

# Multivariate calibration of spectroscopic sensors for postharvest quality evaluation: A review

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## Abstract

Vibrational spectroscopy methods are widely investigated as fast and non-destructive alternatives for postharvest quality evaluation. As these methods measure spectral responses at a large number of wavebands correlated to the quality traits of interest, multivariate calibration equations have to be built to estimate the quality traits from the acquired spectra. This paper provides an overview of the most important multivariate data analysis techniques for exploring spectral data, detecting outliers and building calibration models for predicting the quality traits of interest. Both linear and non-linear calibration methods are discussed for quantitative (continuous) and qualitative (discrete) quality traits. For each of the presented methods the theory is explained, followed by illustration of an example case from the postharvest domain and a discussion of applications of this technique for postharvest quality evaluation based on spectral sensors. As spectral preprocessing, careful validation and calibration transfer are crucial aspects for successful implementation of spectral sensors for postharvest quality evaluation, special attention is given to these aspects. Finally, conclusions are drawn and recommendations are made with respect to the steps to take and points of attention for successful calibration.