Needing Separation

Mechanically harvesting Valencia oranges without an abscission agent late in the season causes significant yield problems.

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Valencia oranges pose a significant selectivity challenge for mechanical harvesting systems. Trunk and canopy shakers must remove a sufficient percentage of this year's mature crop, and at the same time, not adversely affect next year's crop. By mid-May, growers observe mechanical harvesters removing green fruit measuring 2 cm to 3 cm in diameter. Concerned that losses of fruit quarter-size and larger will have an adverse affect on next year's crop, growers have insisted that mechanical harvesting systems shut down.

Previous research in the late 1970s and early 1980s supported growers' concerns. Since 1999, however, redesigned trunk and canopy harvesting equipment began working in commercial groves. The new equipment raised the possibility that Valencia oranges could be harvested mechanically without abscission agents into June and not suffer any, or at least minimal, yield losses the following year. A study was conducted during the 2003 and 2004 seasons where trees were harvested with canopy and trunk shakers at various degrees of intensity. Data was collected to evaluate the effects of harvest method on yields in the following year.

Yields Decreased

Trunk shakers were operated at full aggressiveness, but shake duration was decreased from 10 to 4 seconds. For canopy shakers, duration of shake, as measured by ground speed, was kept constant. The study began in 2003 with harvest dates from early May to mid-June. In 2004, trees were harvested in the same manner.

Yields in 2003 were essentially the same for hand-picked plots and any of the mechanically picked plots. This result was expected because the fruit crop was set prior to the beginning of the experiment. Shaking trees for 10 seconds with a trunk shaker reduced yields between 1 and 1.4 boxes per tree compared with hand-picked controls. Shaking trees for only 4 seconds mitigated some of the yield impact, but generally, yields were between 18% and 22% less than if the trees had been hand-picked.

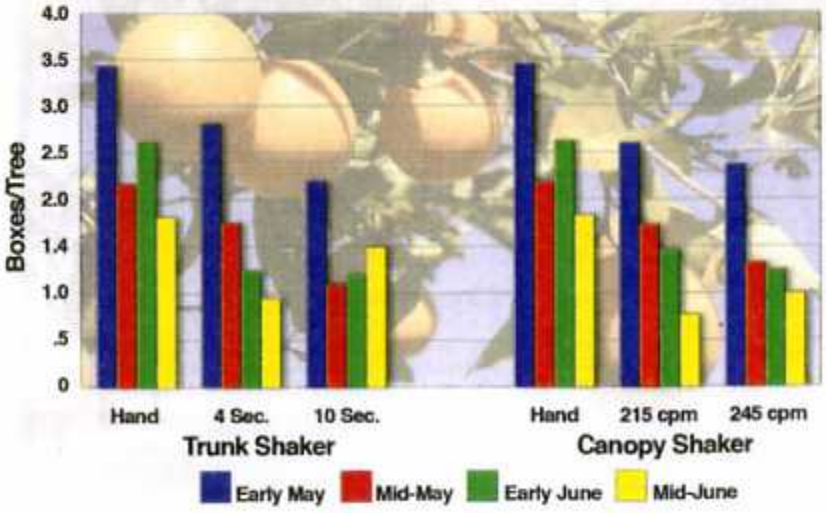
Results for the canopy shaker were similar to those measured for the trunk shaker. During the early June harvest, yields from trees shaken at the most aggressive setting were reduced by more than 50% as compared to hand-picked plots. Even at the gentlest setting, yields from canopy-shook trees in 2003 were 25% lower than hand-harvested trees.

Valencia harvesting continues through June, and in some years, into early July. Halting mechanical harvesting by mid-May is a significant impediment to the development of cost-effective mechanical systems. Attaining the full harvest cost-saving potential of trunk and canopy shaking systems depends on increasing acreage over which these systems operate.

Abscission Agent Required

Despite the introduction of new harvesting equipment, results from this study confirm previous University of Florida research that trunk or canopy shaking without an effective abscission agent will lead to yield losses in the following year. These results highlight the importance of developing and registering an effective abscission compound. Abscission is the key to achieving the dual objectives of removing this year's fruit and leaving next year's crop intact. Abscission selectively loosens the pull-force of mature fruit; thereby significantly lessening the energy required by trunk or canopy shakers. With less energy transferred into the tree at harvest, the more likely the immature green fruit remains attached to the tree. FG

2004 Average Yields by Harvest Method and Date (Treatments Initiated in 2003)



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