



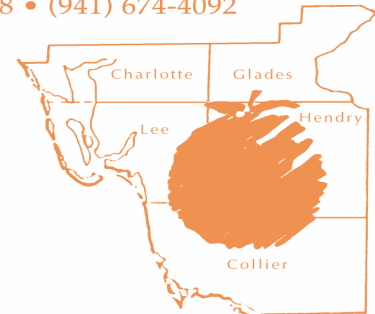
UNIVERSITY OF
FLORIDA

EXTENSION

Institute of Food and Agricultural Sciences

Hendry County Extension • P.O. Box 68 • LaBelle, Florida 33975-0068 • (941) 674-4092

Flatwoods Citrus



Vol. 5, No. 10 October 2002

Dr. Mongi Zekri, Multi-County Citrus Agent

UPCOMING EVENTS

Seminars at the Hendry County Extension Office, LaBelle

Tuesday, October 15, 2002, 10:00 AM – 12:00 Noon

Cultural practices that influence fruit quality

Speaker: Dr. Gene Albrigo

2 CEUs for Certified Crop Advisors

Sponsor: Jerry Southwell, Hydro Agri

Following the seminar, we are planning a free lunch (Compliments of Hydro Agri) for only who call Sheila at 863 674 4092 no later than Friday, 11 October.

Tuesday, November 19, 2002, 10:00 AM – 12:00 Noon

Hedging, topping, skirting and tree size management

Speakers: Drs. Jodie Whitney, Adair Wheaton, and Bill Castle

2 CEUs for Certified Crop Advisors

Sponsor: Robert M. Bancroft, Citrus Hedging, Inc.

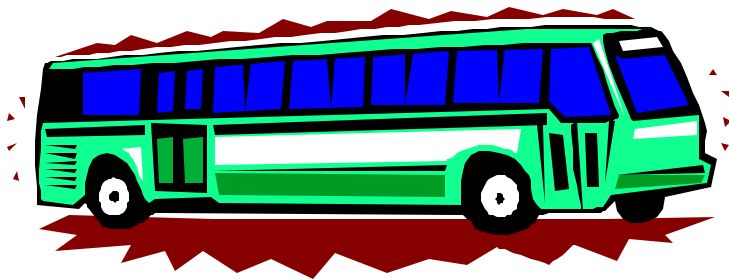
Following the seminar, we are planning a free lunch (Compliments of Citrus Hedging) for only who call Sheila at 863 674 4092 no later than Friday, 15 November.

If you want to print a color copy of the Flatwoods Citrus Newsletter, get to the Florida Citrus Resources Site at

<http://www.fcprac.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

Hendry County Extension Ag Tour



Date: Saturday, 7 December 2002

For more information, call Inez at 863 674 4092

CITRUS RESEARCH & EDUCATION CENTER NEWS

UF/IFAS Postharvest website:

<http://postharvest.ifas.ufl.edu>. To view the Citrus Packinghouse Day program and speaker PowerPoint presentations, click on "Previous Events."



Contacts: Dr. Mark Ritenour (mritenour@ifas.ufl.edu), UF/IFAS Indian River Research and Education Center; Dr. William Miller (wmm@lal.ufl.edu) or Dr. Renée Goodrich (rmg@lal.ufl.edu), UF/IFAS Citrus Research and Education Center, Tel. (863) 956-1151.

Photos available. Contact CREC Public Relations, Monica Lewandowski

(mmlew@lal.ufl.edu); Tel. (863) 956-1151.

- 41st ANNUAL CITRUS PACKINGHOUSE DAY -

LAKE ALFRED - Decay control, food safety, security concerns, the importation of Spanish clementines, new packinghouse technology, fresh cut citrus and internet resources were among the topics of discussion at the 41st Annual Citrus Packinghouse Day at the University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) Citrus Research and Education Center on August 29. The event attracted over 175 participants from the fresh citrus industry.

Participants had the opportunity to visit over 30 vendors that service the citrus fresh fruit industry. A luncheon was sponsored by Cerexagri DECCO, a provider of crop protection and habitat management products. Citrus Packinghouse Day organizers were Drs. Ritenour, Miller and Goodrich.

