

Codling Moth

(*Cydia pomonella*)

August, 2020

Hosts

Apple, crabapple and pear; rarely other fruit trees in B.C.

Damage

Surface stings or holes in fruit plugged with dark masses of excreta; both types of damage allow fungi and bacteria to enter the fruit and cause fruit rot during storage.

Identification

Egg - flattened, transparent, 1-2 mm in diameter.

Larva - Pinkish-white caterpillar with black or mottled black head; mature larvae 12-20 mm long.

Adult - Brownish-gray moth about 10-12 mm long with a copper spot on the end of each forewing.

Life History

Mature codling moth larvae overwinter in silken cocoons in protected sites on the tree (under loose bark, in cracks and crevices), in the soil or in wooden materials under or beside infested trees (bins, ladders, poles, buildings, large prunings). Larvae pupate in the spring and adults usually begin to emerge in early May and continue emerging until late June (mid-July in cooler areas), depending on temperature. Mating and egg-laying occur when twilight temperatures are above 15°C. Females lay eggs on fruit or on leaves near fruit. Larvae usually wander over the fruit surface before cutting through the skin and boring deeply into the fruit. Mature larvae leave the fruit to pupate in protected sites on and off the tree as described above.

Second generation moths appear in late July and August. Because weather during July and August is usually favourable for codling moth activity and reproduction, and a greater proportion of eggs are laid on the maturing fruit, second-generation larvae can cause



Codling moth entry hole (sting) plugged with frass



Codling moth eggs



Codling moth larva in apple



Codling moth adult. Photo courtesy of Agriculture and Agri-Food Canada

considerable damage, often close to harvest. If weather is warm during late August or early September a partial third generation may occur in southern districts.

Monitoring

Use codling moth sex pheromone traps in all apple and pear blocks to estimate population levels and determine the need for sprays. Install one trap per hectare in orchards by the pink bud stage and check weekly to record the location and the number of male moths captured. Replace the lures every 5-6 weeks and change the trap bottoms when the stickiness diminishes.

After a spray is applied, check the traps as usual to provide the information needed for decisions on additional sprays. Continue to monitor trap catches until 2 weeks before harvest.

Timing of the first codling moth spray in the spring can be more accurate if the beginning of egg hatch is predicted using codling moth trap captures and degree-day accumulations. Check the [SIR website](#) or [BC DAS](#) for degree day information.



Codling moth pheromone trap

Control

Banding - To detect and reduce larval emergence, wrap corrugated cardboard bands around tree trunks and scaffold limbs by mid-June through to the end of July. This encourages any larvae leaving the fruit to enter the cardboard bands and spin cocoons. Replace the bands applied for the first generation larvae around mid-July and burn immediately to prevent larvae from completing their development and exiting. If applying bands for the second generation, remove and destroy the replacement bands after harvest. In warm years with a 3rd generation, remove the summer bands at regular intervals to prevent

development. Banding material is available from chemical suppliers or OKSIR program (<https://www.oksir.org/>).



Tree banding for codling moth control

Fruit Removal - It is extremely important that fruit found infested with codling moth is not left on the trees at any time during the growing season. Growers should make sure that infested fruit found while thinning and picking is destroyed in order to kill any larvae in the fruit; complete crushing of fruit is the best way to kill larvae. Culled fruit should never be dumped in orchards. If infested fruit is placed in soapy water to drown the larvae, do not remove the apple for at least one week.

Sanitation - Remove any non-commercial codling moth host trees; if on surrounding properties or public lands, inform SIR staff. Woodpiles and any wooden structures, such as fruit bins or boxes, tree props, or ladders, are important sources of overwintered codling moths. As codling moth populations decrease, it becomes important to eliminate or treat wooden structures within or immediately adjacent to the orchards. Pay attention to the source of anything wooden entering the orchard, especially wooden bins and props.

Mating Disruption - Mating disruption works by preventing male moths from finding female moths for mating within blocks treated with the pheromone dispensers, Isomate-C Plus (codling moth) or Isomate CM/LR (codling moth and leafrollers) or Isomate-CM/LR TT (codling moth and leafrollers twin tubes). This control tactic is most effective when applied on an area-wide basis involving as many adjoining orchards as possible. Isomate-C Plus and Isomate CM/LR should be applied at a rate of 1000/ha (400/ac), Isomate-CM/LR TT at a rate of 750/ha (300/ac) before the first moths fly in the spring. Do not reduce the rate before consulting with the SIR program or your crop management advisor. Place the dispensers in the upper third of the canopy, preferably in shaded areas. Orchards less than 2 ha in size are not suitable for mating disruption. Growers should apply a border cover spray along edges adjacent to unmanaged sources of codling moth. Place additional dispensers in border trees to minimize the effect of immigration. Carefully read and follow the instructions provided with the dispensers.

