

Title Fruit injury from mechanical harvester for California black ripe processed table olive

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Abstract

Olive manual harvest costs in California are higher than \$ 300 per ton, accounting for more than 50% of grower's gross return. Decreasing harvest cost by implementing mechanical harvest with increased fruit removal efficiency without bruising the fruits is a promising way to increase the profit margin in olive production. However, to improve an available canopy shake-and-catch harvester to mitigate fruit injury, we first evaluated and quantified the contribution of individual machine components, such as the shaker head, the catching frame, conveyors and the bin, in causing fruit injury. In October 2006, experimental data were acquired with the harvester provided by Dave Smith Enterprises (DSE) while working on 21 Manzanillo cultivars at the University of California Davis experimental station in Lindcove, CA. Dynamic measurements of displacement, velocity and acceleration were obtained for fruit, branches and shaker rods by applying available three-dimensional video analysis software to the stereo high speed video images recorded at 500 fps in the field. Several design improvement suggestions were created based on the results of the analysis and the improved understanding of fruit detachment and injury causes. These suggestions were implemented by DSE during the 2006-2007 off season, which included appropriate angle of attack of the shaker drums to produce vertical force components to facilitate fruit detachment and padding of head rods and catching frame. Trials were conducted during the 2007 season in approximately two hectares of three different orchards to evaluate the prescribed design modifications and machine performance. Complete analysis of fruit injury, machine performance and component contributions to fruit injury are available and will be reported. Preliminary results have indicated quite successful design results on fruit injury mitigation and detachment.