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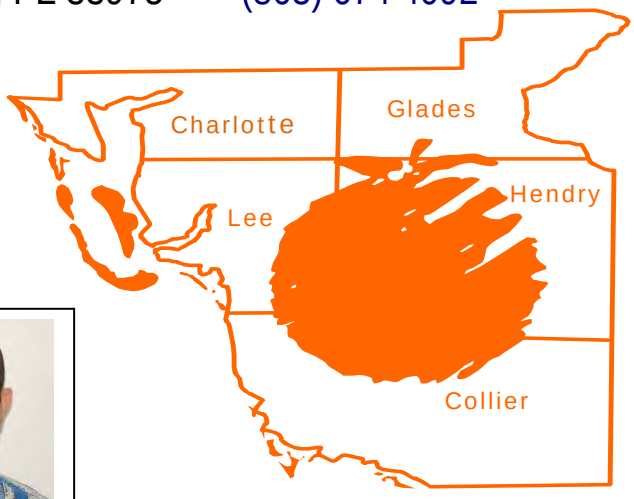
Flatwoods Citrus



Vol. 26, No. 2 **February 2023**

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

Mongi Zekri

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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
851 Trafalgar Ct, Suite 310E, Maitland, FL 32751-4132
(407) 648-6013 · (855) 271-9801 FAX · www.nass.usda.gov/fl

February 8, 2023

Florida All Orange Production Down 11 Percent from January Forecast
Florida Non-Valencia Orange Production Down 14 Percent
Florida Valencia Orange Production Down 9 Percent
Florida All Grapefruit Production Unchanged
Florida All Tangerine and Tangelo Production Unchanged

FORECAST DATES - 2022-2023 SEASON	
March 8, 2023	May 12, 2023
April 11, 2023	June 9, 2023
July 12, 2023	

Citrus Production by Type – States and United States

Crop and State	Production [1]		2022-2023 Forecasted Production [1]	
	2020-2021	2021-2022	January	February
	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)
Non-Valencia Oranges [2]				
Florida	**22,700**	**18,250**	**7,000**	**6,000**
California [3]	41,300	31,800	38,000	38,000
Texas [3]	1,000	170	900	900
United States	65,000	50,220	45,900	44,900
Valencia Oranges				
Florida	**30,250**	**22,800**	**11,000**	**10,000**
California [3]	7,700	8,600	8,100	8,100
Texas [3]	50	30	250	250
United States	38,000	31,430	19,350	18,350
All Oranges				
Florida	**52,950**	**41,050**	**18,000**	**16,000**
California [3]	49,000	40,400	46,100	46,100
Texas [3]	1,050	200	1,150	1,150
United States	103,000	81,650	65,250	63,250
Grapefruit				
Florida-All	**4,100**	**3,330**	**1,500**	**1,500**
Red	**3,480**	**2,830**	**1,320**	**1,320**
White	**620**	**500**	**180**	**180**
California [3]	4,200	4,100	4,300	4,300
Texas [3]	2,400	1,700	2,200	2,200
United States	10,700	9,130	8,000	8,000
Lemons [3]				
Arizona	750	950	1,500	1,500
California	20,100	24,900	22,000	22,000
United States	20,850	25,850	23,500	23,500
Tangerines and Mandarins [4]				
Florida	**890**	**750**	**500**	**500**
California [3]	28,800	17,400	22,000	22,000
United States	29,690	18,150	22,500	22,500

[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 (including Navel) and midseason varieties in Florida and Texas.
[3] Estimates carried forward from January.
[4] Includes tangelos and tangors.

All Oranges 16.0 Million Boxes

The 2022-2023 Florida all orange forecast released today by the USDA Agricultural Statistics Board is 16.0 million boxes, down 2.00 million boxes from the January forecast. If realized, this will be 61 percent less than last season's final production. The forecast consists of 6.00 million boxes of non-Valencia oranges (early, mid-season, and Navel varieties) and 10.0 million boxes of Valencia oranges. A 9-year regression has been used for comparison purposes. All references to "average", "minimum", and "maximum" refer to the previous 10 seasons, excluding the 2017-2018 season, which was affected by Hurricane Irma. Average fruit per tree includes both regular and first late bloom.

Non-Valencia Oranges 6.00 Million Boxes

The forecast of non-Valencia production is reduced 1.00 million boxes to 6.00 million boxes. Size and drop components were final last month. The Row Count survey conducted January 24-25, 2023, showed 92 percent of the early and mid-season non-Valencia rows, excluding Navels, are harvested. Estimated utilization for non-Valencia oranges (including Navels) to February 1, with an allocation for non-certified fruit, is 5.77 million boxes. The Navel forecast, included in the non-Valencia portion of the forecast, is 250,000 boxes.

Valencia Oranges 10.0 Million Boxes

The forecast of Valencia production is down 1.00 million boxes from the January forecast to 10.0 million boxes. Current fruit size is below the minimum and is projected to be below the minimum at harvest. Current droppage is above the maximum and projected to be above maximum at harvest.

All Grapefruit 1.50 Million Boxes

The February forecast of all grapefruit production is unchanged at 1.50 million boxes. The red grapefruit forecast is unchanged at 1.32 million boxes. The white grapefruit forecast also is unchanged at 180,000 boxes. Fruit size and drop are final in this report. White grapefruit final size is above average, while red grapefruit final size is below the minimum. Drop for white grapefruit is above average, while red grapefruit drop is above the maximum. Estimated utilization for white grapefruit to February 1, with an allocation for non-certified fruit, is 62,000 boxes and for red grapefruit is 1.11 million boxes. The Row Count survey conducted January 24-25, 2023 showed 47 percent of the grapefruit rows are harvested.

Tangerines and Tangelos 500,000 Boxes

The forecast for tangerines and tangelos is unchanged from the January forecast and is 500,000 boxes, 33 percent less than last season's utilization of 750,000 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 6.3 percent. If you exclude the three abnormal production seasons (three hurricane seasons), the "Root Mean Square Error" is 6.4 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 6.3 percent, or 6.4 percent excluding abnormal seasons. Chances are 9 out of 10 (90 percent confidence level) that the difference will not exceed 10.9 percent including abnormal seasons and 11.1 percent excluding abnormal seasons.

Changes between the February 1 Florida all orange forecast and the final estimates during the past 20 years have averaged 5.55 million boxes (5.20 million, excluding abnormal seasons), ranging from 0.05 million boxes to 12.7 million boxes including abnormal seasons, (0.70 to 12.7 million boxes excluding abnormal seasons). The February 1 forecast for all oranges has been below the final estimate 8 times, above 12 times, (below 7 times, above 10 times, excluding abnormal seasons). The difference does not imply that the February 1 forecasts this year are likely to understate or overstate final production.

Citrus workshop via Zoom

22 February 2023 Citrus Workshop

Date and time: Wednesday, February 22, 2023, 11:00 AM – 12:00 Noon

Title: Citrus Pests and Management in Traditional Orchards and CUPS

Speaker: **Dr. Jawwad Qureshi**, Associate Professor in Entomology, UF-IFAS Southwest Florida Research and Education Center, Immokalee.

