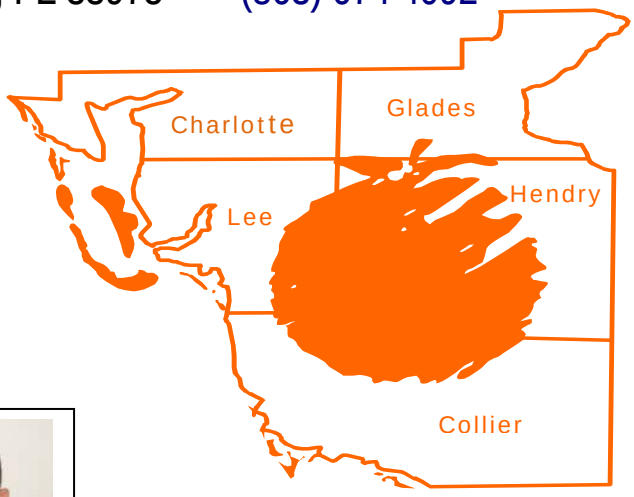
UF UNIVERSITY of FLORIDA
IFAS Extension

EXTENSION

Institute of Food and Agricultural Sciences

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

Flatwoods Citrus



Vol. 22, No. 2 **February 2019**

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

Table of Contents

Upcoming Event	2
Flatwoods Citrus Newsletter Sponsors – Thank you!	3-5
El Niño/Southern Oscillation (ENSO) Diagnostic Discussion	6
Citrus February Forecast	7-8
Bureau of Citrus Budwood Registration	9-10
Postbloom Fruit Drop	11
Citrus Black Spot	12-13
Importance of Sprayer Calibration	14
Importance of Fertilizer Spreader Calibration and Maintenance	15
Nutrition of Citrus Trees	16-17
Boron	18
Microsprinkler Irrigation & Fertigation	19
Mobile Irrigation Lab	20

Seminar

Pre-registration is required.
No registration fee and lunch is free Thanks to **Sam Monroe with Nichino**.
To reserve a seat, call 863 674 4092, or send an e-mail to Dr. Mongi Zekri at: maz@ufl.edu

2 CEUs for Certified Crop Advisors (CCAs)
2 CEUs for Pesticide License Renewal

All You Need to Know About Scouting and Management of Citrus Insect Pests

Date: Thursday, **February 14, 2019**, Time: 10:00 AM **– 12:00 Noon**
Location: Immokalee IFAS Center
Program Coordinator: Mongi Zekri, UF-IFAS
Program Sponsor: Sam Monroe with Nichino

Agenda

----10:00 AM - 11:00 AM

1. **Scouting and managing citrus pests and beneficials**
   Citrus leafminer and citrus psyllid: damage, symptoms, scouting, life cycle, management

Dr. Jawwad Qureshi, UF-IFAS

11:00 AM – 11:10 AM Break

----11:10 AM - 11:40 AM

2. **Scouting and managing citrus rust mites (CRM)**
   Scouting methods, update on new products for CRM control

Barry Kostyk, UF-IFAS

----11:40 AM – 12:00 Noon

3. **Nichino Citrus Product Update** as part of your pesticide resistance management program

Dr. Scott Croxton, Nichino

2019 ANNUAL FLORIDA CITRUS GROWERS' INSTITUTE

Date & Time: Tuesday, 2 April 2019, 8:00 AM – 3:35 PM
Location: Avon Park Campus of South Florida Community College

Coordinators: Citrus Extension Agents, UF-IFAS

Agenda and information on registration will be available in February.

Special Thanks to 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 or maz@ufl.edu

BLACKSMITH BIOSCIENCE

Jack Kilgore
Technical Sales Rep, SE US

Office:
7150 East Brentwood Road
Ft. Myers, FL 33919

(239) 707-7677
g8trmanjek@comcast.net
www.blacksmithbio.com

NICHINO **AMERICA**

Scott Croxton
scroxton@nichino.net
Samuel S. Monroe
smonroe@nichino.net
www.nichino.net

Stacey Howell
BAYER
Cell: 239-272-8575
stacey.howell@bayer.com

Magna-Bon®
AGRICULTURAL CONTROL SOLUTIONS

Frank Miele
Office: 863 357 0400
Cell: 954 275 1830
Fax: 863 357 1083
E-mail: famiele1@aol.com

Heath Prescott

KeyPlex®

Toll Free: 800 433 7117
Mobile: 863 781 9096
Nextel: 159*499803*6

Arysta LifeScience

Shaun Yule
Phone: 386-561-0493
E-mail: shaun.yule@arysta.com

Wellmark

Extinguish PLUS

EXTINGUISH

www.extinguishfireants.com

Jack Kilgore
M: 239-707-7677
g8trmanjek@comcast.net

Plant Food Systems, Inc.
P.O. Box 775
Zellwood, FL 32798
Tel: 407 889 7755

POLYON® Controlled-Release fertilizer makes you more efficient. *Ask me how!*
POWERED BY POLYON Controlled-Release Fertilizer
Brett Howell (239-986-6638)
Trey Whitehurst (863-633-8711
www.harrells.com

