EVALUATION OF FUNCTIONAL PROPERTIES OF ERI AND ERI UNION FABRICS

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Abstract

A study was performed on the functional properties of Eri union fabrics. Eri yarns of 2/60s was used as warp and cotton and polyester yarns of 2/40s used as weft to construct the Eri union fabrics using three different weaves namely plain, twill and satin. From the experimental results, it was seen that the strength of Eri × Polyester plain, twill and satin weaves were better than the pure Eri × Eri fabrics of all the weaves. Although the other properties were also improved when compared with pure Eri × Eri fabrics.

Key Words: Union fabric, eri, cotton, polyester.

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INTRODUCTION

In recent years, the fabrics of different blends and union fabrics are available in the market for various end uses. The raw material - yarn of different types are used for producing different varieties of fabrics to meet the fashion. Raw materials used for fabric construction are cotton, silk, wool, jute, synthetic, etc. (Azad and Jafrin,2009). Union fabric is made by using different yarn in warp and weft direction. Union fabric is durable, crease resistant, absorbent, lustrous and resilient. Various kinds of union fabrics can be produced by combination of silk with cotton, rayon, ramie, polyester, acrylic, etc.to reduce the cost of the silk fabric as well as the weight of the fabric (Nayak *et al.*, 2009).

If eri is woven as a union fabric with other yarns, we can expect an attractive fabric with improved functional properties. In this type of fabrics the properties of two different yarns are combined together to get a new fabric having the properties of both the yarns. The Eri union fabric obtained will offer flexibility in choosing varieties of Eri fabric which would be cost-effective yet attractive.

MATERIALS AND METHODS

The union fabric used in this experiment was made from Eri with cotton and Eri with polyester. The Eri yarn was of 2/60s count and cotton and polyester yarns were of 2/40s count. Eri silk yarn was used as warp and cotton and polyester yarns were used as weft to construct the eri union fabrics using three different weaves namely plain, twill and satin. Fabrics of pure Eri x Eri in plain, twill and satin weave were also constructed for comparison. Constructional details of eri and eri union fabrics are shown in Table 1. The important functional properties like fabric tensile strength, elongation, fabric abrasion resistance, fabric drapability, fabric pilling, etc, of the constructed fabrics were tested. The union fabrics were tested for functional properties as per the standard methods (Table 2).

Table 1. Constructional details of Eri and Eri union fabrics

Fabrics	Weave types	Direction	Yarn	Yarn type	Yarn count	Reed count
Eri/Eri (EEP)	Plain	Warp	Eri	2 ply	2/60s	60s
		Weft	Eri	2ply	2/60s	
Eri/Cotton (ECP)	Plain	Warp	Eri	2ply	2/60s	60s

		Weft	Cotton	2ply	2/40s	
Eri/Polyester(EPP)	Plain	Warp	Eri	2 ply	2/60s	60s
		Weft	Polyester	2 ply	2/40s	
Eri/Eri (EET)	Twill	Warp	Eri	2/ ply	2/60s	60s
		Weft	Eri	2/ply	2/60s	
Eri/Cotton (ECT)	Twill	Warp	Eri	2/ply	2/60s	60s
		Weft	Cotton	2/ply	2/40s	
Eri/Polyester (EPT)	Twill	Warp	Eri	2/ply	2/60s	60s
		Weft	Polyester	2/ply	2/40s	
Eri/Eri (EES)	Satin	Warp	Eri	2/ply	2/60s	60s
		Weft	Eri	2/ply	2/60s	
Eri/Cotton (ECS)	Satin	Warp	Eri	2/ply	2/60s	60s
		Weft	Cotton	2/ply	2/40s	
Eri/Polyester (EPS)	Satin	Warp	Eri	2/ply	2/60s	60s
		Weft	Polyester	2/ply	2/40s	

Table 2. Instruments used for determining the properties of Eri union fabrics

Properties	Instrument	Standard methods
Fabric tensile strength and elongation(%)	Instron strength tester	ASTM 22561-1968
Fabric abrasion resistance(cycles)	Martindale abrasion tester	IS 12673-1989
Fabric drapability(%)	Eureka drape meter	IS 8357:1977
Fabric pilling(ratings)	Heals pilling tester	ASTM D4970/D4970M

Functional properties of union fabrics

Fabric tensile strength (kg)

Table 3 narrates about the tensile strength of fabrics. Union fabrics of Eri x Polyester of all the three weaves exhibited high tensile strength in both warp and weft direction. The highest tensile strength of 52.26 kg in the warp direction was shown by Eri x Polyester twill weave fabric followed by Eri x Eri plain with 49.10 kg. The least strength (41.01 kg) in the warp

direction was shown by pure Eri x Eri plain weave fabric.The tensile strength in the weft direction was much more than in the warp direction. The highest strength of 77.12 kg was shown by Eri x cotton twill weave followed by Eri x polyester satin weave with 70.82 kg. Eri x Cotton satin weave had the lowest strength of 34.22 kg in the weft direction. The high strength of Eri x Polyester union fabrics may be attributed to the polyester yarn which is stronger compared to Eri and Cotton yarns.

