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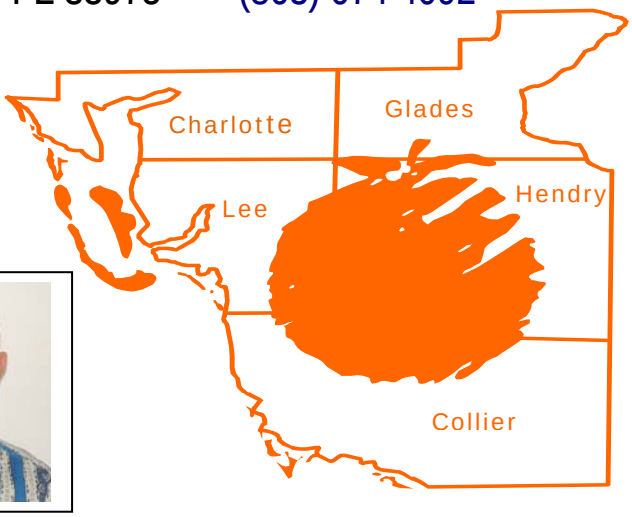
Institute of Food and Agricultural Sciences

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

Flatwoods Citrus



Vol. 18, No. 4 **April 2015**

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

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Previous issues of the Flatwoods Citrus newsletter can be found at:
http://citrusagents.ifas.ufl.edu/agents/zekri/index.htm
http://irrec.ifas.ufl.edu/flcitrus/

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

Citrus IPM workshop

Date & time: Tuesday, **April 21st, 2015, 10:00 AM – 12:10 PM**
Location: Immokalee IFAS Center
Program Coordinator: Dr. Mongi Zekri, UF-IFAS
Program Sponsors: Samuel Monroe and Botond Balogh from Nichino America, Inc.

----10:00 AM - 10:25 AM

1. **Overview of Insecticidal Control of Asian Citrus Psyllid. Dr. Jawwad Qureshi**, UF-IFAS

----10:25 AM - 10:50 AM

2. Soil-Applied Systemic Insecticides for Protecting Young Trees from ACP and HLB. **Dr. Phil Stansly**, UF-IFAS

10:50 AM – 11:00 AM Break

----11:00 AM – 11:25 AM

3. Metalized reflective Mulch for Protecting Young Trees from ACP and HLB. **Scott Croxton**, UF-IFAS

----11:25 AM – 11:50 AM

4. Trial Results with Foliar Sprays for Control of ACP and Citrus Rust Mite. **Barry Kostyk**, UF-IFAS

----11:50 AM – 12:00 Noon

5. Nichino Products Update. **Samuel Monroe** Nichino America Inc.

----12:00 Noon – 12:10 PM

6. Uses of Apta Insecticide/Miticide on Citrus. **Bo Balogh**, Nichino America Inc.

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

Pre-registration is required. No registration fee and lunch is free Thanks to **Samuel Monroe** & **Bo Balogh** with Nichino America Inc.

Workshop-Citrus Nutrition & Irrigation Management in the HLB Era

Date & time: Tuesday, **May 19th, 2015, 10:00 AM – 12:10 PM**
Location: Immokalee IFAS Center
Program Coordinator: Dr. Mongi Zekri, UF-IFAS
Program Sponsor:

----10:00 AM - 10:05 AM

1. **Introduction. Dr. Mongi Zekri**, UF-IFAS

----10:05 AM - 10:20 AM

2. Basic interaction of soil moisture, soil moisture sensors and evapotranspiration in irrigation scheduling. **Dr. Kelly Morgan**, UF-IFAS

----10:20 AM - 10:40 AM

3. Review of water uptake results for HLB affected citrus trees in field and greenhouse experiments. **Dr. Kelly Morgan**, UF-IFAS

----10:40 AM - 11:00 AM

4. Installation and use of smart phone citrus irrigation app. **Dr. Kelly Morgan**, UF-IFAS

11:00 AM – 11:10 AM Break

----11:10 AM – 11:30 AM

5. Citrus nutrient requirements. **Dr. Arnold Schumann**, UF-IFAS

----11:30 AM – 11:50 AM

6. Review of Citrus Advanced Production Systems projects in the HLB era. **Dr. Arnold Schumann**, UF-IFAS

----11:50 AM – 12:10 PM

7. Distribution and use of citrus nutrient model in the HLB era. **Dr. Arnold Schumann**, UF-IFAS

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

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

The Twenty Fifth Annual Farm Safety Day

Friday, 8 May 2015
Saturday, 9 May 2015

AN IMPORTANT MESSAGE TO EMPLOYERS

Safe and competent equipment operators are important to you as an employer. Accidents, which cause damage, injury or death to employees, equipment and crops, are costly. We believe all types of accidents can be reduced with proper employee training. Our training has been designed to help your employees perform better, operate safely to prevent accidents, fulfill necessary training requirements and build pride in themselves and their farm company.

Topics:

1. Ladder Safety in Citrus Harvesting
2. Worker Protection Standards for Pesticide Handlers
3. First Aid Response
4. Working Around Agriculture Equipment

Detailed information was attached in the previous issue

The number of trainings offered and attendance at each training are LIMITED. Don't wait.

Registration Deadline is Thursday, April 23, 2015

Field Day at Lake Alfred CREC, May 28, 2015

Mark your calendar

Coping with Citrus HLB

--Advanced Citrus Production Systems (ACPS)
--Citrus Undercover Production Systems (CUPS)
--Whole Tree Thermotherapy (WTT)
--Experiments that target primarily fresh fruit production for maximum pack-out
--Mature tree canopy pruning, controlled release fertilization (CRF) and high density young tree drip fertigation experiments

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

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Very Important - For SW Florida Citrus growers

This is what you are asking for

We are conducting a survey of citrus growers and production managers to collect data on current costs of grove production practices.

