

# PRIMARY HAND VALUES AND TOTAL HAND VALUES OF FABRICS DEVELOPED BY DIFFERENT BLENDING OF YARNS: AN EVALUATION STUDY

*Dr. Nishi Dubey*

*Ph. D, Punjab Agricultural University, Ludhiana (Punjab)*

## ABSTRACT

*The present paper is the extension of my previous work in which I studied the different physical and mechanical properties of yarn after blending at different ratios and their effect on the properties of the wool. In this section we have done the fabric analysis on basis of apparel and appraisal in mens wear and women's wear. Subjective evaluation of these samples was done to study the developed fabrics for different parameters and end user applications. Evaluation of different parameters such as texture, lusture, tactile sensation and aesthetic appearance was done on a five point scale with scores ranging from 1 for poor to 5 for excellent. Ranking method was used for the subjective evaluation of the end user applications. A panel of 30 judges was purposively selected from College of Home Science, Punjab Agricultural University, Ludhiana to carry out the evaluation. The cost of the developed yarns was calculated on the basis of weight of the yarn manufactured and the cost of the raw fibers, degumming, spinning and weaving, labour and electricity charge. The collected data were coded, tabulated and analysed by using suitable statistical tests.*

**Keywords:** *apparel, fabric wool textile, suitings.*

## INTRODUCTION

Reasons for producing blended fabrics are to reduce cost or obtain a different appearance, obtain a greater number of desirable characteristics that cannot be obtained by using one fiber alone such as absorbency, comfort, light fastness, cross dyed effect, wearing, furnishing and dyeing efficiency etc. Fibers have been blended to produce fabric and articles of improved functionality. Technology of blending improving the qualities of constituent fibers and the cost effectiveness of the resultant produce has a great potential for development and adoption at cottage level. Although wool- silk blended fabrics are not new to the world but due to lack of awareness mills are not using blends. Therefore researches for developing appropriate method for utilization of wool, blended with other protein fiber like silk need to be intensified. Silk competes with wool because of its high elasticity, colour brilliance, resistance to pilling, strength and colour fastness properties.

Wool has been blended with silk due to economic reasons. Wool and oak tasar fibers blends can be recommended as the combined effect of warmth and comfort of wool with the strength, lusture, and comfort of silk can be successfully achieved through blending (4). Wool- silk blended fabrics are today well accepted world over due to superior technical properties like drape, strength, lusture, etc. in comparison to the pure woolen fabric.

Silk can be blended with many fibers. When it is to be blended with any of the natural fibers, silk noil is used. This makes blending and spinning possible because all the fibers are of staple length. The resultant properties depend upon the ratio of the fibers blended. Silk is mainly blended with cotton and viscose or is made into union fabrics (6). The combination of cotton, rayon and same with tasar silk reduces the cost of tasar silk fabric as well as weight of the fabric. The combination of polyester with tasar improves the wash and wears along with anti-crease properties (5, 6).

Silk is the queen of all the fibres. Silk fibres have the most exciting characters like extra lustre, extreme smooth feeling, and very good moisture absorbency. Moreover, the attractive character is brilliant shade for better resilience. The other most attractive property is very good elastic recovery of silk fibre. However, pure silk has its limitations, viz less durability, poor permanent pleating, poor abrasion resistance and high cost. Considering all these characteristics of silk, the study has been planned to blend oak tasar silk with wool. But on the other hand silk is a very costly fibre. To overcome the cost factor, introduced another fibre-wool, which is a also protein fibre. Its cost is less than silk fibre, because of the above factors, present study has been designed to blend oak tasar silk, and wool with a goal to create specialized yarn, mainly with extreme soft feel with good elastic recovery, absorbency and which facilitates a brilliant colour. Tasar silk has some warmth properties so this blend can be used for winter wear clothing. (9, 8, 10)

Not much work has been done for value addition of oak tasar fiber and its waste for optimum utilization. It is because of this reason; it was decided to blend the oak tasar with wool in different proportions for value addition. Blending of oak tasar and wool is the way to incorporate better appearance in woolen fabric and to increases utility of oak tasar silk fabric.

