Use of hyperspectral imaging to classify 'Rojo Brillante' persimmon in three texture classes before and after storage

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Fruit preservation can cause texture alterations which may affect consumers acceptance if conditions are not appropriate. Hence, fruit classification based on texture alterations can be of interest for food industries. Whereas artificial vision systems have been used to detect external quality of fruit, detection and classification based on texture cannot be done accurately using external information. Hyperspectral visible (VIS) and near-infrared (NIR) imaging has already been used to assess internal and external quality of the fruits, and thus, it can be a tool to obtain texture classification. The objective of this work was to predict three types of changes in the texture of persimmon fruits under different types of storage conditions using Vis/NIR hyperspectral imaging.

A total of 3,340 persimmon cv ‘Rojo Brillante’ were stored for three months at different conditions of temperature, and part of the fruits were treated with 1-MCP before storage with the aim to produce different texture alterations. At the beginning of the experiment, and every month, the texture of a random set of fruits was measured with a texturometer, recording the force curve until fracture. In addition, Hyperspectral images of these fruits were acquired with a Vis/NIR hyperspectral imaging system (420-1010 nm), and mean spectrum of each persimmon was extracted. Samples were randomly divided into training set (70%), used 10-fold cross-validation, and independent test set (30%). The spectra were pre-treated with standard normal variate (SNV). Models based on partial least squares discriminant analysis (PLS-DA), support vector machine (SVM) and random forest (RF) were used to separate the fruit with different textures. Preliminary results obtained from the test set showed a prediction accuracy higher than 90%.

**Keywords:** Diospyros kaki, hyperspectral imaging, VIS-NIR, prediction, texture

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