

WINTER CITRUS PRODUCTION PRACTICES

By Tim Gaver, Gary England, Stephen Futch, Tim Hurner, Chris Oswalt and Mongi Zekri

Although citrus production activities during the winter are reduced when compared to the warmer months of the year, there are numerous important functions that should be performed to carry on an effective production management program.

The general topics outlined in this article include management of weeds, nutrition, insects and mites, diseases and cold-protection considerations.

WEED MANAGEMENT

While weed growth is slower during the cooler months, continuing to maintain a relatively weed-free soil surface under the trees provides a number of benefits. Even during the cool months, weeds continue to compete for water and nutrients. Harvesting costs may also be increased where weeds are not effectively managed. Weeds in the row middles and tree rows that are killed by frosts or freezing temperatures also represent a potential fire hazard in the grove. Clean or closely-mowed ground also allows the soil to store more heat during the day in freeze events.

Problem weeds should be identified and managed during this period. Although many herbicide labels recommend that post-emergence herbicide applications be applied when weeds are actively growing, herbicides applied during the cool season can be effective, even though apparent activity on the weeds may be slowed. Management options include tank mixing non-selective, post-emergence products such as glyphosate combined with a pre-emergence herbicide, or following a post-emergence application with a pre-emergence herbicide to ensure that emerging weed seedlings in the spring are controlled. Late-season application of post-emergence herbicides may cause fruit drop if the product contacts low-hanging fruit.

NUTRITION MANAGEMENT

Nutrients uptake during periods when the soil is cold is significantly reduced as compared to warmer season applications. Most growers make their first dry fertilizer application ahead of the new growing season in February or early March. Planning for this important fertilizer application should



Damage to a valencia orange tree after a freeze

involve analyzing the data collected from tissue and soil tests conducted the previous summer. Reviewing trends of nutrient content in soil and tissue tests taken annually can help to most efficiently determine the amounts of fertilizer materials that need to be applied for maximum yield and fruit quality.

Soil pH is an important factor in how applied nutrients are utilized by citrus. The recommended pH range for citrus in Florida is 6.0 to 6.5, with the application of calcitic or dolomitic

limestone advised when pH levels fall below 6.0. An increase in soil pH following an application of liming material is not immediate, so winter provides another window for applications of calcitic materials that were not ideally applied in the fall. In locations where soil copper is in excess of 100 pounds per acre, the pH should be adjusted to 7.0 to minimize the availability of copper and reduce the potential for copper toxicity.

Phosphorus (P) is an expensive fertilizer component that will continue to draw attention related to water quality in Florida. Although P is a necessary nutrient for citrus production, routine application of P when soil tests indicate levels in the high or excessive range is not warranted. Rates of nitrogen, potassium and magnesium that need to be applied should be determined by soil and/or tissue testing data and the recommendations in "Nutrition of Florida Citrus Trees," SL253. (<http://edis.ifas.ufl.edu/ss478>). Printed copies of this publication may also be available from citrus Extension agents at UF/IFAS county Extension offices.

INSECT AND MITE PEST MANAGEMENT

While most insect pest populations are at low levels during the winter, rust mites and the spider mite species can be a problem, especially on varieties grown for the fresh market.

Both the citrus rust mite (CRM) and the pink citrus rust mite (PCRM) can be found on all citrus varieties, with the CRM usually being the most abundant, especially during the cooler months. A scouting program conducted at regular intervals is necessary to ensure that rust mite populations on fresh fruit do not reach the damaging levels that cause "bronzing" of the peel. On fresh fruit, rust mite populations that average 2 CRM/cm² indicate an action threshold requiring an application of a miticide. Light-to-moderate peel damage on processed fruit is usually tolerated, but severe fruit injury can result in increased drop and reduced fruit size. Populations that average 6 CRM/cm² on processed fruit should be closely monitored and immediate action is recommended when populations reach 10 CRM/cm². Very high rust mite populations on foliage can result in leaf drop during cold, dry and windy periods.

