

**Title** Visible and near-infrared spectroscopy for nondestructive quality assessment of pickling cucumbers

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**Citation** Postharvest Biology and Technology, Volume 44, Issue 2, May 2007, Pages 165-174

**Keywords** Near-infrared spectroscopy; Pickling cucumber; Firmness; Color; Dry matter content

### **Abstract**

This study was aimed at developing a nondestructive method for measuring the firmness, skin and flesh color, and dry matter content of pickling cucumbers by means of visible and near-infrared (Vis/NIR) spectroscopy. ‘Journey’ and ‘Vlaspik’ pickling cucumbers were hand harvested and then stored at 10 °C and 95% relative humidity for various periods up to 18 days. Spectroscopic measurements were made from each intact cucumber in interactance mode with a low-cost CCD-based Vis/NIR spectrometer over 550–1100 nm and an InGaAs-based NIR spectrometer over 800–1650 nm. Standard methods were used to measure skin and flesh color, firmness, and dry matter content of the pickling cucumbers. Calibration models were developed using the partial least squares method for predicting firmness, skin and flesh chroma and hue, and dry matter content.

NIR measurements correlated well with Magness–Taylor slope or area, with values for the coefficient of determination ( $R^2$ ) of 0.70–0.73 for calibration and 0.67–0.70 for validation, better than those obtained with the Vis/NIR spectrometer. Vis/NIR measurements had good correlations with skin chroma ( $R^2 = 0.89$  and 0.83 for calibration and validation, respectively) and hue ( $R^2 = 0.76$  for calibration and validation). Promising results were obtained in predicting dry matter content of the cucumbers with  $R^2 = 0.65$  in validation for ‘Journey’ cucumbers. Visible and NIR spectroscopy is potentially useful for sorting and grading pickling cucumbers.