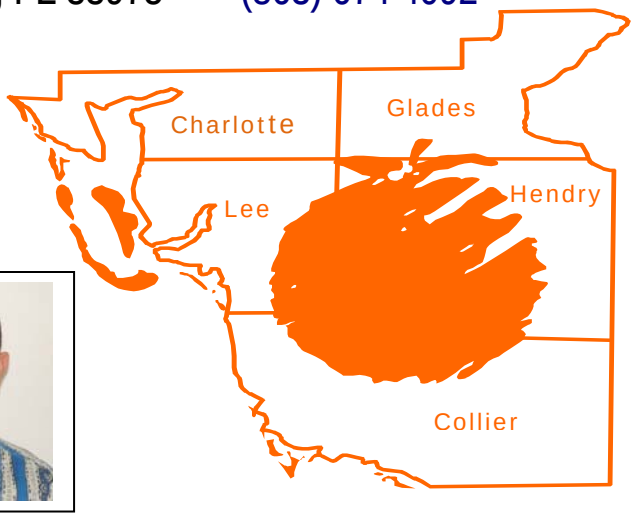
UF UNIVERSITY of FLORIDA
IFAS Extension

EXTENSION

Institute of Food and Agricultural Sciences

Hendry County Extension, P.O. Box 68, LaBelle, FL 33975 (863) 674 4092

# Flatwoods Citrus




**Vol. 19, No. 10** **October 2016**

Dr. Mongi Zekri
Multi-County Citrus Agent, SW Florida

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**Previous issues of the Flatwoods Citrus newsletter can be found at:**
**http://citrusagents.ifas.ufl.edu/agents/zekri/index.htm**
**http://irrec.ifas.ufl.edu/flcitrus/**

# Seminar

## Soil Microbes for Citrus in Relation to Citrus Greening (HLB) and Beneficial Nematodes for Diaprepes Control

Date: Thursday, October 20th, 2016
Time: **10:00 AM – 12:00 Noon**
Location: Immokalee IFAS Center
Program Coordinator: Dr. Mongi Zekri, UF-IFAS
Program Sponsor: Joe Mitchell, BASF Technical Service

### Agenda

10:00 AM – 10:55 AM. **What have we learned about citrus microbiome and its application? Dr. Nian Wang, UF-IFAS Citrus REC**

***--Citrus microbiome and HLB***
***--Beneficial bacteria and its application on disease control***
***--Plant defense inducers on HLB control***
***--Trunk injection of bactericides on HLB control***

**10:55 AM – 11:05 AM Break**

**11:05 AM – 12:00 Noon. Entomopathogenic nematodes as a component of Diaprepes root weevil IPM, Joe Mitchell, BASF Technical Service**

Entomopathogenic nematodes as part of a Diaprepes root weevil IPM program meeting, October 20th, 10:00 AM, Immokalee IFAS Center designed specifically to control Diaprepes root weevils using entomopathogenic nematodes (EPNs) have been unavailable since 2011. Because of recent high demand by growers, a product for weevil control in citrus was released last year and a second release is available this summer. To provide practical information about the use of these available EPNs for weevil control, Joe will speak on the following topics to address the use of EPNs in Florida citrus groves:

***--How do EPNs work as biological pesticides and as naturally occurring biological control agents in groves?***
***--What levels of control can be expected from using EPNs?***
***--How EPNs are applied and at what rates for optimum control?***
***--What is the best timing of application and how to integrate with other IPM tactics?***
***--What is the cost and how will we know if EPN use is profitable in groves with HLB?***

**2 CEUs for Certified Crop Advisors (CCAs)**
**2 CEUs for Pesticide License Renewal**

**12:00 Noon, Sponsored Lunch**
Lunch Sponsor: **Joe Mitchell**, **BASF** Technical Service

**Pre-registration is required**. To reserve a seat, call 863 674 4092 or send an e-mail to Dr. Mongi Zekri at: maz@ufl.edu

# Seminar

## WEATHER

Date: Wednesday, December 14th, 2016
Time: **10:00 AM – 12:00 Noon**
Location: Immokalee IFAS Center
Program Coordinator: Dr. Mongi Zekri, UF-IFAS
Program Sponsor:

Agenda

10:00 AM – 10:55 AM
Winter weather watch, freeze protection, and citrus leaf freezing information, **Chris Oswalt**, UF-IFAS

**10:55 AM – 11:05 AM Break**

11:05 AM – 12:00 Noon
FAWN management tools focusing on cold protection and irrigation scheduling, **Rick Lusher**, UF-IFAS

**2 CEUs for Certified Crop Advisors (CCAs)**

**12:00 Noon, Sponsored Lunch**

# 2016 Ridge Citrus Production School

UF/IFAS Citrus REC, BHG Hall, Lake Alfred, Florida 9:30 am – 1:00 pm

Register online at https://ridgecitrusproductionschool.eventbrite.com

*The Ridge Citrus School will be a series of educational seminars held at the UF/IFAS Citrus Research and Education Center (700 Experiment Station Road, Lake Alfred, Florida 33850). Each seminar will have speakers from throughout the state of Florida who will provide core concepts and research updates for the Florida citrus industry.*

*If you would like to register for all of the seminars, the cost will be $40.00. To receive the reduced rate, you must register by October 12, 2016.*

*Each seminar will cost $7.00 per participant. If you register for each seminar individually, the deadline to register is the Friday prior to the seminar day.*

*The registration fee will cover the costs of printed materials and refreshments. Lunch will be provided compliments of our sponsors.*

**PRESENTATIONS**

October 18: Horticulture and Engineering
New Technologies in Citrus Disease Detection and Management, Reza Ehsani, UF/IFAS CREC
Corrective Pruning to Rehabilitate HLB Affected Trees, Tripti Vashisth, UF/IFAS CREC
Plant Physiology is Not an Abstract Concept, Christopher Vincent, UF/IFAS CREC

October 25: Plant Pathology
Foliar Fungal Diseases, Megan Dewdney, UF/IFAS CREC
Root Health in Florida Citrus Trees, Evan Johnson, UF/IFAS CREC
Postbloom Fruit Drop, Megan Dewdney, UF/IFAS CREC
Citrus Tristeza Virus and *Candidatus* Liberibacter asiaticus Infection Pathways, Amit Levy, UF/IFAS CREC

