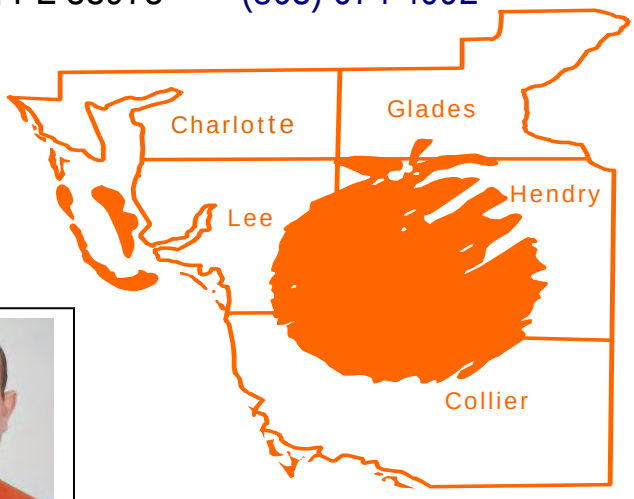
UF UNIVERSITY of FLORIDA
IFAS Extension

EXTENSION

Institute of Food and Agricultural Sciences

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

Flatwoods Citrus



Vol. 26, No. 9 **September 2023**

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

Mongi Zekri

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September 28, 2023 Zoom Citrus Workshop

Date and time: Thursday, September 28, 2023, 10:00 AM – 11:00 AM
Title: "Silicon - A beneficial nutrient for citrus production"
Speaker: **Dr. Muhammad Adnan Shahid**, Assistant Professor of Horticulture at the UF-IFAS North Florida Research and Education Center in Quincy
Discussions will include:

-What is the silicon and its benefits
-Different sources of silicon fertilizer
-Application methods of silicon and application rate
-Use of silicon in citrus production

Zoom link will be provided next week
Coordinator: Dr. Mongi Zekri, UF-IFAS, maz@ufl.edu
1 CEU for pesticide license renewal
1 CEU for certified crop advisors

CEUs for pesticide license renewal

Earn CORE CEUs online through articles written by UF-IFAS Citrus Extension Agents in the Citrus Industry magazine
http://citrusindustry.net/ceu/

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

- 2023 #3: **A Guide to Safe, Effective Pesticide Use (7/31/24)**
- 2023 #2 **What To Do When You've Been Exposed to a Pesticide (4/30/24)**
- 2023 #1: **Key Terms to Know When Using Pesticides (1/31/24)**
- 2022 #4: **Making Sense of Pesticide Formulations (10/31/23)**

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.

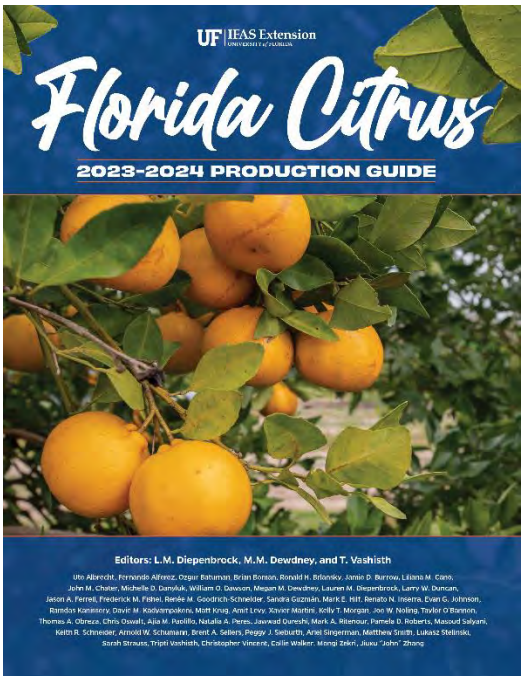
Florida Citrus Production Guide
https://crec.ifas.ufl.edu/resources/production-guide/

The objective of the Florida Citrus Production Guide is to assist citrus growers in the identification of pest management options and the selection of appropriate control measures. This publication should serve as a reference once it has been determined that control measures might be warranted. It is not intended to replace pesticidal product labels which contain important usage information and should be immediately accessible for reference. Violations of directions for use printed on the label are against State and Federal laws. Care should be taken to select only those treatments best suited for control of the specific pest(s) identified as requiring suppression. Products listed in all tables have been shown to be efficacious, non-phytotoxic to citrus, and relatively safe on non-target arthropods and microorganisms when used as directed. However, it is important to realize that results may not be consistent under different environmental, application, and tank mix conditions.

