EXTENSION

Institute of Food and Agricultural Sciences

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Flatwoods Citrus

Vol. 23, No. 11 **November 2020**

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Multi-County Citrus Agent, SW Florida

Table of Contents

November ZOOM Seminar

Thursday, November 19, 2020
10:00 AM to 11:00 AM

1 CEU for certified crop advisors

10:00 AM – 10:30 AM

"Effect of various irrigation rates on growth of high-density plantings of young trees"

Dr. Said Hamido and Dr. Kelly Morgan, UF-IFAS

In November 2017, eight-month-old citrus trees were transplanted at different densities with four irrigation treatments (very low, low, medium, and high) of recommended rates for young citrus trees. Between 2017 and 2020, tree height, trunk diameter, leaf area, canopy volume, root growth, nutrient concentrations, stem water potential, and water use were evaluated. Results concluded that the highest irrigation rate increased the tree's height, trunk diameter, canopy volume, root growth, root lifespan, stem water potential, and nutrients uptake.

10:30 AM – 11:00 AM

"Manual pruning for high quality citrus: not all varieties are pruned equal"

Dr. Fernando Alferez, UF-IFAS

Modern manual pruning is a mix of science and art, and is the result of centuries of accumulating knowledge. In this talk, I will address the basics of citrus hand pruning. How, why, and when to prune by hand, and types of pruning. I will also make emphasis on varietal differences that will dictate the way we prune each variety for better yield and quality, as pruning principles are totally different depending on the variety. I will show two case studies to illustrate those differences: Satsuma mandarins and Navel oranges, as they behave differently and require radically different manual pruning.

December ZOOM Citrus Seminar

Tuesday, December 15, 2020
10:00 AM to 11:00 AM

1 CEU for pesticide license renewal
1 CEU for certified crop advisors

10:00 AM – 10:30 AM
"Strategies for managing difficult weeds in citrus"
Dr. Ramdas Kanissery, UF-IFAS
Some weeds in citrus groves are more difficult to control than others due to their ability to tolerate herbicide treatments. For instance, managing weeds, like goatweed, ragweed parthenium, guinea grass etc. can be challenging as they have an inherent ability to survive the herbicide sprays. Moreover, such weeds produce seeds abundantly for future infestation if given a chance to establish. The talk will cover some of the strategies to manage such problematic weeds in citrus production.

10:30 AM – 11:00 AM
"Management of Aquatic and Semi-aquatic Weeds in Canals and Ditchbanks"
Dr. Brent Sellers, UF-IFAS
This presentation will cover the basics of plant identification of various common canal and ditchbank weeds that often prevent flow of drainage water. Participants will be provided with information on basic plant identification of common aquatic and semi-aquatic plants. Once participants have that knowledge they can begin to synthesize a management plan. Participants will also learn about the herbicides that can be utilized in these systems with specific recommendations for several of the most common aquatic and semi-aquatic plant species.

CEUs for pesticide license renewal

Earn CEU Credits NOW online through Southeast AgNet & Citrus Industry Magazine
http://citrusindustry.net/ceu/

The following series of articles and quizzes are available:

- **2020 #4:** Proper storage of pesticides (10/31/21)
- **2020 #3:** Understanding pesticide labeling (7/31/21)
- **2020 #2:** Avoiding harmful effects of pesticides (4/30/21)
- **2020 #1:** Scouting: The tip of the IPM spear (1/31/21)

Each article grants one General Standards (Core) CEU when submitted and approved toward the renewal of a Florida Department of Agriculture and Consumer Services restricted-use pesticide license.

There are also CORE CEUs available at Growing Produce
http://www.growingproduce.com/crop-protection/ceu-series/

http://www.growingproduce.com/crop-protection/ceu-series/

Online Pesticide CEUs
https://pested.ifas.ufl.edu/ceu/

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EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by

CLIMATE PREDICTION CENTER/NCEP/NWS
and the International Research Institute for Climate and Society

12 November 2020

ENSO Alert System Status: La Niña Advisory

Synopsis: La Niña is likely to continue through the Northern Hemisphere winter 2020-21 (~95% chance during January-March) and into spring 2021 (~65% chance during March-May).

