Title Comparison of diffuse reflectance and transmission mode of visible-near infrared spectroscopy for detecting brown heart of pear

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Abstract

The objective of this research was to compare transmission and reflectance modes of visible (VIS)/near infrared (NIR) spectroscopy for detecting brown heart in pears. Transmission spectra were collected by a fiber spectrometer in the range of 400–1028 nm with two fruit-orientations: stem-calyx axis vertical (T1) and stem-calyx axis horizontal (T2). Diffuse reflectance spectra were acquired using a FT–NIR spectrometer with two detectors (Si: 670–1110 nm; InGaAs: 800–2630 nm). Discriminant analysis (DA) method was employed to classify the pears with brown heart and without brown heart. Better results were obtained based on transmission spectra than those on reflectance spectra. The classifying correctness was 91.2% by using transmission spectra acquired in fruit-orientation T2. Three defective pears and one sound pear were misclassified during calibration process and for validation, no defective pear was predicted incorrectly and only one sound pear was predicted as defect. The results indicate that VIS–NIR spectroscopy is feasible for detecting brown heart in pear and transmission mode is better than reflectance mode for internal disorder detection.