November 1: Entomology
Why When and How to Manage Asian Citrus Psyllid, Phil Stansly, UF/IFAS SWFREC
Management of Asian Citrus Psyllid for Organic and Conventional Citrus, Jawwad Qureshi, UF/IFAS IRREC
Using Nematodes and Other Tactics to Manage Root Weevils, Larry Duncan, UF/IFAS CREC
Citrus Leafminer Management Practices in Citrus, Lukasz Stelinski, UF/IFAS CREC
CHMA Performance, Implementation, and Effect on the Ridge, Brandon Page, UF/IFAS CREC

November 8: Handling and Processing
Improvement of Citrus Flavor Using a Flavoromics Platform, Yu Wang, UF/IFAS CREC
Food Safety Update – FSMA's Produce Safety Rule, Michelle Danyluk, UF/IFAS CREC
Effects of Preharvest Factors and Management Practices on Citrus Fruit Quality and the Development of Postharvest Decay and Disorders, Mark Ritenour, UF/IFAS IRREC

November 15: Varieties and Rootstocks
The Importance of Rootstocks for Citrus Production in Florida, Ute Albrecht, UF/IFAS SWFREC
Progress in Developing Rootstocks for the HLB World, Jude Grosser, UF/IFAS CREC
New Scion Varieties from the UF/IFAS CREC for Florida Citrus Production, Fred Gmitter, UF/IFAS CREC

November 22: Alternative Crops
Peach Production in Florida, Tripti Vashisth, UF/IFAS CREC
Considerations for Commercial Blueberry Production in Central Florida, Jeff Williamson, UF Gainesville
Challenges to Peach Production in Florida, Jose Chaparro, UF Gainesville
Economics of Alternative Crops, Ariel Singerman, UF/IFAS CREC

November 29: Citrus Economics
Economics of Citrus: Understanding CHMA Participation Decisions, Ariel Singerman, UF/IFAS CREC
Navigating Wage/Hour Rules with and without H-2A Workers, Fritz Roka, UF/IFAS CREC
Florida Citrus Industry 2016-17 Outlook, Marissa Zansler, FDOC, Gainesville
Development of Florida's Citrus Forecast, Candi Erick, USDA-NASS

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**REGISTRATION FORM**

2016 Ridge Citrus Production School

UF/IFAS Citrus Research and Education Center, 700 Experiment Station Road, Lake Alfred, FL 33850

Submit form to: Sarah McCoy, sarahmccoy@ufl.edu Phone: 863-956-8632 Fax: 863-956-8768

**Register online at https://ridgecitrusproductionschool.eventbrite.com**

Participant Name: _____

Company Name: _____

Phone: _____ Email: _____

**Please select the days attending.**

- ☐ October 18: Horticulture and Engineering
- ☐ October 25: Plant Pathology
- ☐ November 1: Entomology
- ☐ November 8: Handling and Processing
- ☐ November 15: Varieties and Rootstocks
- ☐ November 22: Alternative Crops
- ☐ November 29: Citrus Economics

Please make checks payable to: UF

Registration fee is $7.00 per seminar day.
Payment is due the Friday before each seminar day.

A one time fee for all seminars is $40.00.
Must register by October 12, 2016.

# Citrus Nutrition Day

## Tuesday, October 11, 2016

University of Florida, IFAS, Citrus Research and Education Center
700 Experiment Station Road, Lake Alfred, Florida
Ben Hill Griffin, Jr. Hall

| | |
|---|---|
| 9:00 am | Check-in begins |
| 9:45 am | Welcome and Introductions, Michael Rogers, UF/IFAS CREC |
| 10:00 am | Getting Started with the Diagnosis and Recommendation Integrated System (DRIS) for Citrus Nutrition Decision Support, Arnold Schumann, UF/IFAS CREC |
| 10:20 am | Managing Nutrient Accumulation and Uptake Using Advanced Citrus Production Systems, Davie Kadyampakeni, UF/IFAS CREC |
| 11:00 am | Refreshment Break and visit with exhibitors |
| 11:20 am | Clues Emerging Regarding the Relationship of Nutrition and Root Health in HLB-infected trees, Jude Grosser, UF/IFAS CREC |
| 11:40 am | Foliar Fertilization for Grapefruit Production in the Indian River Region, Alan Wright, UF/IFAS IRREC |
| 12:00 pm | Lunch and visit with exhibitors |
| 1:00 pm | A Grower's Perspective on UF/IFAS Grower Nutrition Trials, Vic Story, Story Citrus |
| 1:15 pm | A Grower's Perspective of Nutrition for Fresh Grapefruit, Tom Stopyra, The Packers of Indian River, Ltd. |
| 1:45 pm | Refreshment Break and visit with exhibitors |
| 2:00 pm | UF/IFAS Grower Nutrition Trials-Update and New Trials, Tripti Vashisth, UF/IFAS CREC |
| 2:25 pm | Question and Answer; Conclude |

**Registration fee: $30.00 per person**

Complete registration form below and make checks payable to UF
---OR---
Register online at www.citrusnutritionday2016.eventbrite.com

**Pre-registration required by Tuesday, October 4, 2016**
***(Registration fee increases to $45.00 after October 4th)***

**CEUs will be requested for Restricted Use Pesticide and Certified Crop Advisors**

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## REGISTRATION FORM

Citrus Nutrition Day
Tuesday, October 11, 2016

Mail the completed registration form and check (made payable to UF) to:
Sarah McCoy, Citrus REC, 700 Experiment Station Road, Lake Alfred, Florida 33850
sarahmccoy@ufl.edu Phone: 863-956-8632 Fax: 863-956-8768
**Register online at www.citrusnutritionday2016.eventbrite.com**

Participant Name: _____

Company Name: _____

Phone: _____ Fax: _____

Email: _____

Dietary Restrictions (please circle):

Vegetarian Gluten Free Dairy Free Other: _____

***Pre-registration required by Tuesday, October 4, 2016 to avoid late registration fee***

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8:30 A.M.
CLAY SHOOT BEGINS
9:00 A.M.

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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**
**8 September 2016**

**ENSO Alert System Status: Not Active**

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**Synopsis: ENSO-Neutral conditions are slightly favored (between 55-60%) during the upcoming Northern Hemisphere fall and winter 2016-17.**

ENSO-Neutral conditions were observed over the past month, although sea surface temperatures (SSTs) were below-average over the east-central equatorial Pacific Ocean (Fig. 1). While the Niño-3.4 and Niño-3 regions remained around -0.5°C for most of the month, Niño-4 and Niño 1+2 were -0.1°C and +0.3°C, respectively, by the end of the month (Fig. 2). Subsurface temperatures across the eastern and central Pacific remained below average (Fig. 3), and negative temperature anomalies remained weak across the western Pacific (Fig. 4). Atmospheric anomalies over the tropical Pacific Ocean largely indicated ENSO-Neutral conditions. The traditional Southern Oscillation index and the equatorial Southern Oscillation index were weakly positive during August. The lower-level winds were near average, while the upper-level winds were anomalously westerly in a small region to the east of the International Date Line. Convection was suppressed over the western and central tropical Pacific, although less suppressed compared to last month (Fig. 5). Overall, the combined ocean and atmosphere system continues to reflect ENSO-Neutral.