CREC News Releases are available to all interested persons by fax or E-mail. Contact the CREC Public Relations office, Monica Lewandowski, Tel. (863) 956-1151 or E-mail: mmlew@lal.ufl.edu

Special Thanks to the following 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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FACTORS AFFECTING CITRUS PRODUCTION AND FRUIT QUALITY

Do irrigation and nutrition impact citrus fruit production and quality? A new wall chart provides answers to this and many other questions. The chart is available for \$10 plus tax. To get the 2 feet by 3 feet poster, contact Jane Wilson at the University of Florida (UF) Institute of Food and Agricultural Sciences (IFAS) Citrus Research and Education Center (CREC) in Lake Alfred (tel.: 863 956 1151, fax: 863 956 4631). Proceeds from chart sales go to the Citrus Research and Education Foundation to help CREC programs.

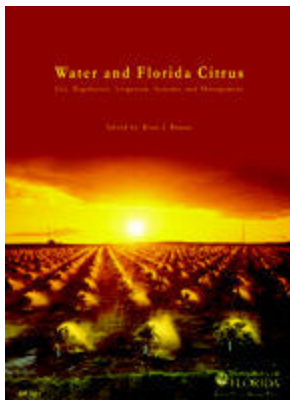
The poster-size chart, "Factors Affecting Citrus Production and Fruit Quality," outlines relationships between 32 influencing factors and 15 production quality elements. The 32 influencing factors are listed under 9 broad categories, including climate, rootstock,

water, nutrition and pests and diseases. Production and quality elements include fruit yield, fruit size, juice content, ratio, soluble solids per acre and juice color.

The chart was developed with the goal of summarizing factors that affect citrus production and fruit quality, and represents a first attempt to compile the information distributed throughout the scientific literature. It is anticipated that updated information will be added over time. While the chart is geared primarily to Florida, much of the information is applicable to other citrus growing regions where interested individuals may also choose to modify the contents to more accurately reflect their specific conditions.

Authors are David Tucker, Graham Barry and Renee Goodrich. Tucker is an Extension horticulturist emeritus with UF/IFAS, Barry is a research horticulturist with Capespan International, South Africa, and Renee Goodrich is an Extension food scientist at CREC.

WATER AND FLORIDA CITRUS, A COMPREHENSIVE GUIDE, NOW AVAILABLE FROM UF/IFAS EXTENSION BOOKSTORE



Editor: Dr. Brian Boman

www.IFASBooks.com

Water and Florida Citrus, a new comprehensive guide published by the University of Florida's Institute of Food and Agricultural Sciences, provides growers, grove managers, technicians and irrigation specialists with detailed information on a wide range of water management topics. It is a 603-page book with color photos. It includes 39 chapters and 14 appendices that provide citrus growers with much

of the information required to design, operate and maintain water management systems.

Water and Florida Citrus (SP281 priced at \$30 plus appropriate local Florida tax and \$4 shipping charge) is available from the IFAS-Extension Bookstore at UF in Gainesville. Order via telephone with MasterCard or Visa 1-800-226-1764; FAX (352) 392-2628.

<http://IFASBOOKS.UFL.EDU>

Special Thanks to the following 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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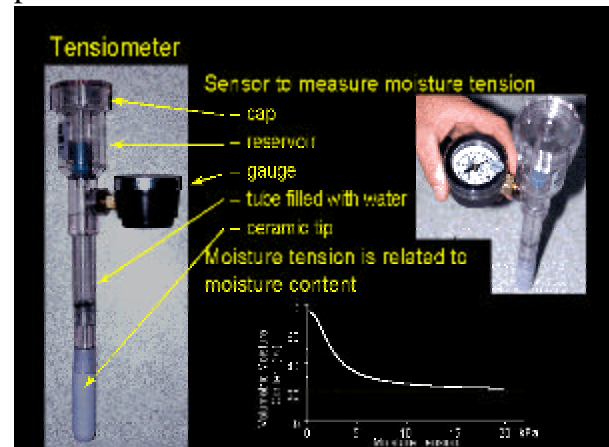
IRRIGATION, NUTRITION AND FRUIT QUALITY

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



The effects of irrigation and nutrition on fruit quality are very important and should be understood and taken into consideration by citrus growers and production managers to increase their profitability and enhance their sustainability and competitiveness on a worldwide basis. In general, excessive irrigation and nutrition reduce fruit

quality. Therefore, balanced nutrition with sound irrigation scheduling based on IFAS recommendations should be a high priority management practice for every grower. Citrus trees require a properly designed, operated, and maintained water management system and a balanced nutrition program formulated to provide specific needs for maintenance and for expected yield and fruit quality performance.



