



Development of Apparel Products from Eri and Ramie Blended and Union Fabrics

Meenakshi Tamta and Surabhi Mahajan

Dept. of Apparel and Textile Science, Punjab Agricultural University Ludhiana, Punjab (141 004), India



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Corresponding meenakshitamta04@gmail.com

0000-0002-5148-8478

ABSTRACT

The study was conducted in the Department of Apparel and Textile Science, College of Community Science, Punjab Agricultural University during 2019–2022. The objective of the investigation was to develop apparel products viz. men's waist coat, ladies top and men's jacket from eri and ramie blended and union fabrics according to the end use specifications opined by a panel of judges. The commercial viability of the developed end products was also analyzed through a survey based on consumer's outlook. The consumers were highly appreciative of the developed products and in terms of aesthetic properties, men's waist coat was found to be excellent whereas ladies top and men's jacket were found to be very good. As far as overall ranking of the products was concerned, waist coat was considered as the best as compare to men's jacket and ladies' top. The price suitability of all the developed products was also found to be appropriate among the consumers. So, the study recommends that proper utilization of eri and ramie fibres in the form of attractive handloom apparel products that will add to its commercial value and also lead to diversification in the market. This study will also inspire fashion designers and manufacturers for the development of unique eco-friendly range of products from natural fibers as the developed products were found to have very good consumer response.

KEYWORDS: Aesthetic, blended, eri, end products, consumers, handloom, price

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1. INTRODUCTION

Consumer markets are changing quickly with rapid growth in disposable incomes, inclination toward modern lifestyles and the rise of trend-conscious consumers. There is a growing transition from price consideration to design, quality, and durability of fabrics (Choudhury, 1982). Several studies have revealed that while accounting the handle of fabrics in making a choice, consumers prefer fabrics whose cost is less (Kulkarni et al., 1997). The primary reason for the development of blends is economic consideration. Expensive fibers can be produced economically by blending them with more abundant and less expensive natural fibers (Charankar et al., 2007). Natural fibers had some good properties and the most important is biodegradability and non-carcinogenic which bring them back into fashion, with an advantage of being cost-effective (Satyanarayan et al., 1990 and Yan et al., 2014). Natural fibers have begun to replace synthetic fibers in several applications (Fangueiro and Rana, 2016). Woven designed fabrics with eco-friendly natural fibers are more in demand (Garbyal, 2015).

Silk is one of the most favored fibers all over the world. It is very soft, lustrous, smooth, strong and durable than any fibers. Similarly, it also had excellent absorbency, good dyeing affinity, enhanced thermal resistance and good insulation properties, which make it an excellent choice for textile end uses (Li et al., 2015). The fabrics developed from silk fibre has the same feel as cotton, voluminous, bulky and provides warmth same as wool, excellent luster and good amount of softness (Kariappa, 2006, Chollakup et al., 2008). Eri silk is a protein fibre derived from cocoons made by the *Samia Cynthia Ricini* moth. The eri yarn is normally used for production of traditional textile materials for domestic use (Reddy and Shankar, 2008). Eri silk fabrics gives good amount of warmth in winters and cooling effect in summers due to its great insulating properties. As it have excellent thermal properties, so it is extensively utilized for making shawls, jackets and blankets (Somashekhar, 2003).

Ramie (*Boehmeria nivea*) is a type of bast fiber (Liu and Cheng, 2016). It is an herbaceous perennial plant from the Urticaceae family (Ni et al., 2018). It is a natural fiber having high strength, silky appearance, soft feel and compatibility with other natural fibers (Lu, 1992). Ramie fiber is exhibiting superior strength and capable to blend with different types of silk wastes i.e. mulberry, muga, and eri (Mukerjee, 1998). The blending of fibre is done to develop drape properties, comfortability, durability and many other properties of the fabric products (Prakash et al., 2012). Blended fabrics can be used for manufacturing shirting's, suiting, knitwear and shawls having required functional performance and look (Gill and Singh, 2002). In recent years, the fabrics of different blends and union fabrics

available in the market for various end uses (Azad and Jafrin, 2009). Union fabrics developed with different yarns in warp and weft direction of the fabric. A number of union fabrics can be created by combination of different types of yarns like silk with cotton, ramie, rayon, acrylic etc. in order to reduce the high cost of silk fabrics as well as the weight of the fabric (Nayak et al., 2009). Union fabric showed better handle properties in terms of softness and total hand value than their individual application. A union fabric also shows high durability, crease resistance, moisture absorbency, luster and good resiliency. Therefore, the present study was undertaken with the aim of producing eri/ramie blended and union fabrics for variegated apparels with plain weave in handloom. The developed apparel products also analyze for their commercial viability with the consumer's opinion regarding the developed apparel products.

