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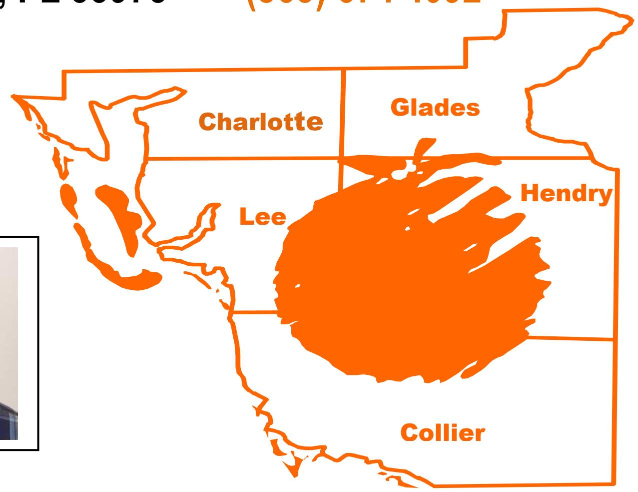
Flatwoods Citrus



Vol. 12, No. 9 September 2009

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

UPCOMING EVENTS

Citrus Packinghouse Day on Thursday, August 27th at the Citrus Research and Education Center in Lake Alfred, and the **Indian River Postharvest Workshop** on Friday, August 28th at the Indian River Research and Education Center in Ft. Pierce.

Visit http://postharvest.ifas.ufl.edu

For more information, contact Mark Ritenour at 772-468-3922, ext. 167 or at ritenour@ufl.edu.

Citrus Low Volume Applicator Calibration Rodeo for Low Volume Pesticide Application Equipment

Lake Placid, September 15, 2009 (9:00 AM – 3:00 PM)
Haines City, September 16, 2009 (9:00 AM – 3:00 PM)
(More details on pages 17 & 18)

Seminars in SW Florida

► Low volume application technology for citrus pests

Location: **Immokalee IFAS Center**
Date: Tuesday, October 6, 2009, Time: **8:30 AM** – 12:00 Noon
2 CEUs for Pesticide License Renewal, 2 CEUs for Certified Crop Advisors
(More details and more locations are available on page 19)

► Mechanical Harvesting

Location: **Immokalee IFAS Center**
Date: Tuesday, December 8, 2009, Time: 10:00 AM – 12:00 Noon
2 CEUs for Pesticide License Renewal, 2 CEUs for Certified Crop Advisors

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55th Annual Meeting of the Interamerican Society for Tropical Horticulture (ISTH)

11 - 16 October, 2009
Barquisimeto, **Venezuela**
For more information, contact: isthlv2009@gmail.com

ISHS
International Society for Horticultural Science

SECOND INTERNATIONAL CITRUS BIOTECHNOLOGY SYMPOSIUM
CATANIA, ITALY, NOVEMBER 30 – DECEMBER 2, 2009
All information regarding the symposium will be available at: www.fagr.unict.it
For questions, please contact us at the following address: biotech2009@unict.it

Special Thanks to the following sponsors (on pages on pages 3, 4, and 5) of the Flatwoods Citrus Newsletter for their generous contribution and support. If you would like to be among them, please contact me at 863 674 4092 or maz@ifas.ufl.edu

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Woman Fights Cancer With Fruit Juice

Albina Duggan was told she had three years to live after she was diagnosed with Stage IV cancer in 2004. Five years later, she has defied the odds and her tumors have shrunk with the help of a common drink: grapefruit juice.

Duggan, 41, turned to clinical drug trials after several unsuccessful attempts to treat the tumors that had spread from her liver to her spine and lymph nodes. University of Chicago cancer researchers started Duggan on a weekly dose of the drug rapamycin, accompanied by a daily glass of grapefruit juice, the **Chicago Tribune** reported.

Grapefruit juice can help fight cancer? A University of Chicago clinical trial showed a chemical in grapefruit juice boosted the effectiveness of the cancer-fighting drug rapamycin. A daily glass of freshly frozen juice paired with a weekly dose of the drug helped stop tumor growth, according to the study leader who reported his preliminary results in the spring.

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A chemical in grapefruit juice heightens the potency of many drugs. While this could lead to a dangerously high dosage if the juice is paired with some medicines, the increased effectiveness is beneficial when working with cancer-fighting drugs.

Not just any grapefruit juice will work. In fact, Duggan's tumors did not initially respond to her daily glass of grocery-store juice.

