COMPARISON BETWEEN ACOUSTIC RESPONSE AND LOW MASS IMPACT MEASUREMENT TECHNIQUES TO ASSESS AVOCADO FIRMNESS

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Two non-destructive dynamic test methods, low-mass impact and acoustic response, were tested and compared with destructive compression and penetration tests to evaluate avocado ("Fuerte" cultivar) firmness. The purpose of the study was to analyse the performance of the impact test methods for non-destructive firmness evaluation. A bench top low-mass impact firmness tester produced by Sinclair International (SIQ-FT) was used to perform the impact tests, and a piezoelectric-film transducer was applied in the acoustic tests. The Sinclair internal quality index (IQ) and a firmness index (FI) were calculated from the output signals. The non-destructive tests were followed by parallel-plate compression and cone penetration tests. The SIQ-FT can capably detect the ripening stages of avocados. The correlation between the destructive tests was high (R=0.943) as was that between the low-mass impact firmness (SIQ-FT) and modulus of elasticity and cone penetration (R=0.953 and R=0.955, respectively). The correlations of the acoustic technique (FI) to the elastic modulus and cone penetration, were lower (R=0.68 and R=0.695, respectively). The findings demonstrated the advantage of measuring non-spherical fruit by a low-mass impact technique compared to the acoustic technique, and the potential of using the SIQ-FT to assess fruit quality non-destructively.