Citruslines

The Mission of UF/IFAS is to develop knowledge in agricultural, human and natural resources and to make that knowledge accessible to sustain and enhance the quality of human life.

Winter 2010

January, February & March

UF UNIVERSITY of FLORIDA
IFAS Extension
Lake County Extension

Upcoming Events

http://cfextension.ifas.ufl.edu/calendar.shtml

The Florida Citrus Grower's Institute	**Avon Park**	**April 13th**
Mid Florida Citrus Foundation Field Day	**Winter Garden**	**May 11th**
Private Applicator Licenses	**Kissimmee**	**May 19th**
Florida State Horticulture Society Annual Meeting	**Crystal River**	**June 6-8th**
CEU Day and Worker Protection Standards (WPS)	**Apopka**	**June 10th**

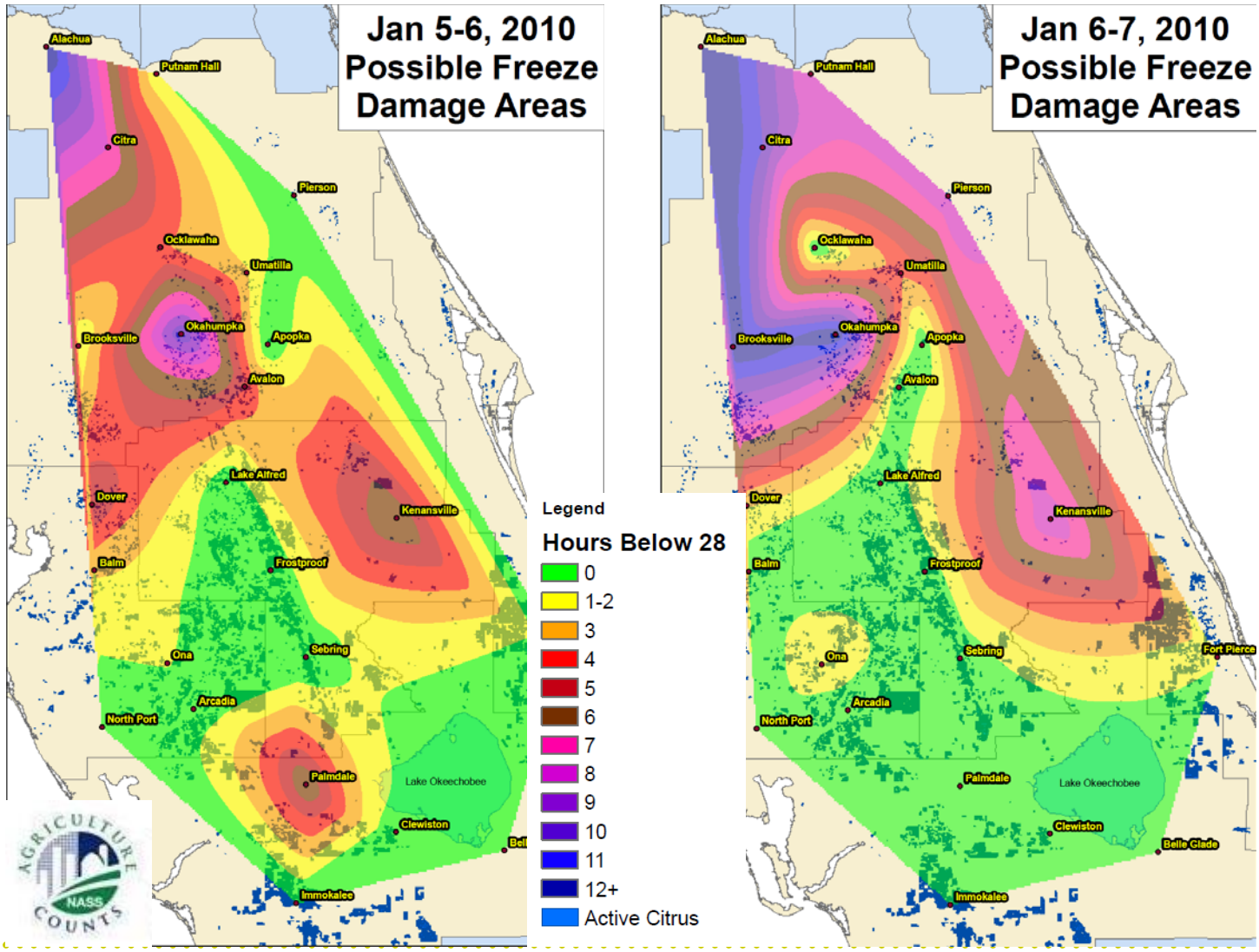
Well thankfully we are closing out the winter of 2010. We here in the more northern territory of citrus have yet again dodged a bullet with cold weather. There was some fruit and tree damage, but thankfully not many trees were lost. Hopefully we can put the cold weather in the rear view mirror for at least a few years. As Ben Krupski told me after the ten days of freezing weather in early January which required long days and nights "if we would have known what we were in for we would have saved our strength for later". It seems that the first signs of freeze get us all active, even when the weather maybe a bit marginal. Once you go thru a few nights of below 28 degrees for long durations, marginal nights don't seem so worrisome. Now as the weather turns warm, we focus our attention to psyllid control, fertilization and irrigation. Hopefully like the freezes of last year, by July you won't be able to tell the trees ever suffered this winter if given good care.

Other events of possible interest

Future of Global Orange Juice Industry	Lake Alfred	April 8th
Mechanical Harvesting Field Day	Immokalee	April 21st
Florida Citrus Mutual Annual Meeting	Bonita Springs	June 9-11th
Florida Agriculture Financial Management Conference	Orlando	May 20-21st
Brazil Citrus Tour	Sao Paulo	June 19-26

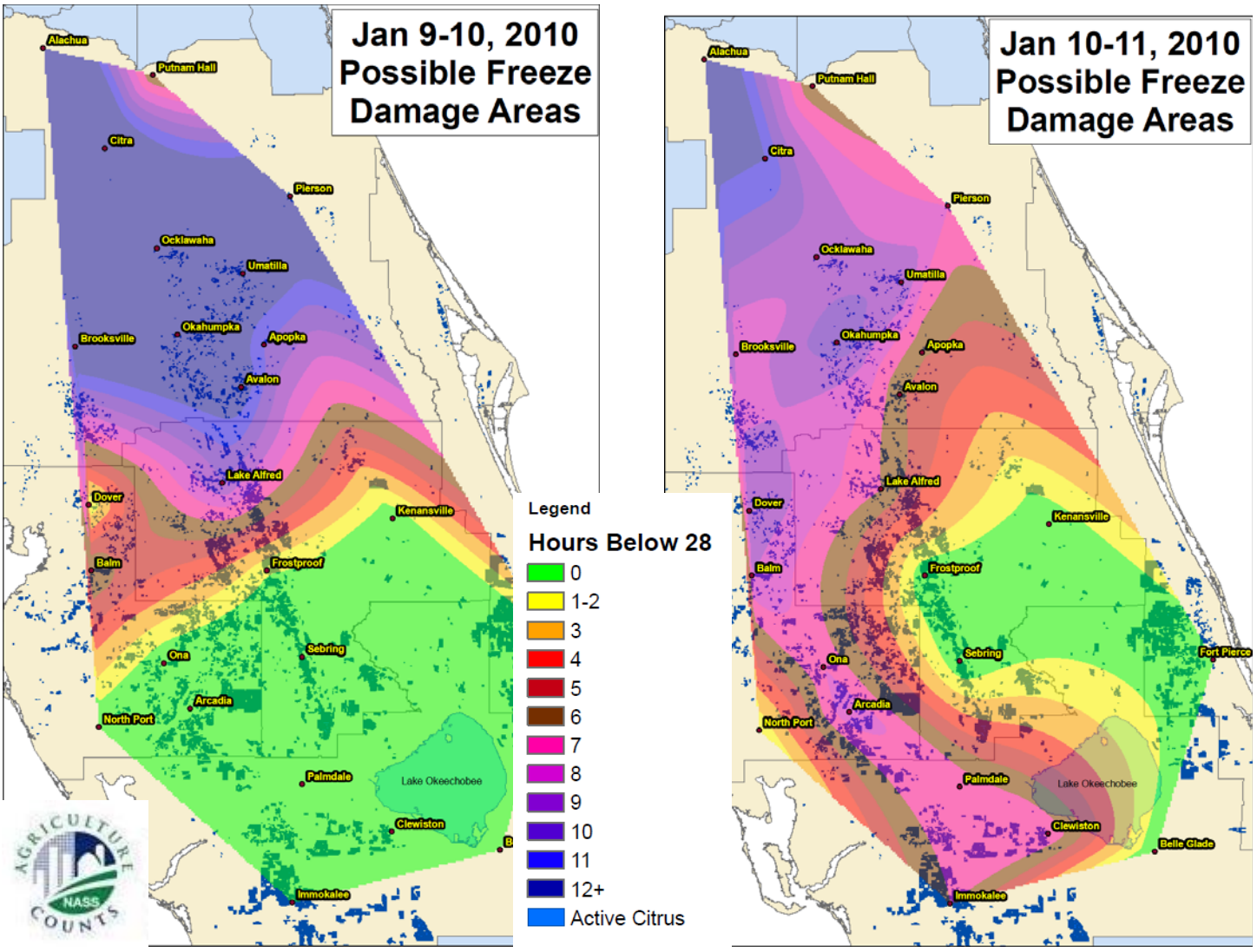
Freezes of 2010

Having a weather watch extension program devoted to cold weather and specifically freeze events I was fascinated by the maps below when I received them. These maps were created by John Miley at the Florida Agricultural Statistics Service from data collected from F.A.W.N. sta-



tions. The maps show areas of the state shaded in different colors based on the estimated durations under 28 degrees. Sweet oranges become damaged typically starting after 4 hours at 28 degrees, so duration under 28 degrees is an interesting number. Every freeze event is different for every location. Cold is much like water in that it will flow down hill to following the path of least resistance to the lowest areas and pool up growing in diameter as it becomes colder. When winds become calm, there is less mixing of the atmosphere and radiational cooling starts to play an increasing role on temperatures. It is during these conditions when low/high effects are most often in play. Look at map of Jan10-11th where ridge locations such as Frostproof and Sebring may have zero hours below 28 versus a lower lying area like Palmdale (which is 34 miles south) which had approximately 7 hours under 28 degrees.

Due to the severity of the freeze events the USDA declared the state of Florida officially a disaster area. This designation makes farm operators in both primary and contiguous counties eligible to be considered for assistance from FSA, provided eligibility requirements are met. This assistance

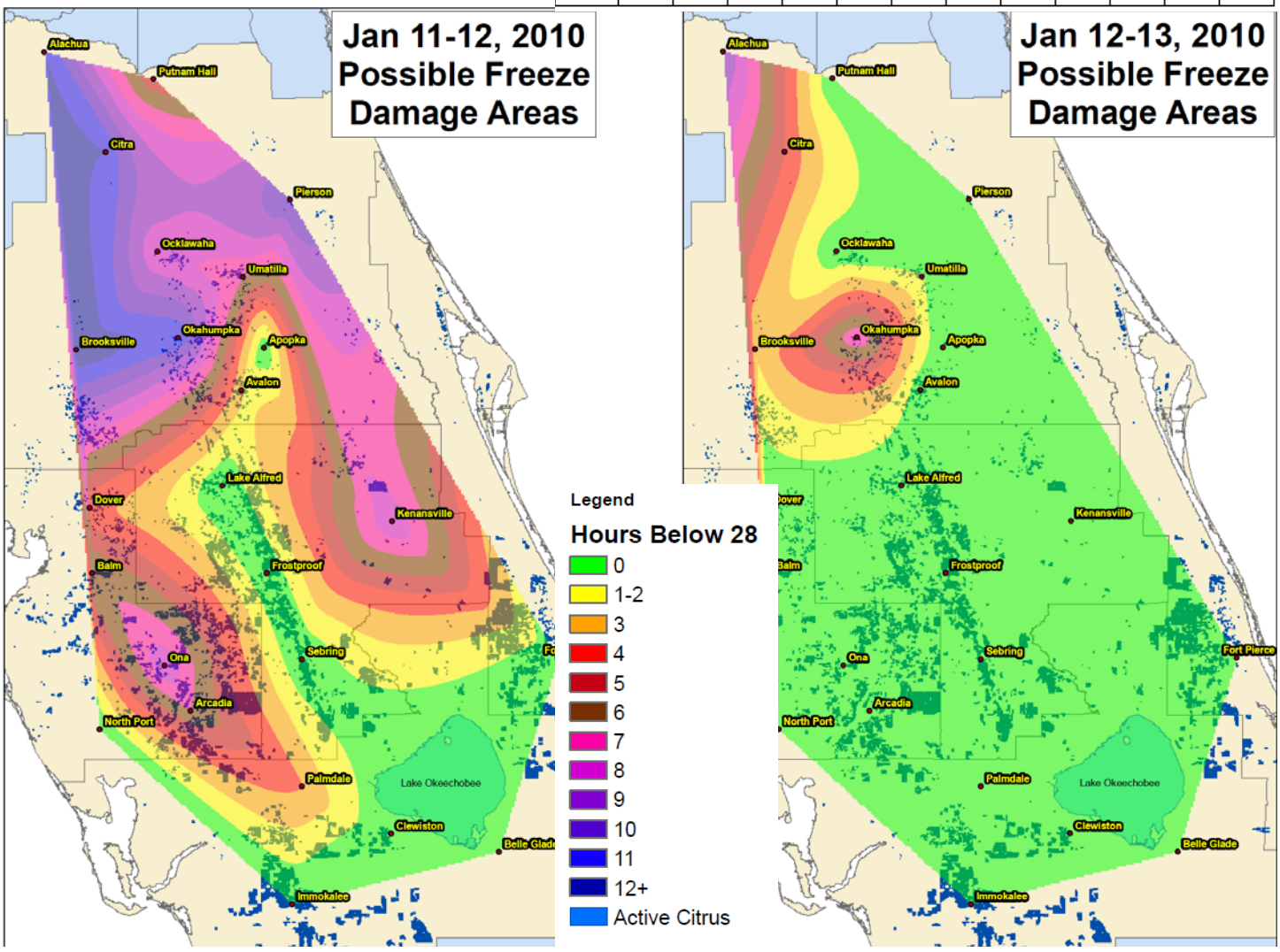


includes FSA emergency loans and the Supplemental Revenue Assistance Payments Program (SURE). SURE was approved as part of the Food, Conservation, and Energy Act of 2008 and was implemented beginning on January 4, 2010. FSA will consider each application on its own merit by taking into account the extent of losses, security available, and repayment ability. Local FSA offices can provide affected farmers with further information. Get in touch with your local FSA at:

http://offices.sc.egov.usda.gov/locator/app?state=fl&agency=fsa

Chart to the right shows temperature and percent fruit damage when subject to the temperature (on left) for 1-12 hours (on top). This chart was from research conducted on sweet oranges by Drs. Gerber and Bartholic. Fruit damage can vary slightly between different citrus varieties.

