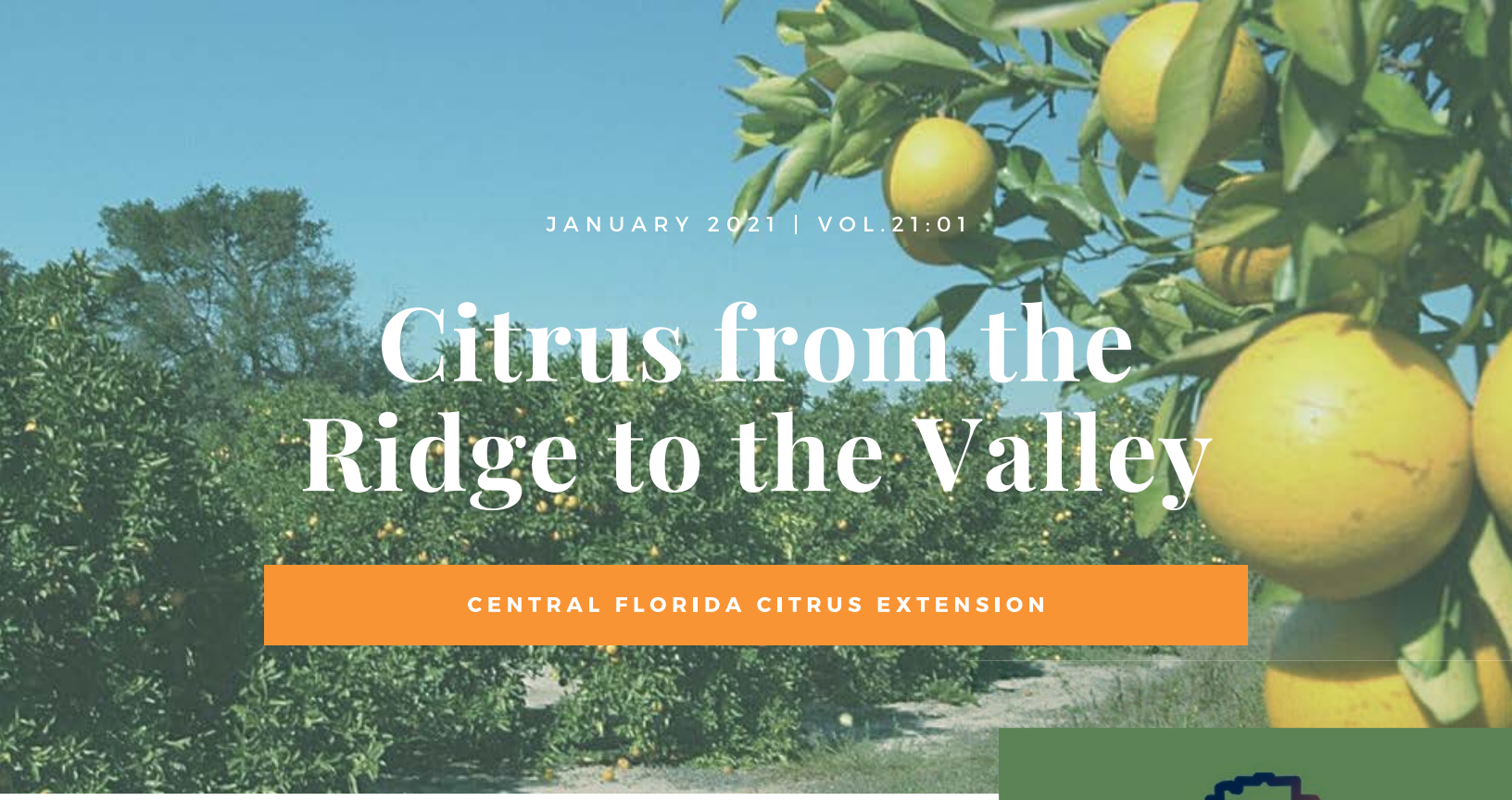

JANUARY 2021 | VOL.21:01

Citrus from the Ridge to the Valley

CENTRAL FLORIDA CITRUS EXTENSION

January OJ Breaks

Join us on Tuesday, January 12, 2021, and ring in the new year with another virtual OJ Break in our series beginning at 1:00 p.m. This month Dr. Christopher Vincent, Assistant Professor at the UF/IFAS Citrus Research and Education Center, will be making the presentation. Dr. Vincent will be discussing how water, light, and temperature interact to affect citrus growth and why this matters to growers. He will present their most recent results from their kaolin establishment study and the first year of a study with mature trees. Also, look at how Dr. Vincent thinks particle films are helping HLB-affected trees, along with the help of some results from our studies with shade. So, as you can see, there will be several topics covered in the OJ Break on January 12, 2021. One Continuing Education Unit (CEU) will be available for both your restricted use pesticide (RUP) license and for certified crop advisors (CCA).

Then plan to attend our second virtual OJ Break on Tuesday, January 26, 2021, when Dr. Arnold Schumann, Professor at the UF/IFAS Research and Education Center, will be our speaker. Dr. Schumann will be discussing a new technology that uses artificial intelligence (AI) to help growers identify citrus nutritional deficiencies, pests, and diseases. This app-based system will be great for new or existing citrus employees to identify these disorders better. Doing this will provide another set of eyes in the field to help you better manage your citrus operation. One Continuing Education Unit (CEU) will also be available for both your restricted use pesticide (RUP) license and for certified crop advisors (CCA).