Please feel out the survey form and bring it with you on Tuesday May 19 at 8:30 AM to the Immokalee IFAS Center auditorium.

We hope to see you on May 19 to collect the information from you at 8:30 AM.
We also invite you to attend the workshop on citrus nutrition and irrigation starting at 10:00 AM with Lunch around noon.

The data collection process is completely anonymous and confidential. There will be no linking back to your operations and also no individual data will be shared or disclosed

During the meeting, each grower/production manager will have a "clicker" or remote control. As Dr. Singerman goes through the different categories included in the survey, you will click in their estimates (again, confidentially and anonymously even to him because you do not need to submit the form)

Once you clicked in the answers for each category, the average (and the average only) across all of their responses will appear on the screen for you to see

Once in his office, Dr. Singerman will put together all the data across categories to come up with the 2014/15 average cost of production for SW FL and present the final results to the growers/production managers at their convenience

Please let us know if you have any question or need any clarification.

Thank you for your cooperation!

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2014/15 **SW Florida (Flatwoods)** Processed Oranges Cost of Production Survey

Please enter all annual estimates below on a **per acre** basis for a "*typical*" irrigated mature grove (10+ years old), including resets.

Tree density per acre:_____ Total acres your operation manages:_____

Program	Materials Cost per acre	Application cost per acre		Annual number of applications per acre*	
Mechanical Mowing					
Chemical Mowing					
Herbicide					
Insecticide		Ground	Aerial	Ground	Aerial
Fungicide					
Foliar Nutritionals					
Ground/dry Fertilizer					
Fertigation/liquid fertilizer					
CHMAs sprays					
Hedging and Topping					
Chop/Mow Brush					

*If applicable, this refers to spraying every middle (as opposed to every other middle)

Irrigation. Include all of the following:	Cost per acre
Fuel for pump	
Travel set-up cost (Start/Stop pump)	
Maintenance and repairs (pump and emitters)	
Ditch and canal maintenance	
Water control (pump water in/out of ditches)	

Item	Cost per acre
Management Costs	
Water Management Tax	

Tree replacement	Per acre
Annual number of trees removed	
Annual number of trees reset	
For resetting:	Cost per Tree
Tree removal (Clip-shear; use front-end loader)	
Site preparation (disk; rotovate)	
Planting (cost of tree + plant and watering)	
Young tree care years 1 thru 3	

FOLIAR FEEDING

Foliar feeding is becoming very common on many horticultural crops including citrus. Economic and environmental considerations require the utilization of more efficient methods for nutrient applications.

It is usually assumed that foliar feeding refers to nutrient applications to the plants' leaves. In fact, it has been shown that all aboveground parts of a plant can absorb nutrients, including twigs, branches, buds, fruit, flowers, and stems. However, since leaves usually represent the largest surface area, they are the most important structures.

Foliar feeding is not intended to completely replace soil-applied fertilization of the macronutrients (nitrogen, potassium, and phosphorous). However, macronutrients can be foliarly applied in sufficient quantities to influence both fruit yield and quality. Some crops, such as citrus, can have a large part of the nitrogen, potassium, and phosphorous requirements met through foliar applications.

Foliar applications of other plant nutrients (calcium, magnesium, and sulfur) and micronutrients (zinc, manganese, copper, boron, and molybdenum) have proven for many crops to be an excellent means for supplying the plants' requirements.

Foliar feeding should be used as an integral part of the annual nutritional program. It can be used in other situations to help plants through short, but critical periods of nutrient demand, such as fruit set and bud differentiation. Foliar nutrition may also prove to be useful at times of soil or environmentally induced nutritional shortages. Foliar application of nutrients is of significant importance when the root system is unable to keep up with crop demand or when the soil has a history of problems that inhibit normal growth.

Foliar feeding is proven to be useful under prolonged spells of wet soil conditions, dry soil conditions, calcareous soil, cold weather, or any other condition that decreases the tree's ability to take up nutrients when there is a demand. Foliar feeding may be utilized effectively when a nutritional deficiency is diagnosed. A foliar application is the quickest method of getting the most nutrients into plants. However, if the deficiency can be seen, the crop might have already lost some potential yield.

Foliar fertilization is also efficient since it increases the accuracy of fertilizer application. Applications made to the soil can be subject to leaching and volatilization losses and/or being tied up by soil particles in unavailable forms to citrus trees.

While foliar feeding has many advantages, it can burn plants at certain rates under certain environmental conditions. It is important, therefore, to foliar feed within the established guidelines. There are a number of conditions that can increase the chances of causing foliar burn. A plant under stress is more susceptible to damage. Stressful conditions include drying winds, disease infestations, and poor soil conditions. The environmental conditions at the time of application are also important factors. Applications when the weather is warm (above 80^0F) should be avoided. This means that during warm seasons, applications should be made in the morning or evening. Additionally, applications should not be at less than two-week

intervals to give the plant sufficient time to metabolize the nutrients and deal with the added osmotic stress.

Another important factor when applying nutrient foliarly is to ensure that the pH of the material is in the proper range. The pH range of the spray solution should be between 6 and 7. Attention should be paid to the pH of the final spray solution. This is significant in areas where water quality is poor.

