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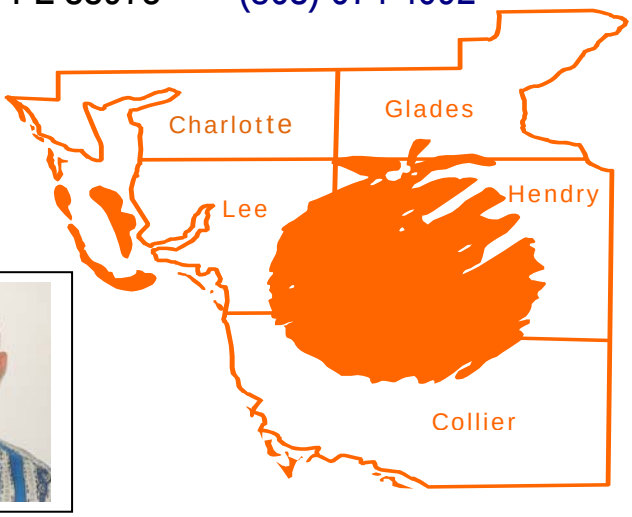
Flatwoods Citrus



Vol. 18, No. 7 **July 2015**

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/

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I M P O R T A N T E V E N T S

SEMINAR-
WEED MANAGEMENT IN CITRUS GROVES AND UPDATE ON CITRUS BLIGHT

Date & time: Thursday, **July 16th, 2015, 10:00 AM – 12:00 Noon**
Location: Immokalee IFAS Center
Program Coordinator: Dr. Mongi Zekri, UF-IFAS
Program Sponsors: Stacey Howell with Bayer

----10:00 AM - 10:50 AM

1. Weed Management in Citrus Groves. **Dr. Megh Singh**, UF-IFAS
   - Principles of weed control i.e. Cultural, mechanical, chemical and biological
   - Classification of weed i.e. annual, perennial and grasses, broadleaves and sedges
   - Current het herbicides registered for citrus in Florida
   - IFAS recommendation for weed control
   - How to make herbicides more effective?
   - Why do herbicides fail?

10:50 AM – 11:00 AM Break

----11:00 AM - 11:50 AM

2. Citrus Blight Research Update. **Dr. Ron Brlansky**, UF-IFAS
   - Pararetrovirus found in blight trees: what is it and where is it?
   - Update on Pararetrovirus detection in field trees
   - Why do we believe that this might be the cause of citrus blight?
   - Possible transmission mechanisms and control measures

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

Pre-registration is required. No registration fee and lunch is free Thanks to **Stacey Howell with Bayer.** To reserve a seat, call 863 674 4092, or send an e-mail to Dr. Mongi Zekri at: maz@ufl.edu

No pre-registration = No lunch

The Great CEU Round-Up

PRESENTED BY Florida Turfgrass Association | UF University of Florida

July 22, 2015
8:30 am—4:00 pm EDT

AGENDA

8:30 – 9:00	Registration	
9:00—9:50	**Factors to Consider When Developing A Weed Management Program**	*Dr. Greg MacDonald*
9:50—10:00	Break	
10:00 – 10:50	**How Herbicides Work & Where They Go**	*Dr. Fred Fishel*
10:50—11:00	Break	
11:00—11:50	**Preventing Herbicide Failures**	*Dr. Stephen Enloe*
11:50—1:00	Lunch (provided)	
1:00—1:50	**Understanding Adjuvants**	*Dr. Jay Ferrell*
1:50—2:00	Break	
2:00—2:50	**BMP in Urban, Aquatic & Natural Systems**	*Susan Haddock*
2:50—3:00	Break	
3:00—3:50	**Identification & Integrated Management of Invasive Grasses**	*Dr. Lyn Gettys*
3:50 – 4:00	Closing & CEU Distribution	

CEU Information

Up to 6

- Aerial
- Ag. Row Crop Pest Control
- Ag. Tree Crop Pest Control
- Aquatic Weed Control
- Comm. Lawn & Ornamental
- Demo & Research
- Forestry
- Ltd Lawn & Maintenance
- Ltd Lawn & Ornamental
- Ltd Urban Fertilizer
- Natural Areas Weed Mgmt.
- Ornamental & Turf
- Private Applicator
- Regulatory Pest Control
- Right-of-Way

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Walton County
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IFAS LOCATION	

LIST ADDITIONAL ATTENDEES

	PRINT FIRST AND LAST NAME Example: Jane Doe	IFAS COUNTY EXTENSION OFFICE (do not indicate the City) Example: Collier County
1		
2		
3		
4		
5		
6		
7		
8		

PRICING INFORMATION (PER ATTENDEE)

IFAS EMPLOYEE	MUNICIPAL EMPLOYEES	INDUSTRY PROFESSIONAL
$15 pre-registration | $22.50 on-site	$30 pre-registration | $45 on-site	$50 pre-registration | $75 on-site

