

Title Overview of in-line Impact Testing of Fruit

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Abstract

Low-mass impact testing is becoming an acceptable method for on-line firmness assessment of many fruits. The dynamic test is aimed to replace the traditional quasi-static compression and the penetration tests that measure the force-deformation fruit property and the yield strength of the fruit. Yet, many researchers reported various problems associated with the impact testing. The purpose of this paper is to present an overview of the low mass impact methods for the evaluation the firmness and ripeness stage of fruit, and the implementation of this methods in in-line sorting machines. The paper describes the dynamic and static properties of fruit tissue, the impact characteristics of the fruit, the different non-destructive impact methods and the signal analysis applied. The aim of the paper is to analyze these characteristics and to evaluate its effects on the performances of the test method. Low-impact tests were performed by using bench-top impact tester and in-line commercial machines. Tests were carried out with calibration rubber balls and several fruit varieties, including Apples, Mango, Avocado, Peaches, Papaya and Kiwifruit. Traditional and new impact parameters were considered and compared with the quasi-static destructive tests. The sensitivity of the impact parameters to variations in fruit characteristics and test conditions were analyzed. Results of the in-line impact testing of various fruit varieties in commercial plants are presented.