

VII.II.O61. Time-resolved reflectance spectroscopy reveals different texture characteristics in 'Braeburn', 'Gala' and 'Kanzi' apples

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Time-resolved reflectance spectroscopy (TRS) has been used for non-invasive assessment of maturity and texture characteristics in intact apples. The absorption coefficient measured at 670 nm can be considered a maturity index for apples as it decreases during fruit growth, at delayed harvest dates and during shelf life. The scattering coefficient μ'_s changes according to the pulp texture characteristics, increasing with apple softening and when fruit texture changes from very firm-crispy to mealy. The aim of this work was to study the pulp optical properties measured by TRS in relation to fruit maturity and texture characteristics, in three apple cultivars. 'Braeburn', 'Gala' and 'Kanzi' apples were picked at three times, stored in air for 1 month (1°C, RH~97%) and analyzed after 7 days of shelf life at 20°C (RH~78%). Each fruit was measured by TRS in the 580-1064 nm wavelength range, obtaining the chlorophyll (CHL) and water (WAT) contents and the scattering coefficient (μ'_s). On the same samples, intercellular spaces (RISV), mechanical-acoustic parameters as well as sensory attributes were determined. 'Kanzi' apples were characterized by the lowest μ'_s and the highest WAT content, 'Braeburn' by the highest CHL content with intermediate values of WAT and μ'_s while 'Gala' showed the highest values of μ'_s and intermediate WAT and CHL contents. PCA on all data extracted three functions. PC1 grouped flesh firmness (Fmax), total area, mean acoustic sound (MEAN), acoustic linear distance (LD), sound at Fmax together with sensory firmness, crispness and juiciness, which were opposed to mealiness, RISV and μ'_s . PC1 scores were highest in 'Kanzi' apples and lowest in 'Braeburn' ones and decreased with picking time. PC2 grouped compression, stiffness and CHL content opposed to MEAN and number of acoustic peaks, showing the highest scores in 'Braeburn' apples and the lowest in 'Gala'. PC3 opposed sensory juiciness and firmness to LD and highest acoustic peak, having the lowest scores in 'Gala'. Our results showed that TRS optical properties actually are able to differentiate texture/structure characteristics of apples.

Keywords: *Malus domestica*, nondestructive, absorption, scattering, chlorophyll, mechanical properties, acoustic, sensory texture