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Institute of Food and Agricultural Sciences

Hendry County Extension • P.O. Box 68 • LaBelle, Florida 33975-0068 • (941) 674-4092

# Flatwoods Citrus



Vol. 5, No. 9 September 2002

Dr. Mongi Zekri, Multi-County Citrus Agent

## UPCOMING EVENTS

### *Seminar at the Hendry County Extension Office, LaBelle*

Tuesday, September 17, 2002, 10:00 AM – 12:00 Noon

Title: **Brown Rot, other Phytophthora diseases, and bark scaling**

Speaker: Drs. Jim Graham and Pam Roberts

2 CEUs for Pesticide License Renewal

2 CEUs for Certified Crop Advisors

Sponsor: Larry McCauley, Griffin LLC

**Following the seminar, we are planning a free lunch**

**(Compliments of Griffin LLC) for only who call Sheila at 863 674 4092 no later than Friday, 13 September.**



### **Annual meeting of the Florida Associations of Extension Professionals (FAEP)**

Date: Sept. 9-12, 2002, Location: Bay Point Marriott in Panama City Beach

### **Annual meeting of the Interamerican Society for Tropical**

**Horticulture, Date:** October 6-11, 2002, **Location:** Tegucigalpa, Honduras

Contact Dr. Richard Campbell at Fax: 305 665 8032, E-mail: [rcampbell@fairchildgarden.org](mailto:rcampbell@fairchildgarden.org)

**If you want to print a color copy of the Flatwoods Citrus Newsletter, get to the Florida Citrus Resources Site at**

**<http://www.fcprac.ifas.ufl.edu/>**

**You can also find all you need and all links to the University of Florida Citrus Extension and the Florida Citrus Industry**

**Tuesday, September 17, 2002, 12:00 AM – 1:00 AM (Lunchtime)**

Location: Hendry County Extension Office, LaBelle

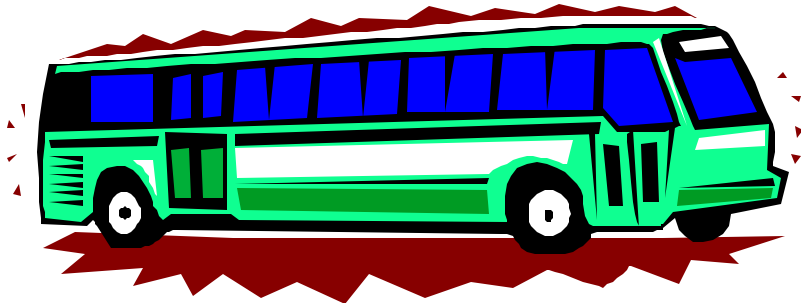
Title: **Association of Farmworker Opportunity Programs: Public Education on Child Labor Topics**

Speaker: **Ms. Jacqueline DeCarlo, M.S.**

There are many perspectives on child labor depending on occupation, crop interest, culture, location, and other factors. Ms. DeCarlo is directing a DOL funded program designed to engage with employers, farmworkers, and the general public on this topic. She would like to solicit viewpoints and perspectives, share information, and build understanding.

**Following the Brown rot seminar, individuals who can participate in a focus group during lunch will receive a commemorative Washington, D.C. souvenir, \$25 value.**

## **Hendry County Extension Ag Tour**



**Date:** Saturday, 7 December 2002

For more information, call Inez at 863 674 4092

## ***Pesticide Applicator's License Training***



Please take note of the upcoming opportunities for **obtaining a pesticide applicator's license** and/or earning CEUs for renewing a commercial/public pesticide applicator license for the Tree Crops, Row Crops, and Aquatic Categories on Wednesday and Thursday, 18 & 19 September 2002.

This program will be held at the Hendry County Extension Office in LaBelle. For more information, call 863 674 4092.

Special Thanks to the following  
sponsors of the Flatwoods Citrus  
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contribution and support. If you  
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## **THE CITRUS LEAFMINER**

The citrus leafminer can occur on new flush throughout the growing season, but usually is not a problem in the winter and early spring and does not affect the first spring flush.



## **THE CITRUS PSYLLID**

The citrus psyllid is a problem all year long. The citrus psyllid has a very high reproductive rate. Multiple, overlapping generations can lead to very high populations causing severe damage to leaves and shoots.