2. MATERIALS AND METHODS

The present investigation was carried out in the Department of Apparel and Textile Science, College of Community Science, Punjab Agricultural University in 2019–2022.

2.1. Material used for the study

Three fabrics were taken for this study detailed as under: Blended fabric- which was having eri and ramie in the ratio of 50:50, Union-I fabric- which is having eri yarn in warp direction and ramie yarn in weft direction and Union-II fabric- which is having ramie in warp direction and eri in weft direction.

2.2. Assessment of end use of fabrics by a panel of judges

The blended and union fabrics were assessed for end use applications for both men and women apparel. The fabrics were subjectively assessed for their end use applications by a panel of judges comprising of industrial experts of Ludhiana industry and faculty members of Department of Apparel and Textile Science, College of Community Science, PAU, Ludhiana, Punjab.

2.3. Development of apparel products

According to the opinion of the judges, three apparel products were constructed from the selected fabrics using simple drafting and sewing techniques following standard measurements in medium size. These were men's jacket from 50:50 eri/ramie blended yarn, ladies' top from union-I fabric and men's jacket from union-II fabric.

2.4. Cost estimation of the products

Cost is an important factor to be considered both for commercial exploitation of developed products and their acceptance by the target consumers. Hence, an effort was made to estimate the cost of the made products.

2.5. Consumer acceptance of the developed products

The products were shown to randomly selected thirty consumers visiting local apparel shops in posh markets of Ludhiana city for their aesthetic evaluation on a 5-point scale ranging from ‘Excellent’ to ‘Poor’. The aesthetic evaluation parameters included suitability of fabric, design, colour combination, overall impact and utility of the article. Ranking was also given to the developed products according to the consumer preferences. Finally, the price suitability of the developed products was also analyzed by taking preferences from consumers in order to check commercial viability of the developed products.

2.6. Statistical analysis

Statistical analysis of the data was done by calculating weighted mean Score (WMS) and percentage of the given data by the use of MS excel and Statistical Package for Social Sciences (SPSS) software.

3. RESULTS AND DISCUSSION

The results of the present investigation as well as relevant discussion have been presented under the following sub heads.

3.1. Assessment of blended and union fabrics for end use application and development of apparel products

The selected blended and union fabrics were assessed for their end use applications for both men and women apparel by the panel of judges.

3.1.1. Women’s apparel

For women’s apparel, different products categories such as jacket, top, stole, *kurti* and suiting material was given as an end use option to the judges. Table 1 shows the results pertaining to this and it was found that the U-I fabric had highest weighted mean score of 3.1 for the option of ladies’ top. It was also found that this mean value was highest

Table 1: Analysis of selected fabrics for women’s apparel based on judges’ opinion (n=10)

Women’s Apparel	50e:50r (B1)		Union-I (U-I)		Union-II (U-II)	
	WMS	Rank	WMS	Rank	WMS	Rank
Jacket	1.4	IV	1.2	V	1.4	IV
Top	1.5	III	3.1	I	2.6	I
Stoles	2.2	II	2.0	III	1.6	III
Kurti	2.4	I	1.5	IV	1.9	II
Suiting Material	2.2	II	2.2	II	1.9	II

B1: blended fabric made with 50e/50r yarns; U1: Union fabric made with 100s×100r yarn; U2: Union fabric made with 100r×100s yarn

amongst all the fabrics (B1 and U-II). So, U-I fabric was concluded to be best for women apparel and used for the preparation of ladies’ top (Figure 1).