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EMAIL Heather@FTGA.org
ONLINE REGISTRATION www.ftga.org/ceu-round-up

PRE-REGISTRATION DEADLINE: **JULY 15, 2015** (7/16/15 on-site pricing goes in effect)
REGISTRATION CLOSES: **JULY 20, 2015** (walk-in registrations available at IFAS location)

CITRUS EXPO IN NORTH FORT MYERS

http://www.citrusexpo.net/

SEMINAR-

PHYTOPHTHORA, NEMATODES, AND DIAPREPES

Date & time: Thursday, **August 27th, 2015, 10:00 AM – 12:00 Noon**
Location: Immokalee IFAS Center
Program Coordinator: Dr. Mongi Zekri, UF-IFAS
Program Sponsors: W Garry Gibson with BASF

----10:00 AM - 10:50 AM

1. HLB interactions with Phytophthora diseases. **Dr. Jim Graham**, UF-IFAS

--Statewide Phytophthora soil populations have surged, declined, and resurged as HLB spread statewide.

--HLB interaction with soil and water stress increases susceptibility to Phytophthora.

--Control of Phytophthora populations and how well HLB roots infected with Phytophthora respond to fungicides has been affected.

--Priorities for management of HLB groves affected by soil and water stresses and Phytophthora will be discussed.

10:50 AM – 11:05 AM Break

----11:05 AM - 12:00 Noon

2. Nematodes and Diaprepes. **Dr. Larry Duncan**, UF-IFAS

--Importance of managing weevil and nematode problems in conjunction with HLB infection

--Current management methods

--Expected outcomes of management

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

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Special Thanks to sponsors of the "Flatwoods Citrus" newsletter for their generous contribution and support. If you would like to be among them, please contact me at 863 674 4092 or maz@ufl.edu

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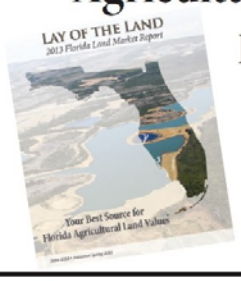

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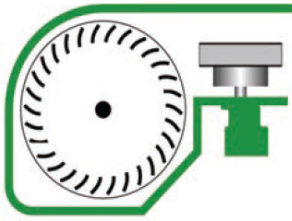

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RESETTING IN CITRUS GROVES

Mongi Zekri

From: Mongi Zekri, September 2014, Citrus Industry magazine 95 (9):6-8.

For maximum efficiency of a production unit or grove, it is essential that every tree space is occupied by a healthy and productive tree. The average annual tree loss across the Florida citrus industry is currently around 6%. However, the extent of tree loss among individual groves can vary from 2 to 12% or more. Prompt replacement of unproductive trees means higher average long-term returns from the grove. If the declining trees remain in the grove, they keep getting weaker and yield less fruit each year and therefore the potential production capacity for the grove keeps declining even though production costs remain the same or even increase. It is very important to remove and replace such trees once it is clear that they are declining and they are no longer economically profitable. However, the reason for the decline should be determined and the condition should be corrected so that the replacement tree does not suffer the same fate.

Resetting should be considered if the tree is affected by an incurable disease such as blight, tristeza, or citrus greening. The resetting program should be conducted regularly rather than being delayed until serious losses in production have occurred. Resets should be planted with the same cultivar already in the block. Usually, it is more economical to keep resetting and not to push the entire block unless the cultivar and/or the tree spacing between rows is an undesirable one. Replanting in a mature grove seems justified only when a minimum of 8 ft between canopy driplines, (not from trunk-to-trunk), is available for canopy development of the new trees.

Replacement of dead, diseased, and declining trees in Florida citrus groves should always be an important part of the total production program. Today, tree replacement is more important than ever since overhead and production costs are dramatically increasing and a full stand of productive trees is essential to maximize production and profits. Freezes, blight, tristeza, Phytophthora, Diaprepes, and other pests and diseases have been particularly troublesome to Florida citrus growers for the last two decades. Citrus canker and greening have been devastating citrus groves since their introduction to Florida. Extensive tree losses coupled with the economic necessity of regular resetting have caused many growers to investigate ways to achieve new efficiencies in reset management.

NOT AN EASY TASK

Caring for young citrus trees is always troublesome because they require far more attention than larger, established trees. Florida's sandy soils, high summer temperatures, possible low winter temperatures, and scattered rainfall patterns complicate young tree care by forcing growers to protect, fertilize, and weed young trees regularly or face extensive losses. Young trees are more sensitive and more attractive to pests than mature trees due to high levels of vegetative growth. Therefore, special care is needed to insure pests are adequately controlled. Resets often present an even greater problem because trees are usually scattered throughout a block of larger trees, where they compete with large, full-grown trees for limited supplies of water, nutrients, and sometimes sunlight.

