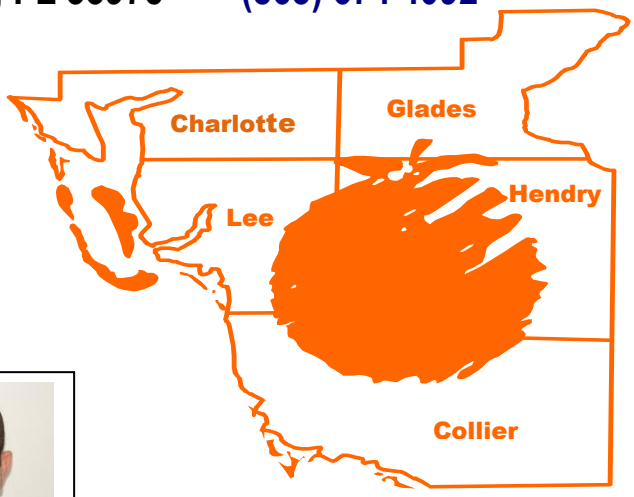
UF UNIVERSITY of FLORIDA
IFAS Extension

EXTENSION

Institute of Food and Agricultural Sciences

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

Flatwoods Citrus



Vol. 24, No. 9 November 2021

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

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November 2021 Zoom Citrus Seminar

Date & Time: Wednesday, November 17, 2021, 10:00 AM – 11:00 AM

Title: Citrus Winter Weather Program-Preparation and Management in the HLB Era

1. Winter weather watch
2. Ag weather forecasts
3. Freeze protection
4. Florida Automated Weather Network (FAWN)
5. Cold protection and irrigation tools

Speakers:

--**Chris Oswalt**, Multi-County Citrus Extension Agent, UF/IFAS
--**William R. (Rick) Lusher**, Director - FAWN, UF-IFAS

Coordinator: Mongi Zekri, Multi-County Citrus Extension Agent, UF-IFAS

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

You are invited to a Zoom meeting.
When: Nov 17, 2021 10:00 AM Eastern Time (US and Canada)
Register in advance for this meeting:
https://ufl.zoom.us/meeting/register/tJIkceCvqz0oE9Z7C8otI7kictWalOyZdG2Q
After registering, you will receive a confirmation email containing information about joining the meeting.

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December 2021 Zoom Citrus Seminar

Date & Time: Wednesday, December 1, 2021, 10:00 AM – 11:00 AM
Title: Scouting and Management of Citrus Pests
The presentation will cover recognition, monitoring, and management of insect and mite pests of citrus and their natural enemies. Cultural, biological, and chemical methods of pest control particularly for Asian citrus psyllid will be discussed.
Speaker: **Dr. Jawwad Qureshi**, Associate Professor, UF/IFAS Southwest Florida Research and Education Center, Immokalee
Coordinator: Dr. Mongi Zekri, Multi-County Citrus Extension Agent, UF-IFAS

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

Register in advance for this meeting:
https://ufl.zoom.us/meeting/register/tJMtfuGupzspHtT_sINXsF1FhupGxr1MTuHS

After registering, you will receive a confirmation email containing information about joining the meeting.

January 2022 Zoom Citrus Seminar

Date & Time: Wednesday, January 12, 2022, 10:00 AM – 11:00 AM
Title: **Scouting and Management of Citrus Diseases (HLB, Phytophthora, Leprosis)**

Speaker: **Dr. Ozgur Batuman**, Assistant Professor, UF/IFAS Southwest Florida Research and Education Center, Immokalee
Coordinator: Dr. Mongi Zekri, Multi-County Citrus Extension Agent, UF-IFAS

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

Register in advance for this meeting:
https://ufl.zoom.us/meeting/register/tJMpcOisqTorHNw9BSz9IEsJLq8kQikBzKWx

After registering, you will receive a confirmation email containing information about joining the meeting.

CEUs for pesticide license renewal

Earn CEU Credits NOW online through Southeast AgNet & Citrus Industry Magazine

http://citrusindustry.net/ceu/

The following series of articles and quizzes are available with their expiration dates noted:

- **2020 #4:** Protecting People From Pesticide Exposure (10/31/22)
- **2021 #3:** Before You Spray (7/31/22)
- **2021 #2:** When a Pesticide Doesn't Work (4/30/22)
- **2021 #1:** The Goals of Pest Management (1/31/22)

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

FYI, there are also CORE CEU available at Growing Produce
http://www.growingproduce.com/crop-protection/ceu-series/

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

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

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EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by

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

14 October 2021

ENSO Alert System Status: La Niña Advisory

Synopsis: **La Niña conditions have developed and are expected to continue with an 87% chance of La Niña in December 2021- February 2022.**

