

# Citrus Notes



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Vol. 11-01

*Dear Growers,*

*This month we will be holding our Citrus Roundtable grower meeting in Hillsborough County. The Florida Citrus Show will also be held in January in Ft. Pierce. Dr. Steve Futch is scheduling another grower trip to Brazil and I have included some additional information on the trip. Don't forget the International Research Conference on HLB to be held in Orlando also in January. As part of the conference, a Grower Day has been scheduled that will summarize the week long conference. Growers can register only for the Grower Day if they can't make the week long conference. I have also included a reprint of the description of how to use the FAWN Cold Protection Toolkit.*

*Enjoy the issue,*

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## **Hillsborough County January Citrus Roundtable**

This month we will be ringing in the new year with our Hillsborough County Citrus Roundtable on Wednesday, January 5, 2011. The Roundtable will be held at the Gulf Coast Research and Education Center in Balm (14625 CR 672) beginning at 10:00 a.m.

Last month Ryan Atwood and I did a project to quantify the effect of microsprinkler irrigation on citrus canopy microclimate at the Conser II grove in Orange County. It was interesting since we have a concurrent project monitoring the wind speed and direction and temperature and dew point parameters on the effectiveness on low volume spray applications. This allowed us to collect these measurements outside and inside the block while the microsprinkler irrigation system was running for cold protection. I'll have some of that information for our Roundtable discussion on Wednesday.

In addition, we will be discussing the identification of a citrus health management area or CHMA for the area between SR 674 and CR 672. This will encourage and help growers in the area coordinate a dormant psyllid spray application.

I'll bring the OJ, coffee and donuts. Hope to see you next week.



## **2011 Florida Citrus Show**

The 2011 Florida Citrus Show will be held January 19-20, 2011 at the Haverly L. Fenn Center in Ft. Pierce, Fl. Registration is now open at the following link: <http://www.citrusshow.com/?page=reg>. I also have enclosed a copy of the program schedule at the end of this edition.

## **Grower Trip to Brazil**

Dr Steve Futch is in the process of planning a grower trip to Brazil for June 11 - 17, 2011. The trip will depart from Miami using American Airlines. The approximate cost per participant with 12 participating would be \$3000 and with 15 the cost would be \$2700. Departure from other cities would incur the additional airfare. These costs are based upon current air fare and exchange rates and subject to change. The entire week would be spent in the state of Sao Paulo and groves would be visited Monday – Friday with a return to the US on Friday night and arrival in Miami on Saturday morning.

If you or someone you know may be interested in participating in a trip to Brazil in June 2011, please let Dr. Futch know. You can email him at [shf@ufl.edu](mailto:shf@ufl.edu) or call him at 863-956-1151.





## ***International Research Conference on HLB***

The 2<sup>nd</sup> International Research Conference on Huanglongbing will be held from January 11 - 14, 2011 at the Caribe Royale Orlando All-Suites Hotel and Conference Center. Additional information can be found at the following website: <http://www.irchlb.org/hlb.aspx>.

As part of the conference a Grower Day has been scheduled for Friday, January 14, 2011. At the Grower Day presenters will summarize information that can be implemented in groves now. Topics will include HLB management in Florida and Brazil, HLB pathology, entomology and horticulture. The session will end with lunch and a final keynote speaker. For individuals only wanting to attend the Grower Day session and lunch, the cost is only \$35 and reservations can be made by contacting Clark Baxley at 863-682-1111, ext. 213 or email at [clarkb@flcitrusmutual.com](mailto:clarkb@flcitrusmutual.com).

If you register for the full conference it will include the Grower Day registration.

### ***Citrus Cold Weather Protection Tools Using Florida Automated Weather Network (FAWN) Data***

*(Authors: John Jackson, Kelly Morgan and William Lusher, from SL 269)*

#### **Introduction**

With a crop value of \$597 million in 2006/07, citrus is the most important horticultural crop grown in Florida. The 2.4 million tons of annual citrus production in Florida accounts for approximately 75 and 20% of United States

and world citrus production, respectively. Agricultural water use has become a greater concern for citrus production in Florida due to increasing competition between agricultural, commercial, and residential use of limited water supplies. Tools have been developed for the FAWN that will assist citrus growers in improving frost protection. These tools are in the Cold Protection Toolkit. Use of these tools, potential benefits to citrus growers and water savings are described below.

