Mechanical harvesting — *the nurseryman and grower's perspective*

By Timothy M. Spann

AUTHOR'S NOTE: This article is the first in a three-part series that will examine mechanical harvesting and its impacts on the citrus industry from the perspective of the major stakeholders. This article looks at how planning for future mechanical harvesting impacts the nurseryman and grower/production manager. Future articles will be from the harvester's and processor's perspectives, respectively.

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During the 2006-07 harvest season, approximately 35,600 acres (8.3 million boxes, or 7 percent of total crop) of oranges were mechanically harvested in Florida. That was an increase of 23 percent over the 2005-06 season. Most in the industry agree that those figures will only continue to increase as labor costs and shortages remain a major issue for all agricultural sectors. That being the case, how does the prospect of future mechanical harvesting influence the decisions and actions of nurserymen and growers today?

No matter which mechanical harvesting system is considered, the skirt height of trees needs to be about 24 inches. This allows for catch frames to fit under the trees without causing damage, and it accommodates the physical limitations of how low to the ground the machines can effectively remove fruit. For the nurseryman, this requirement impacts the heading height of the trees in the nursery.

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and time of year. This extra time is primarily due to the time it takes to develop the caliper necessary to support a tree that is 6 to 8 inches taller, and not because of the time needed to develop the height. For the grower, this will translate into an extra $1 to $1.50 per tree.

Aside from the extra cost, a taller tree will have other impacts on the grower. The extra 6 to 8 inches needed to accommodate the harvesting equipment means more trunk that can produce sprouts. Growers will need to consider taller tree wraps, or be ready to absorb the labor costs necessary to keep the trunk sprout-free. Not doing so will defeat the purpose of spending the extra money for a higher headed tree.

Forgoing spending the extra $1 to $1.50 for higher headed trees will likely lead to equivalent or even higher costs later on if mechanical harvesting is used. A block planted with traditionally headed trees (16 to 18 inches) will need to be skirted prior to mechanical harvesting. This will lead to an immediate loss of yield from skirt removal, plus the labor costs to carry out the skirting. However, yields will recover over time in well-managed trees. Not skirting the trees prior to mechanical harvesting will still result in the loss of yield from the lower skirt limbs because of the physical limitations of the machines. Significant tree damage may also occur if these limbs are ripped from the tree by the machine. And the yield loss due to this potential damage may not be recoverable, even in well-managed trees.

While the extra height may not affect the actual planting process, it may influence when trees are planted. These larger trees will still be grown in a standard-sized citrapot or similar container. Thus, they will have a slightly lower root:shoot ratio (i.e. fewer roots to support more canopy) than a smaller tree in the same size pot. Therefore, post-planting watering needs may be slightly higher to ensure the survival of these trees, making planting during spring and summer a bit more risky. This is something that growers will need to develop a feel for as more and more of these taller trees are planted.

Another consideration from the growers' side of things is grove design. Mechanical harvesting equipment is not as maneuverable as goats and other grove equipment. Proximity of tree rows to ditches and canals must be taken into account so that mechanical harvesters can move efficiently through a grove. In existing groves, some trees may need to be removed to accommodate the larger equipment. General grove maintenance will also play a role in efficiency of the machines and their effects on the trees. As with hedging equipment, small variations in the terrain can cause large deviations in the plane the machine moves in. When a canopy shaker drives through a rut left from tree removal, hog routing, etc., the tines may move several feet in or out of the canopy, potentially reducing fruit harvested or causing tree and/or machine damage.

While UF/IFAS research as well as more than 10 years of commercial mechanical harvesting has demonstrated no long-term detrimental effects on tree health or yield, these issues continue to be a concern for some growers. As mentioned in the previous paragraph, grove maintenance is one thing that growers can control that will affect how machines perform and how they treat the trees. In addition, trees that are stressed