The multi-model averages favor borderline Neutral-La Niña conditions (3-month average Niño-3.4 index less than or equal to -0.5°C) during the Northern Hemisphere fall, continuing into winter (Fig. 6). However, the more recently updated model runs from the North American Multi-Model Ensemble (NMME) more strongly favor ENSO-Neutral (Fig. 7). The forecaster consensus prefers this outcome, which is supported by the lack of significant anomalies in several indicators over the past month (winds, convection, subsurface temperatures). Overall, ENSO-Neutral conditions are slightly favored (between 55-60%) during the upcoming Northern Hemisphere fall and winter 2016-17 (click CPC/IRI consensus forecast for the chance of each outcome for each 3-month period).

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). Forecasts are also updated monthly in the Forecast Forum of CPC's Climate Diagnostics Bulletin. Additional perspectives and analysis are also available in an ENSO blog. The next ENSO Diagnostics Discussion is scheduled for 13 October 2016. 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.

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

# ALGAE

UF UNIVERSITY of FLORIDA
IFAS Extension

## Algae are in the plant kingdom, but maybe they're not really plants!

In Florida's freshwaters, algae are what make the water green, or even "slimy". However, green water is not necessarily undesirable, and neither are algae. In fact, algae are essential to the ecosystem and to life as we know it, and must be treated with respect.

**Algae are a diverse group of organisms,** which survive in all different types of habitats. They range in size from microscopic to meters in length and in complexity from single-celled to complex organisms that would rival even large plants. Though these organisms may look like the true, "higher", plants, they are anything but, since they do not have roots or true stems and leaves.

**Algae are one of the first steps of the food web.** There are microscopic algae, like phytoplankton, and there are macroalgae, algae that can be seen by the naked eye. Algae occur naturally in all types of systems and may be considered indicators of ecosystem condition. Even the mere presence of a species can give an indication of the amount and type of nutrients that run through the system. Algae provide food for all types of animals, including fish, insects, mollusks, zooplankton (microscopic animals), and humans.

### What causes an algae bloom?

**At times algae can grow so quickly and densely that they form a "bloom".** Many people don't like the "look" of a bloom, though blooms can be a natural occurrence. Blooms are not necessarily green, though that is the most common color. They can be blue-green, brown, red, and even violet.

Some blooms turn the water a certain color; this is usually a bloom associated with phytoplankton (microscopic algae). Other blooms form clumps or mats that float on top of the water, or that grow attached to the bottom or to plants. Still others can form dense mats that cover the water surface. Algae need nutrients, such as nitrogen and phosphorous, and light to grow. The level of growth or productivity is often dependent on the amount of nutrients in a system. There is a classification for productivity of a system; it ranges from oligotrophic (low productivity and nutrients) to hypereutrophic (very high nutrients). Also, since algae need light to photosynthesize, how far light penetrates the water is also another limiting factor.

Blooms can have far reaching effects on the environment. Some can become so dense they can ultimately cause a problem with low oxygen levels. A decrease in oxygen causes hypoxia (low oxygen) or anoxia (no oxygen) and the other organisms in the water that need oxygen to survive, such as fish, become stressed and may die. Other

blooms may release toxins that can be harmful to animals.

There is a general consensus that rapidly growing human development, and increased human use and disposal of nutrients over the past few centuries, has increased the frequency and intensity of algal blooms in many regions of the world. This has created a global effort to control harmful blooms.

## Controlling blooms

**The most direct way to control blooms** is to reduce the availability of nutrients. Most water management organizations throughout the world are actively pursuing a variety of nutrient control strategies. However, for some aquatic ecosystems nutrient control is impractical, ineffective or simply too costly. For some cases chemical or biological treatments can be helpful alternatives.

### Chemical Treatments

**Copper sulfate** (bluestone) and **chelated copper compounds** such as Cutrine-Plus, Algae Pro, and K-TEA, as well as Endothall are common chemical treatments used to kill algae. Chemical compounds that shade out the light for algae growth, e.g. Aquashade, are also used to control blooms. Each chemical has its own restrictions and toxicity to animals. Read the directions carefully before application.

### Biological Treatments

The main biological treatment that is employed today is the use of various carp fish species to control submersed and floating algae. **Grass carp** (*Ctenopharyngodon idella*) is mainly used for aquatic weeds and attached submersed algae, such as *Nitella* sp., and *Chara* sp. Where they do not prefer filamentous algae to eat, grass carp will eat *Lyngbya*. The **silver carp** (*Hypophthalmichthys molitrix*) has been shown to be an effective treatment for controlling filamentous algae, including blue-green algae.

Both species are non-native species and there are many restrictions to employing them as a means of weed control; some states prohibit their use altogether. When they are allowed, the use is restricted to **triploid carp**. Triploid carp have an extra set of chromosomes that render the fish sterile, therefore prohibiting a population explosion if the fish escapes into an uncontrolled area.

### Physical Treatments

Physical treatments for algae in ponds include aeration and airlifts. While aeration does not kill or remove algae from the water, it oxygenates and stirs the water column, and can create conditions to shift from toxic and smelly blue-green algae to preferred green algae species. The resultant algal population is usually not as dense or as toxic to other organisms in the ponds.

### Mechanical Treatments

Harvesters are sometimes used to skim dense mats of blue-green lyngbya alga from the surface of lakes and rivers. Lyngbya normally grows in dense mats at the bottoms of nutrient enriched lakes. These mats produce gasses during photosynthesis that often causes the mats to rise to the surface. At the surface, winds pile the algal mats against shorelines or in navigation channels; these mats can be several acres in size. Managers have developed a process called "grubbing" whereby harvesting machines lift the mats off of submersed plants such as native eelgrass, without cutting the eelgrass. By removing the blanket of lyngbya from the eelgrass, the plants grow and expand. Eelgrass is an important food source for manatees in the Crystal and Homossassa Rivers.