#### **History of the Cold Protection Tools**

Winters in Florida are generally very pleasant with afternoon temperatures near 70°F and minimum temperatures ranging from 40°F to 60°F. These temperatures allow winter production of vegetables, citrus, strawberries, ornamental plants, ferns, and many other crops that cannot be grown in other states during this time of the year. However, Florida is not free from frosts and freezes and many growers must have a cold protection plan in place to deal with the sporadic arrival of cold air. Generally speaking central and south Florida growers are more concerned with freeze/frost events than those in the northern or western parts of the state.

Several methods of cold protection are used in Florida. In a few isolated situations, heaters are used to protect high-cash crops. A few citrus growers still use wind machines during calm nights to mix warm air aloft with cold air that has settled near the ground. However, these two methods of frost protection require high volumes of fuel and are becoming less used in Florida. More and more growers are using "heat blankets" to capture heat which has been stored in the ground during the day and is radiated back to the sky at night. This method of cold protection works well with low growing crops, but must be removed in a relatively short period of time to avoid damaging the plants.

By far the most widely used method of cold protection in Florida is the application of water. Some crops such as ferns and strawberries require relatively large amounts of water per acre to protect the entire crop, while citrus trees require much smaller amounts, to protect primarily the tree trunk and scaffold limbs.

When using water for cold protection, growers must determine the critical minimum temperatures for their crop(s). Then, they must operate their irrigation systems to keep their crops from being damaged, while at the same time minimizing water use. Growers have followed a fairly general procedure when dealing with cold events in Florida. FAWN examined the various steps in the process and then developed methods to collect and display information useful to growers, utilizing current data from its sites, and forecast products from the National Weather Service (NWS), such as its 7-day Point Forecast.

Management tools evolve over time as refinements are made and additional data are collected. The FAWN cold protection tools are a classic example of this process. The first tools provided guidance for operation of irrigation systems used for cold protection – simply turning them on and off. The Brunt Equation has provided guidance over the past 10-20 years related to estimating the minimum overnight temperature and was a minor aid used only to add a little confidence to the forecasted minimum temperature. More recently, however, the Wet-Bulb Based Irrigation Shutoff Temperature tool was developed to tell users when it is safe to turn off irrigation systems based on their critical temperature to avoid tree damage due to evaporative cooling. This tool is now considered critical for anyone using water for cold protection.

### **FAWN Cold Protection Tool Kit**

These are several examples that demonstrate how cold protection tools have evolved over the years. Additional cold protection tools have been developed and added to FAWN, for a total of six currently available. These are described in greater detail below. All FAWN

management tools contain "background" information that describes the tool and provides the names and contact information for the developers/authors of those tools.

### **Determining Critical Temperature**

The first step in the cold protection process is to determine the critical temperature for a given crop. Many growers already know this value and can simply enter it into the tool. However, the online guide, *Determining Critical Freezing Temperatures for Plants in Florida*, provides assistance with determining the critical temperature for various crops and can be found at: [http://fawn.ifas.ufl.edu/tools/coldp/crit\\_temp\\_select\\_guide.php](http://fawn.ifas.ufl.edu/tools/coldp/crit_temp_select_guide.php). Once entered, the critical temperature is saved for use with other steps in the toolkit.

Citrus is somewhat unique with regard to critical temperature as the plant acquires hardiness from exposure to cool temperature and loses hardiness if exposed to warm temperatures. Leaf freezing temperatures for several varieties of citrus have been documented over the years by several scientists. Currently, citrus leaf freezing temperatures are being studied by scientists at several locations in Florida with funding from the Southwest Florida Water Management District, and can be found at [http://fawn.ifas.ufl.edu/tools/coldp/crit\\_temp\\_select\\_guide\\_citrus.php](http://fawn.ifas.ufl.edu/tools/coldp/crit_temp_select_guide_citrus.php).

