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Influence of Water Repellancy on Silk: Cotton Handloom Fabrics Finished by Integrated Weaving

Vasu P¹, Dr T Ramachandran²

¹Research Scholar, Department of Textile Technology,

²Principal, Karpagam Institute of Technology, Coimbatore, India.

Abstract: Special characteristics which are not the inherent quality of a fibre can be incorporated through functional finishes. Normally finishing process is undertaken in Processing Mills after completing weaving in Weaving mill. Handloom saree textile fabrics being of short length cannot be taken for separate finishing. Thus handloom textiles normally do not undergo any finishing. Through this research integrated weaving with finishing has been devised as a new approach. Water Repellency / Stain Guard is a finish now-a-days given to mill made fabrics of high value to protect it from any stains which are prone to occur on normal daily life. Handloom saree fabrics – Silk, Cotton and Sico sarees, are very costly due to its handcrafted work involved in it and high wages paid against the skill of the weaver involved in weaving it. These high value sarees can be protected against any stains, by incorporating with stain guard finish during the weaving process. This research aims at developing special finishing method, integrating with weaving process on Handloom. The effect of the finish applied through this method on different fibres / combination of fibres and its efficiency before and after many wash cycles is studied. The physical properties before and after finish also studied separately.

Keywords: Special Characteristics, Functional Finishes, Handloom, Water Repellancy / Stain Guard Finish, integrating with weaving, effect of finish, before & after wash, physical properties before & after finish

1. INTRODUCTION

This research work aimed to impart special water repellancy / stain guard finish to fabric by integrating, weaving & finishing process on handloom. Handloom / Hand woven sarees / products have become very costly due to its handcrafted work and are worn by connoisseurs as formal wear or office wear. Stains which may normally occur in day to day life work due to incidental mishappenings not only causes damage to the costly fabric but also cause lot of discomfort and hurt the feelings, make the wearer to become upset. The saree may require immediate washing or dry cleaning to prevent from spreading of stain in other places. As the cost of dry cleaning is very high, the maintenance cost through dry cleanings at times outweigh the original cost of the saree / attire, the fact cannot be ruled out. Thus it is felt necessary to impart this special finish to costly handloom fabrics / sarees which are normally worn as work wear / functional wear. An attempt is made to impart finish on handloom saree by devising a new method of integrated weaving & finishing application process.

2. Materials and Methods

For the study, high value handloom saree fabrics of three different groups of varieties of 10 samples each- pure silk, pure cotton and silk / cotton (sico) have been taken. These groups of variety fabrics have been applied with water repellent / stain guard finish on the loom while weaving by weaver himself immediately after weaving, allowed to dry and cured by special arrangement, before taking up the woven fabric on cloth beam. The cloth beam after weaving is taken out of loom and kept in hot sun for 2 hours exposing the whole

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fabric, which helps in proper polymerisation / curing of finish on the fabric, in absence of curing chamber of mill. Table 1 below shows specification details of the saree fabrics developed by integrated method of weaving cum finishing process.

Table 1- Saree Fabric details which were developed & finished by special method

S.No	Fabric Code	Fibre Content	Specifications				Nominal Fabric Weight Range (g/m ²)
			Count of Warp	Count of Weft	Reed	PPI	
1	SGS 1	100% Silk	20 / 22 D Silk (2 ply)	20/22D Silk(3ply)	96	88	66
2	SGSC 2	50 : 50 Silk :Cotton	20 / 22 D Silk (2 ply)	2/100 Cotton	96	72	55
3	SGC 3	100 % Cotton	80 ^s	80 ^s	80	72	60

* In the above fabric codes, SG stands for Stain Guard / Water Repellent Sample, ‘S’ stands for ‘Silk’, ‘C’ stands for ‘Cotton’, ‘SC’ stands for ‘Silk Cotton’.

