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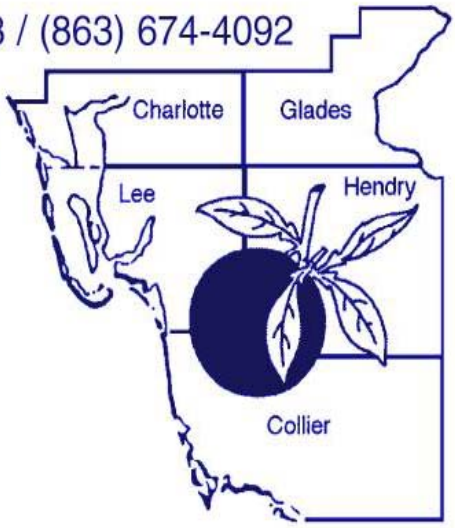
Flatwoods Citrus



Vol. 9, No. 4 **April 2006**

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

E-mail: maz@ifas.ufl.edu

U P C O M I N G E V E N T S

MECHANICAL HARVESTING & ABSCISSION FIELD DAY

Speakers: Fritz Roka, Jackie Burns, Gary Stich, Resa Ehsani, Tom Burks, Jim Syvertsen, Bob Rouse, and Kelly Morgan
Location: Immokalee IFAS Center
Date: Thursday, April 6, 2006, Time: 8:00 AM – 3:30 PM
2 CEUs for Pesticide License Renewal, 2 CEUs for Certified Crop Advisors
Lunch is free, but RSVP is required for planning purposes.
Call Barbara Hyman at (239) 658-3415 to RSVP and for more information

WINDBREAK SHORT COURSE, 19 April 2006, Lake Alfred CREC

LIVING AND ARTIFICIAL WINDBREAKS FOR CITRUS

Advance registration is encouraged. Visit the CREC website, http://www.crec.ifas.ufl.edu/, for program details and a form that can be downloaded and submitted or call 863 956 1151.
Program details including the registration form are also enclosed here.

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

MANAGEMENT OF GREASY SPOT & PHYTOPHTHORA
MANAGEMENT OF CITRUS RUST MITES
Abacus from Rotam USA, a new abamectin product for citrus pest control

Speakers: John Frieden, Bob Johnson and Drs. Phil Stansly & Pete Timmer
Location: Immokalee IFAS Center
Date: Thursday, 4 May 2006, Time: 10:00 AM – 12:00 Noon
2 CEUs for Pesticide License Renewal
2 CEUs for Certified Crop Advisors
Sponsor: **John Frieden**, **Rotam USA LLC**
There is no registration fee and lunch is free (Compliments of **Rotam USA LLC**). However, **RSVP is required**. To RSVP, call 863 674 4092 no later than 1May 2006 or send an e-mail to maz@ifas.ufl.edu

2006 Aquatic Weed Control Short Course

www.conference.ifas.ufl.edu/aw
Date & Location: May 1-5, 2006, Coral Springs Marriott Hotel, Golf Club and Convention Center
For registration questions, call
Tracy Nininger, Phone: 352 392 5930, Fax: 352 392 9734, E-mail: tnn@ufl.edu

FARM SAFETY DAY

Saturday, June 3, 2006, Immokalee IFAS Center

Coordinator: Mongi Zekri

118th Annual Meeting of the Florida State Horticultural Society (FSHS)

Date: June 4-6, 2006
Location: MARRIOT TAMPA WESTSHORE
http://www.lal.ufl.edu/fshs/

CITRUS EXPO
IN FORT MYERS

Wednesday, August 23 &
Thursday, August 24, 2006

Special Thanks **to the sponsors 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.**

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FOLIAR FEEDING

Foliar feeding is becoming very common on many horticultural crops including citrus. Economic and environmental considerations require the utilization of more efficient methods for nutrient applications.

It is usually assumed that foliar feeding refers to nutrient applications to the plants' leaves. In fact, it has been shown that all aboveground parts of a plant can absorb nutrients, including twigs, branches, buds, fruit, flowers, and stems. However, since leaves usually represent the largest surface area, they are the most important structures.

Foliar feeding is not intended to completely replace soil-applied fertilization of the macronutrients (nitrogen, potassium, and phosphorous). However, macronutrients can be foliarly applied in sufficient quantities to influence both fruit yield and quality. Some crops, such as citrus, can have a large part of the nitrogen, potassium, and phosphorous requirements met through foliar applications.

Foliar applications of other plant nutrients (calcium, magnesium, and sulfur) and micronutrients (zinc, manganese, copper, boron, and molybdenum) have proven for many crops to be an excellent means for supplying the plants' requirements.

