

# Development of Denim and Non-Denim Fabrics from Modified Bamboo Charcoal Fiber: An Innovative Approach to Textile Production

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**Abstract:** The study on the development of denim and non-denim fabrics from modified functional bamboo fibers represents an innovative approach in the textile industry. This study focuses on the feasibility and advantages of using modified bamboo fiber, specifically for denim and non-denim fabric production. Bamboo, being a rapidly renewable resource and regarded as a sustainable material, has gained significant attention in the textile sector.

Bamboo fiber is widely recognized for its natural antibacterial properties, biodegradability, high moisture retention capacity, softness, and luster, which have established its extensive application in textiles. In this study, the spotlight is on the modified version of bamboo fiber, known as bamboo charcoal fiber. This modification endows the fiber with enhanced characteristics such as odor resistance, infrared rays blocking, wash durability, thermal regulation, and antistatic properties [1,2,3,4].

The modified bamboo charcoal fiber used in the study is 1.5 dtex 38 mm in size, specifically chosen for its suitability in denim fabric production. The research involved weaving denim fabrics with yarns containing varying proportions of bamboo charcoal fiber and assessing their physical and chemical properties. The findings revealed that the modified bamboo fiber imparted superior comfort, durability, and functional traits to the fabrics [5].

The study conducted various yarn trials and produced woven fabrics with different yarn codes. For instance, yarns made entirely from bamboo charcoal fiber and those combining bamboo charcoal fiber with other textile fibers (78 dtex Elastane and 55 dtex T400® (PET/PTT)) were examined. This diversity demonstrates the potential of modified bamboo fiber across different fabric structures and applications.

In conclusion, this study has illustrated the viability of using modified bamboo charcoal fiber in the production of denim and non-denim fabrics, highlighting the environmental and functional benefits this material offers. Modified bamboo fiber represents a significant step towards increasing the use of sustainable, innovative, and eco-friendly materials in the textile industry. Its incorporation in the denim sector enhances the functionality and environmental sustainability of products, contributing to the industry's future development.

The results of the study underscore the need to expand the use of modified bamboo fiber in the textile industry, especially for denim and non-denim fabric production. This expansion is crucial for improving product quality

and reducing the environmental footprint of the textile industry. Therefore, the adoption of such innovative materials by the industry is vital for future sustainability and competitiveness.

**Keywords:** *Modified Bamboo Fiber, Denim Fabric, Non-Denim Fabric, Functional Properties, Eco-friendly Materials*

**Table 1** Bamboo Cotton Yarn Trials for Denim Fabric Production

Warp	Weft
Ne14/1 100% Cotton	Ne16/1 100% Bamboo Cotton
	Ne16/1 Bamboo Cotton + 78 Elastane
	Ne16/1 Bamboo Cotton + 55T400® + 78 Elastane
Ne14/1 100% Cotton	Ne14/1 100% Bamboo Cotton
	Ne14/1 Bamboo Cotton + 78 Elastane
	Ne14/1 Bamboo Cotton + 55T400® + 78 Elastane
Ne14/1 100% Cotton	Ne12/1 100% Bamboo Cotton
	Ne12/1 Bamboo Cotton + 78 Elastane
	Ne12/1 Bamboo Cotton + 55T400® + 78 Elastane

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