In the past month, La Niña conditions emerged, as indicated by below-average sea surface temperatures (SSTs) across the central and east-central equatorial Pacific [Fig. 1]. In the last week, the Niño-3.4 and Niño-4 index values were -0.6°C and -0.7°C, respectively [Fig. 2]. The Niño-3 and Niño-1+2 indices were not as cool, with values at -0.3°C and 0.1°C. Below-average subsurface temperatures (averaged from 180-100°W) strengthened significantly in the past month [Fig. 3], as negative anomalies were observed at depth across most of the central and eastern Pacific Ocean [Fig. 4]. Low-level easterly wind anomalies and upper-level westerly wind anomalies were observed over most of the equatorial Pacific. Tropical convection was suppressed near and west of the Date Line and enhanced over Indonesia [Fig. 5], while the Southern Oscillation Index and Equatorial Southern Oscillation Index were both positive. Overall, the coupled ocean-atmosphere system was consistent with La Niña conditions.

The IRI/CPC plume average of forecasts for the Niño-3.4 SST index favors La Niña to continue through the fall and winter 2021-22 [Fig. 6]. The forecaster consensus also anticipates La Niña to continue through the winter, with ENSO-neutral predicted to return during March-May 2022. Because of the recent oceanic cooling and coupling to the atmosphere, forecasters now anticipate a 57% chance of one season (November-January) reaching -1.0°C or less in the Niño-3.4 index. Thus, at its peak, a moderate-strength La Niña is favored. In summary, La Niña conditions have developed and are expected to continue with an 87% chance of La Niña in December 2021- February 2022 (click CPC/IRI consensus forecast for the chances in each 3-month period).

La Niña is anticipated to affect temperature and precipitation across the United States during the upcoming months (the 3-month seasonal temperature and precipitation outlooks will be updated on Thurs. October 21st).

This discussion is a consolidated effort of the National Oceanic and Atmospheric Administration (NOAA), NOAA's National Weather Service, and their funded institutions. Oceanic and atmospheric conditions are updated weekly on the Climate Prediction Center web site (El Niño/La Niña Current Conditions and Expert Discussions). Additional perspectives and analysis are also available in an ENSO blog. A probabilistic strength forecast is available here. The next ENSO Diagnostics Discussion is scheduled for 11 November 2021.

To receive an e-mail notification when the monthly ENSO Diagnostic Discussions are released, please send an e-mail message to: ncep.list.enso-update@noaa.gov.

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

DROUGHT

Water stress is the physiological condition to which a plant is subjected whenever the rate of water loss from the leaves by transpiration exceeds the rate at which water is absorbed by the root system. Water stress can be the result of excessive transpiration due to hot weather or slow absorption from a dry soil, flooded soil or saline conditions. Any degree of water imbalance can produce a deleterious change in physiological activity of growth and reproduction. Short-term drought often reduces production and prolonged drought can cause total crop failure. Severe drought between February and June can reduce fruit set, fruit development and fruit growth. The number of fruit, fruit size, and tree canopy are reduced with water stress. Extension growth in shoots and roots, and leaf expansion are all negatively correlated with water stress. Trees subjected to water stress are generally reduced in size. Vegetative growth is particularly sensitive to water deficit. Growth is closely related to turgor and the loss of turgidity reduces photosynthesis, leaf and fruit enlargement, juice content and yield, and increases wilting and leaf and premature fruit drop. Growers cannot afford water stress or water restrictions during critical periods. Irrigation is not only essential during the springtime, but it is also important during dry falls to minimize premature fruit drop.

Mobile Irrigation Lab

https://www.swfwmd.state.fl.us/business/agriculture/mobile-irrigation-lab

Assisting the agricultural community by improving irrigation efficiency and conserving water.

The Mobile Irrigation Lab program is an ongoing joint effort between the District, the U.S. Department of Agriculture–Natural Resources Conservation Service (USDA–NRCS) and the agricultural community. The program began in 1987 to assist the District in meeting its statutory responsibilities and to assist growers with water conservation.

The Mobile Irrigation Lab is a free volunteer service to the agricultural community. Any grower can contact the District to arrange a free evaluation. It was expanded to help growers meet water use permit conditions. District staff has used high pumpage reports to identify users who might wish to voluntarily reduce water use before a resource problem or permit violation occurs.

A trained technician is invited to a grower's field and collects irrigation system and specific field data. System pressure and irrigation uniformity data are then reviewed and computer-analyzed. A report provides recommendations for improvements and irrigation schedules. If needed, the technician assists the local NRCS office in the redesign of the system.