However, her doctors were soon advised that key chemicals in the juice break down when it is processed. Duggan then switched to freshly frozen grapefruit juice, which effectively raised the levels of rapamycin in her blood.

Of the 25 patients involved in the study, a third showed positive results, according to a preliminary report presented at the American Association for Cancer Research's annual meeting this spring. However, study leader Ezra Cohen says no results were as dramatic as Duggan's.

Duggan told the Tribune the low weekly dose of rapamycin minimized her side effects and drug costs. Her life expectancy, once pegged at three years, is now indefinite. "There is nothing in my charts that will point to any number," the mother of four said. "I might outlive everybody."

You might have forgotten **Citrus Blight**, but is it in your grove and it is the cause of many declining trees

Citrus blight is a wilt and decline disease of citrus whose cause has not been determined. The first symptoms are usually a mild wilt and grayish cast to the foliage often accompanied by zinc deficiency symptoms. Trees rapidly decline with extensive twig dieback, off-season flowering, and small fruit. Blight trees reach a stage of chronic decline, but seldom die. The disorder affects only bearing trees and usually first appears when the grove is 6-8 years old. The first affected trees in a grove are usually randomly distributed, but groups of blighted trees may eventually occur, either as clusters or down the row. The disease has been transmitted by root grafts, but not by limb grafts or with budwood. The means of spread, other than by root grafts, is not known.

Blight symptoms can be confused with other decline diseases and accurate diagnosis is important in order to follow proper practices. Citrus blight is characterized by: 1) high Zn content in trunk bark and wood, 2) presence of amorphous plugs in the xylem, 3) failure to absorb water injected into the trunk, and 4) presence of blight-associated proteins in roots and leaves. The best procedure for diagnosis of individual trees in the field is to test water uptake into the trunk using a battery-powered drill and a plastic syringe without a needle. Healthy trees or trees declining from Phytophthora root rot, nematodes, water damage, tristeza, or greening will usually take up about 10 ml of water in 30 sec. Trees affected by citrus blight take up no water regardless of the amount of pressure applied. A serological test is available which is accurate and, with proper equipment, many samples can be processed in a short time. For confirmation of blight using the serological test, small numbers of samples of mature leaves may be collected and sent to the diagnostic lab in Gainesville.

All scion varieties of citrus, as well as ungrafted seedlings, may be affected by citrus blight. Trees on all rootstocks are susceptible, but significant differences between stocks exist. The rootstocks that are the most severely affected by blight are rough lemon, Rangpur lime, trifoliate orange, Carrizo citrange, and some others. Those most tolerant to blight are sweet orange, sour orange, and Cleopatra mandarin. Swingle citrumelo was listed as tolerant; however, there appears to be an increase in blight incidence on that rootstock. Sweet orange and sour orange are not recommended because of problems with Phytophthora root rot and tristeza, respectively.

Recommended Practices

There is no known cure for citrus blight. Once trees begin to decline, they never recover. Severe pruning of blighted trees will result in temporary vegetative recovery, but trees decline again once they come back into production. The only procedures recommended are:

Remove trees promptly once yield of affected trees has declined to uneconomic levels.

Plant or replace trees with trees on rootstocks such as Cleopatra mandarin or Swingle citrumelo that do not develop blight at an early age.

Plant trees on vigorous, productive rootstocks such as Carrizo citrange or rough lemon which develop blight at an early age and replace trees that decline as soon as they become unproductive. Production can be maintained at relatively high levels in spite of blight with these stocks.

PESTICIDE RESISTANCE AND RESISTANCE MANAGEMENT

Many pest species, such as the citrus rust mite, are exceptionally well-equipped to respond to environmental stresses because of their short generation time and large reproductive potential. The use of chemical sprays to control insect, mite, and some fungal diseases of citrus pests creates a potent environmental stress. There are now many examples of pests that have responded by developing resistance to one or more pesticides. Pesticide-resistant individuals are those that have developed the ability to tolerate doses of a toxicant that would be lethal to the majority of individuals. The mechanisms of resistance can vary according to pest species and/or the class of chemical to which the pest is exposed. Resistance mechanisms include an increased capacity to detoxify the pesticide once it has entered the pest's body, a decreased sensitivity of the target site that the pesticide acts upon, a decreased penetration of the pesticide through the cuticle, or sequestration of the pesticide within the organism. A single resistance mechanism can sometimes provide defense against different classes of chemicals and this is known as ***cross-resistance***. When more than one resistance mechanism is expressed in the same individual, this individual is said to show ***multiple resistance***.

