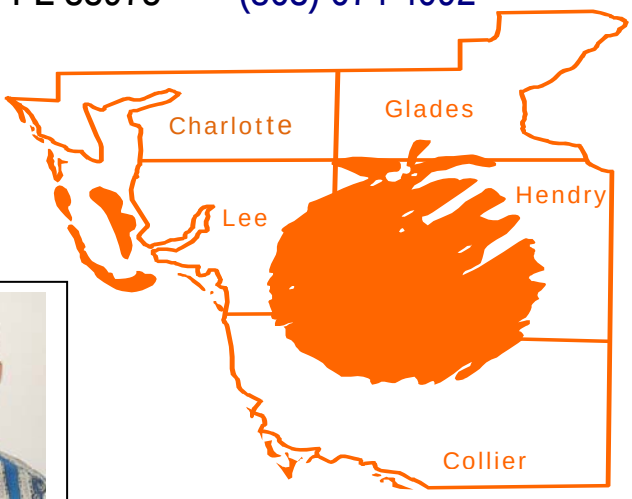
UF UNIVERSITY of FLORIDA
IFAS Extension

EXTENSION

Institute of Food and Agricultural Sciences

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

Flatwoods Citrus



Vol. 16, No. 9 **September 2013**

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

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

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

SEMINAR

Florida Citrus Industry, Brazilian Citrus Industry, Preharvest Fruit Drop and Growth Regulators for Citrus

Program Coordinator: Dr. Mongi Zekri, UF-IFAS Extension
Program Sponsor: Ray Bassett and Justin Newsome with Aglime Sales, Inc.
Date: Thursday, September 26th, 2013, Time: **10:00 AM** – 12:00 Noon
Location: UF-IFAS Southwest Florida Research and Education Center
2685 SR 29, Immokalee, FL 34142 See: **http://www.imok.ufl.edu/** for directions
Agenda
10:00 AM – 10:35 AM

1. Outlook of the Florida citrus industry and economic challenges**- Dr. Fritz Roka, UF-IFAS**

10:35 AM – 11:10 AM

2. Observations on the Brazilian Citrus Industry – June 2013 **–Thomas Stopyra, The Packers of Indian River, Ltd**

11:10 AM – 11:20 AM - Break
11:20 AM – 12:10 PM

3. Preharvest fruit drop, what will this season bring and can we do anything about it? **- Dr. Gene Albrigo, UF-IFAS**

2 CEUs for Pesticide License Renewal
2 CEUs for Certified Crop Advisors (CCAs)
No registration fee. A complimentary lunch will be provided. Thanks to **Ray Bassett** and **Justin Newsome** with **Aglime Sales, Inc.** Advance registration is required for an accurate meal count. Call 863 674 4092, or send an e-mail to Dr. Mongi Zekri at **maz@ufl.edu**

Presentations from 2013 Florida Citrus Growers' Institute

The 2013 Institute held on April 2 in Avon Park drew over 300 growers to the South Florida State College campus. For those of you who attended and those who could not make it, video recordings were made of the presentations and most of them are posted on the Citrus Agents Website.
http://citrusagents.ifas.ufl.edu/events/GrowersInstitute2013/GrowersInstitute2013.htm

CITRUS SPOT BURNER WORKSHOP

Date and Time: Tuesday, 8 October 2013, 9:00 AM
Location: Hendry County Extension Office in LaBelle

CERTIFIED CROP ADVISER CEU SESSION

SOIL & WATER MANAGEMENT (5 CEUs) – CROP MANAGEMENT (5 CEUs)
Wednesday, 9 October 2013
http://www.crec.ifas.ufl.edu/crec_websites/cca/registration.shtml
Registration by mail is $100; Registration at the door is $120.

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EFFECT OF WATER pH ON EFFICACY OF PESTICIDES

