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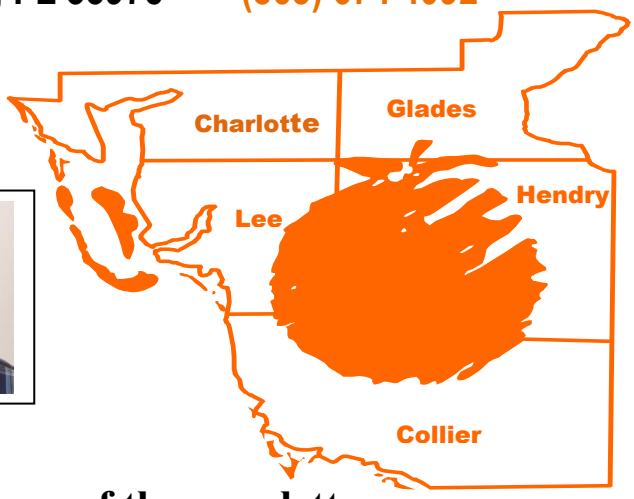
Flatwoods Citrus



Vol. 12, No. 7 July 2009

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

Important!!! This may be your last hard copy of the newsletter.
Please provide us with your e-mail address if you have not done so.
Please send it to maz@ifas.ufl.edu
 If you do not have an e-mail address and wish to keep receiving a hard copy of the newsletter, please fill out the last page.

U P C O M I N G E V E N T S

Actara - Technical overview

Actara - Best use guidelines for Florida citrus

Clinch - Fire ant bait for citrus, aerial label expansion

Clinch - Best use guidelines and benefits

Date: Thursday, July 23, 2009, Time: 10:00 AM – 12:00 Noon
Location: Southwest Florida REC (Immokalee IFAS Center)
Speakers: Cody Hoffman & John Taylor
2 CEUs for Pesticide License Renewal, 2 CEUs for Certified Crop Advisors (CCAs)
Program Sponsor: Syngenta
Attendance & Lunch are free, but **RSVP is required** for planning purposes. To RSVP, call 863 674 4092 or send an e-mail to maz@ifas.ufl.edu

CERTIFIED PILE BURNER CLASS

21 July 2009, Immokalee IFAS Center

Class size is limited to the first 50 people.

Details were enclosed in the previous issue of this newsletter.

Go to: http://www.fl-dof.com/training_education/training_schedule.html

Or call 863 674 4092 or send an e-mail to **maz@ifas.ufl.edu**

CITRUS EXPO

IN FORT MYERS

Wednesday, August 19 &
Thursday, August 20, 2009,

See enclosed brochure

Citrus Packinghouse Day on Thursday, August 27th at the Citrus Research and Education Center in Lake Alfred, and the Indian River Postharvest Workshop on Friday, August 28th at the Indian River Research and Education Center in Ft. Pierce. Visit http://postharvest.ifas.ufl.edu
For more information, contact Mark Ritenour at 772-468-3922, ext. 167 or at ritenour@ufl.edu.

55th Annual Meeting of the Interamerican Society for Tropical Horticulture (ISTH)

11 - 16 October, 2009
Barquisimeto, **Venezuela**
For more information, contact: isthlv2009@gmail.com

ISHS
International Society for Horticultural Science

SECOND INTERNATIONAL CITRUS BIOTECHNOLOGY SYMPOSIUM
CATANIA, ITALY, NOVEMBER 30 – DECEMBER 2, 2009
All information regarding the symposium will be available at: www.fagr.unict.it
For questions, please contact us at the following address: biotech2009@unict.it

Special Thanks to the following sponsors (on pages on pages 3, 4, and 5) of the Flatwoods Citrus Newsletter for their generous contribution and support. If you would like to be among them, please contact me at 863 674 4092 or maz@ifas.ufl.edu

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NOAA ISSUES ATLANTIC HURRICANE SEASON OUTLOOK, ENCOURAGES PREPAREDNESS

NOAA forecasters say a near-normal Atlantic hurricane season is most likely this year. However, as with any season, the need to prepare for the possibility of a storm striking near you is essential.

"Today, more than 35 million Americans live in regions most threatened by Atlantic hurricanes," Commerce Secretary Gary Locke said. "Timely and accurate warnings of severe weather help save lives and property. Public awareness and public preparedness are the best defenses against a hurricane."

In its initial outlook for the 2009 Atlantic hurricane season, which runs from June through November, NOAA's National Weather Service Climate Prediction Center calls for a 50 percent probability of a near-normal season, a 25 percent probability of an above-normal season and a 25 percent probability of a below-normal season. Global weather patterns are imposing a greater uncertainty in the 2009 hurricane season outlook than in recent years. Forecasters say there is a 70 percent chance of having nine to 14 named storms, of which four to seven could become hurricanes, including one to three major hurricanes (Category 3, 4 or 5).

