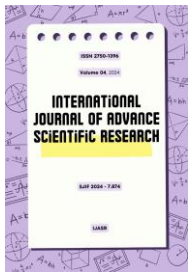
International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 04 ISSUE 12 Pages: 143-146
OCLC – 1368736135



Journal Website: http://sciencebring.com/index.php/ijasr

Research Article

ANALYSIS OF COTTON BEDDING FABRICS

Submission Date: December 10, 2024, **Accepted Date:** December 15, 2024,
Published Date: December 20, 2024
Crossref doi: https://doi.org/10.37547/ijasr-04-12-22

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Abstract

This paper presents an analysis of three types of cotton fabrics intended for bed linen, focusing on their physical, mechanical, and performance characteristics. The study evaluates the fabrics based on standardized quality parameters, including tensile strength, shrinkage, colorfastness, and comfort properties. The results reveal variations in performance among the samples, with one fabric meeting all required standards for durability, comfort, and aesthetic appeal. Based on the findings, the first sample is recommended for practical use in bed linen production, highlighting its superior quality and compliance with industry requirements.

Keywords

Fabric, bed linen, yarn, fabric shrinkage, density, warp, weft.

Introduction

The assortment of fabrics produced in our country is diverse. Cotton fabrics, which account for 25% of all articles, are characterized by a wide variety of options. Silk and wool fabrics also have diverse assortments, while linen fabrics represent the least diverse group (10% of all articles).

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The assortment of fabrics is updated annually by 10-15% due to the discontinuation of fabrics that are not in demand among the population and the introduction of new fabrics. The greatest assortment renewal is achieved through the use of chemical fibers, textured and metallized threads, fancy and highly bulky yarns [1].

The assortment of cotton fabrics primarily includes household fabrics used to produce various clothing items: underwear, bed linen, tablecloths, dresses, robes, sundresses, sportswear, special clothing, and more. Cotton fabrics can be made from both single and twisted yarns in the warp and weft.

According to the trade catalog, cotton fabrics are divided into 17 groups: calico, percale, linen, satin, dress, clothing, lining, pile, etc. Some groups are further divided into subgroups: linen fabrics are classified into percale, muslin, and special-purpose fabrics, etc. [1].

Linen fabrics include materials for underwear, bed linen, towels, handkerchiefs, and tablecloths. For underwear and bed linen, primarily cotton and linen fabrics are used. These fabrics are mostly produced using plain weaves, with minimal finishing, low relative density (40-60%), and surface density (80-140 g/m^2). They are predominantly bleached and less often colored or patterned with borders [2].

Sheets and duvet covers are made from cotton, linen, and semi-linen fabrics, as well as linen-polyester blends. Pillowcases are manufactured from percale, cloth, satin, ticking, and other materials.

Since cotton fabric is the most demanded material for bed linen, our research focused on studying it. For comparison, we selected samples of three types of cotton fabrics with widths of 220 cm, 220 cm, and 230 cm. Before testing, the samples were conditioned in normal climatic conditions as per GOST 10681–75. Testing was conducted in the laboratory of the Department of Knitting Technology at the Namangan Institute of Textile Industry. The quality indicators of the selected fabric samples, intended for bed linen, were studied using modern equipment.

Bedding fabrics must meet certain hygienic requirements: they must be hygroscopic, breathable, soft, sufficiently white, and retain their properties after washing. Since bedding fabrics are exposed to significant physical, chemical, and mechanical effects during wear and washing, they must be strong, resistant to abrasion, water, sweat, soap, and high temperatures during washing and ironing. The shrinkage of bedding fabrics should not exceed 3% [3].

Textile fabrics used for bed linen must have a surface density of at least 110 g/m^2. Dimensional changes after wet treatment should not exceed minus 5.0% [4]. Therefore, we verified the compliance of the three samples with the standard. Electronic laboratory scales, a YG 141D fabric thickness gauge, an air permeability tester, and a YG026T automatic tensile testing machine were used for testing.