3. Results and Discussions

The three groups of varieties of samples, of 10 numbers in each group, developed on handloom by integrated method of weaving & Finishing processes were tested for its water repellent efficiency by Spray test by AATCC-TM 22 2010¹ method and results are analysed. Figure 1 below shows the results.

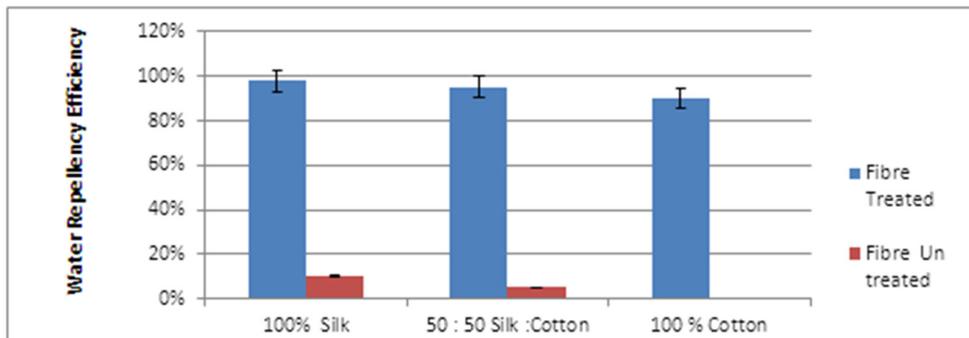


Figure 1. Water Repellency Finish Efficiency of untreated & treated fabrics

The result shows 100% silk fabric has 98 % water repellent efficiency after finish and Sico shows 95% efficiency & Cotton shows 90 % efficiency of finish, applied through the newly developed integrated method.

3.1 Effect of Water Repellent Finish after Washing

Further the effect of finish after wash is assessed by testing the samples after many wash cycles.

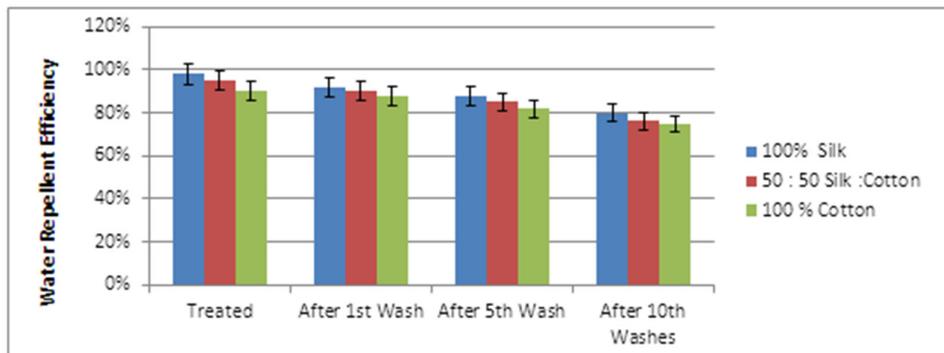


Figure 2. Efficiency of Finish after different Washing Cycles

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Fig 2. Shows that the efficiency does not reduce drastically after wash, thus the finish is not temporary and after many wash cycles – 5 washes & 10 Washes reduces gradually, but still has good efficiency. Thus the novel method of application of finish integrating weaving with finishing is successful.

3.2 Testing for Physical Properties of Untreated and Treated Fabric with Water Repellent Finish

All the 3 groups of samples, treated and untreated are tested for basic physical properties like Tensile Strength & Elongation, Bending Length, Drape & Abrasion Resistance/ Pilling and results are compared.