"This outlook is a guide to the overall expected seasonal activity. However, the outlook is not just about the numbers, it's also about taking action," said Gerry Bell, Ph.D., lead seasonal hurricane forecaster at NOAA's Climate Prediction Center. "Prepare for each and every season regardless of the seasonal outlook. Even a near- or below-normal season can produce landfalling hurricanes, and it only takes one landfalling storm to make it a bad season."

Shaping this seasonal outlook is the possibility of competing climate factors. Supporting more activity this season are conditions associated with the ongoing high-activity era that began in 1995, which include enhanced rainfall over West Africa, warmer Atlantic waters and reduced wind shear. But activity could be reduced if El Nino develops in the equatorial Eastern Pacific this summer or if ocean temperatures in the eastern tropical Atlantic remain cooler than normal.

NOAA's seasonal hurricane outlook does not project where and when any of these storms may hit. Landfall is dictated by weather patterns in place at the time the storm approaches. For each storm, NOAA's National Hurricane Center forecasts how these weather patterns affect the storm track, intensity and landfall potential.

"NOAA strives to produce the best possible forecasts to help emergency officials and residents better prepare for an approaching storm," said Jane Lubchenco, Ph.D., under secretary of commerce for oceans and atmosphere and NOAA administrator. "I'm pleased to have the Administration's support for an additional $13 million in next year's budget request to continue the trend of improving hurricane track and intensity forecasts."

Tropical systems acquire a name – the first for 2009 will be Ana – upon reaching tropical storm strength with sustained winds of at least 39 mph. Tropical storms become hurricanes when winds reach 74 mph, and become major hurricanes when winds increase to 111 mph. An average season has 11 named storms, including six hurricanes with two becoming major hurricanes.

NOAA scientists will continue to monitor evolving conditions in the tropics and will issue an updated hurricane outlook in early August, just prior to what is historically the peak period for hurricane activity.

NOAA understands and predicts changes in the Earth's environment, from the depths of the ocean to the surface of the sun, and conserves and manages our coastal and marine resources.

DRAINAGE

In certain areas, several factors make drainage a necessity for agricultural production. These factors include slow soil permeability, flat or depressional topography, restrictive geologic layers underlying the soil profile, and periods of excess precipitation. Texture affects permeability or the ability of soils to drain water. Slowly permeable soils contain relatively high percentages of clay- and silt-sized particles, which hold water well but do not drain well. The permeability of the soil is also affected by soil structure. A granular soil structure promotes the movement of water through the soil while a massive structure with little or no granular components decreases the movement of water.

In the coastal Flatwoods areas of Florida during the rainy season, drainage of excess water is important since citrus root damage may occur under prolonged conditions of high water table.

Both surface and subsurface drainage are generally required for citrus grown in Flatwoods areas. Drainage systems in Flatwoods groves consist of systems of canals, retention/detention areas, open ditches, subsurface drains, beds, water furrows, swales, and pumps. These systems require continued good maintenance in order to minimize the chances of root damage from prolonged exposure to waterlogged soils following high precipitations.

Observation wells are good tools for observing soil-water dynamics. They are very reliable for evaluating water-saturated zones in sites subject to chronic flooding injury. These wells can also be used to measure the rate of water table drawdown, which is the key to how long roots can tolerate flooding. Observation wells constructed with float indicators allow water tables to be visually observed while driving by the well site.

Benefits of Drainage

1. Better soil aeration results from good drainage. This permits deeper and more extensive root development and a more favorable environment for beneficial soil microorganisms.
2. An increased supply of nitrogen can be obtained from the soil where water tables are lowered by a drainage system. This can reduce nitrogen fertilizer application.
3. Certain toxic substances and disease organisms are removed from the soil due to better drainage and better aeration.
4. Soil erosion can be reduced on a well-drained soil by increasing its capacity to hold rainwater, resulting in less runoff.
5. High water tables in the summer due to poor drainage and high precipitations cause shallow root development and a smaller soil volume from which trees can obtain water and nutrients.
6. Increased crop yields and improved crop quality result from favorable soil water conditions with good drainage.

Loop Legislative Internship Program

The Loop Legislative Internship Program was established by the Florida Farm Bureau Federation in honor of Carl B. Loop, Jr. It provides financial assistance for University of Florida College of Agricultural and Life Sciences undergraduate or graduate students who will be completing legislative internships at the state or federal level. Applications are available online at www.cals.ufl.edu/careerresources/legislative.html.

The first recipients of the Loop Legislative Internship Program were selected for Summer 2009. They were as follows: Ashley Allen, an agricultural education and communication junior interning in Congressman Adam Putnam's District Office in Bartow; Vivian Christmas, a food and resource economics senior interning in Congressman Cliff Stearns' Washington, DC office; and Brady Revels, an agricultural education and communication junior interning with CropLife America in Washington, DC.