La Niña strengthened during October, as indicated by well below-average sea surface temperatures (SSTs) extending from the Date Line to the eastern Pacific Ocean (Fig. 1). The SST indices in the two westernmost Niño regions, Niño-4 and Niño-3.4 cooled further from last month, and the Niño-3.4 index was -1.5ºC in the past week (Fig. 2). The equatorial subsurface temperature anomalies (averaged from 180°-100°W) also became colder (Fig. 3), and continue to reflect below-average temperatures from the surface to 200m depth in the eastern Pacific Ocean (Fig. 4). The atmospheric circulation anomalies over the tropical Pacific Ocean remained consistent with La Niña. Low-level wind anomalies were easterly across most of the tropical Pacific and strengthened during October. Upper-level westerly wind anomalies expanded over most of the tropical Pacific. Tropical convection continued to be suppressed from the western Pacific to the Date Line, and enhanced convection remained over Indonesia (Fig. 5). Also, both the Southern Oscillation and Equatorial Southern Oscillation indices were positive. Overall, the coupled ocean-atmosphere system indicates the continuation of La Niña.

A majority of the models in the IRI/CPC plume predict La Niña (Niño-3.4 index less than -0.5°C) to persist through the Northern Hemisphere winter 2020-21 and to weaken during the spring (Fig. 6). The latest forecasts from several models suggest the possibility of a strong La Niña (Niño-3.4 index values at -1.5ºC) during the peak November-January season. The forecaster consensus supports that view in light of significant atmosphere-ocean coupling already in place. In summary, La Niña is likely to continue through the Northern Hemisphere winter 2020-21 (~95% chance for January-March) and spring 2021 (~65% chance for March-May; click CPC/IRI consensus forecast for the chances in each 3-month period).

La Niña is anticipated to affect climate across the United States during the upcoming months. The 3-month seasonal temperature and precipitation outlooks will be updated on Thurs. November 19th.

This discussion is a consolidated effort of the National Oceanic and Atmospheric Administration (NOAA), NOAA's National Weather Service, and their funded institutions. Oceanic and atmospheric conditions are updated weekly on the Climate Prediction Center web site (El Niño/La Niña Current Conditions and Expert Discussions). Additional perspectives and analysis are also available in an ENSO blog. A probabilistic strength forecast is available here. The next ENSO Diagnostics Discussion is scheduled for 10 December 2020. To receive an e-mail notification when the monthly ENSO Diagnostic Discussions are released, please send an e-mail message to: ncep.list.enso-update@noaa.gov.

Climate Prediction Center
National Centers for Environmental Prediction
NOAA/National Weather Service
College Park, MD 20740

United States Department of Agriculture
National Agricultural Statistics Service

CITRUS

NOVEMBER FORECAST
MATURITY TEST RESULTS AND FRUIT SIZE

Cooperating with the Florida Department of Agriculture and Consumer Services
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November 10, 2020

Florida All Orange Production 57.0 Million Boxes
Florida Non-Valencia Orange Production 23.0 Million Boxes
Florida Valencia Orange Production 34.0 Million Boxes
Florida All Grapefruit Production 4.50 Million Boxes
Florida All Tangerine and Tangelo Production 1.10 Million Boxes

FORECAST DATES	– 2020-2021 SEASON
December 10, 2020	April 9, 2021
January 12, 2021	May 12, 2021
February 9, 2021	June 10, 2021
March 9, 2021	July 12, 2021

