

# Non-destructive analysis of internal and external qualities of mango fruits during storage by hyperspectral imaging

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## Abstract

Internal and external qualities of mango fruit during storage were evaluated by a hyperspectral camera system. Mangoes at table maturity and full maturity were harvested in Okinawa Prefecture, Japan, and stored for 10 or 6 d at 27°C (RH 90%). Spectral reflectance (380-1000 nm) and soluble solid content (SSC) were measured during storage, and their relationship was investigated. The hue angle ( $H^\circ$ ) of the fruit on the vine side was usually smaller than that on the blossom side during storage, possibly because the red color on the vine side was more perfect in hue than that on the blossom side. However, the SSC on the blossom side was slightly higher (i.e., better) than that on the vine side. The red color of the peel is an important index for grading mangoes by visual inspection. Conversely, sweetness is one of the most important qualities of fruits in general. These results suggest that sweetness is not associated with the red color of the peel; thus, a non-destructive method for predicting the SSC on each side is needed. Spectral reflectance data were transformed to the scores of principal component analysis. A non-linear model was constructed by artificial neural networks for predicting the SSC. SSC and principal components 1-5 were selected as output and input variables, respectively. The SSC of mangoes was predicted by the proposed ANN model with a correlation coefficient of 0.79 and a root-mean-square error of cross validation of 0.069. This method may be effective for the non-destructive prediction of the SSC of mango fruit.