Minimum Requirements

- Undergraduate Students: Have completed at least 60 credit hours with the most recent 12 at UF
  Graduate Students: Have completed at least 9 graduate credit hours at UF
- Must be enrolled as a full-time CALS student at the time of application
- Must be actively seeking or have accepted a legislative internship
- Minimum 3.00 grade point average
- Good interpersonal and public relations skills
- Record of campus involvement

Awards

The amount of the award is to be determined by the CALS Dean's Office and may vary by the student's internship and location. Awards may be used for housing, travel and living expenses. Funds are intended to help defray the costs associated with completing an internship rather than funding an internship in its entirety.

Application Deadlines

Deadlines are as follows:

Internship Semester	Application Deadline
Fall 2009	**June 26, 2009**
Spring 2010	Sept. 28, 2009
Summer 2010	March 1, 2010

Please feel free to contact **Cathy Herren Carr** if you have any questions or need assistance getting started in your internship search.

Cathy Herren Carr

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National Biosolids Partnership

FREQUENTLY ASKED QUESTIONS ABOUT BIOSOLIDS

1) What are Biosolids?

Biosolids are the nutrient-rich solid organic matter recovered from the treatment of domestic sewage in a wastewater treatment facility. Biosolids are a beneficial resource, containing essential plant nutrient and organic matter and are recycled as a fertilizer and soil amendment. When treated and processed, these residuals can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth.

2) What is the difference between biosolids and sewage sludge?

Sludge is generally used before applicable beneficial recycling criteria have been achieved which normally occurs at the outlet of the stabilization process. It should be used in tandem with a specific process descriptor (e.g., *primary sludge*, *waste activated sludge*, *secondary sludge*, etc.)

Biosolids is generally used after applicable beneficial recycling criteria have been achieved, i.e., at the outlet of the stabilization process. Common stabilization processes include the following: aerobic digestion, autothermal thermophilic aerobic digestion (ATAD), anaerobic digestion, composting, alkaline stabilization, thermal drying, including flash, rotary, fluid bed, paddle, hollow-flight, disc, and infrared dryers, thermophilic pozzolanic fixation, acid oxidation/disinfection, and heat treatment/acid digestion.

3) Why do we have biosolids?

We have biosolids as a result of treating sewage sludge (i.e., the solids generated during the treatment of domestic sewage in a treatment plant) to meet the land application regulatory requirements). Wastewater treatment technology has made our water safer for recreation and seafood harvesting. Thirty years ago, thousands of American cities dumped their raw sewage directly into the nation's rivers, lakes, and bays. Through regulation of this dumping, local governments now required to treat domestic sewage and to make the decision whether to recycle the solids generated as fertilizer, incinerate them or bury them in a landfill. If the solids meet the regulatory requirements for land application and are recycled, they are biosolids.

4) How are biosolids generated and processed?

Biosolids are generated when solids generated during the treatment of domestic sewage are treated further to meet regulatory requirements. The wastewater treatment can actually begin before the wastewater reaches the treatment plant. In many larger wastewater treatment systems, pre-treatment regulations require that industrial facilities pre-treat their wastewater to remove many hazardous contaminants before it is sent to a wastewater treatment plant. Wastewater treatment facilities monitor incoming wastewater streams to ensure their recyclability and compatibility with the treatment plant process.

Sewage sludge is not generated until domestic sewage is treated in a treatment works, and biosolids are not produced until the sewage sludge meets the land application Part 503 requirements. For these reasons, the treatment of biosolids cannot occur before the domestic sewage reaches the wastewater treatment plant. Once the wastewater reaches the plant domestic sewage goes through physical, chemical and biological processes that clean the domestic sewage and remove the solids. If necessary, some of the solids are then treated with lime to raise the pH level to eliminate objectionable odors. Pathogen reduction (disease-causing organisms, such as bacteria, viruses and parasites) and other organisms capable of transporting disease for the solids usually occur in a different process (e.g., a digester).

5) How are biosolids used?

After treatment and processing, biosolids can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth. The controlled land application of biosolids completes a natural cycle in the environment. By treating sewage sludge, it becomes biosolids that can be used as valuable fertilizer, instead of taking up space in a landfill or other disposal facility.

6) Are biosolids safe?

Decades of studies have demonstrated that biosolids can be safely used on food crops. The National Academy of Sciences has reviewed current practices, public health concerns and regulator standards, and has concluded that "the use of these materials in the production of crops for human consumption when practiced in accordance with existing federal guidelines and regulations, presents negligible risk to the consumer, to crop production and to the environment." In addition, an epidemiological study of the health of farm families using biosolids showed that the use of biosolids was safe.

7) Do biosolids smell?

Biosolids may have their own distinctive odor depending on the type of treatment it has been through. Some biosolids may have only a slight musty, ammonia odor. Others have a stronger odor that may be offensive to some people. Compounds that contain sulfur and ammonia, which are both plant nutrients, cause most odors.

8) Are there regulations for the land application of biosolids?