FMC Corporation
Ed Early
Phone: 239-994-8594
Edward.Early@fmc.com
Eric Johnson
Eric.R.Johnson@fmc.com

G.P. SOLUTIONS
Mark White
Cell: 239-214-1072
MWhite@GPSolutionsFL.com
Toll Free: 866-648-7630
www.GPSolutionsFL.com

Timac AGRO USA
Think Different...Grow Better.
FOLLOW US:
Charles McCartney
CMcCartney@timacusa.com
www.us.timacagro.com

actagro
Reese Martin
Reese.Martin@actagro.com
863 605 8533
www.actagro.com

Adrian Jahna
BASF Corporation
Cell: 863 443 2404
Adrian.jahna@basf.com

EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by

CLIMATE PREDICTION CENTER/NCEP/NWS
and the International Research Institute for Climate and Society

10 January 2019

ENSO Alert System Status: El Niño Watch

Synopsis: El Niño is expected to form and continue through the Northern Hemisphere spring 2019 (~65% chance).

ENSO-neutral continued during December 2018, despite widespread above-average sea surface temperatures (SSTs) across the equatorial Pacific Ocean (Fig. 1). In the last couple of weeks, all four Niño indices decreased, with the latest weekly values at +0.2°C in the Niño-1+2 region and near +0.7°C in the other regions (Fig. 2). Positive subsurface temperature anomalies (averaged across 180°-100°W) also weakened (Fig. 3), but above-average temperatures continued at depth across most of the equatorial Pacific Ocean (Fig. 4). The atmospheric anomalies largely reflected intra-seasonal variability related to the Madden-Julian Oscillation, and have not yet shown a clear coupling to the above-average ocean temperatures. Equatorial convection was generally enhanced west of the Date Line and suppressed east of the Date Line, while anomalies were weak or near average over Indonesia (Fig. 5). Low-level winds were near average, while upper-level wind anomalies were westerly over the eastern Pacific. The traditional Southern Oscillation index was positive, while the equatorial Southern Oscillation index was slightly negative. Despite the above-average ocean temperatures across the equatorial Pacific Ocean, the overall coupled ocean-atmosphere system continued to reflect ENSO-neutral.

The majority of models in the IRI/CPC plume predict a Niño3.4 index of +0.5°C or greater to continue through at least the Northern Hemisphere spring 2019 (Fig. 6). Regardless of the above-average SSTs, the atmospheric circulation over the tropical Pacific has not yet shown clear evidence of coupling to the ocean. The late winter and early spring tend to be the most favorable months for coupling, so forecasters still believe weak El Niño conditions will emerge shortly. However, given the timing and that a weak event is favored, significant global impacts are not anticipated during the remainder of winter, even if conditions were to form. In summary, El Niño is expected to form and continue through the Northern Hemisphere spring 2019 (~65% chance; click CPC/IRI consensus forecast for the chance of each outcome for each 3-month period).

This discussion is a consolidated effort of the National Oceanic and Atmospheric Administration (NOAA), NOAA's National Weather Service, and their funded institutions. Oceanic and atmospheric conditions are updated weekly on the Climate Prediction Center web site (El Niño/La Niña Current Conditions and Expert Discussions). Forecasts are also updated monthly in the Forecast Forum of CPC's Climate Diagnostics Bulletin. Additional perspectives and analysis are also available in an ENSO blog. The next ENSO Diagnostics Discussion is scheduled for 14 February 2019. To receive an e-mail notification when the monthly ENSO Diagnostic Discussions are released, please send an e-mail message to: ncep.list.enso-update@noaa.gov.

Climate Prediction Center
National Centers for Environmental Prediction
NOAA/National Weather Service
College Park, MD 20740

United States Department of Agriculture
National Agricultural Statistics Service

CITRUS

FEBRUARY FORECAST
MATURITY TEST RESULTS AND FRUIT SIZE

Cooperating with the Florida Department of Agriculture and Consumer Services
2290 Lucien Way, Suite 300, Maitland, FL 32751-7058
(407) 648-6013 · (855) 271-9801 FAX · www.nass.usda.gov/fl

February 8, 2019

Florida All Orange Production Unchanged from January Forecast
Florida Non-Valencia Orange Production Unchanged
Florida Valencia Orange Production Unchanged
Florida All Grapefruit Production Down 3 Percent
Florida All Tangerine and Tangelo Production Unchanged

FORECAST DATES - 2018-2019 SEASON	
March 8, 2019	May 10, 2019
April 9, 2019	June 11, 2019
July 11, 2019	