Citrus Production by Type – States and United States

Crop and State	Production [1]			Forecasted Production [1 2]
	2017-2018	2018-2019	2019-2020	2020-2021
	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)
Non-Valencia Oranges [3]				
Florida	**18,950**	**30,400**	**29,650**	**23,000**
California	35,900	42,000	44,300	42,000
Texas	1,530	2,210	1,150	1,300
United States	56,380	74,610	75,100	66,300
Valencia Oranges				
Florida	**26,100**	**41,450**	**37,650**	**34,000**
California	8,300	10,200	9,000	8,500
Texas	350	290	190	200
United States	34,750	51,940	46,840	42,700
All Oranges				
Florida	**45,050**	**71,850**	**67,300**	**57,000**
California	44,200	52,200	53,300	50,500
Texas	1,880	2,500	1,340	1,500
United States	91,130	126,550	121,940	109,000
Grapefruit				
Florida-All	**3,880**	**4,510**	**4,850**	**4,500**
Red	**3,180**	**3,740**	**4,060**	**3,800**
White	**700**	**770**	**790**	**700**
California [4]	3,800	4,200	3,800	3,800
Texas	4,800	6,100	4,400	4,900
United States	12,480	14,810	13,050	13,200
Lemons				
Arizona	1,000	1,350	1,800	1,300
California	21,200	23,700	25,700	22,000
United States	22,200	25,050	27,500	23,300
Tangerines and Tangelos				
Florida	**750**	**990**	**1,020**	**1,100**
California [5]	19,200	26,500	22,000	23,000
United States	19,950	27,490	23,020	24,100

[1] Net pounds per box: oranges in California-80, Florida-90, Texas-85; grapefruit in California and Texas-80, Florida-85; lemons-80; tangerines and mandarins in California-80, Florida-95.
[2] Estimates carried forward from October
[3] Early non-Valencia (including Navel) and midseason non-Valencia varieties in Florida; Navel and miscellaneous varieties in California; Early and mid-season varieties in Texas.
[4] Includes pummelos in California.

All Oranges 57.0 Million Boxes

The 2020-2021 Florida all orange forecast released today by the USDA Agricultural Statistics Board is carried forward from October at 57.0 million boxes, down 15 percent from last season's final production. The total includes 23.0 million boxes of non-Valencia oranges (early, midseason, and Navel varieties) and 34.0 million boxes of Valencia oranges. The Navel orange forecast, at 700 thousand boxes, accounts for 3 percent of the non-Valencia total. The estimated number of bearing trees for all oranges is 50.1 million.

All Grapefruit 4.50 Million Boxes

The forecast of all grapefruit production is carried forward at 4.50 million boxes, 7 percent less than last season's utilization of 4.85 million boxes. The total is comprised of 3.80 million boxes of red grapefruit and 700 thousand boxes of white grapefruit.

Tangerines and Tangelos Total 1.10 Million Boxes

The forecast for tangerine and tangelos is carried forward at 1.10 million boxes, 8 percent more than last season's utilization of 1.02 million boxes. This forecast number includes all certified tangerine and tangelo varieties

Weather and Field Conditions

Daily temperatures during October were average or above for this time of year, with highs mostly in the mid to high 80s. Rainfall amounts varied across the citrus producing region, ranging from one and a half inches in the Northern citrus growing area, to over eight inches in the Indian River District. Some Southern and Central area locations had several days of heavy rains causing localized flooding in citrus groves. According to the October 29, 2020 U.S. Drought Monitor, the entire citrus growing region remained drought free. Grove activities included mowing, herbiciding, fertilizing, nutritional spraying, dead tree removal, new tree planting, and general grove maintenance.

Crop Progress

The crop season in October began with harvesting of Navel and Hamlin oranges, red grapefruit, and Fallglo and Early Pride tangerines. Harvested fruit was primarily for the fresh market. By the end of October, two processing plants were open for eliminations and sixteen packinghouses were shipping fruit. According to the Citrus Administrative Committee Utilization Report, dated November 1, 2020, just over 1 percent of early and midseason oranges, 15 percent of Navels, 7 percent of all grapefruit, and 10 percent of tangerines and tangelos have been certified.

Estimates of Production by Marketing Districts

Production forecasts for Florida oranges and grapefruit were divided among marketing districts for this report. Comparisons are shown to the previous season in the table below. Marketing District II is the legally defined Indian River District along the East Coast. Marketing District III (Gulf) includes the counties of Charlotte, Collier, Glades, Hendry, and Lee. Marketing District I (Florida SunRidge) includes all other citrus-producing counties.

