Krittakorn Sabjaruern 2010: Determination of Organic Tomato Fruit Quality Using Near Infrared Spectroscopy. Master of Engineering (Food Engineering), Major Field: Food Engineering, Department of Food Engineering. Thesis Advisor: Assistant Professor Ronnarit Rittiron, Ph.D. 183 pages.

The objectives of this research is to classify organic grown and conventional grown tomato fruits and to determine chemical attributes of the tomatoes nondestructively using Near Infrared Spectroscopy (NIRS) technique. The NIR spectra of tomato samples in the short wavelength region of 700 to1100 nm were collected by Portable NIR spectrometer FQA-NIR GUN (FANTEC) in interactance mode and those spectra in the long wavelength region of 1100 to 2500 nm were acquired by NIR spectrometer InfraAlyzer 500 (BRAN+LUEBBE) in reflectance mode. The classification of organic tomato fruits was conducted using Partial Least Squares Discriminant Analysis (PLS-DA) method. The PLS-DA classification model was developed in the short and long wavelength region gave the similar results with classification accuracy of 57-62 % for organic grown tomatoes and 84-87 % for convention grown tomatoes. Partial Least Squares (PLS) regression for the determination of chemical constituents: total soluble solids (TSS), ascorbic acid, lycopene and beta carotene contents in tomato were used to develop Calibration equation. The calibration equations developed in the long wavelength region gave the best result for prediction of TSS and lycopene. The calibration equation for TSS showed correlation coefficient (R) of 0.86 and standard error of prediction (SEP) of 0.35 %. An equation for lycopene yielded R of 0.78 and SEP of 0.10 mg/100g. For calibration equations developed in the short wavelength region gave the best result for prediction of ascorbic acid and beta carotene. The ascorbic acid equation gave R of 0.80 and SEP of 0.23 mg/100g, while equation for beta carotene showed R of 0.79 and SEP of 0.02 mg/100g. Using the paired t-test of calibration equations, chemical attributes predicted by NIR were not significantly different from the actual value at 95 % confidence.

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