

Fungi in my neighborhood

By Megan Dewdney

As the spring bloom approaches, it is time to plan for the new season. Although huanglongbing (HLB) is still the most overwhelming plant disease issue, fungal diseases are still important for overall tree health and fruit quality. Blemishes are particularly important for fresh fruit, but defoliation and fruit drop can cause general tree stress and lower yields. In addition, defoliation can promote more summer flushes, which increase the risk of an Asian citrus psyllid infestation. Good foliar fungal disease management can help to keep yields high, and that's important in these times of uncertainty.

GREASY SPOT

Greasy spot, caused by the fungus *Mycosphaerella citri*, is a problem on all Florida citrus, and is a concern for processing or fresh market production. The ascospores are formed from last season's infections in the leaf litter underneath the trees. If a block had very high greasy spot levels the

previous season, it is advisable to increase greasy spot control efforts this year, potentially adding an application in August.

Major ascospore ejections occur from late April to June, but conditions are not always favorable for infection at that time. However, there are still many ascospores in the air that can cause infection in June through July, when conditions are favorable. During the summer, *M. citri* is in its epiphytic (on the surface of plants) phase and is most vulnerable to chemical control. Most infections do not occur until late summer, and symptoms are most often seen from November to February, depending on whether the climate has been cool or warm. Symptoms develop most rapidly when it is warm. Severe outbreaks of greasy spot can cause major defoliation on untreated trees.

Copper is an effective and economical choice for greasy spot control, especially in groves with canker. However, if summer temperatures are high and the weather is dry, copper can cause phytotoxicity on the fruit.

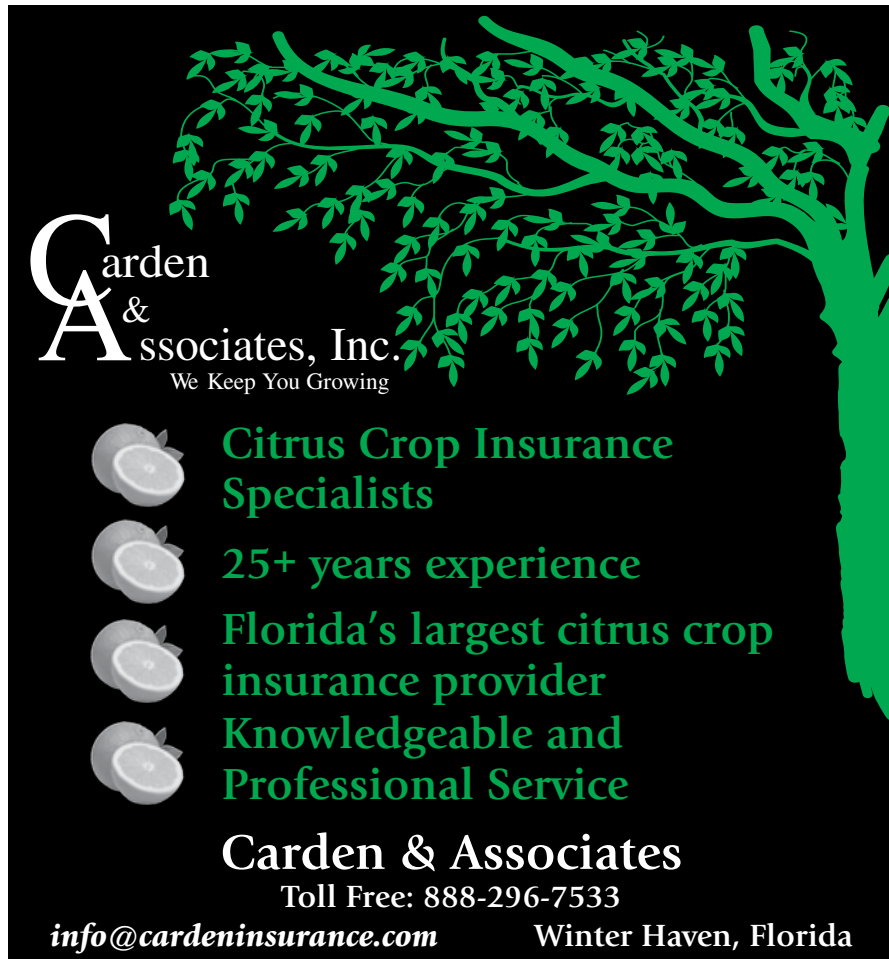
Application of copper with petroleum oils can also lead to rind defects during the summer months — most problematic for fresh fruit production. Therefore, copper is best applied on moderately warm days without any additives, including petroleum oil, at 2 lb./acre or less.