Irrigation contributes to the efficiency of fertilizer programs. Adequately watered and nourished trees grow stronger, have better tolerance to pests and stresses, yield more consistently, and produce good quality fruit. On the other hand, excessive or deficient levels of watering or fertilization will result in poor fruit quality.

The most important management practices influencing fruit quality are irrigation and nitrogen, phosphorus, potassium, and magnesium nutrition. The effect of other macronutrients and most micronutrients on fruit quality is not significant or not known. However, when any nutrient element is severely deficient, fruit yield and fruit quality will be negatively altered. Trends in fruit quality response to high nutrition and irrigation are described and summarized below.

Nitrogen (N)

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

Phosphorus (P)

- ❑ Reduces acid content, which increases soluble solids-acid ratio. Phosphorus rates have no effect on soluble solids per box but may increase soluble solids per acre due to increase in fruit production in soils that are low in P.
- ❑ Increases number of green fruit but reduces peel thickness.
- ❑ Increases expression of wind scar but reduces that of russeted fruit.

Potassium (K)

- ❑ Potassium produces mostly negative effects on juice quality except soluble solids per acre. Potassium increases fruit

production therefore producing more soluble solids per acre.

- ❑ Decreases juice content, soluble solids, ratio, and juice color.
- ❑ Increases acid content.
- ❑ Increases fruit size, weight, green fruit and peel thickness.
- ❑ Reduces incidence of creasing and fruit plugging. In storage, reduces stem-end rot.



Magnesium (Mg)

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

Irrigation

- ❑ Increases juice content and soluble solids-acid ratio.
- ❑ Reduces soluble solids and acid contents. Soluble solids per box will decrease, but soluble solids per acre may increase due to yield increase.

- ❑ Increases fruit size and weight, increases green fruit at harvest, but decreases rind thickness.



- ❑ Increases incidence of blemish from wind scar, scab and *Alternaria* brown spot, but reduces rind plugging.
- ❑ Reduces stem-end rot incidence but increases incidence of green mold in storage.

Specific effects on juice and external fruit qualities are summarized in the Table below. This summary is based on numerous field experiments conducted over many years, mostly on responses of oranges to irrigation and fertilizer practices. Most of these effects were consistently observed, but some of them appear to depend on local conditions and growing regions. These observations are useful in developing a strategy to improve fruit quality for a particular variety or location.



EFFECTS OF MINERAL NUTRITION AND IRRIGATION ON FRUIT QUALITY

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

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

NEMATODES

Plant parasitic nematodes are microscopic, (~ 0.5 mm long), unsegmented roundworms that live in soil and plant tissues and feed on plant roots. Many different species of nematode have been found in association with citrus roots. However, relatively few have been documented to be of major economic consequence. In Florida, the nematode species of major economic importance include the citrus nematode, causal agent of "slow decline" of citrus, and the burrowing nematode, causal agent of "spreading decline" of citrus. Other species of limited economic importance include the sting nematode, and two species of lesion nematode. Citrus nematode attacks roots by burrowing its anterior end deep inside the root cortex while the posterior end remains outside in the soil.



Damage.

Damage caused by citrus nematode infestation depends on the age and vigor of the tree, density of the nematode population, and susceptibility of the rootstock. Mature trees can tolerate a considerable number of nematodes before showing lack of vigor and decline symptoms. In heavily infested sites, young trees may be stunted or fruit production may be reduced on bearing trees grown on susceptible rootstocks. The damage is greater when trees are predisposed by

other factors such as Phytophthora root rot or any other pest or physiological stress.

Symptoms

Most nematode species that are known pathogens of citrus actually do not kill citrus trees but can significantly reduce tree vigor, growth, fruit productivity and fruit size. The symptoms described below are typical of a nematode problem but are not diagnostic, as they could result from other causes as well. Nematode infested trees generally grow more slowly.

