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Effect of Singed Viscose Yarn on Woven Fabric Characteristics

A Thirunarayanan[1], Dr T Ramachandran[2]
[1]Research Scholar, Department of Textile Technology,
[2]Principal, Karpagam Institute of Technology, Coimbatore, India.

Abstract: *Viscose single Parent yarns of Ne 18/1, Ne 28/1 & Ne 38/1were selected for the development of Woven Plain Grey fabrics. The Parent yarns were singed to achieve the nominal linear densities of 'Singed' yarns of Ne 20/1, Ne 30/1 & Ne 40/1. These singed yarns were selected for the development of Woven Singed Plain Grey fabrics. Rapier Loom was used for the development of Plain Woven Parent & Singed Grey Fabrics. The six varieties of Woven Parent & Singed Grey fabrics were properly coded. The quality characteristics of developed Woven Parent & Singed Grey fabrics such as Pilling Resistance, Water Absorbency and Air Permeability were tested and critically analysed.*

Keywords: *Viscose, singed, linear density, woven plain grey fabric, Rapier Loom, Pilling Resistance, Absorbency, Air Permeability*

1. INTRODUCTION

Woven fabrics of normal Viscose yarns have hairiness on its surface. Hairiness in general on fabric surfaces is not desired owing to problems in the subsequent processes. Hairiness also severely affects the final fabric appearances. An attempt is made to produce Woven fabrics using Singed Viscose yarns and the effect of singed Viscose yarns on Woven fabric characteristics such as Pilling Resistance, Water Absorbency and Air Permeability were critically studied and compared with Woven fabrics of its Parent Viscose yarns.

2. Materials and Methods

For this study, three different Viscose single yarns of nominal linear density of Ne 18/1, Ne 28/1 & Ne 38/1 were selected and singeing was carried out on Gas Yarn Singeing Machine to achieve the singed yarn nominal linear density of Ne 20/1, Ne 30/1 and Ne 40/1 respectively. Six varieties of Woven Grey Plain fabrics were developed with the Parent and Singed viscose yarns using Rapier Loom. Prior to weaving, the Parent and Singed viscose single yarns were sized using single end sizing machine. Warping of sized yarns was carried out in a Sectional Warping machine and the beams were produced. These beams were used for weaving in a Rapier Loom for development of plain Woven fabrics. The nominal fabric weight (GSM) of the Woven-Parent Grey fabrics & Woven-Singed Grey fabrics were kept similar for the respective linear densities. The developed fabrics were coded and the developed fabrics' construction details for each coded fabrics were shown below in Table 1. In order to maintain similarity in fabric weight (GSM), the pick density was increased for Singed yarn Woven fabrics.

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Table 1- Woven Fabric Construction Details

S.No	Fabric Code	Fabric Construction						Application
		Warp Linear Density (Ne)	Weft Linear Density (Ne)	Ends/cm	Picks/cm	Fabric Width	Nominal Fabric weight (g/m^2)	
1	WCPG*	Ne 18/1	Ne 18/1	23	18	45 cm	152	Ladies Garment
2	WCSG*	Ne 20/1	Ne 20/1	23	23	45 cm	152	Ladies Garment
3	WMPG*	Ne 28/1	Ne 28/1	29	22	45 cm	119	Ladies Garment
4	WMSG*	Ne 30/1	Ne 30/1	29	25	45 cm	119	Ladies Garment
5	WFPG*	Ne 38/1	Ne 38/1	36	30	45 cm	114	Shirting
6	WFSG*	Ne 40/1	Ne 40/1	36	34	45 cm	114	Shirting

***** In the above fabric codes, 'W' stands for 'Woven', 'C' stands for 'Coarse', 'M' stands for 'Medium', 'F' stands for 'Fine', 'P' stands for 'Parent yarn', 'S' stands for 'Singed yarn' & 'G' stands for 'Grey fabrics'.

Above Coded six varieties of Woven fabrics were developed as per fabric construction details shown in Table 1. These developed fabrics were tested and critically analysed for fabric characteristics such as Pilling Resistance, Absorbency and Air Permeability. ASTM D 4970-02 test method was used for Pilling Resistance and Martindale Abrasion and Pilling Tester, Model M 235 was used for conducting the Pilling tests. AATCC/ASTM Test method TS 018 was adopted for Water Absorbency and ASTM D 737-96 test methods were used for Air Permeability.