Because the traits for resistance are passed from one generation to the next, continued stress from a pesticide may, over time, create resistance in the majority of individuals in a population. From an operational perspective, this process would be expressed as a gradual decrease and eventual loss of effectiveness of a chemical. Resistance to a particular chemical may be stable or unstable. When resistance is stable, the pest population does not revert to a susceptible state even if the use of that chemical is discontinued. When resistance is unstable and use of the chemical is temporarily discontinued, the population will eventually return to a susceptible state, at which time the chemical in question could again be used to manage that pest. However, in this situation, previously resistant populations may eventually show resistance again.

Of the factors that affect the development of resistance, which include the pest's biology, ecology and genetics, only the operational factors can be manipulated by the grower. The key operational factor that will delay the onset of pesticidal resistance and prolong the effective life of a compound is to assure the survival of some susceptible individuals to dilute the population of resistant individuals. The following operational procedures should be on a grower's checklist to steward sound pesticidal resistance management for acaricides, insecticides, fungicides, and herbicides:

1. Never rely on a single pesticide class.
2. Integrate chemical control with effective, complementary cultural and biological control practices.
3. Always use pesticides at recommended rates and strive for thorough coverage.
4. When there is more than one generation of pest, alternate different pesticide classes.
5. Do not use tank mixtures of products that have the same mode of action.
6. If control with a pesticide fails, do not re-treat with a chemical that has the same mode of action.

For more information, go to:
2009 Florida Citrus Pest Management Guide: Pesticide Resistance and Resistance Management
at: http://edis.ifas.ufl.edu/CG026

BROWN ROT

Management of brown rot, caused by *Phytophthora nicotianae* or *P. palmivora*, is needed on both processing and fresh market fruit. While the disease can affect all citrus types, it is usually most severe on Hamlin and other early maturing sweet orange cultivars.

Phytophthora brown rot is a localized problem usually associated with restricted air and/or water drainage. It commonly appears from mid-August through October following periods of extended high rainfall. It can be confused with fruit drop due to other causes at that time of the year. If caused by *P. nicotianae,* brown rot is limited to the lower third of the canopy because the fungus is splashed onto fruit from the soil. *P. palmivora* produces airborne sporangia and can affect fruit throughout the canopy.

Early season inoculum production and spread of *Phytophthora* spp. are minimized with key modifications in cultural practices. Skirting of the trees reduces the opportunity for soil-borne inoculum to contact fruit in the canopy. The edge of the herbicide strip should be maintained just inside of the dripline of the tree to minimize the exposure of bare soil to direct impact by rain. This will limit rain splash of soil onto the lower canopy. Boom application of herbicides and other operations dislodge low-hanging fruit. Fruit on the ground becomes infected and produces inoculum of *P. palmivora* that can result in brown rot infection in the canopy as early as July while fruit are still green. The beginning stages of the epidemic are very difficult to detect before the fruit are colored and showing typical symptoms. Application of residual herbicides earlier in the summer may reduce the need for post-emergence materials later and minimize fruit drop throughout this early stage of inoculum production from fallen fruit.

Usually a single application of Aliette, Phostrol or ProPhyt before the first signs of brown rot appear in late July is sufficient to protect fruit through most of the normal infection period. No more than 20 lb/acre/year of Aliette should be applied for the control of all Phytophthora diseases. Aliette, Phostrol and ProPhyt are systemic fungicides that protect against postharvest infection and provide 60-90 days control. Copper fungicides are primarily protective but are capable of killing sporangia on the fruit surface and thus reducing inoculum. They may be applied in August before or after brown rot appearance and provide protection for 45-60 days. If the rainy season is prolonged into the fall, a follow-up application of either systemic fungicides at one-half of the label rate, or copper in October may be warranted. With average quality copper products, usually 2-4 lb of metallic copper per acre are needed for control.

Precautions should be taken during harvesting not to include brown rot-affected fruit in the field containers as this could result in rejection at the processing or packing facility.

Recommended Chemical Controls for Brown Rot of Fruit

Pesticide	FRAC MOA[2]	Mature Trees Rate/Acre[1]
Aliette WDG	13	5 lb
Phostrol	13	4.5 pints
ProPhyt	13	4 pints
copper fungicide	M9	Use label rate.

