

CARDED AND COMBED YARN EFFECT ON FINISHED FABRIC QUALITY

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Abstract

Now a day's most of the buyer of textile industry throughout the world is looking for best quality product. Often buyers are asking to produce finished product from carded or combed yarn. So knowing the performance of product made from carded or combed yarn is getting higher day by day. Yarn is the fundamental unit of fabric. Yarn contains a lot of properties (variables) which can affect dyed fabric finished quality. Carded and combed yarns of same GSM have many different properties because of different manufacturing process. Combed yarn is of superior quality and carded yarn is of inferior quality. The main purpose of this project is to find out or investigate carded and combed yarn effect on dyed fabric finished quality such as Color fastness properties (Rubbing, Wash, Perspiration, K/S value).

Keywords: Combed, Carded, Single jersey, Rib, Fleece, Dyes, Dyeing, Reactive Dye, Color fastness to Rubbing, Washing, Perspiration etc.

Introduction

Dyeing is an ancient art. It was practiced during the Bronze Age in Europe. Dyeing is the process of adding color to textile products like fibers, yarns and fabrics. Primitive dyeing techniques included sticking plants to fabric or rubbing crushed pigments into cloth. Dyeing is normally done in a

special solution containing dyes and particular chemical material. After dyeing, dye molecules have uncut chemical bond with fiber molecules. The temperature and time controlling are two key factors in dyeing. There are mainly two classes of dye, natural and man-made. The primary source of dye, historically, has generally been nature, with the dyes being extracted from animals or plants. Since the mid-18th century, however, humans have produced artificial dyes to achieve a broader range of colors and to render the dyes more stable to resist washing and general use. Different classes of dyes are used for different types of fiber and at different stages of the textile production process, from loose fibers through yarn and cloth to completed garments. Acrylic fibers are dyed with basic dyes, while nylon and protein fibers such as wool and silk are dyed with acid dyes, and polyester yarn is dyed with disperse dyes. Cotton is dyed with a range of dye types, including vat dyes, and modern synthetic reactive and direct dyes.

Sample preparation (Material)

Same GSM of combed and carded fabric was collected from knitting mill considering other properties. We took 3 types of fabric, a. Single jersey, b. Rib, and c. Fleece. The samples were scoured and bleached. All the samples were dyed in open bath.

The samples were delivered for dyeing. . Dyeing process was done in same dyeing condition and same dyeing recipe for same fabric structure. We used Reactive dye for dyeing those samples. We used 1%, 3% and 5% shade for Single jersey, Rib and Fleece fabric. Moreover combined shade was also used to check the performance.

Single jersey: Single Jersey is a knit fabric used predominantly for clothing manufacture. In single jersey fabric, all face loops are present in one side and all back loops are present in other side of the fabric. One set needle is used to produce single jersey fabric. And this fabric has curling tendency.

Rib: It is the derivatives of double jersey. Back side and face side appearance is same. And this fabric has no curling tendency. Two sets needle is use to produce Rib fabric. Rib fabric is more compact than single jersey.

Fleece: It is the derivatives of single jersey. It contains all the properties of single jersey. But this fabric is more compact than single jersey and Rib fabric.

Reactive dye: A dye, which is capable of reacting chemically with a substrate to form a covalent dye substrate linkage, is known as reactive dye.

Here, the dye contains a reactive group and this reactive group makes covalent bond with the fibre. This covalent bond is formed between the dye molecules and the terminal –OH group of cellulosic fibres.

Method

Color fatness to rubbing test Method: ISO 105/12

Color fastness to wash test Method : ISO 105:CO3

Color fastness to perspiration test Method: ISO 105 E04

Result and Discussion

Rubbing Test:

Fabric type	Shade percentage	Card / Combed	Assessments			
			Grade changing for		Grade staining for	
			Dry	Wet	Dry	Wet
Fleece Color: Yellow	1%	Card	1	1/2	5	4/5
		Combed	1	1/2	5	4/5
	3%	Card	1	1/2	5	4/5
		Combed	1	2	5	4
	5%	Card	1	1/2	5	4/5
		Combed	1	2	5	4
Rib Color: Blue	1%	Card	1	1/2	5	4/5
		Combed	1	1/2	5	4/5
	3%	Card	1	1/2	5	4/5
		Combed	1	2/3	5	3/4
	5%	Card	1	1/2	5	4/5
		Combed	1	2/3	5	3/4
Single jersey Color: Red	1%	Card	1	1/2	5	4/5
		Combed	1	2	5	4
	3%	Card	1	2	5	4
		Combed	1/2	3	4/5	3
	5%	Card	1/2	2	4/5	4
		Combed	1/2	3	4/5	3
Fleece Y:R:B= 1:2:3	1%	Card	1	1	5	5
Combed		1	1/2	5	4/5	
Rib Y:R:B= 3:2:1		Card	1	1	5	5
Combed		1	1/2	5	4/5	
S/j Y:R:B= 1:3:2		Card	1	1	5	5
Combed		1	1/2	5	4/5	

Table 1: Test report for rubbing

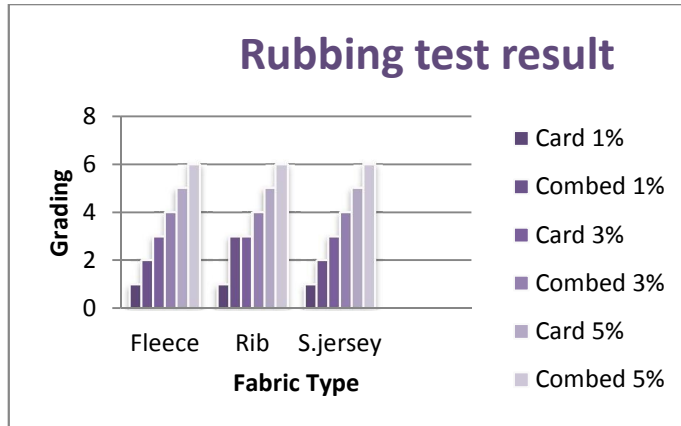


Figure 1: Rubbing test result of Fleece, Rib and S. Jersey fabric with different shade%

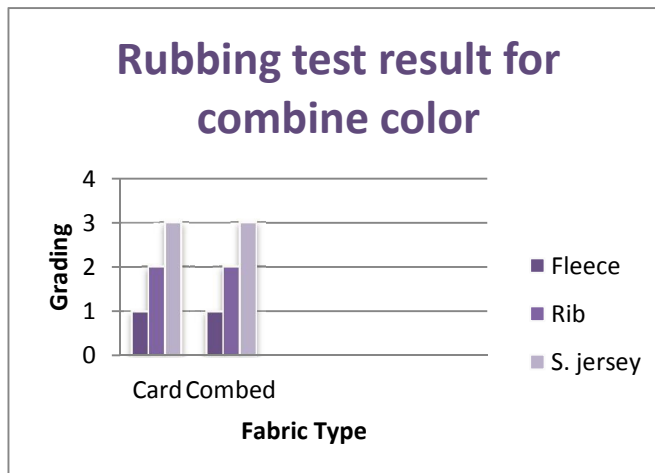


Figure 2: Rubbing test result for Fleece, Rib and s. Jersey fabric in combined recipe

Maximum fabric has no change in changing and staining scale at dry state. Those values are graded as excellent according to the grading system. But there are a little changes at wet state. And those values are graded as good to fair according to the grading scale.

Colorfastness to rubbing of single jersey fabric have some changes both dry and wet state. This changes have done for both Carded and Combed fabric and for 3% and 5% shade. Those values are graded as good to fair according to the grading scale.

Washing Test:

Fabric type	Shade percentage	Card/ combed	Assessments						
			Grade for changing	Color staining to multi-fibre fabric					
				acetate	cotton	Nylon	Polyester	Acrylic	Wool
Fleece color: Yellow	1%	Card	2	4/5	4	5	5	5	2/3
		Comb	1/2	4/5	4/5	5	5	5	5
	3%	Card	3	4	3	5	5	5	2/3
		Comb	1/2	5	4/5	5	5	5	4
	5%	Card	2/3	3/4	3/4	5	5	5	2/3
		Comb	2	3/4	4	5	5	5	4
Rib color: Blue	1%	Card	1/2	4	4/5	3	5	5	2/3
		Comb	1/2	4	4/5	3	5	5	2
	3%	Card	2/3	3	3/4	2/3	5	5	1/2
		Comb	1/2	4	4/5	3	5	5	2
	5%	Card	2/3	3	3/4	2/3	5	5	1/2
		Comb	2	3/4	4	2/3	5	5	1/2