As you can see, we are kicking off the new year with plenty of opportunities to stay informed and pick up some additional CEU's. To register for these and other UF/IFAS Citrus Extension Agent meetings, visit the UF/IFAS Citrus Agent's website: https://citrusagents.ifas.ufl.edu/oj-break/.

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Citrus Nutrition Box Program

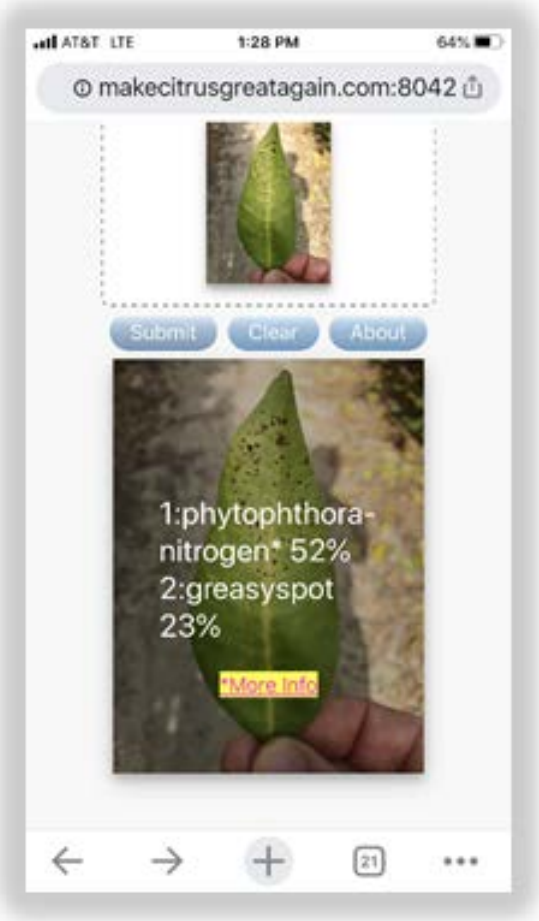
Due to popular demand, we will continue with our citrus nutrition box program for another year. For growers who have participated in the program this past year, we ask that you continue to sample the same block or grove this year. You will receive a personalized link to confirm your contact information and update the current status of your grove. Also, if you have another block that you wish to enroll or it is your first time participating in the program, please contact your local citrus Extension agent to register the additional grove. New groves participating in the program must be a sweet orange variety, five years or older, and have a minimum of five acres. The variety and age requirement would not apply to the blocks continuing for a second year. We are limiting the new block to specific varieties and age to better manage the variability in the nutritional analysis we have seen this past year. Each grower may have a maximum of three nutrition boxes pending box availability. If you would like more than three boxes, your name will be added to a waitlist. The deadline to register for 2021-22 is January 31st.

