friction between the cotton yarn and fabric.

MATERIAL AND METHOD

The study was undertaken to evaluate fabrics prepared by union of ahimsa and conventional silk yarns with cotton hand spun yarns in three different ratios viz. 33:67, 50:50, and 67:33 respectively. After collecting the yarn, different union fabrics were woven at weaver's services centre, Jaipur. Nine different plain fabrics were woven on hand loom using fly shuttle loom with reed count 48. After weaving of the Ahimsa silk union fabrics, the fabric samples were tested to determine their sewability parameters. The sewability parameters of Ahimsa and Conventional silk union fabric were assessed and compared. Sewability parameters assessed were:

Table 1 Standard test methods of the sewability parameters measured:

Sewability parameters	Standard test Methods
Seam strength	ASTM 1683 -04
Seam slippage	ASTM 1683 - 04
Seam efficiency	ASTM 1683 - 04

Selection of sewing parameters:

ASTM 1683 – 04 method asserts that if fabric mass up to 270 g/m2 then stitch density should be (4.7+1/2) stitches per centimetres or (12+1/2 stitches per inch) and needle size was Metric 90 as standard for seam preparation for seam strength test. From the table it can be observed that ahimsa silk and conventional silk fabrics weigh below 270 (g/m2) that's why stitch density 12 and needle size Metric 90 were selected for seam preparation. Tested samples were sewn by using typical sewing machine with YSC-8260 and 4000 stitches/minute.

Table 2 Sewing Specification:

Stitch type	Seam type	Needle number in Metric	Needle size in singer system	Stitch density/inch	Stitch length /mm	Sewing thread size
Lock stitch 301	Ssa-1	90	14	4.7+_1/2 stitches per centimetres (12+ ½ stitches per inch)	2	Polyester - core (Tex 40)

Specification of high speed lock stitch machine

Features	Machine Name	Country of Origin	Company Name	Machine Speed	Stitch Class	Number of thread
Specification	High speed lock stitch machine	China	Typical	4000	300	2 (1needle thread, 1 bobbin thread)

RESULTS AND DISCUSSION

The present study has been undertaken to assess assess and compare the sewability parameters of the prepared Ahimsa and Conventional silk union fabrics.

Table 3 Samples of Ahimsa and Conventional Silk Union Fabrics:

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

The union fabrics prepared by Ahimsa and Conventional silk yarns with Cotton hand spun yarns in three different ratios viz. 33:67, 50:50, and 67:33, for the purpose of study, have been shown in above table.

Table 4 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

Seam strength refers to the load required to break a seam. The results as shown in table 4 Eri*cotton (67:33) gives the highest seam strength 259.9 of warp direction of fabric and Eri*cotton (50:50) shows 241.0 value as seam strength. The lowest seam strength value was 142.9 shows by muga*cotton (50:50) in warp direction of union fabrics. As similarly eri*cotton (67:33) gives highest seam strength value 249.7 in weft direction of fabric and 204.0 value shown by tussar*cotton (67:33). Muga*cotton (50:50) gives lowest seam strength value 155.6 in weft direction of fabric.

Table 5 Assessment of Seam slippage properties 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 Slippage	Warp direction	>80 (FBS)	>80 (FBS)	>80 (FBS)	52.02 (SS)	74.94 (FBS)	>80 (FBS)	39.95(SS)	69.56 (SS)	70.66 (SS)
	Weft direction	>80 (FBS)	>80 (FBS)	75.7 (SS)	>80 (FBS)	75.84 (FBS)	>80 (FBS)	>80 (FBS)	>80 (FBS)	>80 (FBS)

FBS= fabric break at seam, SS= seam slippage

Table 5 depicts fabric break at seam and seam slippage of fabrics. Eri*Cotton (33:67) shows the lowest value for seam slippage of fabric in warp direction indicating highest seam slippage, whereas Muga*Cotton in all the three ratios, viz. 33:67, 50:50 and 67:33 illustrated highest value for fabric break at seam indicating minimum seam slippage in warp direction. In weft direction, Muga*Cotton 67:33 and Tussar*Cotton 50:50 had lowest values for fabric break at seam, indicating high seam slippage in weft direction of woven fabric.

Table 6 Assessment of seam efficiency properties 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 efficiency	75.76	69.17	81.53	49.01	43.42	50.55	58.41	77.41	56.36

Seam efficiency mainly depends upon the dimensional & surface characteristics of the sewing thread, the tensile behavior of fabrics and sewing thread, the combination of fabric and sewing thread and the machine and process parameters. As shown in table 6. It can be observed that Muga*cotton (67:33) gives highest value as seam efficiency of constructed fabric. Eri*cotton (50:50) shows 77.41 value of fabric and Muga*cotton (50:50) gives lowest value 43.42 of prepared union fabric.

CONCLUSION:

From this study it can be concluded that in Eri*Cotton shows highest seam strength. Tussar*Cotton and Muga*Cotton and Eri*cotton union fabrics are good in sewability parameters (seam strength, seam slippage and seam efficiency). Ahimsa silk*cotton union fabrics is produced by eco-friendly method and is stronger, soft to wear and durable and is good in all season. Therefore, Ahimsa silk*cotton union fabrics are as suitable for making apparel products as the union fabrics made of conventional silk*cotton. The development of union fabric can be a milestone in creation of variety in fabric types in future, especially sustainable and ethical fabric for apparel production and to the fashion and textile world. In a wider perspective, it will assist in preservation of our ecosystem and healthy environment of planet for generations. Along with this, these union fabrics are pocket friendly, so these can be serve middle income groups of the society in a better and economic way.

REFERENCES:

1. Akter, M. & Khan, M. M. R. (2015). The Effect of Stitch Types and Sewing Thread Types on Seam Strength for Cotton Apparel. International Journal of Scientific & Engineering Research, 6 (7), 198- 205.
2. Bharani, M., Shiyamaladevi, P. S. S. & Gowda M. R. V. (2012). Characterization of Seam Strength and Seam Slippage on Cotton Fabric with Woven Structures and Finish. Research Journal of Engineering Sciences, 1 (2), 41-50.
3. Ghani, S. A. (2011). Seam Performance: Analysis and Modeling. University of Manchester. 1-209. (https: //www.research.manchester.ac.uk.).
4. Goff, L. (2017). Properties of Cotton fabric. https://oureverydaylife.com.
5. Hasan, M. Z. (2016). Comparative Study on the Effect of Sewing Thread Count for Different Types of Seam Strength. European Journal of Advances in Engineering and Technology, 3 (10), 1-7.
6. Kulkarni, A. (2007). Quality Characteristics of Viscose Rayon and Eri Silk Union Fabrics. Master Thesis of Home Science, Dharwad University of Agricultural Sciences.
7. Lapere, C. (2006). The Effects of Different Fabric Types and Seam Designs on the Seams [sic] Efficiency. Honors Thesis 5.
8. Sarhan, T. M. A. (2011). A Study of Seam Performance of Micro-Polyester Woven Fabrics. Journal of American Science, 7 (12), 41-46.
9. Shehata, Z. (2015). The Study of the Effect of the Juxtaposition of Specific Materials on Some Seam Properties. Life Science Journal, 12 (3), 195-203.

Websites:

10. http://commons.emich.edu/honors/53
11. (http://www.fibre2fashion.com/)
12. http://mytextilenotes.blogspot.com/2011/10/difference-between-blended-fabrics-and.html