The federal biosolids rule is contained in 40 CFR Part 503. Biosolids that are to be land applied must meet these strict regulations and quality standards. The Part 503 rule governing the use and disposal of biosolids contains general requirements, numerical limits for metals in biosolids, pathogen and vector attraction reduction standards, management practices and frequency of monitoring, record keeping and reporting requirements for land applied biosolids as well as similar requirements for sewage sludge that is surface disposed or incinerated. Most recently, Part 503 requirements have been proposed to limit the concentration of dioxin and dioxin like compounds in biosolids to ensure safe land application. Biosolids are one of the most studied materials that have ever been regulated by EPA.

9) Where can I find out more about the regulations?

The biosolids rule is described in the EPA publication, A Plan English Guide to the EPA Part 503 Biosolids Rule. This guide states and interprets the Part 503 rule for the general reader. This guide is also available in hard copy. In addition to the Plain English Guide, EPA has prepare A Guide to the Biosolids Risk Assessments for the EPA Part 503 Rule which shows the many steps followed to develop the

scientifically defensible, safe set of rules (also available from EPA in hard copy.) The cited references provide valuable information about the Part 503 land application requirements. However, if the information in the references is different form the requirements in the Part 503 rule, the Part 503 rule requirements apply. A number of relevant biosolids publications are located on the National Biosolids Partnership's web page at: http://www.biosolids.org.

10) How are biosolids used for agriculture?

Biosolids are used to fertilize fields on which crops are grown. Agricultural uses of biosolids that meet strict quality criteria and application rates have been shown to produce significant improvements in crop growth and yield. Nutrients found in biosolids, such as nitrogen, phosphorus and potassium and trace elements such as calcium, copper, iron, magnesium, manganese, sulfur and zinc, are necessary for crop production and growth. The use of biosolids reduces the farmer's production costs and replenishes the organic matter that has been depleted over time. The organic matter improves soil structure by increasing the soil's ability to absorb and store moisture.

Crops use the organic nitrogen and phosphorous found in biosolids very efficiently because these plant nutrients are released slowly throughout the growing season. This enables the crop to absorb these nutrients as the crop grows. This efficiency lessens the likelihood of groundwater pollution of nitrogen and phosphorous.

11) Can biosolids be used for composting?

Yes, biosolids may be composted and sold or distributed for use on lawns and home gardens. Biosolids composted with sawdust, wood chips, yard clippings, or crop residues make excellent mulches and topsoils for horticultural and landscaping purposes. Even after composting, the sewage sludge has to meet the appropriate Part 503 requirements for it to become biosolids that can be applied to lawns and home gardens. Many professional landscapers use composted biosolids for landscaping new homes and businesses. Home gardeners also find composted biosolids to be an excellent addition to planting beds and gardens. Most biosolids compost, are highly desirable products that are easy to store, transport and use.

12) Are there rules about where biosolids can be applied?

To determine whether biosolids can be applied to a particular farm site, a good management practice includes an evaluation of the site's suitability and is generally performed by the land applier. The evaluation examines water supplies, soil characteristics, slopes, vegetation, crop needs and the distances to surface and groundwater.

There are different rules for different classes of biosolids. Class A biosolids contain no detectible levels of pathogens and must meet strict vector attraction reduction requirements and low levels metals contents. The biosolids preparer usually applies for a permit and only have to apply for permits to ensure that these very tough standards have been met. However, the Part 503 requirements have to be met even if there is no permit. Class B biosolids are treated but still contain detectible levels of pathogens. There are

buffer requirements, public access, and crop harvesting restrictions for Class B biosolids. (The land application site restrictions have to be met in all cases where Class B biosolids are land-applied.) Nutrient management planning ensures that the appropriate quantity of biosolids is land applied. The biosolids application is specifically calculated to match the nutrient uptake requirements of the particular crop. Nutrient management technicians work with the farm community to assure proper land application and nutrient control.

13) Is EPA pushing the use of biosolids as a fertilizer? Is the federal policy for biosolids driven by economics of disposal?

As a result of its decade-long assessment of biosolids, EPA concluded that recycling biosolids to land was an environmentally responsible solution, when used in accordance with the Part 503 rule. The Federal policies supporting and promoting the beneficial recycling of biosolids are based upon sound science that has demonstrated the benefits of such recycling. These policies are not driven by economics, and the choice of to recycle biosolids remains a local decision.

14) How do the risks associated with biosolids compare with other soil amendments used in agriculture?

A Water Environment Research Foundation (WERF) study completed in 2002 finds that the risks associated with biosolids are no greater than risks associated with other soil amendments used in agriculture. The project, "Evaluate Risks and Benefits of Soil Amendments Used in Agriculture" (project no. 99-PUM-1), examined the risks and benefits, advantages and potential disadvantages associated with the use of a variety of soil amendments in comparison to chemical fertilizers. Project results indicate that the relative risk to the environment from amendments and fertilizers varies by parameter and shows that known risks from each of the materials studied can be managed. Moreover, these manageable risks must be carefully weighed against the considerable benefits provided by the land application of amendments and fertilizers.

