

Mechanical harvesting — what's the cost?

An online decision tool compares costs of citrus mechanical harvesting systems

By Fritz Roka

Mechanical citrus harvesting machinery, including trunk and canopy shakers, harvested more than 30,000 acres during the 2005-06 season, slightly more than 5 percent of the acreage in processed oranges.

Grower interest in machine harvesting should increase over the next five years as mechanical systems improve in their performance and become more integrated into grove operations. Furthermore, mechanical harvesting costs likely will decrease as new technology, such as abscission, is incorporated.

As growers consider mechanical harvesting systems, their primary criterion should be "net" harvest costs. Important to note is that "net" cost means more than a contractor's quoted price. Determining the net cost of a harvest system includes gleaning, pre-harvest grove preparation, post-harvest grove repairs and the value of non-harvested fruit.

Many growers are concerned about whether mechanical harvesters diminish next year's crop or adversely affect long-term tree productivity. If there is such a connection between mechanical harvesters and tree decline, the value of tree decline attributable to mechanical systems would have to be factored into "net" costs as well.

While mechanical systems appear to be harsher on trees than hand crews, data from UF/IFAS research have not documented any significant damage or yield decline from mechanical harvesting systems in use today. In addition, available evidence suggests that mechanical harvesting will not shorten a tree's productive life.

The Citrus Harvesting Decision Tool was developed to help growers organize the relevant harvest cost information and allow them to compare the net harvest costs among multiple harvesting options.

The Decision Tool is found at its Web address, <http://www.citrustool.ifas.ufl.edu> or through the citrus mechanical harvesting Web site address,

<http://citrusMH.ifas.ufl.edu/index.asp>. By logging-in with a user-ID and password, information entered during one session can be stored and reused at a later date.

The program leads the user through three data-entry boxes. The first box asks for basic market and grove information — yield, delivered-in price, and hauling costs from the grove to the processing plant. This information allows the Decision Tool to estimate harvest costs by individual block and allows for specific market conditions.

The second data box asks for cost information by harvest

method. Cost-to-hand harvest is the basic reference point and should be estimated for specific block conditions. As growers know, the "pick" and "roadside" charges generally vary inversely with production. That is, the lower the yield, the higher the pick and roadside rate. Hand harvesters nearly clean the tree of all fruit, so that the "minimum recovery percentage" is either close to or at 100 percent. If a grower anticipates some post-harvest repairs to irrigation lines, then an estimate can be entered.

Next, the user selects one or more mechanical harvesting options. Most, if not all, of this information comes from the mechanical harvesting contractor. The contractor's information answers three questions:

1) the contract price (\$/box) to harvest and deliver fruit to the bulk trailer;

2) the recovery percentage (i.e. the percent of fruit on the tree that the mechanical system delivers to the trailer); and

3) whether a gleaning service is included in the contract price. If gleaning is included, the "minimum recovery percentage" should be more than 97 percent. If gleaning is offered as a separate service, then expect the "minimum recovery percentage" by the mechanical system to be closer to 90 percent. Gleaners generally collect 99 percent of the remaining fruit, or between 5 and 20 percent of the total crop, depending on the efficiency of mechanical recovery.

Mechanical systems with catch frames operate under "skirted" trees, implying that a grower has an annual cost to trim the lower canopy of the trees. Expect to include some costs for post-harvest repairs. Usually, repair work is needed to realign irrigation tubing and replace damaged emitters.

The third and final data box asks for costs to retrofit, or prepare an existing grove for mechanical harvesting. Systems with catch frames, or ground pick-up equipment, require unobstructed access beneath the tree canopy. In addition, trunk shakers require a minimum of 18 inches of clear trunk height so that the shaker clamp can firmly grasp around the trunk.

Skirting, pruning, and brush cleanup for a block being retrofitted for mechanical harvesting can range from \$50 to \$100 per acre. Some yield loss in the first year after retrofitting should be expected, as skirting and pruning removes bearing tree canopy. After the initial skirting and pruning, the assumption is that the tree will compensate and set the same volume of fruit as before the retrofitting operation. The user is asked to provide an estimate of this expected loss as a percentage of the available crop. The Decision Tool computes an on-tree value for the lost fruit and adds it to the total cost of tree/block preparation. Costs to retrofit a grove for mechanical harvesting should be viewed as a one-time expense, similar to a capital investment. Annual maintenance costs have already been included in the previous data page for "Harvest Method."

With all the relevant cost data entered, the Decision Tool computes a "net" unit harvest cost by harvest method, and the user can readily rank harvest methods from least to most expensive. The Decision Tool also calculates the change in per-acre harvest costs as compared to the hand-harvest standard. If a mechanical system generates a savings, then a "time to recoup retrofitting costs" is calculated.

The Citrus Harvesting Decision Tool allows a grower to enter information on as many different harvesting options as are available. Options could mean different equipment, same equipment but different contractors, same equipment and same contractor but with and without gleaning. By determining "net" unit costs of harvesting, a grower can evaluate several harvesting methods and make an informed decision.

Growers and other users of the Citrus Harvesting Decision Tool are encouraged to contact Fritz Roka at the University of Florida/ IFAS Southwest Research and Education Center (239-658-3400) to ask questions and offer any comments on how the Decision Tool can be improved. ☛

Vol. 88 No. 7 Pg. 12