Temp (˚F)	1	2	3	4	5	6	7	8	9	10	11	12
28	0	0	0	0	5	7.5	10	12.5	15	17.5	20	20
27	0	10	20	20	30	40	42.5	45	47.5	50	50	50
26	0	10	20	30	40	43	46	50	50	50	50	55
25	10	20	30	40	45	50	52	54	55	57	58.5	60
24	15	24	40	40	45	50	53	57	60	65	70	80
23	20	27	40	41	50	60	70	75	80	90	100	100
22	25	30	40	55	70	80	100	100	100	100	100	100
21	30	35	50	65	80	100	100	100	100	100	100	100
20	40	50	60	80	100	100	100	100	100	100	100	100
19	45	60	75	90	100	100	100	100	100	100	100	100
18	50	70	90	100	100	100	100	100	100	100	100	100



The Florida Citrus Grower's Institute Avon Park April 13th

For the last few years the citrus extension agents have held the Florida Citrus Grower's Institute. This years program is packed full of great speakers and topics. In my opinion it is the most important program of the year, due to the fact it covers a wide range of topics with the latest research based information. In addition, the international and national speakers add to the robustness of the program.

Avon Park is centrally located for the entire state's citrus growing region. Most growers in our area should be able to travel 2 hours or less to this venue. A free lunch will be provided. Registration is required and space is limited, so do not wait until the last minute.

Check in begins at 8AM and the presentations are from 8:30-3:45. Please see the flyer enclosed with the newsletter for more details or call my office at 352-343-4101.

Mid Florida Citrus Foundation Field Day Winter Garden May 11th

Please plan on joining us for a field day at the MFCF in Winter Garden. Flyer provide at back of newsletter with form.

Welcome/HLB Nutritional Trial —Ryan Atwood

New UF/IFAS Valencia release-Dr. Grosser

Sprout control and new herbicides-Dr. Futch

Remedial and preventative tests for HLB– Dr. Albrigo

Rooted Cutting Trial– Ryan Atwood

Psyllid control work-Dr. Rogers

Psyllid control/Leafminer-Dr. Stelinski

Lunch

Peach Varieties-Dr. Olmstead

Horticultural Peach practices-Bob Rouse

Peach Pest Management– Gary England

Peach Nursery production-Phil Rucks

Economics of Peach Production-Ryan Atwood

Private Agricultural License Review & Exam May 19th 8:30-4:00

A pesticide license is required by any persons who apply or supervise the application of restricted use pesticides for agricultural production. This certification requires a passing grade of 70% on the General Standards and Private exam. This certification must be renewed ever 4 years either by testing or by 8 CEU's.

There will be a review and exam in Kissimmee on May 19th. The review starts at 8:30 AM. There is a $20 charge for the class. CEU's are available for the training session.

It is advisable to purchase the "Applying pesticides correctly" and "The private applicator training manual" from the IFAS bookstore on-line at www.ifasbooks.ufl.edu or by calling 800-226-1764.

The private agricultural license itself cost $100 which does not have to be paid until after you pass the exam. To register please send in sign up sheet located at the back of the newsletter.

CEU Day and WPS Training
Apopka June 10

If you are in need of a lot of CEU's for your pesticide license you are in luck. Every year in June we offer a CEU Day. This year the CEU Day will be held at the Mid Florida Research and Education Center in Apopka. Registration is required. Please see attached flyer.

8:20-9:10 a.m. Update on IPM and Biological Control in Landscapes - Dr. Steven Arthurs

9:10- 10:00 a.m. Yard Hole Makers, ID and Control - Bill Kern

10:30 - Noon **25 Minute Hands On Sessions**

Droplet Size and Wind speed - Juanita Popeno
Calibration of Backpack Sprayers and Drop-spreaders—Lelan Parker
Spill Cleanup - Jennifer Pelham
Pesticide Safety Bingo - Ryan Atwood

1:00 – 3:00 p.m. Worker Protection Standards/ Train the Trainer -Ryan Atwood

UF/IFAS Brazilian Citrus Tour
Sao Paulo June 19-26

Dr. Steve Futch will be conducting a Florida citrus grower tour to Brazil June 19-26, 2010. This tour will visit citrus sites in the State of Sao Paulo. Citrus producing areas near Limeira, Araraquara and Sao Jose do Rio Preto will be highlighted during the week tour. The approximate cost for the tour will vary depending on the number of participants and is estimated to be $3,400 to $2,800. A $1,000 non-refundable deposit will be required by April 17, 2010. The above fee includes airline tickets international and domestic), hotel accommodations and ground transportation. The tour will depart from Miami on Saturday, June 19 (9:35 PM) and return to Miami on Saturday, June 26 (7:10 AM). Departure from other locations can be arranged, but at a slightly higher cost.

If interested in participating in this citrus tour, please contact Steve Futch at shf@ufl.edu or by phone at 863-956-1151.

Abandon Citrus Grove Abatement

A cooperative effort between the Florida Department of Agriculture, Florida Citrus Mutual, property appraisers and landowners has begun to indentify abandon groves. Groves that are registered under the Citrus Health Response Program (CHRP) maybe eligible for agricultural classification for up to two years when removing living citrus trees that are not actively managed for citrus (abandoned groves) and may act as a harbor for citrus pests and diseases. Once abandoned grove pest threat is eliminated, the property owner is eligible for a CHRP abandoned grove compliance agreement. CHRP abandoned grove compliance agreements will be valid for a minimum of two years and may be extended in one-year increments based upon a written request justifying the need for additional time to complete land use transition. For more information contact your local CHRP office (located on flyer in back of newsletter).

Pictures of recent Extension Activities

I included pictures of recent activities to your extension program. If you have not been coming, I wanted to show you what you have been missing!

Below: Bill Lennon and Ben Krupski grill a 4H youth about citrus tree care. Thanks to all the judges who volunteer their time!!

Above: Mr. Ryan auctions off the grand champion citrus tree at the Central Florida Fair. Sydney Feliciani of Orange County was the top 4H youth and was overjoyed with the highest bid of $550.00. Thanks to all the growers who buy trees, it is your support which makes the 4H citrus tree program successful.

Above: Danny Finch co-owner of Record Buck Citrus Nursery talks to Farm tour attendees about citrus trees. Attendees had the opportunity to learn more about agricultural industries and their importance to Lake County's local economy.

Left: The Lake County Farm Tour included six local agricultural producers operations. This picture was taken at G&L Farms. Stops also included Frank Bouis's citrus grove off of HWY 19 and CR 48. The tour consisted of Lake County residences, government employees and elected officials.

RootStocks Affect the 17-Year Survival and Performance of 'Valencia' Trees Grown in Immokalee. WILLIAM S. CASTLE AND JAMES C. BALDWIN. UF/IFAS, Citrus REC, Lake Alfred, FL. Proc. Fla. State Hort. Soc. 121:140–144. 2008.

In honor of FSHS meeting coming up in June I would like to summarize the paper that won the "best paper" award in the citrus section from the 2009 meeting. In 1991 non replicated large block plantings of Valencia on nineteen different rootstocks were established near Immokalee. The soil at the site was Malabar-high-fine sand with a average pH of 7.8. Tree survival was assessed at ages four and seventeen, average tree height was determined at age nine, yield data was collected between 1996-2003. Fruit samples were collected in 1995, 1998, 2000, 2001 and 2003 to determine % juice, SSC, Ratio, and PS/box. In addition canopy ratings based on micronutrient deficiencies were evaluated and compared against soil pH and CaCO3 percentages. Included is part of Table 1 from this paper, for the complete table please see original paper. The highest yielding rootstocks over the six seasons were Carrizo and Benton citranges (14-15 boxes per tree), while the lowest was Cleopatra mandarin (9.5 boxes per tree). Highest pound solids per box values averaged over five seasons were from Carrizo, Benton and Rusk citranges. The authors conclude by stating that 500 boxes/acre is possible in Malabar series when choosing the appropriate rootstock. The specifically mention Benton, Carrizo, Sun Chu Sha as favorable rootstocks and state the most promising rootstock was F80 -14. In addition to the publications the Florida State Horticulture Society (FSHS) annual meeting is full of interesting research based information for citrus production. I encourage you to become a member and attend the annual meeting. Information on the FSHS meeting and membership can be found at: http://www.fshs.org/

Table 1. Performance of 'Valencia' trees on various in a planting at Immokalee. Trees planted in Apr. 1991 at 141 trees /acre (14 × 22 ft).

	Tree survival, %		Tree	Yield, boxes/tree[y]			Juice quality[x]			
Rootstock	4 yr	17 yr	ht, ft[z]	Season	Annual	Cum.	% Juice	SSC	Ratio	PS/bo
1572 *P. trifoliata* (L.) Raf.	98	90		94-95	0.5		60.1	10.0	13.2	5.4
x Milam(*Citrus jambhiri* Lush. Hybrid			10.5	99–00			59.5	12.0	14.5	6.4
				00-01			55.6	11.7	16.5	5.9
				01-02	2.8					
				02-03	3.4	12.9	62.9	12.0	14.7	6.8
1573-26 *P. trifoliata*	100	91		94-95	0.5		55.9	11.1	11.8	5.6
x *Citrus sinensis* (L.) Osb. 'Ridge Pineapple'			9.0	99-00			64.6	12.3	13.5	7.1
				00-01			54.7	11.5	15.5	5.6
				01-02	0.9					
				02-03	1.3	4.7	66.3	12.2	14.2	7.3
1578-173 'Ridge Pineapple' x Milam[w]	50	48		94-95	0.3		58.2	10.0	12.7	5.3
			11.5	99-00						
				00-01			56.7	11.8	16.9	6.0
1578-201 'Ridge Pineapple' x Milam[w]	48	45		94-95	0.2		60.2	10.1	13.3	5.5
			11.5	99-00			62.9	11.7	12.9	6.6
				00-01			57.7	11.5	16.7	6.0
Benton citrange (*C. sinensis* x *P. trifoliata*)	99	90		94-95	1.3					
			12.0	99-00			61.4	12.5	15.0	6.9
				00-01			58.4	12.6	17.7	6.6
				01-02	3.3					
				02-03	3.1	14.8	63.4	12.5	18.1	7.1
Carrizo citrange	100	81		94-95	1.2					
			11.5	99-00			65.0	12.4	13.7	7.2
				00-01			61.0	12.2	20.7	6.7
				01-02	4.4					
				02-03	2.8	15.7	60.5	11.9	18.9	6.5
Changsha mandarin (*C. reticulata* Blanco)	99	98		94-95	0.3		60.1	10.0	13.2	5.4
			12.7	99-00			55.2	12.3	17.6	6.1
				00-01			60.6	11.6	16.1	6.3
				01-02	3.2					
				02-03	2.7	11.5	61.4	11.8	15.3	6.5
Cleopatra mandarin	88	67		94-95	0		60.9	9.6	11.9	5.3
			14.2	99-00			58.6	10.6	12.2	5.6
				00-01			59.7	11.2	14.6	6.0
				01-02	2.4					
				02-03	4.5	9.5	58.8	10.5	13.3	5.5
F80-5 citrumelo	99	88		94-95	0.4		59.7	10.0	13.0	5.4
(*C. paradisi* Macf. x *P. trifoliata*)			14.5	99-00			60.0	12	14.8	6.5
				00-01			59.3	12	14.6	6.4
				01-02	3.3					
				02-03	2.8	12.1	60.7	11.4	13.2	6.2
F80-8 citrumelo	100	97		94-95	0.6		58.9	9.9	12.8	5.2
			12.5	99-00			57.9	12	15.0	6.3
				00-01			63.3	11.9	16.6	6.8
				01-02	3.9					
				02-03	3.2	14.4	62.0	11.5	14.2	6.4
F80-9 citrumelo	100	93		94-95	0.3		57.8	10.8	11.3	5.6
			13.5	99-00			60.6	12.5	16.0	6.8
				00-01			57.6	10.7	16.0	5.6
				01-02	3.8					
				02-03	2.9	12.7	60.5	12.2	16.2	6.6
F80-14 citrumelo	100	88		94-95	0.7		59.5	9.6	13.1	5.1
			9.7	99-00			58.8	12.1	14.9	6.4
				00-01			56.6	11.9	16.7	6.0
				01-02	3.4					
				02-03	3.1	14.4	61.2	11.5	15.4	6.3

IFAS Guidance for Huanglongbing (Greening) Management

Recently a document was developed by the UF/IFAS citrus extension team in an effort to provide guidance to the Florida citrus industry when making management decisions about citrus greening (HLB). This document was recently released and is reflects the best thinking of IFAS citrus researchers, based on current scientific evidence and observations in Florida as of the spring of 2010. The document is presented in four sections:

1) HLB in Florida
2) Management strategies
3) Deciding which management strategy to use
4) HLB infection scenarios and management guidance.

I highly recommend that you review this document to aid in your understanding of the current thought on HLB management. You can find a copy of the document online at: http://cfextension.ifas.ufl.edu/agriculture/citrus/documents/IFASHLBGuidanceDocument.pdf and I have also include a copy at the back of newsletter.

I would also encourage you to download the excel sheet developed by Dr. Fritz Roka at the Southwest Florida Research and Education Center to see how different scenarios effect the economic return of your operation. The excel file can be found at:

http://swfrec.ifas.ufl.edu/economics/

Click on the NPV Analysis to compare alternative HLB management strategies (Spreadsheet) link.

EPA Nutrient Requirements

If you are not aware of EPA's proposed numeric nutrient water quality criteria for Florida please take the time to read UF's recent release on this topic at: http://edis.ifas.ufl.edu/pdffiles/SS/SS52800.pdf also provided in newsletter.