Foliar applications of low-biuret urea or phosphite in late December-early January are known to increase flowering, fruit set, and fruit production. **Postbloom foliar applications of potassium nitrate (KNO_3) or mono-potassium phosphate (MKP) have been found to increase fruit yield and size.**

FOLIAR POTASSIUM APPLICATIONS

BRIEF SUMMARY FROM A POWERPOINT PRESENTATION

By Dr. Brian Boman at the University of Florida, IFAS

Potassium (K) in Citrus

•A primary component in cell walls
•K accounts for over 40% of ash from fruit
•70% of fruit size is related to number of cells
•Cell division ceases by late April

SUMMARY

Foliar K applications can increase fruit size and help return higher $$
• K source is not critical
• Salt index should be considered when using low gal/ac applications (MKP or DKP)
• Coverage is not as critical as for fungicides or insecticides
• At least 8 lb/ac K_2O per application recommended
• Foliar applications not a substitute for good nutrition program

•Size changes after April is mainly from cell enlargement
•Post-bloom K (applied in April) may increase cell numbers plus help cell enlargement
•Absorption of K into leaves after foliar application is very rapid

Grapefruit Summary

•Post bloom most important
•Late summer/fall applications successful in half of years
•8 lb K_2O per acre per application
•1/2 to 1 size increase due to foliar K applications
•Smaller fruit increased more than larger fruit

Foliar K Advantages on Valencia

25% more fruit
28% more boxes/acre
33% more size 80 and larger fruit
28% higher gross returns for packed fruit
23% more TSS/acre

• Potential results:
Grapefruit: ½ to 1 size increase
Valencia: Significantly more solids/acre
Sunburst: More larger-sized fruit

PESTICIDE RECORDKEEPING BENEFITS & REQUIREMENTS

BENEFITS

Exemption from pesticide contamination liability. As provided by section 487.081(6), Florida Statutes, if you keep records of all your pesticide use (general and restricted use products), and you have used pesticides legally, you may be exempt from proceedings by the Florida Department of Environmental Protection to recover costs associated with damages, assessment, evaluation, or remediation of pesticide - contaminated property. Records must be kept indefinitely.

Evaluate effectiveness of controls. Use your records to analyze your pest management programs: what works and what doesn't. You can compare pesticides with other control tactics.

Resolve pesticide failures. If reduced pesticide product performance occurs, having record will help you determine the cause such as pest resistance or use of the wrong application rate.

Improve your ability to buy the right amount of pesticide. Records will help you buy the correct amount of pesticide the following year. You'll save money and eliminate excess pesticide disposal problems.

Provide buyers with required records of pesticide use. Nurserymen must document certain preventative applications before selling nursery stock. Other buyers may also require a report on pesticides used on crops or other commodities treated with pesticides.

Improve crop rotation decisions. With records, you know your crop rotation options. Some pesticides have restrictions on crops that can be planted within certain time frames after pesticide application.

Determine carryover injury. If your fields exhibit pesticide carryover injury, records will help evaluate the situation.

Document your legal use of pesticides. Records are your best defense if you are accused of an improper application that causes drift, personal injury, or other problems.

Provide necessary information in a medical emergency. If an accident or pesticide exposure occurs, records may be necessary for medical personnel to give treatment.

Support studies that identify critical pesticide registrations. Through surveys, your records can contribute data needed to preserve pesticide registrations.

Provide accurate data to respond to public concerns about pesticide use. Your records can be added to national databases that will accurately show pesticide use. Efforts to reduce pesticide use can be documented in the information.

Be prepared for requirements of lending institutions. Some lending institutions and buyers request field records to evaluate potential environmental liability when making land sales or loans.

Be in compliance with the law. The Florida Pesticide Law requires all licensed pesticide applicators to keep records of restricted use pesticides applied.

RECORDKEEPING REQUIREMENTS

The following information must be recorded for each application of a restricted use pesticide:

- Name and license number of licensed applicator
- Name of person who applied the pesticide (may be an unlicensed assistant)
- Date, start time, and end time of treatment
- Location of treatment site using one of the following methods:
    1. County, range, township and section
    2. Maps and/or written descriptions that accurately identify the treatment location and distinguish it from other sites

3. USDA identification system found in 7 CFR 110 which uses maps and numbering systems

4. Legal property description

5. Global Positioning Satellite (GPS) coordinates or longitude/latitude points that delineate the treatment site

- Crop, commodity or target site treated
- Total size of area treated
- Brand name and EPA Registration Number of product applied
- Total amount of product applied
- Application method
- Name of person authorizing the treatment, if the application was made to property not owned or leased by the licensed applicator

ADDITIONAL REQUIREMENTS

- The required pesticide application information must be recorded within 2 working days after application.
- Records may be kept in any format that includes all the required information and may be incorporated into other business records.
- It is not necessary to record repetitive information that applies to all records, as long as the information is recorded one time and there is a written record that this information applies to other applications as well.
- Records must be kept for 2 years from application date and must be made available to authorized FDACS representatives upon request.
- Commercial applicators must provide a copy of the application record to the person for whom the application was made within 30 days of application.
- Pesticide application records and any available label information must be provided to licensed health care professionals or their designated agents in the event of a medical emergency or if the health care professional determines the information is necessary to provide medical treatment to an individual who may have been exposed to a pesticide included in the record information.

VIOLATIONS

Licensed applicators who violate any of the above requirements are subject to a fine imposed by FDACS. Violators who are fined have the right to respond to the charges or request a hearing.

FORMS

A Suggested Pesticide Recordkeeping Form for Restricted Use Pesticides and WPS (Worker Protection Standard) is available from the FDACS Bureau of Compliance Monitoring or may be downloaded from **http://www.flaes.org**

CONTACT

For more information contact the FDACS Bureau of Compliance Monitoring, 3125 Conner Blvd., Bldg. 8 (L-29), Tallahassee, Florida 32399-1650, telephone (850) 488-3314.

