

A STUDY ON THE PHYSICAL PROPERTIES OF KORAI AND COTTON BLENDED YARN

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ABSTRACT

Blended yarns play a vital role in the textile industry by combining the advantageous properties of different fibres. This study evaluates the physical properties of a korai (*Cyperus pangorei*) and cotton blended yarn produced under controlled conditions. The yarn was tested for parameters such as count, tensile strength, elongation, and twist using standard testing methods. The results showed that the yarn possessed good uniformity with a count of 5.4 Ne and a low coefficient of variation of 0.93%. The tensile strength was found to be 352.4 gf, indicating moderate strength suitable for textile applications. The elongation value of 10.44% reflects moderate flexibility, while the twist level of 28.78 TPI ensured good yarn cohesion. However, higher variation in elongation suggests some inconsistency in fibre blending. Overall, the study confirms that the korai–cotton blended yarn is suitable for medium-duty textile applications such as curtains and upholstery.

Keywords: *Korai–cotton blend, Yarn properties, Yarn count, Tensile strength, Elongation, Twist, Sustainable yarn.*

1. INTRODUCTION

The performance and quality of textile products are highly dependent on the characteristics of yarn, which serves as the primary element in fabric formation. Key yarn properties such as count, strength, elongation, and twist significantly influence the durability, appearance, and overall behaviour of fabrics.

Cotton is widely used for its softness, breathability, and comfort, while korai fibre is known for its strength and eco-friendly nature. Blending these fibres allows the development of yarns that combine comfort with durability and sustainability.

This study focuses on analysing the physical properties of korai–cotton blended yarn to evaluate its suitability for textile applications, particularly in home furnishing products such as curtains and upholstery.

2. PROBLEM STATEMENT

The textile industry is increasingly shifting towards sustainable materials; however, the utilization of natural fibres such as korai grass in yarn production remains limited. Conventional yarns often rely heavily on cotton or synthetic fibres, which either lack sufficient strength or contribute to environmental concerns.

Although korai grass is known for its strength and eco-friendly nature, its integration into blended yarns is not widely explored or standardized. Additionally, there is a lack of detailed studies evaluating the physical performance of korai–cotton blended yarn, particularly in terms of uniformity, tensile behaviour, elongation, and twist characteristics.

This creates a need to systematically analyze and optimize korai–cotton blended yarn to ensure consistent quality and suitability for textile applications such as curtains and upholstery.

3. OBJECTIVE

The main objectives of this study are:

- 1. To develop korai–cotton blended yarn using suitable fibre blending techniques.
- 2. To evaluate the physical properties of the yarn, including count, strength, elongation, and twist.

- 3. To analyze the uniformity and variability of the yarn using coefficient of variation (CV%).
- 4. To assess the suitability of the developed yarn for textile applications such as curtains and home furnishings.
- 5. To identify limitations in the blending and spinning process and suggest improvements for better performance consistency.

4.LITERATURE REVIEW

The use of blended yarns in textile engineering has gained significant importance due to their ability to combine the desirable properties of different fibres. Natural fibre blends, in particular, are widely studied for their sustainability, biodegradability, and improved functional performance.

Cotton is one of the most commonly used natural fibres due to its softness, breathability, and comfort. However, it may not always provide sufficient strength for certain applications. On the other hand, natural fibres such as korai grass (*Cyperus pangorei*) are known for their high strength, durability, and resistance to wear, making them suitable for reinforcing textile structures.

Previous studies on natural fibre composites and blended yarns have shown that fibre blending can significantly enhance mechanical properties such as tensile strength and durability. Yarn characteristics such as count, twist, and elongation play a crucial role in determining fabric performance. Proper twist levels improve fibre cohesion, while uniform yarn count ensures consistent fabric quality.

Research also highlights that variability in yarn properties, particularly elongation and strength, can affect fabric performance and durability. Therefore, controlled blending and processing conditions are essential to achieve uniform yarn structure.

Despite the known advantages of korai grass, its application in modern yarn production is limited, and detailed studies on its behaviour in blended yarn systems are scarce. This study aims to address this gap by evaluating the physical properties of korai–cotton blended yarn and determining its suitability for sustainable textile applications.

5. METHODOLOGY

The methodology adopted for this study involves the preparation and evaluation of korai–cotton blended yarn under controlled laboratory conditions. The process was carried out in sequential stages, including material selection, yarn preparation, and testing of physical properties.

Material Selection

Korai grass (*Cyperus pangorei*) and cotton fibres were selected as the primary raw materials. Cotton was chosen for its softness and flexibility, while korai fibre was used for its strength, durability, and eco-friendly nature.

Yarn Preparation

The fibres were blended in a suitable proportion and processed into yarn using standard spinning techniques. The blending ensured uniform distribution of korai and cotton fibres to achieve consistent yarn structure. The final yarn was obtained in cheese form for testing purposes.

Testing Conditions

All experiments were conducted under standard atmospheric conditions to ensure accuracy and reproducibility:

* Relative Humidity: $65\% \pm 2\%$

* Temperature: $21^{\circ}\text{C} \pm 1^{\circ}\text{C}$

These conditions were maintained as yarn properties are sensitive to environmental variations.

Testing Methods

The physical properties of the yarn were evaluated using standard testing procedures:

1. Yarn Count (ASTM D1907)

The lea method was used to determine the fineness of the yarn.

2. Tensile Strength and Elongation (UTR-4 Method)

The yarn was subjected to tensile testing to measure the maximum force required for breakage and its elongation characteristics.

3. Twist Measurement

A microprocessor-based twist tester was used to determine the twist per inch (TPI) and twist direction of the yarn.

Data Analysis

The obtained results were analyzed using statistical parameters such as mean and coefficient of variation (CV%) to evaluate uniformity and consistency. The performance of the yarn was interpreted based on its suitability for textile applications such as curtains and home furnishings.



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