Scattered resets frequently have serious weed problems since removal of the previous tree allows the area to receive more sunlight and provides more favorable conditions for weed growth. Since resets are usually scattered throughout a block of much larger trees, they are often difficult to locate and may be accidentally overlooked, resulting in inadequate care. Researchers, growers, and production managers are continually developing and improving methods of dealing with reset care.

PLANNING THE RESET PROGRAM

Grove managers should include tree removal and resetting as a routine part of the production program and assign special crews to deal specifically with young tree care. Planning ahead is very important because there is often a lag period between the time when replacement trees are ordered and when they are received. The wait time for the most desired rootstock and scion combination may be as great as 1 to 2 years, so replacement tree needs should be anticipated (when possible) and orders placed so they can be obtained when needed.

PURCHASING TREES

High quality reset trees are essential for maximum young tree growth. These young trees will be placed in an intensely competitive situation and may sometimes receive less than ideal care, so there is no room for compromising tree quality. Only healthy and properly sized trees from registered sources should be purchased since the initial cost is only a small fraction of the total cost of bringing such a tree into production.

SITE PREPARATION

The planting site should be well prepared. Weeds should be removed before planting. At a minimum, a non-residual herbicide should be applied to the reset area to get weeds under control before the young tree is planted.

Planting sites should be prepared well in advance of receipt of the trees. Ideally, trees should be planted on the same day they are received. Under no circumstances should trees be allowed to dry out. To minimize root desiccation and damage, they should be kept cool and moist until they are planted.

PLANTING THE TREES

Trees should be removed from the container and inspected for evidence of pot-binding. Make several vertical slashes about one inch deep through the root ball to encourage root branching. These slashes also allow the potting soil and roots to interface more closely with the soil in the planting site. It may be easier to cut some of the roots with pruning shears and pull them so they protrude from the ball.

A common problem with nursery trees is that the potting mixture is often highly organic. Such materials form areas, which are difficult to permeate with water after the young tree is planted in sandy soils and irrigated. The outer third of the organic ball should be removed so that the outer roots are exposed and can extend into the soil in which the tree is planted. Otherwise, the tree may not grow off quickly and satisfactorily.

WEED CONTROL

Keeping weeds under control during the establishment period of the reset is very important. Weeds compete with young citrus trees for water, nutrients, soil applied pesticides, and sunlight and they must be properly controlled. Weed control around a reset site should be considered at pre-plant, early post-plant, and after the tree is established. Control of weeds prior to planting should be provided. If residual herbicides are used, they should be used at proper rates and at least 30 days in advance of planting so that residues do not impact reset growth. Prior to planting, contact or growth regulating herbicides may be preferred since they do not leave residual effects in the soil.

Weed control during the establishment period or approximately the first year is frequently quite difficult. Hand labor is scarce and expensive. Trunk damage by hoes or other cultivation equipment further compounds the problem. Chemical weed control provides at least a partial solution to the problem during this establishment period. There is now a fairly wide selection of residual herbicides available, which can be used around young trees. These materials should be applied at reduced rates. Be sure to read labels carefully for restrictions on the use of herbicidal materials around young trees.

After the reset has been planted for a year or more, modifications of the weed control program can be considered. Labels of materials under consideration should be checked carefully for restrictions prior to use. Some herbicides require reduced rates around young trees to minimize potential damage to resets planted among older trees. Specially modified herbicide applicators are available which enable the equipment operator to deliver reduced rates or a different herbicide mix around young trees.

To minimize herbicide contact to young trees, many growers apply a wrap or guard around the lower 12 to 16 inches of the tree trunk. When using these wraps be sure to monitor the protective structure for ants or other pests that may damage the tree trunk.

SPROUTING

Resets require periodic sprout removal. The use of tree wraps usually reduces the need for sprout control. Wraps often stay in place for up to 3 years. They should, however, be checked periodically for the presence of ants or fungal diseases. Reduced sprouting may be enough to justify their use. There are no simple answers to the use of wraps. Each situation is different and requires careful horticultural and economic consideration to arrive at the best procedure of maintenance, inspection, and management.

IRRIGATION & DRAINAGE

Young citrus trees require frequent but moderate water application for survival and proper growth. Competition for water is accentuated by nearby older trees or if weeds are allowed to grow close to the young trees. Anything that can be done to discourage competition for available water should be beneficial to the young tree. Irrigation systems should be in place before planting trees. Special modifications to the irrigation pattern by inverting the micro-sprinkler so that the surface wetting area is reduced or by increasing irrigation frequency can be good strategies to supply water for resets. However, the irrigation frequency necessary to sustain a mature grove is rarely adequate for good growth of newly-set trees, and young trees should be checked frequently to be certain they are receiving sufficient water. Drainage is as important as irrigation. Excess water must be removed from the rootzone. 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. In Florida, both surface and subsoil drainage is necessary to obtain adequate root systems for the trees.