WEB SITE

More information about Bureau pesticide programs and copies of various forms are available from the web site

http://www.flaes.org

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

Pesticide Recordkeeping Benefits and Requirements

Make wiser, more profitable decisions by keeping records of your pesticide use.

IMPORTANCE OF SPRAYER CALIBRATION

Sprayers must be checked to ensure all nozzles are applying pesticides uniformly and at the correct rate. Make sure your equipment is working properly and calibrated to ensure the correct amount of pesticide is delivered to the target area.

Pesticide application, greater than the label rate, is illegal and can result in needless risk to groundwater, increased production costs, and crop damage. Under-application might be costly by not properly controlling the target pest. Although you can sometimes repeat the application, doing so is time-consuming, costs more, increases the risk of applying too much and increases the risk in pesticide resistance.

Regular sprayer calibration includes measuring the output of each nozzle to ensure all nozzles are functioning properly. Specific calibration guides are available from a number of sources. Sprayer calibration should be done every time a different pesticide is applied or at least once each season.

The rate of application depends partly on the particle or droplet size, texture, and other properties of the pesticide being applied. Use only water during the test if the pesticide is a liquid. Contact the manufacturer to get reliable information regarding carrier material to perform the tests if the pesticide is a dust, granule, or fumigant, or a liquid diluted with a liquid other than water.

Follow calibration and mixing instructions carefully. Mixing, loading, and calibration methods must also conform to the speed of the application machinery. Moving too fast or too slow changes the rate of application.

Minimizing spray drift

Spray drift, movement of a pesticide through air during or after application to a site other than the intended site of application is a challenging issue facing pesticide applicators. Complete elimination of spray drift is impossible. However, drift can be minimized by following these control measures:

1. Read and follow the pesticide label.
2. Select low or nonvolatile pesticides.
3. Use spray additives following label guidelines.
4. Use large orifice sizes for spray nozzles.
5. Avoid high sprayer pressures, which create finer droplets.
6. Use drift reduction nozzles.
7. Use wide-angle nozzles, lower spray boom heights, and keep spray boom stable.
8. Do not spray when wind speeds exceed 10 mph and when wind direction is directed toward sensitive vegetation.
9. Use a shielded spray boom when wind conditions exceed preferred conditions.
10. Avoid spraying on extremely hot and dry days, especially if sensitive vegetation is nearby.
11. Keep good records and evaluate the results.

IMPORTANCE OF FERTILIZER SPREADER CALIBRATION AND MAINTENANCE

Properly calibrated and maintained equipment ensures a more uniform distribution of nutrients. This, combined with other conservation practices, reduces production costs, soil surface runoff, and nutrient movement to nearby surface waters. Spreaders that have not been properly maintained and calibrated will have problems delivering accurate rates and evenly distributed fertilizer amounts to the grown crop.

Calibration

Calibration is the process used to help ensure that the equipment applies proper rates of the selected product. Proper calibration is the key to successful fertilizer use efficiency. Failure to calibrate equipment can result in ineffective applications. Applying too much is costly, unlawful and may cause crop injury. Applying too little can result in poor crop growth and production. It is important to calibrate equipment on a regular basis to compensate for variations. The equipment will become worn or damaged with use and result in inaccurate output and spread pattern.

Two items must be considered when calibrating a spreader. The first is the distribution pattern of the spreader. The second is the product application rate, which is the amount of product applied per acre. There are many factors that affect the distribution pattern of a rotary spreader and some of them relate directly to the product. For this reason, it is recommended that the spreader be calibrated separately for every product to be applied. Spreader calibration should be checked more often when the spreader is used frequently.

Product & application

Choose a product according to the need of the crop. Before applying the product, read the spreader manual. The spreader manual will usually indicate proper settings for various application rates. However, calibration still needs to be performed to ensure the settings are accurate and to compensate for wear and variations in equipment. Be sure that the proper procedures and application rates are followed. Check the ‘spread pattern’ and amount being applied. The physical properties of dry fertilizer can vary widely. Since larger particles are thrown further than small particles, a product of uniform size should be used to achieve a consistent application pattern. It is essential to maintain a constant speed when using a rotary spreader to obtain uniform and accurate distribution.

Maintenance and Cleaning

Proper care and maintenance will help retain precise applications and prolong the life of spreaders. Manufacturer’s directions on cleaning and lubricating should be followed. With the shutter or gate wide open, remove all granules from the spreader at the end of each application. Then, the spreader should be thoroughly washed and allowed to dry. Hot water may help break lose fertilizer which is caked on. Finally, lubricate the spreader according to instructions. Spreaders should be stored in a clean, dry place out of direct sunlight.

CITRUS CANKER,

caused by the bacterium *Xanthomonas citri subsp. citri*, is a leaf, fruit, and stem blemishing disease that affects most citrus. Grapefruit, Mexican lime, and some early oranges are highly susceptible to canker. Navel, Pineapple, and Hamlin oranges, as well as, lemons and limes are moderately susceptible. Mid-season oranges, Valencias, tangors, tangelos, and other tangerine hybrids are less susceptible. Tangerines are tolerant.

Major citrus canker outbreaks generally occur when new shoots are emerging or when fruit are in the early stages of development, especially if a major rainfall event occurs during this critical time. Frequent rainfall in warm weather, especially storms, contributes to disease development. Citrus canker causes defoliation, shoot die-back and fruit drop.

With endemic canker, infection starts as early as April.