Citrus Production by Type – States and United States

Crop and State	Production [1]		2018-2019 Forecasted Production [1]	
	2016-2017	2017-2018	January	February
	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)
Non-Valencia Oranges [2]				
Florida	**33,000**	**18,950**	**32,000**	**32,000**
California [3]	39,300	35,900	40,000	40,000
Texas [3]	1,090	1,530	2,000	2,000
United States	73,390	56,380	73,800	73,800
Valencia Oranges				
Florida	**35,850**	**26,000**	**45,000**	**45,000**
California [3]	9,000	9,500	9,000	9,000
Texas [3]	280	350	600	600
United States	45,130	35,850	54,600	54,600
All Oranges				
Florida	**68,850**	**44,950**	**77,000**	**77,000**
California [3]	48,300	45,400	49,000	49,000
Texas [3]	1,370	1,880	2,600	2,600
United States	118,520	92,230	128,600	128,600
Grapefruit				
Florida-All	**7,760**	**3,880**	**6,200**	**6,000**
Red	**6,280**	**3,180**	**5,200**	**5,000**
White	**1,480**	**700**	**1,000**	**1,000**
California [3]	4,400	4,000	4,000	4,000
Texas [3]	4,800	4,800	6,300	6,300
United States	16,960	12,680	16,500	16,300
Lemons [3]				
Arizona	1,550	1,000	1,400	1,400
California	20,500	21,200	20,000	20,000
United States	22,050	22,200	21,400	21,400
Tangerines and Tangelos				
Florida-All [4]	**1,620**	**750**	**1,000**	**1,000**
Early [5]	**600**	**(NA)**	**(NA)**	**(NA)**
Royal	**210**	**(NA)**	**(NA)**	**(NA)**
Honey	**530**	**(NA)**	**(NA)**	**(NA)**
Tangelo	**280**	**(NA)**	**(NA)**	**(NA)**
California [3 6]	23,800	19,200	20,000	20,000
United States	25,420	19,950	21,000	21,000

NA Not available.
[1] Net pounds per box: oranges in California-80, Florida-90, Texas-85; grapefruit in California and Texas-80, Florida-85; lemons-80; and tangerines and mandarins in California-80, Florida-95.
[2] Navel and miscellaneous varieties in California. Early non-Valencia (including Navel) and midseason varieties in Florida and Texas.
[3] Estimates carried forward from January.
[4] In 2016-2017, includes Fallglo, Sunburst, Royal, and Honey tangerine varieties and tangelos. Beginning in 2017-2018, includes all certified varieties of tangerines and tangelos.
[5] Fallglo and Sunburst varieties.
[6] Includes tangelos and tangors in California.

All Oranges 77.0 Million Boxes

The 2018-2019 Florida all orange forecast released today by the USDA Agricultural Statistics Board is 77.0 million boxes, unchanged from the January forecast. If realized, this forecast will be 71 percent more than last season's final production. The forecast consists of 32.0 million boxes of the non-Valencia oranges (includes Navel varieties) and 45.0 million boxes of the Valencia oranges. Regression data used are from the 2008-2009 through 2016-2017 seasons. All references to "average", "minimum", and "maximum" refer to those 9 seasons unless noted. The hurricane affected 2017-2018 season is excluded from the regressions.

Non-Valencia Oranges 32.0 Million Boxes

The forecast of non-Valencia production is unchanged at 32.0 million boxes. Size and drop components were final last month. The Row Count survey conducted January 28-29, 2019, showed 77 percent of the early-midseason non-Valencia rows, excluding Navels, are harvested. Estimated utilization for non-Valencia oranges to February 1, with an allocation for non-certified fruit, is 23.6 million boxes. The Navel forecast, included in the non-Valencia portion of the forecast, remains at 800 thousand boxes.

Valencia Oranges 45.0 Million Boxes

The forecast of Valencia production is unchanged at 45.0 million boxes. Current fruit size is below the minimum and is projected to be below the minimum at harvest. Current droppage is above average and projected to be above average at harvest.

All Grapefruit 6.00 Million Boxes

The forecast of all grapefruit production is lowered to 6.00 million boxes. The white grapefruit forecast is unchanged at 1.00 million boxes. The red grapefruit forecast is lowered to 5.00 million boxes. Fruit size and drop are final in this report. White grapefruit size is below average, while red grapefruit size is below the minimum. White grapefruit drop is just above average while red grapefruit is well above average. Estimated utilization for white grapefruit to February 1, with an allocation for non-certified fruit, is 376 thousand boxes and for red grapefruit is 1.99 million boxes.

Tangerines and Tangelos 1.00 Million Boxes

The forecast for tangerine and tangelos remains at 1.00 million boxes, 33 percent more than last season's hurricane affected utilization of 750 thousand boxes. This forecast number includes all certified tangerine and tangelo varieties.

Reliability

To assist users in evaluating the reliability of the February 1 Florida production forecasts, the "Root Mean Square Error," a statistical measure based on past performance, is computed. The deviation between the February 1 production forecast and the final estimate is expressed as a percentage of the final estimate. The average of squared percentage deviations for the latest 20-year period is computed. The square root of the average becomes statistically the "Root Mean Square Error." Probability statements can be made concerning expected differences in the current forecast relative to the final end-of-season estimate, assuming that factors affecting this year's forecast are not different from those influencing recent years.

The "Root Mean Square Error" for the February 1 Florida all orange production forecast is 5.9 percent. However, if you exclude the three abnormal production seasons (three hurricane seasons), the "Root Mean Square Error" is 5.8 percent. This means chances are 2 out of 3 that the current all orange production forecast will not be above or below the final estimates by more than 5.9 percent, or 5.8 percent excluding abnormal seasons. Chances are 9 out of 10 (90 percent confidence level) that the difference will not exceed 10.2 percent. The result are the same (10.2 percent) when excluding abnormal seasons.

