FT-NIR spectroscopy and multivariate classification strategies for the postharvest quality of green-fleshed kiwifruit varieties

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Abstract

In the present study, combining near-infrared spectroscopy (NIRs) and chemometric analysis was tested for the characterization and commercial classification of green-fleshed kiwifruit (A. deliciosa, Hayward and Bo-Erica® cvs). Two approaches were studied: 1) development of PLS models using both spectral and reference data to assess the fruit guality and nutraceutical levels and 2) supervised classification methods (LDA and SIMCA) using only spectral data in order to sort fruit on the basis of their ripening time and consumer's acceptability. Several traditional quality indexes (i.e. soluble solids, firmness, titratable acidity, dry matter), as well as nutritional ones such as total phenols, carotenoids and antioxidant potential were evaluated. Very good prediction of the internal quality attributes, using partial least squares regressions (PLS), was observed, especially for both soluble solid content and dry matter (R²: 0.993, RMSEP: 0.40 and R²: 0.983, RMSEP: 0.33, respectively). An accurate predictive performance of PLS model was also obtained for the total titratable acidity (R²: 0.933, RMSEP: 6.65). Good model performances were obtained for the prediction of the main nutraceutical traits of the samples, developed herein for the first time on kiwifruit. However, fairly good prediction performances were obtained for both total flavans and vitamin C (R²: 0.813, RMSEP: 0.07 and R²: 0.870, RMSEP: 6.04, respectively). Linear Discriminant Analysis (LDA) and Soft Indipendent Modelling by Class Analogy (SIMCA) models provided good results with rates of 92% and 99% of correctly classified samples. This study highlights that FT-NIRs can be used successfully to improve the quality control of kiwifruit at harvest and during storage as well as to identify and segregate samples prior to distribution in order to reduce fruit loss