

Title Shock absorbing surfaces for collecting fruit during the mechanical harvesting of citrus
Author C. Ortiz, J. Blasco, S. Balasch and A. Torregrosa
Citation Biosystems Engineering, Volume 110, Issue 1, September 2011, Pages 2-9
Keywords citrus; fruit damage

Abstract

Damage to fresh citrus caused by impact of fruits onto collecting surfaces has restricted the adoption of mechanical harvesting. Two different experiments were carried out: investigating free-falling citrus and investigating the shock absorbing capacity of various surfaces. In free-falling experiment damage to mandarin, orange and lemon was studied. Three collecting surfaces were studied: a concrete floor, an elevated canvas provided with a frame and wheels, and a concrete floor covered with a shock absorbing canvases. Three dropping heights were used. In the shock absorbing experiment, an electronic sphere and a triaxial accelerometer were used to measure the shock capacity of seven receiving surfaces: earth, earth covered with a shock absorbing canvas, earth covered with weeds, earth covered with a mulch and an elevated canvas provided with a frame and wheels. The elevated canvases had a higher shock absorbing capacity compared to the other surfaces (260 m s^{-2} maximum acceleration compared with 1753 m s^{-2} to 2772 m s^{-2}). Weeds, mulch and the shock absorbing canvases showed significantly higher shock absorbing capacity than the bare earth. Also, the shock absorbing canvas covering the concrete floor reduce impact and fruit damage (1866 m s^{-2} maximum acceleration compared to 2477 m s^{-2}). Citrus damage susceptibility during harvest depended on variety. Weeds, mulch and shock absorbing canvases were shown to reduce impact when they cover earth during the mechanical harvesting of citrus. Elevated canvases could be used as collection systems for the mechanical harvesting of fresh citrus.