Summer citrus production practices

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Typical summer production tasks in citrus groves include leaf and soil sampling, preparing for hurricanes and tropical storms, and managing weeds, diseases and insect pests.

LEAF AND SOIL SAMPLING

Optimum growth and yield of high-quality fruit cannot be obtained without adequate nutrition. Successful fertilizer programs should be based on tissue analysis, knowledge of soil nutrient status through soil analysis, and utilizing university-based recommendations. Deficiencies or excesses of a plant nutrient element will cause a disturbance in plant metabolism and could result in poor tree performance.

Leaf sampling

For reliable results and useful interpretation of lab analysis reports, proper procedures for leaf sampling and handling must be followed. Improperly collected leaf samples will provide misleading information about the nutritional status of the trees and the fertilizer program. Leaf samples must also be taken at the appropriate time of the year because nutrient levels within leaves are continually changing.

The best time to collect samples would be during July and August. Collected leaves should be 4- to 6-month-old spring flush leaves from non-fruiting twigs. If samples are taken later in the growing season, the summer flush would probably be confused with the spring flush during the sampling process. Each leaf sample should consist of about 100 leaves taken from 15 to 20 uniform trees of the same variety and rootstock under the same fertilizer program.

Soil sampling

The accuracy of a fertilizer recommendation depends on how well the soil sample from which the recommendation was based represents the area of the block or grove. Soil sampling may be conducted at the same time as leaf sampling to save time and reduce cost.

Standard procedures for proper sampling, preparation and analysis have to be followed for meaningful interpretations of the test results and accurate recommendations. Each soil sample should consist of 15 to 20 soil cores taken at the dripline of 15 to 20 trees. These samples should be from within the area wetted by the irrigation system and to a depth of 6 inches. The area sampled should be uniform in terms of soil and tree characteristics and correspond to the area from which the leaf sample was taken. Individual cores should be mixed thoroughly in a clean plastic bucket to form a composite sample. Subsamples of appropriate size should be taken from the composite mixtures and put into labeled paper bags supplied by the lab. Soil samples should be air-dried, but not oven-dried, before shipping to the testing laboratory for analysis. For more details, consult University of Florida-IFAS publication SL 253, "Nutrition of Florida Citrus Trees" at http://edis.ifas.ufl.edu/pdffiles/SS/SS47800.pdf

PREPARING FOR A HURRICANE OR TROPICAL STORM

The hurricane season will soon be upon us. Hurricanes may develop any time between June and November. In order to best protect yourself and your grove, it is essential to develop a hurricane plan and prepare in advance. Although there is not much that can be done to prevent damage to trees and fruit from the wind, rain has the potential to cause the most severe and longest-lasting damage to citrus trees. There are precautions that can be taken to help minimize damage and protect your grove.

- Clean and pump down ditches and grade areas to help maximize drainage and water removal efforts after the storm. Make sure that the ditches receiving water after it leaves your property are also cleaned to ensure they will continue to flow properly and minimize flooding at your location.
- Make sure all emergency equipment is on hand and in good working condition. This includes generators, chain saws, torches and air compressors.
- Ensure two-way radios and telephones are in working order.
- Secure all hazardous materials including pesticides, fertilizers and other chemicals.
- Fill fuel, fertilizer and other liquid material tanks so they won't move in the wind.
- Establish personnel assignments.
- Make a list of all tasks that will need to be performed following the storm.
- Keep an updated list of contact information for workers at their place of safety so you can communicate with them following the storm.
- Keep a list of emergency contact information for agencies that you may need assistance from during or after the storm.

Flooding

Almost all citrus trees grown in southwest and east coast citrus areas in Florida are located on high-water-table, poorly drained soils. Water management on poorly drained soils is difficult and expensive because during heavy rains in the summer, excess

Flooding can cause leaf wilting, chlorosis, dieback and tree decline.

Weeds compete with trees for water, nutrients and even light.

water must be removed from the root zone, and in periods of limited rainfall, irrigation is needed. On these soils, drainage is as important as irrigation. The concept of total water management must be practiced. If either system (irrigation or drainage) is not designed, operated and maintained properly, then the maximum profit potential of a grove cannot be achieved. Both surface and subsoil drainage is necessary to obtain adequate root systems for the trees.

