



# From planning to planting: establishing new groves in the presence of HLB

By Ute Albrecht

**D**espite the constant threat of huanglongbing (HLB), most growers remain optimistic and are replanting citrus trees to maintain production levels necessary for sustaining the industry.

The tax incentive bill under the Emergency Citrus Disease Response Act introduced in December 2015, if implemented, will help growers get back expenses associated with replanting of diseased trees immediately,

instead of slowly over time as mandated under the current law.

Due to frequent flushing, newly planted trees are especially susceptible to insects such as the Asian citrus psyllid (ACP), vector of the HLB pathogen. However, with good management practices, young trees can be kept free of disease for a few years and production can be accelerated, resulting in earlier economic returns. Many factors need to be considered when preparing for new tree plantings. These include tree selection, site preparation, planting density, irrigation, nutrition, weed management and disease control.

An overview of strategies was presented by Mongi Zekri in the March 2016 cover story of *Citrus Industry* magazine. This article will reiterate some of the basic concepts and other important aspects to consider when establishing new groves. See <http://edis.ifas.ufl.edu/ch025> for additional information on citrus reset management.

## TREE SELECTION

It is important to start with high-quality nursery trees purchased from a reputable and registered nursery. A tree that is inferior from the start will not be productive and will result in economic losses. Scion selection will depend on grower's preference and the predicted economic potential of the variety. Although all commercial scion varieties are susceptible to HLB, some (such as Sugar Belle, Fallglo, Nova, Temple, Triumph and Jackson) are reported to perform better in the presence of the disease.

Rootstock selection is critical and should be based on soil characteristics, pest and disease pressure, desired size control and tree spacing, and other traits. The ability to sustain the damaging effects of HLB is also influenced by rootstock. The rootstock selection guide (<http://frootstockselectionguide.org/>) developed in a collaborative effort of citrus researchers from the University of Florida (UF) and U.S. Department



of Agriculture will help growers choose the right rootstock based on their individual situations.

Several new rootstock selections were recently released, many of which are currently being evaluated under the Fast Track program. Choosing the right rootstock will result in higher economic returns without any additional cost.

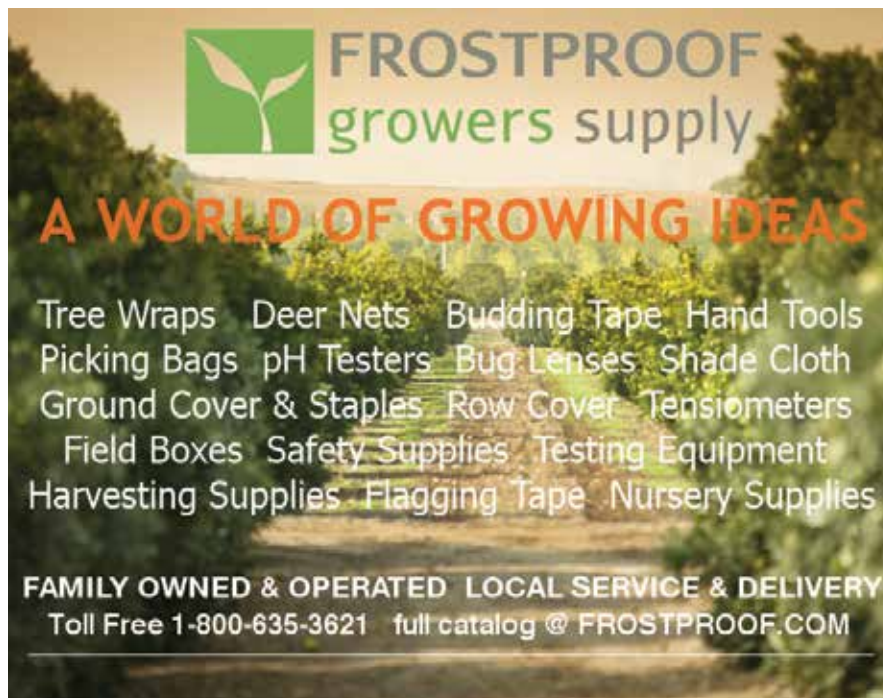
## SITE PREPARATION AND PLANTING

When choosing a site, drainage is one important factor to plan for. Whereas drainage is usually not a problem on the sandy Central Florida ridge, the wet “flatwood soils” of the southwest and eastern production areas require drainage systems that consist of water furrows, ditches or tile drains in combination with raised beds. Trees should be spaced based on the expected size of the tree and lifespan of the grove. A more densely planted grove may provide earlier economic returns despite an initial higher investment, which is advantageous under the current pressure of HLB.

Tree wraps should be placed around young trees in the first years to avoid sprout formation and protect from herbicide and mechanical damage. Some types of tree wraps also provide freeze protection. Wraps should be inspected regularly to avoid insect damage, especially from fire ants, which can girdle young trees.

## IRRIGATION

Irrigation requirements depend on many factors, including rainfall, temperature, time of year and soil characteristics. Proper irrigation scheduling has a direct impact on tree health, fruit quality and yield. Without proper irrigation, trees are more susceptible to nutrient deficiencies, physiological disorders and pests and diseases. The primary objective during the first years of a newly planted tree is the rapid development of the tree canopy to ensure fruit production. Since vegetative growth is especially



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susceptible to water stress, it is crucial to maintain optimum soil moisture at all times.

The current irrigation standards for Florida are low-volume irrigation systems using micro-sprinklers. Use of drip irrigation as part of the advanced citrus production system is also being explored. Advantages of micro-irrigation include lower cost, reduced water use, precise water distribution, reduced foliar diseases and the ability to simultaneously apply fertilizers and other chemicals.