To give this topic a very brief summary, many of Florida's rivers and lakes are not passing The Department of Environmental Protections (DEP) defined pollution standards for nitrogen and phosphorus. Previously the DEP had developed standards for these nutrients however the standards were narrative in nature and not a numeric value. So why should you care? Because anyone who uses fertilizer in the state will be affected by this rule. Obviously those of us in the agricultural industry need to be involved and have input into this process. We do not want other people making decisions that could impact our livelihoods without our opinions being heard. Everyone wants to have clean rivers and lakes, let make sure we can do our part to ensure that that objective goes hand in hand with the sustained success of Florida agriculture.

Please take the time to read more about this important topic.

Lake CEO/IFAS/UF

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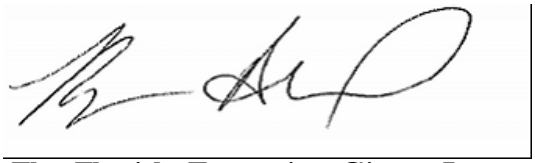
The Vision for the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) is to increase and strengthen the knowledge base and technology for:

- Expanding the profitability of global competitiveness and sustainability of the food, fiber, and agricultural industries of Florida.
- Protecting and sustaining natural resource and environmental systems.
- Enhancing the development of human resources.
- Improving the quality of human life.



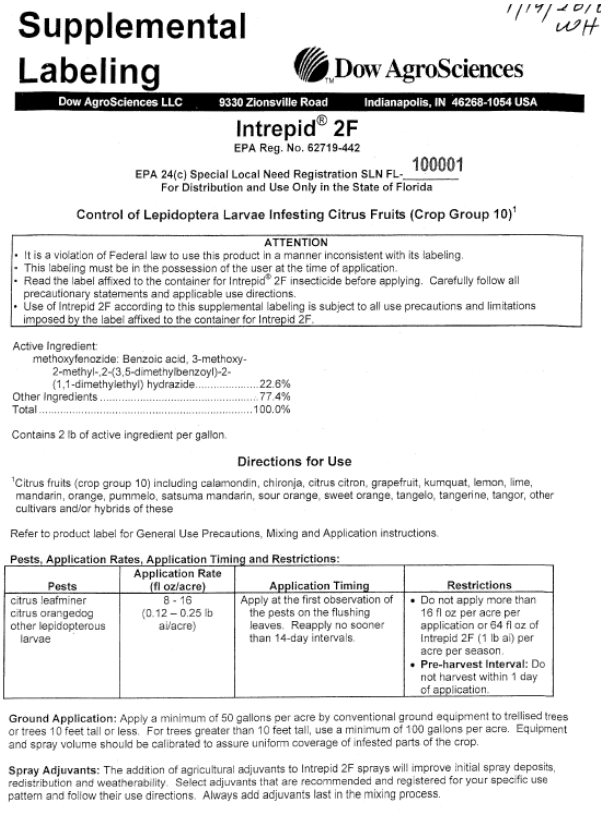
Florida Citrus Agents Survey

The Florida Extension Citrus Agents work cooperatively on educational programs. We need to survey these who participate in our programs to: 1). effectively evaluate the relevance of programs, 2). to determine how participants utilize the information received, and 3). to respond to funding sources for our programs such as grants and sponsors.

If you attended the Florida Citrus Grower Institute Symposium last Spring (April 2009) in Bartow, or one of the Fall 2009 Low Volume Technology Workshops in one of the six locations, would you take four minutes and complete the survey at the following computer link:

http://www.surveymonkey.com/s/BWBDFYH

Intrepid 2F now has a supplemental label for citrus leafminer control. It has a 1 day PHI and a minimal PPE requirement. It has been touted by the manufacture to not cause harm to beneficial insects. Research has shown that trees with leafminer damage to there leaves are much more likely to become infected with citrus canker (when present in the area). Also control of leafminer is important for young trees to maximize their growth potential. For UF/IFAS official recommendations for leafminer control please consult the 2010 pest management guide at http://edis.ifas.ufl.edu/in686.



Supplemental Labeling

Dow AgroSciences

Dow AgroSciences LLC 9330 Zionsville Road Indianapolis, IN 46268-1054 USA

Intrepid® 2F

EPA Reg. No. 62719-442

EPA 24(c) Special Local Need Registration SLN FL- 100001
For Distribution and Use Only in the State of Florida

Control of Lepidoptera Larvae Infesting Citrus Fruits (Crop Group 10)[1]

ATTENTION

- It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
- This labeling must be in the possession of the user at the time of application.
- Read the label affixed to the container for Intrepid® 2F insecticide before applying. Carefully follow all precautionary statements and applicable use directions.
- Use of Intrepid 2F according to this supplemental labeling is subject to all use precautions and limitations imposed by the label affixed to the container for Intrepid 2F.

Active Ingredient:
methoxyfenozide: Benzoic acid, 3-methoxy-2-methyl-,2-(3,5-dimethylbenzoyl)-2-(1,1-dimethylethyl) hydrazide 22.6%
Other Ingredients 77.4%
Total 100.0%

Contains 2 lb of active ingredient per gallon.

Directions for Use

[1]Citrus fruits (crop group 10) including calamondin, chironja, citrus citron, grapefruit, kumquat, lemon, lime, mandarin, orange, pummelo, satsuma mandarin, sour orange, sweet orange, tangelo, tangerine, tangor, other cultivars and/or hybrids of these

Refer to product label for General Use Precautions, Mixing and Application instructions.

Pests, Application Rates, Application Timing and Restrictions:

Pests	Application Rate (fl oz/acre)	Application Timing	Restrictions
citrus leafminer citrus orangedog other lepidopterous larvae	8 - 16 (0.12 – 0.25 lb ai/acre)	Apply at the first observation of the pests on the flushing leaves. Reapply no sooner than 14-day intervals.	• Do not apply more than 16 fl oz per acre per application or 64 fl oz of Intrepid 2F (1 lb ai) per acre per season. • **Pre-harvest Interval:** Do not harvest within 1 day of application.

Ground Application: Apply a minimum of 50 gallons per acre by conventional ground equipment to trellised trees or trees 10 feet tall or less. For trees greater than 10 feet tall, use a minimum of 100 gallons per acre. Equipment and spray volume should be calibrated to assure uniform coverage of infested parts of the crop.

Spray Adjuvants: The addition of agricultural adjuvants to Intrepid 2F sprays will improve initial spray deposits, redistribution and weatherability. Select adjuvants that are recommended and registered for your specific use pattern and follow their use directions. Always add adjuvants last in the mixing process.

Think you haven't received my quarterly newsletter lately or just want to look something up but misplaced an older copy. Archived copies can be found at:

http://citrusagents.ifas.ufl.edu/newsletters/atwood/index.htm

IFAS Guidance for Huanglongbing (Greening) Management

Timothy M. Spann, Ryan A. Atwood, Megan M. Dewdney, Robert C. Ebel, Reza Ehsani, Gary England, Steve Futch, Tim Gaver, Tim Hurner, Chris Oswalt, Michael E. Rogers, Fritz M. Roka, Mark A. Ritenour, and Mongi Zekri

This document has been developed in an effort to provide guidance to the Florida citrus industry in making management decisions regarding Huanglongbing (HLB, citrus greening). Note that the information contained in this document reflects the best thinking of IFAS citrus researchers, based on current scientific evidence and observations under Florida conditions as of spring 2010. However, it is subject to change and the document will be updated as necessary based on new research findings. Users of the document are encouraged to consult with their IFAS Citrus Extension Agent to make sure they are referencing the most recent version.

This document is presented in four sections.

1. HLB in Florida.
2. Management strategies: a) inoculum reduction via removal of HLB-infected trees, and b) use of foliar nutritional sprays to maintain the productivity of HLB-infected trees.
3. Deciding which management strategy to use.
4. HLB infection scenarios and management guidance.

1. HLB in Florida

HLB, also known as citrus greening, is the most devastating disease of citrus, affecting all citrus species and varieties. This disease has severely limited production in many citrus-growing areas around the world. In Florida, the disease is believed to be caused by the bacterium *Candidatus* Liberibacter asiaticus (Las) and is spread by the Asian citrus psyllid (*Diaphorina citri* Kuwayama). This insect was first found in Florida in 1998, and at that time was considered to be a pest of minor importance since the HLB pathogen was not known to be present. The 2005 discovery of HLB in Florida changed the status of this insect to a pest of great importance. Since 2005, HLB has spread to all citrus producing counties in Florida. Las is a phloem-limited bacterium that appears to cause phloem plugging and likely has other undetermined effects on infected trees. Phloem plugging disrupts the transport of carbohydrates leading to root and subsequent tree decline. Symptomatic trees display visual symptoms of blotchy mottle leaf chlorosis and produce small, lopsided fruit that fail to ripen and drop prematurely. Juice from fruit displaying these symptoms is similar in quality to juice from less mature fruit.

2. Management strategies

a) Inoculum reduction via removal of HLB-infected trees

At the time of its discovery in Florida, growers attempted to follow the guidelines used for HLB management in other countries, including rigorous psyllid control and inoculum (i.e. infected tree) removal. In reality, the urgency with which these guidelines needed to be followed for them to be most effective was not fully appreciated initially. Inoculum removal is a sound epidemiological principle that has been practiced for decades in many crop/disease systems, including other citrus producing areas where HLB is present. The principle behind tree removal for HLB control is simple; by removing diseased trees, the percentage of the tree population that is infected is reduced. A lower percentage of infected trees should result in reduced spread of the disease. Even under the best circumstances, HLB will likely never be eradicated. The goal of this strategy is to keep the number of infected trees low; ideally under 2%. This requires a rigorous management effort of psyllid control, scouting for and removing infected trees, followed by resetting with clean nursery stock to recover productivity in the long term. Since psyllid control and scouting are not 100% effective, psyllid control, scouting, tree removal and resetting must be repeated judiciously.

Several factors may prevent tree removal from being as effective in practice as it is in principle. Perhaps most important is HLB disease detection. Our current methods for detecting HLB-infected trees rely on visual detection of symptoms. Currently, our best estimate places visual detection by scouting at about 50% - 60% effective in finding all the symptomatic trees in a single survey. In addition, there is a latency period between infection and symptom development (estimated between 6 months and 2 years, or longer, depending on tree size and other factors). During this latency period, psyllids can acquire the pathogen from asymptomatic trees; however, the rate of acquisition may be lower than from symptomatic trees containing higher levels of the pathogen. Anecdotal evidence suggests that there is usually at least one asymptomatic tree for every symptomatic tree found; although, some estimates put this number much higher. Despite this limitation, removal of infected trees does reduce inoculum.

The second factor that impacts the effectiveness of tree removal is timeliness. Even growers with the most aggressive tree removal program find it difficult to keep pace with new finds and many growers may delay tree removal until the current crop is harvested. Thus, inoculum source trees may remain in the grove longer than desired. Because of these inherent limitations, HLB inoculum reduction must be done in combination with stringent psyllid control to maximize the management of inoculum spread.

The importance of keeping accurate records of the numbers and locations of infected trees and psyllid control efforts cannot be over-emphasized. Growers should track their finds of infected trees over time to see what impact their efforts are having. It is important to remember that because of the latency period of this disease, it is very likely that the number of infected trees will continue to increase for some time after tree removal is initiated. However, if the program is effective and good psyllid control is maintained without lapses, the number of finds should decline and can be maintained at a relatively low level.

One factor that we have only begun to realize is the necessity for HLB inoculum management to be regional. On many occasions, an inoculum control strategy in a grove is not as successful as desired because of deficiencies in management practices in neighboring groves. If psyllid control is inadequate or not coordinated and infected trees not removed, inoculum builds up in the immediate area. The experiences in Florida are similar to those in Brazil. In Brazil, where there are large acreages of citrus with aggressive psyllid and inoculum management, infection rates decrease from the outside edge to the center of a grove. Conversely, small blocks, even with aggressive programs, are unable to reduce the rate of infection when surrounded by other blocks with minimal or no HLB management programs. In Brazil, there are many very large farms that are able to implement aggressive management programs over a wide area, thereby creating an HLB management buffer around them. Large farms are fewer in number in Florida, which may prove to be a disadvantage to the citrus industry here unless growers can begin to coordinate their efforts collectively to control inoculum as they have begun to do with psyllid control.

b) Use of foliar nutritional sprays to maintain the productivity of HLB-infected trees

An alternative HLB management strategy being adopted by many Florida citrus growers uses various foliar nutritional products, primarily micronutrients, to maintain tree health and productivity. There is substantial scientific evidence about the positive effects of improved, balanced mineral nutrition on plant disease, particularly with annual crops and foliar fungal and bacterial diseases. However, the data regarding the interaction of plant nutrition and systemic vascular diseases, like HLB, are less conclusive. The beneficial effects of nutrition do not extend to situations of excessive or luxuriant fertilization, which can in fact increase disease severity.

The theory behind the use of mineral nutrition for management of HLB-infected trees is fairly straightforward. It is well documented that citrus trees respond to Las infection with the production of callose and p-protein, natural wound/defense compounds that block the damaged or infected phloem vessels. This plugging of phloem likely results in disruption of carbohydrate movement from leaves to roots, leading to root system decline. The disruption of carbohydrate transport from the leaves leads to starch accumulation and chloroplast disruption,

expressed as the blotchy mottle symptom in leaves. The declining root system likely reduces water and nutrient uptake contributing to the nutrient deficiencies and twig dieback that are general HLB symptoms. By supplying nutrients to the tree by foliar application, the declining root system may be circumvented, and the tree may tolerate the effects of the disease on disruption of carbohydrate, water and nutrient supply, thereby sustaining the tree for some period of time depending on tree size, vigor and other factors. This potentially could result in new phloem production and supply of carbohydrates to the roots, and eventually new root production and a restoration of root function. Thus, the production of new vascular tissue may enable the tree to "live with" the infection. That is, the tree may sustain an economic yield for some period of time in spite of the infection.

Nutrient supplementation may also affect trees by inducing naturally occurring plant resistance mechanisms that are reported to protect against infection. Such mechanisms, including those known as SAR, SIR and ISR, are thought to be preventative and not curative. If nutrient supplementation can induce these mechanisms, the maximum benefit should be achieved when nutrients are applied to uninfected trees. At this point, there is little evidence that these resistance mechanisms can protect against systemic diseases like HLB at any stage of infection. Some users and/or manufacturers of nutrient supplement products add compounds to the mixture, outside of traditional macro and micronutrients that have been postulated to induce plant resistance, such as salicylic acid. These compounds should not be applied to commercial citrus if they are not registered for this purpose. The maximum benefit from applications of properly dosed and balanced nutrients may lie in their well-known effect on maintaining productive trees through balanced plant metabolism.