### **Fruit Frost Station Forecast**

Once a critical temperature is determined, users generally wish to know when this critical temperature may occur. Forecasts are not part of the Cold Protection Tool Kit. However, FAWN provides quarterly agricultural climate outlooks from the *Southeast Climate Consortium* ([www.agclimate.org](http://www.agclimate.org)), and short-range forecasts from the National Weather Service

(NWS) 7-day Point Forecasts so that growers can plan for future events.

For more than 60 years the NWS collected data during the winter from as many as 350 locations in peninsular Florida and used these data to issue a 24-hour *Fruit Frost Forecast*. Each location contained a minimum recording thermometer and a thermograph housed in a standard "government" weather shelter. During the early years of this program thermograph charts were collected weekly and were processed to provide a summary of each winter's temperatures. Many of these shelters became notorious for low temperatures due to their cold locations. Some of the original sites are now housing developments, shopping complexes, and industrial warehouses. However, FAWN obtained the locations of 178 of these shelters and used the section, range and township to determine the latitude and longitude coordinates for the station's location. The *FAWN Fruit Frost Station Forecast* tool uses these coordinates to retrieve a NWS 7-day Point Forecast for the three (3) mile square area centered on the latitude/longitude coordinates. Locations of interest are selected from table of approximately 180 of the prior "government shelter" locations. Upon selecting a station, a NWS 7-day Point Forecast for that location is shown, providing an overview of whether cold protection may be needed during the following week. This tool can be found at [http://fawn.ifas.ufl.edu/tools/coldp/nws\\_forecast\\_maps.php](http://fawn.ifas.ufl.edu/tools/coldp/nws_forecast_maps.php). Future implementations of this tool will display the locations on a map and, upon selecting a site, a 7-day graph so users can determine the NWS forecast for known cold areas.

### **Forecast Tracker**

Once a forecast for the week ahead has been obtained, the *FAWN Forecast Tracker* offers a unique "look" at individual cold events. Users

can select a FAWN site and view a 48-hour graph that displays the NWS forecasted temperature (24 hours prior to, and ahead of, the current time), and the FAWN observed temperature (24 hours prior to the current time). This tool, called the forecast tracker, allows users to examine how well the forecast has performed over the past 24 hours. A critical temperature can also be displayed on the graph to assist the user in determining the likelihood of the forecasted temperature for the FAWN site reaching their critical temperature, and the length of time the temperature is expected to remain at (or below) that level.

Visual display of the forecast Tracker available on the FAWN Web site. This tool provides a forecast from the National Weather Service for a selected area of Florida with past 24 hour data from the nearest Florida Automated Weather Network station.

This tool is extremely useful for short term forecast evaluations, but is not intended to discount a forecast. Local conditions such as land surface, terrain, and landscape may cause the forecasted temperature to vary from the actual temperature, and these variations, though usually small, can be significant when considering crop livelihood. The Forecast Tracker can be found at [http://fawn.ifas.ufl.edu/tools/coldp/forecast\\_tracker.php](http://fawn.ifas.ufl.edu/tools/coldp/forecast_tracker.php).

### **Minimum Overnight Temperature**

The Minimum Overnight Temperature tool can be used to further evaluate the likelihood of the forecasted temperature occurring. This tool utilizes the Brunt equation, which requires an air temperature and dew point temperature at sunset. The sunset air and dew point temperature can be either manually submitted (ideally for the user's location), or obtained from the nearest FAWN site. Air temperature can vary considerably over a

short distance, while the moisture content of the air generally does not. Therefore, a local air temperature and FAWN dew point temperature are generally suitable for use in this tool. This tool can be found at [http://fawn.ifas.ufl.edu/tools/minimum\\_temperature/](http://fawn.ifas.ufl.edu/tools/minimum_temperature/)

### Evaporative Cooling Potential

There is always a risk when using irrigation systems (e.g. micro-sprinkler or conventional sprinkler) for cold and/or frost protection. Dry and windy conditions can result in a wet bulb temperature 5°F to 6°F degrees lower than the air temperature. When air blows over a wetted plant surface in dry conditions, evaporation occurs, and this can cool the plant surface to temperatures lower than the air temperature. This *evaporative cooling* may result in plant damage when the wet bulb temperature is below the critical temperature for that plant. Therefore, on nights when the air temperature is close to the critical temperature, introduction of water could produce more damage than if no action was taken at all.