Dr. Qureshi will provide knowledge and understanding of the pests, which attack citrus crops in the traditional open orchards and Citrus Under Protective Screen (CUPS). This includes recognition and monitoring of pests and beneficial organisms as well as management of the pests using cultural, biological, and chemical methods of control, particularly for Asian citrus psyllid.

--To register and attend via Zoom, here is the Zoom link:

https://ufl.zoom.us/j/97167367013?pwd=cWovR05MR2lXT0MzRDlubU9wQzl0QT09

After registering, you will receive a confirmation email containing information about joining the Zoom meeting.

Coordinator: Dr. Mongi Zekri, UF-IFAS, maz@ufl.edu

1 CEU for pesticide license renewal

1 CEU for certified crop advisors

CEUs for pesticide license renewal

Earn CORE CEUs online through Southeast AgNet & Citrus Industry magazine

http://citrusindustry.net/ceu/

The following series of articles and quizzes are available with their expiration dates noted:

- **2023 #1:** Key Terms to Know When Using Pesticides (1/31/24)
- **2022 #4:** Making Sense of Pesticide Formulations (10/31/23)
- **2022 #3:** Agricultural Pesticide Licensing: Frequently Asked Questions (7/31/23)
- **2022 #2:** How Weather Affects Pesticide Applications (4/30/23)

Each article grants one General Standards (Core) CEU when submitted and approved toward the renewal of a Florida Department of Agriculture and Consumer Services restricted-use pesticide license.

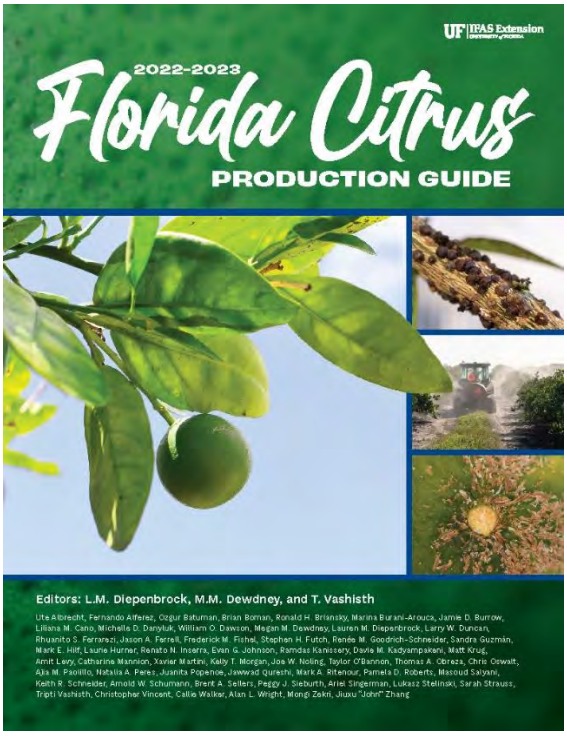
https://crec.ifas.ufl.edu/resources/production-guide/

The objective of the Florida Citrus Production Guide is to assist citrus growers in the identification of pest management options and the selection of appropriate control measures. This publication should serve as a reference once it has been determined that control measures might be warranted. It is not intended to replace pesticidal product labels which contain important usage information and should be immediately accessible for reference. Violations of directions for use printed on the label are against State and Federal laws. Care should be taken to select only those treatments best suited for control of the specific pest(s) identified as requiring suppression. Products listed in all tables have been shown to be efficacious, non-phytotoxic to citrus, and relatively safe on non-target arthropods and microorganisms when used as directed. However, it is important to realize that results may not be consistent under different environmental, application, and tank mix conditions.

PRODUCTION GUIDE MENU

If you did not pick up your hard copy of the newly updated Florida Citrus Production Guide at the Citrus Expo, you can find the electronic version online https://crec.ifas.ufl.edu/resources/production-guide/

If you need hard copies, you can get them free from your Citrus Extension Agent or from the Citrus Research & Education Center in Lake Alfred and the Southwest Florida Research and Education Center in Immokalee.



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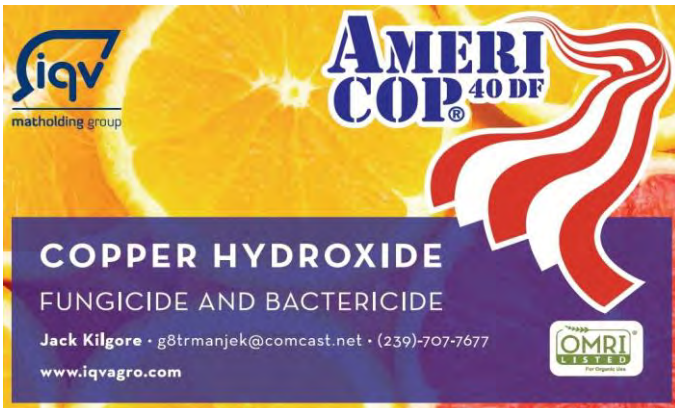

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EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by

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

12 January 2023

ENSO Alert System Status: La Niña Advisory

Synopsis: A transition from La Niña to ENSO-neutral is anticipated during the February-April 2023 season. By Northern Hemisphere spring (March-May 2023), the chance for ENSO-neutral is 82%.

During December, below-average sea surface temperatures (SSTs) weakened over the equatorial Pacific Ocean [Fig. 1]. All of the latest weekly Niño index values were between -0.7°C and -0.8°C [Fig. 2]. The subsurface temperature anomalies also weakened substantially [Fig. 3], but below-average subsurface temperatures persisted near the surface and at depth in the eastern equatorial Pacific Ocean [Fig. 4]. However, the atmospheric circulation anomalies over the tropical Pacific Ocean did not notably weaken. Low-level easterly wind and upper-level westerly wind anomalies remained across most of the equatorial Pacific. Suppressed convection persisted over the western and central tropical Pacific, while enhanced convection was observed around Indonesia [Fig. 5]. Overall, the coupled ocean-atmosphere system continued to reflect La Niña.

The most recent IRI plume predicts that La Niña will transition to ENSO-neutral during the Northern Hemisphere winter 2022-23 [Fig. 6]. Interestingly, the dynamical models indicate a faster transition (January-March) than the statistical models (February-April). At this time, the forecaster consensus favors the statistical models, with a transition to ENSO-neutral in the February-April 2023 season. The sustained atmospheric circulation anomalies and the weakening downwelling oceanic Kelvin wave do not support an imminent transition. However, lower accuracy during times of transition, and when predictions go through the spring, means that uncertainty remains high. In summary, a transition from La Niña to ENSO-neutral is anticipated during the February-April 2023 season. By Northern Hemisphere spring (March-May 2023), the chance for ENSO-neutral is 82% [Fig. 7].

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). Additional perspectives and analysis are also available in an ENSO blog. A probabilistic strength forecast is available here. The next ENSO Diagnostics Discussion is scheduled for 9 February 2023.