For blocks in Hillsborough and Polk counties please contact Gail Crawford at dorothyc@ufl.edu or 863-519-1042

For blocks in DeSoto, Hardee, Highlands, and Manatee counties please contact Ajia Paolillo at ajiacunningham@ufl.edu or 863-251-4763

Citrus Diagnosis – an AI app for smartphones

BY ARNOLD SCHUMANN



Diagnosing symptoms visible on citrus leaves is an important first step in identifying nutrient deficiencies, diseases and pests in groves. Accurate diagnoses are typically only possible after many years of experience working with citrus crops. We created an artificial intelligence application for smartphones that was trained with more than 20,000 photographs of citrus leaves to identify 16 symptoms often encountered in Florida groves. In a scientific study, the app was shown to be significantly more accurate than human participants, exceeding 99% on average. The app is able to identify dual symptoms on the same leaf, such as zinc and manganese deficiencies, which display similar symptomologies and are commonly found together on HLB-affected trees. The app will also diagnose HLB symptoms directly.

There will be a presentation about the Citrus Diagnosis app at the virtual OJ Break meeting on January 26, 2021 (see page 1 for meeting information). To start using the app, you have to register and view the instruction video at http://www.makecitrusgreatagain.com/CitrusDiagnosisHome.htm

The app runs on a web browser and no downloads are required.

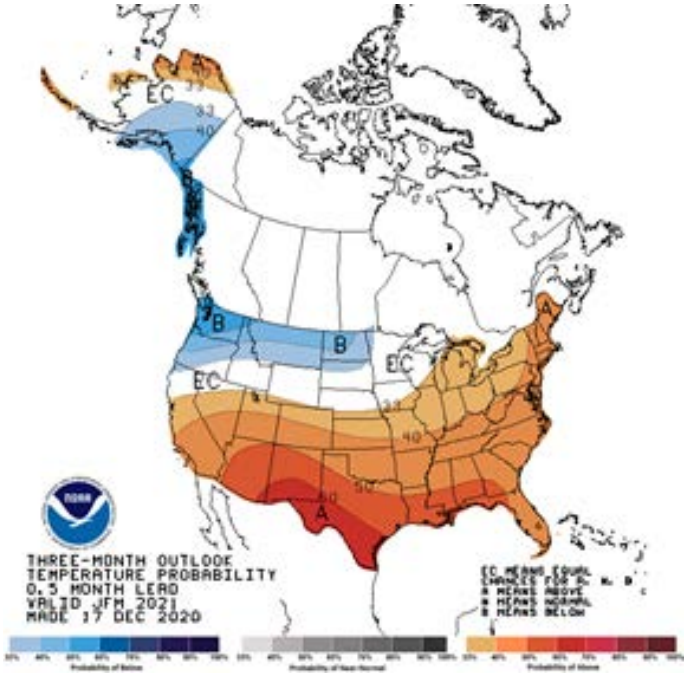
For more information, contact Arnold Schumann at schumaw@ufl.edu

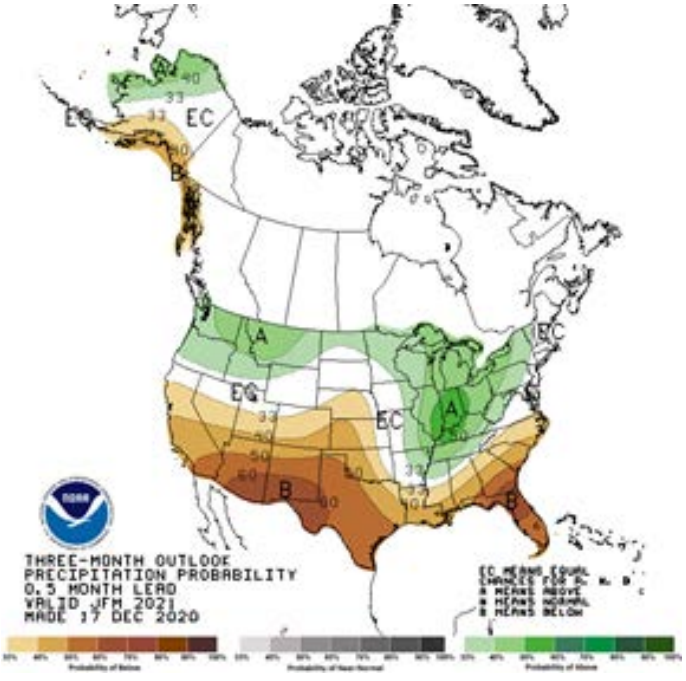
Can you tell what these three leaf symptoms are? (hint: The leaf on the right displays a combination of the symptoms on the other two leaves)