Table 3. Tensile strength and elongation of three different weaves

Weave type	Fabrics	Fabric Tensile strength (kg)		Fabric elongation(%)	
		Warp	Weft	Warp	Weft
Plain	EEP	41.01	42.31	20.01	19.83
	ECP	42.57	41.60	25.09	21.44
	EPP	49.10	65.19	26.09	28.67
Twill	EET	42.85	55.22	16.72	16.32
	ECT	42.36	77.12	13.81	18.85
	EPT	52.26	59.03	18.61	21.54
Satin	EES	44.32	65.33	14.21	18.95
	ECS	41.80	34.22	16.75	26.62
	EPS	44.80	70.82	18.31	26.95

Fabric elongation (%)

Elongation of all test samples were also depicted in Table 3. Eri x Polyester union fabric of plain, twill and satin weave showed higher elongation than other fabrics of the same weave in both warp and weft direction. This may be due to fibre characteristics of Eri and polyester. Polyester is a synthetic fibre and therefore has high elongation. Eri silk is also considered to be more plastic than elastic.

Fabric abrasion resistance (cycles)

The effect of abrasion resistance on fabrics of different yarns and different weaves is presented in Table 4.From the table, it was seen Eri x Polyester union fabrics of plain weave

showed highest resistance to abrasion (3.37) in number of cycles 942, Eri x Polyester twill (3.04) in number of cycles 920 and Eri x Polyester satin weave showed (3.24) in number of cycles 827 respectively. It may be because of polyester yarn which was finer in structure and have less thickness, resulting into better abrasion resistance.

Table 4. Abrasion resistance of three different weaves

Weave type	Fabrics	No.of cycles	Loss of mass(%)
Plain	EEP	700	4.91
	ECP	715	3.57
	EPP	920	3.37
Twill	EET	825	4.21
	ECT	710	4.68
	EPT	942	3.04
Satin	EES	745	3.89
	ECS	730	5.16
	EPS	827	3.24

Fabric drapability (%)

Table 5.illustrated the drape coefficient of pure Eri x Eri and its union fabrics of three weaves *viz*., plain, twill and satin. From the table it was seen that highest drape coefficient(58.29 percentage) was found in Eri x Polyester twill followed by Eri x Polyester plain (58.04 percentage) weave compared to pure Eri x Eri fabrics of three different weaves and Eri x Cotton union fabrics of different weaves. However, the least drape coefficient (41.62 percentage) was found in pure Eri x Eri satin weave fabrics, may be due to stiffness of Eri yarn.

Since drape coefficient of Eri x Polyester of all the three weaves was higher than pure Eri x Eri fabrics of three respective weaves, this union fabrics can be effectively used for various garment styles with graceful folds.

Table 5.Drape coefficient pilling ratings of three different weaves

Weave type	Fabrics	Drape coefficient (%)	Pilling(ratings)
Plain	EEP	43.92	3(hairy& severe pilling)
	ECP	46.30	2(hairy)
	EPP	58.04	1(hairy &slight pilling)
Twill	EET	44.70	3(hairy& severe pilling)
	ECT	57.04	2(hairy)
	EPT	58.29	1(hairy &slight pilling)
Satin	EES	41.62	3(hairy& severe pilling)
	ECS	45.07	2(hairy)
	EPS	47.67	1(hairy &slight pilling)

Fabric pilling (ratings)

The pilling resistance of different samples were also showed in Table 5. From the table, it was seen that pure Eri x Eri sample of three weaves showed hairy and severe pilling. Eri x Polyester union fabric showed hairy and slight pilling and Eri x Cotton union fabric showed hairy but no pilling.

CONCULSION

From this study, it is observed that in Eri×Cotton and Eri×Polyester union fabrics the pilling properties are decreased with increasing tensile strength, abrasion resistance and drapability of fabric. Hence it is concluded that after making Eri×Cotton and Eri×Polyester union fabric, the fabric become more strength, durable, lighter in weight and have increased drapability. Besides this, fabrics have unique appearance, and provide extra luster. Eri union fabrics are best suited for making diversified products such as dress waist coat, tie, cushion cover, stole etc. and also best suited for making baby blankets and jackets for winter seasons. Therefore, development of union fabrics will create a variety in fabric types and cater to the present fashion world.

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