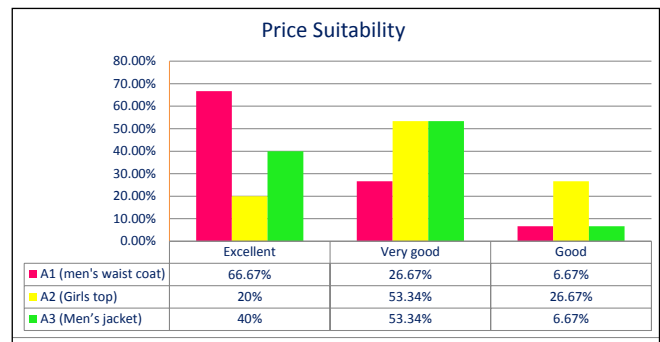


Figure 1: Price suitability of the developed products amongst consumers

3.1.2. Men’s apparel

Data furnished in Table 2 shows that most of the respondents’ selected B1 fabric for men’s garments like a waist coat with the highest weighted mean score value followed by men’s jacket. Respondents gave same preference to muffler and *achkan* with identical WMS value. Least preference was given to *lohis*. In case of U-I fabric, maximum respondents gave their preference to men’s jacket with highest WMS value. Men’s muffler got second highest WMS value followed by waist coat, *lohis* and *achkan*. U-II fabric was preferred by most of the respondents for jacket with maximum WMS value. Muffler and men’s waist coat got second and third position respectively with decreasing WMS values.

So, from the data collected for men’s apparel, it was concluded that B1 (50e/50r) fabric was found to be most appropriate for men’s waist coat preparation whereas U-II fabric for the preparation of men’s jacket (Figure 1).

Table 2: Analysis of selected fabrics for men’s apparel based on judges’ opinion (n=10)

Men’s Apparel	50e:50r (B1)		Union-I (U-I)		Union-II (U-II)	
	WMS	Rank	WMS	Rank	WMS	Rank
Jacket	1.93	II	3.1	I	3.2	I
Waist Coat	3.3	I	1.8	III	1.9	III
Muffler	1.8	III	2.0	II	2.2	II
Lohis	1.3	IV	1.6	IV	1.4	IV
Achkan	1.8	III	1.4	V	1.2	V

B1: Blended fabric made with 50e/50r yarns; U1: Union fabric made with 100s×100r yarn; U2: Union fabric made with 100r×100s yarn

3.1.3. Cost calculation for the developed end products

Three end products were constructed namely men’s waist coat, ladies’ top and men’s jacket using the selected fabrics and also some amount of additional fabric. The cost incurred in making each garment has been presented in Table 3.

Table 3: Cost estimation of developed apparel products

Parameters	Men’s waist coat cost (₹)	Ladies’ top cost (₹)	Men’s jacket cost (₹)
Fabric cost (blended/union +additional fabric)	450	560	610
CMT (Cut, make, trim) cost	940	300	1000
Cost Price	1390	860	1610
Profit %	30	30	30
Selling Price	1807	1118	2093
Rounded figure	1810	1120	2100

3.1.4. Details of the developed apparel products

3.1.4.1. Men’s waist coat

For construction of waist coat, two types of fabrics were used. The main fabric was the blended fabric in 50e:50r ratio and the additional fabric was a cotton blend procured from market. The cost of 1 meter of 50e:50r blended fabric and cotton blend fabric was found to be ₹ 390 and ₹ 60 meter⁻¹ respectively. The CMT (cut, make and trim) cost of the fabric was found to be ₹ 940 which included cutting, stitching, accessories cost and finishing of the garment. Thus, total cost for making waist coat was calculated to be ₹1810 with 30% profit.

3.1.4.2. Ladies’ Top

Two types of fabrics were used for construction of the top. The main fabric was the Union-I fabric and the additional fabric was a cotton blend. The cost of 1 meter of union fabric was ₹ 510 and for cotton blend fabric, it was ₹ 50 meter⁻¹. The CMT cost of the fabric was found to be ₹ 860 and thus, the total cost for ladies’ top was approximately ₹ 1120 with 30% profit.

3.1.4.3. Men’s jacket

The construction cost included the cost of 1meter of union-II fabric and an additional synthetic fabric. These were ₹ 510 and ₹ 100 m⁻¹ respectively. The CMT cost of the garment was ₹ 1000 and it was slightly high than CMT cost of both waist coat and ladies top due to more stitching charges of a jacket. Total cost for men’s jacket was thus found to be approximately ₹ 2100 with 30% profit.

3.1.4. Consumer acceptance of developed apparel products

The developed products were shown to thirty randomly

selected consumers for their aesthetic evaluation on a 5-point scale ranging from Excellent to Poor.

From Table 4, it is evident that the maximum respondents (53.34%) opined that the suitability of fabric for waist coat was excellent followed by 36.67% who reported it as very good. For design of the waist coat, 50% respondents claimed that the design was very good while 43.34% reported it to be excellent. The colour combination and overall impact of the waist coat was found out to be very good by 56.67 and 60% of respondents respectively. Maximum respondents opined that the utility of the article was excellent followed by those who reported it to be very good. For none of the category, poor response was given by the respondents hence; poor category has not been shown in the table.