[1]Lower rates may be used on smaller trees. Do not use less than minimum label rate.
[2]Mode of action class for citrus pesticides from the Fungicide Resistance Action Committee (FRAC) 2003. Refer to ENY624, Pesticide Resistance and Resistance Management, in the 2009 Florida Citrus Pest Management Guide for more details.

Rates for pesticides are given as the maximum amount required to treat mature citrus trees unless otherwise noted. To treat smaller trees with commercial application equipment including handguns, mix the per acre rate for mature trees in 250 gallons of water. Calibrate and arrange nozzles to deliver thorough distribution and treat as many acres as this volume of spray allows.

Watch for **CITIRUS LEPROSIS**,

NOT HERE YET IN FLORIDA

Leprosis is one of the most important citrus diseases in Brazil. This problem is caused by the *Citrus leprosis* virus and is transmitted by mites of *Brevipalpus* spp. It also occurs in other South American countries and has been recently identified in Central America. This northbound spread of leprosis is being considered a serious threat to the Florida citrus industry.

Prior to 1925, leprosis had a negative impact on citrus production in Florida. Then about 1926, the incidence of leprosis in Florida drastically declined, with the decline coinciding with the introduction of sulfur as an effective miticide for controlling citrus rust mite. The last time leprosis was reported in Florida was in the mid-1960s.

This disease alone is responsible for approximately $60 to 100 million per year losses in Brazil. It is quite difficult to work with the citrus leprosis virus, which has hindered much of the progress regarding its accurate detection. Symptoms require field experience and can be confused with those caused by other plant pathogens. On the other hand, laboratory analysis of lesions is time-consuming, requires experience, and is not always very accurate, leading to some false negatives.

Leprosis produces symptoms on leaves, branches and fruit. It causes lesions in the fruit skin, premature drop of leaves and fruits, and twigs dieback, with the possible death of the tree. The damage to the branches can decrease the plant productivity after some years because the damaged branches prevent the normal flow of plant sap. With effective mite control, it might take two years for a citrus tree with leprosis to fully recover. Citrus leprosis infects all varieties of sweet orange, and has been reported on lemon and mandarin. Tangerines and tangor are also susceptible to the disease. Grapefruit is reported to be tolerant.

Dissemination of the disease occurs only when infected citrus trees and vectors are present. In citrus, the population of the leprosis mite is low and usually occurs in clusters of trees, which should be monitored carefully. When the trees are contaminated with the leprosis virus, the number of diseased trees will increase as the contaminated mites disperse.

Leprosis control is based mainly on the elimination of the sources of inoculum by pruning the affected trees and by using miticides to reduce the vector. Additional control procedures are also recommended, such as:

- Planting of young trees free from leprosis mites and from leprosis virus
- Controlling the leprosis mites host weeds
- Disinfection of equipment, boxes and vehicles
- Use of mite non-host species as windbreak
- Developing and using procedures that favor the increase of the population of natural enemies of the leprosis mite.

Watch for **Black Spot**,

Not here yet in Florida

Citrus black spot is one of the most important fungal diseases of citrus. The symptoms are necrotic lesions on fruit that make them unacceptable for fresh market. When disease is severe, black spot may cause extensive premature fruit drop that reduces yields. Citrus black spot has been a significant production problem in a number of countries in Southeast Asia, Africa, South America, and in Australia. Although citrus black spot has not been reported in the U. S., climatic conditions in Florida are likely favorable for the occurrence and establishment of black spot disease. Citrus cultivars grown in Florida are also vulnerable to damage by black spot. Lemons, grapefruits, limes, and mandarins are especially susceptible and late maturing varieties, such as Valencias, can suffer severe yield losses due to premature fruit drop. Sour orange and Tahiti lime are not susceptible.

Black spot causes cosmetic lesions on the rind of fruit that are the most conspicuous symptom of infection. Fruit symptoms can be quite variable. Black spot lesions begin as small orange or red spots with black margins and enlarge to become necrotic lesions. Green tissue may surround the black lesions.

Infection of citrus black spot is favored by warm wet conditions in the summer, presence of susceptible fruit, and presence of abundant inoculum. The primary source of infection is ascospores (sexual spores) produced on dead leaves on the ground. Ascospores are forcibly ejected during rains or irrigation onto fruit and infection occurs mostly in late spring and summer. Fruit are susceptible for 4-5 months after petal fall. Although infection occurs when fruit are young, the fungus undergoes a long period of latency and symptoms may not appear until the fruit become mature. Citrus black spot is an exotic disease to Florida. It is important to keep it out of the state, and if introduced, to quickly detect any infections before they become established. In countries where citrus black spot is endemic, fungicides are required to control the disease. Protective treatments using copper or strobilurin fungicides or mancozeb must be properly timed, and up to 5 sprays may be required during the period of susceptibility. Removal of dead leaves in groves reduces inoculum potential and is an effective practice. Long distance spread of citrus black spot occurs via infected nursery stock, and steps to avoid movement of infected trees help limit spread of the disease to new areas. Little effort has been made toward developing varieties with tolerance or resistance to citrus black spot.

