Title Time-resolved vs continuous wave reflectance measurement as a maturity index to model softening of nectarine fruit

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Abstract

Continuous wave (CW) methods are widely diffused for postharvest fruit quality measurement. CW colorimeters and spectrometers measure the diffusely remitted intensity which is affected also by the skin colour and is determined by both the absorption and the scattering properties of the sample. The absorption coefficient (μ_a) can be discriminated from the reduced scattering coefficient (μ'_s) by Time-resolved Reflectance Spectroscopy (TRS), which explores the sample at a depth of 1-2 cm. The absorption coefficient at 670 nm, which is related to chlorophyll content, was shown to be an effective maturity index for modelling firmness decay of nectarines after harvest. However, until now the TRS instrumentation is restricted to the scientific research field. The aim of this research was to test if CW measurement could provide similar results as time-resolved measurements to model fruit softening. Nectarine fruit (cv 'Ambra' and 'Spring Bright') were measured at harvest with different optical methods: absorption coefficient at 670 nm (TRS), CIELab* (CW), reflectance spectrometry in the VIS region with a 10 nm resolution (CW). Firmness was measured during ripening at 20°C in fruit representing the whole range of maturity. The different optical measurements were used as independent variables to model fruit softening, and results were compared. The models obtained were similar, but CW methods provided lower R^2 than time-resolved method. The absorption coefficient μ_a at 670 nm measured by time-resolved methods was a better maturity index to predict fruit softening during shelf life with the logistic model, than CW measurements.