## **MATERIAL METHOD**

Subjective evaluation of these samples was done to study the developed fabrics for different parameters and end user applications. Evaluation of different parameters such as texture, lusture, tactile sensation and aesthetic appearance was done on a five point scale with scores ranging from 1 for poor to 5 for excellent. Ranking method was used for the subjective evaluation of the end user applications A panel of 30 judges was selected purposively from college of home science, Punjab Agricultural University, Ludhiana was selected. Samples of different count of blends were displayed before judges. The judges were asked to evaluate each sample on evaluation sheet.

## **COST CALCULATION OF FABRIC**

Cost of the developed yarns was calculated on the basis of weight of the yarn manufactured. It included cost of operations starting from the cost of the raw fibers, cost of degumming and cost of spinning, labour and electricity charge.

## RESULT AND ANALYSIS

The primary and total hand values (PHV and THV) of the developed fabrics have been presented in the table. These values have been studied in terms of koshi, shari, fukumari, numeri, hari, sofutosa. The scale used for PHV was 10-strongest, 5-medium and 1-weakest while it was 5-excellent, 4-good, 3- average, 2- fair, 1- poor for THV. The data revealed that the blended fabrics S<sub>1</sub> as well as S<sub>3</sub>, both were most suitable for women's winter suitings and men's suiting winter materials. Furthermore, both these were found to be least suitable for women's thin dress material (summer) in case of S<sub>1</sub> as well as S<sub>3</sub>.

In terms of men's winter suitings, the value of Fukurami (Fullness and Softness) was found to be highest for S<sub>3</sub> and Koshi (Stiffness) was in the case of S<sub>1</sub> fabrics. Both the blended fabrics showed the highest Fukumari (Fullness and Softness). The value of Fukumari (Fullness and Softness) was more in S<sub>1</sub> than that of S<sub>3</sub>. Fukumari (fullness and softness) is the bulky, rich and well formed feeling. When the fabrics were evaluated for men's summer suitings, it was found that hari is highest followed by koshi, shari and fukumari for blended fabrics S<sub>1</sub> and S<sub>3</sub> blended fabrics. These fabrics implying highest anti drape stiffness as well as stiffness. As far as tests for women's suitings (winter) were concerned, S<sub>3</sub> showed highest value of fukumari and numeri (strongest) followed by koshi. Numeri and fabric S<sub>1</sub> showed highest fukumari and Koshi (strongest) values. Though the values were lower for blended fabric S<sub>1</sub> the feel was the strongest here as well. The evaluation of fabrics for women's thin dress material (summer) revealed that the Koshi value of S<sub>1</sub> as well as S<sub>3</sub> was the better than medium and it was the lowest form of S<sub>1</sub> fabric. The fukumari value of S<sub>1</sub> as well as S<sub>3</sub> blended fabric was highest (strongest).

**Table 1 Primary Hand Values and Total Hand Values of blended fabrics**

Properties	S <sub>3</sub>	S <sub>1</sub>
<b>Men's Suiting (Winter)</b>		
Koshi	2.79	7.14
Numeri	4.50	2.92
Fukurami	6.23	6.16
Total Hand Value (THV)	2.55	2.80
<b>Men's Suiting (Summer)</b>		
Koshi	2.84	7.61
Shari	1.74	4.16
Fukurami	2.79	3.52
Hari	3.32	8.16

Total Hand Value (THV)	1.44	2.25
<b>Women's Thin Dress Material (Winter)</b>		
Koshi	6.34	7.95
Numeri	7.05	6.35
Fukurami	10.10	9.96
Total Hand Value (THV)	4.84	3.36
<b>Women's Thin Dress Material (Summer)</b>		
Koshi	6.34	7.95
Numeri	7.05	6.35
Fukurami	10.10	9.96
Total Hand Value (THV)	-0.34	-1.55

Hand value of primary hand	Japanese term	English Equivalent
10 – Strongest, 5 – medium, 1- weakest	Koshi	Stiffness
Total hand value (THV)	Shari	Crispness
5 – Excellent, 4- Good, 3- Average, 2- Fair, 1- Poor	Fukurami	Fullness and Softness
	Numeri	Smoothness
	Hari	Antidrape stiffness
	Sofutosa	Soft touch