This is a summery of "Citrus Diseases Exotic to Florida: Black Spot"
http://edis.ifas.ufl.edu/PP135
By Drs. Chung, Peres and Timmer, UF-IFAS

ACIDIFICATION TO REMOVE MINERAL DEPOSITS IN IRRIGATION SYSTEMS

Acid Injection

Mineral precipitates can form deposits (scale) that clog emitters. The most common deposits are calcium or magnesium carbonates and iron oxides. Since precipitation occurs more readily in water with a high pH (above 7.0), precipitation of these compounds can be prevented by continuous injection (whenever the system is operating) of a small amount of acid to maintain water pH just below 7.0. A more popular control method is to remove deposits as they are formed by periodic injection of a greater volume of acid. Enough acid should be injected continuously for 45 to 60 minutes to reduce the water pH to 4.0 or 5.0.

Phosphoric acid (which also supplies phosphate to the root zone), sulfuric acid, or hydrochloric acids are commonly used. The selection of a specific acid depends on cost and availability, water quality, the severity of clogging, and nutrient needs of the crop. The amount of acid required to treat a system depends on (1) the strength of the acid being used, (2) the buffering capacity of the irrigation water and (3) the pH (of the irrigation water) needed to dissolve mineral precipitates in lines and emitters. The required pH of the irrigation water (target pH) depends on the severity of mineral deposits. Experience is helpful when estimating target pH.

To determine the volume of a selected acid needed at a specific site, estimate the target pH and run a "titration" test (as described below) using the selected acid and irrigation water from the site. This test will indicate the volume of acid required to lower the pH of a selected volume of water to the target pH. Titration provides an acid volume:water volume ratio that can be used in conjunction with the system flow rate to determine the appropriate acid injection rate. The acid injection rate is determined by dividing the volume of water by the flow rate of the irrigation system and multiplying the result by the volume of acid added to reach the target pH.

Titration

A water container, a non-corrosive measuring cup, beaker or pipette calibrated in small increments such as milliliters, and a portable pH meter are needed to run the titration test. The volume of the container may be as small as 10 liters (about 3 gallons) or as large as 55 gallons. In general, the smaller the increments used when measuring and dispensing the acid into water, the smaller the required container.

To run the titration test, put a known volume of water (from the site) into the container and check the pH. Add a small amount of acid (1-3 ml for 3 gallons, 4-8 ml for 30 or more gallons) to the water, stir and re-check the pH. Continue this process until the target pH is attained. As the acidity of the water gets near to the target pH, add acid in very small increments (1 ml) so that the pH does not quickly drop below the target pH and necessitate repeating the test. **Always add acid to water.**

Caution: Never add water to acid.

The following example illustrates how to determine the required volume of acid and the appropriate acid injection rate.

Example: For a system with a flow rate of 200 gal/min.
Based on the severity of mineral deposits in the system, a target pH of 4.5 and an injection period of one hour are selected.
--Put 50 gallons of water into a 55-gal drum. Check the pH. Meter indicates pH of 7.4.
--Add 8 ml phosphoric acid. Check the pH. Meter indicates pH of 6.9.
--Add 7 more ml phosphoric acid. Check the pH. Meter indicates pH of 6.0.
--Add 4 more ml phosphoric acid. Check the pH. Meter indicates pH of 5.3.
--Add 1 more ml phosphoric acid. Check the pH. Meter indicates target pH of 4.5.
20 ml (8+7+4+1) of phosphoric acid were required to lower the pH of 50 gal of water to the target pH of 4.5.
--Divide 50 gal by the system flow rate of 200 gal/minute and multiply the result by the ml of phosphoric acid required to reach the target pH. 200 gal divided by 50 gal = 4 x 20 ml = 80 ml phosphoric acid. Therefore, the required acid injection rate is 80 ml per minute.
--Multiply 80 ml per minute by the injection time to determine the required volume of acid needed during the 1-hour injection period. 80 ml x 60 min = 4,800 ml (approximately 1.3 gal/hr, since there are 3785 ml in 1 gallon)

Note: Acid injection rates are usually very low (ml/hour or oz/hour). Although injection pumps with low flow rates may be suitable for acid injection, they may not have enough capacity for injecting fertilizers.