FERTILIZATION

Reset fertilization requires an extra effort beyond the needs of the bearing grove. Frequent application of water-soluble fertilizers with irrigation water (fertigation) can increase overall fertilizer use efficiency. If the grove is under a fertigation program, there is no need for special care in terms of nutrition for resets. Great care must be taken to ensure that proper rates of fertilizer materials are dispensed to prevent nutritional deficiencies or toxicities. Frequent light applications usually produce best results and lessen the danger of leaching but these practices need to be evaluated for cost effectiveness. The use of controlled-release fertilizers for resets is a better option than making multiple trips throughout the year to scattered resets throughout large blocks.

PEST CONTROL

Because young trees have more frequent flushing cycles than mature trees, they are more attractive and sensitive to pests. Therefore, special care is needed to keep the citrus psyllid and leafminer under control to reduce their damage to new leaves and to reduce the severity of citrus canker and the spread of citrus greening. Relying solely on foliar contact insecticides for resets is not a good strategy. Soil-applied systemic insecticides (neonicotinoids) which provide 6-8 weeks of control are the most effective tool for managing psyllids and leafminers on resets. Currently, three neonicotinoid products are registered for use in citrus: imidacloprid (Admire, Alias, Couraze, Nuprid), thiamethoxam (Platinum), and clothianidin (Belay). Various generic formulations are also available. Resets should also benefit from foliar contact pesticides and from foliar nutrition used on mature trees.

GROVE PLAT

Since resets are usually scattered throughout a block of much larger trees, they are often difficult to locate and may be accidentally overlooked, resulting in inadequate care. An annually updated grove plat is probably the best method for assessing general grove condition and productivity. Plats can be prepared by hand or with the assistance of a computer. This can help determine the number of trees which will be needed and where they should be placed. Reset plats can be prepared to later help equipment operators locate newly-planted trees for periodic care.

Figure 1. Scattered resets in a citrus grove.

2015 Atlantic Hurricane Season Outlook

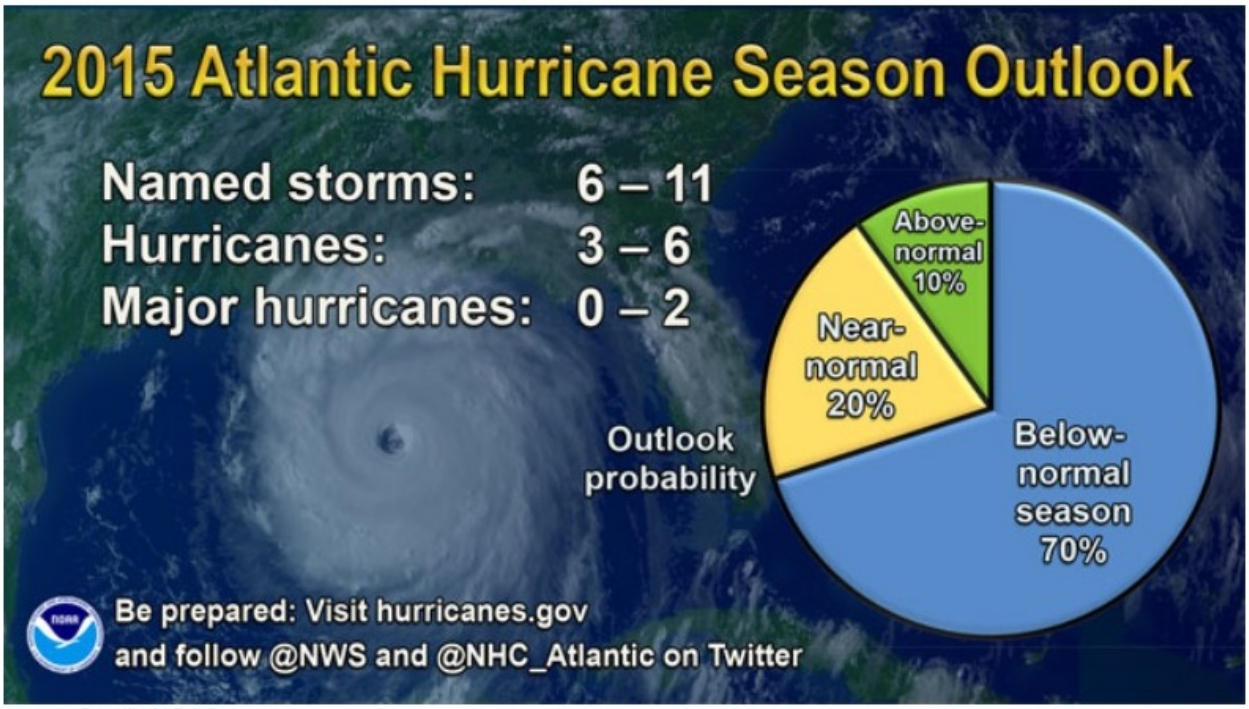


Image Credit: NOAA

NOAA's Climate Prediction Center says the 2015 Atlantic hurricane season will likely be below-normal, but that's no reason to believe coastal areas will have it easy.