An irrigation schedule offers a general guide to determine when and how much to irrigate based on system efficiency, crop requirements and soil characteristics. The technician returns several times for further data collection and review with the grower, installation of free soil moisture-sensing devices to help adapt the schedule to the site and calibration and maintenance of the devices.

In addition to the benefits of free irrigation evaluations, water conservation and water quality improvements, the program shares valuable technology and information with growers.

Mobile Irrigation Lab data suggests that most evaluated systems are already at or above permitted efficiency standards. With only minor improvements, about half the sites below these standards could easily meet them. Typically, if all recommendations are implemented, overall system irrigation efficiency can improve by an estimated 17 percent — helpful to any grower's bottom line, as well as the region's water resources.

Contact:

Jeff Whealton
Agricultural Regulation Program Coordinator
1-800-492-7862 (FL only), ext. 6119

INDIVIDUAL PROTECTIVE COVERS (IPCS) FOR YOUNG TREE PROTECTION FROM THE HLB VECTOR, THE ASIAN CITRUS PSYLLID

https://edis.ifas.ufl.edu/pdf/HS/HS1425/HS1425-Dgw8b66hof.pdf

By Fernando Alferez, Ute Albrecht, Susmita Gaire, Ozgur Batuman, Jawwad Qureshi, and Mongi Zekri

RATIONALE

Because of the endemic presence of huanglongbing (HLB) and its vector, the Asian citrus psyllid (ACP), in Florida, there is a strong need for planting new citrus trees to replace those that have become unproductive. Citrus in Florida faces unique challenges as mature infected trees coexist with newly planted healthy trees that need to be protected from ACP and HLB but have different physiologies and require different management. In mature trees, the main goal is to sustain fruit production, because trees are already infected with *Candidatus* Liberibacter asiaticus (*C*Las), the bacterium associated with HLB. In contrast, young trees are HLB-free at planting, and the main goal is to keep them healthy and free from the disease as long as possible, or at least until they bear fruit. ACP infestation in young trees is usually managed by soil drenches of systemic insecticides rotated with foliar sprays of insecticides with a different mode of action (MOA).

Psyllid exclusion is the most effective strategy to keep citrus trees free from HLB. Citrus Under Protective Screens (CUPS) have been proven effective for growing trees in an enclosed environment and keeping them disease-free (Schumann et al. 2020). However, this system is expensive and probably most applicable for smaller acreages of specialty crops, such as fresh-fruit varieties with a high return on investment. Individual protective covers (IPCs) are a novel strategy based on psyllid exclusion of individual trees using a protective mesh bag. IPCs are economically more feasible for processing varieties grown on a large acreage in Florida. The IPC system provides an alternative to soil drenches and foliar insecticides, which effectively reduce psyllid populations but cannot always prevent *C*Las infection. The situation is exacerbated by the increasing levels of psyllid resistance to the neonicotinoid insecticides, which have been used extensively for more than a decade to protect young trees from ACP. Psyllid exclusion by using IPCs is therefore a promising tool that has sparked interest in recent years, with many growers adopting this technology in their groves.

This document is of special interest for growers planting new trees at their groves. Here we summarize the knowledge we have accrued from our 3-year-long field studies using the IPC system and provide recommendations that can help with effective use of this technology.

IPC CHARACTERISTICS AND INSTALLATION

Currently, there is a wide variety of models and sizes for IPCs. In general, IPCs are net covers that are made of monofilament high-density polyethylene (HDPE) or polyvinyl with a mesh size of 50 (0.297 mm holes, i.e., 50 holes per linear inch), which is small enough to exclude psyllids from the trees, because the average width of a psyllid adult is 0.57 mm. IPC sizes vary from 3 feet to 8 feet or more, and depending on the size, a PVC pole with or without spreaders must also be installed to serve as support for the net. The net covers are tightly secured to the trunk and PVC pole with zip ties just below the graft union; the covers can be tucked into the tree wraps and secured there, or they can be secured outside the wraps (Figure 1).

Figure 1. Installation of IPCs. Detail showing PVC pole and spreader (left) and trunk protection holding the IPC close to the trunk and tucked into the wrap (right).
Credit: Susmita Gaire, UF/IFAS

IPCs can be installed on solid blocks of trees or in resets (Figure 2). As mentioned above, IPCs are especially valuable for planting reset trees in gaps left by dead or removed trees in mature groves where HLB incidence is typically higher and the risk of infection is therefore greatest. IPCs should be placed immediately during planting to prevent any exposure of trees to the psyllids. Tree management can be performed as for noncovered trees, but psyllid management can be reduced or eliminated. Nevertheless, scouting for pest and diseases should be continued.

