Abstract

Nondestructive sensing is critical to assuring postharvest quality of apple fruit and consumer acceptance and satisfaction. The objective of this research was to use a hyperspectral scattering technique to acquire spectral scattering images from apple fruit and develop a data analysis method relating hyperspectral scattering characteristics to fruit firmness and soluble solids content (SSC). Hyperspectral scattering images were obtained from 'Golden Delicious' (GD) and red 'Delicious' (RD) apples, which were generated by a broadband beam over the spectral region between 500 nm and 1,000 nm. Mean and standard deviation spectra were extracted from the hyperspectral scattering images. A hybrid method combining the backpropagation feedforward neural network with principal component analysis was used to develop prediction models for fruit firmness and SSC. The neural network models were able to predict fruit firmness with $r^2 = 0.76$ and the standard error of prediction (SEP) of 6.2 N for GD, and $r^2 = 0.55$ and SEP = 6.1 N for RD. Better SSC predictions were obtained with $r^2 = 0.79$ and 0.64 and SEP = 0.72% and 0.81% for GD and RD, respectively. Hyperspectral scattering is promising for assessing internal quality, especially the firmness, of apples.

http://www.springerlink.com/content/2r44077727203286/fulltext.pdf