

Title Detection of sprout damage in Canada Western Red Spring wheat with multiple wavebands using visible/near-infrared hyperspectral imaging

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Citation Biosystems Engineering, Volume 106, Issue 2, June 2010, Pages 188-194

Keywords wheat; sprout damage; NIR; Vis

Abstract

A visible near-infrared (VNIR) hyperspectral imaging system (400–1000 nm) was used for detecting sprouted and severely sprouted wheat kernels. Canada Western Red Spring (CWRS) wheat kernels were individually scanned using the hyperspectral imaging system. Average spectra of sprouted and severely sprouted kernels had higher reflectance responses compared to sound kernels in the wavelength region above 720 nm. The ratio of the reflectance at 878 nm to that at 728 nm could be used to identify sprouted from non-sprouted kernels. The Principal Components Analysis (PCA) loadings plot identified four wavelengths that contributed to distinguishing the different quality of wheat kernels. Using the morphological features smoothness, size and value range of the third principal component score image, severely sprouted kernels were clearly separated from the sound kernels. Utilising a classification procedure, incorporating both spectral and spatial features, 100% of the sound kernels, about 94% of the sprouted kernels and 98% of severely sprouted kernels were correctly classified.