On processing oranges where fruit blemishes are not as important, petroleum oils are a good alternative to copper, but control rind blotch inconsistently. If phytotoxicity is of particular concern, strobilurin fungicides or products containing strobilurins — Abound (azoxystrobin), Gem (trifloxystrobin), Headline (pyraclostrobin), Quadris Top (azoxystrobin plus difenoconazole) or Pristine (pyraclostrobin plus boscalid) — can be used. Enable (fenbuconazole) is also an effective control option. The strobilurins are most appropriate in late May to early June because they also control melanose. No more than one application of strobilurins alone or in a mixture should be made within a season to avoid selection for resistant strains of *M. citri*. Enable is especially effective for mid- to late-season control of rind blotch, but should not be followed by Quadris Top because they share a mode of action.

MELANOSE

Any season that starts with a lot of freeze damage is a difficult year for melanose control. The fungus that causes melanose, *Diaporthe citri*, rapidly colonizes and sporulates on the small twigs that die from freeze damage and other causes. The spores (or conidia) are formed inside flask-shaped pycnidia that can be seen with the naked eye on twig surfaces as small black bumps. More dead twigs allow the fungus to produce much more inoculum than in a non-freeze year. The fungus also infects live twigs which produce inoculum after the twig dies. *D. citri* sporulates most rapidly and profusely on small, dead angular twigs that are less than half the diameter of a pencil.

Normally, groves under 10 years old should not have much melanose since there are not many dead twigs in the canopy, but a freeze can allow the fungus to become established in young blocks sooner. Luckily, high inoculum levels do not carry over from one year to the next, so if there is not a significant freeze event, melanose inoculum



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should be at normal levels. Melanose severity may gradually increase overall as more groves become afflicted by HLB and greater canopy dieback occurs, but conversely there may not be much flush on such trees to be infected. Only time will tell.

Ten to 12 hours of leaf wetness, not unusual in Florida, are needed for infection if temperatures are between 70° to 80°F (21° to 27°C). However, melanose is not usually severe unless there are extended leaf wetness periods. Even longer leaf wetness periods of up to 24 hours are needed if temperatures are cooler. No spores are produced from leaf and fruit infections.

Copper is the most economical option for melanose control because of the long residual activity, but residues decline with fruit expansion and rainfall. The Citrus Copper Application Scheduler, which estimates the copper residue remaining on the fruit surface to assist decisions on when to reapply copper to maximize protection, is available at <http://www.agroclimate.org/tools/cudecay/>

Grapefruit are the most susceptible to melanose, and copper applications should be made every three weeks from mid-May on average until fruit become resistant in early July. If copper is applied in early June, it can also serve as the first greasy spot application and as a canker application. If there is concern about copper phytotoxicity in hot weather, strobilurin fungicides give good control, but should never be used more than twice in a row for melanose because of possible development of fungicide resistance. One caveat is that strobilurins also do not have as long a residual activity as copper.

ALTERNARIA BROWN SPOT (ABS)

Alternaria alternata is a perpetual problem on fresh market tangerines and tangerine hybrids, causing blemishes in addition to fruit and leaf drop with severe infections. Infected leaves and twigs in the canopy, recently fallen leaves and last season's fruit remaining on the tree produce conidia (spores). Spores become airborne and can land on susceptible tissues when humidity changes or more than 0.1 inch (2.5mm) of rain occurs. Leaf infection occurs in as little as four to six hours, but the disease is more severe with longer wetting periods. Optimum infection temperatures are 73° to 80°F (23° to 27°C), but infection can occur

Citrus Industry Introduction Includes Hands-On Issues Management Training

By Douglas Ackerman



In my first hour as a member of the citrus industry on Jan. 9, I learned a new word...carbendazim. By the end of my first day, I was on a priority conference call with Florida Commissioner of Agriculture Adam Putnam and his team, Chairman Marty McKenna and the team at the Florida Department of Citrus (FDOC), and the Florida Juice Processors Association. Please fasten your seatbelt and welcome to the citrus industry, Doug.