The period IPCs can stay on the trees varies with the rootstock/scion combination, grove management, age of the tree, and size of the cover. Multiple sizes of IPCs are now available to accommodate fast-growing trees on vigorous rootstocks or with vigorous scions; if the trees outgrow the smaller IPCs they can be replaced with larger ones to provide more time under protective cover. The right time to replace smaller IPCs with larger ones is when the canopy has completely filled the bag (typically around 2 years). Alternatively, the bags can be removed permanently at that time. The largest IPCs currently available are 8 feet in size.

Figure 2. IPCs in a large-scale commercial "solid block" grove and on "resets."
Credit: F. Alferez (top) and M. Zekri (bottom), UF/IFAS

IPC FIELD TRIALS

PSYLLID EXCLUSION

In a 3-year field study, no HLB leaf symptoms were found on IPC-covered trees, and all trees tested negative for *C*Las. In contrast, all noncovered trees showed chlorosis and blotchy mottling of leaves, which are typical foliar symptoms of HLB, and consistently tested positive for *C*Las as early as 6 months after planting. This demonstrates that IPCs were effective in excluding psyllids and therefore preventing *C*Las transmission and disease development in young trees during the early years of tree establishment. Healthy vegetative growth after planting is essential for fruit production as the trees enter the productive stage and therefore substantially contribute toward the viability of a grove.

OTHER PESTS AND DISEASES

In addition to excluding psyllids and preventing HLB, IPCs also reduced the incidence of citrus leaf miners. However, some other pests typically found on noncovered trees were also found within the covers. These pests included snow-, purple-, and black scales, mites, and armyworms. It appears that the armyworm

moth was able to lay eggs on the foliage through the mesh, or on the mesh itself, allowing the first instars to move through the holes and resulting in some feeding damage. There have been some reports of mealybug infestation in IPC-covered trees in central Florida, but this was not confirmed in our studies in southwest Florida. This suggests that IPC management will have to be adjusted based on the geographic location and growing environment. We also found a lower incidence of canker in IPC-covered trees; however, greasy spot and sooty mold were somewhat more prevalent in trees with IPCs than in noncovered trees. Taken together, this means that IPCs do not exclude all pests, and that regular scouting and insecticide applications may still be necessary to manage other pests of citrus as growers would do on uncovered trees as part of general grove management. Scouting should be performed at least once every three months (seasonally) and particularly right after severe inclement weather events such as sustained forceful wind, hail, and hurricanes. Scouting is most effective if the trees are uncovered, but it is recommended to leave them uncovered for no more than a few minutes, typically a time needed for the grower to uncover, thoroughly inspect, and cover the tree again. Foliar sprays of insecticides done with a hoop sprayer or speed sprayer provide good coverage on the trees protected with IPCs.

IPC EFFECTS ON TREE GROWTH

IPCs modify the atmosphere within the covered canopy by altering relative humidity and temperature, resulting in a lower vapor pressure deficit (VPD) compared with noncovered trees. A lower VPD means that the air contains more moisture, which allows the leaf stomata to stay open longer and extend the length of time available for photosynthesis compared with higher-VPD conditions. Under IPCs, the leaves were greener and larger with more chlorophyll, more soluble sugars, and less starch, indicating that they have been metabolically more active than noncovered trees. Interestingly, trees under IPCs flushed earlier and more profusely, and flushing was more synchronized compared to trees without IPCs, which ultimately resulted in faster tree growth. Depending on the initial IPC size and the desired time of protection, smaller IPCs may therefore need to be replaced with larger ones to accommodate the growing canopy. After final IPC removal, tree care can commence using methods typical for the production site.

In summary, although IPCs are not a one-size-fits-all system for citrus pest and disease management, they are effective in excluding psyllids and preventing *C*Las infection during the most vulnerable early years of tree growth, provided they are properly installed and remain undamaged during their time of use. IPCs can serve as another tool for growers to manage HLB in young citrus trees but can promote other pests and diseases inside the covers if not managed. Thus, regular scouting and management will still be required to retain tree health and ensure productivity in the years to come. Because IPC is a novel citrus production system, other challenges (or positive effects) may emerge as it continues to be evaluated with different rootstock/scion combinations, different installment patterns (e.g., protecting trees with IPC in “hot spots” such as in the grove perimeter, or in alternating patterns that are more cost friendly) and in different climatic conditions across Florida. The guidelines presented here are therefore preliminary and will be updated as soon as new information from our ongoing research trials becomes available.

HEDGING, TOPPING, AND SKIRTING CITRUS TREES

The interception and utilization of sunlight should be an important consideration in citrus grove design. The effect of insufficient light is frequently observed in mature citrus groves that are not pruned (hedged, topped) regularly. Shading reduces yield and foliage on the lower parts of the trees. Sunlight not only influences flowering and fruit set but also enhances fruit quality and color development. Increased sunlight penetration within the tree canopy might also allow foliage to dry quicker after a rain shower and could help reduce establishment of fungal pathogens. Therefore, adjustments must be made in tree height and hedging angle to maximize sunlight interception.