Foliar feeding should be used as an integral part of the annual nutritional program. It can be used in other situations to help plants through short, but critical periods of nutrient demand, such as fruit set and bud differentiation. Foliar nutrition may also prove to be useful at times of soil or environmentally induced nutritional shortages. Foliar application of nutrients is of significant importance when the root system is unable to keep up with crop demand or when the soil has a history of problems that inhibit normal growth.

Foliar feeding is proven to be useful under prolonged spells of wet soil conditions, dry soil conditions, calcareous soil, cold weather, or any other condition that decreases the tree's ability to take up nutrients when there is a demand. Foliar feeding may be utilized effectively when a nutritional deficiency is diagnosed. A foliar application is the quickest method of getting the most nutrients into plants. However, if the deficiency can be seen, the crop might have already lost some potential yield.

Foliar fertilization is also efficient since it increases the accuracy of fertilizer application. Applications made to the soil can be subject to leaching and volatilization losses and/or being tied up by soil particles in unavailable forms to citrus trees.

While foliar feeding has many advantages, it can burn plants at certain rates under certain environmental conditions. It is important, therefore, to foliar feed within the established guidelines. There are a number of conditions that can increase the chances of causing foliar burn. A plant under stress is more susceptible to damage. Stressful conditions include drying winds, disease infestations, and poor soil conditions. The environmental conditions at the time of application are also important factors. Applications when the weather is warm (above 80^0F) should be avoided. This means that during warm seasons, applications should be made in the morning or evening. Additionally, applications should not be at less than two-week intervals to give the plant sufficient time to metabolize the nutrients and deal with the added osmotic stress.

Another important factor when applying nutrient foliarly is to ensure that the pH of the material is in the proper range. The pH range of the spray solution should be between 6 and 7. Attention should be paid to the pH of the final spray solution. This is significant in areas where water quality is poor.

Foliar applications of low-biuret urea or phosphite in late December-early January are known to increase flowering, fruit set, and fruit production. **Postbloom foliar applications of potassium nitrate (KNO_3) or mono-potassium phosphate (MKP) have been found to increase fruit yield and size.**

FOLIAR POTASSIUM APPLICATIONS

BRIEF SUMMARY FROM A POWERPOINT PRESENTATION

By Dr. Brian Boman at the University of Florida, IFAS

Potassium (K) in Citrus

•A primary component in cell walls
•K accounts for over 40% of ash from fruit
•70% of fruit size is related to number of cells
•Cell division ceases by late April
•Size changes after April is mainly from cell enlargement
•Post-bloom K (applied in April) may increase cell numbers plus help cell enlargement
•Absorption of K into leaves after foliar application is very rapid

Grapefruit Summary

•Post bloom most important
•Late summer/fall applications successful in half of years
•8 lb K_2O per acre per application
•1/2 to 1 size increase due to foliar K applications
•Smaller fruit increased more than larger fruit

Foliar K Advantages on Valencia

25% more fruit
28% more boxes/acre
33% more size 80 and larger fruit
28% higher gross returns for packed fruit
23% more TSS/acre

SUMMARY

Foliar K applications can increase fruit size and help return higher $$
• K source is not critical
• Salt index should be considered when using low gal/ac applications (MKP or DKP)
• Coverage is not as critical as for fungicides or insecticides
• At least 8 lb/ac K_2O per application recommended
• Foliar applications not a substitute for good nutrition program
• Potential results:
Grapefruit: ½ to 1 size increase
Valencia: Significantly more solids/acre
Sunburst: More larger-sized fruit

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. Middles management chemical applications result 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 above-ground 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

For more details, go to:

2006 Florida Citrus Pest Management Guide: Weeds at ***http://edis.ifas.ufl.edu/CG013***

The Gulf Citrus Growers Association (GCGA) was established in 1985 as a non-profit trade association representing the citrus growers of the "Gulf" production region of southwest Florida. Some of the world's finest citrus is produced by GCGA members on over 90,000 acres in Charlotte, Collier, Glades, Hendry, and Lee Counties. Gulf Citrus addresses key issues of economic importance to the sustainable growth and development of the citrus industry in our area, including:

- ***land and water use***
- ***environmental regulation***
- ***farmworker relations***
- ***transportation***
- ***domestic and international trade***
- ***marketing programs***
- ***BMPs***

The association also serves as the Gulf citrus industry voice on other important issues (exotic pests and diseases and hurricanes) impacting the area's agricultural industry.