15) Is recycling much cheaper than disposal?

In areas where disposal costs have increased due to shrinking landfill space and increased costs to maintain and monitor landfills, some cities and towns find that recycling biosolids is less expensive than land filling. However, in most cases, land filling is competitive or less expensive than land application. In such cases, many U.S. communities have made a positive environmental decision to commit to recycling biosolids despite the additional cost. This is especially true where communities have committed to the additional costs of composting or heat drying and pathogen reduction processes for biosolids prior to utilization.

16) Are Biosolids good for the environment?

Recycling biosolids is good for the environment. Organic matter has been recycled for centuries to improve soil fertility and productivity. When properly applied and managed, biosolids can: provide essential plant nutrients; improve soil structure and tilth; add organic matter; enhance moisture retention; and reduce soil erosion.

Biosolids recycling is regulated and encouraged by the United States Environmental Protection Agency and state and local authorities. Research and years of recycling experience have demonstrated that properly managed land application of biosolids is environmentally safe.

LEAF AND SOIL SAMPLING AND ANALYSES TO ADJUST FERTILIZER PROGRAMS

Optimum growth and yield of high quality fruit cannot be obtained without adequate nutrition. The most successful fertilizer program should be based on tissue analysis, knowledge of soil nutrient status through soil analysis combined with university recommendations. The deficiency or excess of an element will cause disturbance in plant metabolism and lead to poor performance.

Plant analysis

Used in conjunction with other data and observations, tissue analysis aids in evaluating the nutrient elements of the soil-plant system. It has proven useful in confirming nutritional deficiencies, toxicities or imbalances, identifying "hidden" toxicities and deficiencies where visible symptoms are not manifested, and evaluating the effectiveness of fertilizer programs.

Leaf Sampling

For reliable results and useful interpretation of lab analysis reports, citrus growers, production managers, and consultants must follow the proper procedures for leaf sampling and sample handling because improperly collected leaf samples will provide misleading information about the nutritional status of the trees and the fertilizer programs.

Considerable care is needed in taking samples. Chemical analysis values can only be useful if the samples obtained are representative of the blocks they were taken from. The proper sampling, preparation and handling would affect the reliability of the chemical analysis, data interpretation, nutritional recommendations, and adjustment of fertilizer programs.

Leaf samples must also be taken at the proper time because nutrient levels within leaves are continually changing. However, leaf mineral concentrations of most nutrients are relatively stable within 4 to 6 months after emergence of the spring flush. Therefore, for mature tree blocks, the best time would be in July and August to collect four- to six-month-old spring flush leaves. If taken later in the season, the summer flush would probably be confused with the spring flush.

Each leaf sample should consist of about 100 leaves taken from non-fruiting twigs of 15- 20 uniform trees of the same variety and rootstock, and under the same fertilizer program. Clean brown paper bag should be used. Information sheets from the testing lab should be completed for each sample as this information helps when interpreting the results. The sample bag and the corresponding information sheet should each be carefully labeled with the same identity so that samples and sheets can be matched in the laboratory.

Sampling techniques for leaves

♦ Immature leaves should be avoided because of their rapidly changing composition.

♦ Abnormal-appearing trees, trees at the edge of the block and trees at the end of rows should not be sampled because they may be coated with soil particles and dust or have other problems.

♦ Do not include diseased, insect damaged, or dead leaves in a sample. Use good judgment.

♦ Select only one leaf from a shoot and remove it with its petiole (leaf stem).

Diagnosing growth disorders

♦ Collect samples from both affected trees as well as normal trees.

♦ Trees selected for sampling should be at similar stage of development and age.

♦ Whenever possible, confine the sampling area to trees in close proximity to each other.

Handling of leaf samples

♦ Samples should be collected in clean paper bags and clearly identified.

♦ They should be protected from heat and kept dry and cool (stored in portable ice chests), and placed in a refrigerator for overnight storage if they cannot be washed and oven dried the same day of collection.

♦ For macronutrient analysis, leaves usually do not need to be washed.

♦ Leaves should be dried in a ventilated oven at 60-70^{o}C.

Preparation for analysis

♦ Leaves that have been recently sprayed with micronutrients for fungicidal (Cu) or nutritional (Mn, Zn) purposes should not be analyzed for those micronutrients because it is unlikely to remove all surface contamination from sprayed leaves.

♦ For accurate Fe and B or other micronutrient determination, samples would require hand washing, which is best done when leaves are still in a fresh condition.

Soil analysis

Soil analysis is an important method for gaining basic information regarding the chemical status of the soil. Soil analysis is particularly useful when conducted over several years so that trends can be seen.

