Title A non-destructive fluorescence method applied to the assessment of the quality of kiwifruit

Author D. Remorini, F. Tardelli, R. Massai, L. Guidi, E. Degl'Innocenti and G. Agati

Citation ISHS Acta Horticulturae 913:547-552.2011.

Keywords *Actinidia deliciosa*; chlorophyll; emission spectra; flavonols; optical sensors

Abstract

Fluorescence spectroscopy was used to evaluate chlorophyll (Chl) concentration in kiwifruit. The excitation light of suitable wavelengths is able to cross the external fruit skin and to reach chlorophyll in the pericarp. This was demonstrated by measuring the Chl fluorescence excitation and emission spectra of intact fruit by a spectrofluorimeter through a double arm optical fiber bundle. The Chl fluorescence signal measured at two emission bands, 685 and 740 nm, was related to the Chl content, because of partial reabsorption of the shorter wavelength by Chl itself. To verify the validity of this relationship 30 fruits were measured using a fluorescence sensor, Multiplex, able to simultaneously detect Chl fluorescence at both red and far-red bands, at a 15 cm distance, integrating on a 6 cm2 surface of the wider sides of fruit. The chlorophyll index, CHL Index, was defined as the ratio between the far-red and the red Chl fluorescence signals excited with red light. Pericarp samples were collected from the side of the fruit where measurements had been taken, homogenized and Chl extracted with 80% acetone. A reasonable correlation (R^2=0.81) occurred between the non-destructive CHL Index and the Chl *a* concentration expressed as µg/g of fresh weight. The sensor was able to detect differences in Chl content on the two fruit faces, depending on their prior and different exposure to sunlight. Estimated Chl content was higher on the exposed side compared to the unexposed side, as previously reported. The same indication was derived for flavonols also assessed by the Multiplex sensor. The fluorescence method has potential to be a suitable non-destructive tool for fruit sorting and postharvest storage monitoring in kiwifruit where Chl content assessment by colorimetric and/or reflectance analysis is problematic due to skin filtering properties.