PRODUCTION GUIDE MENU

If you did not pick up your hard copy of the newly updated Florida Citrus Production Guide at the **Citrus & Specialty Crop Expo**, you can find the electronic version online https://crec.ifas.ufl.edu/resources/production-guide/

If you need hard copies, you can get them free from your Citrus Extension Agent or from the Citrus Research & Education Center in Lake Alfred and the Southwest Florida Research and Education Center in Immokalee.



2023-2024 Citrus Production Guide Available at Florida Citrus Expo

An updated perennial resource for Florida commercial citrus growers is available to support their efforts to produce a successful citrus harvest

PUBLISHED ON **JULY 24, 2023**

The 2023-2024 publication includes the latest technical advice on citrus greening disease management, tree nutrition, grove management and other aspects of Florida citrus cultivation. (Courtesy Photo)

LAKE ALFRED, Fla. — An updated perennial resource for Florida commercial citrus growers is available to support their efforts to produce a successful citrus harvest. The 2023-2024 UF Institute of Food and Agricultural Sciences Citrus Production Guide will be available to growers at the August Florida Citrus Expo in Tampa and through their local UF/IFAS Extension citrus agents afterwards.

The document is a comprehensive reference meant to assist growers in development and management of citrus groves in Florida, said Tripti Vashisth, a UF/IFAS horticulture associate professor and a member of the guide's editorial team.

Additions this year include new fertilizer recommendations for some nutrients that have been recently changed and information on the plant growth regulator gibberellic acid (GA). Information on pesticides registered for use in Florida citrus is also updated in every new edition.

Topics covered in the guide include planting, irrigation, fertilization, weed control, insect management and disease management, she said. For a grove management practice to be recommend in the guide, a minimum of two years of field validated data is required. About 50 UF/IFAS personnel contributed to the latest edition.

"Each year, we update the guide with new information as it becomes available. This is a fundamental component of the UF/IFAS faculty mission to continue to meet the needs of our growers as we learn about and/or develop new tools and strategies for citrus production," Vashisth said.

Hard copies of the updated guide will be available at the UF/IFAS booth at the Florida Citrus Expo held at the Florida State Fairgrounds in Tampa, August 16 – 17. After that, they will be at local UF/IFAS Extension county offices (please see chart) in citrus growing counties.

For a directory of citrus agents, visit http://citrusagents.ifas.ufl.edu/locate/index.shtml. Another way to access the guide is on-line through the UF/IFAS Extension Electronic Data Information Source library at the EDIS website. It will also be available at the UF/IFAS Citrus Research and Education Center and the cirtrusresearch.ifas.ufl.edu websites.

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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

10 August 2023

ENSO Alert System Status: El Niño Advisory

Synopsis: El Niño is anticipated to continue through the Northern Hemisphere winter (with greater than 95% chance through December 2023 -February 2024).

In July, El Niño continued as indicated by above-average sea surface temperatures (SSTs) across the equatorial Pacific Ocean [Fig. 1]. Nearly all of the weekly Niño indices in the central and eastern Pacific were in excess of +1.0°C: Niño-3.4 was +1.1°C, Niño-3 was +1.8°C, and Niño1+2 was +3.4°C [Fig. 2]. Area-averaged subsurface temperatures anomalies decreased compared to June [Fig. 3], but remained positive, in association with anomalous warmth across the equatorial Pacific Ocean [Fig. 4]. Tropical atmospheric anomalies were also consistent with El Niño. Starting in mid-July, low-level winds were anomalously westerly over the western equatorial Pacific, while anomalous easterlies prevailed over the eastern Pacific. Upper-level wind anomalies were westerly over the eastern Pacific. Convection continued to be enhanced around the International Date Line and was weakly suppressed in the vicinity of Indonesia [Fig. 5]. The equatorial Southern Oscillation Index (SOI) and the traditional SOI were both negative. Collectively, the coupled ocean-atmosphere system reflected El Niño.

The most recent IRI plume indicates El Niño will persist through the Northern Hemisphere winter 2023-24 [Fig. 6]. Given recent developments, forecasters are more confident in a "strong" El Niño event, with roughly 2 in 3 odds of an event reaching or exceeding 1.5°C for the November-January seasonal average in Niño-3.4. Note that a strong El Niño does not necessarily equate to strong El Niño impacts locally, with the odds of related climate anomalies often lower than the chances of El Niño itself (e.g., CPC's seasonal outlooks). In summary, El Niño is anticipated to continue through the Northern Hemisphere winter (with greater than 95% chance through December 2023 -February 2024; [Fig. 7]).

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 14 September 2023.