The three spider mites species that are potential pests of citrus in Florida are the Texas citrus mite, citrus red



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mite and six-spotted mite. Lower populations of Texas citrus and citrus red mites are found most commonly on the upper surface of mature leaves, congregating along the mid-vein. The outer margins of the leaf and fruit are infested as populations increase. The six-spotted mite is usually found on the lower leaf surface. All of the spider mites prefer dry weather and can reach damaging levels that can result in leaf loss during the winter. Population levels of five to 10 mites per leaf, especially if trees are stressed, indicate the application of an approved miticide is reasonable on processed fruit.

Citrus leafminer populations are dependent on the presence of new flush, and the cool weather during the winter results in low numbers. Populations will increase rapidly on the new foliage of the spring flush, and control measures may be warranted in late spring.

Asian citrus psyllids (ACP), the HLB disease insect vector, are also at low levels because of cool weather and the dependency on new flush for their development. However, several years of research and grower experience has shown that wide-area insecticidal sprays applied in January-February before the initiation of the spring flush are very effective in suppressing ACP populations to manageable levels in the spring. Many growers across the state are voluntarily participating in defined Citrus Health Management Areas that help coordinate these dormant season and other ACP control efforts.

DISEASE MANAGEMENT

Citrus scab, melanose and Alternaria brown spot are all diseases affecting young foliage and fruit of selected varieties in the early spring. The winter period is a good time to plan a control strategy for these diseases, especially for susceptible fresh fruit varieties and areas with a history of problems with these diseases. Timely applications of copper fungicides, alternated with one of the strobilurin compounds such as Abound, Enable, Gem or Headline, will be necessary for effective control of these diseases.

COLD PROTECTION

The long-term forecast for the 2012 winter season is based on another "La Niña" advisory of this climate phenomenon located in the tropical Pacific Ocean. This generally means drier and warmer conditions across the southern tier of states. However, this does not exclude short-term, cold-weather events like we had in December of 2010 under the influence of the same "La Niña" situation.

Getting solutions to growers — research that enables CHMAs

By Harold Browning



In looking at where we are today in relation to the discovery of HLB in Florida six years ago, there are a number of perspectives. Among them is that production costs have increased. Another less visible view is of the progress made daily that is finding its way into grower practices. I'll use the example of the recent development and acceptance of CHMAs, or Citrus Health Management Areas, to illustrate the point.

Prior to finding HLB in Florida, we had an awareness of asian citrus psyllid (ACP) and damage to young trees, especially during periods of extended flushing. We had materials available to treat psyllids when occasionally it appeared warranted, and we also had released biological control agents.

Today we have a grower-led, area-wide approach to minimize psyllid populations, incorporating tools that were not part of previous practices. Regional cooperation among growers leads to setting the best time for treatment, and to discussing what materials should be used. Agreeing in principle to meet a collective goal of treating as many acres as possible within the CHMA during a particular window of time, growers have adopted a management approach that has proven to be far superior to each grower acting (or choosing not to act) on his or her own. Florida growers should be congratulated for their wisdom in adopting this strategy. This addresses the number-one research priority of the NRC study.

How was this possible? What was necessary for the establishment of 34 CHMAs within a year, and the emergence of confidence in this approach? Clearly, it took grower willingness to take a lead in developing CHMAs, with important help from UF, IFAS extension, and participation of FDACS and USDA in psyllid monitoring. But let's look closer. Where did the tools to implement CHMAs come from?

Since HLB detection in Florida, a significant commitment in grower dollars has been targeted toward slowing the transmission of HLB, primarily through psyllid management. Research funded by CRDF, along with institutional and other investments, has encouraged capable scientists to work together. This has led to a psyllid management system that is available to use via CHMAs. A sample of important research results:

- Greater understanding of psyllid biology, seasonality, and reproductive cycle
- "User-friendly" and cost-effective psyllid population monitoring tools
- Ability to monitor the fraction of adult psyllids which carry the HLB pathogen
- Describing the movement of psyllids from grove to grove and tree to tree
- Awareness of periods of the year that are most important in disease transmission
- Defining winter "dormant" spray strategies to reduce spring psyllid populations
- Detailed evaluation of a growing list of psyllid suppression materials (old and new products)
- Evaluation of attractants and repellents for use in monitoring or suppression
- Refining pesticide use labels for low volume and aerial applications
- Characterizing "best use" of low volume and aerial application for coverage and efficacy
- Monitoring for and developing prevention strategies for pesticide resistance