Leaf susceptibility is complicated by the Asian leafminer. The galleries caused by leafminer larvae do not heal quickly and increase leaf susceptibility. This results in leaves with highly susceptible wounds for long periods of time through which the bacterium can infect the leaf.

Almost all leaf and stem infections occur within the first 6 weeks after initiation of growth unless there is a leafminer infestation. The most critical period for fruit infection is when the fruit are between 0.5-1.5 inch in diameter for grapefruit and 0.25-1.25 inch in diameter for oranges. That is the stage when the stomates on the fruit surface are opening and fruit are particularly susceptible to bacterial penetration. After petal fall, fruit remain susceptible during the first 60 to 90 days for oranges or tangerines and 120 days for grapefruit.

Management

The Citrus Health Response Plan (CHRP) does not require removal of affected trees. Thus, growers should use their best judgment in management of citrus canker. The entire state of Florida is under quarantine, and fruit movement is subject to specific regulations depending on market destination. Canker losses can be severe under Florida conditions, and can be difficult to control on grapefruit and the most susceptible early season orange varieties.

Endemic Canker. Where canker is already endemic, the primary means of

control are: 1) planting of windbreaks, 2) protection of fruit and leaves with copper sprays, and 3) control of leafminer.

Windbreaks. Windbreaks are highly effective for reducing the spread of canker, but more importantly, they reduce the severity of the infection in endemic situations. The vast majority of the infection occurs by wind-blown rains that push the bacteria into tissues. Winds of 18 to 20 mph are needed to force bacteria into stomates on leaves and fruit. For more information on selection of plant species and design, see the CREC Web site (http://www.crec.ifas.ufl.edu/extension/windbreaks/).

No material has proven more effective than copper products. Copper products are quite effective for preventing fruit infection, but much less effective for reducing leaf infection. Application of copper to young leaves protects against infection, but it is soon lost due to rapid expansion of the surface area. Also, copper has limited value in reducing disease spread.

For oranges with endemic canker, most of the infection will occur from April to July. No more than five copper sprays applied at 21-day intervals are recommended for early processing oranges: one in early April (fruit at 0.25 to 0.5-inch stage); a second in late April, a third in mid-May, a fourth in early June and a fifth in late June to early July when the fruit is about 1.5-inch diameter. Three applications at a 21-day interval should be sufficient for Valencias and midseason varieties, in mid-April (fruit at 0.25 to 0.5-inch stage), in early/mid-May, and late May/early June. Varieties of early oranges grown for higher color score (Early Gold, Westin, Ruby, Itaborai) are more susceptible than Hamlin and may require additional sprays before April and beyond July.

The most critical period for fruit infection is when the fruit is between 0.5-1.5 inch in diameter

Navel oranges are susceptible to canker and will probably need to be sprayed every 21 days from early April to mid-July. Fallglo is relatively tolerant and probably three sprays in April, May and June should suffice. Newly planted trees in canker exposed settings are more susceptible because they produce leaf flushes more often and the flush tissue represents a high proportion of the canopy volume. The recommendation for the more susceptible varieties (grapefruit and early oranges) is that the trees be sprayed every 3 to 4 weeks to coincide with vegetative flush cycles from spring though the fall. Sprays should be applied with a hoop sprayer that thoroughly covers the foliage on all sides of the canopy.

Spray volumes for young and fruiting trees will have to be adjusted as more experience is gained. The rates of copper products depend on the length of protection expected and the weather. As little as 0.5 to 1.0 lb of metallic copper will protect spring flush growth or fruit during the dry spring season. However, in the rainy season, more than 1 lb of metallic copper may be required to protect fruit for 3-week periods.

PRECISION AGRICULTURE

Precision agriculture is an integrated crop management system that attempts to match the kind and amount of inputs with the actual crop needs for small areas within a grove. This goal is not new, but new technologies now available allow the concept of precision agriculture to be realized in a practical production setting.

Precision agriculture often has been defined by the technologies that enable it and is often referred to as GPS (Global Positioning System) agriculture or variable-rate farming. As important as the devices are, it only takes a little reflection to realize that information is the key ingredient for precision agriculture. Managers who effectively use information earn higher returns than those who don't.

Precision agriculture distinguishes itself from traditional agriculture by its level of management. Instead of managing whole grove as a single unit, management is customized for small areas within the grove. This increased level of management emphasizes the need for best management practices (BMPs). Before considering the jump to precision agriculture management, a good farm management system must already be in place.

The need for precision agriculture

Growers are aware that their fields have variable yields across the block. These variations can be traced to management practices, soil properties and/or environmental characteristics. Soil characteristics that affect yields include texture, structure, soil water content, organic matter, nutrient status, and landscape position. Environmental characteristics include weather, weeds, insects, and diseases.

Seeing this magnitude of variation prompts most growers to ask how the problem that is causing the low yields can be fixed. There may be no economically feasible method of "fixing" some problems. However, the management challenge is to optimally manage the areas within the grove that have different production capacities. This does not necessarily mean having the same yield level in all areas of the grove.

A grower's mental information database about how to treat different areas in a grove requires years of observation and implementation through trial-and-error. Precision agriculture offers the potential to automate and simplify the collection and analysis of information. It allows management decisions to be made and quickly implemented on small areas within larger blocks.

Tools of precision agriculture

In order to gather and use information effectively, it is important for anyone considering precision agriculture to be familiar with the technological tools available. These tools include hardware, software and recommended practices.

Global Positioning System (GPS) receivers. Global Positioning System receivers, either carried to the field or mounted on equipments allow users to return to specific locations to sample or treat those areas.

