Potential of a double lighting imaging system for characterization of 'Hayward' kiwifruit harvest indices

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Abstract

The timing of harvest date for 'Hayward' kiwifruit (*Actinidia deliciosa* (A.Chev.) C.F.Liang & A.R.Ferguson. cv. 'Hayward') affects its storage life and eating quality. The common method for determination of maturity (Harvest Index) is the soluble solid content (SSC), with a minimum standard of 6.2 %. Measurement of SSC, using a hand-held refractometer, is simple and cheap, but it is destructive and laborious. In this study, we explore the potential for color and fluorescence image features to provide the basis for fast, non-destructive, and portable means of determining the Harvest Index. The most prominent fruit fluorescence excitations and emissions during fruit maturation were identified using excitation-emission matrices (Ex: 280–720 nm, Em: 300–750 nm) measured with Front Face Fluorescence Spectroscopy. The most sensitive excitation-emission wavelengths (Ex: 370 nm, Em: 400–600 nm) that correlated with SSCs were selected using partial least squares regression and were used to develop a double lighting imaging system which captures color and UV-fluorescence images. A SSC prediction model was established based on color and UV-fluorescence images. The results from this system had a root mean square error of validation and correlation coefficient relationship with standard SSCs of 0.39 and 0.94, respectively. This study demonstrated that the developed double lighting imaging system has the potential to non-destructively monitor kiwifruit maturation and determine optimum harvest by using the Harvest Index.