

Angora/merino and eri silk: a new union woven fabric for fashion

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■ **ABSTRACT :** Woven designed fabrics with ecofriendly fibre are more in demand. Now-a-days consumer are fashion and health conscious so that they switch towards the ecofriendly fabrics. In this paper, woven designed union fabric has been woven in dobby loom by using twisted angora/merino (38.84 tex), untwisted angora/merino (36.65 tex) and eri silk (27.23 tex) yarns. Total number of 6 union woven fabrics were prepared by using 3 types of design *i.e.* zigzag, combination of herringbone and basket weave and combination of twill and plain weave from which three union woven fabrics with eri as warp and untwisted angora/merino as weft and three union fabric with twisted angora/merino as warp and eri as weft were made. These designed woven union fabrics were assessed for fashion fabric. It was found that designed union fabrics suitable for apparel purpose.

■ **KEY WORDS:** Union fabric, Eri silk, Angora/merino and weave

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Natural fibres are obtained from the natural sources like plants, animal hairs and minerals. Rabbit hair belongs to the class of fur fibres among the specialty hair fibres. Angora rabbit hair is considered as one of the earliest rabbit breeds, which was domesticated for its fur. Angora rabbit hair is known for its softness, fine micron count and fluffiness. Angora rabbit hair has special characteristics like excellent whiteness, superb softness, lightness and warmth. Angora fibre is eight times warmer than wool.

Rabbit hair fibre also poses difficulty when processed alone (carding) due to its smooth surface structure and absence of crimp. So rabbit hair fibre is blended with the fine merino fibre to reduce its shedding problem during use. Merino wool is finest type of wool,

having good comfort and warmth properties, excellent absorbency, excellent resiliency and poor dimensional stability.

The term 'Vanya' is of Sanskrit origin, meaning wild, or forest-based. Eri Silk comes from the worm *Samia Cynthia ricini*. The name Eri is derived from the Assamese word 'era', which means castor as the silkworm feeds on castor plants. Eri silk is also known as endi or errandi in India (Anonymous, 2011 http://en.wikipedia.org/wiki/Eri_silk). Silk has always been considered as the most exclusive fashion fabric for high class society owing to its natural sheen and softness quality. Beside fabric quality and fashion, design is also most important element to attract consumer to purchase it. Earlier designs were prepared by hand requiring a

time and energy. In order to achieve diversity in designs of modern generation and their demand, more flexible dynamic techniques like CAD (Computer Aided Design) have been developed. CAD has led to better quality and flexibility in design development, which increase efficiency and reduces the time consumption. The advantage of CAD is providing designers new freedom to explore design in a relatively easy and inexpensive ways.

Vijay and Balasubramanian (2000) asserted that CAD can be used in fields like woven fabrics, design systems, knitted fabrics and embroidery system and garment design. The recent adoption of Computer Aided Designing system (CAD) has led to better quality and flexibility in design development, increases efficiency and reduces the time between design concept and actual marketing.

Now-a-days researches in the field of textiles are done every day to obtain better quality, comfortable fabric at an affordable price, so that its cost of produced fabric reaches to pocket of every person. No single fibre is perfect, as it has some positive and negative properties. Blending is a technique to combine fibres so that the good qualities are emphasized and the poor qualities can be minimized.

Blending can be done during opening of fibres; yarn formation or during weaving by using one kind of yarn in the warp direction and other in the weft direction. This type of fabric is called combination fabrics or union fabrics. In this way desired fabric quality can be attained. Blending at weaving stage can be adopted easily, as this method of product diversification is less time consuming; easy to be used by weavers and all together different union fabrics can be prepared with the use of limited resources and technology. According to Roy (2003), mixture fabrics are made up of two or more different kind of yarns, each of which is composed of one kind of fibre. These yarns may be made up of filament or staple length from man-made or natural fibres.

So keeping in view the importance of natural and eco-friendly fibres/yarns made with eri and angora/merino fibres were selected for the present study. The present study was framed with the objective to assess the visual prosperities of union woven fabric with different woven design.

