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Environmental Horticulture Notes

EHN 100

CODLING MOTH MANAGEMENT USING COMPUTERIZED TOOLS

AUTOMATED WEATHER STATION
DEGREE-DAY CALCULATOR – SACRAMENTO COUNTY

TIMING OF CODLING MOTH SPRAY APPLICATIONS:
The Codling Moth Pest Note 7412 covers simple methods that homeowners can use to help them time when to apply insecticidal sprays. Read it first, paying particular attention to identification and Life Cycle sections, and the Chemical Control portion of the Management section. http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7412.html (This URL is case sensitive.)

For more precise spray timing, homeowners can access the same computerized tools from their home computers that commercial growers use.

These are the key tasks you will learn:
- Determine when the moths are flying.
- Establish when sunset temperatures are at least 62 degrees.
- Establish your "biofix" (start date) for degree-day calculation.
- Start the degree-day calculation to estimate the date of the first spray.
- Re-check degree-day calculation as season progresses for subsequent spray timing.

DETERMINE WHEN MOTHS ARE FLYING:
Hang a trap containing a pheromone lure in an apple or pear tree in early to mid March in the Sacramento region (or at bloom). Check the trap twice a week, count and record the number of moths caught, and remove each moth from the trap. Once moths are flying, this indicates that mating and egg laying will soon follow. Male moths are the first to start flying. Be sure to replace the lure according to the manufacturer's suggested interval.

NOTE: Several of the major nurseries in the Sacramento area sell small packages of traps with lures, but it is advisable to contact your local nursery to see if they carry them, or check for sources on line.

DETERMINE WHEN SUNSET TEMPERATURES ARE AT LEAST 62 DEGREES:
Use your own thermometer, or use the link below for automated weather station data on sunset temperatures available from March 1 to mid May each year.

www.ipm.ucdavis.edu/calludt.cgi/SSTSTATIONLIST?YESTERDAY (This URL is NOT case sensitive)

First Screen: The date in the boxes near the top of the screen is the date with the most recently recorded data for March through mid-May of the current year. If you are accessing this site before the March 1 start date of the current year, change the date to May 15 of the prior year, press the "Choose a new date" button, and a list of counties will appear along with last year's data.

Scroll down to Sacramento County and click on the weather station closest to your location: Fair Oaks (Phoenix Field), or Twitchell Island (south of Isleton in the Delta). Sometimes not all stations are shown.

Second Screen: This screen shows a list of dates and sunset temperatures from March 1 of the year selected through mid-May. Temperatures at or above 62 degrees are in bold type.

When working to establish your own biofix, check back frequently to this site until you see several days with sunset temperatures of at least 62 degrees.

Reading: Near the top of each page on this site find the tan colored bar and click on "About sunset temperatures" and read the page. Half way down the page click on "About degree-days and phenology models" and read down to but not including the section "Degree-day Calculation Methods." Exit this website.

ESTABLISH YOUR START DATE: "BIOFIX":

Compare the dates when your trap caught moths with the dates when sunset temperatures were at least 62 degrees. The first date that moths are found in the trap for three consecutive trap checks AND sunset temperatures have reached 62 degrees is the start date for the degree–day calculation. This date is called "biofix". Once biofix has been set, traps can be monitored just weekly.

NOTE: When there are a few warm days in March in which moths are caught, followed by weeks of much cooler weather with few or no moths caught, it is very difficult to establish biofix. This may be when you rely on the following web site information.

You can visit a local professional site to see the biofix date they have established for several nearby areas to compare with your own biofix. Visit the web site now: www.trece.com/field.html

First Screen: This screen shows a list of report dates. The first time you visit this site, click on a date in May of the current or prior year to see how biofix is reported. On future visits, just select the most recent report date.

Second Screen: This screen shows information for several counties in the Central Valley. Locate Sacramento County and note if a biofix date has been established yet for CM (codling moth). There are other moths reported for different fruit crops (PTB, OFM, OLR, etc), be careful not to pick up their biofix dates.

Biofix can vary by several weeks each year depending on how warm or cool the spring is.

Once you have a biofix date, exit the website and proceed to the next step.