The risk of damage due to evaporative cooling can be determined by considering two factors; the difference between the air and wet bulb temperatures, and the wind speed. FAWN utilizes the Jackson/Cross/Fayrna Evaporative Cooling Table which shows 4 categories of risk and criteria for each category. In its current format, user-supplied forecasted values of air temperature, wet bulb temperature, and wind speed are used in conjunction with the table to make a determination of whether evaporative cooling is possible. Future implementations of this tool will automatically obtain these values and provide a level of risk for each FAWN site.

This tool in conjunction with leaf freezing temperature data mentioned previously can have a significant impact on the use of water for cold protection of citrus. There are many nights that are unsuitable for the use of water for cold protection. Using this tool can aid growers in saving both dollars and water, and at the same time eliminate evaporative cooling damage to the

plant. The Evaporative Cooling tool can be found at: [http://fawn.ifas.ufl.edu/tools/coldp/evaporative\\_cooling.php](http://fawn.ifas.ufl.edu/tools/coldp/evaporative_cooling.php).

### Wet-Bulb Based Irrigation Cutoff Temperature

The last tool in the Cold Protection Tool Kit is Wet-Bulb Based Irrigation Cutoff Temperature tool. This tool simplifies the basic cold protection recommendation to *discontinue irrigation when the wet bulb temperature reaches the critical temperature of the crop being protected* (Harrison, et al., 1974). However, it is difficult to know when the wet bulb temperature is going to equal the critical temperature. As mentioned previously, the moisture content of an air mass does not vary much over a short distance. Therefore the wet bulb temperature at the closest FAWN site is a good indicator of moisture content for nearby locations. This tool retrieves a current air and wet bulb temperature (both calculated every 15 minutes) from each FAWN site, calculates the difference between these, and then calculates a "new" wet bulb temperature at the user-supplied critical temperature. This "new" wet bulb temperature is the temperature at which the system can be safely shutdown. Water and dollar savings from this simple tool can be tremendous.

### Pesticide News and Information



### Lawmakers Effort to Redefine NPDES

House Agriculture Committee Chairman Collin C. Peterson, D-Minn. introduced H.R. 6273 which amends the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and

the Clean Water Act (CWA) to prohibit additional permits for pesticide application when pesticides are applied consistent with FIFRA. “This legislation provides farmers and ranchers with the safe harbor they deserve in the application of pesticides. The bill relieves producers from a potentially costly regulatory burden that does little if anything to protect the environment,” Peterson said.

In the decades since Congress enacted the CWA, the Environmental Protection Agency (EPA) has never issued a National Pollutant Discharge Elimination System (NPDES) permit for the application of a pesticide. Instead, EPA has regulated these types of applications through FIFRA, enacted by Congress to control all aspects of pesticide registration, sales and use. The FIFRA registration process includes stringent requirements for a wide range of environmental, health and safety studies to establish the circumstances under which pesticides can be legally used in the United States.

In January 2009, the 6th Circuit Court of Appeals overturned a 2006 EPA rule which specifically exempted permitting of certain pesticide applications from the CWA. In *National Cotton Council of America, et al., v. United States Environmental Protection Agency* the court ruled EPA did not have the authority under the CWA to exempt application of pesticides. The Court’s decision marks a pre-emption of FIFRA by the CWA for the first time in the history of either statute.