Irrigation can be electronically scheduled based on evapotranspiration, and apps have been developed by UF researchers to fine-tune this process (see <http://smartirrigationapps.org/>). Drip irrigation uses less water, increases water-use efficiency and minimizes weed development. However, micro-sprinklers also provide freeze protection and cover a larger area of the root zone, which is important once trees become larger. Adequate irrigation is of particular importance in the HLB era, since HLB-affected trees suffer from fibrous root loss and are more prone to water deficiencies.

Also critical is the pH of the soil, which should be maintained at 6.0 to 6.5. This can be achieved through

acidification of irrigation water and application of acid-forming fertilizers or elemental sulfur. High alkaline water due to excessive carbonate, bicarbonate and hydroxyl anions is detrimental to citrus trees, especially those affected by HLB.

## NUTRITION

Nutrition goes hand in hand with irrigation. Proper nutrition improves tolerance to pests and diseases and ensures the rapid development of the canopy. The optimal fertilizer rate depends on soil type: Soils with high organic matter such as on land that was previously used for pasture or vegetable production will require less fertilizer than soils with low organic matter. Soils should be tested prior to planting to assess proper nutritional needs.

Fertilizer can be applied as dry soluble or controlled-release materials, through fertigation or foliar feeding. To maintain constant nutrient availability and to minimize nutrient leaching, young trees should be provided with regular small doses of fertilizer. Ideally, nutrients should be applied through fertigation divided into 10 or more annual applications. If fertigation is not an

option, a minimum of four to six annual applications of dry soluble fertilizer or one to two applications of controlled-release fertilizer (CRF) are recommended (see <https://edis.ifas.ufl.edu/pdf/SS/SS47800.pdf>). Use of CRF is advantageous, especially during periods of heavy rainfall when soils are too wet for efficient fertigation. Additional foliar applications of micronutrients are beneficial.

## ORGANIC AMENDMENTS

Amendments — such as compost, humic substances or microbes — often improve soil physicochemical properties, root system architecture, water-use and nutrient-uptake efficiency. Amendments can also improve the ability of plants to cope with unfavorable environmental conditions and to defend themselves against pathogens and diseases. Although no specific recommendations for young citrus trees are currently available, using such amendments will likely be advantageous. Studies are in progress to assess different materials and their impact on plant growth and tolerance to HLB and other diseases.

## WEED MANAGEMENT

Weeds compete with young trees for water, nutrients and sunlight, and should be controlled prior to planting. When using herbicides, it is important to allow enough time for residuals to disappear before planting and to adjust applications to rates recommended for young trees. Given the scientific knowledge regarding the benefits of a healthy root/soil microbiome, herbicide use should be minimized as much as possible in order to avoid potentially negative effects on tree growth and health. More research is needed to assess the effects of herbicides and to develop strategies that balance their use with the necessity to maintain a healthy root/soil environment.

## PEST AND DISEASE CONTROL

Once trees are in place, special care



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must be taken to prevent trees from becoming infected not only with the HLB pathogen, but also with citrus canker. Contrary to mature trees, young trees are prone to frequent flushes, which render them highly attractive to ACP and citrus leafminers and accelerate the spread of HLB and canker, respectively. In addition to spreading disease, both insects also cause significant leaf damage, which reduces growth and development of young trees.

The best pest and disease control is through soil drenches with neonicotinoids. Soil drenches are preferred to injection via micro-sprinklers to avoid losses of material outside the root zone. Soil-applied pesticides also have a lower impact on beneficial insects than foliar sprays. Three neonicotinoid products are currently registered for use on young citrus: Admire Pro (imidacloprid), Platinum (thiamethoxam) and Belay (clothianidin).

When applying neonicotinoids, it is best to do so about two weeks prior to leaf expansion to ensure movement of the product from roots to shoots. Application prior to rainfall or scheduled irrigation should be avoided. The recommended rates per acre vary depending on tree size and density of planting. For example, new sets at a density of 140 trees per acre will require 3.5 fluid ounces of Admire Pro 4.6F per acre, whereas older trees of 5 to 9 feet in height will require 14 ounces per acre in a single application. Neonicotinoids may provide six to eight weeks of protection, meaning that at least eight applications per year are necessary to achieve adequate control. The presence of leafminers will indicate a need to reapply.

Since all three insecticides have the same mode of action, foliar sprays of broad-spectrum insecticides are recommended between soil applications to avoid insecticide resistance. There are also limits on the amounts of neonicotinoids that can be used per acre per year. Therefore,

the number of possible applications at recommended rates will diminish with tree age and size as well as with higher planting density (see [www.crec.ifas.ufl.edu/extension/chmas/PDF/Young\\_Tree\\_Care.pdf](http://www.crec.ifas.ufl.edu/extension/chmas/PDF/Young_Tree_Care.pdf)).

Recently, a new strategy was developed using reflective metalized plastic mulch for new citrus tree plantings (see article in the March 2016 issue of *Citrus Industry* magazine). This study demonstrated greater protection from ACP and HLB with mulch compared to insecticides alone and conferred additional benefits, including more efficient use of water and fertilizer and reduced

need for herbicides. These beneficial effects resulted in 44 percent higher yields in 3.5-year-old Hamlin trees using mulch in combination with insecticides compared to insecticides alone.

It is hoped that the successful use of these strategies will encourage growers to replant their groves and allow the citrus industry to stay alive during these challenging times. 🍊

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