UF UNIVERSITY of FLORIDA | IFAS EXTENSION

Citrus Notes

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Inside this Issue:

Dear Growers,

It is with great sadness that I have to inform you of the passing of John Brenneman our Polk County Cooperative Extension Service Director. I have been fortunate to have had the opportunity to work with John over the past 8 years and his leadership and support of the Polk County Citrus Extension Program will be missed. John was an Extension Agent in Polk County for over 30 years and he was not only a colleague of mine but, of my father's. Please remember John's family in your thoughts and prayers.

We have a number of educational opportunities listed in this month's newsletter along with articles on citrus canker management and soil and leaf analysis.

Enjoy the issue,

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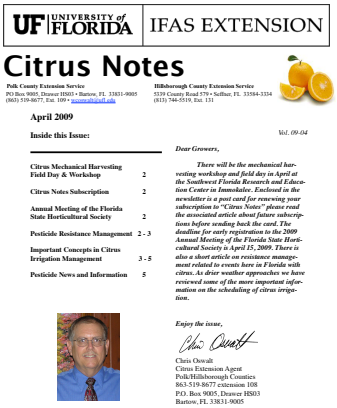
Presentations from the Citrus Greening Symposium

If you happened to miss the "Citrus Greening Symposium" at the 2009 Florida Citrus Growers Institute in Bartow last April, you can still see the presentations. The UF/IFAS County Citrus Extension Agents have posted the entire day of presentations on our website at http://citrusagents.ifas.ufl.edu/ . The program agenda is posted with links for each of the individual presentations. We also have pdf files of most of the presentations on the website.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Inside this Issue:

Citrus Mechanical Harvesting Field Day & Workshop	2
Citrus Notes Subscription	2
Annual Meeting of the Florida State Horticultural Society	2
Pesticide Resistance Management	2 - 3
Important Concepts in Citrus Irrigation Management	3 - 5
Pesticide News and Information	5

Vol. 09-04

Dear Growers,

There will be the mechanical harvesting workshop and field day in April at the Southwest Florida Research and Education Center in Immokalee. Enclosed in the newsletter is a post card for renewing your subscription to "Citrus Notes" please read the associated article about future subscriptions before sending back the card. The deadline for early registration to the 2009 Annual Meeting of the Florida State Horticultural Society is April 15, 2009. There is also a short article on resistance management related to events here in Florida with citrus. As drier weather approaches we have reviewed some of the more important information on the scheduling of citrus irrigation.

Enjoy the issue,

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Citrus Notes Subscription Update

In April you received a return response post card requesting information on your interest in continuing to receive *Citrus Notes* and what was your preferred method of delivery. To date we have received about a 25% response to this request. This will be your final delivered issue of *Citrus Notes* if you do not either send back the response card or contact Gail at our office (phone 863-519-8677 or email dorothyc@ufl.edu). If you have already responded, we will be using the updated mailing list (postal and email lists) next month. This is a requirement from the University of Florida to periodically update our mailing lists. There will be no additional reminders.

Packinghouse Day & The Indian River Postharvest Workshop

The 2009 Citrus Packinghouse Day will be held on Thursday, August 27, 2009, at the Citrus Research and Education Center, Lake Alfred, Florida. The Indian River Postharvest Workshop will be held on Friday, August 28, 2009, at the Indian River Research and Education Center, Ft. Pierce, Florida. More details will be forthcoming or you can contact Mark Ritenour at 772-468-3922, ext. 167 mritenour@ifas.ufl.edu or visit http://postharvest.ifas.ufl.edu.

2009 Citrus Expo "Using Today's Innovations Toward Future Success"

The 2009 Citrus Expo will be held at the Lee Civic Center in Ft. Myers from August 19 - 20, 2009. Enclosed or attached you will find the program brochure with information on the program, accommodations and registration.

Citrus Canker Management

It appears that we have entered into our rainy

season a few weeks earlier than normal. With the early arrival of the summer rainy season, growers need to reevaluate there summer spray programs to address the potential for earlier than expected pest and disease pressures, specifically in blocks with endemic citrus canker. Summer environmental conditions of high humidity and frequent afternoon showers can result in rapid increases in the amount of citrus canker inoculum found in these groves.