Changes between the February 1 Florida all orange forecast and the final estimates during the past 20 years have averaged 6.00 million boxes (5.74 million, excluding abnormal seasons), ranging from 0.05 million boxes to 14.0 million boxes including abnormal seasons, (0.30 to 14.0 million boxes excluding abnormal seasons). The February 1 forecast for all oranges has been below the final estimate 10 times, above 10 times, (below 10 times, above 7 times, excluding abnormal seasons). The difference does not imply that the February 1 forecasts this year are likely to understate or overstate final production.

Forecast Components, by Type – Florida: February 2019

[Survey data is considered final in December for Navels, January for early-midseason (non-Valencia) oranges, February for grapefruit, and April for Valencia oranges]

Type	Bearing trees	Fruit per tree	Droppage	Fruit per box
	(1,000 trees)	(number)	(percent)	(number)
ORANGES				
Early-midseason (Non-Valencia)	19,718	813	26	335
Navel	951	213	26	142
Valencia	29,262	609	24	266
GRAPEFRUIT				
Red	2,573	369	34	137
White	540	362	36	124

From The Annual Report 2018
July 1, 2017 – June 30, 2018
Bureau of Citrus Budwood Registration
Ben Rosson, Chief

Top Clones Propagated 2017-2018		
	Variety Clone	**# Budded**
1	Valencia SPB-1-14-19	1,317,259
2	Vernia UF 35-15	483,037
3	Hamlin 1-4-1	355,505
4	Bearss Le SPB-341-95-33	255,531
5	Sweet Orange UF OLL8	161,707
6	Valencia SPB-1-14-31	136,281
7	WG Mandarin 911-C-37	127,334
8	Valencia F-55-4	122,199
9	Sweet Orange UF OLL4	63,886
10	Florida EV1 UF B7-70	49,634
11	Meyer Le US	49,280
12	Harvey Le F-41-39	48,915
13	Persian Lime SPB-7	45,811
14	Early Pride US 1-62-122	45,479
15	Ruby Red Gft F-58-39	36,725
16	Bingo UF 7-6-27	34,063
17	Florida EV2 UF SF14W-65	33,254
18	Sugar Belle UF LB8-9	28,904
19	Key Lime SPB-51-12	27,640
20	Flame Gft US 1-26-71	25,987
21	Owari Sat 874	23,818
22	W Murcott CGIP-122	19,786
23	Eureka Le DPI -	19,500
24	WG Man 911-17	18,800
25	Minneola F-60-5	18,199
26	Valencia UF B9-65	18,145
27	Ray Ruby Gft CGIP-103	17,485
28	Calamondin DPI-555	16,625
29	Tango CGIP-168	16,333
30	Brown Select Sat 61-0-1	15,976

Top Rootstocks

	2018	# Budded	2017	2016	2015	2014
1	Swingle	683,378	Swingle	Kuharske	Kuharske	Swingle
2	US-942	661,003	US-942	X-639	X-639	Kuharske
3	Kuharske	504,639	X-639	S/O	Swingle	Sour Orange
4	Sour Orange	418,407	Kuharske	US-897	Sour Orange	X-639
5	X-639	349,046	Sour Orange	SWG	Cleopatra	US-802
6	US-897	243,781	US-802	US-942	US-802	US-812
7	US-802	169,465	US-897	US-802	US-897	US-897
8	Own Root	163,966	UFR-04	US-812	US-942	Cleopatra
9	US-812	146,410	US-812	Cleopatra	US-812	Carrizo
10	Volkamer	119,276	C-35	UFR-04	C-35 Citrange	Volkamer
11	C-35	86,181	Cleopatra	Volkamer	Carrizo	US-942
12	UFR-04	71,231	Volkamer	Kinkoji	Volkamer	C-35 Citrange
13	P Trifoliate	53,935	UFR-03	UFR-03	Own Root	Research Stock
14	Rough Lemon	33,909	C-22	Carrizo	UFR-04	Unknown
15	UFR-03	32,853	Carizzo	Rough Lemon	Kinkoji	Rough Lemon
16	UFR-06	28,617	Rough Lemon	Research	Rough Lemon	Kinkoji
17	Cleopatra	21,760	UFR-17	UFR-02	Unknown	Flying Dragon
18	C-22	19,361	Kinkoji	UFR-17	UFR-03	Pon trifoliata
19	US-896	18,205	UFR-01	UFR-16	Benton	Sun Chu Sha
20	UFR-05	16,735	Flying Dragon	Sun Chu Sha	Pon trifoliata	UF-02
21	Carrizo	16,398	Research	Pon trifoliata	Sun Chu Sha	US-896
22	Flying Dragon Trifoliate	8,726	UFR-05	Smooth Flat Seville	Research Stock	UF-04
23	Research	5,807	Pon trifoliata	UFR-05	C-54 Carpenter	Dickinson
24	US-1516	5,208	Duncan	C-57	C-22 Bitters	C-54 Carpenter
25	C-54	2,827	Smooth Flat Seville	C-54	UFR-17	UF-03
26	UFR-16	2,637	UFR-16	C-22	UFR-02	UF-17

POSTBLOOM FRUIT DROP (PFD) has been most severe on Navel and Valencia oranges.