Although the potential exists for enhanced nutrition to increase tolerance to HLB, many unknowns exist. First, what nutrients are important and at what rates? It is unlikely that one single nutrient will be the key; rather it will likely be a combination of nutrients and possibly other compounds. Furthermore, it will be important to maintain the balance between nutrients because having one nutrient drastically out of balance with the others is just as damaging as a deficiency. How long can enhanced nutrition sustain the health of HLB affected trees? Anecdotally, mature tree productivity has been maintained for at least 4 years on such a program when combined with aggressive psyllid management. However, replicated scientific experiments to test these observations are only in their second year. We also do not know if there is a point at which such a management strategy will not work. It is likely that a nutritional program has a greater chance of success when implemented early (at first disease detection or before) rather than after a grove has reached a state of significant decline from infection. In addition, it is unknown if trees in the pre-bearing or early bearing stages will respond similarly to mature trees. Good horticultural practices that promote healthy, productive trees make sense for all groves, regardless of HLB infection.

In addition, significant questions remain about the build up and spread of inoculum under a nutrient management program. As with tree removal, good psyllid control remains critical for two reasons. First, it is likely that a tree will succumb to HLB-infection more quickly if it is repeatedly inoculated with the pathogen. Moreover, since tree removal is not practiced under a nutrient management program, coupled with the fact that psyllids reared on infected trees are more likely to spread the pathogen as adults, increases the risk for disease spread. This raises the question of whether new plantings or resets can be brought into production where the regional decision has been made to adopt the nutrient management strategy. Regardless of how long a nutrient management program can sustain tree productivity there will come a time when those trees die. If the grove or block is within a large area under nutrient management where high levels of inoculum have been allowed to accumulate, can a new grove be planted and brought into production in such a situation? Experiences have been that even in areas where inoculum control is aggressively practiced, it has not been possible to keep 100% of new trees HLB free from the time of planting to bearing age. Thus, if inoculum is allowed to build in an area it is likely that it will be even more difficult, if not impossible, to bring new trees into production.

To summarize, broadly accepted, sound scientific data to support which management strategy – tree removal or nutrient management strategy, or a combination of the two – can sustain a grove or a commercial

citrus industry do not exist; although, a significant amount of research is currently underway to gather such data. At this point, a recent study from Brazil has been published, and this, together with our experiences in Florida, forms the basis of management under the infection scenarios presented below. Decisions about HLB management are very difficult to make because of the continued uncertainty of how best to control inoculum or whether inoculum control is even possible. Many factors other than biology are involved, including economics, sociology, and regional HLB incidence that further complicate an individual grower's decisions on HLB management. The decision of which strategy to pursue must be made by each grower based upon his or her particular situation and objectives as discussed below.

3. Deciding which management strategy to use

The decision to remove infected trees to control HLB or pursue a nutritional supplementation program is a difficult and complex one. The following series of questions and discussion are designed to aid you in making the best decisions possible given your circumstances. The underlying presumption for these questions is that you are reassessing whether to continue tree removal for HLB management or pursue a nutritional program instead. It is our current opinion that a decision to abandon inoculum removal for a program of nutritional supplementation is a one-way path that cannot be reversed for that grove, and the productivity of that grove and possibly surrounding groves will be restricted to the life of the trees in the ground.

What percentage of trees in your grove is infected with HLB?

To accurately assess your situation and make an educated management decision, you must have accurate data about HLB incidence and spread within your grove over time, as well as information about the incidence of HLB in surrounding groves. Your data should include the number of infected trees per block and their location recorded by GPS or on a physical map. This mapping allows you to track success or failure of your management efforts, and make changes to your program in a timely manner.

What has your psyllid control program been?

This is one of the first questions you must ask yourself before making any further HLB management decisions, because the vector of the disease, the Asian citrus psyllid, is the sole natural means by which HLB spreads. As pointed out above, the efficacy of either management strategy relies on a sound psyllid control program.

Have all reasonable efforts been made to successfully control psyllids?

You must answer this question honestly. Have you invested the maximum and sufficient resources available to control psyllids in your grove? If not, could this be why tree removal has not been successful for you? If you have made the maximum investment in psyllid control, it is important to consider the local situation. Are your groves adjacent to other groves (large or small acreage) where psyllid control is poor or not practiced? Can you work with your neighbors to develop an area-wide psyllid control program? Can you use aerial or low-volume applications in your grove to improve the economics and efficacy of psyllid control? Aerial and low-volume applications of pesticides are known to be highly effective for psyllid control, especially when used over large areas. These actions may increase your level of psyllid control allowing tree removal to be effective.

Has the grove been routinely scouted (3-4 times per year) followed by immediate tree removal up to this point?

As described above, identification of infected trees is perhaps the weakest link in the tree removal strategy. Since not every symptomatic tree is found at each scouting, it is critical that scouting be repeated at least 3 – 4 times annually. This will ensure that trees missed during one scouting event are detected and that newly symptomatic trees are found as soon as possible. Additionally, a major reason why a tree removal strategy can fail is the lack of timely tree removal. Once a tree is positively identified, it should be treated with pesticide and removed as quickly

as possible to stop psyllids from feeding on it and transmitting the disease to healthy trees. This must be done regardless of the desire to harvest the tree's crop or because of interference with other grove operations. You must ask yourself and honestly answer the question whether you have been dedicating all possible resources to scouting and tree removal. Importantly, the HLB management practices of the immediate surrounding groves must be taken into account in making this assessment. If possible, scouting and tree removal should be coordinated in cooperation with your neighbors to develop a regional management program.

What is your long-term plan as a citrus grower?
If you are in the business for the "long-haul" then you must consider the future and your long-term investment. In such a case, you may decide the goal of keeping inoculum levels low, despite current yield losses from tree removal, is the best long-term strategy for yourself or the future of the Florida citrus industry. Perhaps you're interested in staying in the business long-term, but surrounding citrus acreage doesn't indicate this will be feasible because of encroaching development or other circumstances. Since tree removal demands a substantial financial outlay, the economic realities of your citrus enterprise may also force a change in strategy. In this case, you may decide that preserving your current investment in mature trees and maintaining their productivity for as long as possible is the best strategy to maximize your current returns for future investment elsewhere. Psyllid control must still be practiced in this situation. This is a serious question that everyone will need to answer before making major management decisions.

4. HLB Infection Scenarios and Management Guidance
After assessing your situation, it is likely that you will find yourself in one of the three situations below. While we would like to state the three scenarios below in more detail, our current knowledge does not allow us to define these categories concretely. However, research is currently underway to help us better define these categories and develop management thresholds. Growers, based on their unique set of circumstances, will have to determine which category best describes their HLB situation.

Groves with low infection
If your grove has a low infection incidence and is located in a region of low infection, *now* is the time to begin managing the disease. Psyllid suppression and scouting for and removing infected trees are the first and second steps to keep HLB incidence low in your grove. *Do not* wait until you begin finding HLB infected trees in a grove to begin controlling psyllids. HLB is in many ways a silent disease in its early stages because it is invisible to the naked eye. HLB can be present in the tree for as long as 2 years or more before symptoms are evident. Such infected trees still harbor the HLB pathogen that can be picked up by a psyllid and spread to neighboring trees. Thus, it is important to implement a psyllid control program prior to the discovery of HLB in a grove that will maintain psyllid populations as low as possible at all times of the year to minimize pathogen spread from asymptomatic trees. Growers should not wait to remove an HLB-infected tree, even if it has fruit nearing harvest, as these trees will serve as an inoculum source for continued pathogen spread. If your grove is close to other groves that are not being managed by aggressive infected tree removal and psyllid control, it is just a matter of time before HLB begins spreading through your grove. Collaboration with neighboring grove owners to insure that infected trees and psyllids are managed effectively is the third step to keep HLB incidence low in your grove. Recent research and experiences from Florida and Brazil indicate that chances for keeping HLB incidence low in your grove are much greater if you 1) aggressively suppress the psyllid population, 2) remove HLB-infected trees immediately, and 3) are located in an area of low HLB incidence. How large must this HLB-management area be? We are not precisely sure at this writing, but evidence from Brazil indicates that at least a 1-mile distance between a managed grove and an unmanaged grove is necessary to keep HLB incidence low. The larger the area of aggressive HLB management, the larger the area will be with low HLB incidence. Keep in mind that infected psyllid incursions will likely occur on the

margins of a managed grove, creating higher HLB incidences along the grove edges. Additional scouting and psyllid control measures may be needed in these border areas. The chances of bringing a reset tree, from clean nursery stock, into production and keeping HLB infection rates low are much greater if the first, second, and third steps are fully implemented. Good horticultural practices involving the application of optimal nutrition and irrigation must be followed to reduce tree stress.

Groves with moderate infection

If you determine that you are at a moderate infection level, it will be imperative that you make an honest assessment of your HLB management efforts up to this point. Have gaps in your program (e.g. inadequate psyllid control, untimely tree removal) played a role in the rise of your infection level? Could an improvement in your psyllid control and/or tree removal program be accomplished while maintaining the economic viability of the grove? Would an increased level of psyllid control be sufficient for dealing with psyllid migrations from surrounding unmanaged groves? Has an attempt been made to coordinate psyllid control and tree removal efforts with your neighbors? Excellent psyllid control will be essential to reduce the spread of HLB. Tree removal may still be an option in this situation, especially if you are located in a region of low HLB incidence, but your answer to the above questions and your economic situation must be considered in the decision to maintain your management strategy. Grove care practices should be evaluated and you should consider steps to improve overall tree health and minimize tree stress, including the addition of foliar nutrition sprays, emphasizing micronutrients, even if deficiency symptoms are not present.

Groves with high infection

In a high infection situation, economics is likely to be the primary factor influencing your management decisions. That is, you will likely conclude that you can no longer survive economically with a reduced tree population, scouting costs, tree removal costs, etc., and decide to pursue a nutrient management strategy. However, rigorous psyllid control must continue in order to reduce infection of newly planted trees, the re-inoculation of infected trees, and to minimize spread to nearby groves. Resources previously allocated to scouting for infected trees should be shifted to scouting for psyllid populations to aid in control efforts. There is currently no IFAS recommendation for a nutrient management strategy; however, information on formulations currently being used in IFAS trials can be found on the IFAS greening website (http://greening.ifas.ufl.edu). The goal of this strategy is to maintain the productivity of HLB infected trees by increasing the levels of nutrients, particularly micronutrients, within the tree by providing nutrients at remedial (corrective) levels. This strategy should be implemented ***before*** trees have severely declined from HLB. It will likely be at least one-year before improvements are seen, depending on the severity of disease symptoms in infected trees when the program was started.

At what point you decide to completely push a grove, rather than continuing either management program, and replant with clean nursery stock will depend on your economic ability to manage a young grove given the HLB and psyllid situation in your region.

Summary

IFAS realizes that the Florida citrus industry faces unprecedented challenges to its continued economic viability, productivity, and existence. Making management decisions for HLB control have been greatly complicated by the rapid buildup of HLB inoculum in the citrus industry, particularly in areas first affected by the epidemic. The industry's muted response to the initial HLB challenge followed by a failure to realize the importance of rigorous implementation of psyllid control and scouting coupled with immediate tree removal, has resulted in a dangerous build-up of HLB inoculum statewide. Grove owners, who find HLB infection rates too high in their groves to remove trees and remain economically viable, are looking to other management strategies that will keep their existing

trees in the ground. The nutrient management strategy can, at least for a short-term, maintain infected grove productivity. However, most dangerously for the citrus industry, a grove solely on nutrient supplementation allows HLB inoculum to remain: eventually every tree will become infected, as psyllid control is not perfect even in the best case. Under such conditions, clean resets or newly planted groves will become infected with HLB and may decline before they become productive, in essence throwing the investment in those young trees away. Surrounding groves will find it difficult if not impossible to maintain low infection rates. Thus, with current knowledge and technology groves managed under a nutrient program without infected tree removal are restricted to the life of the trees in the ground. The management strategy that should ensure the continued economic viability and productivity for the citrus industry is rigorous psyllid control, scouting for infected trees, removing infected trees immediately, and establishing area-wide regions of such management, coupled with good nutrient management practices, that will keep HLB infection rates low over large areas and maintain optimal health and productivity of uninfected trees. We hope that this is achievable, given the current statewide inoculum levels and psyllid populations. Until a long-term solution emerges in the form of a resistant citrus variety, managing HLB successfully will remain one of the largest historic challenges to the Florida citrus industry.

SL316

UF UNIVERSITY of FLORIDA
IFAS Extension

A Guide to EPA's Proposed Numeric Nutrient Water Quality Criteria for Florida[1]

Thomas Obreza, Mark Clark, Brian Boman, Tatiana Borisova, Matt Cohen, Michael Dukes, Tom Frazer, Ed Hanlon, Karl Havens, Chris Martinez, Kati Migliaccio, Sanjay Shukla, and Alan Wright[2]

Introduction

The purpose of this publication is to provide a basic, concise, and understandable description of the United States Environmental Protection Agency's (EPA) proposed numeric nutrient criteria for Florida, the background events that led to its release, some pertinent scientific issues, and implications for the future.[3]

(*Authors' note: This topic is very complex with an intricate and lengthy historical background. Our intent here is to provide highlights and basics. We will present more detailed, comprehensive information in subsequent fact sheets.*)

What happened on January 14th, 2010?

EPA Administrator Lisa Jackson signed a proposed rule called "Water Quality Standards for the State of Florida's Lakes and Flowing Waters." This rule was published in the Federal Register on January 26th, 2010.[4]

What is this rule about?

EPA is proposing "numeric water quality criteria" pertaining to nutrient concentrations to protect aquatic life in lakes and flowing waters, including canals, within the state of Florida. In addition, EPA is proposing regulations to help Florida develop "restoration standards" for impaired waters.

Is Florida the only state where numeric water quality criteria have been required?

