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Institute of Food and Agricultural Sciences

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Flatwoods Citrus

Vol. 7, No. 6 **June 2004**

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

UPCOMING EVENTS

Immokalee IFAS Center

Thursday, June 3, 2004, ***12:00 Noon – 1:30 PM***
Seminar title: **Landmaster II Herbicide Under-tree / Chemical Mowing Recommendations and New Roundup Herbicide Formulations**
Speakers: Thad Boatwright and Donna Muir Strickland
1.5 CEUs for Pesticide License Renewal**,** 1.5 CEUs for Certified Crop Advisors

Thursday, 10 June 2004, 8:00 AM through 5:00 PM
CCA CEUs in Nutrient Management and Soil/Water Management
8 CEUs for Certified Crop Advisors. **For details, see enclosed information.**

FARM SAFETY DAY

Saturday, June 5, 2004, Immokalee IFAS Center
Detailed information was enclosed in the previous issue of this newsletter.

If you want to print a color copy of the Flatwoods Citrus Newsletter, get to the Florida Citrus Resources Site at http://flcitrus.ifas.ufl.edu/
You can also find all you need and all links to the University of Florida Citrus Extension and the Florida Citrus Industry

117th Annual Meeting of the Florida State Horticultural Society (FSHS)

June 6-8, 2004
Sheraton World Resort, Orlando, Florida
http://www.lal.ufl.edu/fshs/

SW Florida Citrus BMPs Meetings

Hendry County Extension Office, LaBelle

June 14, 2004, 10:30 AM
July 21, 2004, 1:00 PM
August 11, 2004, 10:30 AM

Annual Meeting and Professional Improvement Conference of the National Association of County Agricultural Agents (NACAA), http://www.nacaa.com/

Date: July 11-15, 2004
Location: Wyndham Palace Resort and Spa in the WALT DISNEY WORLD Resort, 1900 Buena Vista Drive, Lake Buena Vista,

CITRUS EXPO
IN FORT MYERS

Wednesday, August 25 &
Thursday, August 26, 2004

Annual Conference of Extension Professionals (FAEP)

Date: September 19-23
Location: Cocoa Beach, Florida
http://extadmin.ifas.ufl.edu/

50th Annual Meeting of the InterAmerican Society for Tropical Horticulture (ISTH)

Date: October 24-29, 2004
Location: Universidad EARTH, San Jose, Costa Rica, http://www.earth.ac.cr
For more information, contact Dr. Richard Campbell at rcampbell@fairchildgarden.org

Special Thanks **to the sponsors of the Flatwoods Citrus newsletter for their generous contribution and support. If you would like to be among them, contact me at 863 674 4092.**

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From The Florida Citrus Pest Management Guide

WEED CONTROL IN CITRUS GROVES

Weeds can reduce the growth, health and survival of young trees, or the time to come into bearing and ultimately fruit production. The more competitive the weeds, the more adversely they alter tree physiology, growth, fruit yield and quality. The attainment of early crop production requires controlling the growth of weeds. Weeds alter economic status by competing with trees, particularly young trees, for water, nutrients and even light in the case of climbing vines, which can easily cover trees if left uncontrolled.

Weeds also have various effects on tree performance including reduced efficacy of low volume irrigation systems, and interception of soil-applied pesticides.

Management Methods

Cultural & mechanical

Cultural methods include off-target irrigation and fertilizer applications. Mechanical methods include cultivation in row middles. However, **constant cultivation results in the destruction of citrus fibrous roots, which normally would grow in the undisturbed portion of the soil.**

Mowing is practiced between the tree rows and away from the trees in combination with herbicide applications in the tree row over the major root zone of trees. It is appropriate where a cover crop is desired in bedded groves to prevent soil erosion. Weeds can also be spread by seed and vegetatively during mowing operations, reinfesting tree rows where herbicides have been applied. **Mowing before seedhead formation is necessary to reduce seed dissemination and reinfestation.**

Chemical mowing

Chemical mowing, utilizing Low Rate Technology (LRT) postemergence herbicide spray applications and wiping in combination with mechanical mowing, is used for the suppression of vegetation in row middles. With the high frequency and cost of mechanical mowing required to maintain vegetation control in row middles, chemical mowing and wiping with low rates of glyphosate has increased. Weed management in Middles by chemical applications results in the elimination of tall growing species and establishment of more manageable sod type species such as bermuda and bahia grasses.