Unlike leaf analysis, there are various methods and analytical procedures of soil analysis used by laboratories. In Florida, soil tests for the relatively mobile and readily leached elements such as N and K are of no value. Soil tests are mainly important for pH, P, Mg, Ca, and Cu. For Florida sandy soils, using the Mehlich-1 or double acid (hydrochloric acid + sulfuric acid) extraction procedure adopted by the University of Florida analytical lab, 40-60 lbs/acre (20-30 ppm) of P, 70-120 lbs/acre (35-60 ppm) of Mg, 500-800 lbs/acre (250-400 ppm) of Ca, and 5-10 lbs/acre (2.5-5 ppm) of Cu are considered adequate for citrus. A Ca:Mg ratio of 7:1 seems desirable and ratios of higher than 10 may induce Mg deficiency problems. Copper levels higher than 50 lbs/acre may be toxic to citrus trees if the soil pH is below 6.

Soil sampling

The accuracy of a fertilizer recommendation depends or how well the soil sample on which the recommendation was based represents the area of the grove. In Florida, if soil samples were to be collected once a year, the best time would be at the end of the summer rainy season and prior to fall fertilization, usually during September and October. However, soil sampling may be conducted at the same time as leaf sampling to save time and reduce cost.

Standard procedures for proper sampling, preparation and analysis have to be followed for meaningful interpretations of the test results and accurate recommendations. Each soil sample should consist of 15-20 soil cores taken at the dripline of 15-20 trees within the area wetted by the irrigation system to a depth of 6 inches. The area sampled should be uniform in terms of soil and tree characteristics and correspond to the area from which the leaf sample was taken.

Individual cores should be mixed thoroughly in a plastic bucket to form a composite sample. Subsample of appropriate size should be taken from the composite mixture and put into labeled paper bags supplied by the lab. Soil samples should be air-dried but not oven-dried before shipping to the testing laboratory for analysis.

Conclusion

Tissue and soil analyses are a powerful tool for confirming nutrient deficiencies, toxicities and imbalances, identifying "hidden hunger," evaluating fertilizer programs, studying nutrient interactions. However, if initial plant and soil sampling, handling, and analysis of the sample were faulty, the results would be misleading.

If properly done, tissue and soil analyses can point the way toward more economical and efficient use of fertilizer materials, avoiding excessive or inadequate application rates.

For more details, consult UF-IFAS publication SL 253, "Nutrition of Florida Citrus Trees," at http://edis.ifas.ufl.edu/pdffiles/SS/SS47800.pdf

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Standard Table for Assessing Nutritional Status and Adjusting Fertilizer Programs for Citrus

Leaf analysis standard for assessing current nutrient status of citrus trees based on concentration of mineral elements in 4- to 6-month-old-spring-cycle leaves from non-fruiting terminals.

Element	Deficient less than	Low	Satisfactory	High	Excess more than
Nitrogen (N) (%)	2.2	2.2-2.4	2.5-2.8	2.9-3.2	3.3
Phosphorus (P) (%)	0.09	0.09-0.11	0.12-0.17	0.18-0.29	0.30
Potassium (K) (%)	0.7	0.7-1.1	1.2-1.7	1.8-2.3	2.4
Calcium (Ca) (%)	1.5	1.5-2.9	3.0-5.0	5.1-6.9	7.0
Magnesium (Mg) (%)	0.20	0.20-0.29	0.30-0.50	0.51-0.70	0.80
Sulfur (S) (%)	0.14	0.14-0.19	0.20-0.40	0.41-0.60	0.60
Chlorine (Cl) (%)	------	------	less than 0.5	0.5-0.7	0.7
Sodium (Na) (%)	------	------	less than 0.2	0.2-0.5	0.5
Iron (Fe) (ppm)	35	35-59	60-120	121-200	250
Boron (B) (ppm)	20	20-35	36-100	101-200	250
Manganese (Mn) (ppm)	18	18-24	25-100	101-300	500
Zinc (Zn) (ppm)	18	18-24	25-100	101-300	300
Copper (Cu) (ppm)	4	4-5	6-16	17-20	20
Molybdenum (Mo) (ppm)	0.06	0.06-0.09	0.1-1.0	2-50	50

CALCAREOUS SOILS

For more details, consult UF-IFAS publication SL 253, "Nutrition of Florida Citrus Trees," at http://edis.ifas.ufl.edu/pdffiles/SS/SS47800.pdf

Calcareous soils are alkaline (have pH values greater than 7) because of the presence of free $CaCO_3$. Calcium carbonate ($CaCO_3$) can occur naturally in soils or can be added with alkaline irrigation water. Special nutritional management is required to grow citrus successfully on calcareous soils. However, planting citrus trees on these soils may not be economically feasible. The presence of $CaCO_3$ affects the availability of almost all nutrients.