S/j color: Red	1%	Card	2	5	4	5	5	5	2/3
		Comb	2	4/5	4	5	5	5	5
	3%	Card	2	5	4	5	5	5	2/3
		Comb	1/2	4/5	4/5	5	5	5	4/5
	5%	Card	2	5	4	5	5	5	3
		Comb	1/2	5	4/5	5	5	5	4/5
Fleece Y:R:B= 1:2:3	1%	Card	1	4/5	5	3/4	5	5	3
Rib Y:R:B= 3:2:1		Comb	1/2	4/5	4/5	4	5	5	2/3
		Card	2/3	5	3/4	5	5	5	3
S/j Y:R:B= 1:3:2		Comb	1	5	5	3/4	5	5	3
		Card	1/2	4/5	4/5	3/4	4/5	5	2/3
		Comb	1/2	5	4/5	4	5	5	3

Table 2 : Test report for washing

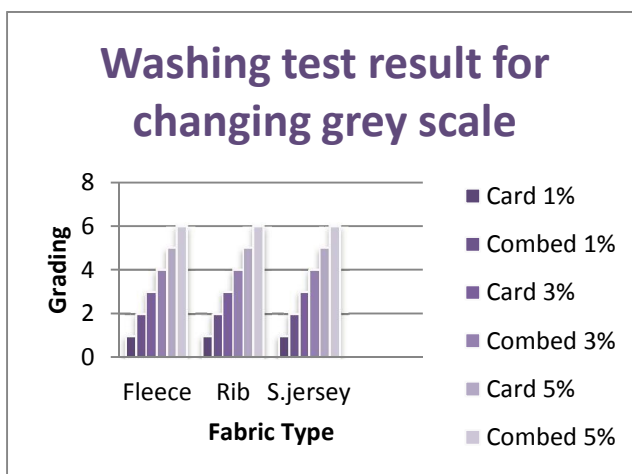


Figure 3: Washing test result for Fleece, Rib and S. Jersey fabric with different shade% in changing grey scale

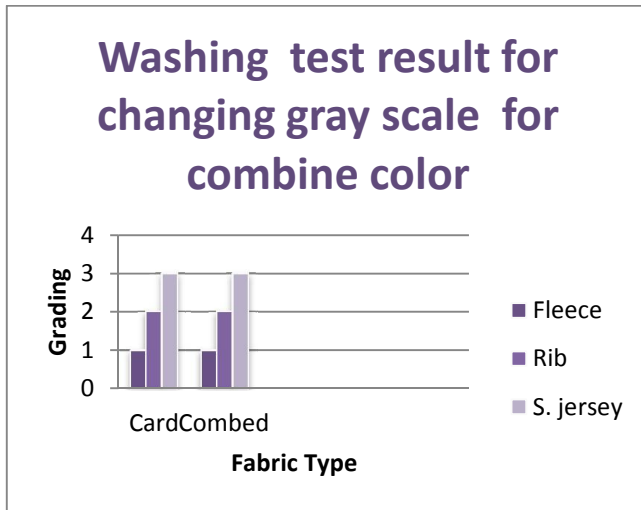


Figure 4: Washing test result for Fleece, Rib and S. Jersey fabric with combined recipe in changing grey scale

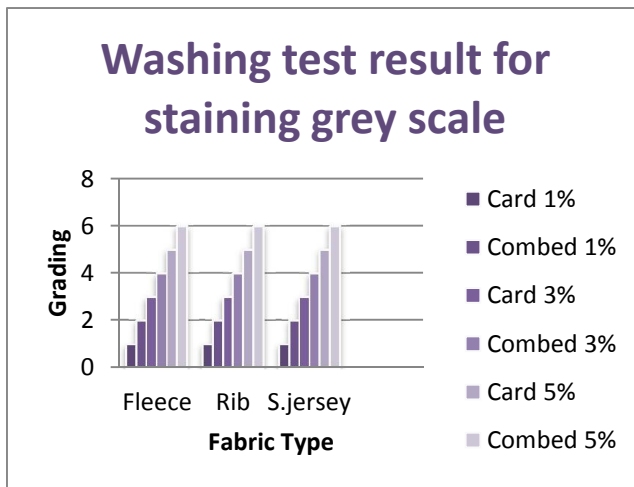


Figure 5: Washing test result for Fleece, Rib and S. Jersey fabric with different shade% in staining grey scale