EPA's 1998 "National Strategy for the Development of Regional Nutrient Criteria" encouraged all states and tribes to adopt numeric nutrient water quality criteria as a more effective way to protect water resources from nutrient enrichment

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and to meet specific aspects of the Clean Water Act. A 2008 EPA status report[5] indicated that nineteen states have adopted numeric nutrient standards for some or all of their lakes and reservoirs, and 14 states have adopted numeric nutrient standards for some or all of their rivers and streams.

What does "impaired water" mean?

An impaired water body is one that is polluted to the point where it does not meet its designated use[6]. For example, a lake designated for swimming could become "impaired" if pollution increased to such a degree that it became undesirable or unsafe for people to swim there. Or, a river designated for aquatic life could become impaired if it were polluted to the point at which certain types of fish that used to thrive there could no longer live. Or, an estuary could become impaired if seagrasses could no longer grow in it. As a water body becomes impaired, the existing aquatic ecosystem changes for the worse, fish or wildlife habitat is degraded, and in extreme cases public health may be threatened.

How many impaired water bodies does the state of Florida have?

According to the Florida Department of Environmental Protection's (DEP) 2008 Integrated Water Quality Assessment Report,[7] about 1000 miles of rivers and streams, 350,000 acres of lakes, and 900 square miles of estuaries are impaired by nutrients (nitrogen and/or phosphorus)[8]. The extent of impairment may be eventually found to be higher because not all of Florida's water bodies had been assessed as of 2008. Nutrients were ranked as the fourth major source of impairment for rivers and streams (after dissolved oxygen, mercury in fish, and fecal coliform contamination). For lakes and estuaries, nutrients ranked first and second, respectively.

How do nutrients affect Florida's water bodies?

All living things need nutrients to survive and grow, but elevated nutrient concentrations may impact the designated use of a water body. Many of our natural areas in Florida developed in a limited nutrient condition. If nutrient concentrations increase in these areas, plant and algal growth can become excessive and affect other living things. A short-term example is when excess nutrients trigger an algal bloom that looks and smells bad, and can result in poor-tasting drinking water. A longer-term example is when sustained algal growth reduces water clarity, which in turn decreases the amount of light reaching a lake bottom. The result can be a decrease in growth of aquatic plants that provide critical fish habitat.

On the other hand, some Florida lakes, streams, and springs are naturally high in phosphorus because these water bodies directly interact with phosphorus-rich bedrock and groundwater. It is important to distinguish a water body that is naturally high in nutrients from those that have become impaired due to excessive inputs of nutrients from human and/or animal sources.

Hasn't DEP already established water quality standards for Florida?

Yes, Florida has had nutrient water quality standards for many years, and DEP has been working to develop numeric nutrient criteria. However, standards previously established by DEP were "narrative" in nature and not "numeric." (See the Further Information section at the end of this document for a historical timeline.)

So, what's the difference between "narrative" and "numeric" standards?

Narrative standards use descriptive language to determine the point at which water quality is no longer supporting the designated use of a particular water body. For example, the Florida narrative standard for nutrients presently indicates that: "In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in the natural population of flora or fauna." This language implies that at some as yet undefined concentration of nitrogen and/or phosphorus, it is expected that nutrients could be harmful to the water body, and that reaching these concentrations would cause the water body to become "impaired." This type of narrative standard often results in a water body becoming

impaired before the level of nutrients that cause imbalance is determined.

A numeric standard defines the maximum nitrogen and/or phosphorus concentration in a water body that will permit that water body to maintain its designated use. A standard expressed numerically may eliminate the need for a case-by-case assessment of risk associated with nutrient enrichment. With a narrowly defined numerically expressed criterion, it is much easier to determine if a problem exists or if a known source of nutrients is a threat.

Here is an example of how a numeric water quality standard would be expressed: "To protect rivers and streams in the Florida panhandle, the yearly average total nitrogen concentration in the river or stream shall not surpass 0.824 ppm* more than once in a 3-year period." This example standard sets a nitrogen limit for a region of Florida (the panhandle), but it does not get any more specific relative to one river versus another within that region.

*ppm = parts per million, which is identical to milligrams per liter (mg/L).

Both narrative and numeric standards allow some nutrients to exist in a water body. How do we know when we have too much?

Determining a specific number (nutrient concentration in the water) that protects the designated use of a particular water body (without being over-protective) is challenging for several reasons. One reason is that no two water bodies are exactly the same when it comes to the nutrient concentration standards that will protect them from impairment. In fact, different water bodies will respond differently to the same nutrient inputs. In addition, natural nutrient concentrations can be quite high in many Florida waters.[9] Both of these reasons make it unlikely that just one number could apply to all of Florida.

If water bodies are grouped by their natural nutrient concentrations, and other factors that influence nutrient response are accounted for, then some of the natural variability discussed above can be sorted out. Creating appropriate groupings of water bodies that share similar natural levels of nutrients and response characteristics is a critical part of establishing nutrient criteria that will appropriately protect the water bodies within the group. (See the Further Information section at the end of this document for details on how numeric nutrient criteria are developed.)

What happened to change the way DEP was addressing Florida's water quality issues?

In July 2008, an organization called Earthjustice, representing the Florida Wildlife Federation, the Conservancy of Southwest Florida, the Environmental Confederation of Southwest Florida, St. John's Riverkeeper, and the Sierra Club filed a lawsuit against EPA. The suit: 1) claimed that there was an unacceptable delay by the federal government in setting limits for nutrient pollution; 2) claimed that EPA had previously determined that numeric nutrient criteria are necessary as described in the Federal Clean Water Act; and 3) further argued that EPA was obligated to promptly propose these criteria for Florida.

So, what happened as a result of the lawsuit?

After EPA assessed the situation, on January 14, 2009, EPA determined that numeric standards were, in fact, needed to meet the requirements of the Clean Water Act. EPA also declared that Florida's existing narrative criteria were insufficient to protect water quality. This determination meant that, despite considerable and ongoing nutrient pollution control efforts by state agencies, water quality degradation remains a significant challenge, especially with Florida's projected population growth and land use changes.

In August 2009, EPA entered into a Consent Decree with the environmental groups to settle the 2008 litigation. (A Consent Decree is a voluntary agreement between the parties in a lawsuit.) EPA committed to propose numeric nutrient standards for lakes and flowing waters in Florida by January 2010, and for Florida's estuarine and coastal waters by January 2011. EPA agreed to establish final standards

by October 2010 for lakes and flowing waters and by October 2011 for estuarine and coastal waters.

What did DEP do as a result of the Consent Decree?

DEP suspended their formal rulemaking process to establish numeric water quality criteria. They are now evaluating EPA's proposed rule and are providing information relevant to deriving numeric criteria. During the past decade, Florida has spent more than $20 million to more fully understand nutrient pollution and control, and DEP has coordinated closely with EPA on this issue. Florida has more data describing its water quality than any other state, and it has shared these data with EPA. The two agencies have worked closely to analyze and interpret the data as the numeric criteria were developed and will continue to do so throughout the process.

What does EPA's proposed rule say?

The proposed rule is long and detailed. The document (obtainable from EPA's web site at http://www.epa.gov/waterscience/standards/rules/florida/) is 196 pages of double-spaced text, footnotes, and 27 data tables. Here are some highlights:

Who will be affected by this rule?

- Industries discharging pollutants to lakes and flowing waters.
- Publicly owned water treatment facilities.
- Entities responsible for managing stormwater runoff.
- Non-point source contributors to nutrient pollution. (Examples of these are agricultural production, managed landscapes, and urban areas. In short, everyone and everything in Florida.)

What do the proposed numeric nutrient criteria look like?

Key points:

- This rule applies to "lakes and flowing waters," which are defined as inland surface waters that we either drink (Class I) or use for recreation and aquatic life support (Class III). Estuaries, coastal waters, and wetlands are not included at this time.
- The numeric criteria proposed are designed to support a balanced natural population of flora and fauna in lakes and flowing waters, while also ensuring the attainment and maintenance of the water quality standards for downstream waters. What this statement means is, the numeric criteria for a water body you are looking at (a stream, for instance) were developed with two things in mind: the requirement of the stream itself, plus the requirement of any water body into which the stream flows (like a lake).

See tables 1 through 4 at the end of this document for specific numeric criteria.

What is a "restoration" water quality standard?

Some Florida water bodies have such poor water quality that it will take a long time to rehabilitate them. In these waters, there is a large difference between current water quality and the nutrient concentrations needed to protect aquatic life and re-establish designated use. In these cases, EPA has proposed that Florida could adopt temporary designated uses and criteria that would be the basis for enforceable permit requirements and other control strategies while efforts are incrementally made to achieve the original designated use. Florida would need to demonstrate that the interim uses and criteria, as well as the time frame, are based on a Use Attainability Analysis that focuses on what is attainable and by when. These interim designated uses, criteria, and the applicable time frames would all be incorporated into the State Water Quality Standards on a site-specific basis, as would be any other designated use change or adoption of site-specific criteria.

What is meant by "site-specific alternative criteria?"

A site-specific criterion is a water quality standard that differs from the statewide standard. The site-specific standard meets the regulatory requirement of protecting a water body, but it is tailored to account for site-specific conditions. Site-specific alternative criteria may be more or less stringent than the state standard, but in either case, must be based on sound science.

If I want to comment on the rule, what should I do?

There is a 60-day public comment period within which you can submit written comments to EPA on the proposed rule. Comments must arrive at EPA's offices by March 29, 2010. There are also several public meetings where you can provide oral comments. More information about the public comment period and the location of meetings can be found at http://www.epa.gov/waterscience/standards/rules/florida/. If you choose to comment:

- Be ready to explain why you agree or disagree with the proposed rule.
- Suggest alternatives and substitute language for your requested changes.
- Describe any assumptions and provide any technical information and/or data that you used.
- If you estimate potential costs or burdens, explain how you arrived at your estimate in sufficient detail to allow for the estimate to be reproduced.
- Provide specific examples to illustrate your concerns, and suggest alternatives.

Just how sensitive are Florida's water bodies to nutrients?

One way we can answer this question is by comparing the proposed numeric nutrient standards to drinking water standards. For example, the drinking water standard for nitrate-nitrogen is 10 ppm, while the highest total N concentration found in the proposed rule is about 1.8 ppm. (There is no phosphorus drinking water standard.) This illustrates that some of Florida's aquatic ecosystems are sensitive to nutrients at concentrations much lower than those directly affecting humans.

In the case of Florida's aquatic ecosystems, changes in nutrient concentration of a water body are more likely to cause an imbalance in aquatic life compared with a water body that has a relatively constant high or low nutrient concentration. For example, if plant or algal growth is limited by lack of nitrogen or phosphorus in a lake, that particular lake will have an algae concentration proportional to the amount of available nitrogen or phosphorus. If more of the limiting nutrient is added to the lake, the algal growth will increase. This increase in plant growth can change the composition of the aquatic ecosystem, potentially resulting in impairment.

On the other hand, if nutrient concentrations in a water body are naturally high, the aquatic ecosystem that developed there is supported by and in some respects dependent on these high nutrient concentrations. One result of human habitation in Florida is the importation of nutrients to our watersheds, some of which ultimately end up in water bodies. It does not take much "extra" nutrient to upset the balance and cause ecosystem change.

How does EPA's rule differ from what DEP was working on?

When we compare EPA's proposed rule with the draft rule DEP was developing before the Consent Decree, we find that DEP's numeric criteria are quite similar for lakes and in-stream protection. However, the two agencies differ substantially in some methodologies and approaches to certain aspects of numeric criteria development.

One difference is that DEP was planning to include a two-tier assessment approach in its rule, with the first tier being numeric nutrient criteria (similar to EPA), and a follow-up second tier that was a biological assessment of the water body. It is uncertain if the two-tier system would have been part of a final rule proposed by the state, but the intent was to have "biological confirmation" that nutrient concentrations above the numeric standard actually

resulted in biological impairment of the water body. One way to look at this is, EPA's numeric criteria are like a "caution light" on a traffic signal, whereas DEP's biological assessment represents confirmation of the presence or absence of water quality impairment.

Another difference between the two rules is that EPA is proposing to use an equation to adjust in-stream total phosphorus criteria to protect downstream lakes, and a different methodology to adjust in-stream total nitrogen criteria to ensure protection of water quality standards for downstream estuaries. DEP's rule prior to the Consent Decree proposed narrative criteria to protect downstream waters using the best available scientific information to translate this narrative.

Lastly, EPA is proposing to set numeric nutrient criteria for canals in south Florida. They would use a statistical distribution approach based on sites meeting designated uses with respect to nutrients identified in four canal regions. DEP did not propose numeric nutrient criteria for south Florida canals in its rulemaking.

So, what does all of this mean to Floridians, and what are the implications for the future?

The intent of the rule is to better protect Florida's water resources from excess nutrient enrichment so these resources can continue to provide the designated uses that we enjoy and depend on. The challenge is that everyone who lives in or visits our state contributes to nutrient enrichment. It may be through a septic tank, a central sewer system, walking a dog, raising and feeding animals, fertilizing lawns and gardens, or managing nutrients on a large farming operation, just to name some examples. We all benefit from protecting water bodies from excess nutrients, but we must also recognize that we are ultimately the source of these nutrients.

Our present regulations say that nutrient enrichment cannot detrimentally affect flora and fauna in aquatic ecosystems. The only thing that would change this statement is a fundamental re-working of the Federal Clean Water Act, which was implemented in 1972. This action is not likely to happen.

There is no doubt that EPA's water quality goals will be very challenging to meet. At this point, EPA has issued their proposed rule for consideration and comment, but they have not provided insight about how their rules will be implemented. Since these rules have only been proposed at this point, it is difficult to say exactly how the future day-to-day activities of Florida's residents, land and water resource managers, businesses, and utilities will be affected. In the case of wastewater disposal systems like sewage treatment plants and septic tanks, technology exists that would allow us to further reduce nutrients from these sources. For other sources of pollution, the answers are not as clear.

One substantive issue that almost certainly will arise is a "misclassification" of lakes as impaired or not impaired. This occurrence is likely because the baseline or natural concentrations of nutrients across Florida may not be sufficiently captured in the proposed numeric nutrient criteria. Because EPA's approach paints lakes with a broader brush, many lakes with naturally high levels of phosphorus, for example, are likely to be listed as impaired. This result could lead to costly efforts to develop site-specific alternative criteria or even to programs to reduce phosphorus concentrations to less than what naturally occurs.

