



## Start now to design groves for mechanical harvesting

By Bob Rouse and Steve Futch

*Change has kept the Florida citrus industry competitive during the last century. The industry is now facing one of its greatest challenges – the change to mechanical harvesting or the loss of competitiveness in the global juice market.*

There is a general consensus among industry leaders that improving harvesting efficiencies offers the greatest potential to reduce costs and keep our juice industry economically viable.

Other tree crops (tart and sweet cherry, pistachios, prunes, olives) that would have been lost have moved to mechanical harvesting to survive, but a generation of change was required and thinking had to be adjusted in line with production of a commodity.

Generally, groves in Florida were not designed and planted with mechanical harvesting in mind.

Therefore, in order to gain the efficiencies necessary, changes to tree shape and grove architecture must occur. We have two paths to follow:

- 1) Begin planting new groves designed for mechanical harvesting, and
- 2) retrofit existing groves that are suitable for mechanical harvesting,

which will be discussed later.

How do we start preparing groves for mechanical harvesting? The first required change is to begin planting all new trees (both new and resets in groves suitable for conversion to mechanical harvesting) with high-headed nursery trees. High-headed nursery trees have longer than normal trunks, with the scaffold branching beginning at about 30 inches. These high-headed trees are suited to accommodate mechanical harvesting by having higher tree skirts, and by providing greater trunk length to allow appropriate clearance for the trunk shaker attachment, as well as having additional horticultural and practical advantages in the grove. Regardless of the harvesting machine utilized, a catch frame must fit under the tree to capture fruit for maximum cost efficiency.

The second change necessary is to reshape existing trees to accommodate current mechanical harvesting equipment. An important point to consider is that not all groves may be good candidates for mechanical harvesting and the first criterion should be to determine where mechanical harvesting may be utilized to obtain maximum harvesting efficiency. Groves determined not to be candidates for mechanical harvesting will have to be hand harvested until a decision is made to remove the grove and replant trees with an architecture that



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maximizes mechanical harvesting efficiency.

New plantings should be designed to conform to the criteria shown in the mechanical harvest grove concept (see drawing). The new plantings should include the following features:

- High-headed trees should be planted with scaffold branching starting at 30 inches high on the tree trunk and skirting maintained at 36 inches at the drip line.
- In-row spacing should be 10-15 feet and 22-24 feet between rows.
- Hedging down the row needs to maintain eight-foot width for passage of equipment.
- Tree heights should be limited to 16 feet with either flat or roof-top configurations.
- Irrigation emitters need to be equal distance between trees in the row.
- Efficiency of machine harvest is enhanced with longer rows
- Adequate turn space is needed at end of row to accommodate large machines.
- In bedded groves, furrows must not be steep and must be suitable to accommodate heavy equipment.

### HORTICULTURAL ADVANTAGES

In addition to preparing for the future of mechanical harvesting and improving the recovery of fruit, there are many horticultural advantages to

high-headed trees:

- Reduced herbicide contact to low-hanging foliage;
- less exposure to brown rot and greasy spot with improved air drainage under the canopy;
- reduced severity and frequency for mechanical skirting;
- more uniform wetting pattern of irrigation emitters with fewer obstacles from low-hanging limbs;
- irrigation emitters are visible for checking proper operation and maintenance;
- fruit production will start sooner after planting because an older and larger nursery tree is planted.

This is not to suggest that high-headed trees won't require some change in attitude and adjustment in cultural practices. The following issues need to be addressed:

- A rigid nursery tree is needed to withstand wind, mechanical, and pest pressure.
- Taller tree wraps and longer stakes will be needed if staking is necessary to support the tree at planting time.
- Taller wraps will require additional maintenance to discourage insects that attract predators that can pull over and break the tree.
- Initial tree cost may be 50 cents to \$1.00 more, but production starts sooner.

### CONVERTING EXISTING GROVES

What about converting my existing grove to mechanical harvesting?

Not all groves are suitable for conversion to mechanical harvesting. It must be determined whether existing tree and grove structure (straight trunk and size, high scaffolds, tree health, age, grove layout, missing trees, grove size, etc.) would be cost effective to change. Additional costs will be incurred if irrigation emitters need to be relocated. If the trees can be skirted, hedged and topped, and meet the criteria of a grove design discussed above, it may be a good candidate.

Skirting has been shown in several studies to only reduce yield a minimal amount the year skirting is done. Where mechanical harvesting has been used the past 10 years, no negative long-term effects have been observed. Limb breakage the first year is usually interior dead wood and injury to live wood is no more than is usually experienced with harvesting ladders. Any root damage is minimal and quickly recovered with no effects on yield.

Can we maintain our position in the world orange juice market without mechanical harvesting? The likely long-term answer is no. Costs have to come down and there is no reasonable expectation that costs of hand harvesting will decline over time.

Leaders in our industry see mechanical harvesting as an important change necessary to reduce our costs enough to remain competitive. We have trained ourselves that every piece of fruit is money and we need every one. However, orange juice is a commodity and individual pieces of fruit are worth very little. As a commodity, we need to be thinking in efficiencies and that removal and recovery of 85 or 90 percent of the crop may be the most economical and provides the most money in the grower's pocket.

Gleaning, especially in today's market, may not be cost effective. Florida citrus growers need to remain profitable to stay in business, and mechanical harvesting offers a viable option that must be considered.

*Rouse and Futch work for UF-IFAS. Rouse is an extension horticulturist; Futch is a multi-county citrus extension agent.*

## It's March and freeze season's over. Or is it?

By JOHN A. ATTAWAY

It's March! Green foliage has been obvious in the swamps and wetlands for a month. Orange, grapefruit and tangerine trees are beginning to bloom. The full moon in February is behind us and citrus growers can heave a sigh of relief because the remaining, unharvested crop is apparently safe.

But be careful. While damaging cold in March is rare, it can happen!

Do you remember March 3-4, 1980, when a late cold wave gave us a foreboding prediction of what was to come later in that decade? Friends who were short in the future's market received a severe jolt on Sunday, March 2 when the

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