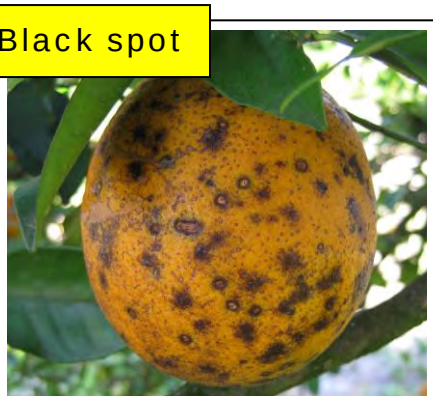
To receive an e-mail notification when the monthly ENSO Diagnostic Discussions are released, please send an e-mail message to: ncep.list.enso-update@noaa.gov.

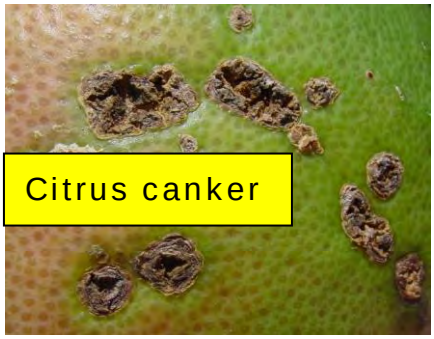
Climate Prediction Center
National Centers for Environmental Prediction
NOAA/National Weather Service

Fungicide effectiveness

Products	Canker	Greasy Spot	Alternaria	Scab	Melanose	Black spot	PFD
Copper	**Good**	**Good**	**Good**	Moderate	**Good**	Moderate	Weak
Oil	None	**Good**	None	None	None	None	None
Ferbam	None	Weak	Moderate	Moderate	Weak	Weak	Weak
Enable 2F		**Good**		**Good**		**Good**	
Headline	None	**Good**	**Good**	**Good**	**Good**	**Good**	**Good**
Abound	None	**Good**	**Good**	**Good**	**Good**	**Good**	**Good**
Gem	None	**Good**	**Good**	**Good**	**Good**	**Good**	**Good**
Pristine	None	**Good**	**Good**	**Good**	**Good**	**Good**	**Good**
Amistar Top	None	**Good**	**Good**	**Good**	**Good**	**Good**	**Good**

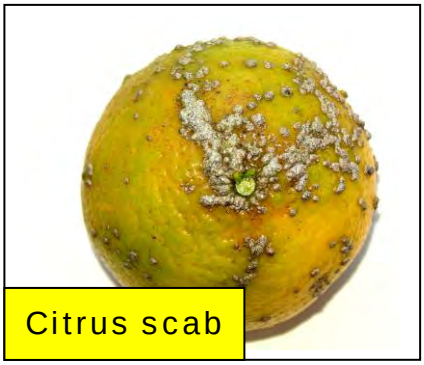
Black spot





Greasy spot

Alternaria Brown spot



PFD

Citrus Spray Programs

Dr. Jawwad Qureshi and Dr. Phil Stansly, UF IFAS- Immokalee

Asian citrus psyllid (ACP) control has been the main objective of Florida citrus growers due to its role in the spread of huanglongbing (HLB) since 2005. While some may question the value of controlling ACP in trees with high HLB incidence, replicated field studies have shown the economic benefit of maintaining young flush pathogen free. Good ACP control starts with effective dormant sprays that will control ACP when populations are low, reduce its infestation and thus HLB infection of the all-important spring flush. Pyrethroids (e.g., Danitol, Baythroid or Mustang) and organophosphates (e.g., dimethoate or Imidan) provide great winter season control of ACP. Best not to use pyrethroids or OPs again during the year except for border sprays which will reduce the need for whole block applications. Follow up with bloom sprays of labeled products to clean up stragglers. Subsequent whole block sprays should target ACP as well as other pests like rust mites and leafminers that may be problematic.

The table below provides some examples of products for different months, depending on which pests are of major concern at the time. Neonicotinoids have not been included as spray option due to their importance for controlling ACP in young trees through soil application. Make choices based on: (1) effectiveness against ACP and other pests that may be problematic, (2) avoiding repetition of any insecticide mode of action in the interest of resistance management, and (3) rebuilding and maintaining an effective natural enemy complex in the grove. Confining the broad-spectrum insecticides (pyrethroids and organo-phosphates) to the winter season and border sprays during growing season will help conserve these products as well as populations of beneficial insects and mites.

Spray Options for Citrus Pest Management

Dormant Season — **Growing Season**

Months	Nov-Dec	Jan	Feb-Mar	Apr	May - June	July - Aug	Sep-Oct
Products *** Labeled for bloom**	OP[1] (e.g. Imidan, Dimethoate)	Pyrethroid[2] (Mustang Danitol Baythroid)	*Sivanto[3] *Movento[4] *Portal[5] *Micromite[6] Intrepid[7] Exirel[8]	Portal[5] Micromite[6] Exirel[8] Apta[9] Sivanto[3] Oil[13]	Movento[4] Delegate[11] Abamectin[12] Knack[14] Exirel[8] Apta[9] Sivanto[3] Oil[13] MinectoPro[10]	Sivanto[3] Apta[9] OP[1] MinectoPro[10] Oil[13]	Movento[4] Delegate[11] Apta[9] Sivanto[3] Oil[13]
Pests	ACP Weevils	ACP Weevils	ACP, Mites Leafminer Weevils Scales Aphids	ACP Mites Leafminer Weevils Aphids	ACP Rust mite Leafminer Scales	ACP	ACP Rustmite Leafminer

ACP[+++ 1,2,3,4,8,9,10] ACP[++ 5,11] ACP[+ 6,12, 13] Leafminer[6,7,8, 10,11,12,13] Rustmite[4, 6,12,13]
Scales[4,12,13] Aphids[3,4] Mealybugs[3,4] (+++ excellent, ++ good, + fair)

FOLIAR FEEDING OF CITRUS TREES

Foliar fertilizer application is certainly not a new concept to the citrus industry. For over five decades, foliar fertilization of citrus has been recommended to correct zinc, manganese, boron, copper, and magnesium deficiencies. It is now common knowledge in agriculture that properly nourished crops may tolerate insect pests and diseases. Traditionally citrus growers try to achieve optimum nutrition through direct soil management. Currently with the introduction of citrus greening in Florida, many growers and production managers consider foliar fertilization a key factor to stimulate the natural defense mechanisms of their trees, to induce pest and disease tolerance, and to improve fruit yield and fruit quality.

In Florida, foliar nutrition programs are becoming very common and extensively used to deliver all of the essential nutrient elements to citrus trees. Furthermore, economic and environmental considerations require the utilization of more efficient methods for nutrient applications. Foliar application of fertilizers is more efficient than traditional soil application because of better, faster nutrient uptake and reduced losses. Although field research has shown that supplemental foliar feeding can increase yield by 10-25% compared with conventional soil fertilization, foliar fertilization should not be considered a substitute for a sound soil-fertility program.

Foliar fertilizer application is highly efficient because the materials are targeted to areas where they can be directly absorbed into the plant. However, nutrients foliarly applied prior to a rainfall are subject to being washed off the leaves and onto the soil. Foliar fertilizer application also provides a more timely and immediate method for delivery of specific nutrients at critical stages of plant growth. Foliar nutrition programs are therefore valuable supplements to soil applications. As indicated previously, foliar feeding is not intended to replace soil-applied fertilization of the macronutrients (nitrogen, potassium, and phosphorus). Foliar applications of macronutrients can however be alternatively applied in sufficient quantities to influence both yield and fruit quality. Citrus trees can have a large part of the annual nitrogen requirements met through foliar applications. Foliar applications of other macronutrients (calcium, magnesium, and sulfur) and micronutrients (zinc, manganese, copper, boron, and molybdenum) have proven to be an excellent means for satisfying citrus tree requirements.