❑ ***WATER MANAGEMENT ISSUES***

Water is of major concern to everyone, whether they are a citrus grower or an urban homeowner. In a time when the state's resources are decreasing and the state's population is increasing, it's important to implement water management and consumption programs.

Gulf Citrus has worked diligently to ensure that the irrigation water supply needs of area growers are considered by the South Florida Water Management District and other agencies as water management and consumption programs are implemented. The association has also been particularly active in monitoring the Everglades Restoration Project, working to achieve a balance between environmental requirements and the needs of the industry. Gulf Citrus Growers Association is involved on various committees and peer reviews at the SFWMD, including the Agriculture Advisory Committee. The Association also monitors the U. S. Army Corps of Engineers and its jurisdictions and projects as related to the Central and Southern Flood Control Project and the regulation of lake levels in Lake Okeechobee.

Through this participation, the association has improved the representation of citrus growers on matters concerning their use of water. The issue of water quality is also being addressed through the water committee's activities with the IFAS, Southwest Florida Research and Education Center in Immokalee.

□ ***LABOR RELATIONS, HOUSING & TRANSPORTATION***

Over the past several years, the Labor Relations Committee has initiated a series of problem solving meetings and seminars for growers and crewleaders. Through the committee's continual work, growers are receiving excellent representation before state and federal agencies on farmworker issues. Representatives of the Federal and State Departments of Labor have expressed their desire to work with area growers through the association.

The association is also working with groups such as the Southwest Florida Housing Coalition to establish better working relationships between industry and governmental representatives in advancing collective solutions to area problems concerning housing and health.

The Gulf Citrus Growers Association is informing governmental representatives that citrus growers are concerned about the

housing, health and transportation of farmworkers and is working to address these issues.

In an effort to improve housing conditions for farmworkers, Gulf Citrus Growers Association coordinated a study to determine the infrastructure needs for farmworkers in Southwest Florida. This study was a combined effort between growers, government officials and farmworker advocacy organizations.

- ***TAXES***

The Gulf Citrus Growers Association's Tax Committee develops data from area growers on production, caretaking costs and fruit prices. They also work with county property appraisers to provide accurate information for their review in establishing equitable property values.

"Gulf" growers continue to communicate the message that taxes should be based on and paid in the current year. Our committee lets growers know what the caretaking costs and pick, load and haul are, and informs the counties when these costs are higher in Southwest Florida than in other areas of the state, if that fact can be documented.

Citrus growers want equity in property taxation and the committee works diligently to achieve that goal.

- ***COUNTY ISSUES***

Working to develop better communications with county commissioners and county administrative staffs has been a top priority for the association. Through our Governmental Affairs Committee and staff activities, hours have been spent presenting the "Gulf" growers perspective before county boards of commissioners on comprehensive growth management plans and county ordinances.

In urban coastal counties, citrus growers have an extra communications challenge because the majority of area citizens and elected officials do not understand agriculture.

The Gulf Citrus Growers Association continues to present the perspectives of "Gulf" citrus growers to county commissioners, county officials and staff, with the intent being to keep local government from passing rules and regulations which can be damaging to area growers.

- ***STATE AND FEDERAL ISSUES***

Although "Gulf Citrus" has focused on local issues, the association works with other state and national agricultural organizations to represent growers on broad-based issues. The Gulf Citrus Growers Association is a member of the Florida Ag Coalition which monitors state issues that affect agriculture. The coalition has banned together to provide a unified voice for Florida organizations in addressing statewide issues.

- ***ENVIROMENTAL REGULATION***

Gulf Citrus Growers Association actively works in conjunction with local growers in monitoring the plans of the U.S Fish & Wildlife Service and the Florida Game and Fresh Water Fish Commission.

These governmental agencies have passed rules that directly affect how growers can manage threatened or endangered species on their property. The association's landholders have been active in addressing grower concerns in the Florida Panther Habitat Protection Plan, along with other species-specific plans. Our goal is to make the plans more "landowner" friendly! Wildlife habitat management can be compatible with successful farming activities. The association is working to help area growers in addressing these land use issues.

- ***PUBLIC AND MEDIA RELATIONS***

Since its formation, the Gulf Citrus Growers Association has worked to develop positive working relationships with a wide range of media, from the citrus trade press to local newspapers and television. The association and its members have become a primary source of information for local newspapers and television any time a citrus-related story appears.

When citrus-related stories appear in the local papers, chances are that a board or staff member of the Gulf Citrus Growers Association has been consulted or quoted. Through the association, citrus growers in Southwest Florida are actively working to present a positive image of the citrus industry to the public.

The association's Community Relations Committee is actively working on a public relations campaign for urban areas in order to positively position citrus and agriculture in the minds of decision-makers and the voting public.

