

**PROTECTION OF COTTON FOLIAR TISSUE
FROM ITS OWN PHOTOACTIVATED
PHYTOALEXINS BY EPIDERMAL
FLAVONOL GLUCOSIDES**

M. Essenberg and J. A. Hall

**Oklahoma Agricultural Experiment Station
Oklahoma State University
Stillwater, OK**

A. A. Bell

**U.S. Department of Agriculture
Agricultural Research Service
College Station, TX**

Sun, T. J., M. Essenberg, and U. Melcher. 1987. Photoactivated DNA nicking, enzyme inactivation, and bacterial inhibition by sesquiterpenoid phytoalexins from cotton. *Molecular and Plant-Microbe Interactions* 2: 139-147.

Abstract

The hypersensitive response in leaves of bacterial blight-resistant cotton lines to infection by *Xanthomonas campestris* pv. *malvacearum* is characterized by development of red pigmentation in epidermal cells surrounding, but usually not over, the hypersensitively necrotic cells. We obtained evidence that the red cells can protect underlying, living mesophyll cells from the photoactivated toxicity of the sesquiterpenoid phytoalexins that accumulate in the necrotic cells and can diffuse into the neighboring living tissue (Sun et al., 1989; Rowlan et al., 1991, Essenberg et al., 1992). The red pigment was isolated and identified as the anthocyanin, cyanidin-3- β -D-glucoside (W. R. Edwards, unpublished work). However, the anthocyanin has little absorbance at the wavelengths of sunlight that activate the phytoalexins. We report here the isolation of yellow flavonols, the principal one of which is quercetin-3- β -D-glucoside, from resistant, inoculated cotyledons. This flavonol has an absorbance peak covering the photoactivating wavelength range. Epidermal strips peeled from resistant line OK1.2, harvested 3 and 6 days post-inoculation with 3×10^6 cfu/ml of race 1, contained 4.5 times as much flavonol per g fresh weight as epidermal strips from mock-inoculated control cotyledons.

References

Essenberg, M., M. L. Pierce, B. Hamilton, E. C. Cover, V. E. Scholes, and P. E. Richardson. 1992. Development of fluorescent, hypersensitively necrotic cells containing phytoalexins adjacent to colonies of *Xanthomonas campestris* pv. *malvacearum* in cotton leaves. *Physiological and Molecular Plant Pathology* 41: 85-99.

Rowlan, A. R., J. A. Hall, T. Barfield-Schneider, and M. Essenberg. 1991. Protection of cotton leaf palisade cells from light-activated toxicity of a phytoalexin by red epidermal cells. *Phytopathology* 81: 1139 (Abstr.).