Chemical

Generally speaking, all weed species listed as susceptible on the herbicide product label will be controlled by that herbicide at the appropriate rate, time of application and stage of growth. Environmental and plant conditions before, during and following the application are also important including moisture in the form of rainfall and/or irrigation.

Poor control can sometimes be expected from postemergence applications to weeds under stress conditions due to poor uptake and translocation of applied herbicides. Assuming that the appropriate herbicide or herbicide mixtures are selected for the weed species present, failures in the program will usually be due to one of the above factors or to the actual application including calibration and/or equipment design and operation.

Herbicides may be classified as foliar or soil-applied. Foliar applied materials may have systemic or contact activity. Soil

applied preemergence herbicides are absorbed through weed root systems, being most effective during germination and early seedling growth stages. Systemic herbicides are those that are absorbed by either roots or aboveground plant parts and are translocated throughout the plant. Contact herbicides act as desiccants, damaging or killing all plant parts actually sprayed with little if any translocation.

For the control of well-established perennial weeds, a postemergence herbicide with systemic metabolic activity should be used with preemergence soil residual products.

Timing and frequency of application are the keys to good vegetation management. **Increased application frequency of lower rates of soil residual herbicides is more effective in young groves where vegetation presence is greater due to more exposure of the grove floor to sunlight and where a greater herbicide safety factor is required**.

Application Technology

Rapid advances in herbicide application technology have resulted in the development of sophisticated equipment. Application equipment is now capable of selective delivery of multiple herbicide products, each directly injected into booms. In a single application, tree rows and row middles may be treated with soil residual and postemergence products with selectivity for tree age, soil type and vegetation species.

Well-maintained, accurately calibrated equipment with good filtration and agitation systems capable of uniform distribution of prescribed spray volumes and droplet size is essential for efficiency, cost-effective vegetation management. Worn nozzle tips result in increased spray delivery rates and distortion of distribution patterns and should be checked regularly. Improved herbicide boom design to reduce tree skirt contact, spray drift and interference of heavy weed cover with nozzle output will reduce tree damage and fruit drop while improving control of target vegetation. Tree skirt pruning and timing of postemergence applications will also reduce boom and spray contact with low hanging limbs and fruit.

Environmental Considerations

In determining management options, herbicide selection should be based not only on species and stage of vegetation development, but product solubility and leaching potential, soil type and rainfall distribution. Objectives are to reduce weed competition and interference through measured vegetation control/suppression with inputs having reduced potential for leaching through over-irrigation, runoff and erosion, chemical drift, or other off-target impacts. CAUTION: Herbicides may move through the soil to groundwater. Several factors influence the rate of this movement. Lower rates applied more frequently combined with sound irrigation management practices will reduce herbicide movement. **The use of bromacil-containing herbicides is prohibited on deep, sandy Ridge-type soils**. Here is a list of several herbicides that are registered for citrus.

Preemergence soil residual herbicides: Karmex, Krovar, Princep, Simazine, Solicam,
Non-selective postemergence systemic herbicides: Roudup, Touchdown
Non-selective postemergence contact herbicides: Gramoxone

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.

A CHLORINE-ACID INJECTION 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 = 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

Maintaining Free Residual Chlorine Concentration

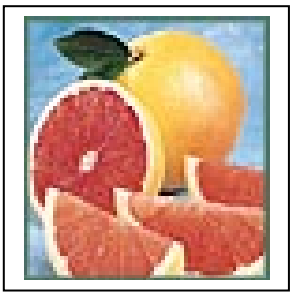
During chlorination, maintain 1 to 2 ppm free chlorine at the point in the system where the concentration is lowest (usually at the point farthest from injection). If the irrigation water has a pH of 7.5 or less, 1 ppm free chlorine may be sufficient. However, for alkaline water with a pH above 7.5, 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. Caution: 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.

Example: 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.

