Important fall practices and concerns in groves

By M. Zekri, S. Futch and C. Oswalt

NUTRITION AND IRRIGATION

Nutrient management plans should include a fall fertilizer application. Fall fertilizer applications, in some instances, have been observed to delay fruit color development and fruit maturity for early season cultivars. Therefore, fertilizer applications to early season fresh marketed fruit varieties should be delayed until after harvest. To increase fertilizer efficiency, soil and leaf analysis data should be taken into consideration when generating a fertilizer program and selecting fertilizer formulations.

Irrigation is very important during the dry periods in the fall to reduce fruit and leaf drop, improve nutrient uptake, promote root growth, and increase juice content. With proper irrigation scheduling, tree growth and fruit yield will not be limited by water stress.

During the fall, fertigation (the application of soluble fertilizers through irrigation systems) can be beneficial. Fertigation allows nutrients to be applied more frequently in small amounts so they are available to meet tree needs. Increased nutrient application frequency can improve fertilizer efficiency and reduce leaching. However, fertigation is not recommended for non-uniform, poorly designed irrigation systems. Furthermore, it should be kept in mind that fertilizer and water are wasted when fertigating very wet soils. Fertigation scheduling should be flexible enough to avoid nutrient application to wet soils.

SPREADER CALIBRATION

Properly calibrated and maintained fertilizer application equipment ensures a uniform distribution of nutrients. This, combined with other conservation practices, reduces production costs, soil surface runoff, and nutrient movement to nearby surface waters. Spreaders that have not been properly maintained and calibrated cannot deliver accurate rates and evenly distributed fertilizer to the grove. Proper calibration is the key to successful fertilizer use efficiency.

Failure to calibrate equipment can result in ineffective applications. Applying too much fertilizer is costly and may result in crop reduction because of tree injury. Applying too little can result in poor tree growth and fruit production.

It is important to calibrate equipment on a regular basis. Over time, equipment will become worn or damaged with use and can result in inaccurate output and a poor distribution pattern. Two items must be considered when calibrating a spreader. The first is the distribution pattern created by discharge from the application equipment. The second is the product application rate, which is the amount of product applied per unit area.

Proper care and maintenance will help ensure precise applications and prolong the life of spreaders. Manufacturers' directions on cleaning and lubricating should be followed. With the shutter or gate wide open, remove all granules from the spreader at the end of each application. Then, the spreader should be thoroughly washed and allowed to dry. Hot water may help break loose fertilizer that is caked on. Finally, lubricate the spreader according to instructions. Spreaders should be stored in a clean, dry place out of direct sunlight.

SOIL ACIDITY AND LIMING

Lime is usually applied in the fall to Florida citrus groves. The target soil pH for citrus trees is 6.0. Soils are limed to reduce the harmful effects of low pH and to add calcium and magnesium to the soil. Liming acidic soils is economically sound and essential for profitable crop production. Soil pH must be monitored yearly through soil testing because development of soil acidity is a continuous process that may require repeated applications of liming materials. Always test your soil before applying liming materials. Do not assume that lime is needed.

Benefits of liming to correct soil acidity

- Increased nutrient availability
- Improved fertilizer use efficiency
- Increased soil microbial activity
- Increased nitrogen fixation by legumes
- Reduced toxicity of copper
- Provides additional amounts of calcium and magnesium to the soil
- Improved soil physical conditions
- Increased cation exchange capacity
- Increased growth and crop yield

FLOODING INJURY

Symptoms of flooding injury may occur within a few days or weeks of heavy rainfall events, but usually shows up after the water table has dropped and

the roots become stranded in dry soils. Leaf wilting, leaf drop, dieback and chlorosis patterns may develop, followed by tree decline or death.

Trees subjected to chronic flooding damage are stunted with sparse canopies, dull colored, small leaves, and produce low yields of small fruit. New growth flushes will have small, pale leaves due to poor nitrogen uptake by restricted root systems.

