

Title Non-destructive measurement of tomato quality using visible and near-infrared reflectance spectroscopy

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Citation Thesis, Master of Science (Food Science), McGill University. 82 pages. 2009.

Keywords NIR; tomato

Abstract

Experiments were conducted to assess the feasibility of determining the quality attributes of tomato (*Lycopersicon esculentum* Mill cv 'DRK 453' and 'Trust') based upon visible/near-infrared reflectance (VIS/NIR) spectroscopy. A partial least squares regression (PLS) method was used to build prediction models.

Excellent prediction performance was achieved for lycopene content (LC), colour value a^*/b^* ratio, tomato colour index (TCI), and firmness. Coefficient of determination (R^2) for each of the parameters was respectively 0.96, 0.99, 0.99, and 0.97. All these R^2 were significant at 1% level. The root mean square errors of prediction (RMSEP) for all the parameters were low indicating the high quality of the fit of the prediction models. The values were 2.15, 0.06, 1.52, and 1.44 for LC, a^*/b^* ratio, TCI, and firmness, respectively. However, the models for prediction of titratable acidity, soluble solids content (SSC) and acid-Brix ratio showed relatively poor reliability, with R^2 value of 0.49, 0.03 and 0.65, and RMSEP of 0.43, 0.15 and 0.08, respectively.

Further, a model built by the PLS2 method showed good performance in simultaneously predicting a^*/b^* ratio, TCI, firmness, and LC of tomato, with R^2 values of 0.99, 0.99, 0.97, and 0.92, and RMSEP of 0.06, 1.75, 1.44, and 3.03, respectively. Once again here all the R^2 values were significant at 1% level.