Successful citrus growers should check the soil pH of their groves yearly and do their best to adjust it for better fertilizer efficiency, tree growth, and fruit production. Soil pH is usually increased by liming and decreased by applying sulfur or acid-forming fertilizers. The pH indicates whether the solution or media is acidic or basic (alkaline). The pH scales goes from 0 to 14, where 7 indicates neutrality. Values less than 7 indicate acidic solutions and values greater than 7 indicate a basic condition. Most of Florida fresh waters have pH values between 7 and 8. Although the pH is the most common measured property or characteristic of a solution or a media, some growers and production managers still ignore to adjust the pH of their water when used for pesticide mixing. For better efficacy, anyone involved in pesticide mixing should use a pH meter. The pH affects the rate at which some herbicides are absorbed by plants. Adjusting the pH of the water allows the user to reduce the rates of herbicides without reducing their efficacy. The effectiveness of spray mixture in the spray tank can be affected by a number of variables. A significant impact on the efficacy of many spray materials is the pH of the water used in the tank. In general, it is desirable to have the pH of the water below 7. Although several chemicals used today are effective at a wide range of pH conditions, many others can be subject to breakdown of the active ingredient at relatively high pH values. With extremely sensitive chemicals, this breakdown can begin between mixing and application. Sevin is among the common pesticides that lose their effectiveness quickly in alkaline (pH values greater than 7) solution. Therefore, it is recommended to reduce the pH of the water in the tank to increase the efficacy of some chemicals. Acidifying agents such as phosphoric acid and citric acid will lower the pH, but can drop it too low. Buffering agents, available from most distributors, will lower the pH to the desired range and help maintain it at that level. It is important to add the buffer to the spray tank water before pesticides are added. **Glyphosate works better when ammonium sulfate is added to the spray tank at rates of 8.5 to 17 pounds for every 100 gallons of spray solution.** Be careful when buffering tank mixes containing copper fungicides. Copper is more soluble in acidic water, and the resulting high concentrations will cause leaf and fruit burn. Aliette makes acid spray. Therefore, do not mix Aliette with copper. **Always read the label of the buffering material as well as the label of the pesticide**. It is also recommended to ask your chemical supplier for up-to-date information on the susceptibility of a material to hydrolysis. A good rule of thumb is to spray pesticide mixtures as soon after mixing as possible, mix only enough to treat the crop and do not allow the mixture to stand for a long period of time or overnight.

IDEOLOGY, DISEASE AND BIG OJ CLASH OVER OUR BREAKFAST: COLUMN

Richard Tren

Disease threatens our favorite breakfast drink.

The Asian citrus psyllid feeds on the liquid inside citrus leaves and is the only transmitter of a disease threatening to wipe out “Made in America” orange juice.

Story Highlights

Nearly 70 percent of American households buy orange juice.

In 2005, citrus greening showed up in Florida orange groves.

The best defense has come from application of a class of pesticide called neonicotinoids.

Beef might be what's for dinner, but at breakfast, orange juice is king. Americans love their oranges — so much so that nearly 70% of American households buy orange juice. But they may be in for a shock.

Orange growers have been desperately battling a disease that could wipe out the U.S. citrus industry, and "Made in America" orange juice along with it. In 2005, "citrus greening" showed up in Florida orange groves. Named for the stunted, unripe fruit that infected trees produce, the disease is spread when Asian citrus psyllids (which looks like a cicada's ugly little sister) feed on citrus trees. There is no cure.

Waiting for science

"The long and short of it is that the industry that made Florida, that is synonymous with Florida ... is totally threatened," Sen. Bill Nelson, D-Fla., told *The New York Times*. "If we don't find a cure, it will eliminate the citrus industry." He has helped secure $11 million in research money to combat the disease.

Some in the industry have pinned their hopes on the development of a genetically engineered orange variety that would be immune to the disease. In pursuing this solution, they're following the path that led to salvation for the Hawaiian papaya industry. Devastated by the ringspot virus in the 1990s, the industry was nearly wiped out until resistant varieties of papaya were developed through genetic engineering.

Delaying tactic

But these solutions take time, even for a cultural icon. That's the one resource that orange growers don't have. "We are to the point now that to stay alive in this type of environment, you have to be on top of it 24/7," grower Mark Wheeler told *The Times*, citing a 30% to 40% crop loss a year for some orchards.

To date, the only treatment that works in slowing down the spread of citrus greening is killing the psyllids before they can infect trees. The best defense has come from application of a class of pesticide called neonicotinoids.

"Neonic crop protection for citrus is currently the only thing we have that can ensure the U.S. citrus industry survives citrus greening long enough to be rescued by (genetic engineering) technology," professor Michael Rogers of the University of Florida told me. "Using neonics to protect young trees buys the time we need to develop a genetically engineered citrus tree, prove its biological and commercial viability, gain regulatory approvals and plant it on a commercial scale."

Tug of war

But if anti-agriculture technology activists have their way, the last-ditch pesticide would be banned. Some groups oppose its use as a matter of principle. Others, such as Beyond Pesticides and the Center for Food Safety, believe that the chemicals harm bees. The fact that many of the same groups fighting the pesticide are also fighting the kind of genetic engineering that would displace it show where they are really coming from.

At the same time that these groups have sued the Environmental Protection Agency to ban the pesticide, Florida growers have successfully lobbied the agency to allow greater application of the pesticide.

Working in Africa on malaria issues, I have seen what happens when governments act on ideology by banning chemicals that provide an imperfect solution before a better solution arrives. It is not pretty. We shouldn't repeat those mistakes.

Richard Tren is Director of Africa Fighting Malaria.

