

Title Correlating optical maturity indices and firmness in stored 'braeburn' and 'cripps pink' apples

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Abstract

Non destructive measurement of firmness is required by fruit industry for better fruit management. Aiming at nondestructively estimating firmness in apples, three optical maturity indices based on chlorophyll content in flesh and skin were compared. The absorption coefficient was measured at 670 nm (A_{670}) by Time-resolved. Reflectance Spectroscopy (TRS), the IAD ($A_{670} - A_{no}$) was measured by means of DA-Meter and the NDVI ($\frac{A_{780} - A_{660}}{A_{780} + A_{660}}$) was measured by means of Pigment Analyzer. While the TRS probes measured the inner fruit tissue at a depth of ~2cm. The DA-Meter and Pigment Analyzer probe measured on the skin and the outer cortex of the apple fruit. 'Braeburn' and 'Cripps Pink' (Pink Lady®) apples were harvested at three times (H1, H2, H3), stored for 6 months in ULO and measured after 1 and 15 days of shelf life at 20°C. Thirty fruits per cv/harvest/day were individually analyzed for A_{670} , IAD and NDVI and for flesh firmness on two opposite sides of the fruit and data were averaged per fruit (360 fruits in total). Optical indices showed higher values in 'Braeburn' apples whatever the harvest time. IAD and NDVI index in both cultivars and A_{670} in 'Braeburn' had the highest values for H1 and the least for H3, whereas A_{670} in 'Cripps Pink' did not differ among the harvest period. All the three indices decreased in the absorption coefficient at the end of the shelflife to the same value in 'Cripps Pink' whatever the harvest period, while in 'Braeburn' H1 apples, it kept the highest values. Firmness showed the same trend of optical indices both considering the harvest times and the shelflife in 'Braeburn', while in 'Cripps Pink' no differences in firmness were found among harvests and with shelflife. Good correlations were found among the three optical indices, with higher r in 'Braeburn' apples and between IAD and NDVI. In 'Braeburn' firmness was well correlated with A_{670} and, with lower r , with IAD and NDVI. In contrast in 'Cripps Pink' no correlations were found between firmness and the optical indices.