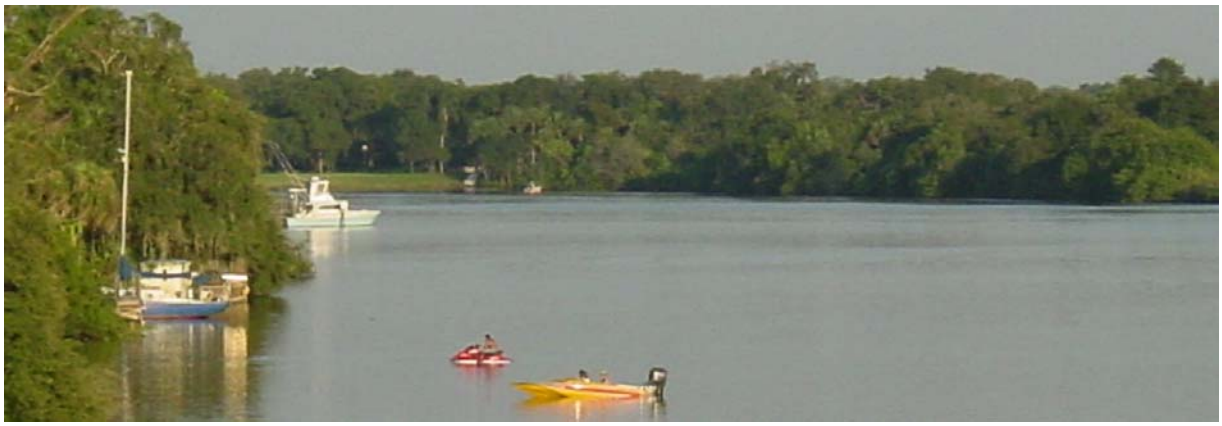
## WHERE FLORIDA'S WATER COMES FROM?

### Please be active in conserving and protecting our waters

Average annual rainfall in Florida is 53 inches, making it one of the wettest states in the nation. The state's differing climate types yield much rainfall variability from region-to-region and from year-to-year. In central and South Florida, most of the rain falls during four summer months and much of the annual amount is "lost" to the natural hydrologic system through evaporation. The region is prone to wide weather extremes of flood and drought.

Nearly two-thirds of Florida's freshwater use is pumped from vast underground reservoirs called aquifers. Of Florida's groundwater sources, the deep Floridan Aquifer, which spans the majority of the state, supplies 62%; the shallower Biscayne Aquifer (underlying most of Miami-Dade and Broward and portions of Palm Beach and Monroe counties), provides 17%; the remaining 21% is supplied by surficial and intermediate unnamed aquifers. The state's remaining freshwater is supplied from surface waters, including lakes and rivers.

In South Florida, approximately 90% of the water used in homes and businesses comes from groundwater sources. The remaining 10% comes from surface waters. Both surface and groundwater supplies are highly dependent on rainfall for replenishment.



At the heart of the South Florida system sits Lake Okeechobee – the largest natural water body in the southeastern United States. It serves as a source of public water supply for the City of Okeechobee (16,000 utility customers) and provides a supplemental source of irrigation water to more than 700,000 acres in agricultural production. In addition, it serves as the backup water supply for more than five million residents. The massive lake also plays a critical environmental and economic role as a sport and commercial fishery, navigation/recreation waterway and natural habitat for fish, wading birds and other wildlife, including a variety of endangered and threatened species.

While heavy rainfall throughout South Florida benefits and recharges underground supplies, the ability to capture and store the rainwater for future use is extremely limited. When floods threaten – even during water shortage situations – the top priority is channeling the excess water away from homes and businesses as quickly as possible. To lower the levels in coastal canals and accommodate direct rainfall and stormwater runoff, freshwater must oftentimes be released to the ocean or gulf.

The demand for water by growing urban populations and agricultural operations in South Florida is expected to increase significantly in the coming decades. Meeting the growing need for water hinges on our efforts to develop region-specific sources that offer an alternative to traditional ground water and surface water. Alternative water sources are important to Florida's future. They also help to make communities less susceptible to the effects of drought.

Developing alternative water sources diversifies our supply while reducing our dependence on fresh water resources. Examples of Alternative Water Supply are:

- saltwater and brackish water
- water reuse
- surface water captured predominately during heavy rainfalls
- sources made available through the addition of new storage capacity
- stormwater (for use by a consumptive use permittee)
- any other source designated as nontraditional in a regional water supply plan

To address the challenge of ensuring the state's current and future water supply, the 2005 Florida Legislature enacted the Water Protection and Sustainability Program. This precedent-setting law encourages cooperation between municipalities, counties and the state's five water management districts to protect and develop water supplies in a sustainable manner. Water management districts are promoting and supporting local government alternative water supply projects that support smart growth and reduce the use of fresh ground and surface water supplies, such as aquifers and lakes for a sustainable future.

Water reuse plays an important role in water resource, wastewater and ecosystem management in Florida. When reclaimed water is used, it eases the demand on traditional, often limited, sources of water. By recycling or reusing water, communities can still grow while minimizing or even reducing their impact on the water resources around them.

Water reuse involves using highly treated domestic wastewater for a new purpose. Reclaimed water systems are continually monitored to ensure the health and welfare of the public and the environment are protected.

Using reclaimed water also reduces discharges to surface waters, recharges ground water and postpones costly capital investments in the development of new, more costly water sources and supplies. Reclaimed water is an excellent water source for:

--Irrigating golf courses, residences, highway and street medians and other landscaped areas
--Meeting urban demands for water to wash cars, flush toilets and maintain ponds and fountains
--Meeting industrial and commercial demands for water at power plants and for processing needs
--Irrigating food crops, such as citrus, and irrigating other crops and pastures for livestock
--Creating wetlands and enhancing restoration
--Recharging groundwater

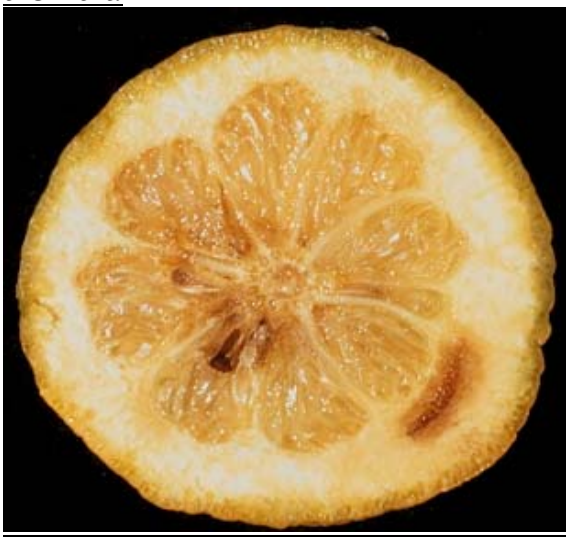
# FALL NUTRITION OF CITRUS TREES

To increase fertilizer efficiency, soil and leaf analysis data should be studied and taken into consideration when generating a fertilizer program and selecting a fertilizer formulation. Dry fertilizer application should be split into 3 to 4 applications per year with a **complete balanced fertilizer**. Based on tree demands, 1/4 to 1/3 of the yearly fertilizer amount should be applied in the fall to satisfy vegetative growth demand. However, late fall fertilizer applications may delay fruit color development and fruit maturity for early season tangerine cultivars.