S<sub>1</sub> = Fabric made from 16s Ne Oak Tasar/Wool blended yarns

S<sub>3</sub> = Fabric made from 10s Ne Oak Tasar/Wool blended yarns

The total hand value of fabrics was estimated from the primary hand values using Kawabata system of equations. The THV values for men's winter suiting were the highest for S<sub>1</sub> fabrics that got the feeling grade 'fair' followed by S<sub>3</sub> fabrics was also graded as 'fair'. Total hand value of the two blended fabrics showed that S<sub>1</sub> was not found suitable for men's summer suitings while the THV was found fair for S<sub>3</sub> fabrics. Total hand value for women's thin dress material (winter) of blended fabric S<sub>3</sub> was found to be good. Whereas, it was fair for blended fabric S<sub>1</sub>. Total hand value of the both blended fabrics was found to be inadequate for women's thin dress material (summer).

## SUBJECTIVE EVALUATION OF HAND VALUE OF DEVELOPED FABRICS

The opinion and preferences of a panel of experts for the two samples of wool: oak tasar (35:65) blended fabrics pertaining for texture, lusture, tactile sensation and aesthetic appearance have been

given in table 4.25. Statistically the results were analysed through Mann Witney U Test. It is evident from the data that the blended fabric made by S<sub>3</sub> was found to have good texture in the terms of smoothness, softness and uniformity as compared to S<sub>1</sub>. While S<sub>1</sub> had good pebbly texture than S<sub>3</sub> sample. A statistically significant difference was found in smoothness, softness and uniformity, while in the case of pebbly texture the difference was not found to be significant.

**Table 2 Subjective evaluation of hand value of developed fabrics**

<i>Properties</i>	<i>S<sub>1</sub></i>	<i>S<sub>3</sub></i>	<i>U value</i>	<i>P value</i>
	<i>Median</i>	<i>Median</i>		
<i>Texture</i>				
• <i>Smoothness</i>	4	5	608.5	0.001*
• <i>Softness</i>	4	5	549.0	0.001*
• <i>Pebbly texture</i>	4	3	1006.0	0.180
• <i>Uniformity</i>	4	4.50	693.5	0.001*
<i>Lusture</i>	3	4	766.0	0.028
<i>Tactile sensation</i>	4	5	660.0	0.001*
<i>Aesthetic Appearance</i>	4	4	852.5	0.359

\* Significant at 1 percent level, S<sub>1</sub>- 35:65 W/OT blend of 10 Ne yarn, S<sub>2</sub>- 35:65 W/OT blend of 16 Ne yarn

The results revealed that the fabric sample S<sub>1</sub> had good lusture than the S<sub>3</sub>, but statistically the difference significantly. The data presented in table 2 showed that the S<sub>3</sub> has well in textile sensation as compared to fabric of S<sub>1</sub>. Statistically there was significant difference was found in tactile sensation. The result showed in table 4.25 clearly indicated that the aesthetic appearance of both the blended fabrics S<sub>1</sub> as well as S<sub>3</sub> has same results. Statistical analysis showed that the difference between the aesthetic appearances of the two fabrics was statistically not significant.

## **SUBJECTIVE EVALUATION OF END USE APPLICATION OF THE FABRICS**

### **Subjective evaluation of blended fabrics for women's wear**

A perusal of the data (table 3) show that the majority of respondents felt that the S<sub>1</sub> were best suited for jackets (1<sup>st</sup> rank) followed by women's suiting (2<sup>nd</sup> rank), shawls, mufflers and then stoles. In

the case of  $S_3$  the respondent's gives first rank to shirting/women's suiting followed by stoles, shawls, jackets and last rank was given to mufflers.