Roots, like the rest of the tree, require oxygen for respiration and growth. Soils in Florida typically contain 20 to 21 percent oxygen. When flooding occurs, the soil oxygen is replaced by water. This condition causes tremendous changes in the types of organisms present in the soil and in the soil chemistry.

Flooding injury would be expected if the root zone was saturated for three days or more during extended summer rains at relatively high soil temperatures (86°F to 95° F). Flooding stress is much less damaging when water is moving than when water is stagnant. The use of observation wells is a very reliable method for evaluating water-saturated zones in sites subject to chronic flooding injury.

Symptoms of flooding injury may occur within a few days or weeks of the event, but usually appear after the water table has dropped and the roots become stranded in dry soils. Leaf wilting, leaf and fruit drop, dieback and chlorosis patterns may develop and tree death may occur.

Drainage ditches should be kept free of obstruction through a good maintenance program including chemical weed control. Tree recovery from temporary flooding is more likely to occur under good drainage conditions.

Do not disk a grove if the trees were injured by flooding. Irrigation amounts should be reduced, but frequencies should be increased to adequately provide water to the depleted, shallow root systems. Soil and root conditions should be evaluated after the flooding has subsided. Potential for Phytophthora infections should be determined through soil sampling and propagule counts. If there is a Phytophthora problem, the use of certain fungicides can improve the situation. Chronic drainage issues rarely respond to fungicidal treatments and should be addressed by improving the grove drainage structures.

WEED CONTROL

Weeds can reduce the growth, health and survival of young trees, extend the time to come into bearing, and ultimately fruit production. Weeds compete with trees — particularly young trees — for water, nutrients and even light. Weeds can easily cover small trees if left uncontrolled. Weeds can also reduce efficacy of low-volume irrigation systems, and intercept soil-applied pesticides.

For the control of well-established perennial weeds, a postemergence herbicide with systemic metabolic activity should be used together with pre-emergence soil residual products. With some pre-emergence herbicides, it is recommended to apply the herbicide to the soil surface which is nearly weed-free. Applying the herbicide to thick vegetation limits the ability of the product to be evenly applied to the soil surface for later incorporation into the soil by rainfall.

Timing and frequency of applications are the keys to good vegetation management. Increased application frequencies of lower rates of soil residual herbicides are more effective in young groves where vegetation presence is greater due to exposure of the grove floor to sunlight and where a greater herbicide safety factor is required. To properly control weeds, the weeds must be actively growing. Herbicides applied to drought-stressed weeds may result in poor control due to the lack of uptake and translocation of the applied herbicides.

Well-maintained, accurately calibrated equipment with good filtration, agitation and uniform spray distribution is essential for effective vegetation management. Improved herbicide boom design to reduce tree skirt contact, spray drift and interference of heavy weed cover with nozzle output will reduce tree damage and fruit drop while improving control of target vegetation. Tree skirt pruning and timing of postemergence applications can also reduce boom and spray contact with low-hanging limbs and fruit.

In determining management options, herbicide selection should be based not only on species and stage of vegetation development, but product solubility and leaching potential, and soil type. Objectives are to reduce weed competition and interference through measured vegetation control/suppression with inputs that have reduced potential for leaching through over-irrigation, runoff and erosion, chemical drift or other off-target impacts. For more details, go to Florida Citrus Pest Management Guide: Weeds at http://www.crec.ifas.ufl.edu/extension/pest/PDF/2014/Weeds.pdf

PHYTOPHTHORA

For management of Phytophthora diseases, consider integration of cultural practices (e.g., disease exclusion through use of Phytophthora-free planting stock, resistant rootstocks and proper irrigation practices) and chemical control methods when indicated by sampling. In groves with a previous history of foot rot, consider use of Swingle citrumelo or other

Phytophthora foot rot causes bark lesions, which can result in tree defoliation, decline and death.

tolerant rootstocks for replanting. Swingle citrumelo is tolerant to foot rot and is less likely to support damaging populations once trees are established. Trees should be planted with the bud union well-above the soil line and provided with adequate soil drainage.

Sampling for *P. nicotianae*

Population densities of the fungus in grove soils should be determined for making decisions on whether fungicide treatment is necessary. Soil samples containing fibrous roots should be collected during the spring through fall (March to November) from under-canopy within the tree dripline and from the area irrigated by microsprinklers or drippers. Samples must be kept cool, but not refrigerated, for transport to the analytical laboratory.