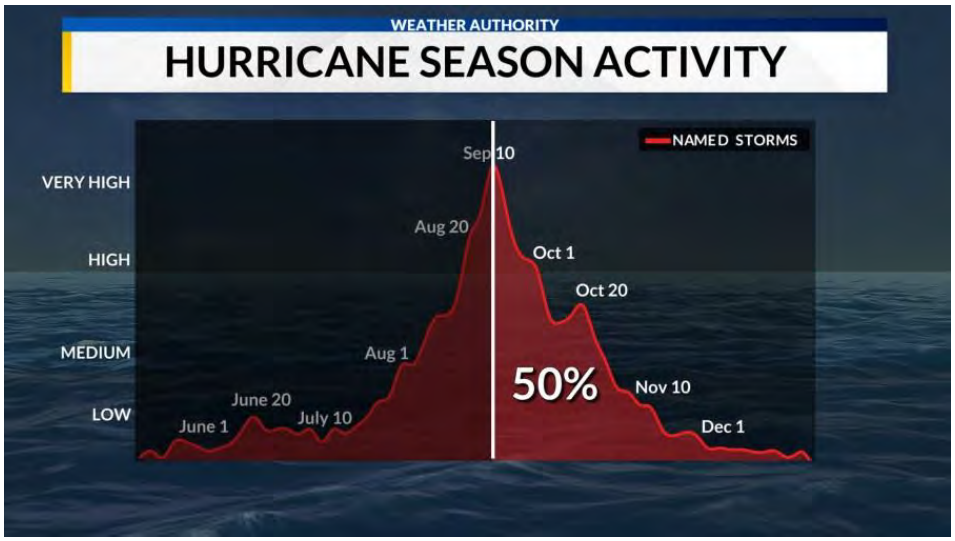
Climate Prediction Center
National Centers for Environmental Prediction
NOAA/National Weather Service

2023 Atlantic Hurricane Season halfway over

By: Jessica Camuto
Updated: Sep 10, 2023

https://whnt.com/weather/valleywx-blog/2023-atlantic-hurricane-season-halfway-over/

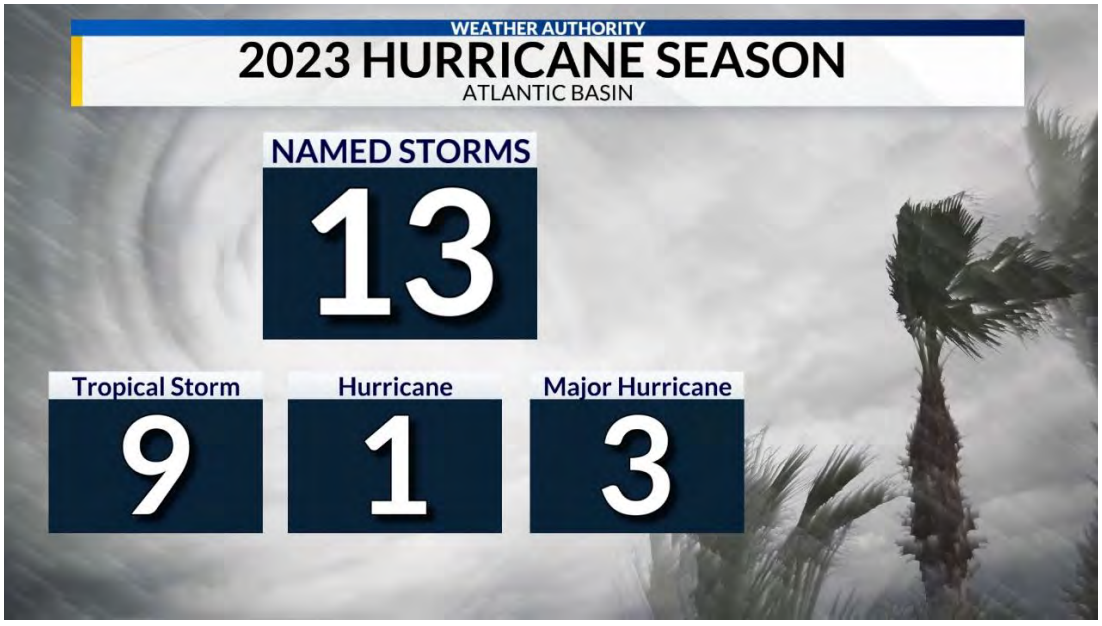
While the Atlantic Hurricane Season runs from June 1st to November 30th, the peak of activity occurs during the month of September.



Hurricane activity in the Atlantic Basin primarily intensifies late August through the month of September. September 10th is the peak of the season and it is also halfway through the season. During a normal season, activity over the Atlantic would slowly begin to come down – though a brief uptick is possible again on October 20th.