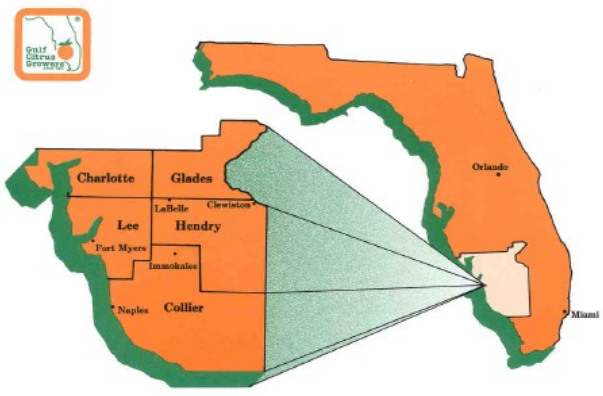
□ ***CITRUS EXPO***

Showcasing southwest Florida citrus growers was the reason Gulf Citrus Growers Association, Citrus Industry Magazine, and the Southwest Florida Citrus Extension Service sponsored the first Florida Citrus Expo in August, 1992. The Expo has since become a premiere industry event, drawing attendees and exhibitors from throughout the state, as well as from national and international markets.

The Citrus Expo has proved to be tremendously successful, selling out exhibit space and experiencing record grower attendance. Two days of informational seminars, tackling a wide range of issues affecting growers, are offered in conjunction with the trade show.

Citrus growers in SW Florida are encouraged to join GCGA and get all advantages and benefits for being a member.

Florida's Gulf Citrus Production Region



A great way to support the industry and your business!

Gulf Citrus is a trade organization representing the citrus growers of southwest Florida's "Gulf" production region, an area that contributes about 25% of the state's total citrus crop! Members currently produce some of the world's finest citrus on nearly 90,000 acres in Charlotte, Collier, Glades, Hendry and Lee Counties. Businesses and individuals that provide goods and services to citrus growers in SW Florida are encouraged to join Gulf Citrus as Associate Members. Your support as a member of Gulf Citrus is an investment both in your business and in the future of the citrus industry in SW Florida.

Benefits include:

●A listing in the annual **GCGA Membership Directory** which includes your business name and location, a contact name and number, and a brief description of the services or products you offer (you may also purchase larger advertising space in the directory);

●A **complimentary copy** of the Membership Directory;

●Invitations to **association meetings** and **seminars**;

●A subscription to two **newsletters**, *Florida Gulf Citrus News* and *Gulf Citrus Update;*

●**Sponsorship opportunities** which enable your business to market its services directly to Gulf growers and other associate members (newsletters, luncheons, and the Gulf Classic Golf Tournament, etc…

For more information on GCGA and on how to become a member or associate member, contact

Ron Hamel or Joanne Stein
Gulf Citrus Growers Association
P. O. Box 1319
LaBelle, FL 33975

Phone: (863) 675-2180

GULF CITRUS GROWERS ASSOCIATION SCHOLARSHIPS

The citrus growers of southwest Florida are committed to supporting education as a long-term investment in the future of this industry. The first Gulf Citrus scholarship was awarded in 1992 through the Gulf Citrus Growers Association. These scholarships were created to assist students pursuing degrees in citrus or ag-related programs or students residing in SW Florida.

The Gulf Citrus Growers Association Scholarship Foundation was established in 2000 as a non-profit entity to oversee the distribution of these awards. Scholarship applications are accepted throughout the year and are reviewed semi-annually by a Scholarship Selection Committee comprised of academic and industry members. The number and amount of awards vary depending upon the number of applications received and available funds.

Scholarship applications

Scholarship applications may be requested by calling the GCGA office at 863 675 2180 or by contacting Dr. Mongi Zekri at maz@ifas.ufl.edu or at the Hendry County Extension Office, UF-IFAS, 863 674 4092.

Membership:

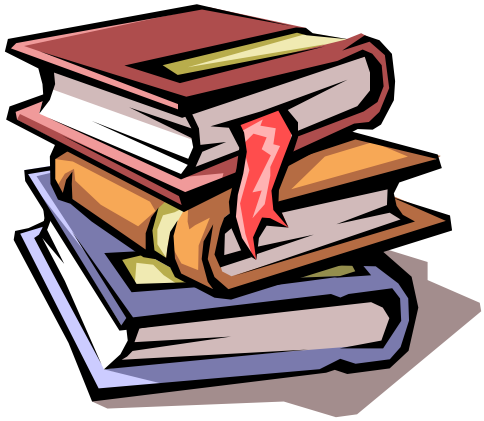
Membership in the Scholarship Foundation is open to all Gulf Citrus Growers Association (GCGA) members for just $25 per year. Members are able to vote for and serve on the Board of Directors for the Foundation.

