

Some Practical Considerations When Using the Codling Moth Model

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Models help us decide the timing of events that are difficult to see. The codling moth is the key pest in Washington orchards, but events of its life cycle are almost impossible to visually monitor unless populations are well above economic thresholds. The signs of codling moth infestation that can be observed include the presence of males in pheromone-baited traps and the actual damage done to the fruit by larvae. This monitoring is a critical part of codling moth management, as models help only with timing of control practices, and tell us nothing about pest numbers or location.

There are numerous inconsistencies that become obvious when generalized model information is compared to trap data. Trap catch numbers often rise and fall abruptly, and average numbers per day rarely form a well-defined "bell curve" as indicated by a codling moth model chart. Although traps are rarely used in numbers and high pressure situations where an adult flight "bell curve" might be observed, this up and down trap catch sometimes causes the model user to question the accuracy and usefulness of the model. Model use might be improved if we all agree upon their best use, and recognize the apparent inconsistencies.

In the past 20 years of development and use, insect phenology models have greatly improved the timing of the first sprays applied for the control of the pest. It is apparent that the calendar timing method is inaccurate, and would have resulted in poor timing of 1st "cover" sprays over the past two decades. (Figure 1).

DAYS FROM BIOFIX TO EGG HATCH CODLING MOTH IN WENATCHEE

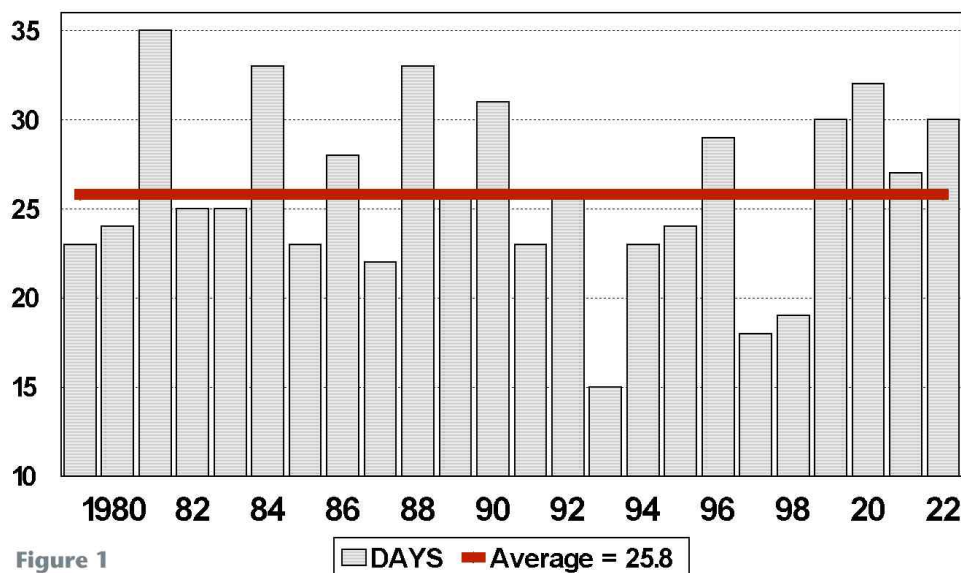


Figure 1

□ DAYS ■ Average = 25.8

While the average number of days that passed between first male trap catch (biofix) and first egg hatch has been about 26 days, the range is from 15 days (1993) to 35 days (1981). Spraying the traditional 17 to 21 days after bloom is a poor practice.

If models are to provide us with the most accurate guidelines, there are aspects of their use that can be improved. What follows are some observations and experience gained during the development, validation and use of various insect, disease and horticultural models in Washington over the past twenty years.

The determination of "Biofix."

Key point: Pool trap catch data taken from numerous neighborhood traps.