Weather Outlook

Believe it or not, we have just rolled into winter (December 21, the official start), and with that, what is the latest updated winter forecast provide? According to the National Weather Service's (NWS) Climate Predication Center (CPC) forecast, we are in a moderate La Nina phase to continue for the foreseeable future. According to the forecast, an approximately 95% chance during the period from January to March 2021. That will mean a continuation of on average warm and dry conditions for the balance of the winter. Dry weather and reduced rainfall should be helpful in the management of post-bloom fruit drop this spring.

One more closing thought - most of our significant freezes in the last 50 years have occurred in either neutral or weak La Nina conditions, so I wouldn't let my guard down.





Citrus Flower Advisories

BY CHRIS OSWALT

Dr. Tripti Vashisth has issued the third flower bud induction advisory just before Christmas. The full advisory can be found at https://crec.ifas.ufl.edu/flower-bud-induction/flower-bud-induction-2020/. To run the model used to predict the approximate bloom date go to http://disc.ifas.ufl.edu/bloom/. Also, Dr. Vashisth provided the following suggestions related to the management of flowering in HLB affected citrus trees:

- DO NOT drought stress HLB-affected trees even though drought stress promotes flower induction and suppress vegetative growth, you should not risk current crop due to additional drought stress. Drought stress can exacerbate fruit drop. Daily, lower volume irrigations to minimize fall drought stress is suggested, especially when the weather is warm,

- Flowering enhancing fertilizer to increase the number of flowers are NOT suggested for severely HLB-affected trees as they are less likely to benefit because of two reasons: (1) HLB-affected trees have more dead wood therefore, there are fewer buds available to become flowers, interestingly a good branch on severe HLB trees has same flowering potential as mild HLB trees. So additional flowering promoting fertilizer is not needed. (2) High twig dieback and low fruitlet retention is the main concern with severe HLB trees in regards to fruit set. Only 2% of the total flowers turn into harvestable crop therefore, pushing tree to flower more is not advisable as that is likely to waste trees' energy and resources in extra flowers.

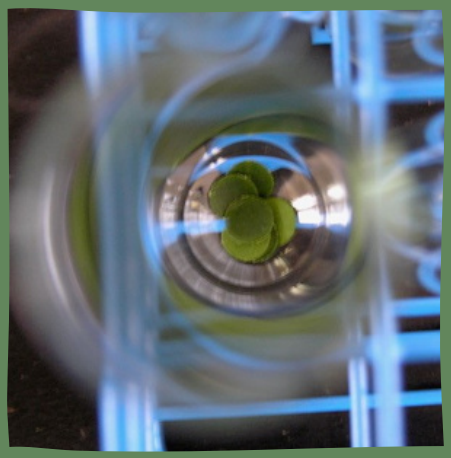
- GA sprays can be used to suppress early spring flowering but the timing of application is critical for GA to be effective. GA should be applied before warm temperatures (that is before differentiation begins).

GA and HLB: Previous research on HLB-affected trees in 2017-2018 (a La Niña winter) has shown that when GA applied monthly in fall, early flowering was suppressed. Therefore, if you have a weak crop load and are forecasted to have warm spells, GA application can be considered to suppress off-season flowering. DO NOT spray GA after first of January to manage flowering. GA sprays will reduce the total number of flower buds, however, the current literature shows that reduction in the number of buds in HLB trees with use of GA does not affect final yield.

It would be good further to monitor flower bud induction and differentiation at this point. Future significant warm-weather events will likely begin this process of differentiation of flower buds. In other words, we are getting close to determining a bloom date for this spring.