Donations:

Donations are a crucial source of funding for scholarship awards and may be made to the Foundation at any time during the year in any denomination, regardless of membership status.

Checks should be made payable to the Foundation.

The GCGA Scholarship Foundation is a non-profit corporation operating under Section 501 © (3) of the Internal Revenue Code. Contributions are tax deductible as allowed by law.



MICRONUTRIENTS IN CITRUS NUTRITION

Iron (Fe): One of the functions of Fe is to act as a catalyst in the production of chlorophyll. Iron deficiency has been of importance on calcareous soils in certain areas of Florida where the soil contains high amount of calcium carbonate and has a pH of 8.0. Iron deficiency is attributed to low Fe content in white sandy areas near lakes and places known locally as "sand soaked areas". Iron deficiency can be induced by high levels of P and accumulations of heavy metals, primarily Cu, in the soil. In Florida, Fe deficiency is commonly associated with Zn and Mn deficiencies.

The symptoms of Fe deficiency are also known as "iron chlorosis". They occur on new growing leaves which are very light in color and sometimes almost white but with the veins greener than the remainder of the leaf. In acute cases, the leaves are reduced in size, very thin, and shed early. The trees die back severely on the periphery and especially in the top. Fruit set, yield, and fruit size will be reduced.

Iron deficiency is usually associated with high soil alkalinity, but it is also associated with over irrigation, prolonged spells of wet soil conditions or poor drainage and low soil temperature. Several areas affected with Fe chlorosis in south Florida have been materially helped or completely cured by careful control of irrigation and drainage. Iron deficiency sometimes occurs where excess salts are present in the soil.

Iron deficiency has been found to be one of the most difficult deficiencies to correct especially on calcareous soils. Foliar applications of Fe are not recommended because of their lack of effectiveness and risk of leaf and fruit burn. At their best, foliar sprays of Fe produce a spotted greening of the leaves rather than an overall greening. The most reliable means of correcting Fe chlorosis in citrus is by soil application of iron chelates. Iron sulfate has not given satisfactory control on either acid or alkaline soils. Citrus rootstocks vary in their ability to absorb Fe. Trifoliate orange and its hybrids (Swingle citrumelo and Carrizo citrange) are the least able to do so.

Zinc (Zn): Zinc is essential for the formation of chlorophyll and function of normal photosynthesis. Zinc is also needed for the formation of auxins which are growth-promoting substances in plants.

Zinc deficiency symptoms are characterized by irregular green bands along the midrib and main veins on a background of light yellow to almost white. The relative amounts of green and yellow tissue vary from a condition of mild Zn deficiency in which there are only small yellow splotches between the larger lateral veins to a condition in which only a basal portion of the midrib is green and the remainder of the leaf is light yellow.

In less acute stages, the leaves are almost normal in size, while in very acute cases the leaves are pointed, abnormally narrow with the tendency to stand upright, and extremely reduced in size. In mild cases, Zn deficiency symptoms appear on

occasional weak twigs. Fruit formed on these weak twigs are drastically reduced in size and have an unusually smooth light-colored thin skin and very low juice content.

Zinc deficiency symptoms can be so severe that they may mask or noticeably alter the symptoms of other deficiencies or disorders. Deficiency in Zn can develop due to soil depletion or formation of insoluble compounds. Excessive P or N has also been found to induce or aggravate Zn deficiency.

A single spray of a solution containing 2 to 4 lbs of elemental Zn per acre from Zn sulfate, oxide, or nitrate can correct Zn deficiency. Under severe deficiency conditions however, application of Zn sprays may be necessary on each major flush of growth to keep the trees free of deficiency symptoms because Zn does not translocate readily to successive growth flushes. Foliage injury can be reduced by adding 2 to 3 lbs of hydrated lime to the spray. Maximum benefit is obtained if spray is applied to the young growth when it is two-thirds to nearly fully expanded and before it hardens off. Treatment on the spring flush is preferable. Soil application of Zn in the fertilizer is neither an economical nor an effective way to correct Zn deficiency. One of the early diagnostic symptoms of a disorder known as young tree decline or "blight" is a Zn deficiency pattern in the leaves. Correction of the symptoms will not alleviate the disorder, and trees will never recover form the disease.

Manganese (Mn): Manganese is involved in the production of amino acids and proteins. It plays a role in photosynthesis and in the formation of chlorophyll.