Hedging and topping are important cultural grove practices. Severe hedging or topping of citrus trees during the winter can reduce cold hardiness. Trees with exposed internal scaffold wood and new tender growth are susceptible to cold injury.

In general, tree response to hedging and topping depends on several factors including variety, rootstock, tree age, growing conditions, time of pruning, and production practices. No one system or set of rules is adequate for the numerous situations encountered in the field. Growers are encouraged to gain a clear understanding of the principles involved in hedging and topping, and to take advantage of research results as well as consulting knowledgeable colleagues and custom operators for their observations.

Hedging should be started before canopy crowding becomes a problem. Developing a pro-active pruning program should assist managers in removing the right-sized branches. Removal of a significant portion of the tree will result in excessive vegetative growth and a drastic reduction in subsequent yield. Hedging is usually done at an angle, with the boom tilted inward toward the treetops so that the hedged row middles are wider at the top than at the bottom. This angled hedging allows more light to reach the lower skirts of the tree. Hedging angles being commonly used vary from 10 to 15 degrees from vertical.

Topping should be done before trees have become excessively tall and should be an integral part of a tree size maintenance program. Long intervals between toppings increase the cost of the operation due to heavy cutting and more brush disposal. Furthermore, excessively tall trees are more difficult and expensive to harvest and spray. Topping trees will improve fruit quality and increase size. Some common topping heights are 10 to 12 ft at the shoulder and 13 to 14 ft at the peak. As a general rule, topping heights should be two times the row middle width.

After severe hedging or topping, heavy nitrogen applications will produce vigorous vegetative regrowth at the expense of fruit production. Therefore, nitrogen applications should be adjusted to the severity of hedging and/or topping. Reducing or omitting a nitrogen application before and possibly after heavy hedging will reduce both costs and excessive vegetative regrowth. Light maintenance hedging should not affect fertilizer requirements.

Large crops tend to deplete carbohydrates and results in a reduced fruit yield and increased vegetative growth the following year. Pruning after a heavy crop additionally stimulates vegetative growth and reduces fruit yield the following year. Pruning after a light crop and before an expected heavy crop is recommended because it can help reduce alternate bearing which can be a significant problem in Valencia and Murcott production.

Severe hedging may create problems of brush disposal and stimulates vigorous new vegetative growth, especially when done before a major growth flush. This happens because an undisturbed root system is providing water and nutrients to a reduced canopy area. The larger the wood that is cut, the larger is the subsequent shoot growth. Severe pruning reduces fruiting and increases fruit size.

The best time of year to hedge and/or top depends on variety, location, severity of pruning, and availability of equipment. Since pruning is usually done after removal of the crop, early maturing varieties are generally hedged before late maturing varieties. Most growers prefer to hedge before bloom, but trees will get more vegetative regrowth, which may not be desirable. Pruning could begin as early as November prior to harvesting in warmer areas. During this period, conducted pruning operations should only cut minimal foliage and fruit from the trees.

Valencia trees may be hedged in late fall with only minimal crop reduction when the hedging process removes only a small amount of vegetative growth. In cases where excessive growth is to be removed, the trees are usually harvested before hedging is conducted. Light maintenance pruning can be done throughout the summer and until early fall with little or no loss in fruit production. Moderate to severe pruning should not continue into the winter in freeze-prone areas, as trees with tender regrowth are susceptible to cold injury.

With citrus canker and greening diseases, selecting the best time for hedging and topping is becoming more complicated. New growth flushes promoted by hedging and topping in late spring, during the summer, and early fall can increase the population of leafminers and psyllids and aggravate the spread of citrus canker and greening. Declining trees with defoliated tops, dieback, reduced cropping, and severe root loss due to citrus greening are being hedged and topped to help balance the shoot to root ratio to improve tree performance and extend tree longevity.

Skirting is the pruning to raise tree skirts. Without skirting, the movement of herbicide booms is impeded. Fruit and limbs near the ground are often damaged by the passage of such equipment and by herbicide spray and fertilizer contact. Skirting allows uniform distribution of granular fertilizers and good water coverage of microsprinkler irrigation systems under tree canopies. Skirting facilitates the inspection of microirrigation systems and reduces the incidence of Phytophthora foot rot and brown rot because it allows good air circulation.