Flooding injury would be expected if the root zone were saturated for four days or more during extended summer rains at relatively high soil temperatures. Estimates of flooding stress can be obtained by digging into the soil and smelling soil and root samples. The presence of hydrogen sulfide (a disagreeable rotten egg odor) and sloughing roots indicate that feeder roots are dying.

It is difficult and costly to improve drainage in existing groves. Therefore, drainage problems should be eliminated when the grove area is prepared for planting by including an adequate system of ditches, beds and/or drain tiles.

Do not disk a grove if trees have been injured by flooding as disking would sever roots close to the soil surface, further reducing tree root density. Irrigation amounts should be reduced, but frequencies increased to adequately provide water to the depleted, shallow root systems.

The use of observation wells is a very reliable method for evaluating water-saturated zones in sites subject to chronic flooding injury.

PHYTOPHTHORA FOOT ROT AND ROOT ROT

When managing Phytophthora-induced diseases, consider integration of cultural practices to suppress the disease

Bark peeling of the trunk with gumming above the bud union of a Valencia sweet orange tree on Swingle citrumelo rootstock. Sweet orange is sensitive to Phytophthora, but Swingle is tolerant.

that include disease exclusion through use of Phytophthora-free planting stock, resistant rootstocks, proper irrigation practices, and chemical control methods.

Planting stock should be free of Phytophthora in the nursery and inspected for fibrous root rot prior to planting in the grove. Trees should be planted with the budunion well-above the soil line and provided with adequate soil drainage.

Over watering, especially of young trees, promotes buildup of Phytophthora populations in the soil and increases risk of foot rot infection. Prolonged wetting of the trunk, especially if tree wraps are used on young trees, should be avoided by using early to mid-day irrigation schedules.

Control of fire ants prevents their nesting under wraps and the damage caused to tender bark.

Phytophthora densities in grove soil should be determined to assist in making decisions about treating with fungicides. Soil samples containing fibrous roots should be collected during the late spring through fall (May to November) from under-canopy areas within the tree dripline.

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. In mature groves, the decision to apply fungicides for root rot control is based on yearly soil sampling to indicate whether damaging populations of Phytophthora have been reached (15 to 20 propagules per cm^3 soil).

Time fungicide applications to coincide with periods of root flushes in late summer or early fall. Soil application of fungicides should be targeted to under canopy areas of highest fibrous root density.

To avoid leaching of soil applied fungicides from the root zone, excessive irrigation durations and frequencies should be avoided.

For more details on foot and root rot, go to http://edis.ifas.ufl.edu/CG009

CITRUS BROWN ROT

Management of brown rot is needed on both processing and fresh market fruit. While the disease can affect all citrus types, it is usually most severe on Hamlin and other early maturing sweet orange cultivars.

Phytophthora brown rot is a localized problem usually associated with restricted air and/or water drainage. It commonly appears from mid-August through October following periods of extended high rainfall. It can sometimes be confused with fruit drop due to other causes.

If caused by Phytophthora nicotianae, brown rot is usually limited to the lower third of the canopy because the fungus is splashed onto fruit from the soil.

Phytophthora palmivora produces airborne sporangia and can affect fruit throughout the canopy.

Early season inoculum production and spread of Phytophthora spp. are minimized with key modifications in cultural practices such as skirting trees and applying residual herbicides early in the summer rather than applying post-emergence herbicides in the fall to avoid fruit drop.

The beginning stages of the epidemic are very difficult to detect before the fruit are colored and show typical symptoms. Groves with a history of brown rot infection should be monitored carefully to consider a preventative spray prior to the onset of favorable disease development conditions. Usually a single application of a copper fungicide or Aliette in late August is sufficient to protect fruit through most of the normal infection period.

When the disease has already spread, copper should be used to protect fruit not yet infected.

Precautions should be taken during harvesting not to include brown rot affected fruit in the field containers as this could result in rejection at the processing or packing facility.

