

Title Detection of Pear Firmness Using Near Infrared Diffuse Reflectance Spectroscopy
Author Xiaping Fu, Yibin Ying, Yande Liu, Huishan Lu and Jianping Wang
Citation 2005 ASAE Annual International Meeting, Tampa Convention Center, Tampa, Florida, 17-20 July
 2005, Paper Number 056072, 2 p.
Keywords: Near infrared; Spectroscopy; Diffuse reflectance; Firmness; Fruit; Pear

Abstract

Near infrared (NIR) spectroscopy is a promising technique for nondestructive measurement of fruit qualities. The objective of this research was to study the potential of NIR diffuse reflectance spectroscopy as a way for nondestructive measurement of the firmness of “Xueqing” pear. NIR spectral data were acquired in the spectral region between 800 nm and 2630 nm, but only data between 800 nm and 2500 nm were used for analyzing. Spectral data smoothing with different gaps using Savitsky-Goaly method were discussed both qualitatively and quantitatively. The results suggested that smoothing of NIR original spectra had little influence on spectral data analyzing. Statistical models were developed using partial least square (PLS) method. Models for spectra of three mathematical treatments (original, first derivative and second derivative) were established in three spectral regions 800-2500 nm, 800-1890 nm and 832-872 nm. Original spectra showed better results than first derivative spectra and second derivative spectra in all three spectral regions. And in the case of the three spectral regions, the full spectral region of 800-2500 nm had better results. The PLS model of original spectra in the range of 800-2500 nm gave good predictions of pear firmness, with correlation coefficient (r) of 0.88 and standard errors of calibration (SEC) of 3.80 N for the calibration sample set and correlation coefficient (r) of 0.83 and standard error of prediction (SEP) of 4.35N for the validation sample set. The results of this study show that NIR diffuse reflectance spectroscopy can be used to predict the firmness of “Xueqing” pear, even though the accuracy still needs to be improved.