SOIL ACIDITY & LIMING

The optimum soil pH range for citrus trees is 6.0 to 7.0. ***Trifoliate hybrid rootstocks such as citrumelos and citranges do better at the low end of this pH range.*** For sandy soils, one ton of liming material such as dolomite will raise the soil pH by about one unit. Liming acidic soils is economically sound and essential for profitable crop production. Soil pH must be monitored every year through soil testing because development of soil acidity is a continuous process that requires repeated applications of liming materials. Always test your soil before liming. Do not assume that lime is needed.

Problems in very acid soils

*Aluminum (Al) toxicity to plant roots
*Copper toxicity in soils that have received repeated Cu fungicide applications
*Manganese toxicity to plants in continuously wet soils
*Calcium & magnesium deficiencies
*Molybdenum deficiency
*Phosphorus tied up by iron (Fe) & Al
*Poor bacterial growth
*Reduced conversion of ammonium to nitrate

Problems in alkaline (high pH) soils

*Iron deficiency
*Manganese deficiency
*Zinc deficiency
*Excess salts (in some soils)
*Phosphorus tied up by calcium (Ca) and magnesium (Mg)
*Bacterial diseases and disorders

Fertilizers. Both organic and non-organic fertilizers may eventually make the soil more acid. For example, transformations of ammonium- (NH_4^+) and urea-based fertilizers into nitrate (NO_3^-) release H^+ that increases soil acidity. Therefore, fertilization with materials containing ammonium or even adding large quantities of organic matter to a soil will ultimately increase the soil acidity and lower the pH.

Raising soil pH (liming acid soils). Soils are limed to reduce the harmful effects of low pH and to add calcium and magnesium to the soil. Lime reduces soil acidity (increases pH) by reducing the H^+ concentration through neutralization with carbonate (CO_3^{2-}) or hydroxide (OH^-). A Ca^{++} ion from the lime replaces two H^+ ions on the cation exchange complex. The hydrogen ions (H^+) are then reduced and changed into water (H_2O). An acid soil can become more acid as basic cations such as Ca^{2+}, Mg^{2+}, and K^+ are removed, usually by crop uptake or leaching, and replaced by H^+.

Benefits of liming to correct soil acidity

*Increased nutrient availability
*Improved fertilizer use efficiency
*Increased soil microbial activity
*Higher nitrogen fixation by legumes
*Reduced toxicity of copper
*Solving molybdenum deficiency
*Provision of additional amounts of calcium and magnesium
*Improved soil physical conditions
*Increased cation exchange capacity

*Improved herbicide activity
*Increased growth and crop yield

Lime placement. Since ground limestone is relatively insoluble in water, maximum contact with the soil is necessary to neutralize the soil acidity. Lime will not quickly move into the soil like water-soluble fertilizers. Even though it is usually recommended to thoroughly mix lime with the topsoil, it is not practical to incorporate it in a citrus grove. Therefore, it will take lime longer to raise soil pH in a grove compared with a field where it is incorporated. As soon as moisture is present, the lime will begin to react. Coarse lime particles react more slowly than very fine particles. Therefore, using very finely ground limestone is necessary to achieve the desired soil pH change within 4 to 6 months after application.

Overliming. While a correct liming program is beneficial for plant growth, excessive liming can be detrimental because deficiencies and imbalances of certain plant nutrients may result. The practice of estimating lime requirement without a soil test is risky because it can lead to overliming.

Liming materials. The most common liming materials are calcitic or dolomitic agricultural limestone. Calcitic limestone is mostly calcium carbonate ($CaCO_3$). Dolomitic limestone is made from rocks containing a mixture of calcium and magnesium carbonates. Dolomitic limestone also provides magnesium. Not all materials containing calcium and magnesium are capable of reducing soil acidity. Gypsum ($CaSO_4$) does not reduce soil acidity.

Lime may be applied at any time during the year to Florida citrus groves.

Calcium sources

Source	Chemical formula	Calcium carbonate equiv. (pure form)
Burned lime (Quicklime)	CaO	179
Hydrated lime (Builder's lime)	$Ca(OH)_2$	135
Dolomitic lime	$CaCO_3 \bullet MgCO_3$	109
Calcitic lime	$CaCO_3$	100
Basic slag (by-product)	$CaSiO_3$	80
Marl (soft carbonates)	$CaCO_3$	70 to 90
Gypsum	$CaSO_4$	0
Calcium nitrate	$Ca(NO_3)_2$	20
Ordinary superphosphate	$Ca(H_2PO_4)_2 + CaSO_4$	0
Concentrated superphosphate	$Ca(H_2PO_4)_2$	0

FERTILIZER FORMULATIONS AND APPLICATIONS

Fertilizers have many different formulations, analyses and grades available for purchase. Among the many choices, formulation-fluid or granular-is one of the most important. How do you decide which is the right product for your needs?

