Washington State University

Pest Management Transition Project

Tree Fruit Research & Extension Center

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Overwintering Leafroller Larvae

Both pandemis (PLR) and obliquebanded (OBLR) leafroller overwinter as small larvae in hibernaculum in protected areas on the tree. Most PLR have emerged by the half-inch green stage of apple bud development, OBLR emerge later, by the pink stage of flower development. In recent years we have seen a species shift, from PLR to OBLR, across most of Washington. The later emergence of OBLR larvae makes them less susceptible to early applications of Lorsban, which has led to the use of alternative insecticides in the post-bloom period to achieve control. Though OBLR emerge later than PLR, the optimal timing for a post-bloom insecticide application targeting the fourth instar is similar for both species. New predictive models for both PLR and OBLR are available via the WSU Decision Aid System that will help growers improve timing for insecticide applications and for sampling to determine population densities and efficacy of control programs.

Early season fruit damage occurs when LR attach leaves to developing fruit.

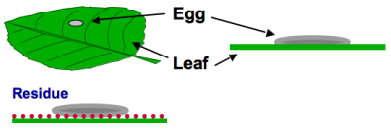
Insecticides for Leafroller Control

Obliquebanded Leafroller Larva

Esteem, Intrepid, Rimon, Success, Delegate, Altacor, Proclaim, and Bt can provide effective control of overwintering leafroller when applied in the post-bloom period. All of these insecticides are toxic to LR larvae that feed on residues. Most of these insecticides should be timed to target the fourth larval instar. Esteem is the exception and should be timed to target the fifth or sixth instar larvae. Proclaim, Success, and Delegate are fast acting and highly toxic to LR larvae. Altacor has provided effective control in research trials conducted at the WSU-TFREC, but is slower acting in comparison. The insect growth regulators (Esteem, Rimon, and Intrepid) kill larvae by disrupting the normal development of the insect. Rimon and Esteem have an extended time-to-kill but both are effective at reducing the subsequent LR generation. Bt products are lethal to LR larvae after being consumed but generally require repeated applications to achieve good control. All of these insecticides must be consumed to be effective, making thorough spray coverage essential.

Killing Codling Moth Eggs

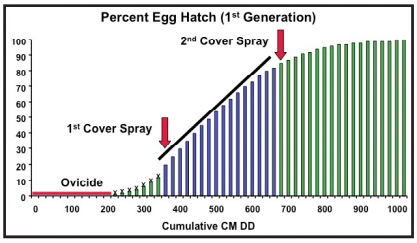
The period of time when overwintering LR larvae are most susceptible to the new insecticides overlaps with the beginning of the codling moth (CM) egg laying period. Some new insecticides can control overwintering leafroller larvae and codling moth eggs, that are laid on top of insecticide residues, when applied at this time. Esteem, Rimon, and Intrepid work in this way. Altacor has shown similar activity against CM eggs in lab studies, but the ovicidal activity of Altacor has not yet been validated in field trials. When these materials are applied between 75 and 200 CM degree-days, the CM eggs that are laid on top of their residues are killed. Because these early eggs are killed, significant egg hatch is delayed until approximately 350DD. This allows a delay in subsequent larvicide applications, which can result in better larval control.



Residual ovicides work when CM eggs are laid on top of insecticide residues.

Delaying Codling Moth Larvicides

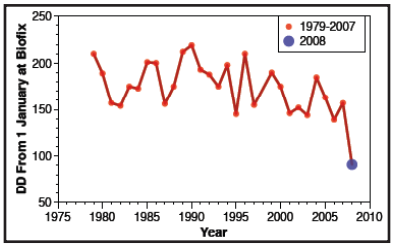
Codling moth degree-day model predictions show that average CM egg-hatch begins approximately 250 DD past biofix. The hatching of deposited eggs starts off slowly and in the first 10-15 days (100DD) only about 12-15% of the total egg hatch occurs. The rate of egg hatch then becomes more rapid and in the 21 day period after 350DD almost 70% of the eggs hatch. After this period of peak activity, the rate of egg hatch slows and the final 15-20% of the first generation egg hatch occurs over about a two-week period. The potential problem with the traditional larvicide application strategy is that the most active residues from the first application are in the orchard at a time when relatively little CM egg hatch is occurring. Applying an ovicide prior to the onset of the egg-hatch period kills eggs that would have hatched in the period starting at 250DD. This allows growers the opportunity to delay the first larvicide application to 350 DD, which is the beginning of the period of peak egg-hatch activity. This strategy also shortens the period of time that larval control is necessary.



Average CM Phenology (1st CM Generation)

Codling Moth Biofix Update

The no-biofix codling moth model that we have been working on should not be used by growers this year and that option has been turned off in the Decision Aid System (das.wsu.edu). The extreme abnormal weather we have experienced this spring has resulted in the earliest codling moth biofix (on a degree-day scale) recorded at WSU-TFREC in the past 28 years (see figure below). We are not sure that the early emerging moths will change the overall phenology of adult emergence or phenology of egg hatch, because some older literature suggests that these early emerging individuals do not begin to lay eggs until later. We will be evaluating both moth flight and egg hatch in several locations in NC Washington this year and use that data to refine our no-biofix approach. If you have not already done so, we recommend that you immediately put traps and lures into the orchard and begin checking them at regular intervals. Overall, whether biofix is used or not, we know that this year will be an extremely unusual year for codling moth and we still hope to be able to use the no-biofix model (with suitable modifications) in the future. We will keep the industry posted on codling moth phenology via the usual information outlets as the growing season progresses.



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Next Newsletter: May 15

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