Nitrogen (N)

Nitrification, which is the conversion of ammonium (NH_4^+) to nitrate (NO_3^-) by soil bacteria, is most rapid in soils with pH values between 7 and 8. Ammonia volatilization is the loss of N to the atmosphere through conversion of the ammonium ion to ammonia gas (NH_3). Volatilization of ammoniacal-N fertilizer is significant when the soil surface pH is greater than 7. Nitrogen loss through ammonia volatilization on calcareous soils is a concern when ammoniacal N is applied on the soil surface and remains there without moving it into the soil. When applying dry fertilizer containing urea or ammoniacal N, the fertilizer should be moved into the root zone through irrigation or mechanical incorporation if rainfall or irrigation is not imminent. Applying a portion of the required N fertilizer foliarly (urea, potassium nitrate, calcium nitrate) will improve the N status. Applying N with irrigation water (fertigation) and scheduling irrigation to maintain the N in the root zone is a sound method to prevent large N leaching losses.

Phosphorus (P)

When P fertilizer is added to a calcareous soil, it undergoes a series of chemical reactions with Ca. These reactions decrease P solubility through a process called P fixation. Consequently, the long-term availability of P to plants is controlled by the application rate of soluble P and the dissolution of fixed P. Applied P is available to replenish the soil solution for only a relatively short time before it converts to less soluble forms of P. Phosphorus fertilizer should be applied each year in newly planted groves on previously-non-fertilized soil until the groves begin to bear fruit. As the trees approach maturity, P applications can be limited to once every few years. Diagnostic information from leaf and soil testing can help determine whether P fertilization is necessary.

Potassium (K) & magnesium (Mg)

It is often difficult to increase K and Mg uptake with fertilizer applied to calcareous soils. High soil Ca suppresses K and Mg uptake by citrus trees through the competition of Ca, Mg, and K. In cases where soil-applied fertilizer is ineffective, the only means of increasing leaf K and Mg concentration is through foliar application of water-soluble fertilizers, such as potassium nitrate, monopotassium phosphate, or magnesium nitrate.

Mg deficiency

A solution of 20 lbs KNO_3 per 100 gallons of water has been shown to raise leaf K, especially if applied two or three times during the year.

For citrus on noncalcareous soils, nitrogen and potassium fertilizer applications with a 1:1 ratio of N to K_2O are recommended. If leaf testing on calcareous soils reveals that high soil Ca may be limiting K uptake, the K_2O rate should be increased by about 25% to have a N:K_2O ratio of 1:1.25.

Zinc (Zn) & manganese (Mn)

At alkaline (high) pH values, Zn and Mn form solid compounds with low water solubility, decreasing significantly their availability to plants. On alkaline soils, soil applications of Zn and Mn fertilizers are ineffective. The least expensive way to correct effectively Zn and Mn deficiencies is through foliar sprays. Preliminary research data indicate little difference in magnitude of foliar uptake, regardless of the form of carrier or chelate applied.

Iron (Fe)

Iron is considerably less soluble than Zn or Mn in high pH soils. Thus, inorganic Fe contributes relatively little to the Fe nutrition of plants on calcareous soils. Citrus rootstocks vary widely in their ability to overcome Fe deficiency. The easiest way to avoid lime-induced Fe chlorosis in citrus trees to be planted on calcareous soils is to use tolerant rootstocks.

Fe deficiency

Existing Fe chlorosis can be corrected through soil application of Fe chelates.

Foliar application of iron compounds has not proven satisfactory on citrus trees because of poor translocation within the leaf. Furthermore, foliar sprays of Fe have the possibility to cause fruit and leaf burn.

Sulfur products used as soil amendments

Soil acidulents can improve nutrient availability in calcareous soils by decreasing the soil pH. Soils with visible lime rock or shell in the root zone would require repeated applications of a high rate of acidulent. Examples of S-containing acidulents include elemental sulfur (S) and sulfuric acid (H_2SO_4). These compounds act to neutralize $CaCO_3$ with acid. Ammonium sulfate [$(NH_4)_2SO_4$] acidifies the soil by converting NH_4^+ to NO_3^- during nitrification. The sulfate ion (SO_4^{2-}) alone possesses no acidifying power. Elemental S is the most effective soil acidulent. Although not an acidic material itself, finely ground elemental S is converted quickly to sulfuric acid in the soil through microbial action. Sulfuric acid reacts more quickly than any other material, but it is hazardous to work with and can damage plants if too much is applied at one time. Dilute concentrations of sulfuric acid can be applied safely with irrigation water and used to prevent Ca and Mg precipitates from forming in microirrigation lines. Repeated applications of sulfuric acid with irrigation water will tend to lower soil pH within the wetted pattern of the emitter.

The soil within the wetted pattern of a microirrigation emitter often becomes alkaline when the water contains bicarbonate, while the surrounding soil may be neutral or acidic. To lower the soil pH in this situation, acid or acidifying fertilizer must be applied to the wetted pattern only.

Summary of *citrus nutrition on calcareous soils*

1. Calcareous soils are alkaline because they contain free $CaCO_3$.
2. The availability of N, P, K, Mg, Mn, Zn, and Fe to fruit trees including citrus decreases when soil $CaCO_3$ concentration increases to more than 3% by weight. These soils generally have a pH value in the range of 7.6 to 8.3.
3. To avoid ammonia volatilization, fertilizers containing ammonium-N or urea should be moved into the root zone with rainfall or irrigation, or be incorporated into the soil.
4. Phosphorus fertilizer applied to calcareous soils becomes fixed over time. Plant P status can be evaluated using a leaf tissue test. If citrus leaf P is less than 0.12% indicating reduced soil P availability, then P fertilizer should be applied.

