

Citrus Notes



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Dear Growers,

This month our monthly grower meeting will be the Citrus Roundtable to be held at the Hillsborough County Extension Service Office on Wednesday January 9, 2007. We are continuing to follow the symp-tom development of greening infected trees as we find them this winter. This informa-tion is contained in the Hillsborough and Polk County citrus greening update articles. In addition, we have had confirmation of a citrus greening find in the green swamp area of Polk County. The initial timing of Asian citrus psyllid sprays is important in managing populations throughout the growing season. We have also included an article on citrus flower bud induction. This could be used to better time initial sprays to sup-press over-wintering psyllid populations prior to citrus flowering.



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**Hillsborough
County
Citrus
Roundtable**



Our bi-monthly Hillsborough County Citrus Roundtable will be held on Wednesday, January 9, 2008. This is a week later than usual due to the first Wednesday of January falling on the day after the New Year's Day holiday. The Roundtable will begin at 10:00 a.m. and we have invited Dr. Timothy Spann, our Citrus Extension Specialist from the Citrus Research and Education Center in Lake Alfred, to bring us the latest information on citrus production practices taking into consideration citrus psyllid and greening management.

So join us on January 9, 2008, to kickoff the new year with coffee, OJ and the ever popular assorted selection of donuts. The Roundtable will be held at the Hillsborough County Cooperative Extension Service Office, 5339 CR 579 in Seffner.



**Citrus
Greening
Update Polk
County**

I hope that many of you had the opportunity to come out to the Citrus Greening Field Day held this month in Polk County. It was an excellent event for growers and scouts to identify symptomatic citrus trees in the field. These infected trees had a variety of symptoms and we all got to test our skill at seeing the different symptoms from tree to tree. We also have confirmation of a citrus greening positive tree found in a citrus grove in the green swamp area of Polk County.

What I thought we could do, would be to provide some photographic examples of the various stages of symptoms found in this block. Some of the trees had mild symptoms that were difficult to find, while others had significant symptoms typically not found on newly infected trees. Additionally, it would be worth saying that once you have determined that you have citrus greening in a particular grove, your skill at identifying infected/symptomatic trees increases significantly. As a frame of reference, these trees are Valencia on Swingle about 4 years-old grown on typical ridge soil with micro-sprinkler irrigation.



Young tree with yellow shoot symptom in top center of tree and lower left.

Closer inspection of yellow shoot symptom on lower left of above tree.



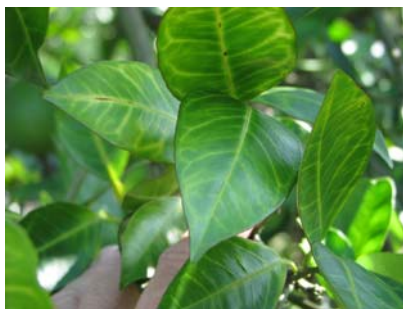
Yellow vein with blotchy mottle on symptomatic leaf.

Yellow shoot with blotchy mottling pattern on leaf.



Comparison of fruit size with normal size next to small misshapen fruit on symptomatic tree.

Off bloom and small fruit set on greening symptomatic shoot



Citrus Greening Update Hillsborough County

This month we are approaching a year of following citrus greening symptom development in this Hillsborough County block. Hopefully by the end of next month, we will have an updated tree count and map of trees that have begun to develop symptoms in the last few months. This will provide us some insight on

the number and extent of disease spread over the past year.

Over the past month one of the more prevalent symptoms that I have noticed more and more frequently is the yellow shoot symptom. Infected trees this summer that had no previous symptoms began to develop typical early symptoms of blotchy mottle and small misshapen fruit. As the months passed from late summer to early fall, we could begin to see the development of persistent yellow veins in some foliage, blotchy mottle leaves and small misshapen fruit. Now trees that have exhibited these early symptoms are developing



Yellow shoot appearing on lower portion of tree canopy in greening infected tree.

Second example of obvious yellow shoot with blotchy mottle developing on infected tree.



these typical yellow shoots with blotchy mottle leaves. These shoots appear many times to be associated with vigorous winter vegetative growth on infected trees. This yellow shoot symptom is a real eye catcher in the field and it does appear to develop in a relatively short period of time.

Another observation I have made over the past year is that greening infected trees have a tendency to have multiple bud break and

shoot development on infected limbs. This is a casual observation but one that I find interesting. Could this be related to phloem necrosis that occurs in a single shoot causing carbohydrate accumulation and forcing bud

Symptomatic shoot on tree exhibiting multiple bud break and shoot growth.



Photograph of symptomatic foliage from above multiple shoots.