For more details on brown rot, go to http://edis.ifas.ufl.edu/CG022

MITES AND INSECTS

Integrated pest management (IPM) depends on grove scouting and close observations to determine the need and timing for pesticide applications as well as modification of cultural practices to minimize damage. Scouting not only helps growers control pests more efficiently, but also lowers the use of pesticides and the chances of developing pesticide resistance.

1) CITRUS RUST MITES are a greater pest problem on fruit grown for the fresh market as compared to fruit grown for the processing markets. However, on some cultivars such as Sunburst, Fallglo and Ambersweet, rust mite damage can be severe on stems and foliage and may cause leaf injury and leaf drop.

Mite populations usually begin to increase in April on new foliage and reach a peak in June-July. Depending on weather conditions and the occurrence of natural enemies, citrus rust mite populations usually decline in August, but increase again in October and November.

Monitoring of rust mite populations is very important and should be carried out every two weeks throughout the fruit season. There are several recommended miticides for the control of citrus rust mites. Always alternate materials to minimize development of pesticide resistance.

For more details on citrus rust mites, go to http://edis.ifas.ufl.edu/CG002

2. SPIDER MITES are most abundant in citrus groves between March and June and during the fall. They are found most commonly on the upper leaf surface along the mid-vein of recently mature leaves. As populations increase, they move to the fruit. Spider mites prefer low relative humidity and usually are not a problem under high humidity conditions between June and September.

Spider mites feed primarily on mature leaves and can cause leaf drop especially in the fall. Sampling methods and assessment of spider mite populations and thresholds are outlined in http://edis.ifas.ufl.edu/CG002.

Predacious mites and insects in some groves may suppress spider mites to low densities. However, when populations averaging five to 10 motile spider mites per leaf develop in the fall or spring, it is recommended to apply a miticide. All miticides, except petroleum oil, should be used only once a year to minimize resistance development.

3. CITRUS LEAFMINER and **CITRUS PSYLLID** can continue to be problems during the fall season.

a) Leafminer. Because of frequent growth flushes, resets and young trees remain vulnerable to leafminer damage. Citrus leafminer does not significantly affect growth and yield of mature trees, but can greatly increase their vulnerability and susceptibility to citrus canker. Leaves and stems damaged by the citrus leafminer may increase infection because these wounds allow easy access of the canker bacterium into plant tissue.

When feeding galleries of the leafminer on leaves become contaminated with the bacterium, the number and size of individual lesions greatly increase and result in enormous inoculum production.

b) Psyllid. The adult psyllid can survive on hardened leaves and moves to young leaves for feeding and reproduction when available. Immature psyllid feeding on growing citrus terminals causes permanent leaf distortion and curling. The citrus psyllid reproduces exclusively on young flush and has a very high reproductive capacity. Multiple, overlapping generations can lead to a rapid buildup of high psyllid populations.

Control of the citrus psyllid should be taken seriously not only because of its damage to new flush, but also because of its transmission of the deadly citrus greening disease. Citrus growers should consider control of psyllid populations in an effort to reduce the spread of citrus greening.

c) Leafminer and psyllid control. Biological control through natural predators and introduced parasitoids contributes in suppressing populations of these two pests. Soil applied systemic pesticides with extended residual, such as imidacloprid (Admire), are recommended for use on young citrus trees during dry fall and spring seasons. For best results, applications should be scheduled prior to onset of pest infestation.

Residual activity of most foliar pesticides is limited by rapid and frequent appearance of new and unprotected flushes so that 2-3 weeks control is the best that can be expected. Therefore, scouting is necessary to determine periods of larval and nymphal activities during flushing periods to increase the efficacy of foliar applied chemicals. Pesticides should be rotated to reduce selection pressure for pest resistance.

For more information on mites and insects, go to http://edis.ifas.ufl.edu/CG004.

Always read and follow the product label directions prior to use.

The authors are multi-county extension agents with the University of Florida Cooperative Extension Service.