



Comparative Study on Dyeing of Aloe Vera and Eucalyptus Fabric Using Pomegranate Peel as Natural Dye

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Abstract: This study was intended to evaluate the comparison on the color fastness of Aloe Vera and eucalyptus fabrics dyed with Pomegranate peel. Pomegranate peel is one of the best natural dyes that provides many beneficial properties. Alum was used as the mordants. The acquired samples have been subjected to different textile laboratory tests. The dye extraction procedure in the experiment was conventional.

The results of aloe vera fabric was found better than the eucalyptus fabric and the mordanted aloe vera fabric shows dark color and good results on color fastness than eucalyptus fabric. Finally, the test concluded with that the aloe vera fabric has the excellent shades of pomegranate peel.

Index Terms – Natural dye, Aloe Vera fabric, Eucalyptus fabric, Alum, Pomegranate peel

1. INTRODUCTION

Dyeing process is ancient art which is been followed since bronze age. In Textiles, dyeing plays a major role where the coloration is done to bring the fabrics lively. There are two type of dyeing and they are Natural dyeing and synthetic dyeing. Synthetic dyes are produced from cheap petroleum sources which is used for commercial purposes as they have simple dyeing process with good fastness properties but research as shown that the synthetic dyes are suspected to release harmful chemicals that are allergic, carcinogenic and detrimental to our environment which are very harmful for all living organism and also for our environment.

The serious environmental problems of environment and public health concern are related to colored waste water. The textile industry is mostly located near some of the other water bodies as the industries use lot of water and also the effluent waste by the industries are released to the same water bodies so researchers promptly looking for eco-friendly products. To recover our environmental condition, we need to introduce environmental friendly products to satisfy consumer's requirement as well economy of the country.

Natural dyes are biodegradable, non-toxic and non-allergic to our environment and to the human body. Natural dyes are found natural sources such as from plants, animals, insects or minerals. So based on the concern of above factors, this work was carried out to study about pomegranate peel which is natural colorant, in dyeing of sustainable fabrics which are Aloe Vera and Eucalyptus fabric using alum as the mordant

2. METHODOLOGY

- Research on pomegranate peel, aloe vera fabric and eucalyptus fabric
- Sourcing of Aloe vera and Eucalyptus fabric was from the online market
- Dyeing of aloe vera and eucalyptus fabric was done using pomegranate peel
- Technical test like EPI, PPI, GSM, thickness, tensile strength, tearing strength, wettability, colour fastness to rubbing and washing tests were conducted to determine the suitability of the material

Dye extraction:

Aqueous extraction of pomegranate peel was taken to bring out the dye from the peel. Firstly, the 10-15 peels are washed and dried. Then those dried peels were directly put into water and boiled at 100 degrees Celsius for 1 hour and then filtered for 2-3 times to removed all the wanted particle to avoid the patches between dyeing.



Fig.1 Pomegranate peel

Mordanting process:

Alum was mordants used in this process. Mordants are bought to aqueous state by boiling at 80 degree Celsius before the dyeing process both the aloe vera and eucalyptus fabrics are being dipped to the two different mordant. For this process 3% mordant was used, 1:40 ratio.



Fig.2 Fabric in mordant process

Dyeing:

Dyeing of aloe vera fabric and eucalyptus fabric was done by the extraction of pomegranate peel at 100 degree Celsius for 30 mins. The bath is taken in the ratio of 1:20 where the weight of the fabric is taken which is 120 gms and water taken is 1.92 litres.



Fig.3- Fabric in dyeing process

Testing:

The following tests were conducted on Aloe Vera fabric to check the suitability of the process for product development and usability using the standard testing procedures:

- EPI and PPI using pick counting glass
- GSM using GSM cutter and digital balance
- Thickness test using thickness gauge
- Tensile strength using Digi-strength tester
- Tearing strength using Elmendorf tearing strength tester
- Color fastness to rubbing using crock meter and washing using launderometer.

These test for the fabric was conducted before and after dyeing.

3. RESULTS AND DISCUSSION

3.1 Test conducted on aloe vera fabric-

Table 1- Test conducted on aloe vera fabric

Name of the Test	Before dyeing	After dyeing
Thickness in mm	17.4	17.8
GSM	118	120
EPI	112	103
PPI	85	72
Tearing strength in g (Warp)	18	18.5
Tearing strength in g (Weft)	17.5	18.2
Tensile strength in kg (Warp) kg/cm ²	4.18	7.72
Tensile strength in kg (Weft) kg/cm ²	4.22	7.26

Table 01 clearly explains that after dyeing, the fabric properties improved with increase in thickness, GSM, tearing strength, tensile strength and wettability. The EPI and PPI has reduced owing to absorption of dye and process.

3.1.2 Color fastness of aloe vera dyed with pomegranate peel-



Fig.1 Dyed sample of Aloe Vera fabric

Color fastness to rubbing has been tested in the method ISO 105 * 12-2001 (wet and dry) in the presence of the mordant and color fastness to washing has been tested at 40 degree Celsius in the method ISO 105C- 10-2006

Table 02: Color fastness test for dyed fabric

Colour fastness to Rubbing		
Staining on Cotton	Dry	Wet
Weft	5	4
Warp	5	4
Colour fastness to Washing		
Change in color	1	
Staining on Cotton	4-5	

3.2 Test conducted on eucalyptus fabric-

Table 3: Test conducted on Eucalyptus fabric

Name of the Test	Before dyeing	After dyeing
Thickness in mm	21	21
GSM	109	112
EPI	86	80
PPI	76	86
Tearing strength in g (Warp)	18	18.5

Tearing strength in g (Weft)	15.6	15.8
Tensile strength in kg (Warp) kg/cm ²	2.4	2.7
Tensile strength in kg (Weft) kg/cm ²	2.6	2.8

Table 03 clearly explains that after dyeing, the fabric properties improved with increase in thickness, GSM, tearing strength, tensile strength and wettability. The EPI and PPI has reduced owing to absorption of dye and process.

3.2.2 Color fastness of Eucalyptus fabric dyed with pomegranate peel-



Fig.2 Dyed sample of Eucalyptus fabric

Color fastness to rubbing has been tested in the method ISO 105 * 12-2001 (wet and dry) in the presence of the mordant and color fastness to washing has been tested at 40 degree Celsius in the method ISO 105C- 10-2006

Colour fastness to Rubbing		
Staining on Cotton	Dry	Wet
Weft	4-5	4
Warp	5	4
Colour fastness to Washing		
Change in color	2	
Staining on Cotton	4-5	

4. CONCLUSION

Pomegranate peel is one of the wide varieties of yellowish green shade which can be appealing to many fashionable consumers. On comparing both aloe vera fabric and eucalyptus fabric dyed to pomegranate peel and on evaluation of technical testing aloe vera fabric it is been observed that aloe vera fabric make noticeable darker shade than eucalyptus fabric and also possess a better fastness and technical properties than eucalyptus fabric. Depth of the shade is depended on the products used and process followed like mordant, presence of mordant, type of mordant or even with the duration of the dyeing process.

Fortunately, now a day the awareness of natural products and their benefits are increasing among the people. Due to lack of technical knowledge on extraction and dyeing techniques and even lack of time, it has not commercially succeeded. Hopefully in near future researchers and investigators would find the solution and meet all the demands of both the dyeing industries and the consumers.

ACKNOWLEDGMENT

I would like to record my sincere gratitude and thanks to my academic mentor, Mrs. Nagaveni K. Asst. Professor, Dept. of Fashion Design, for the guidance and support throughout my research.

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