

**Title** Polyuronide content and correlation to optical properties measured by time-resolved reflectance spectroscopy in 'Jonagored' apples stored in normal and controlled atmosphere

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### Abstract

Time-resolved reflectance spectroscopy (TRS) studies on fruit have shown that the absorption coefficient ( $\mu_a$ ) at 670 nm is a good maturity index and that the scattering coefficient ( $\mu_s^1$ ) at 780 nm allows an insight into the textural properties of apples. This work aimed at studying the relationship between the polyuronide pattern, firmness and TRS optical properties ( $\mu_a$  and  $\mu_s^1$ ) at 630, 670, 750 and 780 nm measured in 'Jonagored' apples at harvest, after 6 months' storage in normal (NA) and controlled atmosphere (CA), and after 7 days of post-storage shelf life at 20 °C. Results showed that fruit of different TRS maturity class had a different polyuronide content, even if their firmness was not different: 'less mature' (high  $\mu_a$ 630) fruit compared to 'more mature' (low  $\mu_a$ 630) ones showed at harvest higher total galacturonic acid (GA) content, residue insoluble pectin (RIP) and protopectin index (PI), and lower GA content in oxalate-soluble pectin (OSP) fraction, indicating a less advanced breakdown of insoluble protopectins to soluble pectins. The  $\mu_a$ 630 and  $\mu_a$ 670 were correlated to alcohol-insoluble substances (AIS) and GA content in RIP measured after storage: as maturity increased, GA decreased in RIP, showing pectin solubilisation. AIS, water-soluble pectin (WSP), RIP and PI measured after storage were highly correlated to scattering coefficients measured after storage. Generally, with increasing  $\mu_s^1$ , AIS and GA in WSP increased while firmness, RIP and PI decreased. CA apples were characterised by lower  $\mu_s^1$  values than NA ones, along with lower WSP and OSP and higher total GA, RIP and PI.