Aboveground symptoms, which develop as a result of nematode infection and damage to roots include wilting, poor response to watering and fertilization, thin canopies with little or no new foliar growth and twig dieback within the upper tree canopy. Symptoms of decline frequently increase with time, and are more apparent during periods of environmental stress or when combined with other damaging soil pests such as root weevils and Phytophthora.

Belowground symptoms of citrus nematode infestation include poor growth of feeder roots and soil adhering to roots giving them a dirty appearance.

Monitoring Nematodes

The only effective way of determining the presence or distribution of nematodes within a grove is by soil and root tissue sampling of under canopy areas of individual trees. A representative grove sample for most nematode species consists of soil and root samples composited from 20 trees within a 5-acre block. Take soil samples within the root zone (0-12 inch depth, depending on soil type and topographical location). Take subsamples from the regularly wetted zones at the edge (dripline) of the tree canopy, and include some feeder roots when possible. In drip irrigated groves, take samples around emitters where feeder roots are

abundant. Mix the subsamples thoroughly and make a composite sample of about 1 quart for each block. Place the samples in separate plastic bags, seal them, and place a label on the outside with your name, address, and location. Once the samples have been collected they should never be subjected to overheating, freezing, drying, or to prolonged periods of exposure to direct sunlight. Samples should be submitted immediately to a commercial laboratory or to the University of Florida Nematode Assay Laboratory for analysis and recommendations. Samples collected in April-November can also be analyzed for population densities of *Phytophthora*.

Managing Nematodes

Nematode management should be considered only after the results of soil and root sampling are available. The laboratory that processed the samples should be able to indicate whether potential nematode problems exist within a grove. However, it is important to remember that in most cases nematode management should not be considered until all other potential causes of tree decline are evaluated and corrected. There is no value in managing nematodes if other problems (poor soil drainage, insufficient irrigation, foot rot and fibrous root rot, root weevils, improper fertilization, poor disease control) limit root function and/or reduce tree growth and fruit yield.

Nematode Control

The best method to manage plant parasitic nematodes in new plantings is good sanitation practices to avoid infestations. To exclude nematodes from a grove, it is essential to use certified nematode-free trees. Use of certified trees will virtually eliminate the possibility of nematode problems in new groves planted in virgin soils or in old citrus soils never infested by nematodes, provided that care is taken to always use clean equipment in those

groves. Use of certified trees also reduces damage during the early years of growth in old, previously infested groves if nematode populations are low. Other methods to exclude nematodes from groves include the use of clean equipment and construction of buffer zones between infested and non-infested blocks of land. Using a resistant rootstock is recommended whether or not nematodes are present. Once established, nematodes cannot be eradicated from groves and annual management of populations may be required. In established orchards, treat when sampling in June-September indicates more than 400 female citrus nematodes are present in 1 gram of roots or 1000 juveniles per 100 grams of soil, or when sampling in April-May indicates more than 700 females in 1 gram of roots or 1600 juveniles per 100 g of soil. In October-November, the numbers are often intermediate. Nema-cur, Temik, and Vydate can be effective in reducing nematode populations. However, there are restrictions for Nema-cur use in many Florida counties.

Integrated pest management (IPM) for nematodes

IPM for nematodes requires:

- 1) Determining whether pathogenic nematodes are present within the grove.
- 2) Determining whether nematode population densities are high enough to cause economic loss.
- 3) Selecting a profitable management option.

It is important to remember that attempting to manage nematodes may be unprofitable unless all of the above IPM procedures are carefully followed. Similarly, some management methods pose risk to people and the environment. Therefore it is important to know that their use is justified by the actual conditions in a grove.

THANKS TO ALL THE SPONSORS FOR THEIR SUPPORT!

Schedule for SW Florida seminars (2002-2003)

Location: Hendry County Extension Office, LaBelle

Coordinator: Dr. Mongi Zekri

The dates for the following programs may change. Therefore, read each issue of the Flatwoods Citrus newsletter.

Friday, 9 August 2002, 10:00 AM – 12:00 Noon

All you wanted to know about citrus in Brazil - culture, problems (Sudden Death, CVC), and nurseries.