Table 2. - Tensile Strength & Elongation of Untreated & Treated Fabrics

S.No	Fabric Code	Fibre Content	Tensile Strength Force (Kg) (Untreated)		Tensile Strength Force (Kg) (Treated)		Elongation (%) (Untreated)		Elongation (%) (Treated)	
			Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
1	SGS 1	100% Silk	16.9	40.0	16.9	39.9	10.64	13.42	10.74	13.46
2	SGSC 2	50 : 50 Silk :Cotton	17.5	34.56	17.2	32.36	10.52	12.52	10.64	12.54
3	SGC 3	100 % Cotton	20.24	24.56	20.16	23.68	10.24	12.48	10.26	12.52

Table 2. Shows tensile strength and elongation of untreated and treated samples of all three varieties of group of samples have been tested as per IS 1968 standards. The result shows there is marginal reduction in the strength of all the varieties after treatment. The difference is negligible. There is also minor difference in elongation, particularly with 100% silk it is slightly higher. Thus it can be concluded that the treatment does not result in significant strength loss or significant change in elongation to the treated fabric.

3.3. Bending Rigidity and Drape of Untreated & Treated Fabrics

The Bending rigidity / Fabric stiffness and Drape are correlated. For saree varieties better drape is must. The test is done to find whether application of Stain Guard finish causes any stiffness or reduces the drape. The Fabric stiffness test done as per standards ISI (IS:6490-1971) to find the Bending length and Drape test as per ASTM D 3512, to find the %age of drape . The results are tabulated below and analysed.

Table-3 Bending Length and Drape values of untreated and treated samples

S.No	Fabric Code	Fibre Content	Bending Length (cm) (Untreated)		Bending Length (cm) Treated		Drape (%) Untreated	Drape (%) Treated
			Warp	Weft	Warp	Weft		
1	SGS 1	100% Silk	4.2	5.6	4.0	5.2	55.28	54.62
2	SGSC 2	50 : 50 Silk :Cotton	10.2	11.2	9.8	10.6	60.37	59.56
3	SGC 3	100 % Cotton	5.0	4.5	4.8	4.2	70.24	70.14

Table 3. Shows the bending length of silk and cotton, untreated samples are less in comparison to Silk /Cotton fabric. After the treatment of WR finishes the stiffness marginally reduced and drape values shows that the finish gives positive effect on drape of fabric. The high bending length and drape values of Silk / Cotton can be accounted due to presence of kora silk in the Silk / Cotton fabric which causes high bending rigidity.

3.4 Testing for Abrasion Resistance / Pilling

The abrasion resistance / pilling of all the three groups of varieties of samples were tested as per ASTM D 3512 test method using Martindale Abrasion and Pilling Tester. The samples were compared with standard ASTM rating scale and pilling qualities were evaluated and graded.

Table 4. Abrasion / Pilling Resistance values of untreated and treated samples

S.No	Fabric Code	Fibre Content	Pilling Resistance (Untreated)	Pilling Resistance (Treated)
1	SGS 1	100% Silk	4	5
2	SGSC 2	50 : 50 Silk :Cotton	5	4
3	SGC 3	100 % Cotton	5	5

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Table 4. Shows there is marginal difference of pilling in untreated and treated samples. In the case of 100% silk the pilling resistance which was less on untreated has improved after treatment whereas in silk / Cotton saree the pilling resistance reduced to next lower value. There is no change in the case of Cotton fabric.

4. Conclusion

Three different fibre ratios of Silk Cotton – 100% silk, 50: 50silk: cotton, 100% cotton saree varieties of hand woven textiles fabrics were developed on handloom integrating weaving & finishing processes. All the three groups of varieties of fabrics have been tested for their efficiency of finish applied through the newly developed method. It has been found that the efficiency of all the variety of fabrics were good. And the efficiency of fabric after many wash cycles – single, 5 washes & 10 washes were tested. The result shows that the samples withstand water repellent efficiency after many wash cycles, thus it shows that the new method of application has proper effect on varieties of fabrics. The efficiency gradually reduces after every wash cycle which is quite normal in other cases also.

The physical properties of untreated and treated fabric samples have been tested for tensile strength & elongation, bending rigidity/ drape and pilling resistance. The result shows that there is only marginal reduction in tensile strength & elongation improved marginally. The bending rigidity or drape of treated fabrics are better than untreated, particularly in the case of silk/cotton fabric. Thus the study shows the new method of integrating weaving & finishing is successful on handlooms.

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