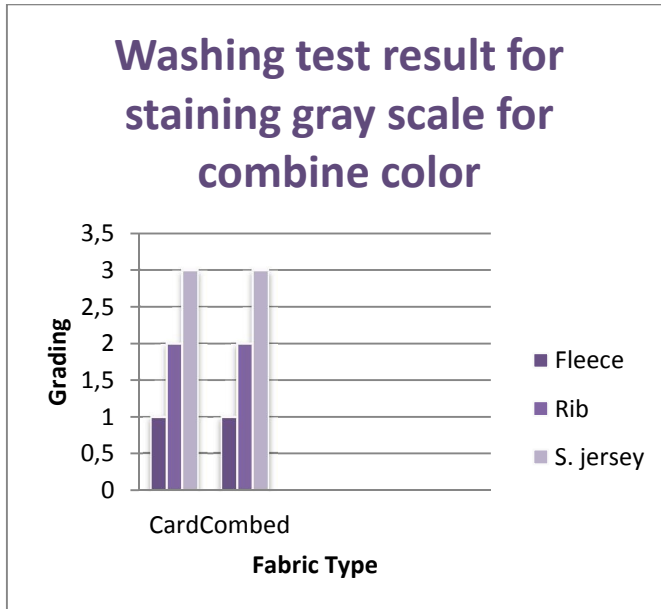


Figure 6: Washing test result for Fleece, Rib and S. Jersey fabric with combined recipe in Staining grey scale

Color staining to multifibre fabric have done mainly for Acetate, cotton and wool fabric. Those values are graded as good to fair according to the grading scale. There are small staining in Nylon fabric for Rib fabric(both carded and combed fabric and 3% and 5% shade). Color staining for Polyester and Acrylic is excellent.

Color changes is also done for all the fabric. And those values are graded as good to fair according to the grading system.

Fabric type	Shade percentage	Card/ combed	Assessments						
			Grade for changing	Color staining to multi-fibre fabric					
				acetate	cotton	Nylon	Polyester	Acrylic	Wool
Fleece color: Yellow	1%	Card	2	5	4	5	5	5	5
		Comb	1/2	5	4/5	5	5	5	5
	3%	Card	2/3	5	3/4	5	5	5	5
		Comb	2	5	4	5	5	5	5
	5%	Card	2/3	5	3/4	5	5	5	5
		Comb	2	5	4	5	5	4/5	5
Rib color: Blue	1%	Card	1	5	5	3	5	5	5
		Comb	1	5	5	3	5	5	5
	3%	Card	2	4/5	4	2/3	4/5	4/5	4/5
		Comb	1/2	4/5	4/5	3	4/5	3	4
	5%	Card	2	4/5	4	2/3	4/5	4/5	4/5
		Comb	1/2	4/5	4/5	3	4/5	4/5	4/5

S/j color: Red	1%	Card	1/2	5	4/5	5	5	5	5
		Comb	1/2	5	4/5	5	5	5	5
	3%	Card	2/3	5	3/4	4/5	5	4/5	5
		Comb	1/2	5	4	4/5	5	5	5
	5%	Card	2	5	4	5	5	4	5
		Comb	1/2	5	4/5	5	5	4/5	5
Fleece Y:R:B= 1:2:3	1%	Card	1/2	5	4/5	4	5	5	5
Comb		1/2	5	4/5	4	5	5	5	
Rib Y:R:B= 3:2:1		Card	2	5	4	5	5	4	5
Comb		1/2	5	4/5	5	5	4/5	5	
S/j Y:R:B= 1:3:2		Card	2	5	4	4/5	5	5	5
Comb		1/2	5	4/5	4/5	5	5	5	

Table 3: Test result for perspiration test (Acid medium)