## **THE CITRUS LEAFMINER & THE CITRUS PSYLLID**

The citrus leafminer and the citrus psyllid do not significantly affect growth and yield of mature trees. However because of their frequent flushes, nursery stocks, resets, and young trees are very vulnerable to severe damage. So far, native natural enemies and imported parasitoids have not suppressed pest populations to a non-economic level. Residual activity of most pesticides is limited by rapid and frequent appearance of new and unprotected flushes so that 3-week control is the best that can be expected. Therefore, scouting is necessary to determine peak periods to increase the efficacy of chemicals. It is recommended to use pesticides that can help suppress the citrus leafminer and the citrus psyllid, but not disrupt natural enemies of citrus pests. Oil has a number of advantages over conventional pesticides because it is less disruptive to natural enemies, has a low toxicity to vertebrates, breaks down readily in the environment and insects do not develop resistance to it. Since the citrus leafminer and the psyllid affect only the new flush leaves, coverage of the peripheral leaves in the canopy should be adequate. Petroleum oil at 3 to 5% concentrations should provide good control.

Special Thanks to the following  
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## **DRAINAGE AND FLOODING INJURY**

Almost all citrus trees grown in southwest Florida are located on high water table, poorly drained soils. Water management on poorly drained soils is difficult and expensive because during heavy rains in the summer, excess water must be removed from the rootzone and in periods of limited rainfall, irrigation is needed. On these soils, drainage is as important as irrigation. The concept of total water management must be practiced. If either system—irrigation or drainage—is not designed, operated, and maintained properly, then the maximum profit potential of a grove cannot be achieved. Both surface and subsoil drainage is necessary to obtain adequate root systems for the trees.

Roots, like the rest of the tree, require oxygen for respiration and growth. Soils in Florida typically contain 20-21 % oxygen. When flooding occurs, the soil oxygen is replaced by water causing hypoxia (low oxygen) or anaerobiosis (no oxygen). These conditions cause tremendous changes in the types of organisms present in the soil and in the soil chemistry.



Flooding injury would be expected if the root zone were saturated for 3 days or more during extended summer rains at

relatively high soil temperatures (86-95° F). 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 high vs. low 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 usually less when water is moving than when water is stagnant. The use of observation wells is a very reliable method for evaluating water-saturated zones in sites subject to chronic flooding injury.



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. Under 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 in order 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 roots become stranded in dry soils. Leaf wilting, drop, dieback, and chlorosis patterns may develop and tree death may occur. Trees subjected to chronic flooding damage are stunted with sparse canopies, dull colored, small leaves and 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, which is soft and easily sloughed.



With acute water damage, foliage wilts suddenly followed by heavy leaf drop. Trees may totally defoliate and actually die, but more frequently partial defoliation is followed by some recovery. However, such trees remain in a state of decline and are very 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.



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 CTV 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 which eventually translates 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 under such conditions. Trees, irrespective of scion and rootstock cultivars, should be planted under the best drainage conditions possible. Drainage ditches should be kept free of obstruction through a good maintenance program including chemical weed control. Tree recovery from temporary flooding is more likely to occur under good drainage structure maintenance conditions.

Do not disk a grove if 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. The nature of the soil, the rootstock, root condition, duration of flooding, soil and air temperature, soil pH, and the presence of sulfur and organic matter in the soil are all factors that need to be considered when trying to evaluate flooding injury and manage tree recovery.





# PHYTOPHTHORA

## FOOT ROT AND

## ROOT ROT

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<sup>3</sup> 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. Aliette and Ridomil are both effective, but alternation of the materials should be practiced to minimize the risk of the development of fungicide resistance.



Foliar spray with Aliette: It is recommended to buffer the spray solution to pH 6 or higher to avoid phytotoxicity when copper has been used prior to or with Aliette. For nonbearing trees, use 5lb/100 gal. For bearing trees, use 5 lb in 100-150 gal/acre. Soil application with Ridomil Gold 4EC: Apply 1quart/treated acre or soil drench by applying 5 gallons of solution (1 quart/100 gal) in water ring. For more details and product selection and rates, get your copy of the 2002 Florida Citrus Pest Management Guide. In SW Florida, it is available at the LaBelle Hendry County Extension Office and the Immokalee IFAS Center.