A fluid fertilizer is formulated and packaged as a liquid. This includes fertilizers that are clear liquids (solutions) or liquids that contain suspended solids (suspension fertilizers). Growers and production managers frequently use more solids (granules) than fluid fertilizers.

Solid fertilizers are dry particles that manufacturers size between an upper and lower limit of screen sizes. They may be finely crushed, granular, crystalline, powder or processed into uniform prills. These fertilizers by themselves usually are water-soluble for quick release but sometimes are coated as controlled-release products.

Water-soluble fertilizers are rapidly available for crops. Examples of common water-soluble products include ammonium nitrate (33-0-0) and urea (46-0-0). Some water-soluble fertilizers are homogeneous products (every particle has the same composition). These homogeneous products have a uniform appearance and are made from blends of raw fertilizer materials such as superphosphate, urea, and potassium chloride. Fertilizer bags always list which raw materials the manufacturer used in the fertilizer bag.

Other solid fertilizers are non-homogeneous blends (you can see the individual granules of different fertilizer materials), where the manufacturer simply has mixed particles together to produce a desired overall composition. Non-homogeneous products may not spread as uniformly as homogeneous products, especially if the particles are different in size and in weight.

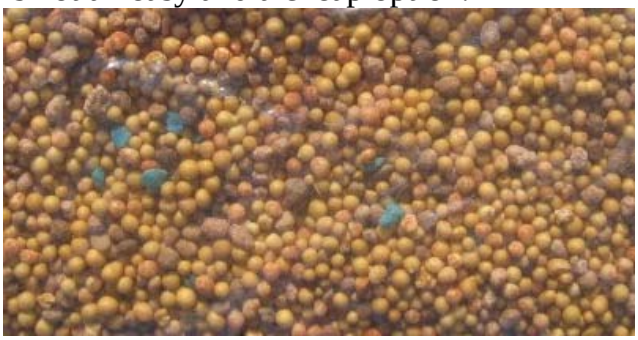
Water-soluble fertilizers produce a rapid response, have a low cost per unit of nutrient, are easy to apply, and do not take expensive equipment or intensive training to ensure correct application.

Foliar feeding uses a small amount of fertilizer sprayed directly to the foliage, providing rapid uptake of nutrients and quick correction of a nutrient deficiency. Typically, applicators use foliar feeding to supply a small amount of a deficient nutrient or as part of a pesticide application. Sometimes, a nitrogen-phosphorous-potassium mix is used.

Benefits from using soluble solids as liquid fertilizers include the ability to apply nutrients through irrigation (fertigation), possible use as a carrier for post-emergence herbicides and flexibility of application as a foliar feed. Liquid application of a soluble-solid fertilizer through fertigation can reduce the risk of foliar burn, provide even coverage and allow simultaneous application of water and fertilizers. Liquid fertilizers can be

applied at low rates on a frequent basis to spoon-feed the crop, promoting consistent and uniform growth. Application of small amounts of fertilizer on a regular basis can increase fertilizer efficiency and reduce environmental risk. Disadvantages of liquid fertilizer may include the extra cost of new application equipment and the issues of handling a heavy, bulky, liquid material.

New technologies have led to the development of resin or polymer-coated fertilizers. Nutrient-release rates depend on factors such as moisture and temperature (depending on the product) and vary with the composition and the thickness of the coating. These fertilizers tend to be uniform in granule size and provide controlled release nutrients. They are an excellent choice in high-value crops or when frequent application of soluble N is not an easy and a cheap option.



On the positive side, use of controlled release fertilizers creates a long-term, consistent growth. Because of the low application frequency, labor cost is low. These products also have a low burn potential. On the negative side, they do not tend to provide a rapid response, and their cost per unit of nutrient is much higher than that of soluble sources.

All fertilizers have both advantages and disadvantages. The appropriate type for each operation depends on several factors. Consider the following in making your choice of fluid or solid fertilizers. Do you have the labor and/or the equipment to make the frequent applications that soluble liquid or solid products require? Consider controlled release products for some blocks.

Do you need a quick fix of a visual manganese, zinc, boron, copper, or magnesium deficiency? Foliar liquid application may be the best solution. Controlled release fertilizers and properly timed, frequent applications of soluble fertilizer sources can help protect the water supplies and the environment, especially in areas prone to heavy rains near environmentally sensitive areas. Test your crop and soil to determine what nutrients you need to apply and which application methods you should use.