Citrus Production and Prorated Forecast, by Marketing District – 2019-2020 and 2020-2021

[Based on tree populations. The possible differences between growing areas, concerning average fruit size, loss from droppage, and harvest patterns can alter the prorated estimates]

Marketing District	Oranges				Seedless Grapefruit			
	Non-Valencia		Valencia		Red		White	
	2019-2020	2020-2021	2019-2020	2020-2021	2019-2020	2020-2021	2019-2020	2020-2021
	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)
Indian River	896	600	2,104	1,450	3,140	2,850	726	600
Gulf	7,040	5,800	11,068	8,700	575	500	14	50
Florida SunRidge	21,714	16,600	24,478	23,850	345	450	50	50
Florida Total	29,650	23,000	37,650	34,000	4,060	3,800	790	700

Post-Storm Recovery

Activity check list—An activity check list will help ensure that all essential damage assessment and recovery operations are carried out. Additionally, a plan that prioritizes the importance of individual blocks makes grove recovery efficient. With a priority plan, managers can quickly determine where to begin recovery operations.

Damage inspection—If roads are passable, inspection of tree and equipment damage may be conducted from trucks. Since flooding, downed trees, and electrical poles may have blocked roads, large growers should consider making prior arrangements for a helicopter or flying service to transport the grove manager to survey grove damage. Aerial surveillance can also determine routes of passage through the grove.

Clear road access—Have crews clear all roads leading to parts of the grove where trees must be reset or other recovery activities must be conducted. Having a clear path for workers will speed the recovery effort.

Water removal—Remove excess water from tree root zones as soon as possible. It is essential to accomplish this task within 72 hours to avoid feeder root damage due to insufficient oxygen.

Tree rehabilitation—Resetting of trees to an upright position should be accomplished as soon as possible after the storm. Ensure that employees know how to properly upright toppled trees and that appropriate equipment is available. Such equipment might include pruning saws, chain saws, front-end loaders, backhoes, and shovels. Toppled trees should be pruned back to sound wood. Painting exposed trunks and branches with white latex paint helps prevent sunburn.

Pruning and resetting a tree to an upright position

Planning for a hurricane will help reduce damage to citrus trees and enhance recovery of the grove operation. The most important pre-hurricane practice is the maintenance of a regular pruning program to limit tree size. After a hurricane, being prepared for clearing debris, repairing the irrigation system, resetting toppled trees, protecting trees from sunburn when significant portion of the canopy has been removed, and irrigating and fertilizing trees frequently will increase chances of tree recovery.

Flooding Injury and Importance of Drainage

Almost all citrus trees grown in the Indian River and Southwest Florida production areas are located on high water tables and poorly drained soils. Water management on these soils is difficult and expensive. During heavy rains, excess water must be removed from the root zone while periods of limited rainfall require irrigation. On these soils, drainage is as important as or sometimes even more important than 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.

Roots, like the rest of the tree, require oxygen for respiration and growth. Well-aerated soils in Florida typically contain around 20-21% 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 is highly probable if the root zone is saturated for 3 or more days when soil temperatures (86-95°F) are relatively high (Figure 1). Flooding during the cooler December-March period can be tolerated for several weeks at low soil temperatures (< 60° F). The rate of oxygen loss from the soil is much greater at higher than at lower temperatures. The potential for damage to roots is less obvious, but equally serious, when the water table is just below the surface. Flooding stress is much less when water is moving than when water is stagnant. The use of observation wells is an easy and a quick method for evaluating water-saturated zones in sites subject to chronic flooding injury.

Figure 1. Flooded citrus grove after a heavy summer rain event.

Short-term estimates of flooding stress can be obtained by digging into the soil and smelling soil and root samples. Sour odors indicate an oxygen deficient environment. The presence of hydrogen sulfide (a disagreeable rotten egg odor) and sloughing roots indicate that feeder roots are dying. In flooded conditions, root death is not exclusively associated with oxygen deficiency. Anaerobic bacteria (the kind that can grow only in the absence of oxygen) develop rapidly in flooded soils and contribute to the destruction of citrus roots. Toxic sulfides and nitrites formed by anaerobic sulfate- and nitrate-reducing bacteria are found in poorly drained groves. Sulfate-reducing bacteria require both energy and sulfates to change sulfates to sulfides. The best sources of energy have been found to be certain organic acids contained in citrus roots, grass roots, and buried pieces of palmetto. Thus, citrus roots can contribute to their own destruction by being an energy source for these bacteria.

