Genetic algorithm optimized non-destructive prediction on property of mechanically injured peaches during postharvest storage by portable visible/shortwave near-infrared spectroscopy

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Abstract

The melting-flesh peach (*Prunus persica,* cv. 'Baihua') tends to rapidly decay after harvest in summer with a short after-ripening period. Although the use of preservatives can inhibit the growth of microorganisms, collisions during transportation greatly affect the shelf life for subsequent sales. To build a high-accuracy model to predict the inner physiological status of mechanically injured peaches during postharvest storage, visible/shortwave near-infrared (Vis/SWNIR) diffuse reflection spectra (300–1150 nm) were acquired for analysis. With 840 samples, two drop heights (30 cm and 60 cm) were applied to study the variations in total soluble solids (TSS) polyphenol oxidase (PPO), malondialdehyde (MDA) and relative electrolyte leakage (REL) by percussive tests. After multiplicative scatter correction and Savitzky-Golay smoothing pretreatments, optimal feature selections from a total of 1024 wavelengths were determined using genetic algorithm (GA) in PLS modeling. For TSS, the best correlation (r_p) is 0.89, root mean square error of prediction (RMSEP) is 0.40 and relative percent deviation (RPD) is 2.94. For PPO, the best r_p is 0.71, RMSEP is 20.34 and RPD is 2.75. For MDA, the best r_p is 0.83, RMSEP is 0.17 and RPD is 1.90. For REL, the best r_p is 0.92, RMSEP is 1.42 and RPD is 2.44. Through several verifications, the GA-PLS models showed good imitative effects and high precisions. They could predict the condition of peaches with minor injury, which are difficult to detect with the naked eye, to reduce loss in practical production.