Table 4:Evaluation of men’s waist coat by consumers (n=30)

Parameters	Excellent	Very good	Good	Fair
Suitability of fabric	16 (53.34)	11 (36.67)	2 (6.67)	1(3.33)
Design	13(43.34)	15 (50)	2 (6.67)	-
Colour combination	9(30)	17 (56.67)	3(10)	1 (3.33)
Overall impact	11(36.67)	18 (60)	1 (3.34)	-
Utility of article	15(50)	13 (43.34)	1 (3.34)	1 (3.34)

Suitability of the fabric for article A2 (ladies’ top) was reported to be very good by maximum (66.67%) respondents whereas 23.34% respondents opined it to be suitable. The design and colour combination of the ladies’ top was found to be very good with by 60% and 66.67% respondents respectively. The overall impact and utility of the fabric was again reported to be very good by majority of the respondents followed by those who found it to be excellent. None of the respondents found the ladies’ top to be poor for any products. Hence, it is not considered in the table (Table 5).

Table 6 reveals that 50% respondent’s opined fabric to be excellent for making men’s jacket while 46.67% reported it to be very good. The design of waist coat was found to be very good by 60% respondents followed by 36.67% respondents who reported it as excellent. Colour combination was coined to be very good by maximum respondents (66.67%). The overall impact and utility of the fabric was found to be excellent by 50% respondents in both the cases. For none of the category, respondents had the poor response.

Table 7 shows the general opinion of respondents regarding the developed products. Article A1 (waist coat) got rank I with highest WMS value of 9.2 as most of the respondents gave their preference to it because of its good design, colour

Table 5: Evaluation of ladies' top by consumers (n=30)

Parameters	Excellent	Very good	Good	Fair
Suitability of fabric	7 (23.34)	20 (66.67)	2 (6.67)	1 (3.34)
Design	6 (20)	18 (60)	6 (20)	-
Colour combination	3 (10)	20 (66.67)	7 (23.34)	-
Overall impact	10 (33.34)	17 (56.67)	2 (6.67)	1 (3.34)
Utility of article	9 (30)	15 (50)	5 (16.67)	1 (3.34)

A1: 50e:50r blended fabric; A2: Union-I fabric (E-warp, R-weft), A3: (Union-II fabric (R-warp, E-weft) (Figures in parenthesis indicate %)

Table 6: Evaluation of men's jacket by consumers (n=30)

Parameters	Excellent	Very good	Good	Fair
Suitability of fabric	15(50)	14 (46.67)	1(3.34)	-
Design	11 (36.67)	18(60)	1(3.34)	-
Colour combination	6 (20)	20 (66.67)	3(10)	1 (3.34)
Overall impact	15 (50)	12 (40)	2 (6.67)	1 (3.34)
Utility of article	15 (50)	12 (40)	3 (10)	-

A1: 50e:50r blended fabric; A2: Union-I fabric (E-warp, R-weft), A3: (Union-II fabric (R-warp, E-weft) (Figures in parenthesis indicate %)

Table 7: Ranking of developed products by the consumers (n=30)

Article	Weighted mean score (WMS)	Rank
A1 (Men's waist coat)	9.2	I
A2 (Ladies top)	7.8	III
A3 (Men's jacket)	8.6	II

A1: 50e:50r blended fabric; A2: Union-I fabric (E-warp, R-weft), A3: (Union-II fabric (R-warp, E-weft) (Figures in parenthesis indicate %)

combination and overall aesthetic appeal. Article A3 (men's jacket) got second highest weighted mean score value of 8.6 so it was ranked II. Article A3 (ladies' top) got least preference by respondents with the weighted mean score value of 7.8 and got III rank.

Table 8 shows the suitability of quoted selling price amongst the respondents. For article A1 (men's waist coat), the

Table 8: Price suitability of the developed products according to the consumers (n=30)

Article	Quoted selling price in rupees (Rs)	Suitability of quoted price		
		High	Appropriate	Low
A1 (Men's waist coat)	1810.00	4 (13.34)	20 (66.67)	6 (20)
A2 (ladies' top)	1120.00	9 (30)	16 (53.34)	5 (16.67)
A3 (Men's jacket)	2100.00	9 (30)	19 (63.34)	2 (6.67)

quoted price was ₹ 1810 and 66.67% respondents opined it to be appropriate whereas 20% respondents said that the price was low. Only 13.34 % respondents were of the view that the quoted price was high. For article A2 (ladies' top), the quoted price was Rs. 1120 and maximum respondents (53.34%) opined that the quoted price was appropriate whereas 30% reported it to be high and only 16.67% respondents claimed it to be low. For article A3 (men's jacket), maximum respondents (63.34%) were of the view that the quoted price was appropriate followed by 30% respondents who reported it to be high while only 6.67% respondents claimed that the quoted price was low. Hence, it can be concluded that the developed products were suitably priced as majority of the respondents found them to be appropriate.