Another shoot on a different tree exhibiting multiple bud break and shoot growth



Close up of multiple shoots on greening infected limb.

break to

metabolize this excess carbon? Don't really know, but I thought it would be interesting to share this information to see if this phenomenon occurs in other infected trees around the state.

Citrus Leaf Freezing Point Temperatures for the 2007-08 Winter



We have started determining the citrus leaf freezing point temperatures for the 2007-08 winter. This year we will be using locations exclusively in the Southwest Florida Water Management District. These sites include Balm, Ft. Meade, Frostproof, Lake Alfred and Polk City. The sampled trees are Hamlin on Swingle, Valencia on Swingle and Valencia on Carrizo. Weekly freezing point temperature information can be obtained from the Winter Weather Watch or from the FAWN (Florida Automated Weather Network). The FAWN website address is: <http://fawn.ifas.ufl.edu> , once at the FAWN home-page, select tools, select cold protection toolkit, select guide to determining critical temperature, select citrus.

To date we have received some cooler temperatures early in the fall, but this last heat wave has resulted in a lack of citrus acclimation. This lack of cooler weather has resulted in elevated citrus leaf freezing temperatures compared to that in past years.



Citrus Flower Bud Induction 2007-08

Currently Dr. Gene Albrigo, at the Citrus Research and Education Center in Lake Alfred, provides growers with information on citrus flower bud induction during the winter. This information has been developed into a model that follows citrus flower bud induction during the winter and predicts citrus bloom date. Growers using this information could enhance citrus flower bud induction and better time their Asian citrus psyllid management program to target over-wintering psyllid populations prior to citrus flowering (this information provides you with the date of citrus flowering). We currently believe that the targeting and reduction of over-wintering psyllid populations increases the efficacy of subsequent suppression efforts made through the balance of the growing season.

The following information was provided by Dr. Gene Albrigo at the Citrus Research and Education Center in Lake Alfred.

Overview of Flower Bud Induction In Florida

Citrus flower bud induction starts in the fall and usually is completed by early January. Low temperatures first stop growth and then promote induction of flower buds as more hours of low temperatures accumulate (below 68 degrees F.). A period of high temperatures in winter can then initiate bud differentiation which, after sufficient days of warm spring-time temperatures, leads to bloom. The meteorologists predict that this winter in Florida

will be a La Nina year, higher than average temperatures and lower than average rainfall. Even under these conditions, enough hours of low temperatures below 68 degrees F. usually accumulate to induce a reasonable level of flower buds. Conditions that can interfere with good flower bud induction include: 1) several warm periods interrupt the induction process or 2) the previous crop was exceptionally high or 3) leaf loss from hurricanes or other causes (canker) was excessive and tree recovery was not complete. Two or three lead to low carbohydrate levels in developing buds which reduced their ability to become flower buds.

Under normal Florida weather conditions, but with a moderate to heavy previous crop, sufficient flower bud induction should be achieved when total accumulated hours of low temperatures exceed 800 hours below 68 degrees F. If the crop load is light, sufficient flower bud induction may occur after 700 hours of accumulated low temperatures. A warm period of 7 to 12 days, with maximum temperatures > 80 to 85 degrees F., can trigger growth (bud swelling) if a minimum total hours of low temperatures have accumulated (400-500 hours below 68 degrees F.). Later in the winter when the accumulated cool temperature induction hours are high, fewer days and lower daytime highs (75 degrees F.) are required in a warm period to stimulate growth of buds. Weather information relative to Florida citrus flower bud development for the current and several previous year's (back to 1998) can be obtained from the Florida Automated Weather System (fawn.ifas.ufl.edu) for locations near you. An 8 day forecast from the National Weather Service predicts Florida weather for several sites around the citrus belt for the next week. Find this information at: <http://www.nws.noaa.gov/mdl/forecast/text/st/ate/FL.MRF.htm>. This is the easiest way to

see if a warm period, which could trigger flower bud growth, is predicted.

Some flower buds will be induced in the range of 300 to 450 accumulated hrs < 68 degrees F. Warm events just after these levels of induction result in weak flowering intensity, and therefore many buds remain that can be induced by later cool periods, or these buds may sprout as vegetative shoots if warm weather continues and the trees are well watered. The first situation results in multiple cohorts of flower buds developing to different bloom dates. The second condition leads to low flowering-fruit set and excessive spring vegetative growth. During the years from 1963 to 2003, multiple blooms occurred in over half of the years. Historically, the time period in which an early warm period (7-12 day) can lead to an initial low number of buds growing is roughly mid-November to mid-December. Then additional flower buds develop later resulting in multiple blooms. Presently, the only management tool available to eliminate or reduce the chance of multiple blooms is sufficient drought stress to stop growth. This water stress may be provided by stopping irrigation well before these predicted warm periods occur. If the warm period(s) are of the typical 7 to 10 day duration, a coincident short period of drought stress will have little impact on current crop development or quality. Sufficient drought stress may be interpreted as leaf wilt observed by 10 or 11 a.m., but leaves recovering by early the next morning. If no rains interrupt a drought stress condition in citrus trees, buds will not grow in response to high temperatures. If a warm period has passed, trees again can be irrigated to minimize current crop stress. Although no weather prediction is guaranteed, rains in the winter usually come on the fronts of cool periods. Sufficiently cool temperatures will prevent growth even though soil