In blocks with endemic citrus canker, rainfall events coupled with winds exceeding 20 miles per hour will intensify the spread of canker within the grove. In blocks with high populations of active citrus leafminer, the spread of canker can occur much more easily due to the presence of citrus leafminer wounds. In addition, copper sprays are currently recommended for the suppression and control of citrus canker in mature groves.

Slowing down the wind during these summer downpours is extremely difficult if not impossible. Windbreaks can address this issue but come at a cost in the occupation of valuable production space within the grove. In many cases it may be more economically viable to control wind blown citrus canker on high value fresh fruit blocks or in highly sensitive citrus varieties (including grapefruit). In blocks destined for the processed market, growers should analyze the cost effectiveness of copper sprays in suppressing canker to the cost of establishment and use of windbreaks. If you choose to employ windbreaks, check out the following comprehensive website on that subject:

http://www.crec.ifas.ufl.edu/extension/windbreaks/index.htm

The damage caused by the tunneling of the citrus leafminer has been long know as a significant element in the spread and quantity of citrus canker inoculum within a grove. Citrus leafminer tunneling wounds take longer to heal and are more susceptible to canker infection than a healthy leaf. These wounds can harbor a significant amount of inoculum not found in individual canker lesions on a citrus leaf. For those of us old enough to remember the early "125 foot canker rule", saw the expansion of this to the "1900 foot rule" in direct response to the arrival of the citrus leafminer to Florida. Currently there are a number of insecticides that have dual action on the citrus leafminer and Asian citrus psyllid. Asian citrus psyllid and citrus leafminer control recommendations can be found in the "2009 Florida Citrus Pest Management Guide". We also have some information and general recommendations on the use of pheromone baits and traps for the timing of citrus leafminer control. If you would like specific information on the leafminer pheromone and traps see the following website:

http://www.iscatech.com/ecommerce/index.php?main_page=product_info&cPath=2&products_id=5

Copper currently is the only material recommended for canker suppression for mature

citrus trees by the University of Florida. Copper applications need to be applied during the fruit susceptibility period beginning when fruit is about 1/2" in diameter and continued every 21 days until early summer or early fall depending on the variety. Rates of copper can range from as little as 0.5 pound in the early spring to 1.0 pound during the summer rainy season. Depending on the susceptibility of the variety the number of copper applications can range from as few as 3 (Valencias and midseason varieties) to as many as 5 (early oranges) to 8 (grapefruit, high color earlies and navels). This schedule is to reduce the occurrence of fruit lesions thereby reducing canker induced fruit drop.

Property or nutrient	Soil testing	Leaf testing
pH	√	
Organic matter	√	
N		√
P	√	√
K		√
Ca	√	√
Mg	√	√
Cu	√	√
Zn, Mn, Fe, B		√

Citrus Soil and Leaf Analysis

Growers should begin plans for their annual citrus leaf and soil sampling for nutrient analyses. A soil analysis is most beneficial for soil pH, phosphorous, magnesium, calcium, copper and organic matter. A leaf analysis can determine trends in nutrient uptake and foliar nutrient levels. There are some guidelines that need to be followed for these analyses to be of benefit to growers.

Soil sampling can begin shortly after the start of the summer rainy season. This timing can coincide with the optimum time period for taking your leaf sample for nutritional analysis. Care should be exercised in not taking soil samples immediately after a soil application of fertilizer. Soil samples should be taken from an area or unit that will have the same citrus nutrient management program. Soil samples should be taken within the wetted irrigation pattern at the drip line of 15 to 20 trees within a designated management area. A single core taken from a depth of 8 inches at the drip line of each of the 15 to 20 trees will comprise a single sample. These cores or single samples are then placed in a clean plastic bucket for mixing. After thoroughly mixing the cores, a composite sample can be taken from the bucket and sent to the soil testing lab of your choice. It may be convenient and less time consuming to take leaf samples from these same trees at this time. Will have more about leaf sampling later in this article.