Models are often adjusted to some observable situation to take some early season variability out of the calculations. For example, the apple blossom phenology model is reset to a certain number when forty percent of the flower buds on the shady side of the tree are cracked open and showing green tissue. To set biofix for the codling moth model, various pest managers set pheromone traps in the orchard just prior to apple blossom time, and watch for the "first catch." This is an observable point in the development of the first generation of codling moth. At the time of first trap catch, the model degree days are set to zero, and daily counting and totaling of degree days begins.

However, if few traps are hung in an area with few moths, or pheromone traps are put out in a cloud of pheromone coming from emitters in a "confusion" block, the first catch of moths might be a test of trap efficiency, rather than a reflection of first male emergence and flight. Best "first flight" information comes from numerous traps hung in areas with numerous moths waiting to fly. Almost invariably, this first significant flight occurs about the same week that apples bloom, and on the first evening when temperatures are above 60 or 65 degrees Fahrenheit.

A true "biofix" is a relatively regional event, similar to full bloom of Red Delicious apples. There are some minor variations of first male flight in a neighborhood due to slope aspect, flats with poor air drainage, and rapid, major changes in elevation. However, if your apples bloom about the same day, you should not expect more than a day or two difference in biofix date.

The most dependable biofix dates come from daily observation of traps, especially following the first warm evenings, and the pooling of this information with others who are also monitoring traps in your neighborhood. Early season trap catch numbers are low, even in relatively infested areas. If you are watching only your few traps, how do you know that the traps all around your orchard are inactive? If there is a sudden flurry of activity in numerous neighborhood traps, you can be certain that you have an accurate assessment of first flight. If someone then passed this biofix date information to the regional IPM Extension agent, (in North Central Washington and the Columbia

Basin that is e-mail address smithtj@wsu.edu, your local biofix can be compared to those in areas known to be both warmer and cooler than your locality.

Use Accurately Measured Temperatures

Key Point: Be certain that the codling moth model you are using was set up using “standard” temperature data.

Have you ever seen an unrealistically high summer temperature displayed on an electronic bank sign? Is it *really* 110 degrees as the sign says when the weatherman reports 98 as the daily high? Well, the temperature of the sensor that the bank used to run the sign probably was 110. Perhaps the sun was shining directly on the temperature sensor, or the thermometer was in the middle of a sunny, paved parking lot.

Weathermen determined long ago that air temperature is quite variable, even within a few feet of any given point. They had to study the issue and agree upon a standard way to determine air temperature, so that comparisons could be made. For many years, standard air temperatures were measured in louvered, five foot high, white painted wooden boxes, placed in a green grassy area, well away from heat sources such as buildings, large boulders, roads and vehicles.

Any deviation from this set-up is likely to cause indicated temperatures to be higher or lower than the standard. As wooden boxes became too expensive, plastic enclosures have been developed that behave very much the same. Some weather monitoring and recording devices have these modern enclosures, other do not.

Most modern insect and disease models were designed using a standard temperature measurement. Some were not. For instance, temperatures may be monitored inside a crop canopy, rather than out in the sun. Be certain you use the same method of temperature determination. The codling moth model uses standardized air temperatures.

It is common to see daily high temperatures taken improperly. These poor quality temperatures are often two to five degrees warmer than standard temperatures, especially on sunny days. A measurement of four degree warmer than the standard each day will cause the codling moth model to shift forward about two days on “first cover” timing, and the first generation will be seven days less in length.

Be certain that the temperatures used to run the codling moth model in your area come from a high quality source.

Take Advantage of Present and Emerging Technology

Ten years ago the internet was an interesting toy, but had little of practical use to offer the average pest manager. Now this resource is the fastest and most up to date method to communicate pest management information, as well as a wealth of other topics related to tree fruit production.

Connecting to the "web" will give you immediate access to current information from your locality, plus information about the subjects you seek from authors all over the USA and world.

There are a great number of out-dated computers sitting around that are cheap, or free for the taking, and perfectly fine for accessing the "web." Monthly charges to connect through you phone line are as low as \$10. Take the plunge, if you have not already. It is simple to start, and after the first week, you'll wonder why you waited so long.