Specifically, what does the proposed rule mean for municipalities?

Many Florida cities have what are called "Municipal Separate Stormwater Systems" (MS4s, for short) that collect polluted stormwater runoff and discharge it to surface waters belonging to the state. Many of these MS4s are regulated, meaning discharges must be permitted in compliance with the National Pollution Discharge Elimination System (NPDES) just like publicly owned wastewater treatment facilities. EPA's proposed rule could affect municipalities that operate both MS4s and wastewater treatment facilities if meeting the numeric nutrient criteria for the receiving or downstream water body requires that more stringent limits be put in place when their NPDES permit is renewed. More stringent

limits will require additional pollution control measures to be put in place as part of the stormwater management program, which will likely be costly.

Specifically, what does the proposed rule mean to agriculture?

During the next 10 to 20 years, the sustainability of Florida's agricultural production as we know it today will be a hotly debated topic. In the short term, numeric standards are not likely to have a great effect on agriculture. The Florida Watershed Restoration Act (FWRA) of 1999 and subsequent revisions to it govern Florida's Total Maximum Daily Load (TMDL) program. The FWRA specifies that the Best Management Practice (BMP) program administered by the Florida Department of Agriculture and Consumer Services (DACS)[10] is the method agriculture will use to meet water quality standards.

The perspective of DEP and DACS is that the FWRA will continue to govern agriculture, regardless of numeric standards imposed by EPA. Agricultural operations that implement appropriate BMPs after filing a notice of intent to do so will receive a presumption of compliance with water quality standards even after acceptance of numeric criteria by DEP. The state of Florida is highly invested in the BMP program, and it is not likely to go away any time soon. However, in the long term, the requirements of the BMP program will likely change as a result of numeric nutrient criteria. With numeric standards, the success of the existing BMP program will be much easier to assess. It is likely that more aggressive and expensive practices will be required. It will be important to document the success of existing BMPs to ensure credit is established for on-going commitments.

Further Information

A timeline describing the development of numeric nutrient criteria in Florida

- In 1998, EPA initiated their "National Strategy for the Development of Regional Nutrient Criteria." The intent was to assist states and tribes in adopting numerical nutrient criteria into state water quality standards as a more effective means to protect water resources from nutrient enrichment.
- In 2000 and 2001, EPA published technical guidance to develop nutrient criteria in lakes/reservoirs, rivers/streams, and estuaries/coastal waters.
- In July 2004, DEP entered into a development plan with EPA to establish numeric nutrient criteria for Florida.
- In 2007, the plan was revised and mutually agreed upon by EPA to more accurately reflect the evolved strategy and technical approach DEP had developed.
- In 2008, a lawsuit seeking to require EPA to promulgate numeric nutrient water quality standards for Florida waters was filed by the Florida Wildlife Federation in an effort to speed up the process of numeric nutrient development and adoption.
- On January 14, 2009, EPA formally determined that Florida's existing narrative criteria on nutrients in water was insufficient to ensure protection of the state's water bodies as required under the Clean Water Act.
- In August 2009, USEPA entered into a Consent Decree with the Florida Wildlife Federation to settle the 2008 litigation, committing to propose numeric nutrient standards for lakes and flowing waters in Florida by January 14, 2010 and for Florida's estuarine and coastal waters by January 2011, with final standards to be established by October of those years.
- On January 14, 2010, EPA released their proposed numeric nutrient criteria rule, and it was published in the Federal register 12 days later.

How are numeric nutrient criteria developed?

There are two main approaches to determine numeric nutrient criteria: 1) stressor-response relationship and 2) reference condition.

In the case of a stressor-response relationship, experiments or monitoring of water bodies within a particular group are studied to determine the nutrient

concentration at which an impact on the designated use is no longer acceptable. This method is the most desirable approach because it directly relates the nutrient "stressor" with the undesirable biological "response."

When there is not enough information to determine stressor-response, then a reference approach is used. First, healthy water bodies are identified in a particular region. Then, water quality data from these water bodies are scrutinized, and numeric nutrient criteria are based on the distribution of nutrient concentrations found. In other words, a healthy water body must be under the "threshold" for impairment, whatever that threshold might be.

With the reference approach, it is assumed that biological integrity is protected as judged by the minimally impacted reference conditions, and that increasing nutrient concentrations above reference would unacceptably impact the designated use. Both stressor-response relationships and the reference approach were used by EPA to develop the proposed rule.

Another challenging aspect in the development of numeric nutrient criteria is that the nutrient concentration determined for a particular water body must also protect downstream water bodies. For example, if a stream is flowing into a lake or an estuary, then the nutrient criteria established for the stream must protect not only its designated use, but also the designated use of the downstream lake or estuary.

Determining the nutrient concentration in a stream that will protect downstream uses first requires nutrient criteria to be established for the downstream receiving water body. Next, the volume of stream flow received by the downstream water body as well as the mass of nutrients that might naturally be removed as the water flows down the stream are determined. From this information, a nutrient concentration within the stream that will match the downstream water body nutrient criteria can be determined. The lower of the two criteria (in-stream protection or downstream protection) is used to establish the numeric nutrient criteria for that water body.

All of the data used by EPA to develop the proposed rule can be found at http://publicfiles.dep.state.fl.us/DEAR/Weaver/.

Figure 1. Map of watershed regions applicable to rivers and streams numeric water quality criteria.

Additional Notes:

3. Details can be found from the EPA, http://www.epa.gov/waterscience/standards/rules/florida/factsheet.html#summary.

4. See http://edocket.access.gpo.gov/2010/2010-1220.htm.

5. See http://www.epa.gov/waterscience/criteria/nutrient/files/report1998-2008.pdf.

6. Florida recognizes five designated uses for public water resources; Class I is water used for drinking, Class II is water used to produce shellfish, Class III is water used for recreation (e.g., swimming) and aquatic life support, Class IV is water used for agriculture, and Class V is water used for navigation, utility, and industrial purposes. Each type of water use has specific quality standards that determine if the designated use is being maintained.

7. See http://www.dep.state.fl.us/water/docs/2008_Integrated_Report.pdf.

8. Of the Florida waters listed as "impaired" in DEP's report, these values represent about 5% of the assessed river and stream miles, 23% of the assessed lake acres, and 24% of the assessed square miles of estuaries.

9. Studies at the University of Florida and data collected as part of the LAKEWATCH program indicate a wide range of natural nitrogen and phosphorus concentrations among Florida lakes mainly due to differences in the availability of these nutrients in soils and sediments.

10. See http://www.floridaagwaterpolicy.com/AtaGlance.html.

Table 1. *Numeric criteria proposed for lakes. A lake is a freshwater body that is not a stream or other water course, with some open water free from vegetation above the water surface.*

A	B	C	D	E	F
		Baseline criteria		Modified criteria[a]	
	Chlorophyll *a* (µg/L)[b]	Total N (mg/L)	Total P (mg/L)	Total N (mg/L)	Total P (mg/L)
Colored lakes[c]	20	1.23	0.050	1.23 – 2.25	0.050 – 0.157
Clear lakes, alkaline[d]	20	1.00	0.030	1.00 – 1.81	0.030 – 0.087
Clear lakes, acidic	6	0.500	0.010	0.500 – 0.900	0.010 – 0.030

[a]If chlorophyll *a* is below the criterion in column B and there are representative data to calculate ambient-based, lake-specific, modified TP and TN criteria, then DEP may calculate such criteria within these bounds from ambient measurements to determine lake-specific, modified criteria.
[b]Chlorophyll a is an indicator of phytoplankton biomass (microscopic algae) in a water body, with concentrations reflecting the integrated effect of many of the water quality factors that may be altered by human activities.
[c]Colored lakes are distinguished from clear lakes based on the amount of dissolved organic matter they have free from turbidity. Dissolved organic matter concentration is reported in Platinum Cobalt Units (PCU). Colored lakes have values greater than 40 PCU and Clear lakes have values less than or equal to 40 PCU.
[d]Alkaline lakes are distinguished from acid lakes based on their concentration of $CaCO_3$. Alkaline lakes have greater than 50 mg/L $CaCO_3$, while acid lakes have values less than or equal to 50 mg/L $CaCO_3$.

Table 2. *Numeric criteria proposed for rivers and streams, defined as free-flowing surface waters in defined channels, including rivers, creeks, branches, canals (outside south Florida), and freshwater sloughs.*

Watershed region*	In-stream protection value criteria	
	Total N (mg/L)	Total P (mg/L)
Panhandle	0.824	0.043
Bone Valley	1.798	0.739
Peninsula	1.205	0.107
North Central	1.479	0.359

*See Further Information section for a map of these regions.

Table 3. *Numeric criteria proposed for springs (the point where underground water emerges onto the land surface, including the spring run) and clear streams (free-flowing clear water other than a spring run:*

Nitrate (NO_3^--N) + nitrite (NO_2^--N) shall not surpass a concentration of 0.35 mg/L as an annual geometric mean more than once in a 3-year period, nor surpass as a long-term average of annual geometric mean values. Total N and total P criteria for streams on a watershed basis are also applicable to clear streams.

Table 4. *Numeric criteria proposed for south Florida canals. A canal is a trench, the bottom of which is normally covered by water with the upper edges of its two sides normally above water. (Note: All secondary and tertiary canals wholly within Florida's agricultural areas are Class IV waters and thus are not subject to this proposed rule.)*

	Chlorophyll *a* (µg/L)	Total N (mg/L)	Total P (mg/L)
Canals	4.0	1.60	0.042
Applies to all canals within DEP's south Florida bioregion, with the exception of canals within the Everglades Protection Area (EvPA) where the TP criterion of 0.010 mg/L currently applies.			

Citrus Health Response Program Update
Abandoned Grove Initiative

A publication of the Florida Department of Agriculture & Consumer Services, Charles H. Bronson, Commissioner

Recognizing the pest and disease risks associated with abandoned citrus groves, the state has initiated a comprehensive plan for their removal and destruction. This initiative will help mitigate the impact of exotic citrus pests and diseases (namely citrus greening and citrus canker) by identifying abandoned groves and working cooperatively with county tax assessor offices and property owners regarding abatement options and tax incentives which will foster removal of these reservoirs of infection.

Key components:

- Catalog all abandoned groves throughout the state
- Map all high-risk abandoned groves
- Contact abandoned grove owners to ask their intentions for properties
- Inform owners if their groves are not kept in production, they will not be considered part of CHRP.
- Inform owners if they eliminate live citrus trees in abandoned groves, it is considered a bona fide agricultural practice and will remain in compliance with CHRP guidelines, thus maintaining their agriculture exempt status.

Agricultural land tax exemption – FDACS' interpretation and position on Section 193.461(7), Florida Statutes, is that if you have a valid CHRP compliance agreement and are in good standing, then the property covered by the agreement is considered in agricultural use, thus for tax purposes is eligible for agricultural land use classification. County property appraisers in citrus-growing areas are developing policies that comply with Section 193.461(7), Florida Statutes.

Property owners with abandoned groves should contact their local CHRP office for more information (see back). Proper documentation is required by county tax assessor offices for exemption, so please contact your local CHRP office for details. If you know of abandoned groves in your area, please report the property to your local CHRP office.

Abandoned Grove Defined:

No commercial fruit harvest during last two seasons

No production care during the past two years, including weed control and mowing

Grove use transferred to other uses (pine or livestock)

Division of PLANT INDUSTRY
Fresh from Florida. Protection through Detection
Florida Department of Agriculture & Consumer Services
Charles H. Bronson, Commissioner

1-800-282-5153 ◇ www.fl-dpi.com/chrp

Citrus Health Response Program Overview

Citrus Health Response Program Mission

Working together to produce healthy citrus

- Ensure security of citrus germplasm and citrus nursery programs
- Support effective disease / disease vector management
- Monitor defendable phytosanitary protocol that allows fresh fruit movement to all markets
- Implement citrus nursery clean stock program

Resources for the Industry

Tools to support citrus

- Compliance agreements and business plans designed to provide guidance and protect citrus
- Grower Assistance Program – decontamination training, survey assistance, self-survey and business plans
- Best Management Practices
- Participate with growers in the Business Plan Share Program

Citrus Germplasm Introduction Program

Important disease-free start

- Ensures citrus germplasm is free from any known graft-transmissible pathogens
- Each variety undergoes years of intensive testing before release
- Provides approved germplasm to citrus budwood registration program
- New 20,000 sq ft facility at future Alachua County budwood site

Citrus Budwood Registration

Responding to disease pressures

- Provides clean budwood to citrus industry
- Facilities located outside of citrus-growing area
- 80,000 sq ft facility in Levy County
- Redundant 60,000-sq-ft location planned in Alachua County

Citrus Nursery Guidelines

Providing clean stock for citrus groves

- Rules and regulations to protect industry, 5B-62
- Geographic separation of new nurseries and groves
- Citrus nursery stock is propagated and housed in approved insect-proof structures
- All citrus nurseries are on 30-day inspection cycle
- Compliance agreements are required

Fresh from Florida®

FDACS/DPI Citrus Health Response Program Offices

Contact Information

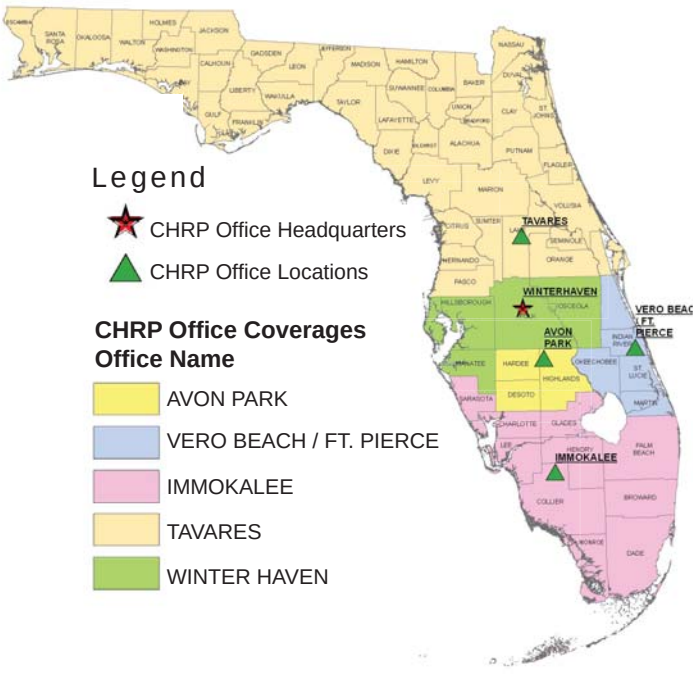
Avon Park
3397 US Hwy 27 South
Avon Park, Florida 33825
Phone: 863-314-5900

Vero Beach / Ft. Pierce
8075 20th Street
Vero Beach, Florida 32966
Phone: 772-778-5069

Immokalee
424 East Market Road, Unit 10
Immokalee, Florida 34142
Phone: 239-658-3684

Tavares
4129 County Rd. 561
Tavares, FL 32778
Phone: 352-253-4547

Winter Haven
3027 Lake Alfred Road
Winter Haven, FL 33881-1438
Phone: 863-298-7777



DACS-P-01613

Purpose of the Symposium

Citrus Greening or Huanglongbing (HLB) continues to spread throughout citrus production areas of Florida. The 2010 Florida Citrus Growers' Institute is an opportunity for Florida citrus growers to come together under a single purpose to learn about effective management of this devastating disease. Topics this year include Asian citrus psyllid management, HLB field experience, HLB management, plant improvement and genomics.