For the hurricane season, which officially runs from June 1 - November 30, NOAA is predicting a 70 percent likelihood of 6 to 11 named storms (winds of 39 mph or higher), of which 3 to 6 could become hurricanes (winds of 74 mph or higher), including zero to 2 major hurricanes (Category 3, 4 or 5; winds of 111 mph or higher). While a below-normal season is likely (70 percent), there is also a 20 percent chance of a near-normal season, and a 10 percent chance of an above-normal season.

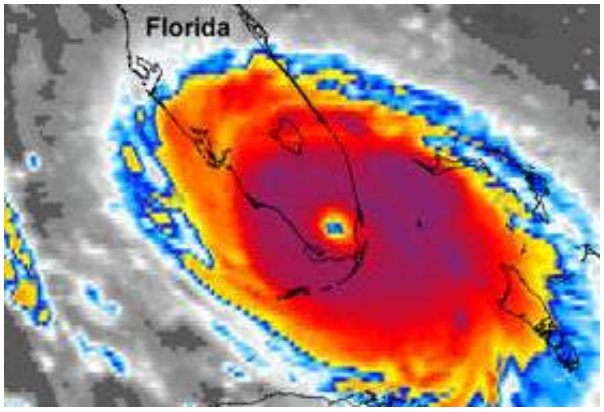
"A below-normal season doesn't mean we're off the hook. As we've seen before, below-normal seasons can still produce catastrophic impacts to communities," said NOAA Administrator Kathryn Sullivan, Ph.D., referring to the 1992 season in which only seven named storms formed, yet the first was Andrew – a Category 5 Major Hurricane that devastated South Florida.

To read the full article click here. http://www.noaanews.noaa.gov/stories2015/20150527-noaa-hurricane-outlook-below-normal-atlantic-hurricane-season-is-likely-this-year.html

PREPARE AND STAY AWARE!

When is Hurricane Season?

June 1 - November 30



What Is A Hurricane?
A hurricane is a tropical cyclone, which generally forms in the tropics and is accompanied by thunderstorms and a counterclockwise circulation of winds. Tropical cyclones are classified as follows:

TROPICAL DEPRESSION
An organized system of clouds and thunderstorms with a defined surface circulation and maximum sustained winds* of 38 mph or less

TROPICAL STORM
An organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds of 39-73 mph

HURRICANE
An intense tropical weather system of strong thunderstorms with a well-defined surface circulation and maximum sustained winds of 74 mph or higher

STORM SURGE - is water that is pushed toward the shore by the force of the winds swirling around the storm. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level 15 feet or more.

INLAND FLOODING - In the last 30 years, inland flooding has been responsible for more than half the deaths associated with tropical cyclones in the United States.

HIGH WINDS - Hurricane-force winds can destroy poorly constructed buildings and mobile homes. Debris such as signs, roofing material, and small items left outside become flying missiles in hurricanes.

TORNADOES - Hurricanes can produce tornadoes that add to the storm's destructive power. Tornadoes are most likely to occur in the right-front quadrant of the hurricane.

Hurricanes and tropical storms can be very devastating to agriculture including the Florida citrus industry. In 2004 and 2005, growers and farmers have seen their groves, barns, equipment and homes destroyed. If a hurricane hit our state this year, damage to trees would be of varying degrees. Some trees would be uprooted. Others would have major limbs split off or would have major defoliation. Fruit would litter the ground and grapefruit trees would suffer the most loss because of the larger size and heavier weight fruit.

PLAN AND PREPARE

Hurricanes can strike at any time during June through October. It is best to devise a hurricane plan and use it to make preparations far before the hurricane season. The hurricane plan should provide protection from a storm and recovery after the storm.

For more details, go to “Hurricane Preparedness”
by Bob Rouse and Mongi Zekri

Hurricane Preparedness

Citrus Growers Must Prepare for Hurricanes Every Year

By **Bob Rouse** and **Mongi Zekri**

Hurricane preparation for citrus growers in 2015 is the same drill as every year. Each year growers look forward to the rainy season to help grow their fruit to maturity. Along with the anticipation of the rainy season is the reality that hurricanes may bring too much water in August and September at the end of the rainy season.

Every year, there are predictions of what the hurricane season (June 1 through November 30) will bring.

