Postharvest ripeness assessment of ‘Hass’ avocado based on development of a new ripening index and Vis-NIR spectroscopy

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Abstract

A classification model using Vis-NIR spectroscopy (380–2000 nm) coupled with partial least square discriminant analysis (PLS-DA) was developed to segregate avocados in three classes, predefined by a warehouse using destructive FF tests performed on a small number of samples. This classification showed a satisfactory general accuracy of 62 %, with 100 % well-classified samples in Class 1, 20 % in Class 2 and 65 % in Class 3. To improve classification, a ripening index (RI) was developed, which combines FF and DMC. The discrimination ability in the three classes was tested using Wilk’s lambda, calculated as between-class variance to the total variance ratio. Results showed values of 0.648 for RI, 0.516 for FF and 0.038 for DMC. A regression model was subsequently developed using Partial Least Squares (PLS) regression to predict RI using Vis-NIR spectroscopy in an independent dataset. The PLS results were satisfactory with the whole spectrum wavelength range (380–2000 nm), with R^2 of 0.62, SEP of 0.69 (), but presented a large bias value of 1.22 (). The same occurs in models developed in the wavelength range from 400 to 1100 nm, with R^2 of 0.63, SEP of 0.68 () and bias of 1.03 (). This could be corrected using a bias and slope correction algorithm. Study of the correlation coefficients of the PLS regression models showed that the region 400–1100 nm has a huge influence in the model, which indicates the potential of using cost-effective short Vis-NIR spectrophotometers for RI prediction.