Because fertilizer applications to the soil can be subjected to undesirable processes such as leaching, runoff, and being tied up in the soil in unavailable forms, foliar applications of nutrients have been designed to be an integral component of overall tree nutrition programs. It is used in other situations to help trees through short, but critical periods of nutrient demand, such as vegetative growth, bud differentiation, fruit set and fruit growth. Foliar application of nutrients is of great 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 nutrient uptake. Foliar nutrition is proven to be useful under prolonged periods of wet conditions, droughty 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 effectively utilized when a nutritional deficiency is diagnosed. Foliar application is absolutely the quickest method of getting the most nutrients into plants. However, if the deficiency can be observed on the tree, the crop has already lost some potential yield.

While foliar feeding has many advantages, it can burn leaves at certain rates under certain environmental conditions. It is important, therefore, to foliar feed within some established guidelines. There are a number of plant, soil, and environmental conditions that can increase the chances of causing foliar burn to foliar fertilizer application. For example, a tree under stress is generally more susceptible to damage. Stressful conditions include drying winds, disease infection, and unfavorable soil conditions. The environmental conditions at the time of application are also important factors. Applications when the weather is hot (above 80^0F) should be avoided. This means that during warm seasons, applications should be made in the morning or evening when the temperature is right, wind is minimal, and the stomates on citrus leaves are open, allowing leaves to efficiently exchange water and air.

Nutrient absorption is increased when spray coverage reaches the undersides of the leaves where the stomates are located. Favorable results from foliar feeding are most likely to occur when the total leaf area is large. Foliar applications of micronutrients with the exception of iron are more effective and efficient when the spring, summer, and fall new flush leaves are about fully expanded. Additionally, applications should be at least two-week apart to give the tree sufficient time to metabolize the nutrients and deal with the added osmotic stress. To be efficient and to avoid crop damage, dilute solutions of nutrient formulations are recommended. Highly concentrated sprays, especially those including salt-based fertilizers, have the potential to cause leaf burn and/or drop.

Another important factor when applying nutrients foliarly is to ensure that the pH of the spray solution is in the proper range (between 5.5 and 6.5). This is particularly important in areas where water quality is poor. In order to enhance uptake and thus the effectiveness of any foliar application, nitrogen should be added to the solution. Urea may be the most suitable nitrogen source for foliar applications due to its low salt index and high solubility in comparison with other nitrogen sources. Urea has been shown to stimulate absorption of other nutrients by increasing the permeability of leaf tissue. However, the urea utilized in foliar sprays should be low in biuret content (0.2% or less) to avoid leaf burn. Other sources of nitrogen can be obtained from ammonium polyphosphates, ammoniated ortho-phosphates, potassium nitrate, calcium nitrate, and ammonium thiosulfate. These sources, when utilized at low rates of foliar application, are excellent supplemental nitrogen carriers with minimal foliage burn side-effects. Triazone nitrogen has been shown to significantly reduce leaf burn and enhance foliar absorbed nitrogen compared with urea, nitrate, and ammonium nitrogen sources.

The use of a combination of poly and ortho-phosphates has been shown to lessen leaf burn and aid in leaf phosphate absorption. Phosphites have also been found useful, safe, and not phytotoxic as foliar sprays on citrus trees. Potassium polyphosphates, potassium hydroxide, potassium nitrate and potassium thiosulfate sources combine both low salt index and high solubility characteristics. Foliar application of calcium, magnesium, sulfur, zinc, manganese, copper, boron and molybdenum can be highly effective to satisfy nutrient requirements. However, there can be difficulties associated with leaf tissue absorption and translocation of calcium, magnesium, boron and molybdenum. Choosing the correct fertilizer sources for these nutrients can be critical.

Be careful about possible chemical interactions among foliar fertilizers. Some materials are incompatible and should not be mixed together. They may create precipitates that tie up and make some nutrients unavailable and/or clog spray nozzles. Many product labels warn of such incompatibilities. If there is no specific packaging information, small quantities of the materials should be mixed with water in a jar and shaken. If there is no precipitate, there should be no problem. Foliar fertilization can sometimes be combined with pesticide application. However, timing conflicts and material incompatibilities can sometimes make combining such sprays unwise. Be sure to read all product labels and do the jar's test if uncertain.

Foliar applications of low biuret urea at 12-14 gallons or at 53-60 lbs (24-28 lbs N) per acre or phosphite (PO_3) at 3 pints (60% P) to 2 quarts (26% P) per acre in late December-early January (6 to 8 weeks before bloom) have been demonstrated to increase flowering, fruit set, and fruit production. Postbloom foliar applications of potassium nitrate or mono-potassium phosphate at 8 lbs K_2O per acre have also been found to increase yield and fruit size. Foliar spray applications of 3-5 lbs/acre of magnesium, manganese, zinc, and copper, and 0.25-0.50 lb/acre of boron and molybdenum are also recommended on each of the 3 major flushes of citrus trees to prevent nutrient deficiencies, cope with HLB, and improve production. Sulfate forms are less expensive and nitrate forms appear to facilitate the uptake of micronutrients.

Conclusion. Today, foliar feeding is playing an important role in Florida citrus production. It is rapidly gaining ground as a nutritional supplement to soil-applied fertilizers to improve yield and fruit quality, particularly in the face of HLB (citrus greening). Foliar nutrition is also a very important and effective way of addressing diagnosed problems with specific deficiencies observed within the grove and a best management strategy for supplying micronutrients with the exception of iron. The concept that foliar sprays should be applied only after the appearance of a deficiency is unsound since reductions in yield and quality usually precede the appearance of visual symptoms. Foliar sprays of nutrients should be used with the objective of maintaining citrus trees health at an optimal level. However, foliar fertilization should be considered a supplement, not a substitute for a sound soil-fertility program.

Citrus tree performance under soil-applied fertilizer program supplemented with foliar nutrition.

PLANT GROWTH REGULATORS (PGRs)

Plant growth regulator sprays can provide significant economic advantages to citrus growers when used in appropriate situations. Many citrus growers routinely use PGRs to enhance crop profitability. Depending on variety and timing, PGRs may improve fruit set, increase fruit size by reducing cropload, extend the harvest season by delaying rind aging, and reduce preharvest fruit drop. Excessive rates, improper timings, untested surfactants or tank mixes, and inappropriate environmental conditions can result in phytotoxicity, erratic results, and/or greatly reduced cropping. Growers are urged to become familiar with PGRs through application to small plots before treating significant acreage. To avoid drift onto susceptible crops in surrounding areas, products containing 2,4-D (2,4-Dichlorophenoxyacetic acid) have stringent requirements for application conditions. READ THE LABEL. Consult with your County Extension Office.