Symptoms of flooding injury may occur within a few days or weeks, but usually show up after the water table has dropped and the soil dries. Leaf wilting appears since the damaged roots cannot take up enough water to meet tree demand. This wilting is followed by leaf drop and twig dieback. Chlorosis patterns may develop and tree death may occur. Trees subjected to chronic flooding damage are stunted with sparse canopies and dull colored small leaves. Trees produce low yields of small fruit. New flushes of growth will have small, pale leaves due to poor nitrogen uptake by restricted root systems. Usually, the entire grove is not affected, but most likely smaller more defined areas will exhibit the symptoms. Striking differences in tree condition can appear within short distances associated with only slight changes in rooting depths. Water damage may also be recognized by a marked absence of feeder roots and root bark that is soft and sloughs easily.

With acute water damage, foliage wilts and sudden heavy leaf drop follows (Figure 2). Trees may totally defoliate and actually die. More frequently, partial defoliation is followed by some recovery. However, affected trees remain in a state of decline and are susceptible to drought when the dry season arrives because of the shallow, restricted, root systems. Moreover, waterlogged soil conditions, besides debilitating the tree, are conducive to the proliferation of soil-borne fungi such as Phytophthora root and foot rot. These organisms cause extensive tree death especially in poorly drained soils.

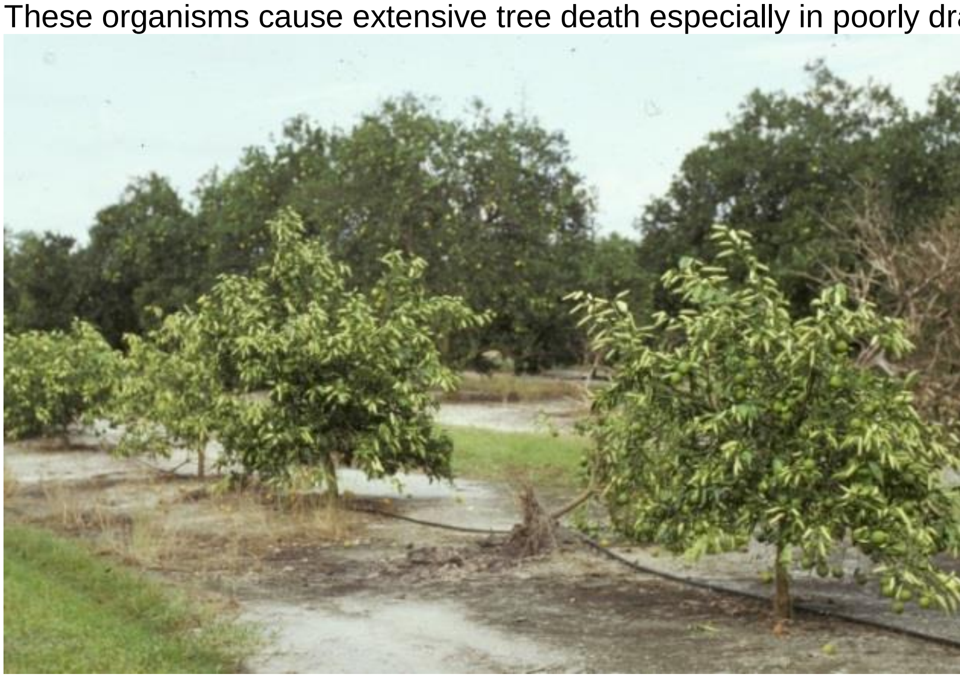

Figure 2. Flooding damage causing severe leaf wilt.

