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Analyses of Shrinkage Property on Cotton and Cotton Blended Fabrics

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Abstract
This study is carried out to analyse the shrinkage percentage of cotton and cotton blended fabrics. Here *Musa paradisiaca* x *Gossypium herbaceum* (50:50) is selected as the cotton blend and *Gossypium herbaceum* on the other side. Shirkage property is on of the most essential parameters of any fabrics as it may affect the outcome of the end product. Fabric may get shrink or elongated after it go for the laundry, so here the cotton fabrics take is washed and the elongation and shrinkage will be analysed which will help for the development of the end product using those fabrics.

Keywords: Cotton, Cotton blends, Musa Paradisiaca x Gossypium herbaceum , Elongation, Shrinkage.

Introduction

Cotton may be blended with other natural or synthetic fibers to lower the cost of the finished fabric since it has a good range of physical and chemical properties. Cotton is blended with other fibers to get the required characteristics. Before spinning, the mixture is blended to provide a distinctive textural appearance. Banana fiber clothing is comfortable and doesn't trigger allergies. It is also resistant to heat, water, oil, and fire. The fabric is rather robust since it is composed of a hardy, durable outer material. All other organic fibers are inferior than banana fiber in terms of spin ability and tensile strength. Banana fiber has an influence on the environment. Banana fabric production falls into a specific type of natural fiber production since it is so extremely sustainable. *"Americans believe cotton is best, but we've invented new fabrics that will change your lifestyle"* - Tadashi Yanai. (1)

A simple definition of "shrinkage" is a change in a fabric or garment's proportions. For fabric length, breadth, and thickness, this dimensional change might be positive (growth or elongation) or negative (shrinkage). Even while processing and usage may also alter a fabric's thickness, this is typically not seen as a concern. Shrinkage in cotton fabric refers to the reduction of width and/or length dimensions. When it comes to garment form, shrinkage features can also be related to other factors including seam puckering, torquing, and overall garment fit, in addition to a change in fabric dimensions. (2)

The proportion of cloth shrinkage following washing or soaking in water is referred to as fabric shrinkage. The phenomenon known as shrinkage occurs when washing, dehydrating, drying, and other procedures cause changes in the length or width of textiles in a certain condition. The degree of shrinkage depends on a variety of factors, including the fiber types, the fabric's structure, the many external pressures the fabric is exposed to during processing, and more. (3) Shrinkage of fabric occurs naturally. Numerous variables, including the kind of fiber, the structure of the fabric, and the finishing techniques, can cause it. It may greatly affect how well clothes fit, look, and hold up over time. cloth shrinkage tests are carried out to

determine whether a cloth may shrink in the future. These tests provide information on how much a piece of fabric or garment will shrink under particular circumstances to producers, designers, and customers. Fabrics made of cotton are notorious for shrinking. Cotton can shrink anywhere from 3% to 5% on average in its first and subsequent washes. On the other hand, some cotton textiles, such those marked as "pre-shrunk" or undergoing pre-shrinking processes in the production process, could have lower shrinkage rates. (4)

Materials

The investigation included two distinct types of fabrics: organic cotton and *Musa paradisiaca x Gossypium herbaceum* . Using a shrinkage template and scale, the shrinkage properties of the textiles under consideration were compared in this analysis.

- To ascertain the percentage of dimensional change, or shrinkage, in textiles directly.
- A finely calibrated shrinkage template measuring 50 cm in length and 50 cm in breadth.
- A calibrated scale for immediate assessment of stretch and shrinking 15% or more.

Working principles of Shrinkage Template & Scale

- Before marking, make sure the fabric is in a flat position on the specimen to be examined by placing the marking template on it.
- To make sure the cloth does not move, firmly grasp the template and mark it through each of the eight holes.
- Next, either dry clean or put the cloth in the washing machine.
- Dry the sample using any available technique. Line dry, flat dry, or tumble dry are the available options.
- Read the shrinkage/stretch at three spots on the wrap side and three points on the weft side to determine the dimensional change.
- To determine the accurate stretch or shrinkage, find the mean value of the wrap- and weft-wise values.

Formula

$$\text{Shrinkage \%} = \frac{\text{Length of the fabric before wash} - \text{Length of the fabric after wash}}{\text{Length of the fabric before wash}} \times 100$$

Result

The analyses of Shrinkage property by *Gossypium herbaceum* and *Musa paradisiaca x Gossypium herbaceum* have been carried out to find which sample withstands the highest level of Dimensional stability.

Table 1: Shrinkage values of Before and After of Gossypium herbaceum and Musa paradisiaca x Gossypium herbaceum

S.No	*Gossypium herbaceum*		*Musa paradisiaca x Gossypium herbaceum*	
	Before wash (cm)	**After wash (cm)**	**Before wash (cm)**	**After wash (cm)**
1.	50	47	50	49

2.	50	45	50	48
3.	50	45	50	49
4.	50	45	50	48
5.	50	47	50	48
6.	50	46	50	48
7.	50	45	50	47
8.	50	45	50	49
9.	50	45	50	49
10.	50	44	50	47

The above *table:1* represents the values analysed during before and after wash of *Gossypium herbaceum* and *Musa paradisiaca x Gossypium herbaceum* using Shrinkage template and scale. The average values of those readings will be analysed.