Since PGRs function by directly influencing plant metabolism, plant response can vary considerably with concentration, making sprayer calibration and accurate material measurement especially important. Studies show that variability in spray deposition increases as spray volume is reduced below 250 gallons/acre in mature citrus groves. At lower water rates, canopy closest to the sprayer manifold tends to retain much more material than other plant surfaces. Because material concentration is especially important in PGR use, water volumes below 125 gallons/acre are not generally recommended.

Unlike most agrichemicals applied to crop, efficacy of PGRs depends on entry of materials into plant tissues. Uptake is influenced by a number of factors: amount of PGR applied, concentration of PGR, presence of surfactants, solution pH, environmental conditions during and after application, foliage condition, and plant stress level. Application of PGRs is recommended only on healthy citrus blocks. Even when properly applied, some PGRs may cause leaf curling, especially when sprayed on young leaves.

GIBBERELLIC ACID (GA_3) is recommended to be used on citrus hybrids that are weakly parthenocarpic and without sufficient cross-pollination to improve fruit set. Applied from full bloom to two-third petal fall, GA can effectively set and produce an excellent crop of seedless Robinson, Nova, Orlando, Minneola, or other self-incompatible mandarin hybrids. Use Gibeerellic acid (GA_3, 4.0% liquid concentrate) at the rate of 10-20 oz/acre. Products marketed include: Pro-Gibb, GibGro, and Gibbex. Because material concentration is important in plant growth regulators, water volumes below 125 gallons/acre are not recommended. Do not use in water above pH 7.5 because uptake will be reduced. Care should also be exercised in not exceeding the recommended GA dosage or concentration because it can cause severe leaf drop.
READ THE LABEL

PLANT GROWTH REGULATORS FOR CITRUS IN CALIFORNIA

The plant growth regulators 2,4-dichlorophenoxyacetic acid (2,4-D), gibberellic acid (GA_3) are registered for preharvest use on California citrus crops. 2,4-D is used mainly to delay and reduce unwanted fruit abscission (fruit drop), GA_3 is used mainly to delay senescence (overripening).

In order to be effective, plant growth regulators must be absorbed by plant tissue. Good spray coverage is essential and climatic conditions that favor absorption are therefore desirable.

Both 2,4-D and GA_3 seem to be compatible with urea, potassium foliar sprays, zinc and manganese micronutrient sprays, and neutral copper sprays, but the timing of growth regulator applications may not coincide with the best time for nutrient sprays.

2,4-dichlorophenoxyacetic acid (2,4-D). 2,4-D is used to control preharvest fruit drop, increase fruit size (oranges, grapefruit, mandarin, and mandarin hybrids), and to control leaf and fruit drop following an oil spray. When you use 2,4-D to reduce drop of mature fruit, apply the compound before (preferably *shortly* before) fruit drop becomes a problem, but far enough ahead of flowering to minimize undesirable effects that 2,4-D would otherwise have on the spring cycle of growth. For navel oranges, October through December sprays are common. October, however, may be too early to effectively reduce fruit drop if conditions favor it (e.g., warm winter, protracted harvest). January sprays may be somewhat risky, especially when environmental factors favor an earlier-than-usual spring flush of growth.

For mature grapefruit and 'Valencia' orange trees, 2,4-D can be applied to control drop of mature fruit or as a dual-purpose spray (to control mature fruit drop and to improve fruit size for the next year's crop). Fruit-sizing sprays require excellent coverage. In general, 'Valencia' orange is more responsive than grapefruit to fruit-sizing sprays. For mandarin and mandarin hybrids, 2,4-D fruit sizing sprays are applied 21 to 35 days after 75% petal fall.

Gibberellic acid (GA_3). The purpose of applying GA_3 to citrus trees in California is to delay fruit senescence. Make applications while the fruit are still physiologically young, but are approaching maturity. GA_3 can have a negative effect on flowering and thus on production for the following year, especially if it is applied much later than specified on the current label or in these guidelines. It delays changes in rind color, an effect that can be considered either desirable or undesirable. For example, if you apply GA_3 to navel orange trees while the fruit still have green rinds, delayed coloring will have a negative effect on your ability to harvest and market the fruit early in the season. In contrast, this effect is desirable for late-harvested fruit because it delays rind senescence, which results in fruit that are paler in color than the deeper-colored fruit from untreated trees. GA_3 applications amplify the re-greening of "Valencia" oranges. This is considered undesirable and can be minimized if you apply the compound no later than the date specified on the label or in these guidelines. GA_3 application may result in leaf drop, which can be severe, especially when it is applied to navel orange trees that are under heat or water stress. When this happens, the tree may also suffer twig dieback. By including 2,4-D in the GA_3 spray, you may be able to reduce this kind of damage.

C. J. Lovatt, Botany and Plant Sciences, UC Riverside
C. W. Coggins, Jr., Botany and Plant Sciences, UC Riverside

PLANT GROWTH REGULATORS IN FLORIDA

By Davies, Ismail, Stover, and Wheaton, UF-IFAS

Plant growth regulator (PGR) sprays can provide significant economic advantages to citrus growers when used in appropriate situations. Many citrus growers routinely use PGRs to enhance crop profitability. Depending on variety and timing, PGRs may improve fruit set, increase fruit size by reducing cropload, extend the harvest season by delaying rind aging, reduce preharvest fruit drop, or reduce hand-suckering by controlling trunk sprout growth in young citrus trees. Excessive rates, improper timings, untested surfactants or tank mixes and inappropriate environmental conditions can result in phytotoxicity, erratic results and/or greatly reduced cropping. Growers are urged to become familiar with PGRs through application to small plots before treating significant acreage. To avoid drift onto susceptible crops in surrounding areas, products containing 2,4-D (2,4-Dichlorophenoxyacetic acid) have stringent requirements for application conditions.

Importance of material concentration and spray volume

Most registered pesticides are effective over a fairly broad concentration range with little likelihood of phytotoxicity. Since PGRs function by directly influencing plant metabolism, plant response can vary considerably with concentration, making sprayer calibration and accurate material measurement especially important. Studies show that variability in spray deposition increases as spray volume is reduced below 250 gallons/acre in mature citrus groves. At lower water rates, canopy surfaces closest to the sprayer manifold tend to retain much more material than other plant surfaces. Because material concentration is especially important in PGR use, water volumes below 250 gallons/acre are not recommended.

PGR uptake

Unlike most agrichemicals applied to crop plants, efficacy of PGRs depends on entry of materials into plant tissues. Uptake is influenced by a number of factors: amount of PGR applied, concentration of PGR, presence of surfactants, after application, and plant stress level.