moisture is adequate for growth. Since winter rains usually occur just before cool temperatures, the chances that drought stress will prevent an early flower bud differentiation event are reasonably good for many warm periods. Even so, growers in some growing districts have often found it difficult to maintain winter drought stress.

Current Status for 2007-08 Winter

The heavier crop and general tree recovery without a hurricane should lead to average flowering next spring, unless an unusual event occurs. Although this is supposed to be a La Nina winter with warmer and dryer than normal weather, average cool temperature accumulation if warm periods do not interrupt the accumulation process. Currently, citrus locations have accumulated low temperatures < 68 degrees F. of 45 to 150 hours from southern to northern areas, respectively. The next 8 days will be below average cool temperatures and another 140 to 168 hours should accumulate. Continued accumulation of cool temperatures and prevention of growth during a winter warm spell are important for a good start for the 2007-08 citrus production. Therefore, start to monitor irrigation amounts so drought stress can occur if a warm period occurs between November 15th and Christmas, depending on the rate of cool temperature accumulation and reaching an acceptable level of 800 hours. Prepare to make groves relatively dry by withholding irrigation if a warm period is predicted. Keep track of induction hours in your area and watch for the next advisory.

If you have any questions, please contact me (albrigo@ufl.edu or phone 863-956-1151).

Citrus Flower Induction Advisory #4 December 20, 2007

Current status for 2007-08 Winter - This is a La Nina winter with warmer and dryer than normal weather, and so far, this year is behaving like an average La Nina winter. Through December 19th, citrus locations had accumulated low temperatures < 68 degrees F. of 490 to 760 hours from southern to most northern areas, respectively. The next 8 day forecast calls for cool nights, but moderate daytime temperatures with another 80 to 110 hours < 68 degrees F. accumulating. The most northern FAWN may reach a satisfactory 850 hours of temperatures < 68 degrees F. The warmer southern areas will only have about 575 hours of temperatures < 68 degrees F. shortly after Christmas. This is probably 150 to 200 hours short of a good minimum for a satisfactory flowering level on trees with a good current crop.

Although most areas received rainfall this past week, FAWN data indicates that only northern areas reportedly received soil saturating amounts. The cool temperatures this week should have allowed soil drying so that drought conditions may exist again when a warm period starts. It is advisable to continue dry soil conditions for at least another 2 to 3 weeks while cool inductions temperatures continue to accumulate. If a warm period (7 days above 83-85 degrees F.) occurs before then with adequate soil moisture for growth, growers should consider applying either 53 to 60 lbs of foliar urea/acre in 80 to 125 gal of water, or a PO3 product at 3 pints to 2 quarts per acre depending on which product is used (60 % P (3pts) or if 26 % P (2 qts) product). This should be applied in the first 2 to 3 days at the beginning of the warm period.

See the initial background advisory for more irrigation details. There are two useful Websites to follow weather forecasts. The Florida Agricultural Weather Network (FAWN) now has an easy access function to the NOAA 4 day forecast, just type location and click. Alternative, an 8 day forecast can be viewed by going to www.crec.ifas.ufl.edu and click on resources> weather> 8-day forecast. Trees should be slightly stressed if a warm period is predicted (7-10 days with maximum temperatures above 85 degrees F.) in order to minimize bud growth. This practice should continue if possible until we reach 750 to 800 hours below 68 degrees F. or a warm period starts after a saturating rain at which time urea of PO3 should be applied to enhance the level of flower induction.

Keep track of induction hours in your area. Because of the holidays, the next advisory will not be posted until after New Year's Day. If you have further questions, please contact me (use only albrigo@ufl.edu until the next advisory).

Tracking Flower Bud Induction

The 'Flowering Expert System for Florida Citrus' model/ system is available for growers to track flower bud induction during the winter. The system is available on-line and may be accessed at:

<http://orb.at.ufl.edu/DISC/bloom> .

Flower Bud Induction advisories are available either weekly or bi-weekly at the following site:

<http://www.crec.ifas.ufl.edu/extension/flowerbud/index.htm> .