Changes in Hyperspectral Reflectance of Cotton Leaves Exposed to Enhanced Ultraviolet-B radiation and Carbondioxide. (A03-kakani154742-Oral)

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Abstract:

Cotton plants were exposed to three levels of biologically effective UV-B radiation (0, 8 and 16 kJ/d) and two levels of CO2 (360 and 720 ppm) in controlled environments. Plants were enclosed in a Plexiglas chamber that was opaque to solar UV radiation and transmitted 93% of incoming solar PAR. Morphological and anatomical parameters were assessed along with leaf hyperspectral reflectance. Leaves developed chlorotic and necrotic patches on exposure to UV-B either in ambient or elevated CO2, but intensity of damage increased with UV-B dosage and duration of exposure. UV-B decreased leaf chlorophyll content, while it increased concentrations of phenolic compounds that filter UV-B. Higher UV-B increased leaf wax content and thickness, slowed epidermal cell division, decreased leaf thickness and increased the number of palisade cell layers. In ambient and elevated CO2 conditions, UV-B increased leaf reflectance significantly ($P < 0.05$) in spectral regions known to be influenced by chlorophyll (500-700 nm), internal anatomy (800-1100) and water content (1600-1800). In conclusion elevated CO2 did not ameliorate the harmful effects of UV-B radiation.

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