Refreshed and renewed: the citrus copper application scheduler

By Megan Dewdney, Clyde Fraisse, Tiago Zortea and Jamie Yates

The citrus copper application scheduler, formerly known as the "DISC copper model," was released originally in 2002 (Figure 1) and designed to assist growers with decisions on timing the next copper application. The system was intended for groves where melanose and other foliar fungal diseases were of concern. Historically, there was concern about inadequate disease control with copper, fruit phytotoxicity or stippling, and toxic buildup of copper residues in the soil. The tool assisted growers in determining the residue remaining on fruit surfaces after application and the timing of an additional application.

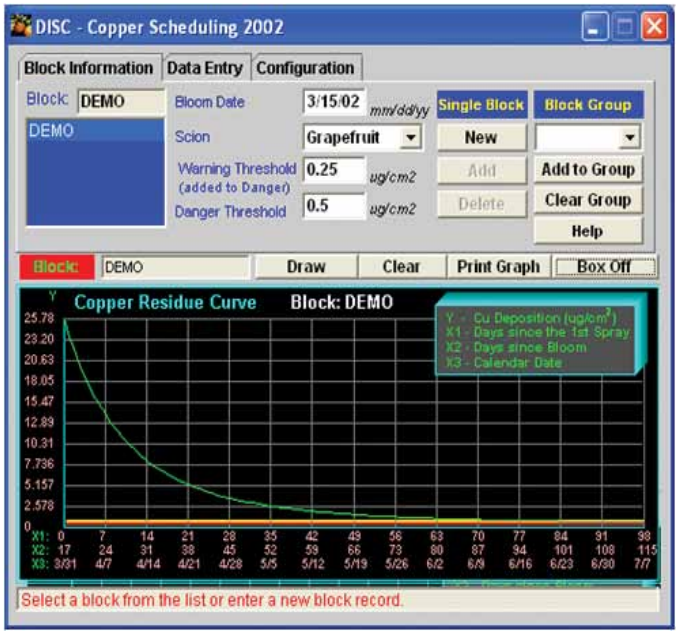

Figure 1. *The original copper model released in 2002*

The aim was to avoid unnecessary copper sprays and to reduce production costs when possible but, conversely, to warn when residue levels were lower than expected so that an application could be made before the next rain event. In other words, avoid infection because copper residues were too low, but also minimize the number of applications.

Copper residue levels are affected by two main factors: fruit growth and rain. When fruit are small and growing rapidly, the fruit surface area expands, but the copper deposit does not, leaving the areas in between copper residues exposed to disease infection. Rainfall is also important because it reduces copper residues below effective levels, leaving fruit vulnerable to disease.

Since the development of the original "DISC copper model," many things have changed in citrus production. For instance, canker was re-introduced to Florida and has since spread through many production areas of the state. Depending on the scion cultivar, copper sprays may be needed until October whereas most foliar fungal diseases only need applications into June. Black spot, a fungal disease, was also recently introduced into Florida. While it has not spread throughout the state as canker has, black spot management requires copper sprays from spring through the summer until September.

The original model was based on growth and residue data that ended in June and may not be accurate for the later season applications. Disease management is not the only thing that has changed in the time since the model was released; computer technology has also evolved impressively. This initial revision of the copper model, renamed the "Citrus Copper Application Scheduler," has taken advantage of current Web-based technologies to make the model interface as user-friendly as possible.

When you open the model on the AgroClimate Web site (www.agroclimate.com), first and foremost, you

will notice the interface has changed dramatically from the original model. Instructions on how to find and use the tool are given below. The model (Figure 2) has been given an entirely new, more appealing appearance. We have tried to make data input simple. Four pieces of information are needed to use the model:

1. Weather station nearest to block;
2. Scion;
3. Approximate bloom date; and
4. Date of application, copper concentration (lb. metallic) and spray volume (gal./acre).

Rainfall data can be inputted in one of two formats: Select a FAWN weather station close to your block or upload data from a CSV (comma-separated value) file on your computer. Instructions on how to format your data for the model are available on the Web site when you click on the word "Help."

Model predictions will only be as good as the data that is uploaded into the model. FAWN weather equipment is checked regularly and the accuracy verified, but there are no such guarantees for other sources of data. Scion is selected from the drop-down menu and you can choose from grapefruit, navel, Valencia or generic orange. We plan to link this tool to the flower-monitoring model to help growers approximate bloom dates in case they do not have them noted for all blocks. Visit http://www.crec.ifas.ufl.edu/extension/plant_pathology/cdm.shtml to view short video demonstrations of how to use the models.