■ RESEARCH METHODS

Procurement of raw materials :

Two types of yarns were purchased to be used as warp and weft threads in making of union fabrics. Raw materials for the present study were collected from Dehradun and Ludhiana. Angora/merino yarn contained the 70 per cent of angora and 30 per cent of merino fibres.

Doubling of angora-merino yarn :

The doubling of angora/merino single ply yarn was done on the twisting machine for strengthening of the yarn. Twisted yarn was steamed at 100°C for 45 minutes so that yarn could become soft and twists get set in their position. Twist implies harshness and stiffness in the fabric so the twisted two ply yarn of angora/merino was used in warp direction only and not used in weft direction. To maintain softness of the fabric, two ply untwisted yarn of angora/merino was used in weft direction of the pure and union woven fabrics.

Development of designs by using CAD :

Under the present study, woven designs were prepared using Arah weave software. Four shaft twill designs and its combination were developed by using Arah weave software. Six union woven samples made with three designs were evaluated by a panel of 30 judges from college of Home Science. Researcher observed that designs created by using Arah weave software were accurate with less consumption of time and energy.

Assessment of physical properties of yarns :

The angora/merino and eri silk yarns were used for weaving and were assessed for their physical properties viz., yarn count and twist per inch.

■ RESEARCH FINDINGS AND DISCUSSION

Under the present study twisted angora/merino, 2 ply angora/merino and eri silk yarns were used for preparation of union fabrics. In order to study the effect of properties yarn with different weave design on resultant union woven fabric, their visual properties were evaluated. Eri silk, 2 ply angora/merino and twisted angora/merino yarns were tested for the physical properties like yarn count, twist per inch.

Table 1 : Physical properties of yarns

Sr. No.	Physical properties	Yarns		
		Eri silk (2 ply twisted)	Angora/Merino (2 ply, Twisted)	Angora/Merino (2 ply, untwisted yarn)
1.	Yarn count (Tex)	27.23	38.84	36.65
2.	Twist per inch	3	6	-

Yarn count :

Three types of yarns were used in the present study. It is evident from Table 1 that yarn count values for eri silk, twisted angora/merino yarn and 2 ply untwisted angora/merino yarn were 27.23, 38.84 and 36.65 Tex, respectively.

It is clear from Table 1 that silk yarn was finer as compared to twisted 2 ply angora/merino yarn and 2 ply untwisted angora/merino yarn. This may be due to fine diameter of the silk fibre *i.e.* 11-12 micron. The count of twisted angora/merino yarn was high as compared to untwisted angora/merino yarn due to the twist imparted since twists provide bulkiness to yarn and weight of twisted angora/merino yarn was more as compared to the untwisted angora/merino yarn.

Twist per inch :

Eri silk yarn and twisted angora/merino yarn were having 3 and 6 twist/inch, respectively. No twist in angora/merino two ply untwisted yarn was imparted. Angora/merino twisted yarn was having greater twist/inch than silk, as angora/merino wool were shorter in length so required greater twist to be converted into yarn.

Visual assessment of union woven fabrics :

Thirty respondents evaluated the designed union woven fabric samples visually on the basis of luster, hand/feel, clarity of weave, fabric suitable for type of garments and overall appearance. The data was tabulated, analyzed and results are reported in terms of weighted mean score