Saffir-Simpson hurricane storm rating scale

Storm category	Wind speed (mph)	Expected Damage to Citrus
1	74-95	Some loss of leaves and fruit, heaviest in exposed areas
2	96-110	Considerable loss of leaves and fruit with some trees blown over
3	111-130	Heavy loss of foliage and fruit, many trees blown over
4	131-155	Trees stripped of all foliage and fruit, many trees blown over and away from property
5	over 155	Damage would be almost indescribable, groves and orchards completely destroyed

The coastal area of Florida where citrus is grown has been extraordinarily lucky in recent years, except for the destructive hurricane seasons of 2004 and 2005. The three hurricanes that impacted citrus in 2004 were Charley (August), ripping the Gulf Coast up through central Florida, and Frances and Jeanne (September), which devastated east coast groves. In 2005, Wilma (October) caused fruit loss and some tree loss in south Florida.

The bottom line is predictions are dubious and a curiosity, and shouldn't affect what we must do. We must prepare every year, regardless of weather predictions. Little can be done to protect trees and fruit from hurricane velocity wind, but we can take steps to protect the people, equipment and supplies that will be needed for the recovery. Below is a checklist for citrus grove managers.

Pre-Hurricane Preparation Checklist

Personnel assignments:

1**.** Make a list of all tasks and make assignments.
2. Update the names on the damage inspection team.
3. Update worker contact list and means for them to call in after the storm.

Safety training:

Train workers in the safe operation of unfamiliar equipment they may have to use.
Example: Drivers may have to use chain saws to remove downed trees blocking roads.

Insurance:

Buildings, equipment including tractors, irrigation parts, and supplies may be damaged.

Buildings:

1. Close storm shutters or board up windows.
2. Store loose, light-weight objects such as garbage cans and tools.

Liquid tanks:

1. Keep fuel, fertilizer and other tanks full so they don't move in the wind.
2. Ensure sufficient fuel is available.

Roads and Ditches:

1. Clear, grade, and keep roads well maintained and keep ditches clean and pumped down.
2. Arrange with a flying service for grove manager to survey grove damage.

Emergency equipment:

1. Test-run generators, chain saws, torches, air compressors, and other equipment.
2. Have shovels, slings, fuel, paint, and equipment parts available in good repair.
3. Know where to obtain backhoes, front-end loaders, and other heavy equipment.

Communications equipment:

1. Ensure that radios are in good working order.
2. Have hand-held portable radios with extra charged battery packs available.
3. Direct truck-to-truck radio and cellular phones save valuable time during recovery.

Hazardous materials:

1. Secure hazardous materials prior to a storm.
2. Shut down gasoline pumps.

Emergency contacts:

1. Have a list of emergency phone numbers, including electric companies, sheriff, and medical.

Cultural Practices:

1. Regular pruning can reduce broken limbs and minimize toppled or uprooted trees.
2. Windbreaks reduce tree damage and spread of citrus canker bacterium.

Post-Hurricane Recovery Checklist

Damage inspection:

Make a visual assessment of the damage and determine priorities and equipment needed.

Prioritize Damage:

A priority plan can quickly determine where and how to begin recovery operations.

Employee call-in:

When safe, call in those needed for damage inspection and grove recovery work.

Clear road access:

Clear roads to where trees must be reset or recovery activities must be conducted.

Water removal:

Remove excess water from tree root zones within 72 hours to avoid root damage.

Tree rehabilitation:

1. Resetting trees to an upright position should be accomplished as soon as possible.
2. Toppled trees should be pruned back to sound wood.
3. Painting exposed trunks and branches with white latex paint helps prevent sunburn.

Irrigation:

Check the irrigation system as rehabilitation is a long process and water is critical.

Fertilizer:

1. Plant nutrients should be applied when new growth begins.
2. Toppled trees will require less fertilizer due to reduced root system and tree canopy.
3. Reduce N fertilizer proportionally to canopy or leaf loss.
4. The following year, trees may require more-than-normal rates to re-establish canopy.
5. Micronutrients should be applied in nutritional sprays to the leaves.

Weeds:

Resume row middles mowing and herbicide applications on a normal schedule.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

WATER WATCH

Keeping an Eye on Water Resources

District-Wide Conditions for June 17, 2015

Water levels remain adequate in the Kissimmee basins, the Southwest Coast and the Upper East Coast. Water levels in Broward and Miami-Dade counties, and to a lesser extent Palm Beach County, are declining because of a continuing rainfall deficit.

Water Levels in Key Locations (June 17)		
Location	**Today's level (NGVD29)**	**Water Supply Floor**
WCA-1	15.12 feet	14.00 feet
WCA-2A	10.91 feet	10.50 feet
WCA-3A	8.93 feet	7.50 feet

Water Conservation

- South Florida is under the District's Year-Round Landscape Irrigation Rule, which limits residential and business landscape irrigation to two or three days per week.
  - To determine watering days and times in your area, contact your local government or visit www.sfwmd.gov/2days.
- Permitted water users such as nurseries, agriculture, golf courses and utilities can find water use conditions in their permits online at www.sfwmd.gov/ePermitting.
- For tips and information about water conservation, visit www.savewaterfl.com.