IRRIGATION, NUTRITION AND FRUIT QUALITY

Florida has the highest citrus fruit quality standards in the world. Fruit quality factors include juice content, soluble solids and acid concentrations, soluble solids-acid ratio, fruit size, and color. Florida citrus growers know that quality factors differ for the fresh and processing markets. For example, fruit size, shape, color, and maturity date are most important for fresh fruit, but high juice content and soluble solids are desired for processing fruit. Fruit quality is affected by several factors including cultivar, rootstock, climate, soil, pests, irrigation, and nutrition.

The effects of irrigation and nutrition on fruit quality are very important and should be understood and taken into consideration by citrus growers and production managers to increase their profitability and enhance their sustainability and competitiveness on a worldwide basis. In general, excessive irrigation and nutrition reduce fruit quality. Therefore, balanced nutrition with sound irrigation scheduling based on **IFAS** recommendations should be a high priority management practice for every grower. Citrus trees require a properly designed, operated, and maintained water management system and a balanced nutrition program formulated to provide specific needs for maintenance and for expected yield and fruit quality performance. Irrigation contributes to the efficiency of fertilizer programs. Adequately watered and nourished trees grow stronger, have better tolerance to pests and stresses, yield more consistently, and produce good quality fruit. On the other hand, excessive or deficient levels of watering or fertilization will result in poor fruit quality. The most important management practices influencing fruit quality are irrigation and nitrogen, phosphorus, potassium, and magnesium nutrition. However, when any nutrient element is severely deficient, fruit yield and fruit quality will be negatively altered. Trends in fruit quality response to high nutrition and irrigation are described and summarized below.

Nitrogen (N)

- Increases juice content and color, total soluble solids (TSS), and acid content.
- Increases soluble solids per box and per acre. However, excessive N, particularly with inadequate irrigation, can result in lower yields with lower TSS per acre.
- Decreases fruit size and weight.
- Increases peel thickness and green fruit at harvest.
- Increases incidence of creasing and scab but decreases incidence of peel blemishes such as wind scar, mite russeting, and rind plugging.
- Reduces stem-end rot incidence and green mold of fruit in storage.

Phosphorus (P)

- Reduces acid content, which increases soluble solids-acid ratio. Phosphorus rates have no effect on soluble solids per box but may increase soluble solids per acre due to increase in fruit production in soils that are low in P.

- Increases number of green fruit but reduces peel thickness.
- Increases expression of wind scar but reduces that of russeted fruit.

Potassium (K)

- Potassium produces mostly negative effects on juice quality except soluble solids per acre. Potassium increases fruit production therefore producing more soluble solids per acre.
- Decreases juice content, soluble solids, ratio, and juice color.
- Increases acid content.
- Increases fruit size, weight, green fruit and peel thickness.
- Reduces incidence of creasing and fruit plugging. In storage, reduces stem-end rot.

Magnesium (Mg)

- Slightly increases soluble solids, soluble solids-acid ratio, soluble solids per box and soluble solids per acre.
- Slightly increases fruit size and weight but decreases rind thickness.

Irrigation

- Increases juice content and soluble solids-acid ratio.
- Reduces soluble solids and acid contents. Soluble solids per box will decrease, but soluble solids per acre may increase due to yield increase.
- Increases fruit size and weight, increases green fruit at harvest, but decreases rind thickness.
- Increases incidence of blemish from wind scar, scab and *Alternaria* brown spot, but reduces rind plugging.
- Reduces stem-end rot incidence but increases incidence of green mold in storage.

Specific effects on juice and external fruit qualities are summarized in the Table below. This summary is based on numerous field experiments conducted over many years. Most of these effects were consistently observed, but some of them appear to depend on local conditions and growing regions.

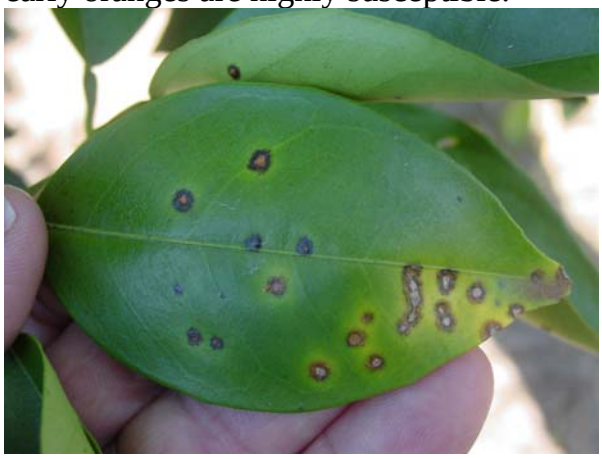
EFFECTS OF MINERAL NUTRITION AND IRRIGATION ON FRUIT QUALITY

Variable	N	P	K	Mg	Irrigation
Juice Quality					
juice content	+	0	-	0	+
soluble solids (SS)	+	0	-	+	-
acid (A)	+	-	+	0	-
SS/A ratio	-	+	-	+	+
juice color	+	0	-	?	0
solids/box	+	0	-	+	-
solids/acre	+	+	+	+	+
External Fruit Quality					
size	-	0	+	+	+
weight	-	0	+	+	+
green fruit	+	+	+	0	+
peel thickness	+	-	+	-	-

Increase (+), Decrease (-), No change (0), No information (?).