Effect of surfactants and tank mixes

Surfactants and other spray adjuvants can affect uptake in several ways. Surfactants and oils spread spray materials over leaf surfaces, and increase uptake by enhancing the total area contacted by spray solution. Many surfactants, urea, ammonium salts and oils can also directly enhance uptake by helping materials penetrate the plant cuticle. Organosilicone surfactants and some oils can result in very rapid uptake by carrying material through plant pores known as stomates. Surfactants can significantly enhance entry of PGRs into plant tissues, however, most PGR studies in citrus were conducted without surfactants or with less effective surfactants than many currently available. Use of untested surfactants may significantly enhance uptake, resulting in excessive plant response and/or phytotoxicity. Tank mixing with other spray materials may influence PGR uptake through surfactants or oils in material formulation or may bind PGR molecules rendering them ineffective.

https://edis.ifas.ufl.edu/pdffiles/HS/HS131000.pdf

Plant Growth Regulators

Tripti Vashisth, Chris Oswalt, Mongi Zekri, Fernando Alferez, and Jamie D. Burrow

There are five classic groups of Plant growth regulators (PGRs): auxins, gibberellins, cytokinins, abscisic acid, and ethylene. In addition to the five classic PGRs, other groups of biochemicals are now also recognized as PGRs. They include jasmonates, salicylic acid, strigolactones, and brassinosteroids. Each group of PGRs has unique attributes and is involved in a number of different physiological processes. It is very important to keep in mind that PGRs do not work in isolation. Plant response and efficacy of materials often depend on several factors, such as the concentrations of the materials, levels of other plant hormones, plant health, nutritional and water status, time of year, and climate. For example, the influence of gibberellins on citrus flowering, fruit set, seedlessness, color development, and preharvest fruit drop varies with many of these factors.

Auxins

Auxins were among the first plant hormones identified. Auxins are known to be involved in plant-cell elongation, apical dominance, inhibition of lateral bud growth, promotion of rooting, suppression of abscission, inhibition of flowering, and seed dormancy. A well-known auxin is indole acetic acid (IAA), which is produced in actively growing shoot tips and developing fruit.

Synthetic auxin analogs like 2, 4-dichlorophenoxyacetic acid (2, 4-D) and naphthalene acetic acid (NAA) are extensively used in fruit crop production. 2, 4-D is commonly used in agriculture as an herbicide. It is also used to control preharvest fruit drop and to increase fruit size, particularly in oranges, grapefruit, mandarin, and mandarin hybrids. The efficiency of 2, 4-D in reducing preharvest fruit drop increases when used with oil sprays. The timing of 2, 4-D application to reduce preharvest fruit drop should be carefully assessed to minimize undesirable effects on flowering and harvest timing. NAA is used to inhibit the undesirable growth of suckers on tree trunks. As discussed earlier, NAA can inhibit lateral branching; therefore, its application to trunks keeps lateral buds in a dormant state. NAA can also promote fruit abscission and can therefore be used to thin excessive fruit and increase size of the remaining fruit. Environmental conditions can greatly influence uptake and activity of NAA. High temperatures and delayed drying of spray solution due to high humidity both contribute to greater thinning action. Best results are likely to occur when applied between 75°F and 85°F. Because uptake continues for several hours after the spray dries, heavy rain within six hours of application may significantly reduce NAA action.

Gibberellins

Gibberellins, abbreviated as GA for Gibberellic Acid, have many effects on plants but primarily stimulate elongation growth. Spraying a plant with GA will usually cause the plant to grow larger than normal. GA also influences plant developmental processes like seed germination, dormancy, flowering, fruit set, and leaf and fruit senescence. In citrus, GA is often used to delay fruit senescence. GA delays changes in rind color, and application will result in fruit with green rinds and delayed coloring. This will have a negative effect when selling fruit early in the season for the fresh-fruit market. However, this effect is desirable for late-harvested fruit because it results in fruit that are paler in color than the deeper-colored fruit from untreated trees. GA also affects flowering in citrus. GA application can reduce the number of flowers and therefore fruit yield. It is important to carefully assess

timing of GA applications to avoid yield losses. Depending on the application time, GA can reduce preharvest fruit drop and improve fruit set in some citrus varieties.

Cytokinins

Cytokinins derived their name from cytokinesis (cell division) because of their role in stimulating plant cells to divide. In addition to being involved in cell division, cytokinins were shown to have important effects on many physiological and developmental processes, including activity of apical meristems, shoot growth, inhibition of apical dominance, leaf growth, breaking of bud dormancy, and xylem and phloem development. Cytokinins also play an important role in the interaction of plants with both biotic and abiotic factors, including plant pathogens, drought and salinity, and mineral nutrition.

Abscisic Acid

Despite its name, abscisic acid (ABA) does not initiate abscission (drop). ABA is synthesized in the chloroplast of the leaves, especially when plants are under stress, and diffuses in all directions through the vascular bundles. ABA promotes dormancy, inhibits bud growth, and promotes senescence. It also plays a major role in abiotic stress tolerance. During water stress, ABA levels increase in leaves, which leads to the closing of stomata, thereby reducing water loss due to transpiration. ABA is costly to synthesize; therefore, its use in agriculture is limited.

Ethylene

Ethylene, a gaseous hormone, is well known for its role in promoting fruit ripening. In addition, it plays a major role in leaf, flower, and fruit abscission. Ethylene also affects cell growth, shape, expansion, and differentiation. Plants under biotic or abiotic stresses produce high levels of ethylene, which triggers an array of responses. For example, when leaves are damaged or infected with pathogens, high levels of ethylene are produced to promote abscission of those leaves. In citrus, ethylene is commonly used in postharvest to degreen oranges, tangerines, lemons, and grapefruit, making them more attractive to consumers. Ethylene treatment of mature but poorly colored fruit enhances the peel color and increases the marketability of fruit.

New Classes of Plant Hormones

Brassinosteroids

Brasssinosteroids (BR) play a pivotal role in a wide range of developmental processes in plants, such as cell division, cell differentiation, cell expansion, germination, leaf abscission, and stress response. Because of their involvement in many different physiological processes, application of BRs might be of interest in crop production. Successful use of BR in agriculture depends on the production of cost-effective, stable synthetic analogs of BR.

Strigolactones

This group of plant hormones is known for inhibiting shoot growth and branching and stimulating root-hair growth. Strigolactones also promote a symbiotic interaction with mycorrhizal fungi and facilitate phosphate uptake from the soil.

Jasmonates

This group of plant hormones is involved in plant defense responses. Herbivory, wounding, and pathogen attacks trigger the production of these hormones, which results in the regulation of plant-defense-related genes to fight the infection.

Salicylic Acid

Salicylic acid (SA) plays a role in plant growth and development processes, photosynthesis, and transpiration. SA is well known for mediating plants' defense response against pathogens. Their role in increasing plant resistance to pathogens is inducing the production of pathogenesis related proteins. It is involved in the systemic acquired resistance (SAR) response, in which a pathogenic attack on one part of the plant induces resistance in the affected area as well as in other parts of the plant.

General Consideration for Use of PGRs in Citrus Groves in Florida

Because PGRs function by directly influencing plant metabolism, plant response can vary considerably, depending on the variety and plant stress level. Therefore, it is recommended that growers become familiar with PGR effects before application. Preliminary trials in a small field plot should be conducted before using on a large acreage of trees. Most PGRs work best when used with an adjuvant (surfactant, sticker, or spreader). PGRs are regulated as pesticides and therefore, label instructions need to be followed—the label is the law. Table 2 summarizes some of the PGRs that are known to be effective in Florida citrus production.