Citrus Leaf Freezing Data

BY CHRIS OSWALT



This year, we are determining the acclimation of Florida citrus trees to cold weather by determining the citrus leaf freezing temperature. Certain environmental conditions will initiate this acclimation process. These environmental cues will cause physiological changes to occur within the plant that will depress the temperature at which plant damage will occur. Major environmental factors in Florida citrus are air temperature and water.

At 55 F, citrus plant growth slows; as temperatures remain below 55 F, citrus trees will continue to acquire acclimation (plant cold hardiness) to these cooler temperatures. This process is reversible during warm winter periods, and a loss of acclimation can occur. This loss of acclimation (de-acclimation) can happen rather quickly under field conditions compared to the process of acclimation. The greatest amount of citrus acclimation occurs during a consistently cool fall and winter. Once de-acclimation occurs, citrus trees will generally not re-acclimate to the same level before the onset of de-acclimation.

Irrigation and fall/winter rainfall can have a pronounced effect on citrus acclimation. However, visibly drought-stressed trees are more susceptible to freeze damage and HLB induced fruit drop. The key here would be to provide adequate water to the tree with irrigation and manage that irrigation to not cause growth during the winter (i.e., over-irrigating).

Cold hardiness in citrus is highly dependent on the vigor of the rootstock/scion combination, crop load, the susceptibility of plant tissue, tree water status, nutrition, and other cultural practices that affect tree vigor. These represent a combination of factors and interactions that are difficult to identify and quantify. Over the years, several methods to measure citrus cold hardiness have been developed. These techniques included freezing detached leaves, direct measurement of leaf cellular solute concentrations, and leaf cellular leakage.

Citrus Leaf Freezing Data (Continued)

BY CHRIS OSWALT

Early studies on measuring citrus acclimation involved the freezing of detached leaves in a freeze chamber. This procedure used small temperature probes called thermistors attached to the leaf surface. The freeze chamber temperature was slowly dropped below freezing until an increase in leaf temperature was measured. This increase in leaf temperature is called an exotherm. An exotherm is a measurable increase in temperature as water freezes to ice. These exotherms in the test chamber were produced by the heat given off when cellular water freezes to ice. The temperature at which this exotherm occurred was considered the citrus leaf freezing point temperature. This method was found to produce mixed results, and the process has since been modified to produce a more accurate evaluation of acclimation in citrus leaves.

In the mid-1980s, researchers in Florida developed a new methodology to determine citrus leaf freezing point temperatures more accurately. This methodology used the measurement of cellular leakage to determine the leaf freezing point temperature. The process was further modified in the mid-1990s, and this procedure is the basis of how leaf freezing point temperatures are determined. Citrus leaves are harvested weekly from the same randomly selected trees of the same rootstock, scion, and grove location. The leaves are then delivered or shipped to the lab for freeze temperature analysis. Leaf disks are punched from these leaves using a paper hole punch, and five disks are placed in individual test tubes. The test tubes containing the leaf disks are placed in an ethylene glycol freeze bath.

The freeze bath temperature is set at 28 F, and the disks are held for one hour. After the first hour, a sub-set of the samples is removed. The temperature of the freeze bath is then dropped to 24 F and held for one hour. A sub-sample is then removed, and the temperature of the freezing bath is lowered 2 F. The sample held for another hour, after which a sub-sample is removed. This procedure continues in 2 F, increments down to the last temperature of 16 F. De-ionized water is then added to each test tube containing the leaf disks. The samples are held overnight to allow for the leakage of damaged cells into the de-ionized water. The following day, the solution's electrical conductivity containing the disks is measured and recorded for each test temperature, and then the samples are frozen in a freezer overnight or autoclaved. The following day these samples are allowed to thaw, and an electrical conductivity value from the test temperatures is divided by the electrical conductivity of the freezer sample representing 100% damaged. Graphs are plotted using percent damage and test temperature. The citrus leaf freezing point temperature is determined where the test temperature and 50% damaged value meet. The value of 50% is when citrus leaf cells are damaged to the point of tree defoliation.
This method has been consistent with field observations made after freeze events.