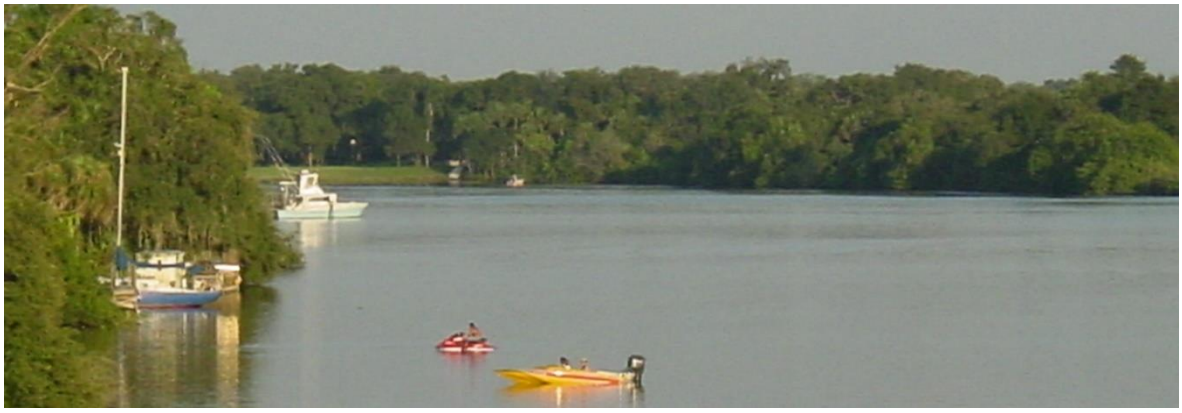
WHERE FLORIDA'S WATER COMES FROM?

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

Saline Irrigation Water: Impacts on Citrus Production

What conditions lead to irrigation water becoming salinized?

Irrigation of Florida citrus can be challenging due to the variety of ways that salts can be introduced into the agricultural water supply. For example, the use of Floridan aquifer water containing high salt levels, leaking artesian wells that have contaminated surficial aquifer wells, saltwater intrusion into groundwater aquifers, and the salt index of fertilizers are all factors that should be taken into consideration when developing a citrus irrigation management plan. In general, all irrigation water has at least some dissolved salt. The degree to which irrigation water is salinized can be measured through monitoring the Total Dissolved Solids (TDS). Typically, irrigation water intended for citrus production is usually considered "adequate" if the TDS (measured in parts per million, ppm) is less than 1,000 ppm – 1,200 ppm. In irrigation water with TDS values greater than 1,000 ppm, the potential for developing toxic conditions for plant growth arises from high levels of sodium and chloride ions. High concentrations of these ions, even when the total volume of irrigation water applied is adequate for tree growth and fruit production, can make it more difficult for a tree to take up water from the soil due to increased osmotic stress of the plant's root cells.

Why is monitoring irrigation water salinity important?

If irrigation water salinity is not managed (for example, if the TDS value chronically exceeds 1,200 ppm), there is an increased risk of toxicity to the citrus tree. Highly salinized water negatively affects all biological stages of citrus, including root, leaf, and fruit development (**Figure 1**). Citrus is considered to be a salt-sensitive crop because important plant physiological processes (including leaf photosynthesis and flower induction) are negatively impacted with even moderately salinized irrigation water.

How can irrigation water salinity be managed?

Throughout the growing season, water content within the soil fluctuates. During the rainy months of summer, water content is higher, and in the drier months of winter, it is lower. Salt ions become concentrated within the soil when water contents are relatively low. This is due to the inability of salts to be leached below the citrus tree's root zone. Thus, periodic leaching may be required to help flush salts from the root zone. This flushing is accomplished by frequent irrigation cycles during the dry months of the year.

If groves are located in a region where it is known that TDS values regularly exceed 1,200 ppm, or in areas where soil is poorly drained or where there is a perched water table, there is an increased risk of salinity-associated plant toxicity. In these situations, frequent irrigation cycles are also used to help flush excess salts beyond the citrus tree's root zone. However, salt concentrations also fluctuate throughout the year, and it is important to regularly monitor the TDS value of irrigation water. A County Extension Agent can assist in developing a salinity monitoring program, including providing instructions on how to take water samples and interpreting the results. Regular maintenance of any water furrows, ditches, and canals will also reduce the risk of developing salinity-associated toxicity by ensuring that the soil in the grove is drained properly.