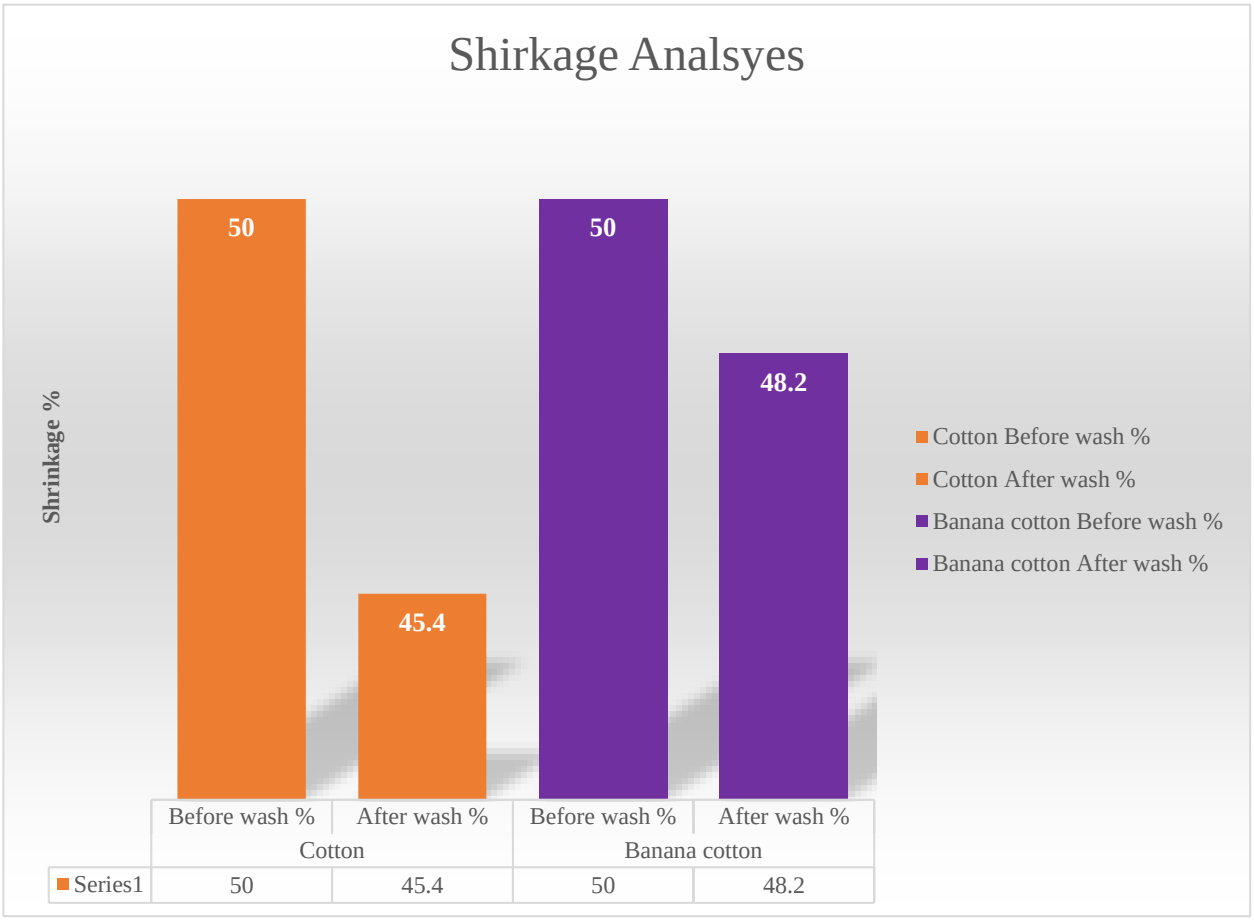

Fig 1: Shrinkage Analyses

The graph implies the shrinkage % of *Gossypium herbaceum* fabric and *Musa paradisiaca x Gossypium herbaceum* fabric, here the fabrics did not show any impact to elongation, both the fabric resulted to shrinkage.

Conclusion

This study on shrinkage property of *Gossypium herbaceum* and *Musa paradisiaca x* Gossypium *herbaceum* shows mild variations on fabrics after wash and it does not show any elongation. The shrinkage

percentage was calculated after observing ten readings and using the formula mentioned, both the fabric has the standard percentage which was kept to 50 before wash and after wash the shrinkage percentage of *Gossypium herbaceum* fabrics came down to 45.4%, where as *Musa paradisiaca x* Gossypium *herbaceum* fabric was at 48.2% resulting as the better shrinkage resistance to wash. Thus, it is concluded that the blended cotton fabric (*Musa paradisiaca sssx* Gossypium *herbaceum*) showed the better result.

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