**Table 3 Subjective evaluation for end use application of blended fabric for women's wear clothing**

Purpose	$S_1$		$S_3$	
	Weighted Mean	Ranks	Weighted Mean	Ranks
Jackets	4.43	1st	3.0	4th
Shawls	3.0	3rd	3.66	3rd
Stoles	2.03	5th	3.73	2nd
Mufflers	2.6	4th	2.86	5th
Shirts/women's suiting	3.96	2nd	4.53	1st

$S_1$ = 35:65 W/OT blend of 10 Ne yarn,  $S_2$ = 35:65 W/OT blend of 16 Ne yarn

#### Subjective evaluation of blended fabrics for men's wear

Data pertaining to subjective evaluation of blended fabric for men's wear clothing are given in table 4 showed that the respondents showed preference for jackets in blended fabric  $S_1$  and the second highest for *lohis* followed by *kurtas* and coats whereas the least preference was given to mufflers.

**Table 4 Subjective evaluation for end use application of blended fabric for men's wear clothing**

Purpose	$S_1$		$S_3$	
	Weighted Mean	Ranks	Weighted Mean	Ranks
Jackets	4.33	1st	3.0	3rd
Coats	3.53	4th	2.93	5th
Mufflers	1.53	5th	2.96	4th
Lohis	3.9	2nd	3.63	2nd
Kurtas	3.56	3rd	4.76	1st

$S_1$ = 35:65 W/OT blend of 10 Ne yarn,  $S_2$ = 35:65 W/OT blend of 16 Ne yarn

It was clear from the data (table 4.27) that the blended fabric  $S_3$  has highly preferred for *kurtas* and the second rank given to *lohis* while the least preference was shown to coats material.

### Subjective evaluation of blended fabrics for home textiles

The data reported in the table 5 revealed that the majority of respondent gave highest preference to sofa cover fabric in the case of sample  $S_1$ , while the least preference was given to throws.

The sample  $S_3$  was highly preferred by respondents for throws and the second rank given to *khes/* woolen sheet followed by cushion cover and sofa cover. Its use as curtains was the least preferred.

**Table 5 Subjective evaluation for end use application of blended fabric for home textile**

Purpose	S <sub>1</sub>		S <sub>2</sub>	
	Weighted Mean	Ranks	Weighted Mean	Ranks
Throws	1.66	5th	3.83	1st
Curtains	3.60	2nd	3.06	5th
Sofa cover	4.13	1st	3.33	4th
Cusion cover	3.23	3rd	3.63	3rd
Khes/ woolen sheet	2.7	4th	3.80	2nd

*S1- 35:65 W/OT blend of 10 Ne yarn, S2- 35:65 W/OT blend of 16 Ne yarn*

### COST CALCULATION OF DEVELOPED FABRICS

Calculate of cost was one of the objectives of the study. For this cost was estimated at every step i.e. procurement of raw material, degumming, blending and spinning, weaving and overheads, etc. The simple operational cost incurred in the production of per kg yarn of each blend was estimated and is presented in table 6. The production cost of yarn blended in 35:65 ratio was the maximum i.e. 1781.2 Rs/ kg of yarn. The cost of per meter 35:65 W/OT blended fabric is Rs. 1,593.73. Wastage of fiber and the high cost of spinning were the major factor in increasing the overall cost production.

Since it is an exploratory study, the cost of production was higher. It can be brought down by scaling up the production and purchasing the raw fiber in larger amount. The costs can be further reduced by production on a large scale.

**Table 6 Cost of procurement and preparation of fibers**

Item	Oak tasar			Merino wool		
	Cost per unit (Kg)	Amount (Kg)	Total cost (Rs.)	Cost per unit (Kg)	Amount (Kg)	Total cost (Rs)
Cost of raw material	750/kg	15 kg	11,250	600/kg	10 kg	Rs. 6,000
Cost of degumming			129			
Total cost of prepared fibers	758.6/kg	-	11,379	600/kg	-	Rs. 6,000

**Table 7 Cost of per kilogram of developed yarns**

Processing cost	W:OT 100:0	W:OT 65:35	W:OT 50:50	W:OT 35:65
Cost of fiber	600 Rs	652.5 Rs	675 Rs	781.2 Rs
Cost of blending and spinning	800	800	800	800
Overhead charges	200	200	200	200
Total cost/ kg yarn	1600 Rs	1652.5 Rs	1675 Rs	1781.2 Rs

**Table 8 Cost of per meter developed fabric**

Processing cost	W:OT 35:65	W:OT 100:0
Cost of yarn	593.73 Rs	533.33 Rs
Weaving cost	1000 Rs	1000 Rs
Total cost/ meter	1,593.73 Rs	1,533.33 Rs.