Chemical control

Use of fungicides in young groves should be based on rootstock susceptibility, likelihood of Phytophthora infestation in the nursery, and history of Phytophthora disease problems in the grove. For susceptible rootstocks, fungicides may be applied to young trees on a preventive basis for foot rot. For other rootstocks, fungicide treatments should commence when foot rot lesions develop. The fungicide program for foot rot should be continued for at least one year for tolerant rootstocks, but may continue beyond that for susceptible stocks.

In mature groves, the decision to apply fungicides for root rot control is based on yearly soil sampling to indicate whether damaging populations of *P. nicotianae* occur in successive growing seasons. Time applications to coincide with periods of susceptible root flushes in late spring and late summer or early fall. Soil application methods with fungicides should be targeted to under-canopy areas of highest fibrous root density.

For more details and product selection and rates, go to http://www.crec.ifas.ufl.edu/extension/pest/PDF/2014/Phytophthora.pdf

CITRUS BLACK SPOT

Citrus black spot is one of the most important fungal diseases of citrus. So far, it has been contained to southwest Florida. The symptoms are necrotic lesions on fruit making them unacceptable for fresh market. When disease is severe, black spot may cause extensive premature fruit drop that reduces yield.

The primary source of infection is ascospores (sexual spores) produced on dead leaves that have fallen to the ground. Ascospores are forcibly ejected during rains or irrigation and infection occurs mostly in late spring and summer.

Currently, there are two product groups registered for citrus in Florida for black spot control: copper compounds and the strobilurins. The strobilurin fungicides can be used at any time for disease control. Copper fungicides are more economical and have more residual activity than the strobilurins. Residue levels can be monitored with the Citrus Copper Application Scheduler (www.Agroclimate.org). However, copper fungicides applied in hot weather can be phytotoxic to the fruit. Use of strobilurins in hot weather will avoid fruit damage. Protective treatments using these fungicides must be properly timed, and up to five sprays may be required during the period of susceptibility.

Removal of dead leaves or practices that cause leaves to more quickly decompose in groves can reduce inoculum potential and may be an effective practice. Be sure to rotate between modes of action to minimize pesticide resistance issues. For more information, go to 2014 Florida Citrus Pest Management Guide: Citrus Black Spot at http://www.crec.ifas.ufl.edu/extension/pest/PDF/2014/Citrus%20Black%20Spot.pdf

GREASY SPOT

Management of greasy spot must be considered in all Florida citrus groves. Greasy spot spores germinate on the underside of the leaves and the fungus penetrates through the stomates (natural openings on lower leaf surface). Warm and humid nights combined with high rainfall — typical of Florida summers — favor infection and disease development.

On Valencia, a single spray should provide acceptable control when applied from mid-May to June. On early- and mid-season oranges and grapefruit for processing, two sprays may be needed, especially in the southern part of the state where summer flushes constitute a large portion of the foliage. Two applications are also needed for fresh fruit and where severe defoliation from greasy spot occurred in the previous year. In those cases, the first spray should be applied from mid-May to June and the second soon after the major summer flush has expanded.

Thorough coverage of the underside of leaves is necessary for maximum control of greasy spot, and higher spray volumes and slower tractor speeds may be needed. For more information on greasy spot, go to 2014 Florida Citrus Pest Management Guide: Greasy Spot at http://www.crec.ifas.ufl.edu/extension/pest/PDF/2014/Greasy%20Spot.pdf

CITRUS CANKER

Citrus canker is still a major problem in Florida citrus groves. Citrus fruit infected with canker cannot be packed for the fresh fruit market. Citrus canker can cause defoliation, fruit drop, twig dieback, severe tree decline and reduced yield. Major citrus canker outbreaks generally occur on new shoots or when fruit are in the early stages of development. Frequent occurrence of rainfall in warm weather, especially during thunderstorms, contributes to disease development. Leaf and twig susceptibility is increased by the citrus leafminer.

Spread of canker bacteria is by wind and rain over short distances. Spread of canker over longer distances can occur during severe tropical storms, hurricanes and tornadoes. Where canker is widespread, the primary means of control are: 1) planting of windbreaks, 2) protection of fruit and leaves with copper sprays and 3) control of the citrus leafminer.

Copper products are quite effective for preventing fruit infection, but much less effective for reducing leaf infection. Applications of copper to young leaves will prevent infection, but the protection is soon lost due to rapid expansion of the surface area.

