Title Addressing potential sources of variation in several non-destructive techniques for measuring firmness in apples

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Abstract

Measurements of firmness have traditionally been carried out according to the Magness Taylor (MT) procedure; using a texture analyser or penetrometer in reference texture tests. Non-destructive tests like the acoustic impulse response of acoustic firmness sensors (AFSs), a low-mass impact firmness sensor Sinclair International (SIQ-FT) and impact test (Lateral Impact – UPM) have also been used to measure texture and firmness. The objectives of this study were to evaluate the influence of different sources of variation in these three non-destructive tests and to evaluate their respective capabilities of discriminating between fruit maturity at two different harvest dates, turgidity before and after dehydration treatment and ripening after different storage periods. According to our results, fruit studied an unexpected AFS trend with turgidity. Contact measurements (Lateral Impact – UPM and SIQ-FT) appeared highly sensitive to changes in turgidity, but were less able to follow changes in ripening caused by storage period. Contact measurements were suitable for detecting differences between fruits from different harvest dates and showed higher correlation coefficients with reference texture tests than acoustic measurements. The Lateral Impact – UPM test proved better at separating fruits according to turgidity than the SIQ-FT instrument.