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EVALUATION OF NATURAL DYED 3 DIFFERENT GRADES SILK FABRICS BY TEARING STRENGTH & CREASE RECOVERY

Sharmila M[1], Dr R Divya[2], Saniya A[3]
[1]Research scholar, Department of Costume Design & Fashion, PSG College of Arts & Science, Coimbatore – 14
.sharminims78@gmail.com
[2]Associate professor, Department of Costume Design & Fashion, PSG College of Arts & Science, Coimbatore – 14
.divyasathyam25@gmail.com
[3]Research scholar, Department of Costume Design & Fashion, PSG College of Arts & Science, Coimbatore – 14.
saniyaajikumar@gmail.com

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ABSTRACT
Silk is one of the oldest fiber among the natural fibers. The silk fibers is categorised in different qualities and grades from cocoon depending on the water and the food feed, and also the impurities in it. Basically silk fibers possess excellent mechanical properties due to a combination of strength and extensibility, biocompatibility, and biodegradability. For every silk that has been characterized in any detail, over 1000 uncharacterized silks are known to exit. For this study the 3 different silk graded is taken categorised as A, B and C and the silk is dyed using natural dyes. To analysis and evaluate the durability, wear and tear and crease recovery the fabric is subjected to tearing strength test and crease recovery test.

Keywords: *silk grades, natural dyed, silk fabrics, tearing strength, crease recovery.*

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INTRODUCTION
Silk grades: There is a difference in the quality of yarn even if they are made of the same material. The quality is mainly based on the length if the fiber and the low level of impurities. In the case of natural fibers, it is not so much that functions are added, but rather the texture and appearance are changed to a higher quality. The amino acids contained in silk fibers have a high thermoregulatory function, are hypoallergenic and hygroscopic, and help maintain an appropriate water balance in the human body. The silk quality standards depend on uniformity of yarn, minimal impurities, minimal fluff, tensile strength and elongation. Silk is generally graded on an A, B and C scale.

Natural dyed: Dyes or colorants that are derived from the natural sources like plants, minerals, etc. Ecological considerations are becoming important factors in the selection of consumer goods all over the world. Production and application of synthetic dyes release vast amount of waste and unfixed colorants poses serious health hazard and are disturbing the eco-balance of the nature. The amount of variation in natural dyeing recipes and each one produces a different result.

Tearing strength: Test is a material's ability to resist failure perpendicular to the stress being applied. This is usually tested by measuring the force required to begin a tear, while that force is applied to an unrestrained area close to a clamp retaining the material edge. Tear strength is a measure of how well a material can withstand the effects of tearing. Greater strength equals greater safety, the stronger the fabric on outer is the less likely it is to tear because of bad weather, rough handling, etc.

Crease recovery: In crease recovery testing, the fabric specimen (either wet or dry) is creased and compressed under specified load and atmospheric conditions for a predetermined period. Crease recovery is determined depending upon this recovery angle. If the angle is 0^o then recovery is zero and if the angle is 180^o then recovery is full. Crease recovery depends on the construction, twist of yarn, pressure, time etc. Basically silk fabrics have good crease recovery, crease recovery angles in the range $250\text{-}270^o$. Usually crease recovery is more in warp way than in weft way. Folds or crushing in a material is a property which indicates the strength and the quality of the fabric to get back to its original position after ironing.

MATERIALS & METHODS

The natural dyed (dye –*Berberis vulgaris L.* + *Clitoriaternatea L.* &*Musa acuminate*) silk fabrics with 3 different grades is selected to analysis and evaluate the abrasion, tearing strength and crease recovery of the fabrics. The dye is extracted from the barberry wood (*Berberis vulgaris L.)* + Butterfly pea flower *(Clitoriaternatea L.)* and banana flower (*Musa acuminate*) outer shell by accumulating and desiccated in a room temperature and crushing then secluded for the dyeing. The silk fabric is dyed evenly by natural dyeing method. The different qualities with A, B and C grades respectively is dyed using natural dye (*Berberis vulgaris L.* + *Clitoriaternatea L.* &*Musa acuminate*) in natural dyeing process, and the samples were made to test.

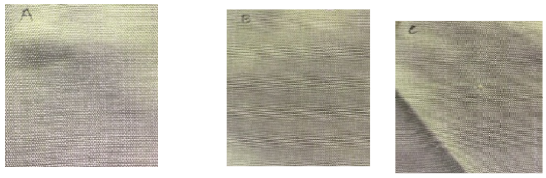


Figure 1: Silk fabrics grades A, B & C correspondingly

Tearing strength

The standard test method measures the resistance to the formation and expansion of a tear. The sample is held between two holders and a uniform pulling force is applied until deformation occurs. Force applied is divided by the thickness of the materials to calculate the tear resistance. The testing is done on both weft and warp stretched fabric. This is because warp yarns are well in quality, strength, treated with sizing, kept in more tension during weaving etc.