Most of the infection of oranges occurs from April to July. With endemic canker, five copper sprays (starting in early April) applied at three-week intervals are recommended for early processing oranges. Three applications (starting in mid-April)

at three-week intervals should be sufficient for Valencia and midseason varieties. Applications into October may be needed for fresh grapefruit.

Copper usage should be minimized since this metal accumulates in soil and may cause phytotoxicity to the fruit peel, or create environmental concerns. For more information, go to the Florida Citrus Pest Management Guide: Citrus Canker at http://www.crec.ifas.ufl.edu/extension/pest/PDF/2014/Canker.pdf

CITRUS LEAFMINER (CLM)

Leafminer populations build rapidly on the spring flush. Throughout the warm season, leafminer populations vary with the flushing cycles, and subsequent flushes are often severely damaged. The summer period of high leafminer damage coincides with the rainy season when canker spread is most likely.

CLM greatly exacerbates the severity of citrus canker. Leafminer tunnels infected by canker produce many more times the amount of inoculum than is produced in the absence of leafminer damage. On young trees, use of the soil-applied systemic insecticides is the most effective means of preventing mining damage on the new flush and has little direct effect on natural enemies. Soil drenches directly to the base of the tree have been shown to provide at least six weeks control of leafminer. Foliar sprays should be timed to coincide with the appearance of the first visible leaf mines, which occur immediately following the feather leaf stage or one to two weeks after budbreak.

The only products currently available for leafminer control on large trees are foliar insecticide sprays. While a number of products are effective against this pest, achieving control of leafminer using foliar sprays on large trees is difficult due to the unsynchronized flush typically encountered during summer and fall. However, since leafminers affect only developing leaves, coverage of peripheral leaves in the canopy should be adequate to exert suppression when applying foliar pesticides. For more information, go to the Florida Citrus Pest Management Guide: Asian Citrus Psyllid and Citrus Leafminer at http://www.crec.ifas.ufl.edu/extension/pest/PDF/2014/ACP%20and%20Leafminer.pdf

ASIAN CITRUS PSYLLID

The Asian citrus psyllid has become the most important insect pest of Florida citrus due to the presence of huanglongbing (HLB, citrus greening) which is spread by the psyllid.

Young trees that produce multiple flushes throughout the year are at greater risk of HLB infection than mature trees because of the attraction of adult psyllids to the new flush. Even without HLB, young trees in the field need to be protected for about four years from psyllids and leafminers in order to grow optimally. Soil-applied systemic insecticides will provide the longest lasting control of psyllids with the least impacts on beneficials.

Management options for psyllid control on bearing trees are much more limited than for non-bearing trees. At present, the only chemical control option that has been demonstrated effective for reducing psyllid populations on bearing trees is the use of broad-spectrum foliar insecticide applications. Broad-spectrum foliar sprays are most effective when used to control adult psyllids prior to the presence of new flush.

Psyllid management programs should begin by first targeting overwintering adult psyllids during the winter months when the trees are not producing flush. By eliminating these overwintering adults, psyllid populations will be greatly reduced in the spring.

Additional sprays for psyllids should be made when observing an increase in adult populations during the summer. Foliar insecticide applications should only be used when needed to minimize the impact on natural enemies that maintain psyllids at low levels later in the year.

Management practices used within a grove can also affect psyllid populations, especially those practices that promote new flush such as hedging, topping and fertilization. Trees should always be sprayed with a broad-spectrum insecticide prior to or just after hedging and topping before any flush develops. For more information, go to the Florida Citrus Pest Management Guide: Asian Citrus Psyllid and Citrus Leafminer at http://www.crec.ifas.ufl.edu/extension/pest/PDF/2014/ACP%20and%20Leafminer.pdf

Mongi Zekri, Steve Futch, Chris Oswalt, Gary England, Camille Esmel McAvoy, Laurie Hurner and Parker Platts are all University of Florida-IFAS Extension agents.

Daniel Brooks recently joined Coldwell Banker Commercial Saunders Real Estate and Coldwell Banker Commercial Saunders Ralston Dantzler Realty as a marketing and communications specialist.

David Hungerford recently joined Coldwell Banker Commercial Saunders Real Estate as a licensed real estate sales associate.


Brooks


Hungerford

Haines City Citrus Growers Association lead receiver Agustin Leon was recently recognized for his dedication and outstanding work ethic by Director of Packing Operations John Soles.


Agustin Leon, left, and John Soles.