Yield monitoring and mapping. Yield monitors can provide data necessary for yield maps when linked with a GPS receiver. Yield measurements are essential for making sound management decisions. However, soil, landscape and other environmental factors should also be weighed when

interpreting a yield map. When used properly, yield information provides important feedback in determining the effects of managed inputs such as fertilizer, lime, pesticides and cultural practices including irrigation.

Yield measurements from a single year may be heavily influenced by weather. Examining yield information records from several years and including data from extreme weather years helps in determining if the observed yield level is due to management or is climate-induced.

Yield maps are only as accurate as the data collected to produce them and only demonstrate that yield variability exists. Monitors must be correctly installed and periodically checked to provide accurate data. Yield map data should be used with soil and plant tissue analysis data, scouting notes and other observations to learn why variability exists. The knowledge gained from site-specific crop management equips growers to make better management decisions that have positive environmental benefits and that result in improved productivity and profitability.

Grid soil sampling and variable-rate fertilizer (VRT) application

The recommended soil sampling procedure is to take samples from areas that are no more than 2 acres in size. Several soil cores should be taken at random locations from each 2-acre area, combined together, and sent to a laboratory for testing. Grid soil sampling uses the same principles of traditional soil sampling but increases the intensity of sampling. Soil samples collected in a systematic grid also have location information that allows the data to be mapped.

The goal of grid soil sampling is a map of nutrient needs, called an application map. Grid soil samples are analyzed in the laboratory, and an interpretation of crop nutrient needs is made for each soil sample. Then the fertilizer application map is plotted using the entire set of soil samples. The application map is loaded into a computer mounted on a variable-rate fertilizer spreader. The computer uses the application map and a GPS receiver to direct a product-delivery controller that changes the amount and/or kind of fertilizer product, according to the application map.

Site-specific management strategies

Site-specific strategies for improving productivity and profitability have common elements related to soil characteristics, topography and past management practices. These strategies often have at least some general relationship to yield maps.

Where the topsoil has varying physical properties, such as soil type or soil depth, the yield potential will vary considerably throughout the field. Past management practices of uniform nutrient applications may have created excess nutrient applications and accumulations in areas with low yield potential and nutrient deficits in areas with high yield potential. A variable rate application strategy will generally place higher rates of nutrients in areas with higher yield potential and lower rates of nutrients in areas with lower yield potential.

Where controllable factors such as weed pressure and drainage limit yield, modifications to management or renovations to the land should be used to improve productivity if the long-term benefits out-weigh the costs.

Geographic information systems (GIS)

Geographic information systems (GIS) are computer hardware and software that use feature attributes and location data to produce maps. An important function of an agricultural GIS is to store layers of information, such as yields, soil survey maps, remotely sensed data, crop scouting reports, tissue nutrient concentrations, and soil nutrient levels. Geographically referenced data can be displayed in the GIS, adding a visual perspective for interpretation. In addition to data storage and display, the GIS can be used to evaluate present and alternative management by combining and manipulating data layers to produce an analysis of management scenarios.

Information management

The adoption of precision agriculture requires the joint development of management skills and pertinent information databases. Effectively using information requires a grower to have clear objectives and crucial information necessary to make decisions. Effective information management requires more than record-keeping analysis tools or a GIS. It requires an attitude toward education and experimentation.

Identifying a precision agriculture service provider

Growers should consider the availability of custom services when making decisions about adopting site-specific crop management. Agricultural service providers may offer a variety of precision agriculture services to growers. By distributing capital costs for specialized equipment over more land and by using the skills of precision agriculture specialists, custom services can decrease the cost and increase the efficiency of precision agriculture activities.

The most common custom services that precision agriculture service providers offer are intensive soil sampling, yield mapping and variable rate applications of lime, fertilizers and herbicides. Equipment required for these operations include a vehicle equipped with a GPS receiver and a field computer for soil sampling, a computer with mapping software and variable-rate applicators for fertilizers, lime, and herbicides. Purchasing the equipment and learning the necessary skills is a significant up-front cost that can be prohibitive for many growers. Agricultural service providers must identify a group of committed customers to justify purchasing the equipment and allocating human resources to offer these services.

Summary

Precision agriculture gives growers the ability to more effectively use crop inputs including fertilizers and pesticides. More effective use of inputs means greater crop yield and/or quality. Precision agriculture can address both economic and environmental issues that surround production agriculture today. It is clear that many growers are at a sufficient level of management that they can benefit from precision management. Questions remain about cost-effectiveness and the most effective ways to use the technological tools we now have, but the concept of "doing the right thing in the right place at the right time" has a strong intuitive appeal. Ultimately, the success of precision agriculture depends largely on how well and how quickly these new technologies will be embraced.

EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by

CLIMATE PREDICTION CENTER/NCEP/NWS
and the International Research Institute for Climate and Society
9 April 2015

ENSO Alert System Status: El Niño Advisory

Special Notice: Starting in May 2015, the ENSO Diagnostic Discussion will be released on the second Thursday of each month.

Synopsis: There is an approximately 70% chance that El Niño will continue through Northern Hemisphere summer 2015, and a greater than 60% chance it will last through autumn.

