UF UNIVERSITY of FLORIDA
IFAS Extension

EXTENSION

Institute of Food and Agricultural Sciences

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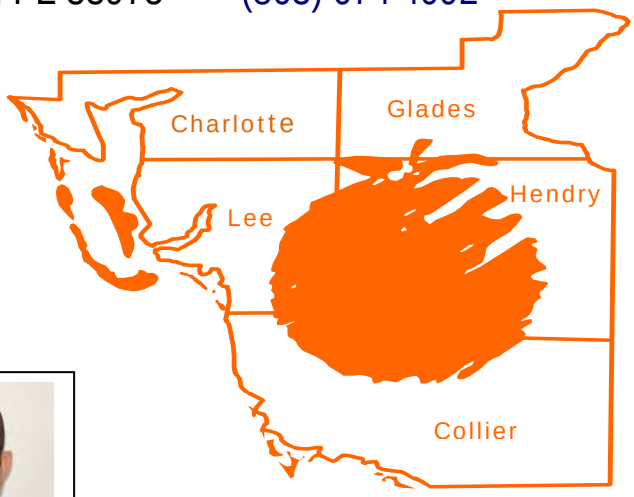
Flatwoods Citrus



Vol. 24, No. 7 **September 2021**

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

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October 2021 Zoom Citrus Seminar

Date & Time: Thursday, October 14, 2021, 10:00 AM – 11:00 AM
Title: Nutrient and irrigation management in the HLB era
Presentation summary:

- FAWN weather stations can be used along with irrigation apps to schedule irrigation and reduce nutrient leaching.
- Irrigation decisions should be based on use of soil moisture sensors recommended for Florida sandy soils to minimize nutrient leaching.
- Current data suggests the need to update secondary macronutrient and micronutrient guidelines for HLB-affected trees: improved yield, improved canopy size.
- It is good to note the lag time for nutrient applications to show effect on yield, canopy and trunk size.
- With macronutrients and micronutrients we observed reduced root dieback and increased root growth because root density was increased by foliar nutrient application and the tree was more efficient in soil nutrient applied uptake.

Presenter: **Dr. Davie Kadyampakeni**, Assistant professor at UF-IFAS, Citrus Research and Education Center, Lake Alfred.
Coordinator: Dr. Mongi Zekri, UF-IFAS Extension

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

You are invited to a Zoom meeting.
When: Oct 14, 2021 10:00 AM Eastern Time (US and Canada)
Register in advance for this meeting:
https://ufl.zoom.us/meeting/register/tJAof-2hqDMoGNNKgM2prQR8LeiMX-1E5qKP
After registering, you will receive a confirmation email containing information about joining the meeting.

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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

9 September 2021

ENSO Alert System Status: La Niña Watch

Synopsis: **A transition from ENSO-neutral to La Niña is favored in the next couple of months, with a 70-80% chance of La Niña during the Northern Hemisphere winter 2021-22.**

In the last month, ENSO-neutral continued with near-to-below average sea surface temperatures (SSTs) persisting in the central and eastern equatorial Pacific [Fig. 1]. In the last week, all of the Niño index values ranged from -0.2°C to -0.3°C [Fig. 2]. Negative subsurface temperature anomalies (averaged from 180-100°W) remained steady in August [Fig. 3], reflecting below-average temperatures that extended from the surface to ~250m depth in the eastern Pacific Ocean [Fig. 4]. Low-level wind anomalies were easterly over the western Pacific Ocean, while upper-level wind anomalies were westerly over the western and east-central Pacific. Tropical convection was suppressed near and west of the Date Line and enhanced over Indonesia [Fig. 5]. Given these conditions, the ocean-atmosphere system reflected ENSO-neutral, but is edging toward La Niña.