Most spores of this fungus are produced directly on the surface of infected petals. Spores are splash-dispersed by rain to healthy flowers where they infect within 24 hours and produce symptoms in 4-5 days. The fungus survives between bloom periods as resistant structures on the surface of leaves, buttons, and twigs.
Groves with persistent calyxes (buttons) from the previous year should be closely examined once the bloom begins. Groves with a history of PFD should be checked twice weekly during the bloom period. Ground and aerial applications are effective for control of PFD. The removal of declining trees, where off-season blooms may provide a site for fungal spore buildup should reduce disease severity.
Of the products recommended for control of PFD, Abound, Gem, and Headline are effective but do not have a long residual effect. Ferbam is less effective and should not be used alone, but it can be combined with low rates of other products to maximize protection and reduce the risk of resistance development. No resistance has been detected to date. Neither Abound, Gem, nor Headline should be used alone more than once per season, but can be used more than once if combined with Ferbam.
For more information go to:
https://crec.ifas.ufl.edu/extension/pest/PDF/Postbloom%20Fruit%20Drop.pdf

Recommended Chemical Controls

READ THE LABEL.
Rates for pesticides in Table 1 are given as the maximum amount required to treat mature citrus trees unless otherwise noted. To treat smaller trees with commercial application equipment, including handguns, mix the per-acre rate for mature trees in 125 gallons of water. Calibrate and arrange nozzles to deliver thorough distribution and treat as many acres as this volume of spray allows.

Table 1. Recommended Chemical Controls for Postbloom Fruit Drop

Pesticide	FRAC MOA[2]	Mature Trees Rate/Acre[1]
Ferbam Granuflo	M3	5-6 lb. Maximum 3 ferbam applications a year and do not apply more than 6 lb ai/acre in a single application.
Abound[3]	11	12.0-15.5 fl oz. Do not apply more than 92.3 fl oz/acre/season for all uses.
Abound[3] + Ferbam	11, M3	12.0 fl oz + 5 lb. Maximum 3 ferbam applications a year and do not apply more than 6 lb ai/acre in a single application.
Gem 500 SC[3]	11	1.9-3.8 fl oz. Do not apply more than 15.2 fl oz/acre/season for all uses. Do not apply within 7 days of harvest.
Gem[3] + Ferbam	11, M3	1.9 fl oz + 5 lb. Maximum 3 applications a year and do not apply more than 6 lb ai/acre in a single application.
Headline SC[3]	11	12-15 fl oz. Do not apply more than 54 fl oz/acre/season for all uses.
Headline[3] + Ferbam	11, M3	12fl oz + 5 lb. Maximum 3 applications a year and do not apply more than 6 lb ai/acre in a single application.
Pristine3,4	11 + 7	16-18.5 oz. Do not apply more than 74 oz/acre/season for all uses.
Amistar Top3,4	11 + 3	15.4 fl oz. Do not apply more than 61.5 fl oz/acre/year
Priaxor3,4	11 + 7	9-11 fl oz. Do not apply more than 44 fl oz/acre/year
https://crec.ifas.ufl.edu/extension/pest/PDF/Postbloom%20Fruit%20Drop.pdf		

CITRUS BLACK SPOT fungal disease causes fruit blemishes and fruit drop especially on sweet oranges.

Lemons are the most susceptible, but sweet oranges, especially mid to late maturing types such as Valencia, are highly susceptible to this disease. Hamlin sweet oranges and tangerine/mandarin types are moderately susceptible. Grapefruit is thought to be moderately susceptible and symptoms have been seen in Florida.

Black spot fruit symptoms are wide ranging and have many different names. Hard spot is the most diagnostic symptom of black spot. Lesions are nearly circular, depressed, with gray necrotic tissue at the middle, and a brick-red to black margin that can be cracked around the edges. Significant fruit drop is a common symptom in heavily infected groves.

Airborne ascospores produced in decomposing leaf litter on the grove floor are the source of the primary inoculum for black spot. They are blown into the canopy by wind. These spores germinate and directly infect the leaves and fruit. Major ascospore release usually occurs from April to early September, with favorable infection conditions from May through September. Fruit remains susceptible most of the growing season. Monthly fungicide applications of copper and/or strobilurins (Abound, Gem, or Headline) will be needed from early May to mid-September to control black spot. If there is substantial rain in April, starting fungicide applications in April is advised. Since only four strobilurin fungicides can be used in a season for any purpose, it is recommended for fresh fruit to reserve strobilurin fungicides for times when phytotoxicity from copper applications is a concern (temperatures >90°F). For processing fruit, strobilurins can be used earlier in the season, and applications for greasy spot and melanose can be combined. It is recommended that strobilurin fungicides not be applied in two consecutive sprays to manage pathogen resistance. Currently, we do not have any other rotational fungicides for resistance management.