The salt index (**Table 1**) and fertilizer source materials should be taken into consideration when developing a citrus irrigation management plan. As values of the salt index increase, the osmotic stress (the stress placed on citrus roots' ability to absorb water from the soil) also increases. Thus, selecting fertilizers with low salt indexes, particularly in situations where TDS values exceed 1,200 ppm, should be part of the management program. Specifically, replacing sodium nitrate and potassium chloride N and K sources with lower salt index N and K materials should result in lowered salinity-associated stress and reduce exposure to toxic Na and Cl in the soil solution. Frequent irrigation cycles aimed at leaching salts below the root zone (mentioned above) can also flush essential plant nutrients away from roots. Therefore, using split-applications of dry, water-soluble fertilizers several times during the year, or low-volume, low-concentration with high-frequency liquid fertigation cycles, may be preferred to fewer fertilizer applications at higher rates.

Citrus scion cultivar and rootstock also have known interactions with salinized irrigation water. Generally, grapefruit cultivars are more sensitive to high salt levels than orange cultivars; although both grapefruit and orange cannot tolerate salinized irrigation water for long periods of time. Through both anecdotal and formal research observations, it has been noted that some rootstocks are more forgiving of saline irrigation water than others. The following rootstock varieties are generally viewed as being relatively less-to-more sensitive to salinity: 'Cleopatra' mandarin, sour orange, sweet orange, 'Swingle' citrumelo, 'Carrizo' citrange, and rough lemon.

In summary

The salinity of irrigation water can have far-reaching effects on citrus production. Chronically high levels of salt (when TDS values exceed 1,200 ppm) can severely damage citrus tree growth and fruit production. Under these conditions, it is important to regularly provide a flushing irrigation that will be successful in leaching potentially toxic salt ions past the root zone. Even when water sources typically have TDS values below 1,200 ppm, periods of little rainfall can lead to high concentrations of salt ions in the soil. Thus, a leaching irrigation is often also required in times of little or no rainfall. The following are basic guidelines that might form the basis for successful citrus irrigation management.

- Regular flushing irrigations to achieve root zone leaching (duration of at least 6 hours every 7-10 days) when TDS values regularly exceed 1,200 ppm or during periods of little or no rainfall.
- Maintenance of any water furrows, ditches, or canals to ensure that the grove space is drained properly.
- Avoid using fertilizers whose components have high salt indexes. If using dry fertilizer, rely upon split-applications as frequently as possible. If fertigating, rely on low-volume, low-concentration applications with frequent cycles.
- Rootstock selection can have significant implications regarding salinity management: 'Swingle,' 'Carrizo,' and rough lemon are relatively more sensitive to salt; although all citrus is susceptible to salinity-associated toxicity.

Figure 1. Symptoms of salt damage (yellowing and desiccation) to citrus foliage.

Table 1. Salt index of some fertilizer sources

Material and Analysis	**Salt Index per unit (20 lb) of plant nutrient**
Nitrogen	
Ammonia, 82.2% N	0.572
Ammonium nitrate, 33.5% N	2.990
Ammonium sulfate, 21.2% N	3.253
Ammonium nitrate, 20.5% N	2.982
Calcium nitrate, 15.5%	4.194
Sodium nitrate, 16.5% N	6.060
Urea, 46.6% N	1.618
Phosphorus	
Normal superphosphate, 20% P_2O_5	0.390
Concentrated superphosphate, 45% P_2O_5	0.224
Concentrated superphosphate, 48% P_2O_5	0.210
Monoammonium phosphate, 12.2% N, 61.7% P_2O_5	0.405
Diammonium phosphate, 18% N, 46% P_2O_5	0.456
Potassium	
Potassium chloride, 60% K_2O	1.936
Potassium nitrate, 13.8% N, 46.6% K_2O	1.219
Potassium sulfate, 46% K_2O	0.853
Monopotassium phosphate, 52.2% P_2O_5, 34.6% K_2O	0.097
Sulfate of potash-magnesia, 21.9% K_2O, 10.8% Mg	1.971

Winter Weather Watch

UF/IFAS Polk County Cooperative Extension Service

The 2021 - 22 version of the Winter Weather Watch will begin on November 15, 2021. Time is short so send in your subscription form to receive timely agricultural winter weather forecasts and information.

The 2021-22 edition of the Polk County Winter Weather Watch program will begin on November 15, 2021. The program provides growers with winter weather forecast information specifically geared toward agricultural interests in West Central and Southwest Florida. The program provides subscribers with an unlisted phone number for (24 hour/7 days a week) access to daily weather forecasts. The zone forecasts are from the National Weather Service (NWS) and are listed on the automated phone menu, so you can select the products you are interested in. Forecasts include the zone forecasts, 6-10 and 8-14 day outlook forecasts. In addition to the forecasts we have special weather narratives provided as needed in the event of freezing temperatures and a weekly outlook provided by our own meteorologist Fred Crosby. When freezing temperatures are predicted in our area additional updates will include the afternoon zone forecast and the modified sunset brunt minimum temperature equation. If this is not enough we will also provide the weekly citrus leaf freezing temperatures and the 2021-22 Winter Weather Watch manual.