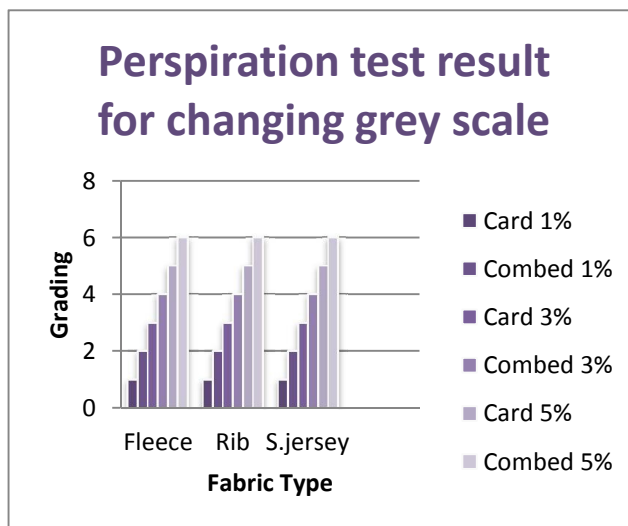


Figure 6: Perspiration test result for Fleece, Rib and S. Jersey fabric in changing grey scale

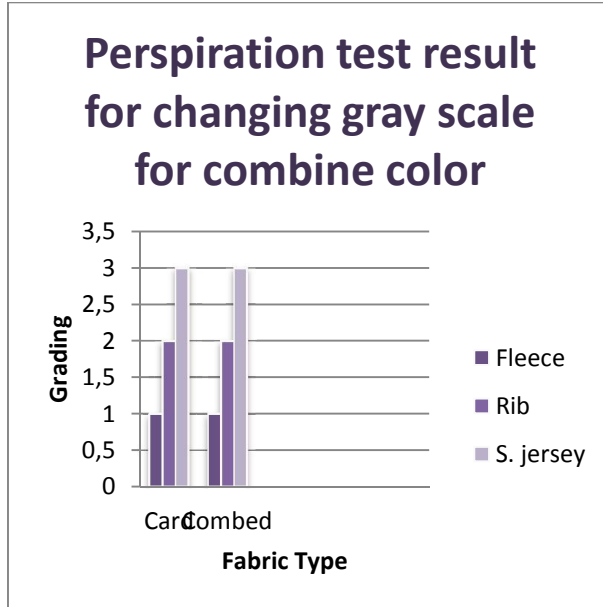


Figure 7: Perspiration test result for carded and combed fabric

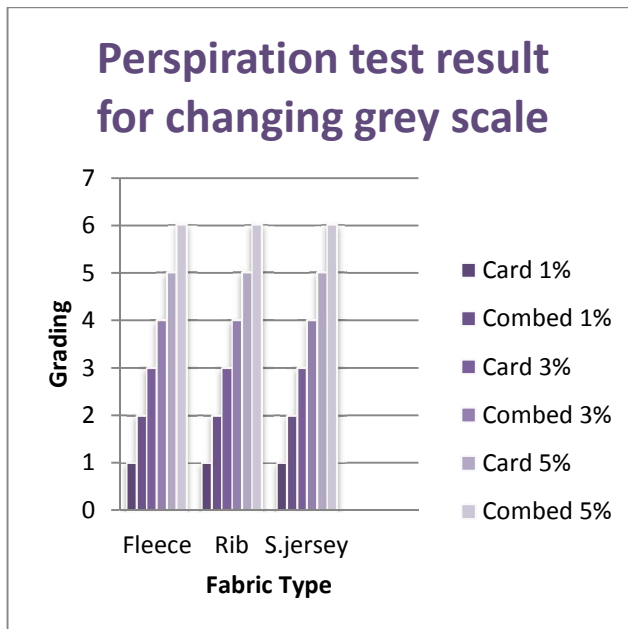


Figure 8: Perspiration test result for Fleece, Rib and S. Jersey fabric in changing grey scale