4. CONCLUSION

Developed products were highly accepted by the consumers due to their aesthetic properties and price suitability. It was also found that commercial manufacturing of these products can add diversity in new range of existing apparel market. Men's waist coat was most liked product pointing towards its immense potential of mass production.

5. REFERENCES

- Azad, A.K., Jafrin, S., 2009. Study on the effect of size material on jute-cotton union fabric Daffodil. International University Journal of Science and Technology4, 42-44.
- Charankar, P., Verma, V., Gupta, M., 2007. Growing importance of cotton blends in apparel market. Journal of Textile Association2, 202-03.
- Chollakup, R., Suesat, J., Ujain, S., 2008. Effect of blending factors on eri silk and cotton blended yarn and fabric characteristics. Macromolecular Symposia265, 44-49.
- Choudhury, S.N., 1982. Eri silk industry. Directorate of sericulture Weaving, Govt of Assam, Guwahati, pp 1-177.

- Fangueiro, R., Rana, S., 2016. Natural fibres: advances in science and technology towards industrial applications from science to market; Springer: Dordrecht, The Netherlands, 97.
- Garbyal, R., 2015 Angora/merino and eri silk: a new union woven fabric for fashion. *Asian Journal of Home Science*10, 437–441.
- Gill, P., Singh, O.P., 2002. Value addition of wool through blending. *Textile Trends*44(6), 27–30.
- Kariappa, T.H., Roy, S.S., Sastry, N., 2006. Indian silk. *Man-Made Textiles in India*49(5), 176–185. (<https://doi.org/10.1007/s40034-018-0116-5>)
- Kulkarni, A., Mahale G., Kariyappa T.H., 2011. Physical properties of developed viscose rayon and eri silk union fabrics. *Karnataka Journal of Agricultural Sciences*24, 506–09.
- Li, G., Li, Y., Chen, G., 2015. Silk-based biomaterials in biomedical textiles and fibre-based implants. *Adv Healthcare Mater*4, 1134–1151.
- Lu, H.R., 1992. Bast-fiber crops cultivation science in china; Agriculture Press: Beijing, China, 98.
- Liu, X., Cheng, L., 2016. Influence of plasma treatment on properties of ramie fiber and the reinforced composites. *Journal of Adhesion Science and Technology*,31(15) 12–95. (<http://dx.doi.org/10.1080/01694243.2016.1275095>).
- Mukherjee, P.K., 1998. Mulberry silk yarn. *Indian Textile Journal*75, 107–226.
- Nayak, R.K., Pung, S.K., Chatterjee, K.N., 2009. Comfort properties of suiting fabrics. *Indian Journal Fiber of Textile Research*34, 122–130.
- Ni, J.L., Zhu, A.G., Wang, X.F., Xu, Y., Sun, Z.M., Chen, J.H., Luan, M.B., 2018. Genetic diversity and population structure of ramie (*Boehmeria nivea* L.). *Industrial Crops and Products*115, 340–347.
- Prakash, C., Ramakrishnan, G., Koushik, C.V., 2012. Effect of blend ration on quality characteristics of bamboo/cotton blended ring spun yarn. *Journal of Science and technology* 7, 34–36.
- Reddy, R., Shankar A. J. P., 2008. Text book of Sericulture. Commonwealth Publishers, Rashan Offset Printers, Delhi, 105.
- Somashekar, T.H., 2003. Recent advances in eri silk spinning, weaving and future prospects. *Indian Silk* 41, 49–52.
- Satyanarayana, K.G., Sukumaram, K., Mukherjee, P.S., Pavithran, C., Pillai, S.G.K., 1990. Natural fibre polymer. *Cement and Concrete Composites* 22, 379–384.
- Yan, L., Chouw, N., Jayaraman, K., 2014. Flax fibre and its composites- a review. *Composites Part B:Engineering* 56, 96–317.