Title Rapid estimation of lycopene concentration in watermelon and tomato puree by fiber optic visible reflectance spectroscopy

Author R. Choudhary, T.J. Bowser, P. Weckler, N.O. Maness and W. McGlynn

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Abstract

Chemometric models were developed for prediction of lycopene concentration in watermelon and tomato puree from their visible reflectance spectra acquired by a fiber optic reflectance probe. A fiber optic spectrometer was used to acquire reflectance spectra from puree samples in the wavelength range of 500–750 nm. Least squares (LS) and partial least squares (PLS) regression were used to correlate spectral data with lycopene concentration measured by hexane extraction and spectrophotometry. An apparent absorbance index (AAI) obtained by subtracting apparent absorbance at 700 nm from that at 565 nm showed linear correlation with lycopene concentration ($R^2 = 0.90$ for watermelon puree and 0.62 for tomato puree). A normalized apparent absorbance index (NAAI) obtained by dividing the AAI by the sum of apparent absorbances at 565 and 700 nm, also had linear correlation with lycopene concentration ($R^2 = 0.90$ and 0.61 for watermelon and tomato, respectively). The LS linear regression model for watermelon puree could predict lycopene concentration with R^2 of 0.93, and standard error of prediction (SEP) of 5.1 mg kg^{-1}. The LS linear regression model for tomato puree could predict lycopene concentration with R^2 of 0.54 and an SEP of 5.2 mg kg^{-1}. The PLS model for watermelon puree could predict lycopene concentration with an R^2 of 0.97 and an SEP of 3.4 mg kg^{-1}. The PLS model for tomato puree could predict lycopene concentration with an R^2 of 0.88 and an SEP of 2.5 mg kg^{-1}. The high linear correlations between spectral parameters and lycopene concentration of samples (with lycopene concentration between 10 and 80 mg kg^{-1}) suggest that this method can be reliably used for fast and safe quantification of lycopene concentration in watermelon and tomato puree.