



Tropentag, September 19-21, 2012, Göttingen -
Kassel/Witzenhausen

“Resilience of agricultural systems against crises”

Non-destructive Method for Determining Inner Quality Attributes of Intact Mango by Near Infrared Spectroscopy

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Abstract

To evaluate the feasibility of near infrared spectroscopy (NIRS) technique in measuring inner quality in intact mango, relationships called calibration models between soluble solid content (SSC), ascorbic acid, total acidity (TA) measured by standard laboratory measurement and near infrared diffuse reflectance spectra in the wavelength range of 1000 - 2500 nm were established. Multivariate analysis was then applied to develop these relationships to predict inner quality attributes from a set of wavelength as predictor variables. A total of 58 mangos, cultivar Kent were used as samples with an acceptable range of maturity stages. Multiplicative scatter correction (MSC) was applied to mango NIR spectra prior to calibration model development. A partial least square regression (PLSR) combined with ten-segments of cross validation was then used to develop the models for predicting SSC, ascorbic acid and TA of intact mango fruit. The quality of calibration model was then quantified by the correlation coefficient (r), standard error of calibration (SEC) and root mean square error of prediction, resulted from cross validation (RMSEP). The result showed that MSC-PLSR can predict and determine inner quality attributes of intact mango fruit satisfactorily, with correlation coefficient, SEC and RMSEP were (0.82, 1.36°Brix and 1.47°Brix), (0.84, 0.66 mg/100g and 0.8 mg/100g) and (0.98, 26.05 mg/100g and 26.94 mg/100g) for SSC, Ascorbic acid and TA respectively. These results demonstrated that near infrared spectroscopy technique was feasible for determining inner quality attributes of intact mango fruit. It may also conclude that this technique combined with a proper calibration model can be considered as one of non-destructive method and should be able to replace laborious and costly standard laboratory measurement.

Keywords: Inner quality, mango, multivariate analysis, NIRS, non-destructive method