Citrus Canker is still a devastating problem

Citrus canker is a serious bacterial disease that affects citrus. Grapefruit and some early oranges are highly susceptible.



Major outbreaks of citrus canker occur when new shoots are emerging or when fruit are in the early stages of development. Frequent rainfall in warm weather, especially during storms, contributes to disease development. Citrus canker is mostly a leaf-spotting and fruit rind-blemishing disease, but when conditions are highly favorable for infection, it causes defoliation, shoot die-back, and fruit drop. When feeding galleries of Asian leafminer on leaves, stems, and fruit become contaminated with the bacterium, the number and size of individual lesions greatly increases and results in tremendous inoculum production.

Canker is more severe on the side of the tree exposed to wind-driven rain. Spread over longer distances can occur during severe tropical storms, hurricanes, and tornadoes. Workers can carry bacteria from one location to another on hands, clothes, and equipment. Grove equipment spreads the bacteria in blocks within groves, especially when trees are wet. The entire state of Florida has been under quarantine, and fruit movement is subject to specific regulations based on market destination.

Windbreaks. Windbreaks are highly effective in reducing the spread of canker, but more importantly, they reduce the severity of the infection in endemic situations. The vast majority of the infection occurs by wind-blown rains. Winds of 18 to 20 mph are needed to actually force bacteria into the stomates on leaves and fruit. Windbreaks are the single most effective means of dealing with canker. To be effective for canker control, windbreaks need not to be dense. All that is required is to reduce wind speed to less than 20 mph.
It is recommended that growers plant windbreaks along fence lines, ditches, around wetlands, or wherever they can plant without removing citrus trees. If it becomes obvious that more windbreak protection is needed, rows of citrus or end trees can be removed to accommodate windbreaks.

Copper sprays. Copper products are quite effective in preventing infection of fruit, less effective for reducing leaf infection, and have limited value in reducing spread of the disease. Application of copper to young leaves protects against infection, but protection is soon lost due to rapid expansion of the surface area. Fruit grows

more slowly and is easier to protect. Fruit is susceptible to infection after the stomates open when the fruit is about 1/2- to 1-inch in diameter until they develop resistance in mid to late July. Infection through wounds can occur at any stage.
It is believed that most of the infection will occur during June and July. With endemic canker, we suggest that three copper sprays be used for early oranges grown for processing, one in mid-May, a second in mid-June, and a third in mid-July. If canker continues to be very severe, another application of copper in August will be needed. Two applications should be sufficient for Valencias, in early June and early July.
Programs for fresh fruit are more complex, but many copper sprays are already used on these varieties. For fresh market grapefruit, a low rate of copper should be added to the spray of spring flush for scab. Subsequently, the copper spray program used for melanose control should also control canker, but additional applications may be needed in late June, July, and August. Copper may need to be added to applications of fungicides or petroleum oil.
Most tangerines are fairly tolerant to canker. Programs used for control of Alternaria should also protect against canker, but copper will have to be used in each spray. Navel oranges are highly susceptible to canker and will probably need to be sprayed every 3 weeks from late April through August. Fallglo is more tolerant and probably three sprays in May, June, and July should suffice.
The rates needed depend on the length of protection expected and the weather. As little as 0.5 to 1.0 lb of metallic copper will protect spring flush growth or fruit during the dry spring season. However, in the rainy season, 2 lb of metallic copper will be required to protect fruit for 3 to 4 weeks.
Copper usage should be minimized since this metal accumulates in soil and may cause phytotoxicity and creates environmental concerns.

Leafminer control. The citrus leafminer does not spread canker, but extensive infestation by leafminer greatly increases canker inoculum levels making the disease difficult to control. Leafminer control on the first summer flush can reduce disease pressure considerably. If properly timed, applications of petroleum oil, Agri-mek plus oil, Micromite, Spintor, or Delegate will reduce damage by leafminer. Late summer flushes tend to be erratic and effective control at that time will probably be difficult.

The Citrus Leafminer

Leafminer populations decline to their lowest levels during the winter, due to cool temperature and the lack of flush for larval development. Populations of leafminer build rapidly on the spring flush, although their presence is not apparent until late spring as populations increase while the amount of new foliage decreases. The summer period of high leafminer damage coincides with the rainy season when canker spread is most likely.