The benefits of soil sampling and analysis are numerous in developing a sound citrus nutrition program. Soil analyses are most beneficial when conducted over a number of consecutive years to examine trends in soil nutrient levels. There are some important concepts to consider when interpreting the soil analysis. First, lab procedures used to determine soil organic matter levels and soil pH are universal and these values are comparable from lab to lab. However, the analysis used for other soil nutrient levels can vary from lab to lab based on the extraction method (or chemicals) used by a particular lab. This becomes important when comparing nutrient levels from year to year using different labs that do not use the same extraction methods. The extraction of soil nutrients from a soil sample does not measure the total amount of nutrient present in the soil. Conversely, the extraction of nutrients from the soil sample does not measure the amount of soil nutrients available for citrus tree uptake. What a soil analysis value represents is a value of soil nutrient levels that can then be correlated or calibrated to a plant response. The results of a typical

Table 4.4. Interpretation of soil analysis data for citrus using the Mehlich 1 (double-acid) extractant.

Element	Soil test interpretation				
	Very Low	Low	Medium	High	Very High
	mg/kg (ppm)[1]				
P	< 10	10 – 15	16 – 30	31 – 60	> 60
Mg[2]	---	< 15	15 – 30	> 30	---
Ca[2]			250[3]	> 250	
Cu			< 25[4]	25 – 50[5]	> 50[6]

[1]parts per million (ppm) x 2 = lbs/acre.
[2]A Ca-to-Mg ratio greater than 10 may induce Mg deficiency.
[3]The Univ. of Florida Extension Soil Testing Laboratory does not interpret extractable Ca.
Work with Florida citrus trees suggests that a Mehlich 1 soil test Ca of 250 mg/kg or greater is sufficient.
[4]Cu toxicity is unlikely even if soil pH is less than 5.5.
[5]Cu toxicity is possible if soil pH is less than 5.5.
[6]Cu toxicity is likely unless soil pH is raised to 6.5.

Table 4.5. Soil test interpretations for other extraction methods compared with Mehlich 1.

Extractant	Nutrient	Soil test interpretation				
		Very Low	Low	Medium	High	Very High
		(Less than sufficient)			(Sufficient)	
Mehlich 1	P mg/kg (ppm)[1]	< 10	10 – 15	16 – 30	31 – 60	> 60
Mehlich 3[2]		< 11	11 – 16	17 – 29	30 – 56	> 56
Ammonium acetate pH 4.8[3]		≤ 11			> 11	
Bray P1[3]		≤ 40			> 40	
Bray P2[3]		≤ 65			> 65	
	Mg mg/kg (ppm)		Low	Medium	High	
Mehlich 1			< 15	15 – 30	> 30	
Mehlich 3[4]			< 25	25 – 33	> 33	
Ammonium acetate pH 4.8[5]			< 14	14 – 26	> 26	
		Less than sufficient			Sufficient	
Ammonium acetate pH 7.0[3]		≤ 50			> 50	
	Ca mg/kg (ppm)	Less than sufficient			Sufficient	
Mehlich 1		≤ 250			> 250	
Mehlich 3[4]		≤ 200			> 200	
Ammonium acetate pH 4.8[5]		≤ 270			> 270	
Ammonium acetate pH 7.0[3]		≤ 250			> 250	

[1]parts per million (ppm) x 2 = lbs/acre.
[2]Estimated from unpublished correlation data (T. A. Obreza, 2006).
[3]From Koo et al. (1984).
[4]Estimated from correlation data (Alva, 1993).
[5]Estimated from correlation data (Sartain, 1978).

soil analysis will yield a value that will fall into a category ranging from very low to very high. If soil nutrient levels are in the low categories then one should expect a plant response (either yield or growth) from increasing the specific nutrient level. Values in the high ranges would indicated that with the addition of these nutrients one would not expect a corresponding increase in tree yield or growth.

Annual soil sampling and analysis provides you with some necessary information in identifying trends in soil nutrient levels. In perennial crops like citrus there may be many cases where a poor relationship will exist between the results of a soil analysis and tree growth and yield. In an effort to better understand this poor relationship, it is recommended that annual citrus leaf analysis be included in the overall development of a citrus nutrition program.