In addition to chemical control measures, practices to accelerate leaf litter decomposition beneath the trees to reduce the ascospore inoculum may be beneficial. Enhancing leaf litter degradation should commence in mid-March. There are three methods that have reduced the ascospore inoculum of *Mycosphaerella citri*, the fungus that causes greasy spot. The first is to increase the microsprinkler irrigations to at least 5 times a week for approximately a ½ hour per irrigation period for 1.5 months. The leaf litter decomposition will be greater compared to that with the traditional irrigation frequency. A drawback is that leaf litter reduction will be confined to the areas where the

microsprinklers reach. A second method is to apply urea (187 lb/treated acre) or ammonium sulfate (561 lb/acre) to the leaf litter. The final method is to apply dolomitic lime or calcium carbonate (2226 lb/treated acre) to the leaf litter. The decay rate is greater for litter treated with lime and inoculum production is reduced. All treatments worked equally well with *M. citri* and there is no indication that one method is better than another. Lime or irrigation methods should not be used in conjunction with the high N treatments, since they have opposite methods of action.

Care must be exercised in handling and moving citrus fruit, leaves, twigs and debris from citrus black spot (CBS) Quarantined Areas, since the disease may be easily and unwittingly spread to other citrus trees, nurseries or groves.

There are many rules and regulations that **Growers, Harvesters, Haulers, Processing, Packing Facilities and Haulers have to be aware of with relation to the black spot disease in Florida. For more information, go to:** https://crec.ifas.ufl.edu/extension/pest/PDF/Citrus%20Black%20Spot.pdf

READ THE LABEL.

See Table 1.

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

Table 1.
Recommended Chemical Controls for Citrus Black Spot

Pesticide	**FRAC MOA[2]**	**Mature Trees Rate/Acre[1]**
copper fungicide	M1	Use label rate.
Enable 2F4	3	8.0 fl/oz. Do not apply more than 24 oz/acre/season
Abound[3]	11	9.0-15.5 fl oz. Do not apply more than 92.3 fl oz/acre/season for all uses. Best applied with petroleum oil.
Gem 500 SC[3]	11	1.9-3.8 fl oz. Do not apply more than 15.2 fl oz/acre/season for all uses. Best applied with petroleum oil. Do not apply within 7 days of harvest.
Headline SC[3]	11	12-15 fl oz. Do not apply more than 54 fl oz/acre/season for all uses. Best applied with petroleum oil.
Pristine3,4	11 + 7	16-18.5 oz. No more than 74 oz/acre/season
Amistar Top3,4	11 + 3	15.4 fl oz. Do not apply more than 61.5 fl oz/acre/year
https://crec.ifas.ufl.edu/extension/pest/PDF/Citrus%20Black%20Spot.pdf		

IMPORTANCE OF SPRAYER CALIBRATION

Sprayers must be checked to ensure all nozzles are applying pesticides uniformly and at the correct rate. Make sure your equipment is working properly and calibrated to ensure the correct amount of pesticide is delivered to the target area.

Pesticide application, greater than the label rate, is illegal and can result in needless risk to groundwater, increased production costs, and crop damage. Under-application might be costly by not properly controlling the target pest. Although you can sometimes repeat the application, doing so is time-consuming, costs more, increases the risk of applying too much and increases the risk in pesticide resistance.

Regular sprayer calibration includes measuring the output of each nozzle to ensure all nozzles are functioning properly. Specific calibration guides are available from a number of sources. Sprayer calibration should be done every time a different pesticide is applied or at least once each season.

The rate of application depends partly on the particle or droplet size, texture, and other properties of the pesticide being applied. Use only water during the test if the pesticide is a liquid. Contact the manufacturer to get reliable information regarding carrier material to perform the tests if the pesticide is a dust, granule, or fumigant, or a liquid diluted with a liquid other than water.

Follow calibration and mixing instructions carefully. Mixing, loading, and calibration methods must also conform to the speed of the application machinery. Moving too fast or too slow changes the rate of application.

Minimizing spray drift

Spray drift, movement of a pesticide through air during or after application to a site other than the intended site of application is a challenging issue facing pesticide applicators. Complete elimination of spray drift is impossible. However, drift can be minimized by following these control measures:

1. Read and follow the pesticide label.
2. Select low or nonvolatile pesticides.
3. Use spray additives following label guidelines.
4. Use large orifice sizes for spray nozzles.
5. Avoid high sprayer pressures, which create finer droplets.
6. Use drift reduction nozzles.
7. Use wide-angle nozzles, lower spray boom heights, and keep spray boom stable.
8. Do not spray when wind speeds exceed 10 mph and when wind direction is directed toward sensitive vegetation.
9. Use a shielded spray boom when wind conditions exceed preferred conditions.
10. Avoid spraying on extremely hot and dry days, especially if sensitive vegetation is nearby.
11. Keep good records and evaluate the results.

IMPORTANCE OF FERTILIZER SPREADER CALIBRATION AND MAINTENANCE

Properly calibrated and maintained equipment ensures a more uniform distribution of nutrients. This, combined with other conservation practices, reduces production costs, soil surface runoff, and nutrient movement to nearby surface waters. Spreaders that have not been properly maintained and calibrated will have problems delivering accurate rates and evenly distributed fertilizer amounts to the grown crop.