After the desired amount of acid has been injected and distributed throughout the irrigation system, turn the system off and let the low pH water remain in the lines for several hours, preferably overnight. This allows sufficient reaction time for the acidified water to dissolve mineral precipitates. After the setting period, flush the lines to remove dislodged and solubilized materials. To flush the lines, bring the system to full charge by running the irrigation pump (injection pump off) until the system reaches normal operating pressure. With the irrigation pump running, begin sequentially opening the ends of the PVC lines and emitter lines to flush the system. To ensure proper flushing, do not open so many lines at one time that system pressure drops below normal levels. If too many lines are opened at one time, the pressure drops too low and the system will not flush adequately. Improperly flushed lines after acidification will likely result in severe clogging problems. Keep in mind that routinely flushing lines with non-acidified irrigation water will also help remove mineral precipitates from the system.

CHLORINATION TO CONTROL ALGAE AND BACTERIA IN IRRIGATION SYSTEMS

Chlorine Injection Interval

Chlorine injection will prevent clogging of lines and emitters by algae and bacterial slime. Continuous injection of small amounts of chlorine can keep algae and bacterial slime under control. However, periodic injection of larger amounts of chlorine is the preferred treatment for controlling algae and bacteria in microirrigation systems. You do not need to inject chlorine if you are using municipal water that is already chlorinated. However, if your irrigation water has not been chlorinated, you should be prepared to inject chlorine as needed. If water quality is extremely poor, it may be necessary to chlorinate at the end of each irrigation cycle. Experience is helpful when determining the appropriate intervals between chlorine injections.

Recommended Chlorine Formulations

Liquid sodium hypochlorite (NaOCl) is the easiest form of chlorine to handle and is the type most often used for treatment of microirrigation systems. It is readily available in supermarkets and other stores as common household bleach (5.25% chlorine). Liquid chlorine is also available from some swimming pool companies as a 10% chlorine solution. Caution: Powdered calcium hypochlorite $Ca(OCl_2)$, also called High Test Hypochlorite (H.T.H.) is a dry powder commonly used in swimming pools. This material is not recommended for injection into microirrigation systems. When mixed with water (especially at high pH), the calcium contained in H.T.H. can form precipitates.

Initial Chlorine Injection Rate

As chlorine is injected, some of it reacts with bacteria (as it destroys the bacteria) and other forms of organic matter in the irrigation lines. This "reacted" chlorine is chemically bound or "tied up" and is no longer antibacterial. Chlorine that has not reacted remains as "free residual chlorine." Only this free chlorine is available to destroy bacteria and to continue treatment of the system. For chlorination to be effective, you should maintain 1 to 2 ppm free chlorine in the system for 30 to 60 minutes. Usually, an initial concentration of 5 to 6 ppm is required in order to maintain 1 to 2 ppm free chlorine. Samples for determining the initial chlorine concentration should be taken near the point of injection. However, samples should be taken far enough past the point of injection that the chlorine is uniformly mixed in the irrigation water.

The following equation can be used to calculate the injection rate.

Injection rate (gal/hr) = 0.03 x GPM divided by % chlorine.

Example: The desired initial chlorine concentration in irrigation water just past the point of injection is 5 ppm. Assume a drip irrigation system with a total flow rate of 100 gallons per minute (gpm) and that common chlorine bleach (5.25% chlorine) will be injected.

Injection rate (gal/hr) = 0.03 x GPM divided by %chlorine
= 0.03 x 100 divided by 5.25
= 0.57 gal/hr

The chlorine solution must be in contact with algae and bacteria for at least 30 minutes to successfully treat the drip irrigation system. To ensure that all parts of the system receive a minimum of 30 minutes' contact time, inject chlorine for one hour.

For convenience, the injection rates (gal/hr and oz/hr) required to give an initial concentration of 5 ppm chlorine have been calculated for selected flow rates in the following Table.

