

## **A STUDY ON EFFECT OF ECO FRIENDLY FINISHON MECHANICAL AND COMFORT PROPERTY OF SILK FABRIC**

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### **ABSTRACT**

Textiles are indispensable part of human life. They are mainly to cover the body for protection against all adversities. Microbial infestation poses danger to both living and non living matters. The inherent properties of the textile fiber provide room for the growth of micro organism. In order to overcome these bad effects antimicrobial finishes are needed to apply on textile substrate.

In the present work Neem, Papaya, Mexican daisy leaves are selected for the antimicrobial finish and it is tried on the silk fabric. The mechanical, comfort and antimicrobial activities of such herbs on silk fabric was evaluated.

**KEYWORDS:** Silk Fabric, Textiles, Antimicrobial Activities on Silk Fabric

### **INTRODUCTION**

The consumers are increasingly aware of hygienic life style and there is a necessity and expectation of textile products finished with antimicrobial properties. Both good and bad microbes are present everywhere including our skin flora. Textiles are a more vulnerable to microbial attack by cross infection, transfer of disease, allergic reaction and odour upon a human being due to infection by microbes. The future development should be focused on the environment friendly compounds having good degree of durability with expected level of performance in the antibacterial finishing. There are many natural products from plants which show antibacterial properties. Antibacterial activities have been detected in chemical extracted from roots, stems, leaves and flowers. Due to these effects, the natural antimicrobial compounds such as Neem, Papaya Mexican Daisy leaves are used in an eco-friendly way to protect the mechanical and comfort property of silk fabric.

### **OBJECTIVES**

- To select the herbs for antimicrobial finish
- To optimize the procedure for extraction and application procedure on mulberry silk fabric
- To apply the selected natural antimicrobial finish on silk fabric
- To study the performance of antimicrobial finish on mechanical and comfort property of silk fabric.

### **METHODOLOGY**

#### **Material Selection**

#### **Fabric**

White colour raw mulberry silk fabric with 110 counts is selected for the study IS procured from kadhi. Silk fabric was degummed before finishing.

## HERBS

Neem, Mexican daisy and papaya leaves were selected which has abundant antimicrobial property. To mix this selected herbs pilot study was done in the ratio of 1:2:2, 2:1:2, 2:2:1. In that 2:2:1 ratio gives the good result. So 2:2:1 ratio was selected for this study.

The herbs were collected and thoroughly cleaned and shade dried and made into a fine powder. After the pilot study 2:2:1 ratio was selected for the final study. The selected three herbs were taken in the optimized ratio and soaked in ethanol for three days after three days the ethanol was left to evaporate.

The extracted solution and water were taken in the beaker in three different proportions 15, 25, 35 percent. In this 35 percent shows good microbial activity in the pilot study. So 35% is selected. In that percentage 15 minutes of curing is done at 80° C give better result. So it is selected.

## BINDER

Citric acid is good cross linking agent or binder; it is used to carry out pH adjustment and as a mortar agent. So citric acid is selected as a binder. 9:1 had given good result so that ratio is selected for the study.

## PRETREATMENT

As raw silk material is selected for the study to improve the absorbency and soft feel degumming was done to remove the sericin from the fabric. It is treated with alkali to remove the sericin. After the degumming process silk material absorbs more than raw fabric.

## METHOD OF FINISHING

Methanolic leaf extracts (75% & 100 % conc.) were mixed with the mordant (citric acid – 100% conc.) in the ratio 9:1. The liquor was finished onto the fabric (110X110 yarn count, 180 GSM, plain weave) at the optimized conditions in the ratio 80:20 in a water (pad-dry - cure). The fabric was then dried at 80°C for fifteen minutes to remove the moisture. Finally, the fabric samples were tested for antimicrobial activity as per the standard test methods.