Water damage may usually be distinguished from other types of decline by a study of the history of soil water conditions in the affected areas. Areas showing water damage are usually localized and do not increase in size progressively as do areas of spreading decline. Foot or root rot symptoms include a pronounced chlorosis of the leaf veins caused by root damage and girdling of the trunk. Lesions also appear on the trunk usually near the soil level (foot rot) or roots die and slough-off (root rot). Flood damage does not produce lesions. Trees with blight or citrus tristeza virus are usually randomly distributed within the grove and diagnostic tests are available to distinguish them from water-damaged trees.

Citrus trees respond physiologically to flooding long before morphological symptoms or yield reductions appear. Photosynthesis and transpiration decrease within 24 hours of flooding and remain low as flooding persists. Water uptake is also reduced. These effects eventually translate to decreased shoot growth and yields.

It is both difficult and costly to improve drainage in existing groves, so drainage problems should be eliminated when the grove area is prepared for planting by including a system of ditches, beds, and/or tiling. Growers should not depend on the slight and often unpredictable differences in rootstock tolerance to waterlogging to enable trees to perform satisfactorily in soil-saturated conditions. Trees, irrespective of scion and rootstock cultivars, should be planted using the best drainage conditions possible.

Do not disk a grove when 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 fungal invasion should be determined through soil sampling and propagule counts. If there is a Phytophthora problem, the use of certain fungicides can improve the situation.

Both surface and subsoil drainage is necessary for citrus trees grown in flatwoods areas to obtain adequate root systems. Drainage systems consist of canals, retention/detention areas, open ditches, subsurface drains, beds, water furrows, swales, and the pumps required to move the drainage water. These systems require continued good maintenance to minimize the chances of root damage from prolonged exposure to waterlogged soils following high intensity rains. Rutting in the water furrows that prevents water from efficiently moving into ditches is often a precursor to waterlogging and root damage.

Water furrows and drainage ditches should be kept free of obstruction through a good maintenance program including chemical weed control. Drainage systems should generally be designed to allow water table drawdown of 4 to 6 inches per day, which should be adequate to prevent root damage. Good drainage allows air to move into the soil and prevents oxygen-deprived conditions. Tree recovery from temporary flooding is more likely to occur with good drainage structure maintenance conditions.

Recent research work has shown that citrus greening (HLB-) infected trees are much more affected by extremes in soil moisture than trees without HLB. This stress intolerance was found to be due to a significant loss of fibrous roots. This finding makes attention to good drainage even more important because flooding could cause additional damage to root systems already weakened by HLB.

Additional information on drainage systems for citrus can be found at: http://edis.ifas.ufl.edu/ch165

PHYTOPHTHORA

Foot rot results from infection of the scion near the ground level, producing bark lesions, which extend down to the budunion on resistant rootstocks.

Crown rot results from infection of the bark below the soil line when susceptible rootstocks are used. Root rot occurs when the cortex of fibrous roots is infected, turns soft and appears water-soaked.

Fibrous roots slough their cortex leaving only white thread-like stele.

When managing Phytophthora-induced diseases, consider integration of cultural practices (e.g., disease exclusion through use of Phytophthora-free planting stock, resistant rootstocks, proper irrigation practices) and chemical control methods.

Cultural practices. Field locations not previously planted with citrus are free of citrus-specific *P. nicotianae*. Planting stock should be tested free of Phytophthora in the nursery and inspected for fibrous root rot in the nursery or grove before planting. In groves with a previous history of foot rot, consider use of Swingle citrumelo for replanting. Swingle citrumelo is resistant to foot rot and roots do not support damaging populations once trees are established.

Cleopatra mandarin should be avoided because it is prone to develop foot rot when roots are infected in the nursery or when trees are planted in flatwoods situations with high or fluctuating water tables and fine-textured soils. Trees should be planted with the budunion well-above the soil line and provided with adequate soil drainage. Overwatering, especially of young trees, promotes buildup of 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 midday irrigation schedules. Control of fire ants prevents their nesting under wraps and causing damage to tender bark.