Things to consider when applying PGRs are:

- Concentration of active ingredient
- Spray volume
- Method of application
- Time of day
- Season
- Compatibility with other chemicals in the tank mix
- Type of adjuvant
- Weather condition (humid, dry, sunny, cloudy, windy)
- Tree health (canopy density)

Use of PGRs for Huanglongbing Affected Trees

Huanglongbing (HLB) affected trees often suffer from extensive preharvest fruit drop. Due to the ability of PGRs such as 2, 4-D and GA to reduce preharvest fruit drop, they were considered as good candidates to mitigate the extensive fruit drop associated with HLB. Results from field trials with HLB-affected trees suggest that PGRs are inconsistent in their effects. Therefore, it is suggested not to use PGRs to alleviate HLB-associated preharvest fruit drop.

If excessive flowering, prolonged flowering, or off-season flowering is identified as a problem in HLB-affected trees, GA applications in the fall (September–January) can be made at 10–20 g a.i., 100–120 gallons per acre without negatively affecting yield. Fall GA applications reduce flowering in the following season. However, GA can also cause delay in color break of the existing crop; therefore, for early-season varieties of sweet orange, mandarins, and grapefruit, applying GA after the fruit is harvested would be ideal. GA applications in 'Valencia' during fall may improve fruit size of the existing crop as well as next season's crop due to reduced flowering. Do not apply GA later than January, because late applications can suppress flowering significantly, resulting in low yields.

Table 2. Plant growth regulator sprays—Florida citrus. Growth regulators may cause serious problems if misused. Excessive rates, improper timing, and fluctuating environmental conditions can result in phytotoxicity, crop loss, or erratic results. Under certain environmental conditions, 2, 4-D may drift onto susceptible crops in surrounding areas. Observe wind speed restrictions and follow all label directions and precautions.

Variety	Response	Time of Application	Growth Regulator and Formulation	Product Rate or Volume per Acre
Orange, Temple, and Grapefruit	Preharvest fruit drop	November–December. Do not apply during periods of leaf flush.	2, 4-D Dichlorophenoxyacetic acid (Citrus Fix, Isopropyl ester of 2,4-D 3.36 lb/gal)	3.2 oz
Navel orange	Reduction of summer-fall drop	6–8 weeks after bloom or August–September for fall drop. Do not make late application when fruit is to be harvested early. Do not apply during periods of leaf flush.	2, 4-D Dichlorophenoxyacetic acid (Citrus Fix, Isopropyl ester of 2,4-D 3.36 lb/gal)	2.4 oz
Tangerine and Murcott	Fruit thinning; activity is temperature dependent. Severe overthinning may result from applications made to trees of low vigor or under stress conditions.	Mid-May	Naphthaleneacetic acid, NAA (K-Salt Fruit Fix 200, 6.25%)	24–120 oz (100–500 ppm)
Grapefruit	Delay of rind aging process and peel color development at maturity; combine with 2, 4-D for fruit drop control.	August–November. Late sprays can result in re-greening.	Gibberellic acid, GA_3 (ProGibb 4%, ProGibb 40%, ProGibb LV Plus)[2]	16–48 gram a.i.[3]
Tangerine hybrids				20–40 gram a.i.
Navel oranges				16–48 gram a.i.
All round orange				20–60 gram a.i.
Navel oranges Ambersweet orange Sweet orange	Improvement of fruit set and yield; can result in small size and leaf drop.	December–late January	Gibberellic acid, GA_3 (ProGibb 4%, ProGibb 40%, ProGibb LV Plus)[2]	15–25 gram a.i.
Tangerines Mandarins Grapefruit		Full bloom		8–30 gram a.i.
Processing oranges (late varieties)	To increase juice extraction yield	Color break	Gibberellic acid, GA_3 (ProGibb 4%, ProGibb 40%, ProGibb LV Plus)[2]	20 gram a.i.

[1]Rates are based on application of 500 gal. per acre to mature trees. The effects of applications at lower volumes (concentrate sprays) are unknown.
[2]Do not use in spray solutions above pH 8.
[3]Active ingredient; follow the label for variety-specific rates and conversion to fluid ounce per acre.

For more information, go to: https://edis.ifas.ufl.edu/pdf/HS/HS1310/HS1310-Dwbnfn90f9.pdf

Institute of Food and Agricultural Sciences
UF-IFAS Hendry County Extension Service

P.O. Box 68
LaBelle, FL 33975

Information for the next Certified Pile Burners Course:

The Florida Forest Service and University of Florida Cooperative Extension Service will be conducting a Certified Pile Burners Course on **Tuesday, April 11, 2023**. This course will show you how to burn piles ***legally, safely and efficiently***. Most importantly, it could save a life. If you burn piles regularly, don't put off registering for this training. When the weather is dry, certified pile burners will receive priority for authorization to burn. Also, certified pile burners are allowed to burn up to two hours longer per day and get multiple day authorizations. Don't wait. The number of trainings offered and attendance at each training is LIMITED. This training will be held from 8:30 am till 4:30 pm at the **Southwest Florida Research and Education Center, Immokalee, Florida**. Included are a registration form and program agenda.

Registration is required to attend and class size is limited. To attend please send the following information (see form on next page):

1. Your full name (as wanted on your pile burning certificate).
2. Your mailing address (where you want the certificate mailed).
3. Your Florida Forest Service (FFS) Customer Number (It is the number that you are required to give the FFS when you call in for your burn permits. If you do not know it, please call your local FFS office and ask them to create one for you).
4. Your email address (or your office e-mail address).
5. Your contact phone number.
6. A check made out to: University of Florida for $50.00.

The first fifty individuals to provide these six requirements will be registered. There will be a 7-day non-refundable fee limit. If you do not make the training and did not contact our office at least one week before the class, you will not receive a refund. There will be a test at the end of the session. You must receive a grade of 70% or higher on the exam and demonstrate a proper pile burn with your local FFS office to become certified. Once you are certified it will be noted with your customer number, thus it is important for us to have the proper number. If you do not have a customer number the FFS office will set one up for you. Fill out the registration form on the next page and return it with a check as directed.

Sincerely,
Mongi Zekri

For Questions Contact: Dr. Mongi Zekri at maz@ufl.edu or 239-595-5494

Registration Form

Florida's Certified Pile Burner Program
Tuesday, April 11, 2023

Location: Southwest Florida Research and Education Center (Immokalee IFAS Center)
2685 State Road 29 North, Immokalee, FL 34142 (239) 658-3400

Please send this form and a check for $50.00 made payable to:
University of Florida

Mail to: **Dr. Mongi Zekri**
Hendry County Extension Office
P. O. Box 68
LaBelle, FL 33975

The registration fee of $50 covers the training sessions, a booklet with all the presentations in color, other handouts/tools, refreshments, and lunch.