Speaker: Eduardo Girardi, Sao Paulo, Brazil

Sponsor: Ed Early, DuPont Ag. Products

Tuesday, September 17, 2002, 10:00 AM – 12:00 Noon

Brown Rot, other Phytophthora diseases and bark scaling

Speaker: Drs. Jim Graham and Pam Roberts

2 CEUs for Pesticide License Renewal

2 CEUs for Certified Crop Advisors

Sponsor: Larry McCauley, Griffin LLC

Tuesday, October 15, 2002, 10:00 AM – 12:00 Noon

Cultural practices that influence fruit quality

Speaker: Dr. Gene Albrigo

2 CEUs for Certified Crop Advisors

Sponsor: Jerry Southwell, Hydro Agri

Tuesday, November 19, 2002, 10:00 AM – 12:00 Noon

Hedging, topping, skirting and tree size management

Speakers: Drs. Jodie Whitney, Adair Wheaton, and Bill Castle

2 CEUs for Certified Crop Advisors

Sponsor: Robert M. Bancroft, Citrus Hedging, Inc.

Tuesday, December 17, 2002, 10:00 AM – 12:00 Noon

Foliar nutrition (potassium, urea and phosphite), nitrogen rates and micronutrients vs. fruit production

Speakers: Drs. Brian Boman, Gene Albrigo, and Tom Obreza

2 CEUs for Certified Crop Advisors

Sponsor: Robert Murray, Florida Favorite Fertilizer

Tuesday, January 14, 2003, 8:30 AM – 4:00 PM

Workshop on scouting for pests and diseases

Speakers: John Taylor, and Drs. Pam Roberts, Stephen Rogers and Phil Stansly

6 CEUs for Pesticide License Renewal

6 CEUs for Certified Crop Advisors

Sponsor: Robert Gregg, Syngenta

Tuesday, January 21, 2003, 10:00 AM – 12:00 Noon
Citrus scab, alternaria, melanose, and fungicide update
Speakers: Dr. Pete Timmer and Pam Roberts
2 CEUs for Pesticide License Renewal
2 CEUs for Certified Crop Advisors
Sponsor: Shelby Hinrichs, Nufarm Agriculture USA

Tuesday, February 4, 2003, 10:00 AM – 12:00 Noon
Strategies for efficient application of pesticides
Speaker: Dr. Masoud Salyani
2 CEUs for Pesticide License Renewal
2 CEUs for Certified Crop Advisors
Sponsor: Michael Harowitz, FarmSaver.com

Tuesday, February 18, 2003, 10:00 AM – 12:00 Noon
Update on herbicide program options
Speakers: Dwight Meeker, Mike Prescott and Dr. Steve Futch
2 CEUs for Pesticide License Renewal
2 CEUs for Certified Crop Advisors
Sponsor: Donna Muir-Strickland, Monsanto

Tuesday, March 18, 2003, 10:00 AM – 12:00 Noon
Irrigation scheduling, maintenance, plugging problems and solutions
Speakers: Drs. Larry Parsons, Brian Boman, Tom Obreza and Sanjay Shukla
1 CEU for Pesticide License Renewal
2 CEUs for Certified Crop Advisors
Sponsor: John Coley, Citrus Maintenance & Service, Inc.

Tuesday, April 15, 2003, 10:00 AM – 12:00 Noon
Citrus leafminer and citrus psyllid management for resets and non-bearing trees
Speaker: Dr. Phil Stansly
2 CEUs for Pesticide License Renewal
2 CEUs for Certified Crop Advisors
Sponsor: Jay Hallaron, Uniroyal Chemical/Crompton Corporation

Tuesday, May 20, 2003, 10:00 AM – 12:00 Noon
Greasy spot and possible contaminants from pesticides and fertilizers
Speaker: Cathleen Osgood and Drs. Tom Obreza, Pete Timmer and Pam Roberts
2 CEUs for Pesticide License Renewal
2 CEUs for Certified Crop Advisors
Sponsor: Bobbitt Jenkins, BASF Corporation

Tuesday, June 17, 2003, 10:00 AM – 12:00 Noon
Record keeping software for grove practices and how to find citrus information
(Pest Management Guide, Fact Sheets, Labels, etc.) on the Internet
Speakers: Rick Montney, Diana Hagan and Dr. Mark Ritenour
Sponsor: Aglime Sales, Inc., Babson Park, FL

FLATWOODS CITRUS NEWSLETTER

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Gender

Female

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