Title Hyperspectral Scattering for assessing Peach Fruit Firmness

Author Renfu Lu, and Yankun Peng

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Abstract

Light scattering is related to the structural characteristics of fruit and hence is potentially useful for estimating fruit firmness. This research investigated hyperspectral scattering as a means for measuring peach fruit firmness. A hyperspectral imaging system was used to simultaneously acquire 153 spectral scattering profiles, generated by a broadband light beam, from 'Red Haven' and 'Coral Star' peaches between 500 and 1000 nm. The spectral scattering profiles at individual wavelengths were fitted accurately by a two-parameter Lorentzian distribution function with the average value for the coefficient of determination r^2 greater than 0·990. Firmness prediction models were developed, using multi-linear regression coupled with cross validation, on relating individual Lorentzian parameters and their combinations at different wavelengths to peach fruit firmness. The wavelength of 677 nm, corresponding to chlorophyll absorption, had the highest correlation with fruit firmness among all single wavelengths. However, a combination of 10 or 11 wavelengths was needed in order to obtain best predictions of fruit firmness. Best firmness predictions were obtained with values for r^2 of 0·77 and 0·58 for 'Red Haven' and 'Coral Star' peaches when Lorentzian parameters a and b were used as independent variables where a and b are the peak scattering value and the full width of the scattering profile at one half of the peak value, respectively. Hyperspectral scattering is potentially useful for rapid, non-destructive estimation of peach fruit firmness.