## CONCLUSION

The texture in terms of softness, smoothness and the uniformity was found to be better in S<sub>3</sub> made from 16 Ne yarn while the S<sub>1</sub> had a more pebbly texture. Lusture and the tactile sensation were also found to be better in fabrics S<sub>3</sub> made from 16 Ne as compared to S<sub>1</sub> made from 10 Ne yarn. Same scores were assigned to the aesthetic appearance of all the fabrics. Statistical analysis of results showed that there was no significant difference in pebbly texture, lusture and aesthetic appearance. Evaluation of blended fabrics for women's wear showed that S<sub>1</sub> was best suited for jackets (1<sup>st</sup> rank) followed by women's suiting (2<sup>nd</sup> rank), shawls, mufflers and stoles. In the case of S<sub>3</sub>, the respondents' gave first rank to shirting/women's suiting, followed by stoles, shawls, jackets and the last rank was given to mufflers. Data pertaining to subjective evaluation of blended fabric for men's wear showed that in the case of S<sub>1</sub> maximum preference was given to jackets and the second highest to *lohis* followed by *kurtas* and coats and mufflers. The sample S<sub>3</sub> was highly preferred for *kurtas* and the second rank was given to *lohis* and its use as coats was least preferred. With regard to home textiles, the highest preferences were given to sofa cover in the case of S<sub>1</sub>, while the least preference given to throws. The sample S<sub>3</sub> was highly preferred by respondents for throws and the second rank was given to *khes*/ woolen sheet, followed by cushion covers, sofa covers and for curtains.

## REFERENCES

1. Sreenivasa, Itagi M R, Chilakwad S L and Patil B G (2003) *Khana – The blended beauty of silk and cotton*. *Indian Silk* **41**: 27-29.
2. Tyagi G K, Gopal A and Gon D P (2007) *Contribution of fiber profile to performance characteristics of polyester- viscose and polyester-cotton ring and MJS yarns*. *Indian J Fiber Text Res* **32**(1-6): 404-08.
3. Loghavi A , Shaikhzadeh S, Etrati S M, Mazaheri F and Haghghat-kish M (2008) *A study of spinning persian silk waste/ cotton blends on Rotor Spinning System*, *J Text Inst* **25**: 49-50.
4. Mahish S S and Punj S K (2007) *Effect of process parameters and blend percentage on physical properties of polyester/ viscose blended air-jet textured yarns*. *Indian J Fiber Text Res* **33**: 13-16.
5. Kothari V K and Bari S K (2002) *Properties of polyester/ wool parent and air-jet textured yarns and their fabrics*. *Indian J Fiber Text Res* **27**: 156-60.
6. Vadivu P K and Dharni K S (2008) *Enhancing the aesthetic and functional properties of silk using cotton and linen*. *Man Made Text* **51**: 54-57.
7. Datta R K and Patel N C (1995) *Fabric feel, and appearance of some Indian suiting fabrics using Kawabata instrument*. *ATIRA Comm Tex*, **29**: 22-35.
8. Bhattacharya S S, Khatwant P A and Yardi S (2001) *are tertiary blends better than binary blends*. *Indian Text J III*: 19-25.

9. *Deshmukh G (2009) Ahimsa peace silk- an innovation in silk manufacturing. Man- made Text***53**: 421-24.
10. *Dréan J Y, Sinoimeri A, Chollakup R and Frydrych R (2004) Proceedings of the Beltwide Cotton Conferences : 2002-2004 full papers, cotton pest loss database. [Cd-Rom]. Memphis:NCCA, p. 2715-2715. Beltwide Cotton Conferences, 2004-01-05/2004-01-09, San Antonio, Etats-Unis.*
11. *Fatima Z and Vatsala, R (1992) A studies on blending of tasar silk waste with polyester. IndianText J***102**: 98-101.
12. *Sreenivasa, Itagi M R, Kumar H L V and Nadiger G S (2007) Development and study of the properties of Eri silk and polyester blended yarn. Man-Made Text***48**: 15-18.