Lake Okeechobee Operations

- The U.S. Army Corps of Engineers manages Lake Okeechobee water levels based on its regulation schedule and the best available science and data provided by its staff and a variety of partners, including SFWMD.
- Corps water managers prefer to maintain water levels between 12.5 feet and 15.5 feet to help balance competing demands such as public safety, water supply and environmental health.

Lake Okeechobee Levels	
Today (June 17)	**12.58** feet
This Date One Year Ago	**12.61** feet

Flooding Injury and Importance of Drainage

Mongi Zekri, Larry Parsons, and Brian Boman

UF | IFAS Extension
UNIVERSITY of FLORIDA

From: June 2015, Citrus Industry magazine 96 (6):24-26

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 in the summer, 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 during the summer 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 (See “Water Table Measurement and Monitoring in Citrus Groves”, Citrus Industry magazine, May 2015 issue).

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

WEED MANAGEMENT IN CITRUS GROVES

Weeds can reduce the growth, health and survival of young trees, or the time to come into bearing and ultimately fruit production. The more competitive the weeds, the more adversely they alter tree physiology, growth, fruit yield and quality. The attainment of early crop production requires controlling the growth of weeds. Weeds alter economic status by competing with trees, particularly young trees, for water, nutrients and even light in the case of climbing vines, which can easily cover trees if left uncontrolled.

Weeds also have various effects on tree performance including reduced efficacy of low volume irrigation systems, and interception of soil-applied pesticides.

Management Methods

Cultural & mechanical

Cultural methods include off-target irrigation and fertilizer applications. Mechanical methods include cultivation in row middles. However, **constant cultivation results in the destruction of citrus fibrous roots, which normally would grow in the undisturbed portion of the soil.**

Mowing is practiced between the tree rows and away from the trees in combination with herbicide applications in the tree row over the major root zone of trees. It is appropriate where a cover crop is desired in bedded groves to prevent soil erosion. Weeds can also be spread by seed and vegetatively during mowing operations, reinfesting tree rows where herbicides have been applied. **Mowing before seedhead formation is necessary to reduce seed dissemination and reinfestation.**

Chemical mowing

Chemical mowing, utilizing Low Rate Technology (LRT) postemergence herbicide spray applications and wiping in combination with mechanical mowing, is used for the suppression of vegetation in row middles. With the high frequency and cost of mechanical mowing required to maintain vegetation control in row middles, chemical mowing and wiping with low rates of glyphosate has increased. Weed management in Middles by chemical applications results in the elimination of tall growing species and establishment of more manageable sod type species such as Bermuda and Bahia grasses.

Chemical

Generally speaking, all weed species listed as susceptible on the herbicide product label will be controlled by that herbicide at the appropriate rate, time of application and stage of growth. Environmental and plant conditions before, during and following the application are also important including moisture in the form of rainfall and/or irrigation.

Poor control can sometimes be expected from postemergence applications to weeds under stress conditions due to poor uptake and translocation of applied herbicides. Assuming that the appropriate herbicide or herbicide mixtures are selected for the weed species present, failures in the program will usually be due to one of the above factors or to the actual application including calibration and/or equipment design and operation.

Herbicides may be classified as foliar or soil-applied. Foliar applied materials may have systemic or contact activity. Soil

applied preemergence herbicides are absorbed through weed root systems, being most effective during germination and early seedling growth stages. Systemic herbicides are those that are absorbed by either roots or aboveground plant parts and are translocated throughout the plant. Contact herbicides act as desiccants, damaging or killing all plant parts actually sprayed with little if any translocation.

For the control of well-established perennial weeds, a postemergence herbicide with systemic metabolic activity should be used with preemergence soil residual products.

Timing and frequency of application are the keys to good vegetation management. **Increased application frequency of lower rates of soil residual herbicides is more effective in young groves where vegetation presence is greater due to more exposure of the grove floor to sunlight and where a greater herbicide safety factor is required**.

Application Technology

Rapid advances in herbicide application technology have resulted in the development of sophisticated equipment. Application equipment is now capable of selective delivery of multiple herbicide products, each directly injected into booms. In a single application, tree rows and row middles may be treated with soil residual and postemergence products with selectivity for tree age, soil type and vegetation species.

Well-maintained, accurately calibrated equipment with good filtration and agitation systems capable of uniform distribution of prescribed spray volumes and droplet size is essential for efficiency, cost-effective vegetation management. Worn nozzle tips result in increased spray delivery rates and distortion of distribution patterns and should be checked regularly. Improved herbicide boom design to reduce tree skirt contact, spray drift and interference of heavy weed cover with nozzle output will reduce tree damage and fruit drop while improving control of target vegetation. Tree skirt pruning and timing of postemergence applications will also reduce boom and spray contact with low hanging limbs and fruit.