By the end of March 2015, weak El Niño conditions were reflected by above-average sea surface temperatures (SST) across the equatorial Pacific (Fig. 1), and by the expected tropical atmospheric response. The latest weekly Niño indices were +1.1°C in the Niño-4 region, +0.7°C in the Niño-3.4 region, and +0.6°C and +1.4°C in the Niño-3 and Niño-1+2 regions, respectively (Fig. 2). Subsurface temperature anomalies increased substantially during the month (Fig. 3) in response to a downwelling oceanic Kelvin wave, which resulted in strong positive subsurface anomalies across most of the Pacific (Fig. 4). Consistent with ocean-atmosphere coupling, enhanced convection shifted eastward to the central equatorial Pacific (Fig. 5), while low-level westerly wind anomalies continued over the western equatorial Pacific and upper-level easterly wind anomalies continued in the central Pacific. Also, both the traditional and the equatorial Southern Oscillation Index (EQSOI) remained negative during the month. Collectively, these features reflect weak El Niño conditions.

Compared to last month, more models predict El Niño (3-month values of the Niño-3.4 index equal to or greater than 0.5°C) to continue throughout 2015 (Fig. 6). These forecasts are supported by the increase in subsurface temperatures, enhanced convection over the Date Line, and the increased persistence of low-level westerly wind anomalies. However, model forecast skill tends to be lower during the Northern Hemisphere spring, which limits the forecast probabilities of El Niño through the year. At this time, there is also considerable uncertainty as to how strong this event may become. In summary, there is an approximately 70% chance that El Niño will continue through the Northern Hemisphere summer 2015, and a greater than 60% chance that it will last through autumn (click CPC/IRI consensus forecast for the chance of each outcome for 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). Forecasts are also updated monthly in the Forecast Forum of CPC's Climate Diagnostics Bulletin. Additional perspectives and analysis are also available in an ENSO blog. The next ENSO Diagnostics Discussion is scheduled for **14 May 2015**. 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

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

WATER WATCH

Keeping an Eye on Water Resources

District-Wide Conditions for March 17, 2015

The South Florida Water Management District (SFWMD) is issuing the following briefing:

Across 16 counties, the South Florida Water Management District saw little rain during the past week. This included an important respite in rainfall within the Kissimmee basins, which slowed the flow of water into an already high Lake Okeechobee.

South Florida's dry season typically runs from mid-October to mid-May, with about 18 inches of rain on average.

Water Levels in Key Locations (March 17)		
Location	**Today's level**	**Water Supply Floor**
WCA-1	16.38 feet	14.00 feet
WCA-2A	11.17 feet	10.50 feet
WCA-3A	9.59 feet	7.50 feet

Water Conservation

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

Lake Okeechobee Operations

- The U.S. Army Corps of Engineers manages Lake Okeechobee water levels based on its regulation schedule and the best available science and data provided by its staff and a variety of partners, including SFWMD.
  - SFWMD makes an operational recommendation each week based on conditions. The most recent Operational Position Statement is available at www.sfwmd.gov/opsreports.

Lake Okeechobee Levels	
Today (March 17)	**14.53** feet
Historical Average for Today	**14.42** feet
This Date One Year Ago	**13.69** feet

Moving Water South

- For an interactive map with weekly updates on the volumes of water being moved south by SFWMD operations, visit http://www.sfwmd.gov/movingwatersouth.

United States Department of Agriculture
National Agricultural Statistics Service

CITRUS

APRIL FORECAST
MATURITY TEST RESULTS AND FRUIT SIZE

Cooperating with the Florida Department of Agriculture and Consumer Services
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April 9, 2015

Florida All Orange Production Unchanged
Florida Non-Valencia Orange Production Unchanged
Florida Valencia Orange Production Unchanged
Florida All Grapefruit Production Down 13 Percent
Florida All Tangerine Production Down 8 Percent
Florida Tangelo Production Unchanged
Florida FCOJ Yield 1.54 Gallons per Box (42° Brix)

FORECAST DATES – 2014-2015 SEASON
[Release time 12:00 p.m. EDT]
May 12, 2015 June 10, 2015
July 10, 2015

Citrus Production by Type and State – United States

Crop and State	Production [1]			2014-2015 Forecasted Production [1]	
	2011-2012	2012-2013	2013-2014	March	April
	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)
Non-Valencia Oranges [2]					
Florida	**74,200**	**67,100**	**53,300**	**47,000**	**47,000**
California	45,500	42,500	* 38,700	40,000	40,000
Texas	1,108	1,499	1,400	1,670	1,800
United States	120,808	111,099	* 93,400	88,670	88,800
Valencia Oranges					
Florida	**72,500**	**66,500**	*** 51,400**	**55,000**	**55,000**
California	12,500	12,000	* 10,700	10,000	10,000
Texas	311	289	376	345	380
United States	85,311	78,789	* 62,476	65,345	65,380
All Oranges					
Florida	**146,700**	**133,600**	*** 104,700**	**102,000**	**102,000**
California	58,000	54,500	* 49,400	50,000	50,000
Texas	1,419	1,788	1,776	2,015	2,180
United States	206,119	189,888	* 155,876	154,015	154,180
Grapefruit					
Florida-All	**18,850**	**18,350**	**15,650**	**15,000**	**13,000**
White	**5,350**	**5,250**	**4,150**	**4,000**	**3,000**
Colored	**13,500**	**13,100**	**11,500**	**11,000**	**10,000**
California	4,000	4,500	* 3,850	4,000	3,800
Texas	4,800	6,100	5,700	6,000	7,000
United States	27,650	28,950	* 25,200	25,000	23,800
Lemons					
California	20,500	21,000	* 18,800	20,000	20,000
Arizona	750	1,800	1,800	2,200	2,150
United States	21,250	22,800	* 20,600	22,200	22,150
Tangelos					
Florida	**1,150**	**1,000**	**880**	**700**	**700**
Tangerines					
Florida-All	**4,290**	**3,280**	**2,900**	**2,500**	**2,300**
Early [3]	**2,330**	**1,910**	**1,750**	**1,450**	**1,450**
Honey	**1,960**	**1,370**	**1,150**	**1,050**	**850**
California [4]	10,800	13,000	* 14,700	15,500	16,000
Arizona [4]	200	200	200	220	220
United States	15,290	16,480	* 17,800	18,220	18,520

Regressions

Regression data used are from the 2006-2007 through 2013-2014 seasons. All references to "average", "minimum", and "maximum" refer to these 8 seasons unless noted.