# ***THANKS TO ALL THE SPONSORS FOR THEIR SUPPORT OF OUR EDUCATIONAL PROGRAMS!***

A Preliminary Schedule for SW Florida seminars (2002-2003)

Location: Hendry County Extension Office, LaBelle

Coordinator: Dr. Mongi Zekri, Multi-County Citrus Agent, Phone: 863 674 4092,  
E-mail: [maz@mail.ifas.ufl.edu](mailto:maz@mail.ifas.ufl.edu)

Tuesday, September 17, 2002, 10:00 AM – 12:00 Noon

Brown Rot, other Phytophthora diseases and bark scaling

Speaker: Drs. Jim Graham and Pam Roberts

2 CEUs for Pesticide License Renewal

2 CEUs for Certified Crop Advisors

**Sponsor: Larry McCauley, Griffin LLC**

Tuesday, October 15, 2002, 10:00 AM – 12:00 Noon

Cultural practices that influence fruit quality

Speaker: Dr. Gene Albrigo

2 CEUs for Certified Crop Advisors

**Sponsor: Jerry Southwell, Hydro Agri**

Tuesday, November 19, 2002, 10:00 AM – 12:00 Noon

Hedging, topping, skirting and tree size management

Speakers: Drs. Jodie Whitney, Adair Wheaton, and Bill Castle

2 CEUs for Certified Crop Advisors

**Sponsor: Robert M. Bancroft, Citrus Hedging, Inc.**

Tuesday, December 17, 2002, 10:00 AM – 12:00 Noon

Foliar nutrition (potassium, urea and phosphite), nitrogen rates  
and micronutrients vs. fruit production

Speakers: Drs. Brian Boman, Gene Albrigo, and Tom Obreza

2 CEUs for Certified Crop Advisors

**Sponsor: Robert Murray, Florida Favorite Fertilizer**

Tuesday, January 14, 2003, 8:30 AM – 4:00 PM

Workshop on scouting for pests and diseases

Speakers: John Taylor, and Drs. Pam Roberts, Stephen Rogers and Phil Stansly

6 CEUs for Pesticide License Renewal

6 CEUs for Certified Crop Advisors

**Sponsor: Robert Gregg, Syngenta**



Tuesday, January 21, 2003, 10:00 AM – 12:00 Noon  
Citrus scab, alternaria, melanose, and fungicide update  
Speakers: Dr. Pete Timmer and Pam Roberts  
2 CEUs for Pesticide License Renewal  
2 CEUs for Certified Crop Advisors  
**Sponsor: Shelby Hinrichs, Nufarm Agriculture USA**

Tuesday, February 4, 2003, 10:00 AM – 12:00 Noon  
Strategies for efficient application of pesticides  
Speaker: Dr. Masoud Salyani  
2 CEUs for Pesticide License Renewal  
2 CEUs for Certified Crop Advisors  
**Sponsor: Michael Harowitz, FarmSaver.com**

Tuesday, February 18, 2003, 10:00 AM – 12:00 Noon  
Update on herbicide program options  
Speakers: Dwight Meeker, Mike Prescott and Dr. Steve Futch  
2 CEUs for Pesticide License Renewal  
2 CEUs for Certified Crop Advisors  
**Sponsor: Donna Muir-Strickland, Monsanto**

Tuesday, March 18, 2003, 10:00 AM – 12:00 Noon  
Irrigation scheduling, maintenance, plugging problems and solutions  
Speakers: Drs. Larry Parsons, Brian Boman, Tom Obreza and Sanjay Shukla  
1 CEU for Pesticide License Renewal  
2 CEUs for Certified Crop Advisors  
**Sponsor: John Coley, Citrus Maintenance & Service, Inc.**

Tuesday, April 15, 2003, 10:00 AM – 12:00 Noon  
Citrus leafminer and citrus psyllid management for resets and non-bearing trees  
Speaker: Dr. Phil Stansly  
2 CEUs for Pesticide License Renewal  
2 CEUs for Certified Crop Advisors  
**Sponsor: Jay Hallaron, Uniroyal Chemical/Crompton Corporation**

Tuesday, May 20, 2003, 10:00 AM – 12:00 Noon  
Greasy spot and possible contaminants from pesticides and fertilizers  
Speaker: Cathleen Osgood and Drs. Tom Obreza, Pete Timmer and Pam Roberts  
2 CEUs for Pesticide License Renewal  
2 CEUs for Certified Crop Advisors  
**Sponsor: Bobbitt Jenkins, BASF Corporation**

Tuesday, June 17, 2003, 10:00 AM – 12:00 Noon  
Record keeping software for grove practices and how to find citrus information  
(Pest Management Guide, Fact Sheets, Labels, etc.) on the Internet  
Speakers: Rick Montney, Diana Hagan and Dr. Mark Ritenour  
**Sponsor: Aglime Sales, Inc., Babson Park, FL**

# FLATWOODS CITRUS NEWSLETTER

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## **Racial-Ethnic Background**

\_\_\_ American Indian or native Alaskan

\_\_\_ Asian American

\_\_\_ Hispanic

\_\_\_ White, non-Hispanic

\_\_\_ Black, non-Hispanic

## **Gender**

\_\_\_ Female

\_\_\_ Male