

Geometrical properties of multifunctional herbal finishes

By: M.Sumithra and N.Vasugi Raaja

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Abstract:

In this study an attempt has been made to approach of developing multifunctional herbal finishes using medicinal herbs. The three herbal extracts of Ricinus communis, Senna auriculata and Euphorbia herita were applied on four types of Denim fabrics directly by using pad dry cure method, following standard conditions and combinations. To enhance the durability of the finished fabric, wash durability test has been carried out and geometrical properties of the results shows better in Denim D fabric when compared to other three fabrics.

Introduction

In the present day world, Hygiene is Headline news and consumers are very conscious of textiles that are hygienic. Healthcare is a serious business which is not only influenced by practicing medical professionals. Good hygiene is an aid to health, comfort and social interactions [1]. Denim is a twill weave with blue warp threads and white filling threads. Denim is designed by the weight of a yard of fabric. 14 ounce denim is heavy duty, while 10 ounce denim is for summer wear [2].

Textiles will have desirable aesthetic qualities if they can suppress odor causing bacteria and other type of odor causing microorganisms. The hygienic and medical effectiveness of textiles is required to prevent the growth of dermatophytic fungi (those that cause skin diseases), pathogenic and potentially lethal microorganisms on fibers and to prevent their infestation by insects [3].

In this study an attempt has been made to improve the usage of herbal finishes in denim fabric. To screen for the Multifunctional properties such as Antibacterial, Antifungal, Anti odor and Mosquito Repellency, to optimize the effective herbal combination of the functional property of the selected finishes, to Finish the optimized herbal combination on the selected four different denim fabrics, to enhance the durability of the finished fabric by wash durability test and to evaluate the **Geometrical properties** of the finished fabrics.

Materials and methods:

Materials:

Selection of the fabric

- A. 68% cotton+32% polyester
- B. 68% cotton+32% Poly Lycra
- C. 68% cotton+32% core Spun Lycra
- D. 100% cotton

Selection of herbs, conditions and combination for Multifunctional finish

Pilot study was conducted with 20 selected herbs; from the pilot study three best resulted herbs were selected. The selected herbs are *Ricinus communis*, *Senna auriculata* and *Euphorbia herita*. The combinations are (1:3:2) and the condition was 20-kgf/cm² pressure (20 m/min rpm) were standardized for the selected best herbs

Methods:

Geometrical properties

This study consists of application of multi functional finishes by physical test. To find out the impregnation of multifunctional finishes in selected fabric.

Fabric Count

A standard weight is suspended in a notch on the beam arm on the pointer side. A template is used to cut short lengths of yarn, the length depending upon the count system required. These lengths are placed on the hook until the pointer comes against the Datum line. The number of short lengths required to balance the beam gives the count of the yarn [4].

GSM (ISO 3801: 1977)

The material to be cut is placed between the Sample Cutter and a Special Cutting Board. When the safety catch is released, light downward pressure on the hand wheel brings the multiple blades into contact with the material. Specimens are cut by rotating the hand wheel under a light and even pressure. (International organization for standards, 1977) The design and precision manufacture of the instrument ensures the specimens are perfectly circular and have smooth edges. To maintain the cutting efficiency, the blades should be turned or changed when they become damaged or blunt, and the Cutting Board should be turned or changed when it becomes worn. The unit is recommended for yield testing i.e. the determination of weight per unit area. The sample cutter cuts out rapidly and accurately circular specimen of 100cm², which is exactly 1 / 100th of a square meter. GSM cutter and fabric weight. The result is grams, multiplied by 100, give the GSM (Grams per square meter) directly [5].

The result is obtained using the following formula.