## STANDARD QUANTITATIVE TEST METHODS

### Anti Bacterial Activity

#### AATCC-147-1998 (USA): Qualitative Antibacterial Assessment of Diffusible Antibacterial Agents

#### ("Quick Method")-Agar Diffusion Test

50ml of nutrient agar was prepared and sterilized at 121°C for 15 minutes. Petri plates were autoclaved in hot air oven at 121°C for 30 minutes. 20ml of Nutrient agar was poured into each of these plates and were allowed to solidify. A series of 8 test tubes containing 4.5ml of sterile water was taken. 0.5ml of culture from Nutrient broth containing the 100% gel treated sample was transferred aseptically into the first test tube. Serial dilution was carried out until its reduced dilution was 10<sup>-8</sup> 100 micro liters of 10<sup>-8</sup> diluted culture was taken aseptically and poured onto the petri plates. This was spreaded by using L rod. The plates were incubated at 37°C for 16-18 hours. Similar procedure was carried out for untreated sample, sample treated with leaf treated sample.

## RESULTS

The result obtained from this study showed that the organisms were susceptible to ethanol extracts and there are positive changes in mechanical and comfort property . In general, the organisms showed the same susceptibility to ethanol extracts.

## DISCUSSIONS

The main aim of the project was to transfer the herbs onto the fabric substrate, such that the fabric thus treated could be used as medicinal fabric. Further it was thought that antimicrobial properties could also be imparted to the substrate with the help of herbs for longer durability.

The discussion related to the study consisted of the following heading:

## SUBJECTIVE EVALUATION

### Wearers Opinion

The wearer showed more interest to wear antimicrobial treated midy top. The wearers said that the dress was not discolored, it gives freshness to the fabric and eliminated the perspiration smell and also there is no skin irritation or allergy due to the finish and perspiration reaction. The treated fabric has good mechanical and comfort property.

## VISUAL EVALUATION

The table indicates the result of the visual evaluation. The 95% judges was rated that it was good in general appearance, the brilliancy of colour was rated as bright by 93% of judges, the evenness of finishing was rated at 98%, and the texture was soft rated by 93% and for luster it was rated as 95%.

**Table 1: Visual Evaluation**

S. No	Sample	Ratings in percentage														
		General Appearance			Brilliancy of Colour			Evenness of Finishing			Texture			Luster		
		Good	Fair	Poor	Bright	Medium	Dull	Even	Partial	Uneven	Soft	Medium	Coarse	High	Medium	Dull
1.	Original sample	95	5	-	97	3	-	98	2	-	95	5	-	95	5	-
2.	Degummed sample	98	2	-	96	4	-	98	2	-	95	5	-	98	2	-
3.	Finished sample	95	5	-	93	7	-	98	2	-	94	6	-	95	5	-

## MECHANICAL PROPERTY

### Tensile Strength & Elongation

10.5" length and 1.5" width sample was used for the test. Five readings were taken for each sample. It shows that the strength was decreased up to 8.10 percent in warp and 5.88 percent in weft when compared to original and degummed sample. It is statistically proved that the treated fabric was significant at one percent level.

The elongation was decreased up to 1.53 percent in warp and 7.14 percent in weft when compared to original and degummed sample. It is statistically proved that the treated fabric was significant at five percent level.

### Abrasion Resistance

Five samples were cut at random for each of the finished concentration using template dimension. It shows that the abrasion resistance was increased up to 30.90 percent when compared to original and degummed sample. It is statistically proved that the treated fabric was significant at five percent level.

### Tearing Strength

Five samples were cut at random for each of the finished concentration using template. It shows that the tearing strength was increased upto 27.39 percent in warp and 21.73 percent in weft. When compared to original and degummed sample. It is statistically proved that the treated fabric was significant at one percent level.

**Table 2: Mechanical Property**

S.No	Sample	Tensile Strength		Tearing Strength		Elongation		Abrasion
		Warp	Weft	Warp	Weft	Warp	Weft	
1.	Os	37	51	73	69	1.3	1.4	0.0055
2.	Ds	36	52	91	81	1.5	1.3	0.0079
3.	Fs	34	48	93	84	1.28	1.3	0.0072

### COMFORT PROPERTY

#### Fabric Stiffness

Five samples were cut at for each of the finished concentration using template. It shows that the Fabric Stiffness was decreased up to 32 percent in warp and 25.92 percent in weft. When compared to original and degummed sample. It is statistically proved that the treated fabric was significant at one percent level.