START YOUR DEGREE-DAY CALCULATION:

"Degree day" is a term used to express the period of time that many organisms need to develop from one stage in its life cycle to another. The degree-day calculation for codling moths begins with moth flight, and estimates when egg hatch will occur and when the next generation should begin to fly based on temperatures. Sacramento County usually has three generations of codling moths, which means moths will be flying and eggs hatching during three separate time periods. Follow this link to start (note – the models for apple and pear are the same):

www.ipm.ucdavis.edu/calludt.cgi/DDMODEL?MODEL=CM&CROP=apples
(This URL is case sensitive)

First Screen: Move down the screen to the weather station boxes. In the box on the right, scroll down through the county listing, then click on "Sacramento." Below the county listing, enter your biofix start date (or if you are doing a practice run, enter March 15 of the current year). Enter an end date of August 31 of the current year. Do not change any of the information in the circles, and do not click on "browse." Then click on "Continue."

Second Screen: Click on the weather station in Sacramento County nearest your home.

- Clay Station is east of Galt
- Fair Oaks is Phoenix Field
- Lambert Rd is near Courtland in the Delta
- Sacramento FAA airport is Executive Airport
- Sheldon is east of Elk Grove
- Twitchell Island is south of Isleton in the Delta

Third screen: Confirm that the information you entered is correct, and click on "Calculate".

Fourth screen: About a third the way down the screen is a group of small boxes. The group to the left is titled "Generation Length". As shown, the first generation of codling moths is 1060 Degree Days (DD) long. The second generation is 1100 DD long, and the third generation is 1200 DD long.

To the right is information on spray timing to coincide with larvae hatch.

- Spray the first generation's egg hatch when 250-300 DD have been reached.
- Spray the second and later generations when 250 DD have been reached **after that generation's moth flight has begun.**

It is important to note that one to two additional sprays may be necessary for each generation, timed for when the residual effectiveness of the previous spray has ended. Some organic and low-toxicity products have a residual of 7 days or less, whereas Sevin lasts for 14 to 21 days.

In addition, if trap counts are unusually high, such as over 10 to 20 moths per week, also spray when 160 DD have been reached for each generation.

Below these boxes is a day by day list starting with the biofix date you entered to the end date you entered. The "A" following some of the temperatures is an average projection for that date. Once actual temperatures are recorded, the minimum and maximum temperatures for each day are automatically updated as well as the accumulated degree days.

Additional Reading: On the above Degree Day calculation page, find the tan colored bar and click on "apples." This provides more detailed information on timing the sprays, depending on the level of infestation.

It is important to note that the frequency of spraying depends upon the product being used and the recommendations on the label. Read the label for the recommended spray frequency for each generation.

A Dose of Reality: Realize that not all moths emerge on the same date, nor do they start mating and laying eggs on the same date; nor do all eggs hatch on the same date. Given that, the degree day calculation gives the best dates to have the most impact without continuously spraying. However, in some years it is difficult to determine the first biofix date due to prolonged cool spring temperatures and sporadic initial trap catches. In this case it may be necessary to check for "stings" or entry holes starting about 3-4 weeks after full bloom to determine when egg hatch is occurring – that would be the first spray timing.

PRACTICE EXERCISE:

Using the information in the fourth screen above in the Degree Day section:

- Find the estimated first spray date -- the date when 250 DD is reached (look in the degree day column).
- Find when the 2nd generation is expected to start flying -- the date when 1060 DD is reached (this is referred to as the second biofix).
- Find the estimated first spray date for the second generation hatch -- the date when 1060 + 250 DD is reached (1310 DD).
- Find when the 3rd generation is expected to start flying -- the date when 1060 + 1100 DD is reached (this is referred to as the third biofix)
- Find the estimated first spray date for the third generation hatch-- the date when 1060 + 1100 + 250 DD is reached.

When the first biofix is established, the use of the DD calculation is just an estimate as to the first spray date. As you get closer to each generation's estimated spray date during the season, re-visit the site frequently for automatically updated data, and new projected spray dates based on actual daily temperatures.

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COMPREHENSIVE EXERCISE:

Find the 2011 codling moth biofix for Sacramento County from the Trece site.

Start the degree day calculation using the Fair Oaks weather station in Sacramento County. Use the codling moth biofix date for 2011 from the Trece site. Enter an end date of August 31, 2011, and run the DD calculation. From the data you pull down, find the following target dates:

- Date for 1st generation's first spray
- Date for 2nd generation's first spray
- Date for 3rd generation's first spray

ANSWERS:

- Biofix 4/15/2011
- 1st generation spray 5/6/2011
- 2nd generation spray 7/8/2011
- 3rd generation spray 8/13/2011