

Title Non-destructive determination of quality parameters in nectarines during on-tree ripening and postharvest storage

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Abstract

Changes in physical–chemical properties of nectarines (*Prunus persica* (L.) Batsch cv. Sweet Lady) were studied during on-tree ripening and postharvest refrigerated storage, using near-infrared (NIR) spectroscopy. Two commercially available spectrometers were evaluated for this purpose: a handheld micro-electro-mechanical system (MEMS) spectrometer of 1600–2400 nm and a diode-array Vis–NIR spectrophotometer of 400–1700 nm. Analysis covered a sample of 144 nectarines during on-tree ripening, and another one of 220 nectarines during postharvest storage (0 °C, 95% RH). Spectra and analytical data were used to develop MPLS (modified partial least squares) calibration equations to quantify changes in soluble solids content (SSC) (%), flesh firmness (N), fruit weight (g) and diameter (equatorial diameter; cm), these being the major parameters used to chart ripening and measure shelf-life in this fruit. Both NIRS instruments provided good precision for SSC ($r^2 = 0.89$; SEP = 0.75–0.81%) and for firmness ($r^2 = 0.84$ –0.86; SEP = 11.6–12.7 N). The diode-array instrument predicted well the two other physical parameters tested ($r^2 = 0.98$ and SEP = 5.40 g for fruit weight; and $r^2 = 0.75$ and SEP = 0.46 cm for diameter), while the handheld MEMS instrument proved less accurate in this respect. The results show that changes in nectarine quality parameters can be measured non-destructively, with a single spectrum measurement and in a matter of seconds, during both on-tree ripening and postharvest storage, paving the way for using the handheld instruments to assist growers in making harvesting decisions in the field.