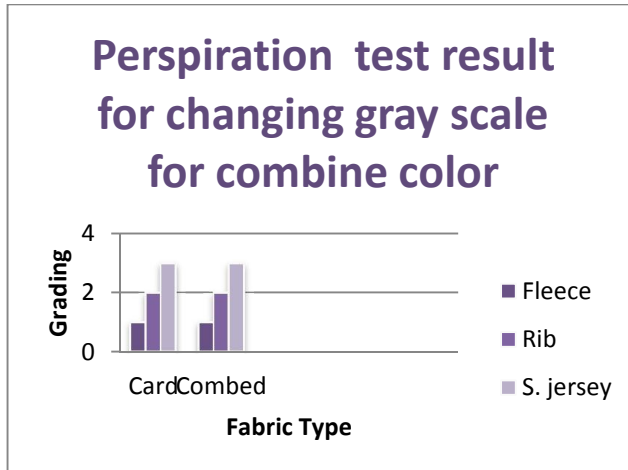


Figure 9: Perspiration test result in case of Fleece, Rib and S. Jersey fabric with combined recipe

In acid solution, color staining to multifibre fabric have done mainly for Cotton and Nylon fabric. But this staining is not so much. It can be graded as good to fair. In Rib fabric(Both carded and combed fabric and 3% and 5% shade), color staining have done for all most all the fabric. And those values are also graded as good to fair.

Color changing is also done for all most all the fabric . And also it can be graded as good to fair.

In alkali solution, color staining to multifibre fabric have done mainly for Cotton fabric. It can be graded as good to fair. In Rib fabric(Both carded and combed fabric and 3% and 5% shade), color staining have done for Nylon and wool fabric. And those values are also graded as good to fair.

Color changing is also done for all most all the fabric . And also it can be graded as good to fair.

Color fastness of combined color of 1% shade is much better than the single colors of all shade in case of all the shade. In case of shade variation, there were a small changes between different shade percentage. Color fastness of 1% shade is better than both 3% and 5% shade.

Fabric type	Shade percentage	Card/ combed	Assessments						
			Grade for changing	Color staining to multi-fibre fabric					
				acetate	cotton	Nylon	Polyester	Acrylic	Wool
Fleece color: Yellow	1%	Card	1/2	5	4/5	5	5	5	5
		Comb	1	5	5	5	5	5	5
	3%	Card	2	5	4	5	5	5	5
		Comb	2	5	4	5	5	5	5
	5%	Card	3	5	3	5	5	5	5
		Comb	2/3	5	3/4	5	5	5	5
Rib color: Blue	1%	Card	1	5	5	4	5	5	5
		Comb	1	5	5	4/5	5	5	5
	3%	Card	3	5	5	3	5	5	5
		Comb	1/2	4/5	4/5	3/4	5	5	4/5
	5%	Card	1	5	5	3	5	5	5
		Comb	1	5	5	3	5	5	5

S/j color: Red	1%	Card	2	5	4	5	5	5	5
		Comb	1/2	5	4/5	5	5	5	5
	3%	Card	2/3	5	3/4	5	5	5	5
		Comb	2/3	5	3/4	5	5	5	5
	5%	Card	3	5	3	5	5	5	5
		Comb	3	5	3	5	5	5	5
Fleece Y:R:B= 1:2:3	1%	Card	1/2	5	4/5	5	5	5	5
Comb		1/2	5	4/5	5	5	5	5	
Rib Y:R:B= 3:2:1		Card	1/2	5	4/5	5	5	5	5
Comb		1/2	5	4/5	5	5	5	5	
S/j Y:R:B= 1:3:2		Card	1/2	5	4/5	5	5	5	5
Comb		1	5	5	5	5	5	5	

Table 4:Test result for perspiration test (Basic medium)

Conclusion

The analytical result reveals that carded fabric can easily be used in place of combed fabric. Because there are not so many differences between carded fabric and combed fabric. For this, production cost will be decreased because carded fabric production cost is generally lower than combed fabric. This study work was analyzed a few number of fabric properties. The result of our simple bar diagram shows that using carded fabric and combed fabric have a little change occur in terms of color fastness to wash. There is a little effect on color fastness to rubbing and perspiration both acid and alkali medium.

Combed fabrics are stronger, less hairy and more uniform than carded fabrics. That is why, combed fabrics shows better result on color fastness to rubbing, wash and perspiration than carded fabrics

In case of shade variation, there were a small changes between different shade percentage. Color fastness of 1% shade is better than both 3% and 5% shade.

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