A spatially resolved transmittance spectroscopy system for detecting internal rots in onions

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Postharvest Biology and Technology, Volume 163, May 2020, 111141

Abstract

This study presents the development of a spatially resolved transmittance system for detecting internal rots in onions, particularly small and localised rots. A two-wavelength classifier was chosen by considering sensitivities to rots and path-length variations. Near-infrared spectroscopy transmittance measurements were carried out on rot-affected onions, to determine wavelength sensitivities to the presence and severity of rots. Finite Element simulations of light transport in onions were run to determine wavelength sensitivities to source-detector separation. A spatially resolved transmittance system was then developed, using two laser diodes as sources (728 and 805 nm wavelengths) and a single photodiode as detector. The system was experimentally verified, with the measured spatial profiles of the transmittance ratios of the two source wavelengths being sensitive to variation in position and size of internal rots in onions.