During the month, storms generally develop in the far eastern Atlantic off the west coast of Africa. The Central and Western Atlantic are generally also prime areas for tropical development during the month of September.

This season, El Niño conditions are expected to continue to strengthen through the end of November. Normally, El Niño would limit tropical development over the Atlantic due to stronger trade winds. The stronger wind shear breaks down tropical systems. What has counterbalanced the El Niño effect has been the record-breaking ocean temperatures and the African Monsoons; allowing for an active season so far.



NOAA Forecasters updated their season predictions due to the recent interactions between water temperatures and El Niño conditions. They are forecasting that 14 to 21 named storms may occur, with six to 11 of them being hurricanes and two to five being major hurricanes. So far this season, 13 storms have formed with 3 being major hurricane strength (maximum winds over 111 mph).

During the month of August specifically, six storms formed with two of those becoming major hurricanes. Based on the 30-year average (1991-2020), between three to four typically develop with one or two being a hurricane. During the month of August, a major hurricane forms every one to two years, the last time was in 2021.

Atlantic Basin Names Left

Heading into the second half of the season, there are still eight names left on the list to go through. Remember, the season will officially end on November 30th so there is plenty of time to go. The next name on the list will be Nigel.

MANAGING EXCESSIVE BICARBONATES WITH ACIDIFICATION

By Dr. Jim Graham and Dr. Kelly Morgan, UF-IFAS

HIGH BICARBONATES AND HLB

Irrigation water in Florida that comes from wells in a limestone aquifer or from lakes or canals that cut into limestone contain dissolved bicarbonates, which is a liming material.

Irrigation with such water can increase soil pH with time and cause adverse effects on tree growth, reduce yields and may cause plugging of irrigation emitters. The effect of irrigation on soil pH depends on the concentration of bicarbonates in the water, the amount of the water applied, the buffering capacity of the soil and the sensitivity of the rootstock being grown. A water test is the surest means of determining if a problem exists. If the pH of the irrigation water is below 7.0, then we may safely assume that it will not be a problem. However, if the pH is above 7.0, the water contains bases such as bicarbonates, and a sample should be sent to a laboratory with a request to specifically test for bicarbonates.

The growers we cooperate with were the first to observe that groves most affected by HLB and fruit drop are irrigated with water high in bicarbonates applied to the wetted zone where fibrous roots are concentrated. Greater HLB symptom expression is also associated with grove soils that have a history of excessive dolomite liming to manage high residual soil copper. Groves with high water and/or soil bicarbonates have off-color foliage, thinning canopies due to excessive leaf drop, twig dieback and more severe HLB symptoms in leaves and fruit. Leaf and soil nutrient analysis in these groves suggests that bicarbonate stress reduces root uptake of calcium (Ca), magnesium (Mg), potassium (K) and iron (Fe). For example, even when soil Ca status is very high, associated leaf Ca levels are moderate. Severity of HLB symptoms for trees on different rootstocks follows rootstock susceptibility to bicarbonates: Swingle citrumelo > Carrizo citrange > sour orange > Cleopatra mandarin.

BICARBONATE STRESS, FIBROUS ROOT DENSITY AND YIELD

We found a relationship between fibrous root density and reduction in fruit yields for blocks where irrigation water is in excess of 100 parts per million (ppm) bicarbonates and soil pH is greater than 6.5. The greatest decline occurred in Flatwoods groves, which had a 20 percent decrease in yield compared to Ridge groves under low bicarbonate stress, which had a 6 percent increase in production over a time period when HLB incidence was rapidly accelerating. Greater yield loss under bicarbonate stress was correlated with lower fibrous root density compared to the non-stress condition.

RIDGE AND FLATWOODS DIFFERENCES

Experience in California citrus and observations in Florida confirm that acidification of the soil or water reduces root zone pH and may promote release of Ca, Mg and Fe for root uptake.

Conditioning of irrigation water with acid works quickly to lower root zone pH, but does not work during the rainy season when irrigation is less frequent. Soil conditioning with prilled elemental sulfur applied to the wetted zone creates acidity that releases all season long. When soil pH rises to near the initial pH, the prilled sulfur is reapplied. In the central Ridge (Highlands County), we sampled four low-bicarbonate groves without acidification of the irrigation water and four high-bicarbonate groves with acidification of the irrigation water. Root mass density was similar for groves with or without acidification. Soil pH in the low-bicarbonate and acidified groves ranged from low 5.0 to mid 6s. Leaf analysis confirmed the improved color and absence of twig dieback of the acidified groves, which are associated with optimum leaf nutrient levels. In contrast, the Flatwoods groves (Hardee County) with high bicarbonate irrigation water had a root mass density five to 10 times lower than in the Ridge groves. Soil pH in the acidified groves at the beginning of the survey was in the low 6s, but rebounded to high 6s during the rainy season. Foliage improved in color and vigor, but not as much as for Ridge groves, and was associated with low leaf manganese (Mn) and zinc (Zn) levels.

