

Luminescence of isolated tomato fruit cuticles

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Tomato fruit cuticle exhibits changes in autofluorescence throughout its development. During most of the fruit growth period, a weak blue fluorescence is detected after UV excitation whereas at maturation this autofluorescence disappears and is substituted by a stronger green one. This latter fluorescence is only observed after excitation in the blue spectral region suggesting that the compounds responsible are incorporated to the cuticle during ripening. Phenolics are the obvious candidates to explain this cuticle autofluorescence due to their known luminescent properties. The phenolics identified in tomato cuticles are *p*-coumaric acid, a hydroxycinnamic acid, and the yellowish coloured flavonoid naringenin chalcone. Whereas the former is present throughout the whole growth period and increases during ripening, the latter is only accumulated during ripening, conferring ripe tomato cuticles their characteristic orange colour. Nevertheless, spectral analyses have shown that these aromatic compounds only absorb in the UV range emitting in the blue range of the spectrum, but not in the 500-650 nm range. This indicates that *p*-coumaric acid could explain the blue autofluorescence detected during growth. Microscopy analysis of ripe tomato cuticles lacking naringenin chalcone displayed almost no green fluorescence reinforcing the idea that this flavonoid is responsible or at least participates in this emission of fluorescence. Deprotonation of naringenin chalcone caused a shift in the absorption and emission spectra at longer wavelengths explaining the spectral behaviour above described.

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