The IRI/CPC plume average of forecasts for the Niño-3.4 SST region from the last month favored borderline or weak La Niña during the fall and winter 2021-22 [Fig. 6]. The forecaster consensus this month, however, favors the latest predictions from the NCEP CFSv2 and the North American Multi-Model Ensemble, which suggest higher chances for the emergence of La Niña. At this time, forecasters anticipate La Niña to be of weak strength (seasonal average Niño-3.4 index values between -0.5°C to -0.9°C). In summary, a transition from ENSO-neutral to La Niña is favored in the next couple of months, with a 70-80% chance of La Niña during the Northern Hemisphere winter 2021-22 (click CPC/IRI consensus forecast for the chances in each 3-month period).

This discussion is a consolidated effort of the National Oceanic and Atmospheric Administration (NOAA), NOAA's National Weather Service, and their funded institutions. Oceanic and atmospheric conditions are updated weekly on the Climate Prediction Center web site (El Niño/La Niña Current Conditions and Expert Discussions). 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 October 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

Do not ignore flooding

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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. 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).

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. 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.

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

EFFECT OF WATER pH ON EFFICACY OF PESTICIDES

Successful citrus growers should check the soil pH of their groves yearly and do their best to adjust it for better fertilizer efficiency, tree growth, and fruit production. Soil pH is usually increased by liming and decreased by applying sulfur or acid-forming fertilizers. The pH indicates whether the solution or media is acidic or basic (alkaline). The pH scales goes from 0 to 14, where 7 indicates neutrality. Values less than 7 indicate acidic solutions and values greater than 7 indicate a basic condition. Most of Florida fresh waters have pH values between 7 and 8. Although the pH is the most common measured property or characteristic of a solution or a media, some growers and production managers still ignore to adjust the pH of their water when used for pesticide mixing. For better efficacy, anyone involved in pesticide mixing should use a pH meter. The pH affects the rate at which some herbicides are absorbed by plants. Adjusting the pH of the water allows the user to reduce the rates of herbicides without reducing their efficacy. The effectiveness of spray mixture in the spray tank can be affected by a number of variables. A significant impact on the efficacy of many spray materials is the pH of the water used in the tank. In general, it is desirable to have the pH of the water below 7. Although several chemicals used today are effective at a wide range of pH conditions, many others can be subject to breakdown of the active ingredient at relatively high pH values. With extremely sensitive chemicals, this breakdown can begin between mixing and application. Sevin is among the common pesticides that lose their effectiveness quickly in alkaline (pH values greater than 7) solution. Therefore, it is recommended to reduce the pH of the water in the tank to increase the efficacy of some chemicals. Acidifying agents such as phosphoric acid and citric acid will lower the pH, but can drop it too low. Buffering agents, available from most distributors, will lower the pH to the desired range and help maintain it at that level. It is important to add the buffer to the spray tank water before pesticides are added. **Glyphosate works better when ammonium sulfate is added to the spray tank at rates of 8.5 to 17 pounds for every 100 gallons of spray solution.** Be careful when buffering tank mixes containing copper fungicides. Copper is more soluble in acidic water, and the resulting high concentrations will cause leaf and fruit burn. Aliette makes acid spray. Therefore, do not mix Aliette with copper. **Always read the label of the buffering material as well as the label of the pesticide**. It is also recommended to ask your chemical supplier for up-to-date information on the susceptibility of a material to hydrolysis. A good rule of thumb is to spray pesticide mixtures as soon after mixing as possible, mix only enough to treat the crop and do not allow the mixture to stand for a long period of time or overnight.

IRRIGATION, NUTRITION AND FRUIT QUALITY

Florida has the highest citrus fruit quality standards in the world. Fruit quality factors include juice content, soluble solids and acid concentrations, soluble solids-acid ratio, fruit size, and color. Florida citrus growers know that quality factors differ for the fresh and processing markets. For example, fruit size, shape, color, and maturity date are most important for fresh fruit, but high juice content and soluble solids are desired for processing fruit. Fruit quality is affected by several factors including cultivar, rootstock, climate, soil, pests, irrigation, and nutrition.