## Boron (B)

Boron is particularly necessary where active cell division is taking place. Boron plays an important role in flowering, pollen-tube growth, fruiting processes, nitrogen (N) metabolism, and hormone activity. Florida sandy soils are low in B, and a deficiency of this element in citrus occasionally occurs under field conditions. The deficiency may be aggravated by severe drought conditions, heavy lime applications or irrigation with alkaline water, and by citrus greening. Boron is very mobile in the soil profile of sandy soils and readily leaches by rainfall or excess irrigation.

Boron deficiency is known as "hard fruit" because the fruit is hard, low in juice content, and even dry due to lumps in the rind caused by gum impregnation. The chief fruit symptoms include premature shedding of young fruits. Such fruit have brownish discoloration in the white portion of the rind (albedo), described as gum pockets or impregnations of the tissue with gum and unusually thick albedo. Older fruit are undersized, lumpy, misshaped with an unusually thick albedo containing gum deposits. Affected fruit is low in sugar content. Seed fails to develop and gum deposits are common around the axis of the fruit.



The first visual symptoms of B deficiency are generally the death of the terminal growing point of the main stem. Further symptoms are a slight thickening of the leaves, a tendency for the leaves to curl downward at right angles to the midrib, and sometimes chlorosis. Young leaves show small water soaked spots or flecks becoming translucent as the leaves mature. Leaves of boron deficient citrus trees exhibit vein corking and enlargement.

Associated with this is a premature shedding of leaves starting in the tops of the trees and soon leaving the tops almost completely defoliated. Fruit symptoms

appear to be the most constant and reliable tool for diagnostic purposes.

To treat citrus affected with B deficiency, B compounds can be applied either foliarly or in the fertilizer. As a maintenance program, apply B in the fertilizer at an annual rate equivalent to 1/250 of the N rate. In Florida, foliar spray applications have been found much safer and more efficient than soil application. Soil applications frequently fail to give satisfactory results during dry falls and springs and may result in toxicity problems if made during the summer rainy season. Boron solubility in the soil is reduced at soil pHs below 5 and above 7. Foliar spray may be applied during the dormant period through post bloom and in the fall. Boron does not move very readily from parts of the tree to others. For maintenance spray application, 0.25 lb/acre of B may be used. Boron levels in the leaf tissue should not drop below 40 ppm or exceed 120 ppm (dry wt basis). Where deficiency symptoms are present, double the amount suggested. Use care not to apply more than the recommended amount because it is easy to go from deficiency to excess.

## MAGNESIUM NUTRITION

In Florida, magnesium (Mg) deficiency is commonly referred to as "bronzing". Trees with inadequate Mg supply may have no symptoms in the spring growth flush, but leaf symptoms will develop as the leaves age and the fruit expand and mature in the summer and fall. Magnesium deficiency symptoms occur on mature leaves following the removal of Mg to satisfy fruit requirements. During the summer, when a rapid increase in fruit size occurs, the symptoms appear on leaves close to the developing fruit. Magnesium deficiency symptoms appear as a result of translocation of Mg from the leaves to the developing fruit, although there may also be a translocation from older leaves to young developing leaves on the same shoot.

Disconnected yellow areas or irregular yellow blotches start near the base along the midribs of mature leaves that are close to fruit. They become gradually larger and eventually coalesce to form a large area of yellow tissue on each side of the midrib. This yellow area enlarges until only the tip and the base of the leaf are green, showing an inverted V-shaped area pointed on the midrib.

In acute deficiency, the yellow area may gradually enlarge until the entire leaf becomes yellow or bronze in color.

Leaves that have lost most of their green color due to Mg deficiency drop freely under unfavorable conditions. Defoliated twigs become weak and usually die by the following spring. Severe defoliation will reduce the average size of individual fruit

and cause a general decline in fruit production. In Florida, Mg deficiency in citrus is caused primarily by low levels of Mg on acid light sandy soils and on calcareous soils. Leaching of added Mg is particularly serious and substantially rapid when the soil pH is 4.5 to 5.0. Under such conditions, the use of dolomite to bring the pH to 6.0 will furnish Mg at the same time.

FIXING Mg DEFICIENCY

Soil application of Mg sulfate or oxide to provide 50-60 lbs of Mg per acre can be successful in correcting Mg deficiency when the soil pH is adjusted. Under calcareous soils, the amounts of Mg applied must be greater than those applied on soils low in calcium or potassium. Foliar spray applications of Mg nitrate (3-5 gallons/acre) can be effective when applied on major flush leaves when they are about fully expanded. Remember that Magnesium should be applied regularly at 1/5 (or 20%) of the N rate unless leaf analysis shows more than 0.50% Mg. If leaf Mg deficiency symptoms occur, Mg should be applied in the fertilizer, and the rate should be increased up to 30% of the N rate until symptoms are no longer present in mature leaves of subsequent flushes.