3. Results and Discussions

The six varieties of developed Woven-Parent & Singed Grey fabrics were tested for characteristics such as Pilling Resistance, Absorbency and Air Permeability which are given below.

3.1 Pilling Resistance

As per ASTM D 1776 standard for conditioning, all the six samples were conditioned before testing. As per ASTM D 4970-02 test method for Pilling Resistance, all the six varieties of Woven Parent & Singed Grey fabric samples were tested using Martindale Abrasion and Pilling Tester, Model M 235. The samples were compared with the Standard ASTM Rating Scale and the Pilling qualities were evaluated and the samples were graded. The Standard ASTM Scale Rating is given in Table 2.

Table 2- Standard ASTM Scale Rating

Grade	Description
5	No Pilling
4	Slight Pilling
3	Moderate Pilling
2	Severe Pilling
1	Very Severe Pilling

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Fig 1 shows the Pilling Resistance of all the six samples of Woven-Parent & Singed Grey fabrics.

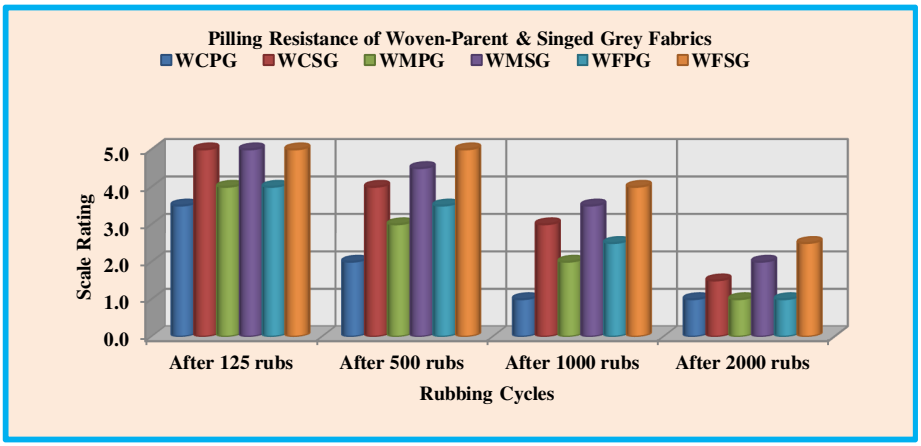

Fig 1- Pilling Resistance of Woven-Parent and Singed Grey Fabrics

In general, Woven-Singed yarn Grey fabrics showed better resistance to pilling than Woven- Parent yarn Grey fabrics for all the rubbing cycles. Woven- Singed yarn Grey fabrics showed better resistance to pilling up to 500 rubbing cycles and the scale values started to deteriorate slowly for 1000 and 2000 rubbing cycles, yet the values were better than Woven- Parent yarn Grey fabrics. In general, finer Woven- Singed yarn Grey fabrics showed better scale values than coarser Woven- Singed yarn Grey fabrics due to lesser fibres in their yarn cross section. The Pilling Resistance was better for Woven- Singed yarn Grey fabrics due to higher weft density used for getting the similar fabric weight as that of Woven- Parent yarn Grey fabric. Higher weft density resulted into better cloth cover and compact fabrics, which offered higher resistance to pilling [1].

3.2 Water Absorbency

Fig 2 shows the Water Absorbency of six varieties of Woven-Parent & Singed Grey Fabrics.