To determine the linear density of threads in the warp and weft, 10 threads measuring 1 meter

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each were taken from each fabric. The surface density of the fabric was calculated, shrinkage after wet treatment was measured, and tensile characteristics of warp and weft threads were tested. The results are presented in Tables 1 and 2.

Table 1. Fabric indicators

Description		Fabric indicators		
		1- sample	2- sample	3- sample
Fabric weave		cloth	cloth	cloth
Fabric surface density, g/m²		129,1	126,8	101
Fabric thickness, mm		0,40	0,43	0,34
Yarn No, Ne	Warp	19	20	19
	Weft	18	20	18
Shrinkage, %	Warp	4,4	8,1	7,5
	Weft	2	3,1	2
Breathability, sm³/sm²s		52,44	47,89	75,22

Table 2. Fabric strength indicators

Description	Streight , H		Elongation, mm		Elongation, %		b-work, J		Break time, sek	
	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
1- sample	305	235	107,2	122	53,6	61	1,2	2,1	32,2	36,6
2- sample	242	159	104,8	136,8	52,4	68,4	1,2	1,5	31,4	41,1
3- sample	212	135	94,7	123,2	47,3	61,6	1,35	1,2	28,4	36,9

The air permeability of the first sample is less than that of the 3rd sample due to the high surface density of the fabric, and this affects the tensile strength. That is, the tensile strength results show that although the same yarn numbers were used for samples 1 and 3, but due to the denser structure, samples 1 and 2 are stronger than the 3rd fabric sample.

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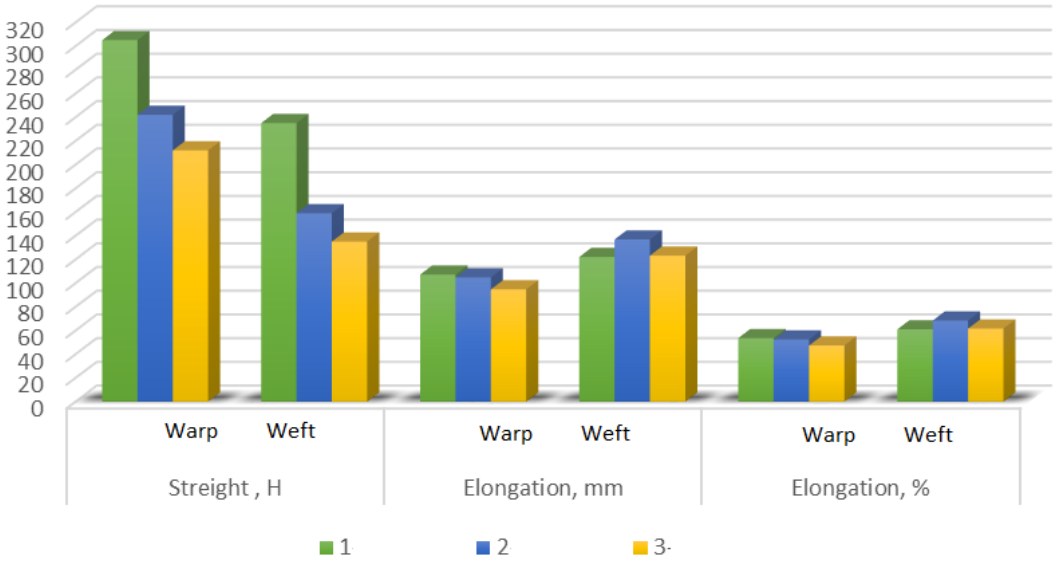

Figure 1. Fabric strength indicators

The air permeability of the first sample is lower than that of the third sample due to the higher surface density of the fabric, which affects tensile strength. The tensile strength results indicate that although the same yarn numbers were used for the first and third samples, the denser structure of the first and second samples made them stronger than the third sample.

From the obtained results, it can be concluded that the same linear density yarns were used for the first sample (220 cm width) and the third sample (230 cm width). The surface density of the first and second samples meets the standard, while the third sample does not meet the requirements. Among all samples, the first fabric sample is fully compliant with quality indicators for bed linen.

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