# Management factors for HLB:

## Sprout control and killing trees in place

#### **By Steve Futch** and Gene Albrigo

he removal of unwanted and/or diseased trees is an important production practice in Florida citrus. The method of tree removal will impact production cost as well as various horticultural aspects. This article discusses issues with remaining stumps and new studies looking at killing a citrus tree in-place to allow removal at a later time to improve efficiency.

#### **CUT STUMPS**

The control of citrus sprouts from stumps or remaining roots after tree removal has been a major concern for years within the Florida citrus industry. Sprout control is even more important today since the arrival of Stump sprouts huanglongbing (HLB, greening),

and the potential for sprouts from infected stumps to serve as inoculum sources.

In the 1980s and early 1990s, removal of citrus trees due to various diseases or declines involved removing the entire tree, including larger roots, using front-end loaders or bulldozers. With entire tree removal, remaining lateral roots in the soil would sprout, causing resetting issues.

In the early 1990s, the practice of shearing (clipping) the tree off above the soil line was gaining in popularity as a preferred tree removal method, especially in the east coast growing region. In 2008, several companies adapted equipment that allows for shredding the entire above-ground portion of the tree while leaving the stump intact. The wood material remaining after shredding is distributed over the soil surface in the area previously occupied by the tree or in the row middle.

Since 2006, the formation of HLB positive sprouts from stumps of citrus trees that were removed due to HLB has demonstrated again the need for effective sprout control.

Rootstock and trunk diameter have an impact on root or stump sprouting. Larger trunk diameter supports greater sprouting frequency as compared to smaller trunks. Additionally, rootstocks such as rough lemon and Cleopatra mandarin are more prone to sprouting than other rootstocks like sour orange.

Historically, some herbicides used for stump treatment have caused injury to adjacent healthy trees by translocation of materials via root grafting to the healthy trees. Resets planted near treated citrus stumps were damaged when



excessive materials were applied to the soil surface or moved off treated stumps by rain or irrigation.

In the 1990s, tree shears were more frequently used in bedded grove situations than on the Ridge. Today, shearing the tree off above the soil surface is the preferred tree removal method. Tree shears are generally less destructive to irrigation systems, soil structure and bed architecture and drainage systems in bedded groves. Additionally, shearing the tree is less costly in terms of tree removal, disposal and land preparation than traditional uprooting methods.

Recently, a number of companies are offering shredding the tree in-place or after clipping as a disposal method of tree removal. Shredding

the tree in-place lessens the potential risk of spreading canker or other pests during tree transport for disposal or burning. With shredding, no burn permits are required.

Early studies suggested that if stumps were not effectively treated with a herbicide, sprouts were seven times higher than with conventional uprooting methods. When shearing the tree off above the soil line, sprouts occurred on or near the stump, whereas with conventional uprooting, the sprouts usually occurred at some distance (greater than 2 feet) from where the trunk was located prior to removal. Sprout formation in the area occupied by a reset tree created numerous production issues and competition for water and nutrients between the reset and sprouts.

Shearing methods can also impact sprout formation. During the shearing operation, care must be used to ensure that lateral roots are not damaged or broken. Damaged or broken roots could prevent or reduce the movement of systemic herbicides throughout the entire root system. Poor translocation will result in greater sprouting frequency.

In the late 1980s and into the early 2000s, products like Weedone CB or methyl bromide were recommended for sprout control in the annual citrus pest management guide. These products are no longer recommended. It was not until 2002 that glyphosate was added to the recommended herbicide products in the annual guide for sprout control. Beginning in 2008, Remedy received label approval for stump treatment in Florida citrus. With all products, care must be used to minimize off-site injury to adjacent healthy trees or resets.



### IN-PLACE TREE KILLING

Although scouting for affected trees three to four times per year and timely removal is recommended as part of the management strategy, cost of tree removal is high when using a front-end clipper and only one or two trees are affected per row. The ability to kill these trees in place and remove them after several cycles of scouting or possibly not remove them at all could be advantageous. This alternative to shearing or stumping infected trees would eliminate dealing with stump sprouting problems.

Experimental tests were conducted to see if common herbicides or other products, including a soil fumigant, could be applied to HLB-affected trees to kill them in place. Tests included outer and inside canopy herbicide sprays as well as applications to cuts in the trunk. Remedy was better than LandMaster for canopy sprays, although neither product was consistently effective and overspray from outer canopy applications often damaged adjacent trees. Spraying the inner canopy avoided this non-target spray problem, but the spray-boom to make these sprays would have to be carefully designed to get good upward penetration and good coverage, particularly into the more extensive canopy that grows toward the row middle. Again Remedy worked better than LandMaster, but even Remedy did not completely kill larger trees.

Treating just the trunk by making cuts or other penetrations into the outer wood layers and applying herbicides was effective with some products. We have successfully killed infected trees with products that contain imazapyr (various brand products), but again LandMaster and Remedy and even 2, 4-D as used in the trials were not very effective.

Trees were killed more easily during the fall and winter than in the spring or summer when active growth was occurring. During spring and summer, undiluted imazapyr at onethird to one-half ounce per tree was needed to achieve good tree kill. Tree death is slow with two weeks required to see leaf or fruit-drop symptoms and at least four weeks to kill the tree. Root or trunk sprouts were never observed when the trunk was treated.

The trunk application method is most promising, but a machine applicator is needed to make this method of tree killing economical. Development of such a machine is ongoing and a promising prototype is being tested.

We have also tested the soil fumigant Midas and found that it can kill trees quickly, but results were inconsistent, particularly on large trees with trunk diameters greater than 6 inches. Cost for product and treatment were greater than for the herbicide method.

Currently, the best tree-killing method was applying an undiluted herbicide with imazapyr as the main ingredient to hatchet cuts or drill holes on four sides of the trunk. By hand, this process is labor intensive, but does eliminate the need for heavy-duty stumping equipment.

The purpose of these studies was to comparatively evaluate the tree killing efficiencies of Midas, Remedy, Landmaster and imazapyr. Not all of these products or methods have received full label approval and thus were conducted under experimental use.

In today's citrus production system, the control and management of HLB and citrus sprouts is essential to the long-term profitability of the Florida citrus industry. Infected trees and/ or sprouts from those trees are an inoculum source for future spread and infection of HLB. Growers who intend to use a tree-killing method for HLB management are advised to adopt practices that enhance operational efficiency and comply with current pesticide labeling recommendations.

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