Chairman Peterson’s bill would make clear that producers who are in compliance with the requirements of FIFRA are not subject to Clean Water Act permits. “The 6th Circuit decision overturned decades of policy and practice with regard to the sufficiency of FIFRA regulation,” Peterson said. “This legislation will make clear that Congress never intended for farmers and ranchers to meet addi-

tional permit requirements for pesticide applications under FIFRA.” Twelve members of the House of Representatives joined Peterson as original co-sponsors of the bill. (House of Representatives, 9/30/10).

### **Malaysia to Release GM Mosquito**

Malaysia will soon take the controversial step of releasing genetically modified (GM) mosquitoes into the wild as part of an experiment to test their survival in natural conditions. The move was approved by the country’s National Biosafety Board in October and will make the nation the first major country in the world to release GM *Aedes aegypti* mosquitoes for field testing - second only after the Cayman Islands in 2009.

The mosquitoes, known as OX513A, have been developed by Malaysia’s Institute for Medical Research (IMR) and the UK-based biotech company Oxitec to control the dengue virus, which is transmitted by *A. aegypti*. A total of 4,000–6,000 male GM mosquitoes are expected to be released by the end of the year, along with a similar number of unmodified male mosquitoes. The male GM mosquitoes mate with normal females to produce larvae that are unusual because of an extra enzyme they produce. This enzyme accumulates in the larvae to a level where it becomes toxic and kills them. The developers hope male GM mosquitoes will compete with normal males for females so that repeated releases cut numbers of *A. aegypti* in dengue-prone areas.

The mosquitoes will be released in inland districts. Each location will have two release phases: the first at a site 0.5–1 km from the nearest human settlement, and the second at an inhabited site. They will be recaptured using mosquito traps, which will be monitored for at least one month, while the inhabited release sites will also be fogged with insecticide when the experiment is over. The board

made its decision after its Genetic Modifications Advisory Committee (GMAC) analyzed the risk factors for the experiment. Ahmad Parveez Ghulam Kadir, head of the GMAC, told reporters that the committee had been concerned that laboratory tests had shown that three percent of the offspring of male GM mosquitoes and normal females actually survive into adulthood rather than dying as larvae as intended. The advisory committee had also been worried that female GM mosquitoes might accidentally be released. The technicians separate the male from the female GM mosquitoes based on the size of the pupae and is therefore not completely accurate. Because of this, Parveez said, the board has insisted that scientists sort through the pupae twice - first mechanically and then manually.

The 'self-limiting' strategy theoretically poses little threat of genes being released uncontrolled into the environment because of the death of the offspring. But future strategies, in which the aim is to overwhelm mosquito populations with those that are resistant to disease, are more controversial because the mosquitoes survive and breed. A Malaysian geneticist, who declined to be named, said he hopes the experiments will be carried out under rigorous safety protocols. "We have the best laws on biosafety in the world, but the problem is the enforcement," he said.

Liow Tiong Lai, health minister of Malaysia, told a press conference that the Malaysian government views the GM mosquitoes as "one of the most efficient and fastest ways of getting rid of the *Aedes* mosquito from our local environment." (SciDevNet, 11/2/10).

### **Lorsban® News**

The EPA is seeking public comment on a draft stipulation in U.S. District Court for the Southern District of New York that will stay

further litigation with the Natural Resources Defense Council and Pesticide Action Network North America on their claim that EPA has unreasonably delayed its response to their 2007 petition to cancel all uses and revoke all tolerances for the pesticide chlorpyrifos (Lorsban®). Under the draft Stipulation and Order, the case will be suspended, provided (1) EPA issues a preliminary human health risk assessment for chlorpyrifos by June 1, 2011, and requests comment on that assessment; and (2) each plaintiff will receive a written response to their petition by November 23, 2011. If the lawsuit is not reactivated by January 23, 2012, it will be dismissed. The draft Stipulation and Order and related documents are available in the docket for the chlorpyrifos petition, EPA-HQ-OPP-2007-1005 at [Regulations.gov](http://Regulations.gov). (EPA OPP Update, 12/1/10).