Biological - Virosoft CP4, Cyd-X Granulovirus - Codling moth larvae must eat the virus before they enter the fruit, so thorough coverage is essential. The efficacy of the virus deteriorates quickly (short residual period). Apply weekly in the late afternoon or on a cloudy day throughout the period when codling moth larvae are emerging from eggs. Because the granulovirus does not kill codling moth larvae as quickly as most chemical sprays, some feeding damage will occur. Store Virosoft in a cool place between uses to reduce degradation of the granulovirus.

Chemical - Only apply cover sprays in those areas of the orchard where trap captures have averaged 1-2 or more moths per trap per week over 2 consecutive weeks. Use a lower threshold of 1 moth/trap for 2 consecutive weeks for high-value apple varieties and golden delicious.

By using degree-day predictions to time the first spray, forecasting dates of codling moth egg laying and hatch is more accurate and spraying can occur when the control products can perform most effectively. Information on the approximate time of egg laying and hatch is available from [SIR website](#) or [BC DAS](#). Because the optimum timing varies among the products based on how they control codling moth, first read the product labels to become familiar with the recommended timing.

Apply additional first brood and second brood sprays only after pheromone trap captures reach treatment levels and the residual protection from sprays ends. Under low-rainfall conditions Assail, Confirm, Intrepid, and Imidan provide about 10-14 days protection. Larvae must eat Assail, Confirm and Intrepid to be most effective so thorough coverage is essential.

Apply Assail, Calypso, Intrepid, or Rimon during egg-laying starting around 150 degree days if codling moth damage was more than 1% the previous year. NOTE: Rimon is registered for use on apples only. Application rates for Rimon depend on the concentration (0.93 or 1.4 L Rimon/1000 L) of the spray mixture and the spray volume applied to provide thorough coverage (minimum 700 L/ha (283 L/acre)). Consult the product label before mixing Rimon 10 EC for correct spray volume according to tree height. Apply Altacor, Assail, Calypso, Confirm, CyD-X, Entrust, Exirel, Harvanta, Intrepid, Rimon, TwinGuard, Virosoft, after the degree-day total predicts that egg hatch is beginning (about 220-300 degree days) and trap counts have reached the treatment level of 2 moths/trap for 2 consecutive weeks. To be most effective, larvae must eat these products so thorough and timely coverage is essential. Apply Delegate once egg hatch is over 90% complete. Do not apply Intrepid after egg hatch is complete.

Apply additional first brood and second brood sprays only after pheromone trap captures reach treatment levels and the residual protection from sprays ends. Under low-rainfall conditions, Calypso, provides about 2-3 weeks protection from codling moth damage.

Research shows that application of neonicotinoid products such as Alias, Assail or Calypso may cause increased mite populations. Therefore, do not apply more than two applications of Alias, Assail or Calypso either alone or alternately per season regardless of target pest (codling moth, aphids, leafhoppers) to avoid mite flare-up. Rimon may also disrupt biological control of mites. If Sevin is used as a thinning spray in the same block treated with Alias, Assail or Calypso, consider monitoring mite levels.

Pesticide resistance management - It is important to alternate application of insecticides from different chemical groups or with different modes of action in order to avoid development of pesticide resistance. All insecticide products have a pesticide Group Number displayed on the label.

The following table summarizes application information on chemical pesticides recommended for codling moth control.

Insecticide (active ingredient)	Group	Target Stages	Maximum Number of Applications ¹	Spray Interval (days)	Pre-harvest Interval (days)
Altacor (chlorantraniliprole)	28	larvae	3	14	5
Exirel (cyantraniliprole)	28	larvae	4	10-14	3
Harvanta (cyclaniliprole)	28	larvae	3	10 - 14	7
Assail 70 WP (acetamiprid)	4	Eggs, larvae	4	12	7
Calypso 480 SC (thiacloprid)	4	Eggs, larvae	4	14-21	30
² Clutch 50 WDG (clothianidin)	4A	Larvae	2	14	7
Delegate (spinetoram)	5	Larvae	3	14	7
² *Entrust 80 W (spinosad)	5	Larvae	3	7-10	7
TwinGuard (sulfoxaflor, spinetoram)	4C,5	Larvae	2	14	7
Confirm 240 F (tebufenozide)	18	Larvae	4	10-14	14
Intrepid 240 F (methoxyfenozide)	18	Eggs, larvae	2	14-21	14
Rimon 10 EC (novaluron)	15	Eggs, larvae	4	10-14	14
Imidan 50 WP (phosmet)	1B	Larvae	5	10	14
*Virosoft CP4 or CyD-X (granulovirus)	U	Larvae	n/a	14	0

¹ As per label restrictions.

² For suppression only

* Certified for organic production systems

See the [BC Tree Fruit Production Guide](#) for more information on insecticide recommendations and precautions.

For more information on codling moth control programs visit the [Okanagan-Kootenay Sterile Insect Release Program](#).



Codling moth stings on pear