

## Cotton Treated with Spent Coffee Extract for Realizing Functional Textiles

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**Abstract :** The objective of this study was to evaluate the ability of spent coffee extract to enhance the antioxidant and antimicrobial properties of cotton fabrics. The emergence and spread of infectious diseases has raised a global interest in the antimicrobial substances. The safety of chemical agents, such as antimicrobials and dyes, which may irritate the skin, cause cellular and organ damage, and have adverse environmental impacts during their manufacturing, in relation to the human body has not been established. Nevertheless, there is a growing interest in natural antimicrobials that kill microorganisms or stop their growth without dangerous effects on human health. Spent coffee is the by-product of coffee brewing and amounted to 96,000 tons worldwide in 2015. Coffee components such as caffeine, melanoidins, and chlorogenic acid have been reported to possess multifunctional properties, including antimicrobial, antioxidant, and anti-inflammatory activities. Therefore, the current study examined the possibility of applying spent coffee in functional textile finishing. Spent coffee was extracted with 60% methanol solution, and the major components of the extract were quantified. In addition, cotton fabrics treated with spent coffee extract through a pad-dry-cure process were investigated for antioxidant and antimicrobial activities. The cotton fabrics finished with the spent coffee extract showed an increase in yellowness, which is an unfavorable outcome from the fabric finishing process. However, the cotton fabrics finished with the spent coffee extract exhibited considerable antioxidant activity. In particular, the antioxidant ability significantly increased with increasing concentrations of the spent coffee extract. The finished cotton fabrics showed antimicrobial ability against *S. aureus* but relatively low antimicrobial ability against *K. pneumoniae*. Therefore, further investigations are needed to determine the appropriate concentration of spent coffee extract to inhibit the growth of various pathogenic bacteria.

**Keywords :** spent coffee grounds, cotton, natural finishing agent, antioxidant activity, antimicrobial activity

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