

Title Mechanical harvesting of oranges and mandarins in Spain
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Abstract

To date, all citrus harvesting in Spain is performed by hand. In experiments, Several varieties of oranges and mandarins were harvested using trunk and hand-held shakers. Tests were performed at different dates and with changes in the shaking frequency and the overall vibration time. The traction force of the fruits, the percentage of fruit removed, the detachment point and the tree damage were evaluated. The overall detachment percentage was 65% for all the tests. The tractor shaker was more effective (72% detachment) than hand-held shakers (57%). With the trunk shaker, a frequency around 15 Hz may be considered adequate. In the first 5 s of shaking almost all the fruit fell; 2 shakes of 4–5 s each were enough to obtain an acceptable detachment percentage.