Environmental Considerations

In determining management options, herbicide selection should be based not only on species and stage of vegetation development, but product solubility and leaching potential, soil type and rainfall distribution. Objectives are to reduce weed competition and interference through measured vegetation control/suppression with inputs having reduced potential for leaching through over-irrigation, runoff and erosion, chemical drift, or other off-target impacts. CAUTION: Herbicides may move through the soil to groundwater. Several factors influence the rate of this movement. Lower rates applied more frequently combined with sound irrigation management practices will reduce herbicide movement. **The use of bromacil-containing herbicides is prohibited on deep, sandy Ridge-type soils**. For more information and for the list of herbicides registered for citrus in Florida, go to:
http://www.crec.ifas.ufl.edu/extension/pest/PDF/2015/Weeds.pdf

Gulf Citrus Growers Association Scholarship Foundation, Inc.

11741 Palm Beach Blvd., #202, Fort Myers, FL 33905
(239) 690-0281 / Fax: (239) 690-0857 / Email: gulfcitrus@embarqmail.com

About the Gulf Citrus Growers Association

The citrus growers of southwest Florida are committed to supporting education as a long-term investment in the future of our industry. The first Gulf Citrus scholarship was awarded in 1992 through the Gulf Citrus Growers Association, a trade organization representing growers in Charlotte, Collier, Glades, Hendry and Lee Counties.

The Gulf Citrus Growers Association Scholarship Foundation was established in 2000 as a non-profit entity to oversee the distribution of these awards. Scholarship applications are accepted throughout the year and are reviewed semi-annually by a Scholarship Selection Committee comprised of academic and industry members. The number and amount of awards vary depending upon the number of applications received and available funds.

Applicants who are not selected may submit a new application for consideration in the next selection cycle. Previous award winners may also reapply.

Scholarship Criteria

Preferred requirements for scholarships are as follows:

AA, BS, MS and **PhD Degrees:**

- Completion of all placement testing and a **declared major** in agriculture or related major.
- Completion of **12 credit hours** towards agriculture or related degree.
- Minimum overall grade point average of **2.5** for AA and BS degrees; **3.0** for MS and PhD degrees.
- A demonstrated **commitment** to complete the degree at a state college, community college or university.

Applicants must send their transcripts including grades for the courses taken the previous semester and complete the attached application, which includes a statement of release giving the selection committee permission to verify information submitted.

*****APPLICATION DEADLINES ARE JULY 31 AND DECEMBER 31*****

Gulf Citrus Growers Association Scholarship Foundation, Inc.

11741 Palm Beach Blvd., #202, Fort Myers, FL 33905
(239) 690-0281 / Fax: (239) 690-0857 / Email: gulfcitrus@embarqmail.com

Scholarship Application

Personal Data

Name: _____Date of Birth:_____

Home Address: _____

City/State: _____ Zip: _____ Phone: _____

Mailing Address: _____

City/State: _____ Zip: _____ Phone: _____

E-mail: _____

Employer: _____
Full time position:____ or Part time position____

Address: _____

City/State: _____ Zip: _____ Phone: _____

Does your employer reimburse you for tuition or other expenses incurred toward your degree? Yes ____ No _____

Educational Information

College or University in which you are enrolled: _____
Full time student:____ or Part time student____

Department / Degree Program: _____

I am working toward the following: AA ____ BS _____ MS _____ PhD _____ Other _____

Courses Taken in Major *(completed)*:

_____
_____
_____
_____

Courses (*in which you are currently enrolled*):

_____
_____

Total Credit Hours Toward Degree: _____ Cumulative Grade Point Average (GPA): _____

Expected Date of Graduation: _____

Please answer the following questions in complete sentences with as much detail as possible.

What are your career goals? _____

_____

_____

_____

_____

What is the potential value of your education to the citrus industry *in southwest Florida*?

_____

_____

_____

_____

_____

I authorize the release of this application and any relevant supporting information to persons involved in the selection of recipients for Gulf Citrus Growers Association scholarships.

_____ _____

Applicant's Signature Date

*****APPLICATION DEADLINES ARE DECEMBER 31 AND JULY 31*****

Please return this application with your official transcripts to:

Gulf Citrus Growers Association Scholarship Foundation, Inc.
Dr. Mongi Zekri, Application Coordinator
Hendry County Extension Office
P. O. Box 68
LaBelle, FL 33975
(863) 674-4092
E-mail: maz@ifas.ufl.edu

Flatwoods Citrus

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☐ 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

Subscriber's Name:_____

Company:_____

Address:_____

City:_____State:_____Zip:_____

Phone:_____

Fax:_____

E-mail:_____

Racial-Ethnic Background

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

Gender

__Female
__Male