5. Trees planted on calcareous soils require above normal rates of K or Mg fertilizer for satisfactory nutrition. Foliar sprays of potassium and magnesium nitrates are effective where soil applications are not.
6. The least expensive and most effective way to correct Zn and Mn deficiencies of fruit trees is through foliar application of inorganic or organic chelated forms.
7. The easiest way to avoid lime-induced Fe chlorosis is to plant trees budded on tolerant rootstocks.
8. The most effective remedy for lime-induced Fe chlorosis on nontolerant rootstocks involves the use of chelated Fe.
9. Sulfur products that act as soil acidulents can potentially improve nutrient availability in calcareous soils.

$CaCO_3$ Neutralizing Power of Several S Sources

Sulfur Source	Amount Needed to Neutralize 1,000 lbs $CaCO_3$
Elemental Sulfur	320 lbs
Concentrated sulfuric acid (66° Baume)	68 gallons
Ammonium sulfate 21-0-0-24S	900 lbs

Florida Gulf Citrus Growers Association

The Gulf Citrus Growers Association is a trade association representing the citrus growers of Southwest Florida. Its geographical service area includes Charlotte, Collier, Glades, Hendry and Lee Counties. "Gulf Citrus" addresses key issues of economic importance to the sustainable growth and development of the citrus industry in the region. These issues include land and water use, environmental regulation, farm worker relations, transportation, marketing, domestic and international trade programs. The association also serves as the "Gulf" citrus industry voice on other issues impacting the area's agricultural industry. Go to http://www.gulfcitrus.org and become a member or an associate member.

GULF CITRUS GROWERS ASSOCIATION SCHOLARSHIP FOUNDATION, INC.

Membership:

Membership in the Scholarship Foundation is open to all Gulf Citrus Growers Association (GCGA) members for just $25 per year. Members are able to vote for and serve on the Board of Directors for the Foundation.

Donations:

Donations are a crucial source of funding for scholarship awards and may be made to the Foundation at any time during the year in any denomination, **regardless of membership status**. Checks should be made payable to the Foundation. For more details, please call the GCGA office at **863 675 2180**.

The GCGA Scholarship Foundation is a non-profit corporation operating under Section 501 © (3) of the Internal Revenue Code. Contributions are tax deductible as allowed by law.

Gulf Citrus Growers Association Scholarship Foundation, Inc.

P. O. Box 1319, LaBelle, Florida 33975 (863) 675-2180 / Fax: (863) 675-8087 / Email: gulfcitrus@embarqmail.com

About the Gulf Citrus Growers Association

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

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

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

Scholarship Criteria

Preferred requirements for scholarships are as follows:

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

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

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

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

Gulf Citrus Growers Association Scholarship Foundation, Inc.

P. O. Box 1319, LaBelle, Florida 33975 (863) 675-2180 / Fax: (863) 675-8087 / Email: gulfcitrus@embarqmail.com

Scholarship Application

Personal Data

Name: _____Student # or SS #:_____

Home Address: _____

City/State: _____ Zip: _____ Phone: _____

Mailing Address: _____

City/State: _____ Zip: _____ Phone: _____

E-mail: _____

Employer: _____

Address: _____

City/State: _____ Zip: _____ Phone: _____

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

Educational Information

College or University in which you are enrolled: _____

Department / Degree Program: _____

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

Courses Taken in Major *(completed)*:

_____

_____

_____

_____

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

_____

_____

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

Expected Date of Graduation: _____

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

What are your career goals? _____

_____

_____

_____

_____

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

_____

_____

_____

_____

_____

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

_____ _____

Applicant's Signature Date

APPLICATION DEADLINES ARE DECEMBER 31 AND JULY 31

Please return this application with your official transcripts to:

Gulf Citrus Growers Association Scholarship Foundation, Inc.
Dr. Mongi Zekri, Application Coordinator
Hendry County Extension Office
P. O. Box 68
LaBelle, FL 33975
(863) 674-4092 / Fax: (863) 674-4636
E-mail: maz@ifas.ufl.edu

Flatwoods Citrus

This may be your last hard copy of the newsletter.

□ If you would like to receive the ***Flatwoods Citrus*** newsletter electronically, please check this box and provide us with your e-mail address. Send it to **maz@ifas.ufl.edu**

□ If you do not have an e-mail address and wish to keep receiving a hard copy of the newsletter, 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@ifas.ufl.edu

Subscriber's Name:_____

Company:_____

Address:_____

City:_____State:_____Zip:_____

Phone:_____

Fax:_____

E-mail:_____

Racial-Ethnic Background

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

Gender

__Female
__Male