Water Flow (gpm)	5.25% Chlorine Solution		10% Chlorine Solution	
	gal/hr	oz/hr	gal/hr	oz/hr
10	0.06	7.7	0.03	3.8
20	0.11	14.1	0.06	7.7
30	0.17	21.8	0.09	11.5
40	0.23	29.4	0.12	15.4
50	0.29	37.1	0.15	19.2
75	0.43	55.0	0.22	28.2
100	0.57	73.0	0.30	38.4
150	0.86	110.1	0.45	57.6
200	1.14	145.9	0.60	76.8
250	1.43	183.0	0.75	96.0
300	1.71	218.9	0.90	115.2
350	2.00	256.0	1.05	134.4
400	2.29	293.0	1.20	153.6

<u>Maintaining Free Residual Chlorine Concentration</u>

During chlorination, maintain 1 to 2 ppm free chlorine at the point in the system where the concentration is lowest (usually at the point farthest from injection). If the irrigation water has a pH of 7.5 or less, 1 ppm free chlorine may be sufficient. However, for alkaline water with a pH above 7.5, maintain 2 ppm. Chlorination for bacterial control may be ineffective above pH 7.5. Therefore, it is recommended to inject acid to lower the pH to increase the efficacy of chlorine. The free chlorine concentration drops as the chlorine reacts with organic matter in the lines. Therefore, to maintain 1 to 2 ppm free chlorine in the lines farthest from injection, it is often necessary to maintain a concentration of 5 to 6 ppm free chlorine near the point of injection. The specific concentration necessary (near the point of injection in a given zone) depends on water quality and the quantity of bacteria, algae and other organic matter in the lines. Maintain the recommended free chlorine concentration at the most distant emitter for 60 minutes. This requires frequent testing of the free chlorine concentration and subsequent adjusting of the chlorine injection rate if needed.

To ensure that the free chlorine concentration is maintained at 1 to 2 ppm, measure free chlorine concentration at the emitter most distant from the injection point 10 to 20 minutes after injection is initiated. This can be done by using a D.P.D. (N,N Diethyl-P-Phenylenediamine) test kit, which measures only free residual chlorine. These test kits are available from chemical suppliers and from most irrigation dealers. <u>Caution:</u> The orthotolidine type test kit, often used for swimming pools, measures total chlorine content (not free residual chlorine) and, therefore, cannot be used satisfactorily for microirrigation systems.

In cases where the injection pump cannot be calibrated low enough to inject 5.25 percent or 10 percent liquid chlorine at the desired rate, dilute the chlorine solution prior to injection. This permits the use of a higher injection rate within the capacity of the injector pump.

<u>Example:</u> Assume you need to inject 1 gallon of 5.25 percent chlorine into your drip system during a one-hour injection period. If your injection pump can inject no less than 2 gallons per hour, add 1 gallons of water to the 5.25 percent chlorine to give a total chlorine solution of 2 gallons. Then set the injector pump to inject 2 gallons per hour.

Citus Low Volume Applicator Calibration Rodeo for Low Volume Pesticide Application Equipment

A collaborative effort between UF/IFAS Extension Service, the USDA ARS and the FCPRAC

Lake Placid September 15, 2009 (9:00 AM – 3:00 PM)

Haines City September 16, 2009 (9:00 AM – 3:00 PM)

What's this about?

The United States Department of Agriculture's Agriculture Research Service (USDA ARS) has a research team from Texas that specializes in agricultural equipment calibration. These experts have been recruited by the Florida Citrus Production Research Advisory Council (FCPRAC) to assist citrus growers in evaluating their low volume citrus sprayers to determine particle size distribution during application.

Who should participate?

Growers, contractors, or anyone in the citrus business that owns a spray applicator (or multiple applicators) and is interested in determining their equipment particle size distribution should participate at one of the rodeo locations. Machine owners will be provided with a confidential print out of results.

Why is this important?

Particle size is important due to specific pesticide label restrictions. Particle size also has a significant effect on spray disposition within a tree and potential success in controlling targeted pests.

Which location should I sign up for?

Choose the location that is most suitable or convenient for you or your operation.

How do I sign up?

Please contact Maggie Jarrell at 352-343-4101 to schedule a time to bring your spray equipment to either location. Scheduling appointments will help to avoid excessive waiting time at the Calibration Rodeo. Scheduling appointments are limited and based on a first to call basis.

