Non-destructive quality and maturity evaluation of the papaya fruit cultivar 'IPB 1' (*Carica papaya* L.)

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Abstract

The purpose of this research was to determine quality and level of maturity in papaya using image processing, an artificial neural network (ANN) and near infrared (NIR) spectroscopy. Papaya images were detected using a digital camera and then processed by an image processing algorithm. The image processing algorithm was developed and applied to 150 papaya samples at three levels of maturity based on picking age. Texture and colour indexes were developed from the samples by image processing. The results from the image processing were then used as inputs for developing an artificial neural network which modelled seven inputs and generated the level of maturity as the output. The ANN was run at a moment constant value of 0.6, function sigmoid value of 1 and an iteration of 10,000. A NIR system was developed and applied to 100 individual papaya fruit at wavelengths of 900-1400 nm with data recorded at 5 nm intervals. The data analysis consisted of calibration and absorbance validation of (Log 1/R) using a Stepwise Multiple Linear Regression (SMLR) method. The data from all samples were then divided into separate calibra¬tion and validation processes. The research results showed that the image processing and ANN could be used to define 'IPB1' papaya maturity level with 100% accuracy. Validation of total soluble solids (TSS) estimation resulted in standard of errors (SE), coefficients of variation (CV) and a ratio between standard of deviation with standard of errors (SD/SE) equal to 0.25, 2.51%, and 3.07, respectively for total soluble solids (TSS), and 0.35, 30.51% and 3.1, respectively for firmness.