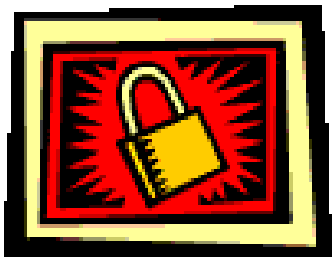
MANAGEMENT RECOMMENDAT IONS

Observations confirm that trees respond well to reducing soil stresses with a balanced, lower and more frequent application of water and nutrients, i.e. “spoon feeding”. Where excess bicarbonates in irrigation water or soil have been identified by water and soil testing, the goal is to reduce soil bicarbonate stress to sustain root functioning in nutrient uptake and root longevity. To assess bicarbonate stress, check soil pH in the wetted zone and test well water for pH, bicarbonates, salinity, cations and anions. Conditioning the irrigation water can be achieved by injection of acids (e.g., sulfuric or phosphoric) or combinations of acids and urea to reduce bicarbonates in irrigation water to below 100 ppm. Injecting products that combine acids and urea reduces corrosion of injection equipment, makes the acids safer to use and supplies a small amount of nitrogen. After correcting water and soil bicarbonate stress, then consider management of root pathogens.

SUMMARY

Surveys of groves after 1 to 1 ½ years of treatment indicate that acidification reduces HLB-induced fruit drop and improves tree appearance. Soil pH/bicarbonate management of irrigation water and soil may reduce stress on fibrous roots and increase nutrient uptake and root longevity. Growers are advised to check soil pH (wetted zone) and test well water for pH, bicarbonates, salinity, cations and anions. Acidification of the rhizosphere will release Ca and Mg from bicarbonate and make soil Mn, Zn and Fe more available for root uptake.

Suggested Facility Security Practices



Awareness
- Conduct a security assessment of your facility.
- Use opening and closing security check lists; note any discrepancies or irregularities.
- Initiate or join your local "crime watchers" program.

Access
- Escort all customers or visitors in storage yards or near loading docks.
- Establish a uniform or ID badge system to distinguish employees.

Alarms
- Install alarms and use a security alarm monitoring service.
- Ensure that phone lines are protected or have a service interruption alarm.
- Locate exterior strobe lights with alarms where neighbors and law enforcement can see them.

Barriers
- Construct structural barriers, including steel doors and barred windows.
- Install fencing as a deterrent where appropriate; fencing should be such that law enforcement and passers-by can view the property.
- Install access gates where fencing is not appropriate.
- Install bollards and chains across driveways or block with trucks and other equipment during off-hours.

Community
- Establish a process for including neighbors and the community as part of facility security and emergency response planning.

Inventory Control
- Know your inventory.
- Establish an ongoing process for inventory control of materials stored at the facility.
- Do not allow unattended, loaded trailers on site.
- Record stored nurse tanks by identification number and weight of remaining product.
- Inspect tanks visually each morning.
- Keep bills of lading, blank forms and all shipping/receiving paperwork secured.

Law Enforcement
- Establish and maintain relationships with local law enforcement and emergency responders. Provide them with your emergency plans and keys to locked gates.
- Provide law enforcement dispatchers with current emergency contact information for the facility. Keep this information current.
- Immediately report unusual or suspicious persons, vehicles or activity to local law enforcement.

Lighting
- Contact your local power company for a lighting assessment and information on leasing lights for your property.
- Install sufficient exterior lighting for law enforcement and passers-by to see your property.
- Discuss your lighting plan with local law enforcement.

Locks
- Establish a procedure and responsibility for locking up at close of business.
- Use high-security locks for doors, enclosures and gates, following local fire code requirements. Keep padlocks locked on hasps while not in use to prevent your lock from being replaced by someone else's.
- Use deadbolt locks on doors with a minimum of 1.5-inch throw.
- Implement key control for locked containers, equipment, hoppers, vehicles and vessels.

Signage
- Post alarm monitoring service signs in highly visible locations. Include signage for:
- No trespassing
- Private property
- Closed circuit TV surveillance
- Patrolled
- No vehicles beyond this point
- All visitors must check-in with front office
- All visitors must be escorted

Surveillance
- Install CCTV surveillance cameras to monitor less visible or high-risk areas.