### **Suicide by Pesticides**

Based on a recent *PloS* article, 370,000 people annually take their own lives by ingesting pesticides. These deaths add up to a third of all suicides globally, making it the single most important method to commit suicide. Intentional pesticide poisoning is most common in rural areas of the developing world. To get an idea of the lethality of pesticides ingested in Sri Lanka, the authors collected information from each case of pesticide poisoning admitted to two hospitals in a rural province of the country between 2006 and 2008. The hospitals admitted more than 9300 cases over the study period, and where possible the researchers documented the pesticide ingested and the outcome for each patient. They used this information to calculate the fatality rate for more than 34 pesticides. Three compounds with a relatively high case fatality - paraquat, dimethoate, and fenthion - were responsible for 47 percent of the deaths. (*PloS*, 10/26/10).





## **PROGRAM**

### **The Florida Citrus Industry in 2011 Session**

- 8:50 – 9:00     **Welcome**  
Chairman, Indian River Citrus League
- 9:00 – 9:20     **What's the Citrus Research & Development Foundation Doing For You?**  
Dan Gunter, Citrus Research & Development Foundation
- 9:20 – 9:40     **Outlook for the Florida Fresh Fruit Industry**  
Richard Kinney, Florida Citrus Packers
- 9:40 – 10:00   **Florida Citrus Good Agricultural Practices (GAPs)**  
Peter Chaires, New Varieties Development and Management Corp.
- 10:00 – 10:50 **Visit the Trade Show**
- 10:50 – 11:10 **Agricultural Water Issues in Florida**  
Rich Budell, FDACS, Director of Office of Ag Water Policy
- 11:10 – 11:20 **IFAS Interaction with the Florida Citrus Industry**  
Dr. Jack Payne, UF Senior Vice President for Agriculture and Natural Resources
- 11:20 – 12:00 **Conventional breeding & genetic engineering of citrus in Parana, Brazil**  
Dr. Eduardo Carlos, Laboratory of Biotechnology, IAPAR, Londrina, PR, Brazil
- 12:00 – 1:30   **Lunch – Visit the Trade Show**

### **Maintaining Citrus Production in Florida Section**

- 1:30 – 2:00     **Utilizing Advanced Production Systems for New Plantings**  
Arnold Schumann, UF/IFAS
- 2:00 – 2:30     **Using Foliar Nutrition for Improved Tree Health**  
Bob Rouse, UF/IFAS

- 2:30 – 3:20 **Visit the Trade Show**
- 3:20 – 3:40 **USDA Rootstock Program**  
Bob Shatters, USDA,ARS
- 3:40 – 4:00 **IFAS Rootstock/Variety Program**  
Jude Grosser, UF/IFAS
- 4:00 – 4:20 **Windbreaks Utilization in Florida**  
Bill Castle, UF/IFAS

Thursday, January 20, 2011

**Florida Citrus Pest Management Section**

- 8:00 – 8:30 **Visit the Trade Show/Continental Breakfast**
- 8:30 – 9:00 **Update on Citrus Leafminer Management**  
Lucasz Stelinski, UF/IFAS
- 9:00 – 9:30 **Citrus Health Management Areas (CHMA's)**  
Michael Rogers, UF/IFAS
- 9:30 – 10:30 **Visit the Trade Show**
- 10:30 – 11:00 **Current Status of Canker Management Research**  
Jim Graham, UF/IFAS
- 11:00 – 11:30 **Citrus Black Spot Management Update**  
Megan Dewdney, UF/IFAS
- 11:30 – 12:00 **USDA Asian Citrus Psyllid Research**  
David Hall, USDA/ARS
- 12:00 – 1:30 **Lunch and Visit the Trade Show**
- 1:30 – 2:00 **Asian Citrus Psyllid Management Update**  
Phil Stansly, UF/IFAS
- 2:00 – 2:30 **Postharvest Issues/Maximum Residue Limits**  
Mark Ritenour, UF/IFAS
- 2:30 – 3:00 **An Economic Analysis of Changes in the U.S. Orange Juice Market**  
Allen Morris, UF/IFAS