Gram per Square Meter = Specimen Weight in Grams x 100

Fabric Thickness (IS 7702: 1975)

Clean the presser foot and the reference plate. Check the pressure foot shaft moves freely. With the pressure- foot so loaded as to exert the appropriate specified pressure on the reference plate, set the thickness gauge to read zero. Raise the pressure- foot and the position the sample without tension on the reference plate so that no part of the area to be measured lies nearer to the selvedge than 150mm. Ensure that the area chosen for the test is free from creases. Do not attempt to flatten out any creases; this is likely to affect the result. Lower the pressure foot gently on to the sample and note the gauge reading after 30 seconds. Similarly determine the thickness at 10 places on the sample

so chosen that each such place contains different warp and weft threads [6]. (Indian standard method, 1975)

Result and discussion

Selection of herbs, conditions and combination for Multifunctional finish

Based on the selected herbs, conditions and combinations were applied in four variant of denim fabric using multifunctional finishes (antibacterial, antifungal, anti odor, and mosquito repellency test) was carried out in a single fabric and physical properties were analysed.

Geometrical properties of multifunctional finishes

Sr. No	Fabric samples	Fabric count warp	% loss or gain	Fabric count weft	% loss or gain	Mass/unit area	% loss or gain	Fabric thickness	% loss or gain
1.	Control sample A	14.2		15.8		264.2		0.55	
2.	Finished sample A	14.1	0.0704	15.8 0	0	264.8	-0.22	0.58	-0.03
3.	Finished sample A after 10 washes	14 .0	1.408	15.8 0	0	264.9	-0.26	0.58	-5.45
4.	Finished sample A after 20 washes	13.9	2.112	15.8 0	0	264.10	-0.03	0.59	-7.27
5.	Finished sample A after 30 washes	13.7	3.521	15.8 0	0	263.1	0.416	0.62	-12.72
6.	Control sample B	14.4		30.1		247.7		0.51	
7.	Finished sample B	14.5	-0.694	30.0	0.332	246.4	0.524	0.55	-1.84
8.	Finished sample B after 10 washes	14.6	-1.388	29.0	3.654	246.3	0.565	0.52	-1.96
9.	Finished sample B after 20 washes	14.3	-0.694	28.1	6.644	246.1	0.645	0.49	3.921
10.	Finished sample B	14.2	1.388	28.0	6.976	246.0	0.686	0.46	9.83

	after 30 washes								
11.	Control sample C	14.8		16.7		262.2		0.56	
12.	Finished sample C	14.5	2.027	16.1	3.592	259.0	1.144	0.59	- 5.357
13.	Finished sample C after 10 washes	14.3	1.379	15.6	6.586	256.1	2.326	0.62	- 10.71
14.	Finished sample after 20 washes	14.0	5.405	15.3	8.38	252.2	3.813	0.65	- 16.07
15.	Finished sample C after 30 washes	14.0	5.405	15.0	10.17	249.1	4.996	0.67	- 19.64
16.	Control sample D	15.3		20.2		219.4		0.51	
17.	Finished sample D	15.4	-0.653	19.8	1.980	219.1	0.1367	0.51 0	0
18.	Finished sample D after 10 washes	15.3	0	19.6	2.970	218.9	0.0911	0.51 0	0
19.	Finished sample D after 20 washes	15.2	0.653	19.5	3.46	218.6	0.3646	0.50	1.96
20.	Finished sample D after 30 washes	15.0	1.960	19.5	3.465	218.2	0.5477	0.48	5.882

Table i Geometrical property of multifunctional finishes (fabric count, mass by unit area and fabric thickness)

From the table i, the findings of the **geometrical properties** of multifunctional finishes after three stages of washes, among A(warp14.1andweft15.8,264.8, and 0.58),B(warp14.5 and weft 30.0,246.4 and 0.55),C(warp14.5 and weft16.1,259.0 and 0.59) and D(warp15.4 and weft 19.8,219.1 and 0.51) samples. The sample D (warp15.4 and weft 19.8, 219.1 and 0.51) shows better than other sample in regard of fabric count, mass/unit area and thickness because of the absorbency, reaction and the type of fiber.

Conclusion

From the present study it is concluded that geometrical properties of multifunctional finishes after three stages of washes, among A, B, C and D. The Denim D fabric shows better value when compared to other three samples in all stages of washes. It may be due to other samples are blended with polyester cotton, polyester lycra and polyester core spun lycra but sample D is 100% cotton denim fabric.

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