Lake Placid location: 464 Cloverleaf Road Lake Placid, FL 33852

464 Cloverleaf Rd Edit
Lake Placid, FL 33852-8970

Haines City Location: 2732 Haines City Fert Works Rd Haines City, Fl 33844

2732 Haines City Fert Works Rd Edit
Haines City, FL 33844-9396

Presented by the Florida Cooperative Extension Service
Multi-County Citrus Extension Agents
http://citrusagents.ifas.ufl.edu

Florida Citrus Extension Agents
Fall Mini Series

Low Volume Application Technology for Citrus Pests

Program Agenda

8:30 am	Registration
9:00 am	Low Volume Labeled Materials
9:30 am	Low Volume Application
10:00 am	Application Considerations
10:30 am	Worker Safety
11:00 am	Equipment Demonstration/Show
12:00 pm	Lunch

Attendees will receive 3.5 Continuing Education Units (CEUs) for the Restricted Pesticide and Certified Crop Advisor Licenses.

Meeting Dates and Locations

October 1st	Lake County Extension Service Office	1911 Woodlea Road	Tavares
October 6th	Southwest Florida Research & Education Center	2685 SR 29 North	Immokalee
October 8th	Polk County Stuart Conference Center	1702 Hwy 17-98 South	Bartow
October 13th	Indian River Research & Education Center	2199 S. Rock Road	Ft. Pierce
October 15th	Turner Agri-Civic Center Exhibition Hall	2250 NE Roan Street	Arcadia
October 20th	Bert J. Harris Agricultural Center	4509 George Boulevard	Sebring

For more information, please contact the local multi-county citrus extension agents

Speakers

(Florida multi-county citrus or horticultural agents)

Steve Futch (Lake Alfred) 863-956-1151
Chris Oswalt (Bartow) 863-519-8677
Gary England (Bushnell) 352-793-2728
Tim Gaver (Ft. Pierce) 772-462-1660
Mongi Zekri (LaBelle) 863-674-4092
Ryan Atwood (Tavares) 352-343-4101
Tim Hurner (Sebring) 863-402-6540

To register for a specific location, please contact:

Tavares	Lake County Extension Service	352-343-4101
Immokalee	Hendry County Extension Service	863-674-4092
Bartow	Polk County Extension Service	863-519-8677
Ft. Pierce	St. Lucie County Extension Service	772-462-1660
Arcadia	DeSoto County Extension Service	863-993-4846
Sebring	Highlands County Extension Service	863-402-6540

Registration is required to plan for the lunch!

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

FDACS/DPI Citrus Health Response Program Offices
Contact Information

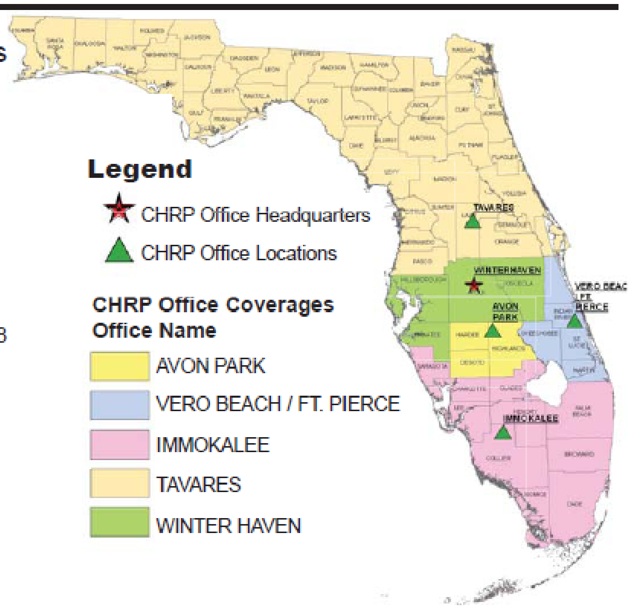
Avon Park
3397 US Hwy 27 South
Avon Park, Florida 33825
Phone: 863-314-5900

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



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Citrus Health Response Program

Shipping to Europe for the 09/10 season?

- ✔ If you plan to ship fresh citrus to the European Union, you will need to have your grove block(s) inspected prior to harvest.
- ✔ Call a few weeks ahead of your estimated harvest date to request a pre-harvest survey and harvesting permit.
- ✔ Permits (to begin harvest) will be good for 120 days if the surveyed grove block with 50-foot buffer is found free of citrus canker.
- ✔ Please contact your local CHRP office when you are ready to schedule a pre-harvest inspection.

Harvesting Permits are only required for EU shipments.

CHRP OFFICES

Avon Park, FL
863-314-5900
Immokalee, FL
239-658-3684

Tavares, FL
352-253-4547
Vero Beach/Ft Pierce
772-778-5069

Winter Haven, FL
863-298-7777

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