

An approach for monitoring the chilling injury appearance in bananas by means of backscattering imaging.

ABSTRACT

The non-invasive detection of chilling injury (CI) symptoms in banana may potentially be approached by means of monitoring changes in the pigment contents and texture of the exocarp. In the present study, laser diodes emitting at 660 and 785 nm were applied to acquire images of backscattered light from intact banana fruits. The idea was to monitor chlorophyll and texture changes by means of relevant wavelengths, respectively. Bananas were stored for 2 days at 13 °C (control), 6 °C (chilling temperature), and subsequently 1 day at ambient temperature to allow the symptom development. Parameters obtained from the backscattering images and their combinations were applied for detecting chilling injury. Significant ($P < 0.05$) interaction of backscattering properties and treatment factors (temperature, ripening stage, and treatment time) were found. Classification of control and chill-injured samples in ripe fruits measured at 660 nm and 785 nm resulted in misclassification error as low as 6% and 8% for early detection, and 0.67% and 1.33% for detection after storage, respectively. The physiological relevance of the variation measured at the two wavelengths was pointed out by means of destructive pigment and water analyses.

Keyword: Backscattering; Banana; Chilling injury; Chlorophyll; Classification; Fruit; Imaging; Texture Quality