This year we are posting the results of our citrus leaf freezing determinations on the Florida Automated Weather Network (FAWN) at the following: https://fawn.ifas.ufl.edu/tools/coldp/crit_temp_select_guide_citrus.php. This year we have again tested new rootstock and variety combinations to provide a better insight to growers in the acclimation process for these combinations. We have been running determinations on Hamlins on Swingle and Valencia on US 942, along with Sugar Belle and Bingo on US 942.

Best Management Practices (BMP) – Irrigation Management

BY AJIA PAOLILLO

This article is part of a series to outline and explain the various Best Management Practices (BMP) for citrus involved in the BMP program, regulated by the Florida Department of Agriculture and Consumer Services (FDACS). This article will discuss irrigation system management and water sources available to growers. The BMP program offers valuable information on irrigation maintenance and improving water use efficiency. If you are interested in enrolling in the BMP program, contact your local FDACS representative.

Irrigation systems are important components when growing citrus. Properly maintaining adequate soil moisture through correctly managed irrigation is needed for optimum tree growth, bloom production, and fruit development. As we continue to harvest mid-season varieties, we are also monitoring environmental conditions and the forecasted timeframe for bloom. We are currently in a dry spell and with this year's prediction of moderate La Niña conditions, we can expect our rainfall to be below normal and temperatures to be above normal. Therefore, growers will need to irrigate to avoid tree water stress, and one way of preventing water stress is by maintaining your irrigation system and keep it running efficiently.

In citrus, we mainly utilize micro-sprinkler irrigation, however, some areas in south Florida use seepage irrigation. Whichever irrigation system you use, system maintenance will help to keep it running efficiently. First, let us look at the water sources that are available to growers, and how that can affect your irrigation system. A large portion of irrigation water comes from groundwater. Our groundwater typically has a large amount of bicarbonates, which can cause mineral deposit build-up in pipes, tubing, and emitters. The use of filters, acidification, and chlorination will help to keep mineral deposits from clogging the irrigation system. Properly flush the system after using fertigation to help keep the lines clear and reduce plugging. Regularly inspect the poly pipe, tubing, and nozzles, which can break down over time or become damaged by grove equipment and animals.

Surface water is also used in many irrigation systems. This water can be from lakes, ditches, canals, or retention areas. These surface waters can be holding areas for tailwater and storm runoff. This allows the excess water to be collected from the agricultural site and re-used for irrigation purposes. Surface water should also be filtered before entering the irrigation system. This will keep debris particles and plant material from entering the lines. Surface water also contains bacteria and algae that should be treated before being pumped through the irrigation system. When utilizing tailwater, keep in mind the residual chemicals that may be present from previous pesticide and fertilizer applications and use the water appropriately. Maintenance on ditches, canals, dikes, and culverts are essential for keeping your system running smoothly. Vegetation should be maintained along ditch banks to prevent erosion, and clearing debris from culverts and risers will keep those components working efficiently. Sediment should also be removed from the bottom of water holding areas periodically.

Best Management Practices (BMP) - Irrigation Management (continued)

BY AJIA PAOLILLO

Another source of irrigation water is reclaimed water. The rise in the use of reclaimed water around the state is due to the population growth in Florida and the increased need for clean usable water. The use of reclaimed water requires the grower to work with water treatment plants to receive the water on the property. With all water sources, be sure to follow food safety guidelines specific to your operation and stay in compliance with the local water management district's regulations.

All irrigation systems utilize pumps, pipes, and valves. These parts should be inspected for damage and replaced as needed. The backflow prevention unit is very important to prevent chemicals from contaminating the water source. This unit uses check valves, low pressure drains and vacuum breaker valves to prevent chemicals from flowing backwards through the system into the water source. It is required by Florida law to have a backflow prevention unit on systems that inject fertilizers and pesticides into irrigation water. Inspect these units regularly to ensure they are working properly.

If you are located near coastal areas, you may experience salt-water intrusion. This can happen from excessive groundwater pumping in critical areas or high salinity resulting from evaporation of surface water sources. Testing your water sources and soil will alert you to high salinity levels. Surface water can be mixed with irrigation water to bring down salinity concentrations when needed. When high salinity levels are found in the rootzone, salts can be flushed through the soil with extra irrigation. Use caution when flushing the rootzone, as nitrogen and other nutrients can also leach through the soil. The use of split fertilizer applications, low-salinity and slow release formulations can also help prevent salt levels from becoming too high.