While on the retail side of the business, I lived through and saw firsthand the effects that product integrity issues can have on customers, retailers and each member of the supply chain. Incidents such as the listeria found in cantaloupe last year and salmonella in peanut butter in 2009 do untold damage to the reputation of industries. Once a product or industry violates consumer trust, the consequences can be far reaching and, in some cases, irreparable.

As I reflect at the end of my first week in the citrus industry, the one thing that sticks out most in my mind about the past few days is the absolute professionalism and dedication of the staff, commissioners and partners of the FDOC. I was pleasantly surprised to find that although most of the industry was just beginning to learn of the issue on Jan. 9, the FDOC had been tracking the issue since New Year's Eve and had already begun contingency planning while the situation was developing. I was also pleasantly surprised to learn that our public relations agency partner, GolinHarris, led the National Peanut Board through the 2009 peanut butter recall with an award-winning crisis communication plan to successfully restore consumer confidence and consumption. In addition to the parties on the conference call, FDOC had also been working closely with the Juice Products Association to ensure that the citrus industry was delivering consistent messages about the safety of orange juice.

During times like these, we all understandably want to rush immediately to the defense of our industry and livelihoods. Please feel confident, as I do, that we have the best in the industry working on your behalf as we ride out this storm together.

I would like to thank the Florida Citrus Commissioners, FDOC staff, citrus growers and industry professionals that I have met in my first week on the job for such a warm welcome. I look forward to meeting more of you as our journey together progresses. If I can be of help to you in any way, please do not hesitate to contact me at dackerman@citrus.state.fl.us or 863-537-3950.

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at any temperature between 63° to 90°F (17° to 32°C).

Strobilurin resistance of *A. alternata* populations was first reported in Florida in 2008. Since that time, more than 23 groves with control failures with strobilurin fungicides have been reported and more suspect cases are being investigated. The first few groves to report control failures had a history of using the highest label rate of these fungicides many times a season, often without rotation. However, new cases of resistance have been found in groves where label rates and rotation instructions were carefully followed. Fungicide resistance is an issue that should concern anyone producing tangerines and tangerine hybrids as it severely limits control options.

Two new products, Quadris Top and Pristine, were introduced for spring 2011. Both of these products contain alternate modes of action, but they are only available as mixtures with strobilurins, so they cannot be used in rotation with strobilurins. While current strobilurin use recommendations will not prevent resistance, they will slow the development. Thus, it is important to restrict strobilurin

use to the label limit, never use strobilurin-containing products more than three times per year and never apply strobilurin-containing products more than twice in a row.

BLACK SPOT

Black spot was first discovered in Florida in March 2010 in the Immokalee area of Collier County. Shortly thereafter, it was also found in a restricted area in Hendry County. In the last year and a half, the disease has spread to larger areas, but is still restricted to a small proportion of groves in the two counties. Most citrus cultivars and species are susceptible to the disease. As with greasy spot, the main inoculums — ascospores — are formed in the leaf litter under the trees and are spread by wind. Additional inoculum, conidia, is formed on dead twigs and in certain symptom types, and is spread by rain splash. The main period of infection is from May to September; however, applications are advised in April if it is wet.

Black spot infection also requires long wetting periods of at least 18 hours, but with the heavy dews that occur in Florida, such prolonged periods are not unusual. At this time, products

for black spot control are restricted to the strobilurin fungicides (Abound, Gem and Headline) and copper. Monthly applications should begin in early May. If canker is problematic in a grove, the copper applications used for canker control will also control black spot. However, in most processing oranges, additional applications will be needed for black spot. Strobilurins are recommended where phytotoxicity is a concern, or where there was severe disease the previous season.

Further information on the control and biology of all the fungal foliar diseases is available on the Citrus Research and Education Center website, as well as in the Florida Citrus Pest Management Guide and at EDIS (<http://edis.ifas.ufl.edu/>).

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