Citrus leafminer greatly exacerbates the severity of citrus canker caused by *Xanthomonas axonopodis* pv. *citri*. This insect is not a vector of the disease. Nevertheless, leafminer tunnels are susceptible to infection much longer than mechanical wounds. Tunnels infected by canker produce many times the amount of inoculum than in the absence of leafminer. Control of leafminer should be optimized in areas where infection by canker is high. Natural enemies already present in Florida have responded to leafminer infestations, causing in excess of 50% mortality of larvae and pupae in some areas. The introduced parasitoid *Ageniaspis citricola* has established throughout most of Florida, with rates of apparent parasitism reaching 90% or more. However, these high rates of parasitism are not seen until late in the year.

Leafminer Management

Nonbearing Trees

On young trees, use of the soil-applied systemic insecticides is the most effective means of preventing mining damage on the new flush and has little direct effect on natural enemies. Soil drenches directly to the base of the tree with Imidacloprid (Admire), Clothianidin (Belay) or Thiamethoxam (Platinum) have been shown to provide at least 8 weeks control of leafminer.

Soil applications of soil-systemic insecticides should be made about 2 weeks prior to leaf expansion to allow time for the pesticide to move from the roots to the canopy. Avoid applications 24 hours prior to significant rainfall events which will result in movement of the product out of the root zone before it can be taken up by the plant. When the residual effects of the spring application have worn off, typically during the mid-summer rainy season, foliar sprays can be used on small trees to reduce leafminer damage.

Bearing Trees

If canker is present in a grove (or in a nearby grove), healthy trees with leafminer damaged leaves are more likely to become sites for new canker infection. The only products currently available for leafminer control on large trees are foliar insecticide sprays. While there are a number of products that are effective for controlling leafminer, achieving control of leafminer using foliar sprays on large trees is difficult due to the unsynchronized flush typically encountered during the summer period when leafminer populations are at their highest levels.

Since leafminers affect only developing leaves, coverage of peripheral leaves in the canopy should be adequate to exert suppression when applying foliar pesticides.

For more information, go to
http://www.crec.ifas.ufl.edu/extension/pest/PDF/2013/Canker.pdf

PHYTOPHTHORA FOOT ROT AND ROOT ROT

Foot rot results from infection of the scion near the ground level, producing bark lesions, which extend down to the budunion on resistant rootstocks.

Crown rot results from infection of the bark below the soil line when susceptible rootstocks are used. Root rot occurs when the cortex of fibrous roots is infected, turns soft and appears water-soaked. Fibrous roots slough their cortex leaving only white thread-like stele.

When managing Phytophthora-induced diseases, consider integration of cultural practices (e.g., disease exclusion through use of Phytophthora-free planting stock, resistant rootstocks, proper irrigation practices) and chemical control methods.

Cultural practices. Field locations not previously planted with citrus are free of citrus-specific *P. nicotianae*. Planting stock should be tested free of Phytophthora in the nursery and inspected for fibrous root rot in the nursery or grove before planting. In groves with a previous history of foot rot, consider use of Swingle citrumelo for replanting. Swingle citrumelo is resistant to foot rot and roots do not support damaging populations once trees are established.

Cleopatra mandarin should be avoided because it is prone to develop foot rot when roots are infected in the nursery or when trees are planted in flatwoods situations with high or fluctuating water tables and fine-textured soils. Trees should be planted with the budunion well-above the soil line and provided with adequate soil drainage. Overwatering, especially of young trees, promotes buildup of populations in the soil and increases risk of foot rot infection. Prolonged wetting of the trunk, especially if tree wraps are used on young trees, should be avoided by using early to midday irrigation schedules. Control of fire ants prevents their nesting under wraps and causing damage to tender bark.

Sampling for *P. nicotianae*. Population densities of the fungus in grove soils should be determined to assist in decisions to treat with fungicides. Soil samples containing fibrous roots should be collected during the spring through fall (March to November) from under-canopy within the tree dripline. Individual small amounts of soil from 20 to 40 locations within a 10-acre area are composited into

one resealable plastic bag to retain soil moisture. Samples must be kept cool but not refrigerated for transport to the analytical laboratory. Currently, populations in excess of 10 to 15 propagules per cm^3 soil are considered damaging. The same soil sample could be tested for populations of nematodes, to assess whether they occur at damaging levels.

Chemical control.

Use of fungicides in young groves should be based on rootstock susceptibility, likelihood of Phytophthora infestation in the nursery, and history of Phytophthora disease problems in the grove. For susceptible rootstocks, such as Cleopatra mandarin and sweet orange, fungicides may be applied to young trees on a preventive basis for foot rot. For other rootstocks, fungicide treatments should commence when foot rot lesions develop. The fungicide program for foot rot should be continued for at least one year for tolerant rootstocks, but may continue beyond for susceptible stocks.