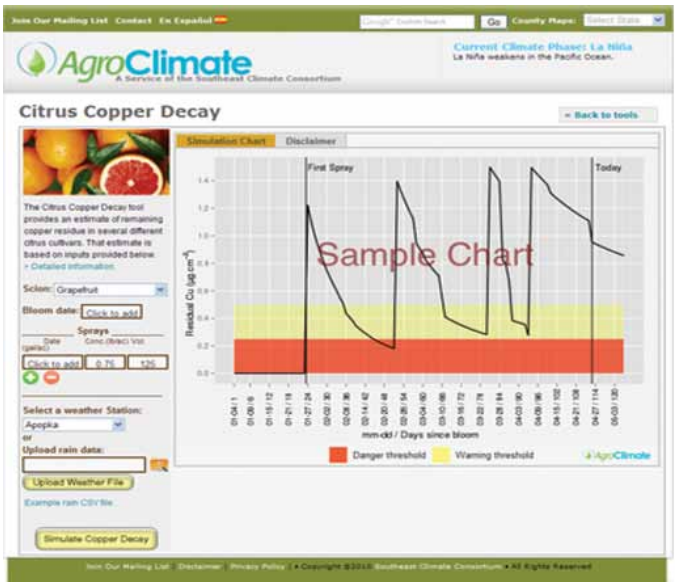

Figure 2. *The revised copper model released in 2011*

Since the "Citrus Copper Application Scheduler" is now a Web-based application and can be accessed via the Web anytime, there is no longer a file that must be saved and downloaded to your computer. In the current format, it is not possible to save the season's data online as could be done in the former version. If we get enough feedback from users that this is a needed service, it can be implemented, but a fee may be required. It is not yet compatible with smart phones or other mobile devices, but we plan to create a version for mobile platforms.

Another feature we are still working on is the forecasting of residues and their persistence. We are also gathering additional data to make late-season copper residue estimates as accurate as possible, but this will take at least another year after this season.

We are very interested in feedback from users, so please contact Megan

Dewdney (mmdewdney@ufl.edu), Clyde Fraisse (cfraisse@ufl.edu) or your multicounty citrus agents. We are planning to do hands-on demonstrations in coordination with the multicounty agents and present the model at Citrus Expo. So if you are interested, please look for announcements.

Megan Dewdney and Clyde Fraisse are assistant professors, Tiago Zortea is a research scholar and Jamie Yates is coordinator of canker and greening Extension education — all with the University of Florida-IFAS.

Citrus Copper Application Scheduler

UF FLORIDA

www.agroclimate.org

AgroClimate

How to Find the Tool

1. Select AgroClimate tools on the left menu bar
2. Click Crop Diseases
3. Click Citrus Copper Application Scheduler

How to Input Information

1. Select the closest weather station or upload personal rainfall data (click help for assistance)
2. Choose the scion (grapefruit, Valencia, navel, mandarin, orange)
3. Insert estimated bloom date (navigate between months and click on day)
4. Insert date(s) of spray application (navigate between months and click on day)
5. Insert the concentration of metallic copper (lbs./ac) and volume (gal./ac) applied
6. Click Simulate Copper Decay to generate chart

How to Read the Simulation Chart

The black dotted line represents the copper residue levels remaining since you sprayed.
The black vertical line represents the current date.
The black dashed line represents forecast copper residue during the next week.
The purple vertical bars represent daily rainfall accumulation.
The gray area represents copper residue is still viable.
The yellow is a warning your copper residues are getting low.
The orange is a danger threshold and you should spray as soon as possible.
Click the Simulation Details tab to view and download data as a spreadsheet.

For more information, contact Megan Dewdney, mmdewdney@ufl.edu or Clyde Fraisse, cfraisse@ufl.edu

WHAT'S SHAKIN'

To successfully use abscission agents for Valencia sweet orange mechanical harvesting throughout the harvesting season, unwanted flower, fruitlet and leaf drop must be assessed and minimized, according to abscission team leaders Bob Ebel and Jackie Burns in the UF/IFAS Abscission and Harvesting 2009-2010 Final Report.

Studies were conducted from 2006 through 2008 to determine the sensitivity of the various plant organs to CMNP and ethylene, a compound known to cause senescence and abscission in other crops. During the harvesting period, mature fruit responded to CMNP but not ethylene, indicating ethylene is not a major contributor to abscission. Also during the harvesting period, abscission of young fruitlets and leaves were not responsive to CMNP or ethylene.

Visit http://citrusmh.ifas.ufl.edu for further information on this study.