Calibration

Calibration is the process used to help ensure that the equipment applies proper rates of the selected product. Proper calibration is the key to successful fertilizer use efficiency. Failure to calibrate equipment can result in ineffective applications. Applying too much is costly, unlawful and may cause crop injury. Applying too little can result in poor crop growth and production. It is important to calibrate equipment on a regular basis to compensate for variations. The equipment will become worn or damaged with use and result in inaccurate output and spread pattern.

Two items must be considered when calibrating a spreader. The first is the distribution pattern of the spreader. The second is the product application rate, which is the amount of product applied per acre. There are many factors that affect the distribution pattern of a rotary spreader and some of them relate directly to the product. For this reason, it is recommended that the spreader be calibrated separately for every product to be applied. Spreader calibration should be checked more often when the spreader is used frequently.

Product & application

Choose a product according to the need of the crop. Before applying the product, read the spreader manual. The spreader manual will usually indicate proper settings for various application rates. However, calibration still needs to be performed to ensure the settings are accurate and to compensate for wear and variations in equipment. Be sure that the proper procedures and application rates are followed. Check the ‘spread pattern’ and amount being applied. The physical properties of dry fertilizer can vary widely. Since larger particles are thrown further than small particles, a product of uniform size should be used to achieve a consistent application pattern. It is essential to maintain a constant speed when using a rotary spreader to obtain uniform and accurate distribution.

Maintenance and Cleaning

Proper care and maintenance will help retain precise applications and prolong the life of spreaders. Manufacturer’s directions on cleaning and lubricating should be followed. With the shutter or gate wide open, remove all granules from the spreader at the end of each application. Then, the spreader should be thoroughly washed and allowed to dry. Hot water may help break lose fertilizer which is caked on. Finally, lubricate the spreader according to instructions. Spreaders should be stored in a clean, dry place out of direct sunlight.

NUTRITION OF CITRUS TREES

Fertilizer management should include calibration and adjustment of fertilizer spreaders, booms, pumps, or irrigation systems to accurately deliver fertilizer rates and place fertilizers within the tree rootzone. To increase fertilizer efficiency, soil and leaf analysis data should be studied and taken into consideration when generating a fertilizer program and selecting a fertilizer formulation. Dry fertilizer application should be split into 3 to 4 applications per year with a complete balanced fertilizer. For mature trees, the highest nutrient requirement extends from late winter through early summer. This coincides with flowering, heavy spring flush, fruit set, and fruit development and expansion. For best fresh fruit quality, nutritional requirements, particularly nitrogen (N), should decrease late in the summer and fall. Based on tree demands, 2/3 to 3/4 of the yearly fertilizer amount should be applied between February and June. In warm areas such as southwest Florida where tree growth can continue certain years during the winter, fertilizer applications should also be made in the fall to satisfy vegetative growth demand. However, fall fertilizer applications may sometimes delay fruit color development and fruit maturity for early and mid-season cultivars. For more information, go to **"Nutrition of Florida Citrus Trees, 2nd Edition"** By Thomas A. Obreza and Kelly T. Morgan http://edis.ifas.ufl.edu/pdffiles/SS/SS47800.pdf

IFAS fertilizer guidelines for nonbearing citrus trees

Year in grove	Lb N/tree/year (range)	Lbs Fertilizer/tree/year (range)		Lower limit of application frequency	
		6-6-6	8-8-8	Dry	Fertigation
1	0.15 – 0.30	2.5-5.0	1.9-3.8	6	10
2	0.30 – 0.60	5.0-10.0	3.8-7.5	5	10
3	0.45 – 0.90	7.5-15.0	5.6-11.3	4	10

IFAS fertilizer guidelines for bearing citrus trees (4 years and older)

Oranges	Grapefruit	Other varieties	Lower limit of application frequency	
Lbs N/acre/year (range)			Dry	Fertigation
120 - 200	120 - 160	120 – 200	3	10

For more information on citrus nutrition, **get to the following EDIS publications:**

Increasing Efficiency and Reducing Costs of Citrus Nutritional Programs
Mongi Zekri, Thomas Obreza and Arnold Schumann
http://edis.ifas.ufl.edu/SS442 [pdf]

Irrigation, Nutrition, and Citrus Fruit Quality
Mongi Zekri, Thomas A. Obreza and Robert Koo
http://edis.ifas.ufl.edu/SS426 [pdf]

Fertigation Nutrient Sources and Application Considerations for Citrus
Brian Boman and Tom Obreza
http://edis.ifas.ufl.edu/CH185 [pdf]

Citrus Fertilizer Management on Calcareous Soils
Thomas A. Obreza, Mongi Zekri, and David V. Calvert
http://edis.ifas.ufl.edu/CH086 [pdf]

Boron and chlorine for citrus trees. UF Coop Ext. Ser.
Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS61900.pdf

Molybdenum and nickel for citrus trees. UF Coop Ext. Ser.
Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS61800.pdf

Iron and copper for citrus trees. UF Coop Ext. Ser. Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS61700.pdf

Manganese and zinc for citrus trees. UF Coop Ext. Ser.
Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS61600.pdf

Nitrogen (N) for citrus trees. UF Coop Ext. Ser.
Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58000.pdf

Phosphorus (P) for citrus trees. UF Coop Ext. Ser.
Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58100.pdf