Sampling for *P. nicotianae*. Population densities of the fungus in grove soils should be determined to assist in decisions to treat with fungicides. Soil samples containing fibrous roots should be collected during the spring through fall (March to November) from under-canopy within the tree dripline. Individual small amounts of soil from 20 to 40 locations within a 10-acre area are composited into one resealable plastic bag to retain soil moisture. Samples must be kept cool but not refrigerated for transport to the analytical laboratory. Currently, populations in excess of 10 to 15 propagules per cm^3 soil are considered damaging. The same soil sample could be tested for populations of nematodes, to assess whether they occur at damaging levels.

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, such as Cleopatra mandarin and sweet orange, 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 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. To avoid leaching from the root zone, soil-applied fungicides should not be followed by excessive irrigation.

Recommended Chemical Controls for Phytophthora Foot Rot and Root Rot include Aliette, Phostrol, ProPhyt, Ridomil, UltraFlourish, and Copper.

For more details, go to:
https://edis.ifas.ufl.edu/cg009

BROWN ROT MANAGEMENT

Management of brown rot, caused by *Phytophthora nicotianae* or *P. palmivora*, 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 be confused with fruit drop due to other causes at that time of the year. If caused by *P. nicotianae*, brown rot is limited to the lower third of the canopy because the fungus is splashed onto fruit from the soil. *P. 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. Skirting of the trees reduces the opportunity for soil-borne inoculum to contact fruit in the canopy. The edge of the herbicide strip should be maintained just inside of the dripline of the tree to minimize the exposure of bare soil to direct impact by rain. This will limit rain splash of soil onto the lower canopy. Boom application of herbicides and other operations dislodge low-hanging fruit. Fruit on the ground becomes infected and produces inoculum of *P. palmivora* that can result in brown rot infection in the canopy as early as July while fruit are still green. The beginning stages of the epidemic are very difficult to detect before the fruit are colored and showing typical symptoms. Application of residual herbicides earlier in the summer may reduce the need for post-emergence materials later and minimize fruit drop throughout this early stage of inoculum production from fallen fruit.

Usually a single application of Aliette, Phostrol or ProPhyt before the first signs of brown rot appear in late July is sufficient to protect fruit through most of the normal infection period. No more than 20 lb/acre/year of Aliette should be applied for the control of all Phytophthora diseases. Aliette, Phostrol and ProPhyt are systemic fungicides that protect against postharvest infection and provide 60-90 days control. Copper fungicides are primarily protective but are capable of killing sporangia on the fruit surface and thus reducing inoculum. They may be applied in August before or after brown rot appearance and provide protection for 45-60 days. If the rainy season is prolonged into the fall, a follow-up application of either systemic fungicides at one-half of the label rate, or copper in October may be warranted. With average quality copper products, usually 2-4 lb of metallic copper per acre are needed for control.

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.

Recommended Chemical Controls for Brown Rot of Fruit

Pesticide	FRAC MOA[2]	Mature Trees Rate/Acre[1]
Aliette WDG	P 07	5 lb
Phostrol	P 07	4.5 pints
ProPhyt	P 07	4 pints
copper fungicide	M 01	Use label rate.

[1]Lower rates may be used on smaller trees. Do not use less than minimum label rate.
[2]Mode of action class for citrus pesticides from the Fungicide Resistance Action Committee (FRAC) 2013. Refer to ENY624, Pesticide Resistance and Resistance Management, in the 2014 Florida Citrus Pest Management Guide for more details.

Rates for pesticides are given as the maximum amount required to treat mature citrus trees unless otherwise noted. To treat smaller trees with commercial application equipment including handguns, mix the per acre rate for mature trees in 250 gallons of water. Calibrate and arrange nozzles to deliver thorough distribution and treat as many acres as this volume of spray allows.

For more information, go to Florida Citrus Production Guide: Brown Rot of Fruit at:
https://edis.ifas.ufl.edu/cg022

Flatwoods Citrus

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Fax:____________________________

E-mail:____

Racial-Ethnic Background

__American Indian or native Alaskan
__Asian American
__Hispanic
__White, non-Hispanic
__Black, non-Hispanic

Gender

__Female __Male