

Spring citrus production practices

By Stephen Futch, Mongi Zekri, Chris Oswalt, Parker Platts, Laurie Hurner and Camille Esmel McAvoy

Spring is just around the corner and it is time to begin thinking about your upcoming spring production practices. These production practices should be designed to foster bloom, enhance fruit set and maximize fruit production. As the days lengthen and the temperatures warm, new foliage and bloom will begin to appear.

CITRUS NUTRITION

Application of nutritional materials (soil and foliar-applied) is intended to meet the tree's nutritional requirements. Citrus tree demand for nutrients is highest in the late winter and extending to early summer. Flowering and fruit development will be competing with spring vegetative growth for applied nutrients. The first application of nutrients should be made to citrus trees via an application of fertilizer between early February and the initiation of flowering. This is followed by the second application in May before the beginning of the rainy season. Soil-applied fertilizer applications should be avoided during the summer rainy period to minimize leaching losses.

Application timing will vary depending on your location within the state as well as winter climatic conditions. Fertilizer applied during the winter (December and January) may not be readily absorbed by the tree due to cold soil temperatures and a lack of root activity. Winter applications of fertilizer are also subject to leaching if micro-sprinkler irrigation is used



for freeze protection.

Be aware that poorly timed applications of fertilizers could stimulate vegetative growth during the winter, thereby providing new flush which further supports overwintering populations of psyllids. This off-season flush would allow psyllids to reproduce and increase in numbers at a time of the year when their populations are generally low. Winter nutritional applications can also increase the susceptibility of young citrus trees to freeze injury.

Applying smaller, more frequent applications of nutrients to the soil during the year will also minimize the risk of fertilizer salt damage, and decrease the potential for leaching while maintaining a continuous nutrient supply during the entire year.

Foliar applications of nutrients offer a number of positive benefits. These benefits include ease of timely application with other pesticide products and more rapid uptake as compared to soil applications. Foliar applications of urea and phosphites six to eight weeks prior to bloom have been shown to increase flower numbers, fruit yield and total soluble solids. Flower bud induction advisories will be offered in the 2013–14 season by L. Gene

Albrigo, University of Florida professor emeritus, to aid in timing of sprays to enhance bloom. His advisories are posted at <http://www.crec.ifas.ufl.edu/extension/flowerbud/>

A special effort to prevent Mn, Zn and B deficiency symptoms should be made in groves with Huanglongbing (HLB or citrus greening) symptoms. Applications of manganese (Mn) and zinc (Zn) are most efficiently applied by foliar sprays of sulfate, nitrate, oxide or organically-chelated sources. For boron (B), foliar sprays of boric acid or borax (sodium borate) are also more efficient than soil applications. For maximum uptake, foliar applications should be made to young leaves when they are two-thirds to nearly fully expanded, before hardening off.

Iron (Fe) deficiency is usually associated with high soil alkalinity, excessive irrigation and low soil temperature. Iron deficiency is best corrected by soil application of chelated products. The amount of nutrients recommended for foliar sprays should be lower than the amount applied to the soil because foliar applications are more efficiently utilized than soil applications.

The total annual applications of both soil (granular, liquid applications via the irrigation system or through the herbicide boom) and foliar applications should be in the range of 140 to 250 pound of nitrogen (N) for oranges per acre per year, depending on fruit yield. Grapefruit should receive 120 to 160 pounds of N per acre per year and should be adjusted based upon yield. Dividing the application frequency into smaller doses will increase the efficiency and maintain a more constant availability of applied nutrients. For more information on nutritional application rates, refer to "Nutrition of Florida Citrus Trees," SP253, which is published by the University of Florida.

Phosphorus (P) should be applied based on leaf tissue and soil test results. In many cases, P may not need to be applied on an annual basis. Potassium (K) should be applied at a rate that is equal to the nitrogen rate. If leaf K is consistently below optimum, increasing the K₂O rate by 25 percent would be appropriate to maintain an adequate nutrient level.

INSECT AND MITE MANAGEMENT

Citrus growers have been focusing on psyllid management; however the

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control of citrus leafminer, mites and other insect pests is also important. The *Florida Citrus Pest Management Guide* provides a complete listing of products that are available to control numerous pests, including mites.