Potassium (K) for citrus trees. UF Coop Ext. Ser.
Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58300.pdf

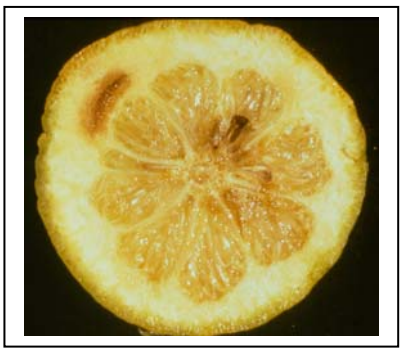
Magnesium (Mg) for citrus trees. UF Coop Ext. Ser.
Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58200.pdf

Calcium (Ca) and sulfur (S) for citrus trees. UF Coop Ext. Ser.
Zekri, M. and T.A. Obreza.
http://edis.ifas.ufl.edu/pdffiles/SS/SS58400.pdf

Boron (B)

Boron is particularly necessary where active cell division is taking place. Boron plays an important role in flowering, pollen-tube growth, fruiting processes, nitrogen (N) metabolism, and hormone activity. 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, misshaped 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.

To treat citrus affected with B deficiency, B compounds 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 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.

MICROSPRINKLER IRRIGATION & FERTIGATION

Microsprinkler irrigation is an important component of citrus production systems in Florida. Microirrigation is more desirable than other irrigation methods for several reasons. Three important advantages are: water conservation, the potential for significantly improving fertilizer management and for cold protection.

Research has shown that when properly managed (no overirrigation), water savings with microirrigation systems can amount to as much as 80% compared with subirrigation and 50% compared with overhead sprinkler irrigation.

Microirrigation provides for precise timing and application of fertilizer nutrients in citrus production. Fertilizer can be prescription-applied during the season in amounts that the tree needs and at particular times when those nutrients are needed. This capability helps growers increase the efficiency of fertilizer application and should result in reduced fertilizer applications for citrus production. Research has also shown the important advantage of microsprinklers for freeze protection of citrus.

Fertigation is the timely application of small amounts of fertilizer through irrigation systems directly to the root zone.

Some advantages of fertigation:

♦ Fertilizer is placed in the wetted area where feeder roots are extensive,

♦ Fertilizer may be applied more frequently in small amounts so that it is available when the tree needs it,

♦ Increased fertilizer application frequency can increase fertilizer efficiency and reduce leaching,

♦ Application cost is much lower than that of dry or foliar fertilizer application.

Through fertigation, comparable or better yields and quality can be produced with less fertilizer. Microirrigation systems must properly maintain to apply water and fertilizer uniformly. Growers must determine:

(1) which fertilizer formulations are most suitable for injection,

(2) the most appropriate fertilizer analysis for different age trees and specific stages of growth,

(3) the amount to apply during a given fertigation event, and

(4) the timing and frequency of applications.

Properly managed applications of plant nutrients through irrigation systems significantly enhance fertilizer efficiency while maintaining or increasing yield. On the other hand, poorly managed fertigation may result in substantial yield losses. Fertigation involves deciding which and how much nutrients to apply, selecting the most effective formulations and scheduling injections to ensure that essential nutrients are available as needed.

Injection Duration

A minimum injection time of 45 to 60 minutes is recommended. This time is sufficient for uniform distribution of nutrients throughout the fertigation zone. Limit injection time to prevent the application of too much water, because excessive water leaches plant nutrients below the root zone.

MOBILE IRRIGATION LAB

The Agricultural MIL is a FREE service that serves Florida. For an Agricultural MIL evaluation in Southwest Florida call **(239) 455-4100**

Assisting the agricultural community by improving irrigation efficiency and conserving water.

The Mobile Irrigation Lab program is an ongoing joint effort between the District, the U.S. Department of Agriculture–Natural Resources Conservation Service (USDA–NRCS) and the agricultural community. The program began in 1987 to assist the District in meeting its statutory responsibilities and to assist growers with water conservation.

The Mobile Irrigation Lab is a free volunteer service to the agricultural community. Any grower can contact the District to arrange a free evaluation. It was expanded to help growers meet water use permit conditions. District staff has used high pumpage reports to identify users who might wish to voluntarily reduce water use before a resource problem or permit violation occurs.

A trained technician is invited to a grower's field and collects irrigation system and specific field data. System pressure and irrigation uniformity data are then reviewed and computer-analyzed. A report provides recommendations for improvements and irrigation schedules. If needed, the technician assists the local NRCS office in the redesign of the system.

An irrigation schedule offers a general guide to determine when and how much to irrigate based on system efficiency, crop requirements and soil characteristics.

In addition to the benefits of free irrigation evaluations, water conservation and water quality improvements, the program shares valuable technology and information with growers.

Mobile Irrigation Lab data suggests that most evaluated systems are already at or above permitted efficiency standards. With only minor improvements, about half the sites below these standards could easily meet them. Typically, if all recommendations are implemented, overall system irrigation efficiency can improve by an estimated 17 percent — helpful to any grower's bottom line, as well as the region's water resources.

Flatwoods Citrus

☐ 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:_____

Address:_____

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