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## For more information on citrus nutrition, **go to the following EDIS publications:**

Increasing Efficiency and Reducing Costs of Citrus Nutritional Programs
Mongi Zekri, Thomas Obreza and Arnold Schumann [pdf]

**Zekri, M**. and T.A. Obreza. Boron and chlorine for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS61900.pdf

**Zekri, M**. and T.A. Obreza. Molybdenum and nickel for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS61800.pdf

**Zekri, M**. and T.A. Obreza. Iron and copper for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS61700.pdf

**Zekri, M**. and T.A. Obreza. Manganese and zinc for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS61600.pdf

**Zekri, M**. and T.A. Obreza. Nitrogen (N) for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58000.pdf

**Zekri, M**. and T.A. Obreza. Phosphorus (P) for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58100.pdf

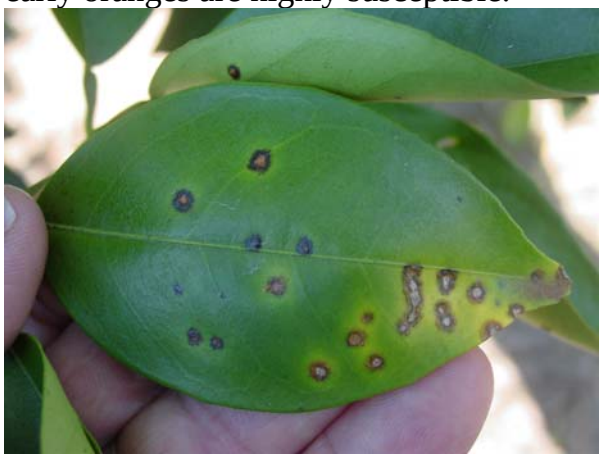
**Zekri, M**. and T.A. Obreza. Potassium (K) for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58300.pdf

**Zekri, M**. and T.A. Obreza. Magnesium (Mg) for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58200.pdf

**Zekri, M**. and T.A. Obreza. Calcium (Ca) and sulfur (S) for citrus trees.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58400.pdf

# Citrus Canker is still a devastating problem

Citrus canker is a serious bacterial disease that affects citrus. Grapefruit and some early oranges are highly susceptible.



Major outbreaks of citrus canker occur when new shoots are emerging or when fruit are in the early stages of development. Frequent rainfall in warm weather, especially during storms, contributes to disease development. Citrus canker is mostly a leaf-spotting and fruit rind-blemishing disease, but when conditions are highly favorable for infection, it causes defoliation, shoot die-back, and fruit drop. When feeding galleries of Asian leafminer on leaves, stems, and fruit become contaminated with the bacterium, the number and size of individual lesions greatly increases and results in tremendous inoculum production.

Canker is more severe on the side of the tree exposed to wind-driven rain. Spread over longer distances can occur during severe tropical storms, hurricanes, and tornadoes. Workers can carry bacteria from one location to another on hands, clothes, and equipment. Grove equipment spreads the bacteria in blocks within groves, especially when trees are wet. The entire state of Florida has been under quarantine, and fruit movement is subject to specific regulations based on market destination.

***Windbreaks.*** Windbreaks are highly effective in reducing the spread of canker, but more importantly, they reduce the severity of the infection in endemic situations. The vast majority of the infection occurs by wind-blown rains. Winds of 18 to 20 mph are needed to actually force bacteria into the stomates on leaves and fruit. Windbreaks are the single most effective means of dealing with canker. To be effective for canker control, windbreaks need not to be dense. All that is required is to reduce wind speed to less than 20 mph.
It is recommended that growers plant windbreaks along fence lines, ditches, around wetlands, or wherever they can plant without removing citrus trees. If it becomes obvious that more windbreak protection is needed, rows of citrus or end trees can be removed to accommodate windbreaks.

***Copper sprays.*** Copper products are quite effective in preventing infection of fruit, less effective for reducing leaf infection, and have limited value in reducing spread of the disease. Application of copper to young leaves protects against infection, but protection is soon lost due to rapid

expansion of the surface area. Fruit grows more slowly and is easier to protect. Copper usage should be minimized since this metal accumulates in soil and may cause phytotoxicity and creates environmental concerns.

***Leafminer control.*** The citrus leafminer does not spread canker, but extensive infestation by leafminer greatly increases canker inoculum levels making the disease difficult to control.

The Citrus Leafminer

Citrus leafminer greatly exacerbates the severity of citrus canker caused by *Xanthomonas axonopodis* pv. *citri*. This insect is not a vector of the disease. Nevertheless, leafminer tunnels are susceptible to infection much longer than mechanical wounds. Tunnels infected by canker produce many times the amount of inoculum than in the absence of leafminer. Control of leafminer should be optimized in areas where infection by canker is high.

***Leafminer Management***

*Nonbearing Trees*

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 with Imidacloprid (Admire), Clothianidin (Belay) or Thiamethoxam (Platinum) have been shown to provide 8 weeks control of leafminer.

Soil applications of soil-systemic insecticides should be made about 2 weeks prior to leaf expansion to allow time for the pesticide to move from the roots to the canopy. Avoid applications 24 hours prior to significant rainfall events which will result in movement of the product out of the root zone before it can be taken up by the plant. Foliar sprays can be used on small trees to reduce leafminer damage.

*Bearing Trees*

If canker is present in a grove (or in a nearby grove), healthy trees with leafminer damaged leaves are more likely to become sites for new canker infection. The only products currently available for leafminer control on large trees are foliar insecticide sprays. While there are a number of products that are effective for controlling leafminer, achieving control of leafminer using foliar sprays on large trees is difficult due to the unsynchronized flush typically encountered during the summer period when leafminer populations are at their highest levels.

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:**

**http://www.crec.ifas.ufl.edu/extension/pest/PDF/2016/ACP%20and%20Leafminer.pdf**

**http://www.crec.ifas.ufl.edu/extension/pest/PDF/2016/Canker.pdf**

# CITRUS BLACK SPOT Quarantine Area Keeps Expanding

## History of Citrus Black Spot

Citrus black spot, caused by the fungal pathogen *Guignardia citricarpa* (sexual stage) and *Phyllosticta citricarpa* (asexual stage), was first found in southwest Florida in March 2010. Around the world, black spot can be found in Argentina, Australia, Brazil, China, Ghana, Mozambique, Philippines, South Africa, Sub-Saharan Africa, Taiwan and other regions of South America.

## Fruit Symptoms

Black spot symptoms occur in several forms called hard spot, cracked spot, false melanose and virulent spot which are described below.
Hard spot is the most common and diagnostic symptom. The lesions are small, round, sunken with gray centers and brick-red to chocolate brown margins. Green halos are often seen around hard spot lesions. Fungal structures appear as slightly elevated black dots in the center of lesions. They appear as fruit begins to color where light exposure is greatest.
False melanose is observed as numerous small, slightly raised lesions that can be tan to dark brown. It may occur on green fruit and does not have pycnidia (fungal structures). False melanose may become hard spot later in the season.

Cracked spot has large, flat, dark brown lesions with raised cracks on their surface. It is thought to be caused by an interaction between the pathogen and rust mites. It occurs on green as well as mature fruit and can become hard spot later in the season.

Early virulent spot, also known as freckle spot, has small reddish irregularly shaped lesions. It occurs on mature fruit as well as post-harvest in storage. It can develop into either virulent spot or hard spot. Virulent spot is caused by the expansion and/or fusion of other lesions covering most of the fruit surface toward the end of the season. Many fungal structures can be found in these lesions.
Severely affected fruit can drop before harvest causing significant yield loss.