#### Crease Recovery

Five samples were cut at random for each of the finished concentration. It shows that the Crease recovery of the finished sample was increased up to 20.68 percent in warp and 1.50 percent in weft when compared to original and degummed sample. It is statistically proved that the treated fabric was not significant.

#### Drapability

Five samples were cut at random for each of the finished concentration using template dimension .It shows that the Drapability of the finished sample was increased upto 34.157 percent when compared to original and degummed sample. It is statistically proved that the treated fabric was not significant.

**Table 3: Comfort Property**

S.No	Sample	Fabric Stiffness		Crease Recovery		Drapability
		Warp	Weft	Warp	Weft	
1.	Original Sample	2.5	2.7	116	133	1.051
2.	Degummed sample	1.9	2.4	138	125	1.429
3	Finished Sample	1.7	2.0	140	135	1.410

#### Absorbency

Five samples were cut at random for each of the finished concentration using template dimension. It shows that the Absorbency of the finished sample was increased up to 8.8 Percent in drop test, 34.157 in sinking test and decreased up to 18 percent it shows good absorbency.

**Table 4: Absorbency Test**

S.No	Sample	Drop Test	Sinking Test	Capillary Rise Test
1.	OriginalSample	45	10.8	150
2.	Degummed sample	42	9.3	108
3	Finished sample	41	8.9	123

## ANTI MICROBIAL TEST

### AATCC-147-1998 (USA): Qualitative Antibacterial Assessment of Diffusible Antibacterial Agents (“Quick Method”)-Agar Diffusion Test

After incubation, the plates were observed for bacterial growth. Then the numbers of colonies were counted for each plate. These results indicate that leaf extract treated fabric shows a larger extent when compared to untreated sample.

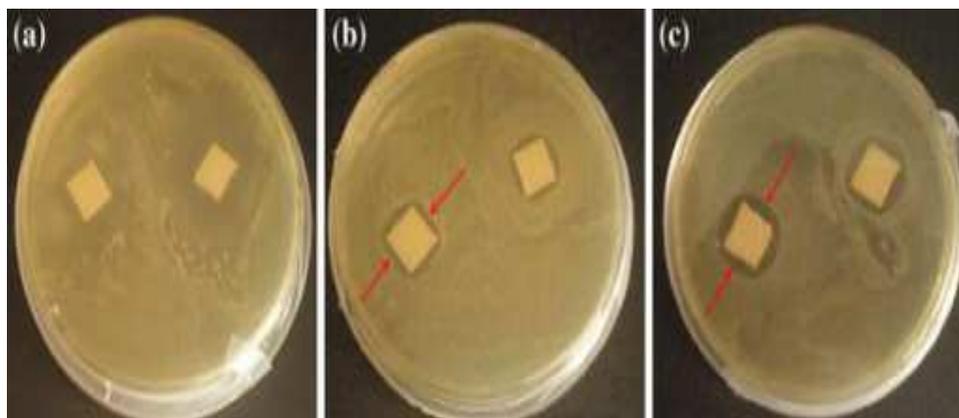


Figure 1

## CONCLUSIONS

Herbs are available in nature abundantly. They have antimicrobial and antifungal properties. The application of herbs on fabrics will give added protection from different microorganism present in air. From this study it was concluded that the neem, papaya and Mexican Daisy Leaves shows good microbe resistant which are non toxic, Non-Allergic, Non-Skin irritation and also eco friendly when applied to the silk fabric by evaluating them through Agar diffusion test. There was increased in Tearing Strength, Crease Recovery, Drapability and Absorbency. There was decrease in Tensile strength, Elongation and Fabric Stiffness.

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