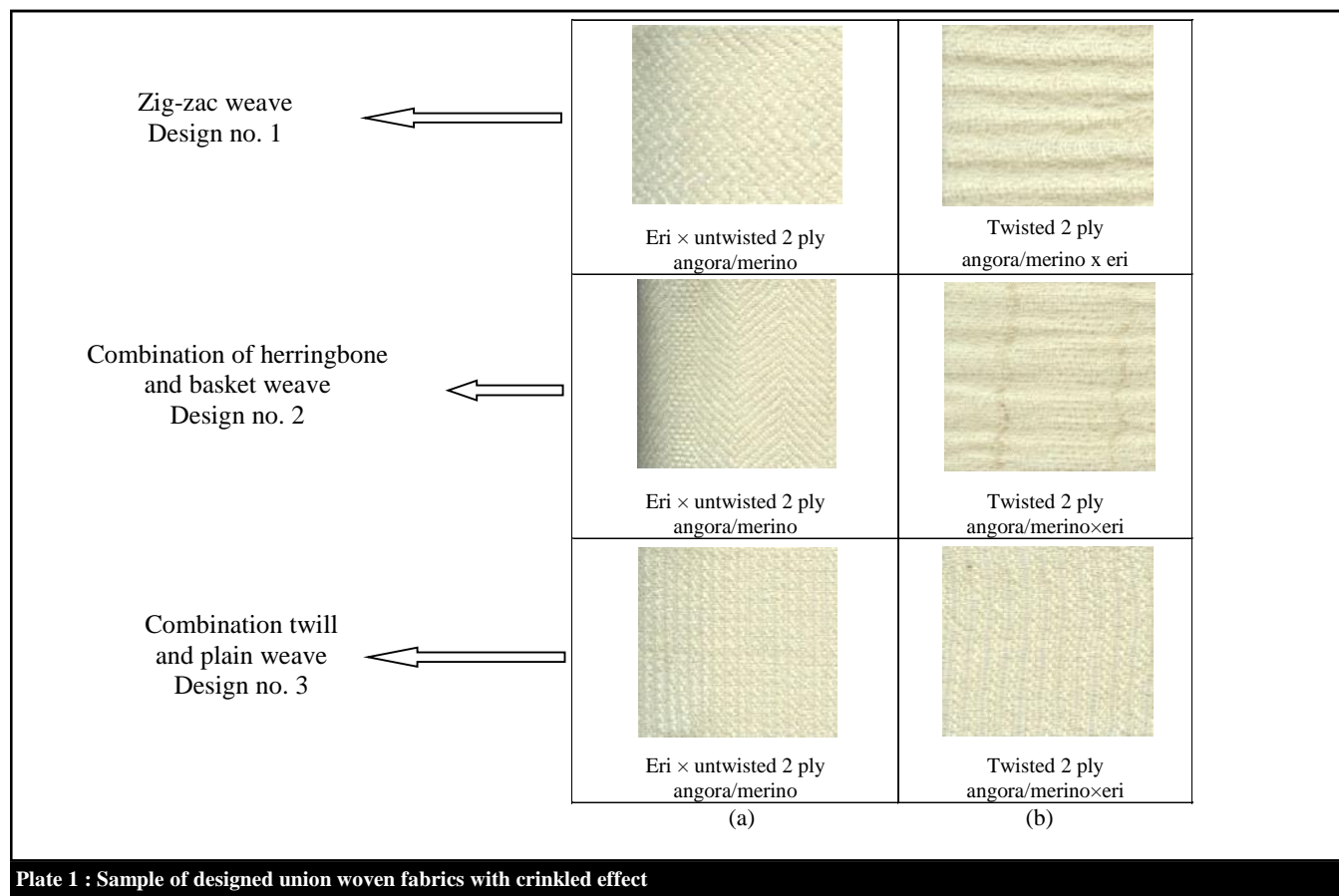


Plate 1 : Sample of designed union woven fabrics with crinkled effect

Table 2 : Visual evaluation of designed union fabrics

Design No.	Union fabric samples		Weave design	Luster	Hand and feel	Clarity of weave	Overall appearance	Rank	
	Warp	Weft							
1.	a	Eri silk	Angora/merino	Zigzag	6.80	8.26	8.60	8.26	1
	b	Angora/merino	Eri silk	Zigzag	5.73	5.53	5.20	6.40	5
2.	a	Eri silk	Angora/merino	Combination of herringbone and basket weave	6.80	8.20	8.66	7.40	3
	b	Angora/merino	Eri silk	Combination of herringbone and basket weave	4.53	4.40	4.53	5.06	6
3.	a	Eri silk	Angora/merino	Combination of twill and plain weave	7.33	7.60	8.06	8.40	2
	b	Angora/merino	Eri silk	Combination of twill and plain weave	7.13	6.66	7.46	7.13	4