## Leaf and Stem Symptoms

Leaf and stem symptoms are not as common as fruit symptoms. They are most commonly found on lemons, a very susceptible species.

## Regulations

Stipulations for Movement of Citrus Fruit from EAN Regulated Areas for Citrus Black Spot PDF
More information will be added as it becomes available. However, for most up-to-date information from regulatory agencies, please contact the Florida Division of Plant Industry 863-298-7777.

## Spread

•Wind-borne ascospores are forcibly ejected from fungal fruiting bodies embedded in leaves in the leaf litter under trees and are carried by air currents, approximately 75 feet (25 meters) from leaf litter.
•Rain splash may also move spores from infected fruit (conidia) and/or leaf litter (conidia and ascospores), but moves the spores only a few inches (centimeters).
•Live leaves that have latent infections (infections that are not visible) are common means of long distance spread. These often are moved as trash in loads of fruit.
•Infected nursery stock is another potential means of spread. This can occur very easily since these latent infections cannot be seen in otherwise healthy-looking trees.
•Leaf litter movement may be either by wind or human activities
•Humans are the main form of long distance movement

## Diagnostics

If you suspect you may have black spot, please contact your local CHRP office for further diagnostic testing.

## Management

•Always plant clean, certified nursery stock. Keeping nursery stock clean is much easier with the new covered nursery regulations but black spot is still a threat. This will help prevent movement of black spot and other diseases into newly established grove plantings.
•Increase air flow in grove to reduce leaf wetness where possible. *G. citricarpa* needs 24-48 hours of leaf wetness for spore germination and infection as do many other fungal diseases.
•Reduce leaf litter on grove floor to decrease ascospore load through enhanced microsprinkler irrigation.
•Fungicides registered for citrus in Florida that have been found effective in other countries:
-Copper products (all formulations have been found to be equivalent)
-Strobilurins fungicides are also useful and approved.
•The best fungicide application method is with air blast sprayer. Aerial applications are not likely to get adequate canopy penetration for control. It is important that the leaves and fruit are covered with fungicide.
•For enhanced coverage, increase the gallons used to 250 gallons/acre for applications to ensure full coverage.
•Strategies for Effective Eradication of Citrus Black Spot in Collier and Hendry Collier

## Links

Florida Division of Plant Industry Citrus Black Spot Updates website
USDA Press Release-English PDF
USDA Press Release-Spanish PDF
Florida Division of Plant Industry Pest Alert PDF
Fungicide resistance: Why it happens and how it may affect you. Citrus Industry, March 2010 PDF
Citrus black spot. Citrus Industry, January 2010 PDF

•It is important to get good canopy coverage with fungicides for black spot control. To ensure complete coverage consider using a spray volume of 250 gallons per acre.
•Leaf litter management is also an important tool for black spot management since the primary spores are produced in the litter like greasy spot. The measures described below have shown to effectively reduce greasy spot inoculum, although not enough to eliminate fungicide applications.
•Urea (20.8 lb/treated acre) through the herbicide boom or ammonium sulfate (561 lb/acre) application will reduce the number of fungal structures and spore production.
•Enhanced irrigation with microsprinkler five times a week starting mid-March and continuing until litter is decomposed.

## Resources

If you would like to obtain laminated identification sheets or copies of the other various educational materials, please contact your citrus extension agent or Jamie Yates, 863-956-1151 ext. 1302 or jdyates@crec.ifas.ufl.edu.
Citrus Black Spot ID Sheet PDF
Citrus Black Spot Management Timing Schedule PDF
Citrus Black Spot Poster for Growers (18 x 27) PDF
Citrus Black Spot Poster for Packinghouses (32 x 26) PDF

## Recommended Chemical Controls

Monthly fungicide applications of copper and/or strobilurins (Abound, Gem, or Headline) will be needed from early May to mid-September to control black spot. If there is substantial rain in April, starting fungicide applications in April is advised. Our fungicide recommendations have been based on efficacy data from trials in other countries with black spot and products registered for use on citrus in Florida. Field testing in Florida of fungicides including Abound, copper-based products, Enable, Gem, Headline, Pristine, and Quadris Top indicate that all of these fungicides can be useful in a fungicide program. Since only four strobilurin fungicides can be used in a season for any purpose, it is recommended for fresh fruit to reserve strobilurin fungicides for times when phytotoxicity from copper applications is a concern (temperatures >94°F). For processing fruit, strobilurins can be used earlier in the season and applications combined for greasy spot and melanose. It is recommended that strobilurin fungicides not be applied in two consecutive sprays to manage pathogen resistance and rotated with a fungicide containing another mode of action.

READ THE LABEL. See Table 1.
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.

**TABLE 1. RECOMMENDED CHEMICAL CONTROLS FOR CITRUS BLACK SPOT**

| Pesticide | FRAC MOA[2] | Mature Trees Rate/Acre[1] |
|---|---|---|
| copper fungicide | M1 | Use label rate. |
| Abound[3] | 11 | 9.0-15.5 fl oz. Do not apply more than 92.3 fl oz/acre/season for all uses. Best applied with petroleum oil. |
| Enable 2F[4] | 3 | 8.0 fl/oz. Do not apply more than 24 oz/acre/season |
| Gem 500 SC[3] | 11 | 1.9-3.8 fl oz. Do not apply more than 15.2 fl oz/acre/season for all uses. Best applied with petroleum oil. Do not apply within 7 days of harvest. |
| Headline SC[3] | 11 | 12-15 fl oz. Do not apply more than 54 fl oz/acre/season for all uses. Best applied with petroleum oil. |
| Pristine[3,4] | 11 + 7 | 16-18.5 oz. No more than 74 oz/acre/season |
| Quadris Top[3,4] | 11 + 3 | 15.4 fl oz. Do not apply more than 61.5 fl oz/acre/year |