Manganese deficiency occurs commonly in Florida. It is particularly evident in the spring after a cold winter. Manganese deficiency leads to a chlorosis in the interveinal tissue of leaves but the veins remain dark green. Young leaves commonly show a fine pattern or network of green veins on a lighter green background but the pattern is not so distinct as in Zn or Fe deficiencies because the leaf is greener. By the time the leaves reach full size, the pattern becomes more distinct as a band of green along the midrib and principal lateral veins with light green areas between the veins.

In more severe cases, the color of the leaf becomes dull-green. Interveinal leaf areas may develop many whitish opaque spots which give the leaf a whitish or gray appearance. The leaves are not reduced in size or changed in shape by Mn deficiency, but affected leaves prematurely fall from the tree. No particular twig symptoms have been related to Mn deficiency. In cases of acute Mn deficiency, the growth is reduced giving the tree a weak appearance.

Manganese deficiency may greatly reduce the crop and the color of the fruit. Manganese deficiency is frequently associated with Zn deficiency. This combination of the two deficiency symptoms on leaves is characterized by dark green veins with dull whitish green areas between the veins. In such combinations, the Mn deficiency is acute and the Zn deficiency is relatively mild.

In Florida, Mn deficiency occurs on both acid and alkaline soils. It is probably due to leaching in the acid soils and to insolubility in the alkaline soils. For deficient trees on alkaline soils, treatments by sprays of Mn compounds are recommended. On acid soils, Mn can be included in the fertilizer. Foliar spray application quickly clears up the pattern on young leaves but older leaves respond less rapidly and less completely. When Mn sprays are given to Mn-deficient orange trees, fruit yield, total soluble solids in the juice and pounds solids per box of fruit increase. Foliar spray of a solution containing 2 to 3 lbs of elemental Mn on two-third to fully expanded spring or summer flush leaves is recommended. If N is needed, adding 7 to 10 lbs of low biuret urea will increase Mn uptake.

Boron (B): Boron is particularly necessary where active cell division is taking place. Boron plays an important role in flowering. Florida sandy soils are low in B, and a deficiency of this element in citrus occasionally occurs under field conditions. The deficiency may be aggravated by severe drought conditions, heavy lime applications, or irrigation with alkaline water. Boron is very mobile in the soil profile of sandy soils and readily leaches by rainfall or excess irrigation.

Boron deficiency is known as "hard fruit" because the fruit is hard and dry due to lumps in the rind caused by gum impregnation. The chief fruit symptoms include premature shedding of young fruits. Such fruit have brownish discoloration in the white portion of the rind (albedo), described as gum pockets or impregnations of the tissue with gum and unusually thick albedo. Older fruit are undersized, lumpy, mis-shapen with an unusually thick albedo containing gum deposits. Seed fails to develop and gum deposits are common around the axis of the fruit.

The first visual symptoms of B deficiency are generally the death of the terminal growing point of the main stem. Further symptoms are a slight thickening of the leaves, a tendency for the leaves to curl downward at right angles to the midrib, and sometimes chlorosis.

Young leaves show small water soaked spots or flecks becoming translucent as the leaves mature. Associated with this is a premature shedding of leaves starting in the tops of the trees and soon leaving the tops almost completely defoliated. Fruit symptoms appear to be the most constant and reliable tool for diagnostic purposes.

Borax and other B compounds are generally used in treating citrus affected with B deficiency. They can be applied either foliarly or in the fertilizer. As a maintenance program, apply B in the fertilizer at an annual rate equivalent to 1/300 of the N rate. In Florida, foliar spray applications have been found much safer and more efficient than soil application. Soil applications frequently fail to give satisfactory results during dry falls and springs and may result in toxicity problems if made during the summer rainy season. Boron solubility in the soil is reduced at soil pHs below 5 and above 7. Foliar spray may be applied during the dormant period through post bloom, but preferably during early flower development. Treating at this growth

stage is important because boron does not move very readily from other parts of the tree to the buds. Applying boron at this time will assist in flower initiation and pollen production, satisfy the needs for pollen tube growth, and enhance fruit set. For maintenance spray application, 0.25 lb/acre of B (1.25 lbs of soluble borate containing 20% B) may be used. Boron levels in the leaf tissue should not drop below 40 ppm or exceed 120 ppm (dry wt basis). Where deficiency symptoms are present, double the amount suggested. Use care not to apply more than the recommended amount because it is easy to go from deficiency to excess.

Copper (Cu): Copper also has a role in photosynthesis and chlorophyll formation. The functions of Cu in the mineral nutrition of plants are numerous. Heavy fertilization with N tends to increase the severity of Cu deficiency.