Continuing Education Units

Continuing Education Units (CEU's) will be offered for holders of restricted use pesticide licenses (RUP) and certified crop advisors (CCA). Six CEU's will be offered in the following categories: private applicator, agricultural tree crop, and demonstration & research for RUP holders. CCA's will be offered CEU's in the pest management (2 CEU's) and crop management (2.5 CEU's) categories.

Sponsors

Platinum

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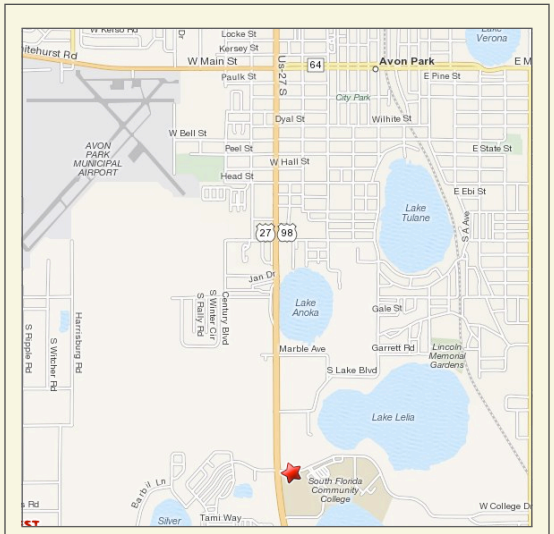


Directions

The South Florida Community College is located at 600 W College Dr in Avon Park.

From the South: Take U.S. Hwy. 27/98 north towards Avon Park, turn east onto W College Dr and follow the signs to the Theatre.

From the North: Take U.S. Hwy. 27/98 south to Avon Park, continue south to W College Dr, turn east onto W College Dr and follow the signs to the Theatre.

From the East: Take U.S. Hwy. 98 north to where U.S. Hwy. 27/98 merge south of Sebring. Proceed on U.S. Hwy. 27/98 north towards Avon Park, turn east onto W College Dr and follow the signs to the Theatre.

From the West: Take S.R. 64 east to Avon Park, turn south on U.S. Highway 27/98 to W College Dr, turn east onto W College Dr and follow the signs to the Theatre.

South Florida Community College
Theatre for Performing Arts
600 W College Dr
Avon Park, FL

Florida Citrus Growers' Institute

Conducted by -
University of Florida, IFAS Extension
Florida Citrus Production Research Advisory Council
Greening Research Task Force

South Florida Community College
Theatre for Performing Arts
Avon Park, Florida
April 13, 2010

2010 Florida Citrus Growers' Institute

Program Agenda

Tuesday, April 13, 2010

8:00 AM - Registration

8:25 AM - **Welcome and Introductions**

Asian Citrus Psyllid Management & Practical HLB Field Experience

8:30 AM - **Effect of Insecticides on HLB Pathogen Transmission by Psyllids** - *Dr. Michael Rogers,* CREC

8:45 AM - **Current and Emerging Psyllid Management Tools and Pesticide Resistance** - *Dr. Lukasz Stelinski,* CREC

9:00 AM - **The Future of Psyllid Management** - *Dr. Phil Stansly,* SWFREC

9:15 AM - **Effect of Light and Cultural Practices on Behavior of Asian Citrus Psyllids** - *Dr. Mamoudou Setamou,* Texas A&M, Kingsville Citrus Center, Weslaco, TX

9:45 AM - **Managing an Insectory** - *Dr. Shawron Weingarten,* Orange Co., Arcadia, FL

9:55 AM - **Lessons Learned from 4 Years of HLB Management** - *Mr. Mike Irey,* United States Sugar Corp., Clewiston, FL

10:10 AM - **Florida Citrus Industry Research Coordinating Council Update** - *Mr. John Jackson,* Director, Lakeland, FL

10:20 AM - **Florida Citrus Administrative Committee** - *Mr. Duke Chadwell,* Manager, Lakeland, FL

10:25 AM - **Break**

HLB Management

10:45 AM - **Update on Systemic Acquired Resistance in Plants** - *Dr. Arnold Schumann,* CREC

11:00 AM - **Nutrition and SAR's Effects on HLB Infected Trees** - *Dr. Bob Rouse,* SWFREC

11:15 AM - **HLB Infected Citrus Tree Yield and Health when on a Nutritional Program** - *Dr. Tim Spann,* CREC

11:30 AM - **Advanced Production Systems in Florida** - *Dr. Kelly Morgan,* SWFREC

11:45 AM - **South Africa's Perspective on Advanced Citrus Production and Greening** - *Dr. Hennie le Roux,* Citrus Research International, Nelspruit, South Africa

12:30 PM - **Lunch**

Plant Improvement and Genomics

1:30 PM - **Breeding, Genomics and Genetic Engineering - What This all Means to a Grower** - *Dr. Mikeal Roose,* University of California - Riverside, Riverside, CA

2:00 PM - **USDA Plant Improvement** - *Dr. Ed Stover,* USDA/ARS, Ft. Pierce, FL

2:15 PM - **Genetic Engineering Approaches to Solving HLB and Canker** - *Dr. Jude Grosser,* CREC

2:30 PM - **Transforming Tristeza to Give Trees Resistance to HLB** - *Dr. Bill Dawson,* CREC

2:45 PM - **DNA Mining Shows that Liberibacter is Lone Cause of HLB** - *Dr. Eric Triplett,* UF/IFAS, Gainesville, FL

3:00 PM - **Genome Sequencing and Application to Genetic Improvement** - *Dr. Fred Gmitter,* CREC

3:15 PM - **Southern Gardens Genetically Modified Citrus Trees** - *Mr. Rick Kress,* Pres., Southern Gardens Citrus., Clewiston, FL

3:30 PM - **Adjourn**

CES: County Extension Service

CREC: Citrus Research & Education Center, Lake Alfred, FL

SWFREC: Southwest Florida Research & Education Center, Immokalee, FL

UF/IFAS: University of Florida, Institute of Food and Agricultural Sciences

USDA/ARS: United States Department of Agriculture/Agricultural Research Service

Registration Required

Florida Citrus Growers' Institute

April 13, 2010

Pre-registration

Name:_____

Company:_____

Address:_____

City/State/Zip:_____

Phone:_____ Email:_____

Please send registration to: Jane Wilson, Citrus REC, 700 Experiment Station Road, Lake Alfred, FL 33850

Phone: 863-956-1151, Fax: 863-956-4631 or email: mjw@crec.ifas.ufl.edu

Mid Florida Citrus Foundation (MFCF) Field Day –Tuesday May 11th

AM Session Citrus

9:00-9:30	Welcome- MFCF overview and HLB Nutritional Trial	Ryan Atwood
9:40-9:55	UF/IFAS New Valencia Releases	Dr. Jude Grosser
10:10-10:25	Remedy for sprout control and new herbicide trials	Dr. Steve Futch
10:25-10:40	Remedial and preventive tests for HLB infection	Dr. Gene Albrigo
10:40-10:50	Rooted Cutting Trial	Dr. Bob Rouse/Ryan
10:55-11:15	Psyllid Control research	Dr. Michael Rogers
11:15-11:35	Leafminer and Psyllid Control research	Dr. Lukas Stelinski
Noon-1PM	Free Lunch	

PM Session Peaches

1:00-1:15	UF/IFAS Low Chill Peach Varieties	Dr. Mercy Olmstead
1:15-1:30	Horticultural Practices for peaches	Dr. Bob Rouse
1:30-1:45	Pest Management for peaches	Gary England
1:45-2:00	Nursery production of peaches and its challenges	Phil Rucks
2:00-2:15	Economics of peach production	Ryan Atwood

Name (s) of attendees_____

_____ I am planning on attending the Citrus AM session at the Mid Florida Citrus Foundation's Field Day on May 11th.

_____ I am planning on attending the Peach PM session at the Mid Florida Citrus Foundation's Field Day on May 11th.

_____ I am planning on attending the free lunch at the MFCF Field Day.

PLEASE BRING A FOLDING CHAIR THAT YOU CAN MOVE AROUND THE GROVE WITH, SO THAT YOU CAN SIT DOWN WHEN THE SPEAKERS ARE TALKING.

Please fax this attendance sheet to 352-343-2767 attention Maggie Jarrell or email mjarrell@ufl.edu

UF UNIVERSITY of FLORIDA
IFAS Extension

Osceola County Extension
1921 Kissimmee Valley Lane
Kissimmee, FL 34744
321/697-3000 PHONE
321/697-3010 FAX

REVIEW AND EXAMS FOR LAWN & ORNAMENTAL AND PRIVATE APPLICATOR PESTICIDE LICENSES

OSCEOLA COUNTY EXTENSION SERVICE, KISSIMMEE, FLORIDA – MAY 19, 2010

ORNAMENTAL & TURF – This license, also known as the **O&T license** is available either as a **Public** certification, for those applicators that apply herbicides to golf courses, parks and cemeteries and that work for federal, state, county or municipal public agencies, or as a **Commercial** certification for contractors to apply pesticides in those same areas.
The exam study manuals are (can be purchased from the IFAS bookstore www.ifasbooks.ufl.edu):

"Applying Pesticides Correctly" (SM-1) $7.00, also called the "Core" manual and
"Spray Equipment & Calibration" (SM-38) $2.00
"Ornamental and Turfgrass Pest Management" (SM-7) $20.00

PRIVATE APPLICATOR - This license is available only for **private individuals** applying pesticides to their own property or to property rented, leased to them or to their employer.
The exam study manuals are (can be purchased from the IFAS bookstore www.ifasbooks.ufl.edu)::

"Applying Pesticides Correctly" (SM-1) $7.00,
also called the "Core" manual and
"The Private Applicator Pest Control Training Manual" (SM-53) $7.00

$20 NON-REFUNDABLE FEE FOR THE CLASS

8:00- 8:30 AM	Registration
8:30 AM – 10:00 AM	Review for General Standards
10:15 AM – 11:15 AM	Calibration Review
11:15AM -12:15 PM	Private Ag and O&T Review
12:15 PM – 1:00 PM	Lunch on your own
1:00 PM-4:00 PM	All Exams Administered

CHECK WHICH CLASS YOU WILL BE ATTENDING

General Standards (CORE)	**Review**	☐
	Exam	☐
Ornamental & Turf	**Review**	☐
	Exam	☐
Private Applicator	**Review**	☐
	Exam	☐

REGISTRATION: REVIEW/EXAM FORORNAMENTAL & TURF & PRIVATE APPLICATOR

NAME _____

BUSINESS _____

ADDRESS _____

CITY/STATE/ZIP _____

PHONE _____

EMAIL _____

$20 NON-REUNDABLE FEE FOR THE CLASS

Deadline to Register: May 14th, 2010. *Make check payable to "HNREAC" and send to Osceola County Extension, 1921 Kissimmee Valley Lane, Kissimmee FL 34744. Attn: Cindy Rutherford. Individuals needing special accommodations to participate in program should call Cindy Rutherford at least (5) five working days prior to the program.*

CEU DAY

June 10, 2010

Your day for CEU and Worker Protection Standards Training needs. At the Mid Florida Research and Education Center Apopka, FL

1 8:20-9:10 a.m.	CATEGORY **"Update on IPM and Biological Control in Landscapes"** Steven Arthurs, UF/IFAS Mid Florida Research and Education Center	**2 CEU's** in Demo & Research, O&T, Private Applicator, Right of Way, Limited L&O, Limited Landscape & Maintenance, L&O
9:10- 10:00 a.m.	**"Yard Hole Makers, ID and Control"** Bill Kern, UF/IFAS Fort Lauderdale Research and Education Center	
10:00 – 10:30 a.m.	**BREAK**	
2 10:30 - Noon	**25 Minute Hands On Sessions** **"Droplet Size and Windspeed"** Juanita Popenoe, UF/IFAS **"Calibration of Backpack Sprayers and Drop Spreaders"** Lelan Parker, UF/IFAS **"Spill Cleanup"** Jennifer Pelham, UF/IFAS **"Pesticide Safety Bingo"** Ryan Atwood, UF/IFAS	**2 CEU's** in Core
Noon- 1:00 p.m.	**Lunch (ON YOUR OWN)**	
	AFTERNOON CONCURRENT SESSIONS (Choose Only One)e)	
3 1:00 – 3:00 p.m.	**"Applied Plant Identification for Aquatic Applicators"** Colette Jacono, Ph.D. - University of Florida, Dept. of Agronomy and Center for Aquatic & Invasive Plants	**2 CEU's** in Aquatic, Private Applicator
4 1:00 – 3:00 p.m.	**"General Household Pest Control Update"** Phil Koehler	**2 CEU's** in GHP, Limited Structural
5 1:00 – 3:00 p.m.	**"Worker Protection Standards/Train the Trainer"** Ryan Atwood, University of Florida/IFAS Multi-County Extension Agent	**2 CEU's** in Aerial, Ag Row, Private Applicator, Soil & Greenhouse, Forestry, Ag Tree Crop, O&T

CEU DAY REGISTRATION FORM

NAME_____

COMPANY_____

ADDRESS_____

CITY_____**ZIP**_____

PHONE_____**FAX**_____

COUNTY_____

Indicated which session(s) you wish to attend:

1 2 (3 4 5)
(Choose Only One)

Amount Enclosed: $_____

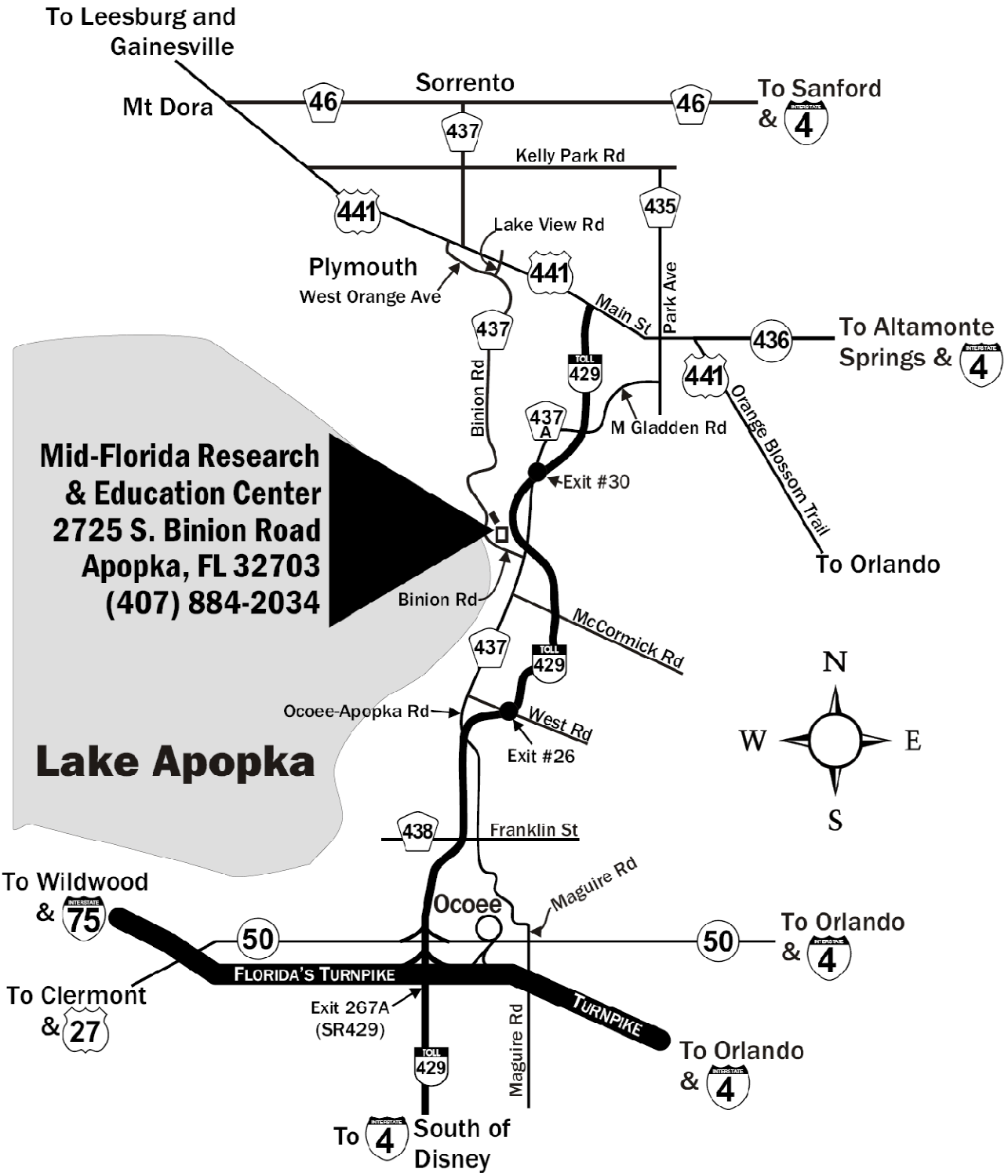
CEU DAY
June 10, 2010

$20.00 a session (per person and non refundable) **Deadline June 8, 2010**

Please detach and mail completed form with payment to: **Horticulture Advisory Account**
Mail to:

Maggie Jarrell
Lake County Extension
1951 Woodlea Road
Tavares, FL 32778

Individuals needing special accommodations to participate in program should contact Maggie Jarrell at 352-343-4101 five (5) working days before program



Directions to MREC

From Florida's Turnpike, take SR429 (toll) north to the West Road exit #26 - turn left on West Road. At Ocoee-Apopka Rd (CR437) head north (right turn) to Binion Rd. Turn Left on Binion Rd ½ mile to MREC on right.

From US441, take CR437 (West Orange Ave, which becomes Binion Rd) south to MREC. Do not take SR429 from US441 There is no south-bound exit from SR 429 before MREC.

UF UNIVERSITY of FLORIDA
IFAS

½-Day Event

THURSDAY - APRIL 8, 2010
9:00am—11:30am

CITRUS RESEARCH & EDUCATION CENTER
700 Experiment Station Road, Lake Alfred, FL 33850

Future of the Global Orange Juice Industry Report Presentation & Discussion

On Thursday, April 8, 2010, the Florida Department of Citrus (FDOC) and the Food & Resource Economics Department, Institute of Food & Agricultural Sciences, University of Florida (FRED-IFAS-UF) will host a presentation to all citrus industry stakeholders beginning at 9:00AM at the Citrus Research & Education Center in Lake Alfred, FL. This report presentation will answer the following question in economic terms: ***What are the relevant factors and assumptions that will determine whether the global orange juice industry grows, shrinks, or stabilizes at current levels?*** This informative meeting will provide an economic basis for decision-making in both public and private sector forums.

Over the past several years, supply uncertainty and demand reaction have placed our industry in jeopardy. An invitation-only workshop will precede this presentation. Institutional citrus economists from the United States and Brazil will evaluate the factors that impact the future sustainability of the global orange juice industry. Twenty-eight citrus economic experts will report on their current research and points of view in their area of expertise. These knowledgeable citrus economists will explore both sides of the supply and demand equation during this unique event. The workshop agenda consists of targeted presentations and detailed discussion and analysis.

All attending economists will be on hand to answer any questions that may come from the audience.

Who Should Come and Why?
All industry stakeholders are welcome to attend the Thursday report presentation. Individual economists will be on hand to answer any questions that may come from the audience. Those who should attend are: growers, packers, processors, institutional leaders, policy-makers, and allied industry members. This informative meeting will provide an economic basis for decision-making in both public and private sector forums.

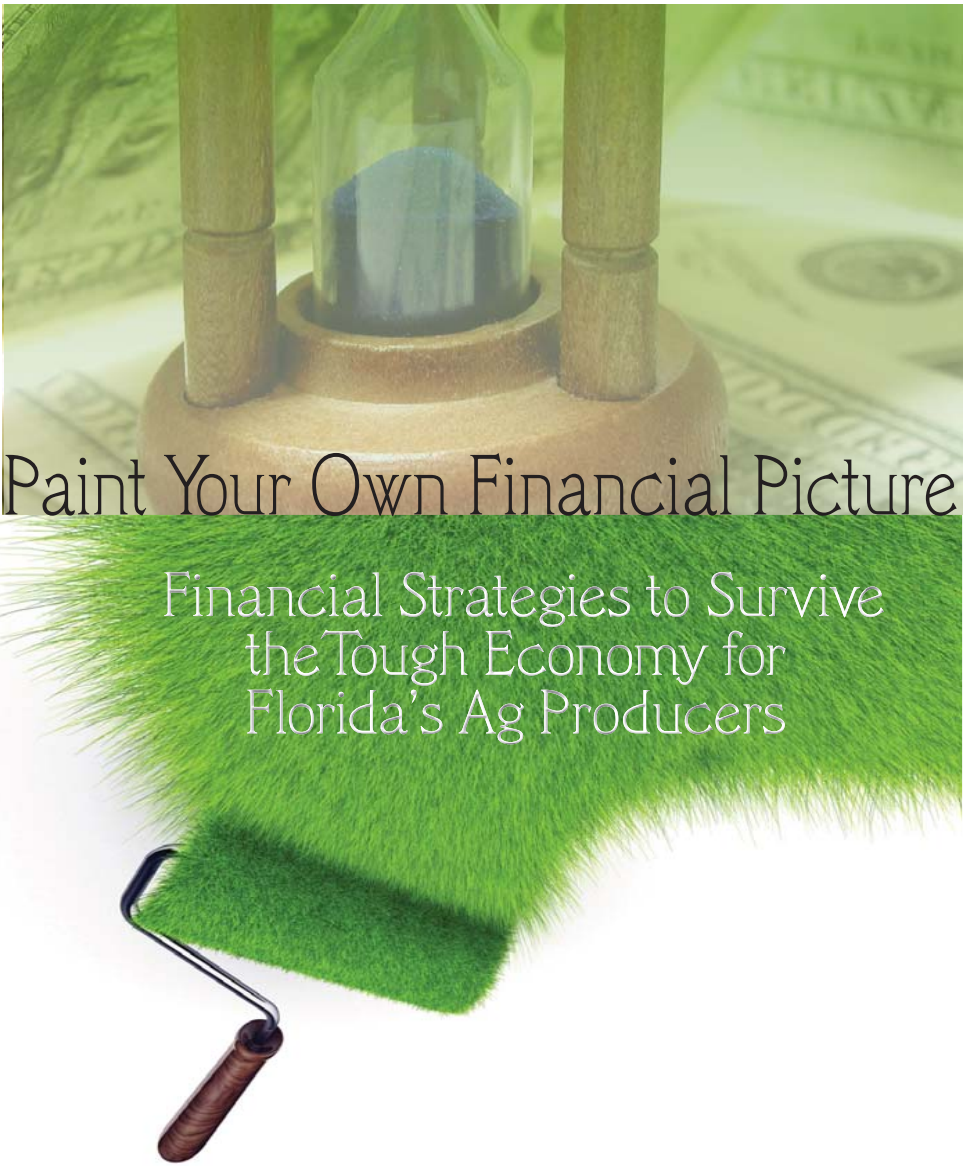
Sponsored by:
FLORIDA DEPARTMENT OF CITRUS
605 East Main Street—P.O. 9010
Bartow, FL 33831-9010
Phone: 863-537-3999
www.floridajuice.com
www.fdocgrower.com
FOOD & RESOURCE ECONOMICS DEPARTMENT
Institute of Food & Agricultural Sciences-UF
1167 McCarty Hall—P.O. Box 110240
Gainesville, FL 32611-0240
Phone: 352-392-1826
www.fred.ifas.ufl.edu

Economic Topics to be Evaluated

- IMPACT OF HLB ON FUTURE ORANGE JUICE SUPPLIES IN FLORIDA AND BRAZIL
- FACTORS THAT WILL INFLUENCE THE COST AND ECONOMIC IMPACTS
- MARKET FACTORS THAT INFLUENCE THE DEMAND FOR ORANGE JUICE
- INFORMATION AVAILABILITY AND TRANSPARENCY

Participating Economists

1. AYERS, Juliano Ayers — *Scientific Manager, Fundecitrus, Araraquara, SP, Brazil*
2. BARBER, Robert — *Economist, Florida Citrus Mutual, Lakeland, FL*
3. BEINHART, Roger — *Statistical Analyst, National Agricultural Statistics Service-USDA, Washington, DC*
4. BLAUER, Reed — *Agricultural Economist, Office of Global Analysis-FAS-USDA, Washington, DC*
5. BOTEON, Margarete — *Researcher, Center for Advanced Studies on Applied Economics, U of SP, Piracicaba, SP, Brazil*
6. BROWN, Mark G. — *Senior Research Economist, Economic & Market Research Dept.-FDOC, Gainesville, FL*
7. CLOUSER, Rodney L. — *Professor, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
8. DA SILVA, M.L.M. — *AGRAFNP-Info & Consulting Agribusiness Co. & GCONCI-Group Citrus Consulting, SP, Brazil*
9. DA SILVA, Valquiria — *Director, Institute of Agricultural Economics, Sao Paulo, SP, Brazil*
10. GAO, Zhifeng — *Assistant Research Scientist, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
11. GEUDER, Jeffrey K. — *Agricultural Statistics Director, Florida Field Office-NASS-USDA, Maitland, FL*
12. GUNTER, Dan L. — *COO, Citrus Research & Development Foundation, CREC-IFAS-UF, Lake Alfred, FL*
13. HODGES, Alan W. — *Extension Scientist, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
14. HOUSE, Lisa A. — *Professor, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
15. LOHBAUER, Christian — *Executive President, CitrusBR-Brazilian Assoc. of Citrus Exporters, Sao Paulo, SP, Brazil*
16. MORRIS, Robert A. — *Assoc. Extension Scientist/Economist, Citrus Research & Education Center-IFAS-UF, Lake Alfred, FL*
17. MOSS, Charles R. — *Professor, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
18. MURARO, Ronald P. — *Professor, Citrus Research & Education Center-IFAS-UF, Lake Alfred, FL*
19. NORBERG, Robert P. — *Deputy Executive Director of Research & Operations, Florida Department of Citrus, Bartow, FL*
20. PAGLIUCA, Larissa Gui — *Graduate of Agronomy Engineering, U of SP, Piracicaba, SP, Brazil*
21. POLLACK, Susan — *Agricultural Economist, Economic Research Service-USDA, Washington, DC*
22. RACEVSKIS, Laila A. — *Assistant Professor, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
23. RAHMANI, Mohammad — *Economic Analysis Coordinator, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
24. ROKA, Fritz M. — *Associate Professor, SW Florida Research & Education Center-IFAS-UF, Immokalee, FL*
25. SCHMITZ, Andrew — *Eminent Scholar, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
26. SPREEN, Thomas H. — *Professor, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*
27. TOZATTI, Gilberto — *Consultant, GCONCI-Group Citrus Consulting, SP, Brazil*
28. VANSICKLE, John J. — *Professor, Food & Resource Economics Dept.-IFAS-UF, Gainesville, FL*



Paint Your Own Financial Picture

Financial Strategies to Survive the Tough Economy for Florida's Ag Producers

Florida Agriculture Financial Management Conference
Rosen Plaza, Orlando, FL

May 20-21, 2010

Presented By FNGLA on behalf of Florida's AgriculturAL Industries

For more information on attending or sponsoring, contact Linda Reindl at the FNGLA Office, 407.295.7994 or 800.375.3642. www.fngla.org

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