The effects of irrigation and nutrition on fruit quality are very important and should be understood and taken into consideration by citrus growers and production managers to increase their profitability and enhance their sustainability and competitiveness on a worldwide basis. In general, excessive irrigation and nutrition reduce fruit quality. Therefore, balanced nutrition with sound irrigation scheduling based on **IFAS** recommendations should be a high priority management practice for every grower. Citrus trees require a properly designed, operated, and maintained water management system and a balanced nutrition program formulated to provide specific needs for maintenance and for expected yield and fruit quality performance. Irrigation contributes to the efficiency of fertilizer programs. Adequately watered and nourished trees grow stronger, have better tolerance to pests and stresses, yield more consistently, and produce good quality fruit. On the other hand, excessive or deficient levels of watering or fertilization will result in poor fruit quality. The most important management practices influencing fruit quality are irrigation and nitrogen, phosphorus, potassium, and magnesium nutrition. However, when any nutrient element is severely deficient, fruit yield and fruit quality will be negatively altered. Trends in fruit quality response to high nutrition and irrigation are described and summarized below.

Nitrogen (N)

- Increases juice content and color, total soluble solids (TSS), and acid content.
- Increases soluble solids per box and per acre. However, excessive N, particularly with inadequate irrigation, can result in lower yields with lower TSS per acre.
- Decreases fruit size and weight.
- Increases peel thickness and green fruit at harvest.
- Increases incidence of creasing and scab but decreases incidence of peel blemishes such as wind scar, mite russeting, and rind plugging.
- Reduces stem-end rot incidence and green mold of fruit in storage.

Phosphorus (P)

- Reduces acid content, which increases soluble solids-acid ratio. Phosphorus rates have no effect on soluble solids per box but may increase soluble solids per acre due to increase in fruit production in soils that are low in P.
- Increases number of green fruit but reduces peel thickness.
- Increases expression of wind scar but reduces that of russeted fruit.

Potassium (K)

- Potassium produces mostly negative effects on juice quality except soluble solids per acre. Potassium increases fruit

production therefore producing more soluble solids per acre.
- Decreases juice content, soluble solids, ratio, and juice color.
- Increases acid content.
- Increases fruit size, weight, green fruit and peel thickness.
- Reduces incidence of creasing and fruit plugging. In storage, reduces stem-end rot.

Magnesium (Mg)

- Slightly increases soluble solids, soluble solids-acid ratio, soluble solids per box and soluble solids per acre.
- Slightly increases fruit size and weight but decreases rind thickness.

Irrigation

- Increases juice content and soluble solids-acid ratio.
- Reduces soluble solids and acid contents. Soluble solids per box will decrease, but soluble solids per acre may increase due to yield increase.
- Increases fruit size and weight, increases green fruit at harvest, but decreases rind thickness.
- Increases incidence of blemish from wind scar, scab and *Alternaria* brown spot, but reduces rind plugging.
- Reduces stem-end rot incidence but increases incidence of green mold in storage.

Specific effects on juice and external fruit qualities are summarized in the Table below. This summary is based on numerous field experiments conducted over many years. Most of these effects were consistently observed, but some of them appear to depend on local conditions and growing regions.

EFFECTS OF MINERAL NUTRITION AND IRRIGATION ON FRUIT QUALITY

Variable	N	P	K	Mg	Irrigation
Juice Quality					
juice content	+	0	-	0	+
soluble solids (SS)	+	0	-	+	-
acid (A)	+	-	+	0	-
SS/A ratio	-	+	-	+	+
juice color	+	0	-	?	0
solids/box	+	0	-	+	-
solids/acre	+	+	+	+	+
External Fruit Quality					
size	-	0	+	+	+
weight	-	0	+	+	+
green fruit	+	+	+	0	+
peel thickness	+	-	+	-	-

Increase (+), Decrease (-), No change (0), No information (?).

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,
MAY BE BACK IN FLORIDA

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.

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)

FLATWOODS CITRUS NEWSLETTER EVALUATION FORM

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

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

Please circle or bold your answer

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

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

Satisfied Neither Satisfied Nor Dissatisfied Dissatisfied

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

(Please write in any comments)

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

10. What is your employment status?

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

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

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