Water use efficiency is reduced when irrigation system components and equipment are damaged or clogged. Regularly measure and calibrate the output of your irrigation system to ensure it is working properly. You can keep records of water use and irrigation run times, and this will alert you to any discrepancies that need to be addressed. To reduce production costs and conserve water, growers should schedule their irrigation around rain events as much as possible. With weather stations such as the UF/IFAS FAWN or on-site stations, growers can have real-time data on precipitation rates and temperature, which can help guide irrigation scheduling. Growers can also utilize soil moisture sensors to determine when the grove needs irrigation.

Effective irrigation is delivered to the rootzone where it can be utilized by the citrus tree. When there is an issue in the irrigation system, the tree may receive too little or excess water, which can have impacts on growth, yield production, and disease incidence. Be sure to test, treat, and filter your water before allowing it to go through the irrigation lines. Regularly inspect equipment such as valves, pipes, tubing and emitters. Follow regulatory guidelines and practices to ensure you stay in compliance.

For more information the FDACS BMP program and practices recommended for citrus, please refer to the Water Quality/Quantity Best Management Practices for Florida Citrus publication: https://sfyl.ifas.ufl.edu/media/sfylifasufledu/lake/docs/fruit-production/pdf/Citrus-BMP-Guide.pdf

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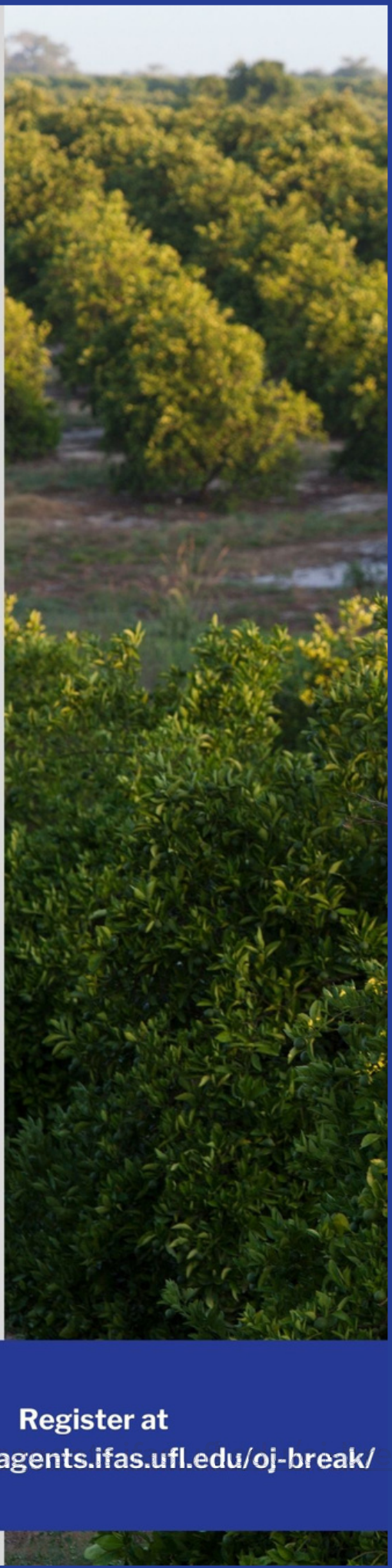
OJ BREAK GROWER MEETINGS

The OJ Break Grower Meeting series is a virtual program provided by the University of Florida IFAS Extension central Florida citrus agents. Meetings will be held twice a month. A zoom link will be sent via email after registration.

<u>Tuesday, February 9</u>
Nutrition Box Program update and data used for recommendations
Presenter: Tripti Vashisth
RUP and CCA CEUs are being requested

<u>Tuesday, February 23</u>
Recent increase in trunk disorders and HLB root health update
Presenter: Evan Johnson
RUP and *CCA CEUs are being requested*



February 9 and 23
1:00 PM to 2:00 PM

Register at
https://citrusagents.ifas.ufl.edu/oj-break/

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