MORE STUDIES NEEDED IN DRUG GRAPEFRUIT JUICE INTERACTION



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WESLACO - Is it safe to take prescription drugs with a glass of grapefruit juice? The bottom line, according to a citrus scientist in South Texas, is that much more research needs to be done before that question can be answered.

In the meantime, talk to your doctor or pharmacist, or drink your grapefruit juice either eight hours before or after taking medication. That's the advice of Dr. Bhimu Patil, a post-harvest physiologist at the Texas A&M- Kingsville Citrus Center in Weslaco.

Patil has spent years with medical experts studying phytochemicals, naturally-occurring compounds in citrus that are beneficial to human health. He thinks the role of grapefruit juice in potential drug interactions has been exaggerated.

"The good news is that grapefruit juice is good for you," said Patil. "Studies have shown that it helps reduce cholesterol, helps in weight loss, and the preliminary results of a current study show that grapefruit juice may actually help diabetics by reducing the amount of insulin in the blood."

And Patil said animal studies he's conducted in collaboration with prestigious medical institutions show that certain compounds in grapefruit, namely limonoids, lycopene, flavonones and others, reduce the incidence of heart disease and certain cancers.

"That's the good news about grapefruit juice that shouldn't be dismissed," he said. "However, there is a concern that other compounds in grapefruit may inhibit enzymes in the digestive tract that metabolize medications and possibly inhibit proteins that transport them to the liver."

What this means is if taken with grapefruit juice, certain prescription drugs could remain in the intestine and deliver higher doses of medication to the blood system than intended.

"But that's never been proven, and until we can isolate those compounds and test them in animal and clinical trials, we just don't know," Patil said. "A lot of this inhibition depends on the amount of enzyme any one individual has in his or her digestive tract to begin with."

Patil has begun collaborative studies on isolating the five suspected grapefruit compounds with Dr. Narayan Bhat at UT-Pan American and Dr. Jennifer Brodbeit at UT-Austin.

But the task has proved difficult. Patil's graduate student, Basavraj Gireennavar, has been able to isolate only two compounds, one of which is found in such tiny quantities that six months of lab work has resulted in less than half a teaspoon of the compound.

"Once we get sufficient quantities, we'll send the compounds to Tufts University School of Medicine in Boston where they'll be analyzed for their inhibitive qualities and eventually tested in human trials," Patil said. "But all this will take several years and funds are not readily available to do these studies, so we've applied for grants from the National Institute of Health."

Patil is working with scientists in the other three citrus-producing states, Florida, California and Arizona, to pool their efforts in applying for grant money and doing the necessary research.

He is hopeful research will show that grapefruit juice enhances the absorption of certain drugs and increases their effectiveness, enabling patients to reduce the amount of medication they take.

His optimism is fueled by a recent study at the Watson Clinic in Lakeland, Fla., in which Dr. Paul Reddy discovered that taking Lipitor, a cholesterol-reducing drug, was more effective when taken with grapefruit juice than without.

But far too many unknowns and variables exist, Patil said, to make any assumptions now.

"Medical doctors know exactly what is in the medication they prescribe, so they may tell a patient to take the medication without grapefruit juice, since the properties of grapefruit juice are still the unknown. That's what we need to study," he said.

In a letter to healthcare professionals, Florida's Department of Citrus cited research by Dr. David Greenblatt, a Tufts University professor and physician, advising that while some prescription medications may interact with grapefruit juice, most do not. Those that may lead to interaction with grapefruit juice, the report said, are mostly limited to cholesterol-lowering, calcium channel blocker, antihistaminic and psychiatric medications.

Patil said many compounds could lead to drug interaction, including some found in foods other than grapefruit.

Ray Prewett, president of Texas Citrus Mutual, a commodity group in Mission, said reports of drug interaction have been exaggerated and grapefruit juice shouldn't be viewed as the only culprit.

"We think there are many foods that could cause drug interactions, but grapefruit juice has been unfairly singled out," Prewett said. "Certainly, drug companies that warn in their product inserts against taking medications with grapefruit juice are over-reacting because of fear of litigation."

Prewett agreed however, that anyone concerned with the issue should consult their doctor or pharmacist, or separate juice consumption and the ingestion of drugs.