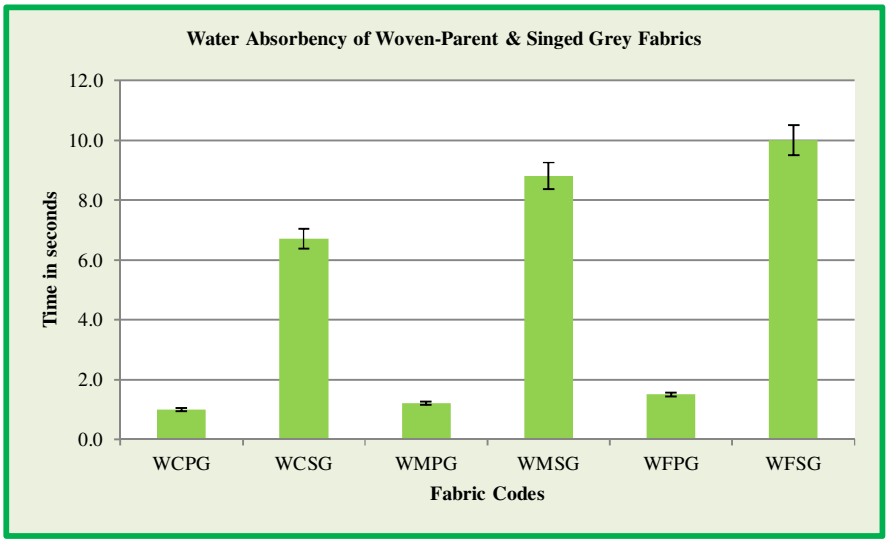

Fig 2- Water Absorbency of Woven- Parent & Singed Grey Fabrics

Woven- Singed yarn Grey fabrics showed lower Water Absorbency than Woven- Parent yarn Grey fabrics due to lesser number of hairs on fabrics. Finer Woven-Singed yarn Grey fabrics took relatively more time than coarser Woven-Singed yarn Grey fabrics [5-7, 9], as is evident from above Fig 2 due to lower fabric GSM. The Water Absorbency values were found statistically significant as is evident from Error bar shown in Fig 2.

3.3 Air Permeability

Fig 3 shows the Air Permeability values of six varieties of Woven-Parent & Singed Grey fabrics.

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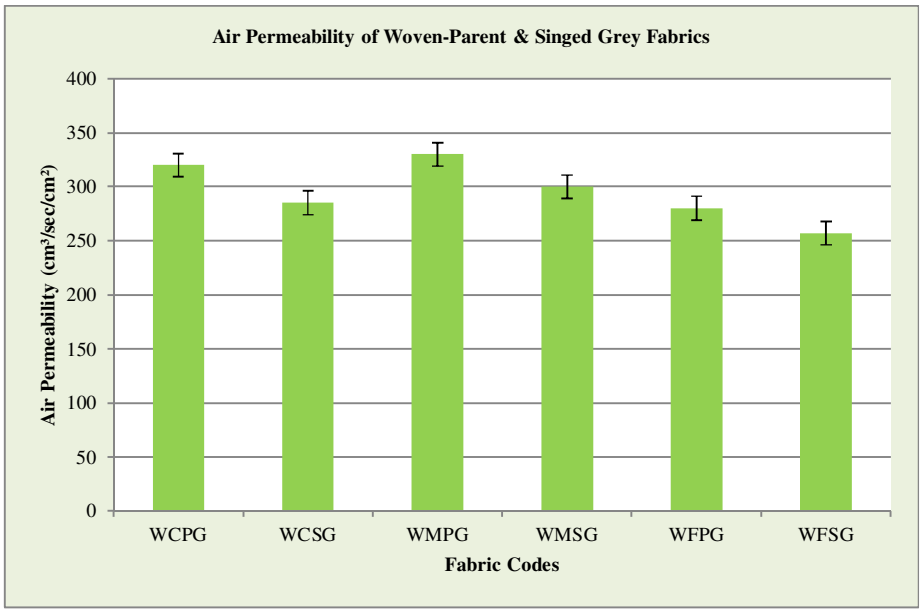

Fig 3- Air Permeability of Woven- Parent & Singed Grey Fabrics

The Air Permeability values of Woven- Singed yarn Grey fabrics were lower by 8.2% - 10.9% than Woven- Parent yarn Grey fabrics due to better cloth cover of Woven- Singed yarn Grey fabrics [1]. Woven fabrics of Singed yarn Grey fabrics had better cloth cover due to higher pick density, which was used for maintaining nominal fabric weight as similar to Woven- Parent yarn Grey fabrics [2, 9]. The Air Permeability values of all the Woven Parent & Singed Grey fabrics were statistically analysed using t-test. It clearly indicated that the values were more significant.

4. Conclusion

Six varieties of Plain Woven-Parent & Singed Grey fabrics were developed using Rapier Loom. The developed Woven Grey fabrics were tested for characteristics such as Pilling Resistance, Absorbency and Air Permeability and the results were critically analysed. It was observed that Woven-Singed Grey fabrics showed significantly better Pilling Resistance than Woven-Parent Grey fabrics due to lesser number of hairs and tight fabric construction. The Water Absorbency and Air Permeability were found to be significantly lower for Woven-Singed Grey fabrics due to lesser hairs on fabric surface and relatively compact fabric structure.

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