

**THE ULTRAVIOLET TRANSMISSION  
PROPERTIES OF NATURALLY COLORED COTTON**

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**Abstract**

Many factors influence the ultraviolet transmission properties of textile fabrics. Among the most important factors are fiber type, dyes and finishes, and fabric porosity. Radiation absorbed by a dye, pigment, delustrant, or UV absorber finish cannot be passed through to the skin and in this way enhances sun protection provided by a textile. In general, dyed fibers provide better sun protection than bleached fibers. Crews, Beyer, and Kachmann (1999, 22) found the UVR transmission of bleached conventional cotton to be nearly twice as high as unbleached conventional cotton. Pigments found in naturally colored cotton produce shades ranging from green to tan and brown. The pigments have not been fully characterized; however, a USDA researcher, Carl Conrad (1941) reported the isolation of a fluorescent fraction from the wax of green cotton. This property of green cotton was intriguing because fluorescence suggested some ability to absorb UVR, which could lead to lower UVR transmission values. Given the pigments in naturally colored cotton, it seemed reasonable to expect that it may provide better sun protection (exhibit lower UVR transmission values) than conventional cotton. However, no published research to date reported UVR transmission values for naturally colored cottons. The purpose of this study was to determine the UVR transmission values of naturally colored cotton in three shades (green, tan and brown). Also of interest was the effect of light exposure on the UVR transmission of naturally colored cotton. Therefore, the naturally colored cotton was exposed to 80 AFUs of xenon light. UVR transmission values were measured following light exposure. Results showed that the naturally colored cottons exhibited significantly lower UVR transmission values than conventional cotton (bleached or unbleached). Although 80 AFUs of xenon light exposure caused some fading as expected, the ultraviolet transmission values of naturally colored cotton continued to be sufficiently low so that all three shades continued to provide good sun protection.

**References**

Crews, P., A. Beyer, and S. Kachman. 1999. Influences on UVR transmission of undyed woven fabrics. *Textile Chemist and Colorist* 31:17-21.

Conrad, C. M. 1941. The high wax content of green lint cotton. *Science* 8:113.