Table 3 : Union fabric suitable for the apparels

Design No.	Designed Union Samples		Fabric suitable for					
	Warp	Weft	Salwar- kameej (WMS)	Skirt (WMS)	Stole (WMS)	Ladies Top (WMS)	Blouse (WMS)	
1.	a	Eri silk	Angora/merino	7.13*	6.13	7.66	6.40	5.46
	b	Angora/merino	Eri silk	4.80	4.53	7.00	5.53	4.86
2.	a	Eri silk	Angora/merino	6.80	6.60*	7.20	6.60	5.13
	b	Angora/merino	Eri silk	4.53	5.33	6.46	4.86	3.93
3.	a	Eri silk	Angora/merino	6.90	5.73	7.80*	6.80*	5.53
	b	Angora/merino	Eri silk	5.60	4.93	6.73	6.40	5.53*

Table 2 shows data related to the assessment of union fabrics *i.e.* luster, hand and feel, clarity of weave and overall appearance, which was carried out by judges from College of Home Science, Pantnagar.

For luster, maximum score was obtained by the design number 3(a) *i.e.* eri silk x angora/merino (7.33), followed by the design number 3(b) *i.e.* angora/merino x eri silk (7.13), design number 1(a) and 2(a) obtained equal score *i.e.* (6.8), design number 1(b) and least luster was gain by design number 2(b).

In case of hand and feel parameter maximum score was obtained for the design number 1(a) *i.e.* eri silk x angora/merino (8.26). It was followed by the design number 2(a) *i.e.* eri silk x angora/merino (8.2), design number 3(a) *i.e.* eri silk x angora/merino (7.6), design number 3(b) *i.e.* angora/merino x eri silk (6.66), design number 1(b) *i.e.* angora/merino x eri silk (5.53) and design number 2(b) *i.e.* angora/merino x eri silk (4.4).

Another feature clarity of weave, maximum score was obtained by the design number 2(a) *i.e.* 8.66, followed by the design number 1(a) *i.e.* 8.6, design number 3(a) *i.e.* 8.06, design number 3(b) *i.e.* 7.46, design number 1(b) *i.e.* 5.2 and design number 2(b) *i.e.* 4.53.

Highest score for overall appearance was obtained by the design number 3(a) *i.e.* 8.4 and followed by the design number 1 (a) *i.e.* 8.26, design number 2(a) *i.e.*



Fig. 1 : Article prepared by union woven designed fabric

7.4, design number 3(b) *i.e.* 7.13, design number 1(a) *i.e.* 6.4 and design number 2(b) *i.e.* 5.06.

Observing scores of all the parameters *i.e.*, luster, hand and feel, clarity of weave and overall appearance obtained by all six union fabrics made with three designs; design number 3(a) got highest score for luster and overall appearance. This may be due to the maximum thread count of eri x angora/merino union woven fabric design so this fabric was smooth with even surface as

compared to the other designed fabrics.

Design number 1(a) received maximum score for good hand and feel which may be due to the use of 2 ply untwisted angora/merino yarns in weft direction of union fabric made with eri as warp and angora/merino as weft and zigzag twill weave design structure.

Design number 2(a) got highest score for clarity of weave. This may be due to the presence of more number of repeat units in this design. On the basis of all the parameters design number 1 (A) got highest rank and followed by design 3(a).

Table 3 present data related to the assessment of the union fabric suitable for apparels *i.e.* salwar- kameej, skirt, stole, ladies top and blouse. Six union fabrics were evaluated for all types of garments. It was found that design number 1 (a) and design number 2 (a) got higher score for salwar- kameej and skirt respectively. For stole and ladies top design number 3 (a) received maximum score.

Maximum twist was found in the angora/merino yarn so that it creates crimp effect on the surface of the fabric.

It was also found that the by changing the amount of twist in yarn content in warp and weft direction, the structure of union woven fabric can be changed, while

the design of the fabric was same.

Conclusion :

It can also concluded that production of the union fabric which is made up of eri silk x angora/merino is more cost effective than pure angora merino fabric without any compromises in the comfort, warmth and shining appearance. Beside the fabric's physical properties visual properties is also most important element to attract consumer to purchases it. It was also found that design number 1(a) with eri silk as warp and angora/merino as weft got 1st rank followed by design number 3 (a). It was also found that the by changing twist in yarn content in warp and weft direction, the texture of union woven fabric can be changed, while the design of the fabric constant.

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