Citrus leaf sampling for nutrient analysis can be done in conjunction with soil sampling. The same trees used for soil sampling can and should be used for leaf sampling. Citrus leaf analysis can provide a quantifiable value of the nutrients that are present in the trees at the time of sampling. It can also be correlated with soil analysis to help describe the nutrient availability between the soil and the citrus tree.

The optimum time to take leaf samples would be when the spring flush is 4 to 6 months old (July/August). Samples should be composed of one hundred of these 4 to 6 month old spring flush leaves from non-fruiting twigs under the same designated management area. These 100 leaves can be taken from the same 15 to 20 trees used for soil sampling and analysis. Leaves should be insect and disease free, mature, hardened-off and only one leaf per shoot taking care to include the leaf petiole. These leaves should then be placed in a clean paper bag with a unique identification number of your choosing. Samples should not be allowed to dry out or be exposed to extreme heat. Leaves that are to be stored over night need to be placed in a refrigerator. For macro-nutrient analysis leaves do not need to be washed. For accurate micro-nutrient analysis leaves need to be surface washed with a mild detergent shortly after collection. Leaves sprayed with micro-nutrients specifically copper, manganese or zinc should not be analyzed for these nutrients since surface washing will not remove these spray residues. Unlike soil analysis, leaf analysis will be reported in total nutrient concentration. The measurement of total nutrient concentration is universal and direct comparisons can be made between different labs.

The University of Florida recommendations for citrus leaf nutrient levels are reported in concentration either as percent nutrient for macro-nutrients or in parts per million for micro-nutrients. The interpretation of these nutrient levels range from deficient to excess. The goal of citrus leaf sampling and analysis

is to maintain leaf nutrient concentration in the optimum range.

Table 4.2. Guidelines for interpretation of orange tree leaf analysis based on 4 to 6-month-old spring flush leaves from non-fruiting twigs (Koo et al., 1984).

Element	Unit of measure	Deficient	Low	Optimum	High	Excess
N	%	< 2.2	2.2 – 2.4	2.5 – 2.7	2.8 – 3.0	> 3.0
P	%	< 0.09	0.09 – 0.11	0.12 – 0.16	0.17 – 0.30	> 0.30
K	%	< 0.7	0.7 – 1.1	1.2 – 1.7	1.8 – 2.4	> 2.4
Ca	%	< 1.5	1.5 – 2.9	3.0 – 4.9	5.0 – 7.0	> 7.0
Mg	%	< 0.20	0.20 – 0.29	0.30 – 0.49	0.50 – 0.70	> 0.70
Cl	%	---	---	< 0.2	0.20 – 0.70	> 0.70[1]
Na	%	---	---	---	0.15 – 0.25	> 0.25
Mn	mg/kg or ppm[2]	< 18	18 – 24	25 – 100	101 – 300	> 300
Zn	mg/kg or ppm	< 18	18 – 24	25 – 100	101 – 300	> 300
Cu	mg/kg or ppm	< 3	3 – 4	5 – 16	17 – 20	> 20
Fe	mg/kg or ppm	< 35	35 – 59	60 – 120	121 – 200	> 200
B	mg/kg or ppm	< 20	20 – 35	36 – 100	101 – 200	> 200
Mo	mg/kg or ppm	< 0.05	0.06 – 0.09	0.10 – 2.0	2.0 – 5.0	> 5.0

[1]Leaf burn and defoliation can occur at Cl concentration >1.0%.
[2]ppm = parts per million.

The following tables provide guidance on the interpretation of citrus soil and leaf analysis results.

Table 4.6. Adjusting a citrus fertilization program based on soil analysis.