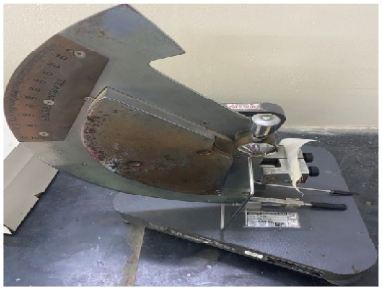


Figure 2: Tearing strength tester

Crease recovery

The ability of a fabric to recover to its original condition is called crease recovery. It is a measure of creases resistance, specified quantitatively in terms of crease recovery angle. The instrument consists of a circular dial which carried the clamp for holding the specimen. Directly under the centre of the dial there is a knife edge and an index line for measuring the recovery angle.

The instrument is based on the principle of deliberately created a fold in the specimen in question, under a given load and period and then allowing the material to recover for a given time period. The angle so formed between the two leaves of the folded fabric strip is measured with the help of a protractor.

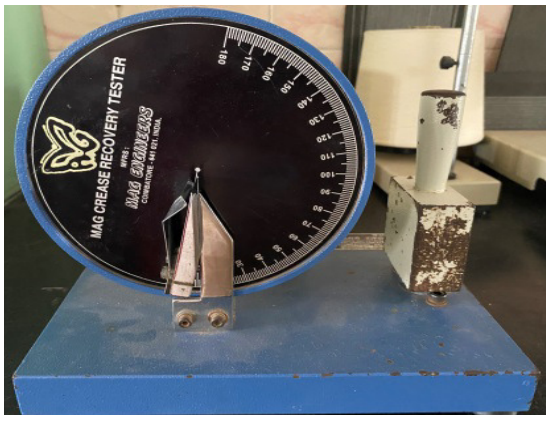


Figure 3: Crease recovery tester

RESULT

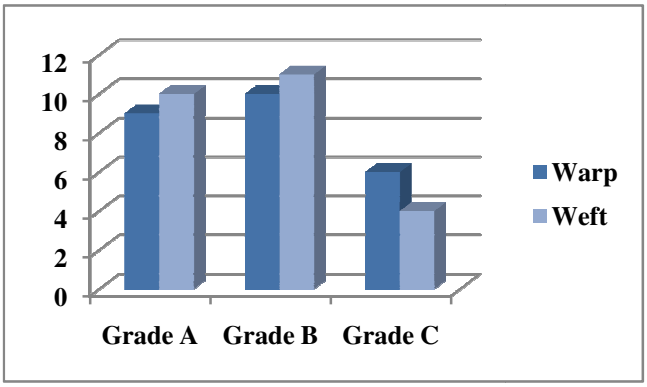
The different grades of silk fabrics with different qualities A, B & C is subjected to 3 tests of tearing strength and crease recovery to determine the strength, durability and wrinkle-free.

Tearing strength

All 3 different qualities of silk fabric grades A, B & C is tested under tearing strength teaser and both the warp and weft edges of the fabric is tested to check which yarn of the fabric is tend to tear soon in use of wear and tear.

Table 4

Sample	Warp	Weft
Grade A	9	10
Grade B	10	11
Grade C	6	4



Graph 4

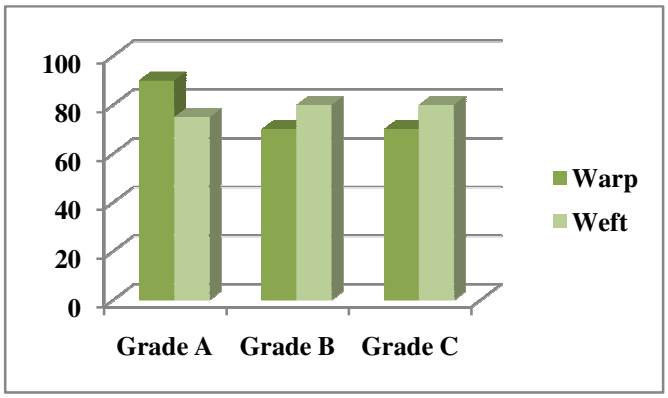
Thus from the above graph Weft seems to be more stronger compared to warp in both the grades A & B and in grade C the warp seems to be stronger compared to warp.

Crease Recovery

All 3 different qualities of silk fabric grades A, B & C is tested under crease recovery teaser and both the warp and weft edges of the fabric is tested to check which yarn of the fabric is easily gets creased when in use.

Sample	Warp	Weft
Grade A	90	75
Grade B	70	80
Grade C	70	80

Table 5



Graph 5

From the above graph the crease strength is higher in warp compared to weft in grade A and in both grade B & C the crease strength is higher in weft than compared to the warp.

CONCLUSION

It is concluded that the natural dyed spun silk yarns are tested for its properties of durability of the yarn. The spun silk yarns are dyed with natural dyes that extracted from natural resources and tested for tearing strength& crease recovery. From the above result, it shows the strength and crease of the dyed fabric. These type of natural dyed natural fibril fabric is biodegradable when trashed after the use, so it is eco-friendly.

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