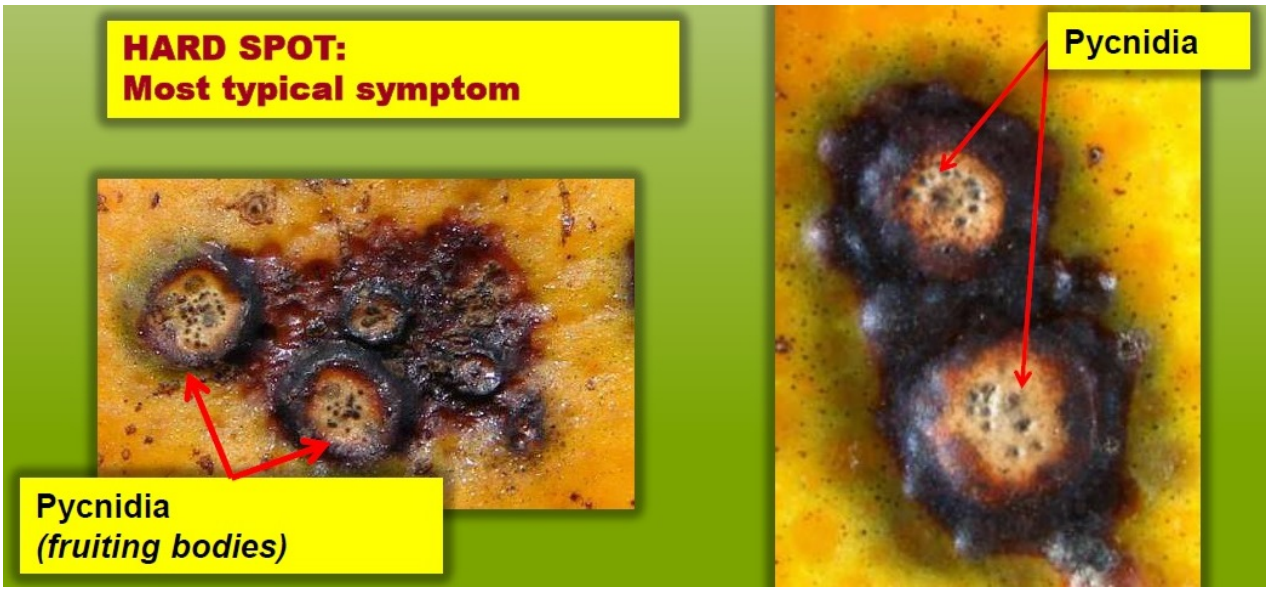
[1] Lower rates can be used on smaller trees. Do not use less than minimum label rate.

[2] Mode of action class for citrus pesticides from the Fungicide Resistance Action Committee (FRAC) 2014. Refer to ENY624, Pesticide Resistance and Resistance Management, in the 2015 Florida Citrus Pest Management Guide for more details.

[3] Do not use more than 4 applications of strobilurin fungicides/season. Do not make more than 2 sequential applications of strobilurin fungicides.

[4] Do not make more than 4 applications of Pristine or Quadris Top/season. Do not make more than 2 sequential applications of Pristine or Quadris Top before alternating to a non-strobilurin, SDHI or DMI

http://www.crec.ifas.ufl.edu/extension/pest/PDF/2016/Citrus%20Black%20Spot.pdf



PERC Pesticide Educational Resources Collaborative

# How to Comply With the 2015 Revised Worker Protection Standard For Agricultural Pesticides

## What Owners and Employers Need To Know

EPA in conjunction with the Pesticide Educational Resources Collaborative (PERC) is making available a guide to help users of agricultural pesticides comply with the requirements of the 2015 revised federal Worker Protection Standard. You should read this manual if you employ agricultural workers or handlers, are involved in the production of agricultural plants as an owner/manager of an agricultural establishment or a commercial (for-hire) pesticide handling establishment, or work as a crop advisor.

This "How to Comply" manual includes:

- Details to help you determine if the WPS requirements apply to you.
- Information on how to comply with the WPS requirements, including exemptions, exceptions, restrictions, options, and examples.
- "Quick Reference Guide"- a list of the basic requirements (excluding exemptions, exceptions, etc.).
- New or revised definitions that may affect your WPS responsibilities.
- Explanations to help you better understand the WPS requirements and how they may apply to you.

This updated 2016 WPS How to Comply Manual supersedes the 2005 version. Changes to the standard have made the 2005 version obsolete.

## ***How to Comply with the Worker Protection Standard for Agricultural Pesticides (146 pp, 3 MB)***

The following documents are the individual chapters and appendixes of the manual.

### Table of Contents



The Pesticide Educational Resources Collaborative is a cooperative agreement (agreement #X8-83616301) between the U.S. EPA's Office of Pesticide Programs and University of California Davis Extension, in collaboration with Oregon State University.

# FLATWOODS CITRUS NEWSLETTER EVALUATION FORM

**Please take a moment to rate the quality and usefulness of the information presented in the Flatwoods Citrus newsletter. Please send back the form to:**

**Dr. Mongi Zekri**
**University of Florida, IFAS**
**Hendry County Extension Office**
**P.O. Box 68**
**LaBelle, FL 33975**
**or Fax to 863 674 4636 or E-mail to maz@ufl.edu** **Thank you for your input!!!**

**Please circle or bold your answer**

| | | | | |
|---|---|---|---|---|
| 1 | Was the information up to date and accurate? | Yes | No | Uncertain |
| 2 | Was the information delivered on time to be useful? | Yes | No | Uncertain |
| 3 | Was the information relevant to your situation? | Yes | No | Uncertain |
| 4 | Was the information easy to understand? | Yes | No | Uncertain |
| 5 | Have you had an opportunity to use the information? | Yes | No | Uncertain |
| 6 | Have you shared the information with someone else? | Yes | No | Uncertain |

7 Overall, how do you feel about the Flatwoods Citrus Newsletter?

Satisfied Neither Satisfied Nor Dissatisfied Dissatisfied

8 **Do you have any suggestions that might improve the newsletter?**

**(Please write in any comments)**

9. How many years have you been using the Extension Service? _____ Years

10. What is your employment status?

| | | |
|---|---|---|
| _____ Grower | ____ Chemical Industry | ____ Service Provider |
| _____ Production Manager | ____ Regulator | ____ University |
| _____ Consultant | ____ Association | Other _____ |

We appreciate your reactions and the time you have given us. Thank you, and please contact us when we may be of service to you.

# Flatwoods Citrus

☐ If you did not receive the ***Flatwoods Citrus*** newsletter and would like to be on our mailing list, please check this box and complete the information requested below.

☐ If you wish to be removed from our mailing list, please check this box and complete the information requested below.

Please send: Dr. Mongi Zekri
Multi-County Citrus Agent
Hendry County Extension Office
P.O. Box 68
LaBelle, FL 33975

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Subscriber's Name:_____

Company:_____

Address:_____

City:_____State:_____Zip:_____

Phone:_____

Fax:_____

E-mail:_____

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## ***Racial-Ethnic Background***

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

## ***Gender***

__Female
__Male