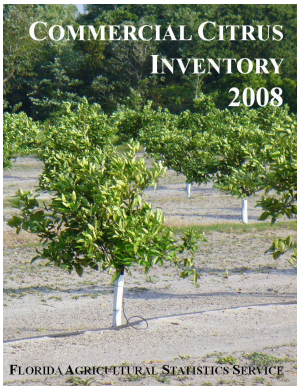
Property or nutrient	What if it is below the sufficiency value in the soil? Options:	What if it is above the sufficiency value in the soil? Options:
Soil pH[1]	1. Lime to pH 6.0.	1. Do nothing. 2. Use acid-forming N fertilizer. 3. Apply elemental sulfur. 4. Change rootstocks.
Organic matter[2]	1. Do nothing (live with it). 2. Apply organic material.	1. Do nothing.
P	1. Check leaf P status. 2. Apply P fertilizer if leaf P is below optimum (see Chapter 8).	1. Do nothing.
K	1. Apply K fertilizer (see Chapter 8).	1. Lower K fertilizer rate.
Ca	1. Check soil pH and adjust if needed. 2. Check leaf Ca status.	1. Do nothing. 2. Check leaf K and Mg status.
Mg	1. Check soil pH and adjust with dolomitic lime if needed. 2. Check leaf Mg status.	1. Do nothing.
Cu	1. Do nothing.	1. Lime to pH 6.5.

[1]The sufficiency value for soil pH is 6.0.
[2]There is no established sufficiency value for soil organic matter.

Table 4.3. Adjusting a citrus fertilization program based on leaf tissue analysis.

Nutrient	What if it is less than optimum in the leaf? Options:	What if it is greater than optimum in the leaf? Options:
N	1. Check yield. 2. Check tree health. 3. Review water management. 4. Review N fertilizer rate.	1. Check soil organic matter. 2. Review N fertilizer rate.
P	1. Apply P fertilizer (see Chapter 8).	1. Do nothing.
K	1. Increase K fertilizer rate (see Chapter 8). 2. Apply foliar K fertilizer.	1. Decrease K fertilizer rate.
Ca	1. Check soil pH. 2. Check soil test Ca status. 3. Consider applying lime or soluble Ca fertilizer depending on soil pH.	1. Do nothing.
Mg	1. Check soil test Mg status. 2. Check soil pH. 3. Consider applying dolomitic lime or soluble Mg fertilizer depending on pH.	1. Do nothing.
Micronutrients	1. Check soil pH and adjust if needed. 2. Apply foliar micronutrients. 3. Include micronutrients in soil-applied fertilizer.	1. Check for spray residue on tested leaves. 2. Do nothing.

All the tables presented in this article are from Nutrition of Florida Citrus Trees", UF/IFAS, SL 253, 2nd Ed, Drs. Thomas Obreza and Kelly Morgan. A limited number of copies are available from our office in Bartow.



2008 Commercial Citrus Tree Inventory

The newest citrus tree inventory for Florida Citrus has just been released. The numbers in this year's inventory showed a decrease of a net 44,796 acres from the 2006 Citrus Tree Inventory. This number was a result of a decline of 66,924 acres statewide from the new acreage planted (22,128). Statewide this is an average reduction from 2006 of 7.2% in Florida citrus acreage. In Polk County there was a net loss of 5,023 acres or a 5.8% decrease from 2006. In Hillsborough there was a net loss of 3,535 acres or a decrease of 23.9% from 2006. Polk County, as in the past, continues to lose citrus acreage at a lower percentage than that of the state average.

Pesticide News and Information

Danitol® Now Labeled for Low Volume Application in Florida Citrus

On April 24, the Florida Department of Agriculture and Consumer Services (FDACS) approved the Special Local Needs registration EPA SLN FL-090003 for Danitol® (fenpropathrin) use in citrus at low volume to manage Asian citrus psyllid. (FDACS PREC Agenda, 5/7/09).

Clinch Fire Ant Bait

Clinch Fire Ant Bait is now registered (labeled) for aerial application in citrus.

Admire Pro for Citrus Canker Suppression

Admire Pro Systemic Protectant 2ee label for use in newly established citrus for canker suppression.

Delegate WG

On May 21, the Florida Department of Agriculture and Consumer Services (FDACS) approved the Special Local Needs registration EPA SLN FL-090009 for Delegate® (spinetoram) use in citrus at low volume to manage Asian citrus psyllid. (FDACS PREC Agenda, 6/4/09).

Actara 25 WG Approved for Use in Florida Citrus

Effective immediately Actara 25WG Insecticide has been approved for use in Florida Citrus. Actara contains the active ingredient Thiamethoxam a Group 4A insecticide. This group consists of the neonicotinoids class of compounds including imidacloprid.