Patil said, "We need to find out which foods contain these inhibiting compounds and whether they exist only in grapefruit. If so, we need to know the compound levels in different grapefruit varieties, how levels vary depending on the time of season the fruit is harvested, how storage affects compound levels, and we need to know if some of these compounds are transferred from the peel to the juice during processing."

Clinical trials using specific grapefruit components could take five to 10 years, provided funding is available, Patil said.

Citrus peel can cut cholesterol

Citrus peel may not be very appetizing - but research suggests it could be very good for you. US scientists fattened up hamsters on a high-cholesterol diet, and then fed them compounds found in tangerine and orange peel. They found the compounds significantly lowered the animals' levels of LDL cholesterol - which is associated with heart disease. The study was published in the Journal of Agriculture and Food Chemistry. Lead researcher, Dr. Elzbieta Kurowska, of the Canadian company KGK Synergize, said citrus juice contains only a small amount of the relevant Polymethoxylated flavones (PMFs). Peel, on the other hand, contains 20 times the level. In addition, the peel-derived compounds are more concentrated and easily absorbed and metabolized by the body. In the study hamsters were given the two PMFs most commonly found in citrus fruits - tangeretin and nobiletin. A diet containing just 1% PMFs was enough to cut the animals' cholesterol by up to 40%.

CCA CEUs in Nutrient Management and Soil/Water Management

Date & time: Thursday, 10 June 2004, 8:00 AM through 5:00 PM
Location: Southwest Florida Research and Education Center



The UF/IFAS Southwest Florida Research and Education Center and Florida Fertilizer and Agrichemical Association (FFAA) are jointly sponsoring up to **eight (8) CEUs** in two training areas that most CCAs need: Nutrient Management and Soil/Water Management. Three CEUs will address topics related to citrus in southwest Florida. Two CEUs will address soils topics that can be used in citrus and vegetable production. Three CEUs will address topics related to vegetable production.

Contact person: Mary Hartney, FFAA and CCAP leader for Florida,
Office 863-293-4827; Fax 863-294-8626; Cell 863-287-8668
E-mail: mhartney@ffaa.org

Cost of the training is $80/person and will be handled by the FFAA.

Lunch will be provided.

Topics: Basic citrus nutrition 101 to controlled release technology, Flatwoods citrus water management, Citrus nutrition in relation to soil acidity and calcareous soils, The role of soil and leaf sampling for the development of nutrient application, The Florida Phosphorus Index, Best management practices to reduce phosphorus loading in the Everglades agricultural area, Review of findings of the Lake Manatee watershed vegetable project, Water management for vegetables, Improving soil quality in vegetable production: Cover crops and organic amendments
Speakers: B. Boman, A. Couillard, O. Diaz, P. Gilreath, F. Hulme, R. Mylavarapu, T. Obreza, M. Ozores-Hampton, B. Rouse, S. Shukla, M. Zekri, and others.

Complete agenda will be available next week at the Southwest Florida Research and Education Center web page: http://www.imok.ufl.edu/ along with directions to the Center.

New update on greasy spot control

(Based on Dr. Timmer's recommendations)

Greasy spot can be a devastating fungal disease. It causes severe leaf drop or defoliation. Defoliation causes dieback, reduces fruit yield, and makes the tree weak and more susceptible to stresses and other pests.

Timing is critical for the control of this disease. **The spring flush leaves can be protected with a spray during the month of May or June before the start of the summer rains. The summer flush leaves should be protected as soon as their size is close to full expansion.**

•Processing

June	- Petroleum oil (455, 470) 5-10 gal
	- Cu fungicides 2-4 lb metal
	- Abound, Gem, Headline + 5 gal oil
	- Enable (grapefruit only)
Jul-Aug	- Petroleum oil (455, 470) 5-10 gal
	- Cu fungicides 2-4 lb metal
	- Abound, Gem, Headline + 5 gal oil
	- Enable (grapefruit only)

•Fresh fruit

June	- Petroleum oil (455, 470) 10 gal
	- Cu fungicides < 2 lb metal, No oil
	- Abound, Gem, Headline + 5 gal oil
July	- Petroleum oil (455, 470) 10 gal
	- Cu fungicides < 2 lb metal
	- Abound, Gem, Headline + 5 gal oil
	- Enable (grapefruit only) 8 fl.oz. + 5 gal oil