Subscriptions for the Winter Weather Watch program are only $100.00 for the entire 4 month period (Nov 15 to Mar 15). The cost is about the same as one tank (well maybe two now days) of gas for your pickup truck. You can subscribe to the Winter Weather Watch by completing and returning a "subscription form" or calling Gail Crawford at 863-519-1042 or email at dorothyc@ufl.edu

Forecast Schedule

The following schedule lists the products available from the Winter Weather Watch. The times and specific days of week and the forecasted minimum temperature dictate when these forecasts products will be updated. Our Winter Weather Watch area includes the following areas by county: Pasco, Hillsborough, Polk, Highlands, Hardee, Manatee, Sarasota, DeSoto, Charlotte, Lee, Glades, Hendry and Inland Collier.

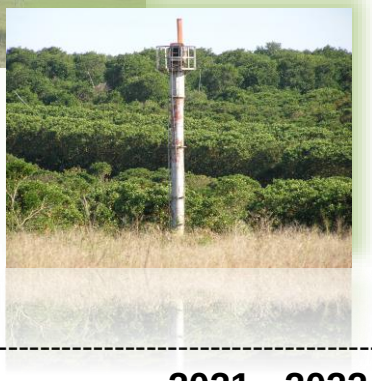
Forecast Schedule

Forecast Product	Above 32 ^{0} F	32^{0}-29^{0}F	Below 28^{0} F
Zone*	***Daily 8:30 a.m.***	***Daily 8:30 a.m.***	***Daily 8:30 a.m.***
6-10 & 8-14 Day Outlooks*	***Mon/Wed/Fri 8:30 a.m.***	***Mon/Wed/Fri 8:30 a.m.***	***Mon/Wed/Fri 8:30 a.m.***
Weekly Outlook	***Friday 5:00 p.m.***	***Friday 5:00 p.m.***	***Friday 5:00 p.m.***
Leaf Freezing Temperatures	***Friday 5:00 p.m. & on the Florida Automated Weather Network (FAWN)***	***Friday 5:00 p.m.***	***Friday 5:00 p.m.***
Special Weather Narratives	***As Needed***	***Daily 3:00 p.m.***	***Daily 3:00 p.m.***
Afternoon Zone*	***None***	***Daily 4:00 p.m.***	***Daily 4:00 p.m.***
Sunset/Brunt	***None***	***As Needed***	***Daily 7:00 p.m.***

*NWS products are subject to changes in schedule timing based on NWS release of these products.

2021 - 2022 WINTER WEATHER

WATCH PROGRAM



NOVEMBER 15, 2021 TO MARCH 15, 2022
REGISTRATION FEE: $100.00

It's once again time to register for the upcoming 2021 - 2022 Winter Weather Watch Program. Upon receiving your $100.00 registration payment, you will be sent an unlisted telephone number with which you can retrieve the latest **Ag Forecasts**, 24 hours a day. **Please do not give this number to others**. The *Winter Weather Watch Program* is funded by the registration fees to pay for telephone equipment rentals, long distance calls, repairs and our consulting meteorologist.

2021 - 2022 Winter Weather Watch Program

NAME:_____ PHONE NUMBER:_____

ADDITIONAL PHONE NUMBERS:_____

COMPANY:_____

MAILING ADDRESS:_____

EMAIL ADDRESS:_____

CITY:_____ZIP CODE:_____

REGISTRATION FEE $100.00

PLEASE RETURN THIS REGISTRATION FORM AND YOUR CHECK PAYABLE TO:

POLK COUNTY EXTENSION CITRUS ADVISORY COMMITTEE
PO BOX 9005, DRAWER HS03
BARTOW, FL 33831-9005

FLATWOODS CITRUS NEWSLETTER EVALUATION FORM

Please take a moment to rate the quality and usefulness of the information presented in the Flatwoods Citrus newsletter.

Evaluation online:
https://forms.office.com/pages/responsepage.aspx?id=lTLMQg7NnES5jlzltWDB04GUfUG_eUVGnCDqLI_nI8pURTE2WE5INE85SjRFR0s2NTBZOEtHMVdGSS4u

or Please send back this form to:
Dr. Mongi Zekri
University of Florida, IFAS
Hendry County Extension Office
P.O. Box 68
LaBelle, FL 33975
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.

Sending hard copies of this Flatwoods Citrus newsletter by regular mail will stop by the end of this year. You will receive your copy only through e-mail.

☐ 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
E-mail: maz@ufl.edu

Subscriber's Name:_____

Company:_____

Phone:_____

E-mail:_____

Racial-Ethnic Background

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

Gender

__Female
__Male