Title Fresh bruise detection by predicting softening index of apple tissue using VIS/NIR spectroscopy

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Citation Postharvest Biology and Technology, Volume 45, Issue 2, August 2007, Pages 176-183

Keywords Softening index; Spectroscopy; PLS; Fresh bruise

Abstract

Bruises are one of the most important causes for rejecting apples at quality inspection. The efficiency of bruise detection in the automatic sorting line is affected by the age of bruises present on apples. This paper presents a spectrophotometric method for detecting fresh bruises by predicting the softening index that is associated with the E-modulus of the apple tissue. Diffused reflectance spectra were acquired with a ZEISS spectrophotometer in the wavelength region between 400 and 1700 nm. Partial Least Squares analysis was applied to the spectra in the NIR wavelength region to predict the E-modulus. Afterwards, the softening index was calculated for the investigated area on the apple surface. With the algorithm developed for the softening index, a classification accuracy of more than 95% was obtained for both of the sound and freshly bruised spots on the selected apple cultivars.