Training
- Involve employees in security planning.
- Train employees to spot suspicious individuals and behavior.
- Conduct periodic emergency drills, e.g. fire, evacuation and security, with employees.

Vendors
- Know vendors that service your facility.
- Require all vendors to check in.
- Escort vendors.

Visibility
- Assure an open area around the facility, unlimited by shrubs, trees, large signs or other barriers to open sight.

SUGGESTED CUSTOMER TRANSACTION PRACTICES

Awareness
- Heighten employee awareness of what constitutes an unusual customer and sales transaction.
- Heighten customer awareness of potential for criminal misuse of agricultural chemicals.
- Advise customers to contact law enforcement immediately with any concerns about unusual persons, vehicles or activities in the vicinity of your facility or theirs.

Sales Transaction

- Know your customer.
- Follow all requirements for verification when selling restricted use pesticides.
- For all sales, record customer's name, address, telephone number. If in doubt ask for a driver's license.
- Make deliveries only when the customer or agent is available to take custody and sign for the material.
- Do not deliver tanks or other products to empty fields or other unattended locations.
- Make follow-up calls to verify receipt of materials by customer in quantity ordered.
- Be alert to those who:
  - Pay in cash;
  - Won't take delivery;
  - Behave in an unusual manner;
  - Hesitate when asked for ID to complete the sale;
  - Don't know the product;
  - Insist on certain products, such as ammonium nitrate, and will not consider other suggestions;
  - Ask questions about product manufacturing;
  - Aren't familiar with farming, pesticides or fertilizer products.
- If in doubt:
  - Write down vehicle color, make, license number and state and a physical description of the individual;
  - Retain papers the customer may have touched for fingerprints;
  - Save this information in the event that it needs to be provided to law enforcement.

Certain agricultural inputs stored at your facility may warrant special security measures, such as anhydrous ammonia, ammonium nitrate, bulk urea and insecticides.

Alarms

- Install alarms near tanks.
- Install explosion-proof alarm systems near combustible material.

Awareness

- Be alert to those attempting to buy ammonia if they cannot state a legitimate, agronomic need for the product.
- Inspect tank and bulk storage areas daily.
  - Check for fresh tracks in mud or snow or disturbed ground around tanks and bulk storage areas;
  - Check to see if tank valves are closed tightly;
  - Look for suspicious items near tanks such as duct tape, garden hose, bicycle inner tubes, buckets and coolers;
  - Check for broken or missing wire ties or seals that you may have placed on valve wheels as markers.
- Make customers aware of the potential for theft or tampering with tanks and bulk ag chemicals.
- Remove hoses between tool bars and nurse tanks; relieve pressure with the bleed valves when left overnight. Encourage end-users to do the same.

Law Enforcement

- Work with local law enforcement to encourage frequent nighttime patrols.
- Contact local law enforcement immediately if you suspect tampering or theft at your facility or the presence of unusual persons, vehicles or activities.
- Do not disturb a potential crime scene.

Locks for Tanks

- Use brightly colored plastic ties or wire seals between the valve wheel and the roll cage to ease visual checks and to identify tampering.
- Use tamper resistant seals and locks.
- Use high-security locks.
- Use specialized tank locks for nurse tanks containing anhydrous ammonia.
- Paint tank locks red so law enforcement can identify anhydrous ammonia tanks.

Visibility

- Store tanks in well-lit areas with a clear line-of-sight.
- Store tanks with flow valves facing outward to speed visual inspections.
- Do not leave tanks in remote areas.

SUGGESTIONS FOR PARTNERING WITH YOUR CUSTOMERS ON SECURITY AND SAFETY

- Take delivery of tanks as close to time of application as possible.
- Position tanks in open, visible areas.
- Don't take delivery of tanks to unattended locations.
- Don't store tanks and tool bars inside buildings, near the farmhouse or livestock confinement houses.
- Remove hoses between tool bars and nurse tanks and relieve pressure with the bleed valves if tanks are left overnight. Store hoses and tool bars away from tanks.
- Don't leave tanks unattended for long periods of time.
- Inspect tanks every day, especially after a weekend when most thefts occur.
- Return tanks immediately after use.
- Inspect and record the condition of each nurse tank upon delivery and return.
- Store all agricultural chemicals, e.g. bulk, bagged, in a secured area.
- Where appropriate, use alarm systems to protect secured storage areas and chemicals.
- Be aware of and maintain inventory control.
- Lock any containers, equipment, hoppers, tanks and vessels containing product whenever possible.
- Be aware of signs of theft of anhydrous ammonia, ammonium nitrate or bulk urea.