Looking at this list, it appears that a considerable amount of new information and new tools are available. Together, these research results make the establishment of CHMAs and regional suppression of psyllids possible. In this view, your foresight in investing grower dollars has led to significant improvement in managing the disease vector, as evidenced by your actions. And this represents only the immediate applications of the psyllid research!

Harold Browning is Chief Operations Officer of CRDF. The foundation is charged with funding citrus research and getting the results of that research to use in the grove.



Column sponsored by the Citrus Research and Development Foundation

Frost or freeze warning forecasts or information can be obtained from the National Oceanic and Atmospheric Administration or from private weather forecasting services. Several citrus Extension agents in the northern part of the citrus belt offer subscription cold-weather monitoring services that can convey forecast information, alerts and updates via phone, personal computer or mobile devices.

Accurate thermometers in a number of locations in the field are an important part of managing cold-weather events. Most growers position thermometer stations in historically cold grove areas in addition to other sites that may be more convenient to monitor on cold nights. These "cold pockets" may require more management using cold-protection techniques than surrounding warmer areas.

While more sophisticated temperature monitoring equipment may be employed in a few locations, the most common thermometers utilized will be

the relatively simple minimum recording type. These thermometers should be checked annually in the fall season for accuracy and overall condition. Accuracy can easily be checked by immersing the thermometers in an ice bath slurry for five minutes. The temperature should read 32° after this immersion period. Instruments that differ from the proper reading should be discarded or tagged to indicate the appropriate temperature adjustment when read in the field. The classic thermometer station should be constructed of wood with a covering over the thermometer and face north with the instrument about 5 feet above the soil surface.

Current cold-protection measures used in Florida citrus include under-tree microsprinkler systems and flooding the furrows in bedded groves to provide some small measure of protection — usually only 1-3° — during frost or freeze events. Flooding bedded groves is a matter of cranking intake pumps prior to the advent of cold

weather and having water resources available to raise water levels high enough in the grove to provide some supplemental warming. The disadvantages of this practice include leaching of nutrients, potential root damage as a result of flooding and the net loss of water resources if the water cannot be returned to a water storage structure within the grove.


Effective and efficient cold protection using microsprinklers is a discipline within itself, but is largely dependent on the readiness of the equipment required. All of the components of the microsprinkler system must be operational to provide effective cold protection. This certainly includes engines and pumps, electrical hardware and functioning supply lines, tubing and unclogged emitters. Working on faulty or broken equipment — often with freezing water involved — can make for a miserable night.

Water use in Florida is becoming a critical issue, and the use of water resources over a number of nights when it may not be needed is expensive and wasteful. The Florida Automated Weather Network (FAWN) offers a number of features to help the citrus production manager possibly reduce his freeze protection inputs. The home page of this website shows real time temperatures at the many FAWN locations statewide (<http://fawn.ifas.ufl.edu/>).

The FAWN Cold Protection Toolkit has a number of "tools," including a Guide for Determining Critical Temperature. Information is gathered throughout the winter to determine when citrus foliage will freeze in various areas of the state. Although the temperature at which fruit will begin to freeze is near constant, foliage that has been "hardened" by cool night temperatures can withstand temperatures well below freezing. The Evaporative Cooling Potential Tool can help to predict when conditions of moderate to high winds, low humidity and cold temperatures can combine to make microsprinkler applications cool the air even more.

An additional feature on FAWN is the wet-bulb based irrigation cutoff temperature program that allows growers to determine when it is safe to shut off the irrigation system after it has been operated to provide cold protection. It has been shown that using this tool to determine when to shut off the irrigation systems can save countless millions of gallons of water as well as fuel and operational costs.

The authors are Extension agents with the University of Florida Cooperative Extension Service; they deal primarily with citrus production. 🍊



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