If Cu in citrus leaves falls below 4 ppm in dry matter, severe Cu deficiency will develop. In the range of 4 to 5 ppm, mild to moderate deficiency symptoms may occur. Copper deficiency rarely occurs when the Cu concentration in leaves is 6 ppm or above.

Excessive applications of nitrogenous fertilizers have been considered for years a contributing cause for this trouble giving rise to the term "ammoniation". The cause might be an unbalanced N/Cu ratio.

The first symptom is the formation of unusually vigorous large dark green foliage with a "bowing up" of the midrib. The twigs are also unusually vigorous, long, soft, angular, frequently "S" shaped and more or less drooping.

Fruit symptoms are most pronounced on oranges. Brown stained areas of hardened gum on the rind of the fruit may precede the appearance of leaf and twig symptoms. In severe cases, dieback of young twigs will occur and the twigs will be covered by reddish brown droplets of gums.

Insufficient available Cu in the soil is believed to be the primary cause of the symptoms described. Copper deficiency is more of a problem on newly planted flatwoods land than the ridge. Prevention or cure of Cu deficiency is accomplished by either foliar sprays or soil applications of Cu compounds. A Cu spray of solution containing 2 to 3 lbs of elemental Cu applied during bloom time commonly causes an almost immediate recovery and results in a good setting of normal fruit. Copper deficiency can be a controlling factor in fruit production, and acute Cu deficiency may put trees entirely out of production. Foliage sprays are often valuable emergency treatments when symptoms of Cu deficiency are first observed.

CONCLUSION

Most micronutrient deficiencies may be recognized by visual symptoms. However, leaf analysis is often helpful in verifying deficiencies particularly when non-typical symptoms or multiple nutrient deficiencies appear. Leaf analysis also provides information on low, but not yet deficient, amounts of an element so that treatment may be applied to prevent a deficiency.

Pick up your copy of the BMP (*Best Management Practices) for Gulf Citrus* manual from the Hendry County Extension Office in LaBelle or the SW Florida Research & Education Center in Immokalee.

Our newest BMP manual reflects two years of hard work by a dedicated group of citrus growers plus local, state, and federal agencies. When used by producers, the manual will protect and improve water quality for citrus operations in Charlotte, Collier, Glades, Hendry, and Lee counties. This effort is of special significance for the Caloosahatchee River, which is an important nursery and fishery for many species, and is an estuarine system of national significance.

As many of you are aware, Florida citrus growers must utilize all tools available to them in order to remain competitive. Best Management Practices, which create reasonable environmental standards for participating growers, are one such tool. Despite all of the challenges faced by agriculture, including recent hurricane damage and our ongoing struggle to combat citrus canker and greening statewide, Florida citrus remains among the state's leading cash crops. In fact, the Gulf Citrus watershed alone rivals that of the entire State of California in terms of citrus producing acreage. These same acres are also critical to protecting water quality, providing valuable water recharge areas, and creating perennial open or "green" spaces throughout Southwest Florida.

Thanks to all who participated in the development of this important BMP manual and watershed protection initiative.

Take advantage of the BMP cost share program.

Information and application form were enclosed in the previous issue or go to: http://citrusbmp.ifas.ufl.edu/gulfcoast/index.html

Apply now.

BMP Development

In 1999, the Florida Legislature enacted the Florida Watershed Restoration Act (FWRA). The FWRA specifically outlines the process for the Florida Department of Environmental Protection (FDEP) to develop and implement total maximum daily loads (TMDLs) for impaired waters of the state. TMDLs are defined as the maximum amount of a pollutant that a waterbody can receive and still meet the water quality standards as established by the Clean Water Act of 1972.

The purpose of the FWRA was to better coordinate the numerous pollution control efforts that were implemented prior to 1999 and develop a standard to address future water quality issues. The FWRA requires that TMDLs be developed for all pollution sources "agricultural and urban" to ensure water quality standards are achieved. The FWRA effects all Floridians thus, in order to effectively implement the TMDL program the FDEP coordinates its efforts with a variety of entities including the Florida Department of Agriculture and Consumer Services, the Water Management Districts, the local Soil and Water Conservation Districts, the environmental community, the agricultural community, as well as concerned citizens.

While the ultimate responsibility for establishing and meeting TMDL water quality goals rests with FDEP, FDACS now assumes the leadership role when dealing with agriculture's non-point source pollution challenges. To accomplish this task FDACS must coordinate with FDEP and other stakeholders to identify, develop and adopt by rule science-based best management practices (BMPs) for agricultural land uses. BMPs must be environmentally protective, based on science, be economically viable, and they must be focused on real problems and solutions that work. The priorities for BMP implementation are to correct existing water quality and quantity problems and to minimize water quality and quantity problems resulting from agricultural operations.