Law Enforcement

- Urge customers to contact local law enforcement immediately if tampering or theft is suspected or suspicious persons or vehicles are seen.
- Do not approach or confront suspicious individuals.
- Do not disturb the area around a possible crime scene.

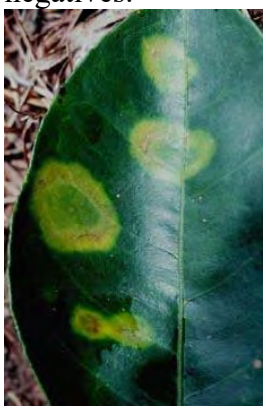
CITRUS LEPROSIS,

NOT HERE YET IN FLORIDA, BUT IN MEXICO

Leprosis is one of the most important citrus diseases in Brazil. This problem is caused by the *Citrus leprosis* virus and is transmitted by mites of *Brevipalpus* spp. It also occurs in other South American countries and has been recently identified in Central America. This northbound spread of leprosis is being considered a serious threat to the Florida citrus industry.

Prior to 1925, leprosis had a negative impact on citrus production in Florida. Then about 1926, the incidence of leprosis in Florida drastically declined, with the decline coinciding with the introduction of sulfur as an effective miticide for controlling citrus rust mite. The last time leprosis was reported in Florida was in the mid-1960s.

This disease alone is responsible for approximately $60 to 100 million per year losses in Brazil. It is quite difficult to work with the citrus leprosis virus, which has hindered much of the progress regarding its accurate detection. Symptoms require field experience and can be confused with those caused by other plant pathogens. On the other hand, laboratory analysis of lesions is time-consuming, requires experience, and is not always very accurate, leading to some false negatives.



Leprosis produces symptoms on leaves, branches and fruit. It causes lesions in the fruit skin, premature drop of leaves and fruits, and twigs dieback, with the possible death of the tree. The damage to the branches can decrease the plant productivity after some years because the damaged branches prevent the normal flow of plant sap. With effective mite control, it might take two years for a citrus tree with leprosis to fully recover. Citrus leprosis infects all varieties of sweet orange, and has been reported on lemon and mandarin. Tangerines and tangor are also susceptible to the disease. Grapefruit is reported to be tolerant.

Dissemination of the disease occurs only when infected citrus trees and vectors are present. In citrus, the population of the leprosis mite is low and usually occurs in clusters of trees, which should be monitored carefully. When the trees are contaminated with the leprosis virus, the number of diseased trees will increase as the contaminated mites disperse.

Leprosis control is based mainly on the elimination of the sources of inoculum by pruning the affected trees and by using miticides to reduce the vector. Additional control procedures are also recommended, such as:

- Planting of young trees free from leprosis mites and from leprosis virus
- Controlling the leprosis mites host weeds
- Disinfection of equipment, boxes and vehicles
- Use of mite non-host species as windbreak
- Developing and using procedures that favor the increase of the population of natural enemies of the leprosis mite.

Citrus variegated chlorosis

Modified version from https://www.dpi.nsw.gov.au/biosecurity/plant/insect-pests-and-plant-diseases/citrus-var-chlorosis#:~:text=Citrus%20variegated%20chlorosis%20is%20caused,spread%20the%20disease%20between%20plants.

Citrus variegated chlorosis (*Xylella fastidiosa*) is an exotic plant pest not present in Florida. This disease is a serious threat to Florida's citrus industry.

Citrus variegated chlorosis is caused by the bacterium *Xylella fastidiosa.* The bacterium lives and multiplies in the sap of citrus plants, blocking water uptake.

Sap feeding insects spread the disease between plants. Once a plant is infected there is no treatment other than to remove infected limbs or whole trees to try and prevent spread.

Xylella fastidiosa is responsible for a number of diseases in other horticultural crops, including Pierce's disease of grapevine, leaf scorch of tree nuts, and phony peach disease.

Description

The first sign of a citrus variegated chlorosis infection is a yellowing between veins on the upper surface of leaves, resembling zinc deficiency. As young leaves mature, light brown, slightly raised lesions develop on the underside of the leaf, directly opposite the yellow areas on the upper side. These lesions continue to develop becoming dark brown or even necrotic.

Newly infected trees show symptoms in isolated parts of the canopy. Trees with older infections show uniform symptoms throughout the canopy.

Younger trees succumb to infection much faster than older trees. Trees more than 8-10 years old are rarely severely affected, but can develop symptoms on the extremities of branches.