Many of the newer miticides offer better control when applied to low pest populations; thus, frequent scouting to estimate population abundance is essential for optimum pest management. During the spring when humidity is low, spider mites can become problematic. This is especially true when broad-spectrum insecticides are used for control of the Asian citrus psyllid. The pest or pests controlled, length of control and treatment cost will vary among products. If the selected product will control multiple pests, then value is added to that product over chemicals that only control a single pest.

Be aware that your application of pesticides, especially insecticides in citrus groves around the bloom period, may impact foraging bees, even if the bee hives are not directly in or adjacent to your property. Bees can forage a mile or more from the hive, depending on available food sources. Pesticide product labels must be carefully followed as most foliar products that control psyllids via soil or foliar applications may be toxic to honey bees.

Some pesticide labels will actually state that the product can't be applied when citrus is blooming. This is due to the impact that those products may have on pollinators (bees). Other labels may specify that a specific amount of time must pass between an application and when bees are placed in the grove or are expected to be foraging. Growers must consider the potential for bee mortality and select products that do not negatively impact bees when in the area or when trees are in bloom. A potential source of information for determining bloom dates is available and can be used to better coordinate

psyllid control applications; it is available using the Internet Expert System on intensity and time of bloom that can be accessed anytime at <http://disc.ifas.ufl.edu/bloom>

CITRUS HEALTH MANAGEMENT AREAS

Growers should be aware of Citrus Health Management Areas (CHMAs) and their efforts to coordinate the control of the Asian citrus psyllid with neighboring growers. These coordinated efforts have resulted in remarkable success as compared with individual efforts. Pesticide applications as a collective action during the dormant season are a very effective tool in reducing psyllid populations to manageable levels.

Visit the CHMA website at http://www.crec.ifas.ufl.edu/extension/chmas/cham_websites.htm for more information on CHMAs. Your local county citrus Extension agent can also help to provide information about CHMAs and how you can become actively involved.

DISEASE MANAGEMENT

As citrus canker continues to spread throughout the state, growers must develop control strategies to suppress canker to minimize leaf loss and fruit drop. Current recommendations for canker control for processing fruit call for up to five copper sprays at 21-day intervals for early oranges with the first application beginning in April. In most cases, three applications of copper for Valencia oranges are usually sufficient when applied beginning in April and timed at 21-day intervals. More optimal timing of copper applications can be achieved with the Citrus Copper Application Scheduler that can be found at <http://agroclimate.org/tools/Citrus-Copper-Application-Scheduler/>

Applications of copper applied to grapefruit intended for fresh fruit markets will require additional sprays into

October for canker. Citrus leafminer control is also important, especially in the summer when canker can invade the leafminer galleries, thereby increasing the inoculum levels of the disease.

In areas where citrus black spot has been found, the need for production practices to minimize the spread and control of the disease is essential. To minimize the spread, harvested fruit must be tarped when moving out of the grove. Equipment (production and harvesting) should be decontaminated and any debris removed before moving out of infected areas. Monthly applications of copper and/or strobilurins (Abound, Gem or Headline) will be needed from early May to mid-September to control the disease. In the event of heavy rains in April, starting applications before May is advised.

Alternaria brown spot can cause severe leaf and fruit drop, particularly in Minneola (Honeybell) and Orlando tangelos, Dancy tangerine and Murcott (Honey tangerine). Alternaria must be controlled on these cultivars to obtain high yields of good quality fruit. Leaf tissue is susceptible until it is fully expanded and fruit is susceptible for about three months after bloom. Copper fungicides including Abound, Gem, Ferbam, Headline, Pristine and Quadris Top are materials registered and recommended for the control of this disease. When planning applications, growers are advised to consider that they likely have some resistance to strobs and should be rotating the mixture of fungicides instead of single-mode-of-action fungicides. The first spray should be applied when the spring flush leaves are one-quarter to one-half expanded. Another spray should be scheduled shortly after petal fall.

Citrus scab fungal disease affects grapefruit, Temple orange, Murcott, tangelos and some other tangerine hybrids. If leaves from the previous season are heavily infected by citrus scab, then three applications of fungicides should be scheduled to control this disease. The first spray should be applied at about one-quarter expansion of the spring flush leaves, the second at petal fall and the third about three weeks later. Fruit becomes resistant to scab about two months after petal fall. Copper fungicides such as Abound, Gem or Headline are good for the control of citrus scab. Do not use Abound, Gem or Headline in nurseries.