BMP measures are not regulatory or enforcement-based, they are strictly voluntary. As part of the BMP implementation, growers perform an environmental assessment of their operations. This process identifies which BMPs should be considered to achieve the greatest economic and environmental benefit. The adopted BMPs may be a single practice or grouping of practices that, when implemented, are designed to improve water quality. The BMPs that are selected for each parcel of land with a tax ID are specified on a ***Notice of Intent to Implement*** and submitted to FDACS. If the practices are not yet implemented, the dates when them will be implemented are included on the *Notice of Intent.* Once enrolled in the BMP program, landowners must maintain records and provide documentation regarding the implementation of all BMPs (i.e. fertilizer application dates and amounts, or design and construction details of a water control structure).

One of the most innovative elements of the FWRA, and the associated agricultural BMP program is the ***Presumption of Compliance*** with water quality standards to landowners who voluntarily implement adopted BMPs that have been verified to be effective by FDEP. This component of the FWRA provides a powerful incentive to encourage landowners to enroll in the BMP programs since landowners are protected from cost recovery by the state if water quality standards are not met. This unique approach to addressing water quality concerns has been well received by the environmental and agricultural communities alike and as a result is becoming the primary method for addressing water quality concerns. In addition, growers enrolled in the BMP program become eligible for cost-sharing funds to implement specific BMP practices.

LIVING AND ARTIFICIAL WINDBREAKS FOR CITRUS

April 19, 2006
Citrus REC, Lake Alfred

Registration: $35 until April 10th; $50 after April 10th. Checks should be made payable to the CITRUS RESEARCH AND EDUCATION FOUNDATION and mailed to:
Jane Wilson, CREC, 700 Experiment Station Road, Lake Alfred, FL 33850.
(Please DO NOT make checks to the Citrus Research and Education CENTER.)

PROGRAM

9:00 a.m.	Registration, coffee and juice
9:30 a.m.	Welcome and Opening Remarks (Castle)
9:40 a.m.	Overview of Windbreaks and Their Benefits and Disadvantages (Timmer)
10:00 a.m.	Windbreaks in Argentina (Héctor Miguel Zubrzycki)
	Living Windbreaks: What to Plant or Not!
10:25 a.m.	A Natural Resources Conservation Service Perspective on Plants (M. Williams)
10:45 a.m.	Break
11:00 a.m.	Pines, Eucalyptus, and Cedars (Rockwood)
11:30 a.m.	Sugarcane (Baucum)
11:45 a.m.	Bamboo (TBD)
12:00 Noon	Lunch
12:50 p.m.	Ornamental Plants (Stamps)
1:15 p.m.	The Florida Experience (Castle)
	Artificial Windbreaks
1:30 p.m.	Artificial Windbreaks (Albrigo)
	Windbreak Design and Management
1:45 p.m.	Design Considerations for Living Windbreaks (Castle)
2:00 p.m.	An Engineer's Perspective (Ehsani)
2:15 p.m.	A Grower's Perspective (Edsall)
	Economics of Windbreaks
2:30 p.m.	Costs of Natural and Artificial Windbreaks (Muraro)
2:45 p.m.	Break
	Resources
3:00 p.m.	NRCS Support Options: EQIP (Stewart)
3:20 p.m.	Plant Resources at the Florida Division of Forestry (Gilly)
3:40 p.m.	CREC Website. Closing Comments (Castle)

*** *D E T A TC H ***

Name: _____ Company: _____

Address: _____City: _____ Zip:_____

Phone: _____

Please make your check payable to CRE Foundation. Registration form and check should be mailed to Jane Wilson, CREC, 700 Experiment Station Road, Lake Alfred, FL 33850.

☐ If you did not receive the ***Flatwoods Citrus*** newsletter and would like to be on our mailing list, please check this box and complete the information requested below.

☐ If you wish to be removed from our mailing list, please check this box and complete the information requested below.

Please send: Dr. Mongi Zekri
Multi-County Citrus Agent
Hendry County Extension Office
P.O. Box 68
LaBelle, FL 33975

Subscriber's Name:_____

Company:_____

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City:_____State:_____Zip:_____

Phone:_____

Fax:_____

E-mail:_____

Racial-Ethnic Background

__American Indian or native Alaskan
__Asian American
__Hispanic
__White, non-Hispanic
__Black, non-Hispanic

Gender

__Female __Male