Damage

The presence of *X. fastidiosa* in the plant sap restricts flow of water and nutrients in the tree.

There is no known treatment for citrus variegated chlorosis once trees become infected. Affected trees show stunting and slow growth rate.

Infected trees produce significantly smaller fruit with a higher sugar content and harder rind.

Twigs and branches die back and the canopy thins, but affected trees do not die.

Spread

Xylella fastidiosa bacteria are carried in the sap of host plants and can be spread between plants by grafting, pruning or sap feeding insect vectors.

The most efficient known vector is the glassy winged sharpshooter. Glassy winged sharpshooter is not currently found in Australia. It is possible that natural insect vectors of this disease may already exist in Florida. The disease is not spread by seed.

Distribution

Xylella fastidiosa is native to the Americas and has spread to Europe where there have been recent detections in Italy and France. It is also present in the Caribbean, Taiwan, Iran, Turkey, Lebanon and Kosovo. Presence in India and Morocco is unconfirmed.

Adult glassy winged sharpshooter (12-14 mm) (Image: Reyes Garcia III, USDA Agricultural Research Service, Bugwood.org)

Pesticide Application Recordkeeping Facts

FDACS recommends recordkeeping for **all** pesticide applications regulated by Chapter 487, F.S., using this form or similar format. When properly completed, this form meets restricted use pesticides and the Central Posting requirements for the federal Worker Protection Standard.

Requirement	Florida Pesticide Law (Restricted Use Pesticide Licensed Applicators)	Worker Protection Standards (All Agricultural Use Pesticides)
• Record Location	Applicator Records	Central Location 
• Recordkeeping Time	**2 yrs** after application date (Section 487.160)	**30 days** after the REI expiration time and/or application time (for pesticides without an REI) (Sections 170.122 & 170.222)

Other WPS Pesticide Application Record Timing Considerations for Central Location

If field warning signs are posted for a treated area *before* an application, the pesticide record application information for that application shall be posted at the same time or earlier. The information shall be posted ***before*** the application takes place, if workers will be on the establishment during application. Otherwise, the information shall be posted at the ***beginning*** of any worker's first work period.

REMEMBER

Use warnings signs correctly, it's the Law!

The signs shall be posted no sooner than **24 hours** before the scheduled application of the pesticide, remain posted throughout the application and any restricted entry interval. They must be removed within **3 days** after the end of the pesticide application, restricted-entry interval expiration time and before agricultural workers entry is permitted.

QUICK SPANISH TRANSLATION OF PESTICIDE APPLICATION RECORD TERMS:

(Definición en español de términos encontrados en el récord de aplicación de pesticidas)

1. Fecha (R/W) 2. Hora de comienzo (R/W) 3. Hora final (R)	Nombre del aplicador actual si es diferente al mencionado arriba (incluya el número de licencia si aplica) (R)	1. Lugar / Descripción del área tratada (R y W) 2. Cultivo Tratado (R)	Tamaño total del área tratada	4. Nombre del Pesticida (R & W) 5. Núm de Registro de "EPA" (R y W) 6. Ingrediente(s) Activo (W)	Cantidad total del pesticida aplicado (R)	Método de Aplicación (R)	Intervalo de entrada restringida (W)

Claves- (R)- Requisito para aplicadores certificados utilizando pesticidas de uso restringido agrícola.
(W)- Requisito bajo las Normas para la Protección al Trabajador Agrícola ("Worker Protection Standard (WPS)" en inglés)

ADAM H. PUTNAM
COMMISSIONER

Florida Department of Agriculture and Consumer Services
Division of Agricultural Environmental Services

SUGGESTED PESTICIDE RECORDKEEPING FORM

Telephone Number (850) 617-7880

FDACS recommends recordkeeping for all pesticide applications regulated by Chapter 487, F.S., using this form or similar format. When properly completed, this form meets the recordkeeping requirements for restricted use pesticides and the central posting requirements for the federal Worker Protection Standard.

Licensed Applicator (R) _____ License No. (R) _____ Property Owner Authorizing Application (R) _____

1. Date 2. Start Time 3. End Time All R/W	Actual applicator if different from above (include license no. if licensed) (R)	1. Location/Description of Treatment Site (R/W) 2. Target Site or Crop (R)	Total Size of Treatment Area (R)	1. Pesticide Brand Name (R& W) 2. EPA Reg. No. (R/W) 3. Active Ingredients (W)	Total Amt. of Pesticide Applied (R)	Application Method (R)	Restricted Entry Interval (W)

(R) = For Restricted Use Pesticides (W) = For Worker Protection Standard Requirement (Vea dorso para definición de términos en español)