Melanose is a fungal disease that affects all commercial varieties of citrus grown in Florida. The pathogen overwinters in recently killed (less than a year) citrus tree twigs. Melanose would rarely cause yield losses,

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but can be a significant factor in fresh fruit production. Spores of melanose begin infecting susceptible fruit and foliage in the spring when temperatures rise to 75°F to 80°F when leaves are wet for 10 to 12 hours. Sprays for melanose should begin in mid- to late-April depending on the variety and should continue to the end of the fruit susceptibility period. Copper fungicides Abound, Gem, Headline, Pristine and Quadris Top are currently recommended for melanose control. Caution should be used if applying copper fungicides during periods of hot, dry weather to prevent phytotoxicity damage to the fruit. For more information on pests and diseases, refer to the *2014 Florida Citrus Pest Management Guide*.

A citrus copper application scheduler tool has been developed and is available to growers to determine when residual copper levels go below effective control levels. The tool uses rainfall measurements from a selected Florida Automated Weather Network (FAWN) weather station or you can upload your own data. The bloom date, copper rate used, spray volume and date are required to be placed in the model by the grower. The model then predicts when the next copper application should be applied. The model is

available at the following website: <http://agroclimate.org/tools/Citrus-Copper-Application-Scheduler/>

Most growers have adopted an enhanced foliar nutritional program to aid trees in combating HLB. Research has shown that these enhanced programs have allowed trees to remain productive and continue to produce acceptable crops. The foliar nutritional program contains applications of micronutrients and a phosphite material which are applied several times per year. These enhanced nutritional programs have visually improved the appearance and yield of symptomatic and asymptomatic trees as compared with trees that have not received foliar nutrients.

When applying phosphite materials, consideration should be given to phytotoxicity which can result from tank mixtures where the pH of the spray solution is below 6.5 and when phosphite materials are combined with copper fungicides. Monitoring the pH of the spray mixture after the addition of each product to the spray solution is important. If the pH is below the desired level at any time during the mixing process, buffering agents should be applied to adjust the pH of the mixture and minimize potential phytotoxicity.

PESTICIDE RESISTANCE

With the increased frequency of pesticide applications, growers must consider avoiding using pesticides with the same mode-of-action (MOA) in consecutive applications to minimize potential pesticide resistance. MOA information is found on all pesticide labels as well as in various sections in the *2014 Florida Citrus Pest Management Guide*.

WATER STRESS AND IRRIGATION

Water stress can produce a deleterious change in physiological activity, growth and reproduction of

citrus trees. Short-term drought often reduces production whereas prolonged drought can cause total crop failure. Severe drought between February and July can reduce fruit set, fruit development, fruit size and yield. Trees subjected to water stress are generally reduced in size and prone to pests and diseases. Growers cannot afford to allow their citrus trees to be water stressed, especially during the spring dry season. Irrigation is important during this period, which coincides with the important stages of leaf expansion, bloom, fruit set and fruit enlargement.

Florida citrus growers and production managers know that they can't grow citrus successfully and competitively without supplemental irrigation. With proper irrigation scheduling, tree growth and fruit yield will not be limited by water stress, either too much or too little. Over-watering can result in an increase in pumping costs, an increase in the leaching of nutrients and other chemicals below the root zone, and could contribute to groundwater contamination.

Good water management practices should include precise irrigation scheduling and use of well-designed, uniform irrigation systems to minimize waste. Non-uniform irrigation will cause excess water to be applied in some areas while other areas will not get enough. Production managers should not only be aware of the losses resulting from irrigation systems that apply water and chemicals non-uniformly, but should adopt the recommended ways to minimize these losses.

Irrigation should be applied when available water has been depleted by one-quarter (25 percent) from February through June and depleted by one-half (50 percent) during the remainder of the year. A citrus irrigation program is available on FAWN to aid in making irrigation decisions. The tool is available at <http://fawn.ifas.ufl.edu/tools/irrigation/citrus/>

HEDGING AND TOPPING

Hedging and topping operations will usually be followed by new growth flushes. New growth is highly attractive to psyllids and leafminers. Pesticide application prior to hedging or topping should be considered to keep psyllid populations from rapidly multiplying on the new foliage. Additional pesticide applications will most likely be needed after hedging to control psyllids when new foliage begins to emerge.

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