

**Title** Non-invasive sensing of fruit development in banana and papaya by means of a spectroscopic approach

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#### **Abstract**

In climacteric tropical fruit such as banana and papaya characteristic pigment changes occur during fruit development in the supply chain. A handheld spectrophotometer has been developed to undertake fruit pigment readings in-situ. Using fruit spectra obtained in optical geometry for non-invasive remittance analysis in-situ as well as diffuse reflectance readings with a laboratory spectrophotometer, spectral variations were analyzed in fruits at different maturity stages as well as after chilling injury treatment. Whole spectra calibration models and two-wavelength indices were evaluated and implemented in the embedded software of the handheld device. In banana and papaya, fruit maturity development and the appearance of chilling injury (CI) symptoms were monitored. Fruit maturity was estimated by means of chlorophyll changes analysed in the red and near infrared wavelength ranges of the fruit spectra. The occurrence of CI was monitored using autocorrelation analysis of the time series.