In mature groves, the decision to apply fungicides for root rot control is based on yearly soil sampling to indicate whether damaging populations of *P. nicotianae* occur in successive growing seasons. Time applications to coincide with periods of susceptible root flushes in late spring and late summer or early fall. Soil application methods with fungicides should be targeted to under canopy areas of highest fibrous root density. To avoid leaching from the root zone, soil-applied fungicides should not be followed by excessive irrigation. Aliette and Ridomil are both effective, but alternation of the materials should be practiced to minimize the risk of the development of fungicide resistance.

Foliar spray with Aliette: It is recommended to buffer the spray solution to pH 6 or higher to avoid phytotoxicity when copper has been used prior to or with Aliette. For nonbearing trees, use 5lb/100 gal. For bearing trees, use 5 lb in 100-150 gal/acre. Soil application with Ridomil Gold 4EC: Apply 1quart/treated acre or soil drench by applying 5 gallons of solution (1 quart/100 gal) in water ring. For more details and product selection and rates, go to: http://www.crec.ifas.ufl.edu/extension/pest/PDF/2013/Phytophthora.pdf

GRAPEFRUIT COULD HOLD KEY TO TREATMENT FOR HEART DISEASE

By Siski Green

New research published in *Biochemical Journal* has found that an extract of grapefruit is effective at preventing the process leading to inflammation within the blood vessels, paving the road for future lower-cost medication.

The fruit extract could provide an effective and low-cost anti-inflammatory medication

Inflammation is key to heart disease, and is significantly linked to many other illnesses such as rheumatoid arthritis and even cancer, and this is why scientists the world over are investigating different ways in which it can be prevented.

Researchers from Glasgow University, within the Institute of Molecular, Cell and Systems Biology, have pinpointed specific molecules, derived from plants, that activate the body's natural immune cells, helping to prevent heart disease.

Many diseases relating to the circulatory system are associated with immune cell dysfunction – the cells are not activated properly and then they stick to other cells (vascular endothelial cells, or VECs) in the lining of blood vessels. This can then lead to inflammation, blockage of the blood vessels, and so eventually, cardiovascular disease.

The researchers found that extract of a particular flavonoid, naringenin, which is found in grapefruit, was effective at preventing the inflammation usually associated with this kind of immune dysfunction.

They plan to continue research to pinpoint how the fruit extract achieves this effect so that medication could potentially be produced, providing an effective and low-cost anti-inflammatory alternative to what is currently available. Current anti-inflammatory drugs are expensive to produce and have a limited shelf life too.

HERBERT HOOVER DIKE REPORT

There is total agreement amongst all the review groups that the safe performance of this project cannot be guaranteed with the lake elevation above 17 feet. This is a 1-in-10-year event. Furthermore, there is anecdotal evidence that the situation is deteriorating with the lake at Elevation 15.3 feet (2003). It is believed that the system came very close to failure in 1995 and 1998, when lake levels were at Elevation 18.8 and 18.4 feet respectively, and that some reaches of the embankment have been seriously damaged as a result of these high lake elevations. It is recalled that the prime purpose of HHD is for flood control.

The Corps is conducting the DSMS to determine the final phase of rehabilitation projects for the dike, a 143-mile earthen structure that encircles Lake Okeechobee in south Florida. The Corps has been engaged in projects since 2007 to address concerns with the dike's integrity. "The results of the Dam Safety Modification Study will be used to define the finish line for this major project," said Tim Willadsen, Herbert Hoover Dike Rehabilitation Project Manager. "We will continue to reduce risk by replacing water control structures around the lake through 2018; this study will be the guiding document for projects we execute in the future."

LAKE OKEECHOBEE, FL -

The Army Corps of Engineers is once again releasing water from Lake Okeechobee. The lake levels are usually kept between 12 and 12.5 feet - but right now it is above 15 feet.

To lover the level, thousands of gallons per second are already flowing out of the Hoover Dike, headed down river.

The dike stretches 143 miles around Lake Okeechobee, and the addition water threatens its stability. Some parts of it date back to the 1930s.

But releasing more fresh water into the Caloosahatchee River is controversial because it increases the chances for algae blooms in Southwest Florida.

"These levels, these continued levels of releases will be devastating to our estuaries and beaches," said Mary Rawl of Riverwatch. "We don't want... mucky water, dead fish, algae blooms. We predict that's what's going to happen."

The Army Corps of Engineers says there's no other option - water levels remain too high in Lake O and Lee County must bear the brunt.

Since dirty water threatens tourism, some want a serious solution.

Flatwoods Citrus

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__Hispanic
__White, non-Hispanic
__Black, non-Hispanic

Gender

__Female
__Male