Name

Mailing address

Email address

Phone Number

Florida Forest Service Customer Number https://www.fdacs.gov/Forest-Wildfire/Our-Forests/Florida-Forest-Service-Office-Locations/County-Foresters/Find-a-County-Forester

This number is required: _____

Florida's Certified Pile Burner Training
Tuesday, April 11, 2023
Location: Southwest Florida Research and Education Center
2685 State Road 29 North, Immokalee, FL 34142
(239) 658-3400

All Times Are Local

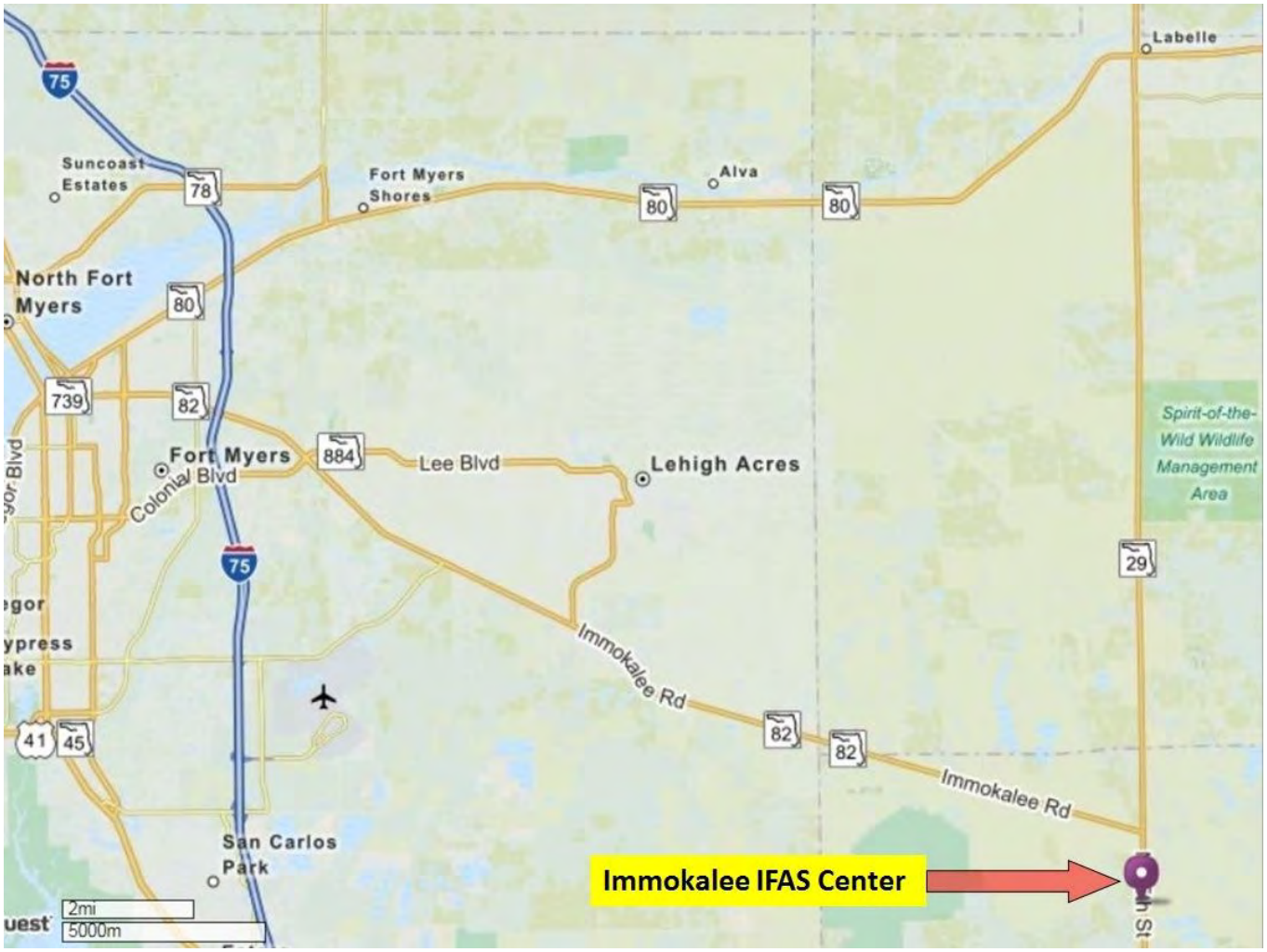
1. Opening Comments and Introduction	08:30 – 09:10
2. Fire Weather	09:10 – 09:50
3. BREAK	09:50 – 10:00
4. Smoke Management	10:00 – 11:20
5. Open Burning Regulations	11:20 – 12:15
6. LUNCH (provided)	12:15 – 01:15
7. Planning and Implementation	01:15 – 02:30
8. Safety	02:30 – 03:10
9. BREAK	03:10 – 03:20
10. Public Relations	03:20 – 04:00
11. Wrap Up & Test	04:00 – 04:30

Please Bring Pencils for the Exam!

Location & Contact Information

<u>Location</u>: Southwest Florida Research and Education Center
(Immokalee IFAS Center)
2685 State Road 29 North, Immokalee, FL 34142 (239) 658-3400

<u>Contact</u>: Dr. Mongi Zekri, Multi-County Citrus Extension Agent
Hendry County Extension Office, P.O. Box 68, LaBelle, FL 33975
Office Phone: 863 674 4092
Cell: 239 595 5494
E-mail: maz@ufl.edu



Florida's Certified Pile Burner Training
Frequently Asked Questions

Q: Why should I be a certified pile burner?

A: Certified pile burners are trained to burn piles ***legally, safely and efficiently***. Most importantly, it could save a life. Also, when the weather is dry, certified pile burners will receive priority for authorization to burn by the Florida Forest Service (FFS). Also, certified pile burners are allowed to burn up to two hours longer per day and get multiple day authorizations.

Q: What is a Pile Burner Customer Number?

A: When you call the FFS for an authorization to burn, you will be assigned a personal customer number. This number references your information so it doesn't need to be gathered each time you call for an authorization. You must have your individual FFS customer number in order to be certified.

Q: Is there a test?

A: Yes, the test is 20 questions and open-book. You must receive a score of at least 70% to pass.

Q: What if I don't pass?

A: Very few people fail the test but if you do, you will be provided another opportunity to take the test at a later date. If you fail the second time, you must re-register and take the training again.

Q: Why do you ask for my email on the application form?

A: Email is the fastest and most convenient method to inform registrants of their registration status. If no email address is provided then all correspondence will be sent through the federal mail. This can take several days to relay messages and this may not be practical if changes are made to the course schedule or for last minute registrations.

Q: How much does it cost to register for the training?

A: Registration for the training is $50 per person and includes lunch, training materials and testing.

Q: How long does my certification last, and how long do I have to complete the certification from the time I finish the class?

A: As long as the person with the certification uses their number at least 5 times in a period of 5 years their certification will not expire under the current program. You MUST complete the certification burn within a year of taking the class.

Q: Will certified burners be notified if their certification expires?

A: Yes, notification will be sent out to them to let them know of their upcoming certification expiration date.

Q: Will I be certified at the end of the one day training?

A: No, you will need to follow the written instructions that you will receive from the FFS to become certified. You will need to complete a simple burn plan, have it reviewed and approved locally by the FFS and also have the burn itself reviewed and approved by the FFS.

Flatwoods Citrus newsletter by regular mail stopped last year. You will receive your copy only through e-mail or through the following link:

https://citrusagents.ifas.ufl.edu/newsletters/

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

☐ If you wish to be removed from our e-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
or E-mail: maz@ufl.edu

Subscriber's Name:_____

Company:_____

Phone:_____

E-mail:_____

Racial-Ethnic Background

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

Gender

__Female
__Male