

Detection of Internal Mold Infection of Intact Tomatoes by Non-Destructive, Transmittance VIS-NIR Spectroscopy

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Abstract : The external characteristics of tomatoes, such as freshness, color and size are typically used in quality control processes for tomatoes sorting. However, the internal mold infection of intact tomato cannot be sorted based on a visible assessment and destructive method alone. In this study, a non-destructive technique was used to predict the internal mold infection of intact tomatoes by using transmittance visible and near infrared (VIS-NIR) spectroscopy. Spectra for 200 samples contained 100 samples for normal tomatoes and 100 samples for mold infected tomatoes were acquired in the wavelength range between 665-955 nm. This data was used in conjunction with partial least squares-discriminant analysis (PLS-DA) method to generate a classification model for tomato quality between groups of internal mold infection of intact tomato samples. For this task, the data was split into two groups, 140 samples were used for a training set and 60 samples were used for a test set. The spectra of both normal and internally mold infected tomatoes showed different features in the visible wavelength range. Combined spectral pretreatments of standard normal variate transformation (SNV) and smoothing (Savitzky-Golay) gave the optimal calibration model in training set, 85.0% (63 out of 71 for the normal samples and 56 out of 69 for the internal mold samples). The classification accuracy of the best model on the test set was 91.7% (29 out of 29 for the normal samples and 26 out of 31 for the internal mold tomato samples). The results from this experiment showed that transmittance VIS-NIR spectroscopy can be used as a non-destructive technique to predict the internal mold infection of intact tomatoes.

Keywords : tomato, mold, quality, prediction, transmittance

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