Results of 2007 Pesticide Data Program

The purpose of the USDA's Pesticide Data Program (PDP) is to provide the EPA with information about the level of pesticides being consumed by the general public through foods. The information is used to assist EPA in establishing and reviewing the effectiveness of existing pesticide residue limits to protect public health. The PDP program is required by law to focus on products frequently consumed by infants and children. The most recent report was released at the end of 2008 on data collected in 2007.

During 2007, the PDP tested fresh and processed fruit and vegetables, almonds, honey, heavy cream, corn grain, groundwater, and treated and untreated drinking water for various pesticides and growth regulators. Of the 12,689 samples, approximately three quarters were domestic and the remainder imports. Nearly three quarters of the samples (9,734) were produce samples.

For the 11,683 samples of fresh and processed commodities, the overall percentage of total residue detections was 1.9 percent. Over 99 percent of the samples analyzed did not contain residues above the tolerances and nearly 97 percent of the samples did not contain residues for pesticides that had no tolerance established. For these samples, residues were detected at very low levels, and probably were the results of spray drift or crop rotation.

For finished drinking water, none of the detections in the finished water samples exceeded established EPA Maximum Contaminant Levels or Health Advisory levels or established Freshwater Aquatic Organism criteria. (*Pesticide Data Program Annual Summary*, Calendar Year 2007 - December, 2008).

Agencies Wrangle Over Pesticides

Last year, a federal judge ordered the National Marine Fisheries Service to review 37 pesticides to determine if they harm endangered salmonid species in the Northwest. Since then, National Marine

Fisheries Service (NMFS) has found that each of the six pesticides it has reviewed so far poses a jeopardy to the fish. In a November 2008 biological opinion, NMFS proposed restrictions on the use of malathion, chlorpyrifos and diazinon. A second opinion released this April proposed similar restrictions for carbaryl, carbofuran, and methomyl.

The Environmental Protection Agency (EPA) is expected to develop label regulations based on these proposed mitigation measures, but agency managers say they are confused about how NMFS arrived at its findings. After receiving a draft of the most recent biological opinion, EPA's director of pesticide programs, Debra Edwards, wrote a response letter criticizing NMFS' approach. "The draft biological opinion lacks a level of transparency necessary for EPA to understand NMFS' rational for its opinion that the use of these pesticides will jeopardize the continued existence" of the endangered fish, Edwards said in the letter, dated April 10.

NMFS seemed to use "conflicting approaches" in how it compiled the biological opinion, drawing conclusions about pesticide risk from uncertain and incomplete data, Edwards said. The biological opinion also failed to explain why NMFS took certain studies into consideration but did not use other studies provided by EPA, she said. Edwards also questioned how realistic NMFS was about pesticide use in agriculture.

Farmers use less pesticides than estimated in the biological opinion, since NMFS assumed growers apply the maximum amount of chemicals permitted by law, Edwards said. "There seem to be numerous assumptions made in the draft that are not reasonably likely to occur and in fact are very unlikely to occur," she said. According to data in the biological opinion, populations of endangered fish have actually improved, but that information doesn't seem to factor into NMFS' conclusions, Edwards said. "Use of these pesticides has been going on for decades," she said. "If the threatened status of the species has not changed appreciably during this time period, it would appear to provide some indication that use of these pesticides are not appreciably reducing the likelihood of both survival and recovery."

Angela Somma, chief of NMFS' endangered program said the agency disagrees with the EPA's view that the biological opinion lacks transparency. "At this point, we have not resolved all the issues with EPA, but we certainly have conversations about it," said Somma. NMFS acknowledges in the biological opinion that some of the studies it considered were uncertain, she said. However, the Endangered Species Act and subsequent legal decisions require NMFS to consider all relevant data when conducting a biological opinion, Somma said. "The courts have told us many times we have to look at all the information," she said. The positive fish population numbers may have been the result of habitat restoration and other efforts, and so did not figure into NMFS' findings, she said. (Capital Press Agricultural News, 5/7/09).