All Oranges 102.0 Million Boxes

The 2014-2015 Florida all orange forecast released today by the USDA Agricultural Statistics Board is unchanged at 102.0 million boxes, but down 3 percent from last season's final production figure. The total includes 47.0 million boxes of non-Valencia oranges (early, midseason, Navel, and Temple varieties) and 55.0 million boxes of Valencia oranges. For those previous 8 seasons, the April forecast has deviated from final production by an average of 2 percent with 4 seasons below and 4 above, and differences ranging from 3 percent below to 5 percent above.

Non-Valencia Oranges 47.0 Million Boxes

The forecast of non-Valencia orange production is unchanged at 47.0 million boxes. The Row Count survey conducted March 31 and April 1 showed 99 percent of non-Valencia orange rows harvested. The Navel portion of the non-Valencia forecast is final at 1.4 million boxes, the smallest in the 35 year series.

Valencia Oranges 55.0 Million Boxes

The forecast of Valencia production is unchanged at 55.0 million boxes. The March Drop survey indicated final droppage at 25 percent. Final fruit size is slightly above last month's projection, requiring 244 pieces of fruit to fill a 1-3/5 bushel box, and is the smallest fruit size in the series dating back to 1960-1961. The Row Count survey showed 15 percent of the Valencia rows are harvested.

All Grapefruit 13.0 Million Boxes

The forecast of all grapefruit production is lowered to 13.0 million boxes. The forecast for each of the components is lowered by 1.0 million boxes with white grapefruit now 3.0 million boxes and colored grapefruit now 10.0 million boxes. The changes are primarily due to the Row Count survey results compared to certified utilization. The Row Count survey conducted March 31-April 1 showed 70 percent of the white grapefruit rows and 92 percent of the colored grapefruit rows have been harvested.

All Tangerines 2.3 Million Boxes

The forecast of all tangerine production is lowered 200,000 boxes to 2.3 million boxes. The early varieties (Fallglo and Sunburst) are final at 1.45 million boxes. The reduction is in the Honey variety, now forecast at 850,000 boxes. Honey tangerine estimated utilization to the first of the month, including an allocation of 60,000 boxes for non-certified use, is over 770,000 thousand boxes.

Tangelos 700 Thousand Boxes

The forecast of tangelo production is unchanged at 700,000 boxes, including an allocation of 80,000 boxes for non-certified use. Tangelo harvest is complete for the season, and is the lowest amount since 500,000 boxes were harvested during the 1960-1961 season. The Row Count Survey shows 97 percent of the rows harvested.

FCOJ Yield 1.54 Gallons per Box

The projection for frozen concentrated orange juice (FCOJ) is lowered to 1.54 gallons per box of 42° Brix concentrate. The projection for Valencia oranges remains at 1.65 gallons per box. The final yield for non-Valencia oranges is 1.419546 gallons per box, as reported by the Florida Department of Citrus (FDOC) in Report No. 23. Last season's final yield for all oranges was 1.569080 gallons per box, 1.521318 gallons per box for non-Valencia oranges and 1.642463 for Valencia oranges.

Forecast Components, by Variety — Florida: April 2015

[Survey data is considered final in December for Navels, January for early-midseason oranges, February for grapefruit, and April for Valencias]

Type	Bearing trees	Fruit per tree	Droppage	Fruit per box
	(1,000 trees)	(number)	(percent)	(number)
ORANGES				
Early-midseason	22,707	890	22	303
Navel	970	295	21	139
Valencia	31,190	624	25	244
GRAPEFRUIT				
White	1,199	477	24	113
Colored	3,374	445	27	118

Forecasters Predict Historically Weak Atlantic Hurricane Season

By: **Growing Produce Staff**

According to Colorado State University climatologists **Dr. William Gray and Dr. Phil Klotzbach**, the 2015 Atlantic basin hurricane season will be one of the least active seasons since the middle of the 20th century.

In their extended-range outlook, the duo notes the likelihood of a moderate to strong **El Niño** will develop this summer and fall. The climate pattern, which is characterized by a sustained warming of sea surface temperatures in the equatorial Pacific, is known to suppress tropical storm development in the Atlantic.

Additionally, the report states that the tropical and subtropical Atlantic water temperatures are quite cool at present.

2015 Extended Atlantic Basin Seasonal Hurricane Forecast

- **Named Storms**: 7
- **Hurricanes**: 3
- **Major Hurricanes (Categories 3-5)**: 1

Along with a below-average hurricane activity, Gray and Klotzbach also anticipate a below-average probability for major hurricanes making landfall along the U.S. coastline.

Probabilities For At Least One Major Hurricane Landfall On Each Of The Following Coastal Areas

- Entire U.S. coastline – 28% (average for last century is 52%)
- U.S. East Coast including Florida Peninsula – 15% (average for last century is 31%)
- Gulf Coast from the Florida Panhandle westward to Brownsville, TX – 15% (average for last century is 30%)

Gray and Klotzbach's forecast is scheduled to be updated and revised in early June.

Click here to view the entire forecast.

Flatwoods Citrus

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Racial-Ethnic Background

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

Gender

__Female
__Male