

Title Non-destructive determination of sugar content in Satsuma mandarin fruit by near infrared transmittance spectroscopy

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Citation J. Near Infrared Spectrosc. 3, 227-237 (1995)

Keywords Brix; prediction; SEP; bias; intact fruit; peeled fruit

Abstract

Using many samples of Satsuma mandarins collected at random in packing houses, a method of establishing stable calibration to determine sugar content in the fruit by near infrared (NIR) transmittance spectroscopy was investigated. High accuracy in the determination of sugar content in the fruit could be obtained by multiple linear regression (MLR) using second derivative (D2) spectra in the 710-930 nm region. As a minimum, the four wavelengths mentioned below were needed as the predictor variables of the MLR equation. The D2 spectral change in the region of 900-910 nm was due to sugars (sucrose, glucose and fructose). A wavelength range of 880-890 nm and a wavelength range of 900-910 nm were selected as the best pair. A wavelength range of 740-755 nm region or 840-855 nm region compensated for the different optical path length of each fruit. One of the wavelengths around 794 nm or 835 nm was needed to compensate for the influence of fruit temperature. The influence of various factors such as fruit variety, growing location, harvest season and production year were investigated when the calibration was developed. When calibration samples had sufficient variation in fruit quality, it was possible to obtain a stable equation for all variations.