Goal of the BMP Program in Florida

http://www.floridaagwaterpolicy.com/

It is to improve water quality to protect the environment while maintaining economic viability by identifying sources and implementing practices, promoting education of and participation by growers. Typically, the development of this statement is an evolving process, much like the BMP practices within the manual, which continues to improve as grower participation and understanding increases. The key emphasis here is that this is a voluntary participation program. It is developed by growers, and it is supported by science where growers feel the science is technically and economically feasible. In addition, the goal is to minimize offsite movement of potential pollutants, and at the same time improve the efficient use by the plant of nutrients, water, and pesticides, thereby possibly decreasing production costs.

In addition, voluntary participants in the BMP program are given a statutory status in relation to the state's water quality standards for ground water and surface water. If you implement the BMP, you are "presumed" to be in compliance with all water quality standards imposed by the state. If water quality data collected by the state suggests otherwise, you are not liable for fines or other punitive measures as long as you participate in the BMP program. If it is found that the BMP is not effective in a particular watershed or region of the state at some point in time, then the Office of Water Policy within the Florida Department of Agriculture and Consumer Services, in cooperation with you and UF/IFAS must revisit the BMP and consider the appropriate changes for the region or watershed. Any changes in the BMP must be supported by UF/IFAS, and the growers, and other stakeholders before they can be considered for inclusion in the existing BMP by this Department. As long as the grower participates in the program, he or she continues to be in compliance with all water quality standards and is waived of any regulatory enforcement action from the state.

The Office of Agricultural Water Policy

The Office of Agricultural Water Policy (OAWP) was established in 1995 by the Florida Legislature to facilitate and improve communications between federal, state, local agencies, and the agricultural industry on water quantity and water quality issues involving agriculture. The OAWP is actively involved in the development of Best Management Practices (BMPs) on a site specific, regional, and watershed basis. The OAWP works cooperatively with agricultural producers and industry groups, the Florida Department of Environmental Protection (FDEP), the university system, the water management district, and other interested parties to develop and implement BMPs programs that are economically and technically feasible.

The primary mission of the Office of Agricultural Water Policy is to formulate and establish water policies that will provide assurances that agriculture will have access to sufficient water supplies in the future. – Commissioner of Agriculture Charles H. Bronson

The official headquarters of the OAWP is in Tallahassee. Charles C. "Chuck" Aller, who has served as the director since its inception, has seen the OAWP grow to a staff of 37 employees. The Tallahassee office is under the direct supervision of Richard J. "Rich" Budell (Assistant Director) with 18 professional and support staff with expertise in several disciplines including soil and water conservation, resource management, environmental regulation, biology, ecology, engineering, GIS, etc. The Tallahassee team provides leadership and supervision for the six field technical teams located around the state.




OPERATION CLEANSWEEP

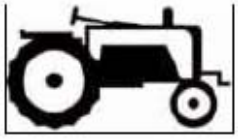
Statewide Pesticide Pick-Up for 2003-2004

Operation Cleansweep is a mobile pesticide collection program that provides a safe way to dispose of cancelled, suspended, and unusable pesticides at no cost. Pesticide dealers can participate for a fee.

- Farmers
- Nurseries
- Golf Courses
- Greenhouses
- Forestry
- Pest Control Services

FREE PICK–UP

We want your pesticides.



Cleansweep Partners and Representatives:

Florida Peanut Producers Association
Florida Turf Grass Association
Florida Farm Bureau
Florida Fertilizer and Agrichemical Association
Florida Fruit and Vegetable Association
Florida Soybean Producers Association
Certified Pest Control Operators
Florida Pest Management Association
Florida Nurserymen & Growers Association
Florida Tomato Committee
Florida Forestry Association
IFAS/University of Florida
Central Florida Regional Planning Council
Florida Department of Agriculture & Consumer Services
Florida Department of Environmental Protection

For more information

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or call Toll-Free

877-851-5285

CLEANSWEEP WEBSITE:

www.dep.state.fl.us/waste/categories/cleansweep-pesticides/default.htm