Title Analysis of the main secondary metabolites produced in tomato (*Lycopersicon esculentum*, Mill.) epicarp tissue during fruit ripening using fluorescence techniques

Author A. Lai, E. Santangelo, G.P. Soressi and R. Fantoni

Citation Postharvest Biology and Technology, Volume 43, Issue 3, March 2007, Pages 335-342

Keywords *Lycopersicon esculentum*; Fruit ripening; Skin pigments; Laser-induced fluorescence

Abstract

Tomato (*Lycopersicon esculentum* L.) fruit are an important source of antioxidant (mainly pigment) compounds, as well as lycopene, β-carotene, ascorbic acid and polyphenols. Differentiation of the final product in the market requires an accurate evaluation of these value-adding compounds. Because of this, we have undertaken a comparison of the spectral characterisation of the tomato fruit surface pigments from the immature to over-ripe stage, using spectroscopy techniques based on visible fluorescence emission upon excitation in the same or ultraviolet spectral regions. The aim was to verify the spectral band for optimal conditions for fruit harvesting using non-destructive techniques. The pattern of pigment composition changed markedly during ripening and showed progressive disappearance of chlorophyll with a concomitant increase in carotenoids until the fully ripe stage. The main fluorescence spectral features belonging to anthocyanins, flavonoids, carotenoids and chlorophyll *a* after excitation of skin tomato pigments at different laser wavelengths was identified. In comparing, the fluorescence spectral ratios at the excitation wavelength $\lambda_{exc} = 266$ nm, significant differences were obtained for the spectral ratios of chlorophyll/flavonoids and carotenoids/chlorophyll. Positive correlation coefficients were found for the carotenoids/flavonoids (0.780) ratios and negative ones for the carotenoids/chlorophyll ratios (−0.513).

Analysis of fluorescence resulted in determination of the most useful laser radiation for remote non-invasive measurements with laser-induced fluoresence (LIF): for the ripening stage, $\lambda_{exc} = 266$ nm was the optimal laser wavelength, since the induced fluorescence spectra obtained appeared to differ with the physiological stage of the fruit.