Apple-Codling moth

Cydia pomonella

Pest description and crop damage This is the most serious pest of apples in the PNW, especially in warmer, dryer areas.. Adult moths are 0.5 inch wide, with alternating gray and white bands on the wings and a copper band on the wing tips. Larvae are whitish with a black head when immature, and pinkish with brown heads when mature. Larvae are 0.1 inch long at hatch and 0.8 inch long at maturity. Pupae are brown and about 0.75 inch long. The eggs are very tiny and rarely seen.

Larvae feed directly on the fruit, either by "stinging" it or boring into it and feeding within. Stings are shallow depressions where feeding occurred and stopped. Larvae which bore into the fruit leave characteristic bore holes on the exterior, filled with frass which extrudes from the hole. Entry holes may be anywhere on the fruit.

Biology and life history Codling moths overwinter as mature larvae in silken cocoons spun under loose bark, in the soil, or in trash at the base of the tree. Pupation takes place in the spring around the time the first blossoms are showing pink, and adults emerge around bloom. Adults are active only at dusk and dawn and lay eggs on leaves, or occasionally on fruit.

The larvae emerge, begin feeding on fruit, and may bore to the center of developing fruit to feed on the flesh and seeds. As they mature, they push frass out of the entry

Codling moth
Cydia pomonella Linnaeus
Adult

Codling moth
Cydia pomonella Linnaeus
Newly hatched on host

hole. After 3 to 4 weeks, the larvae leave the fruit to seek a sheltered spot on the tree to spin cocoons.

The larvae may overwinter in the cocoon, or they may emerge in 2 to 3 weeks as a new flight of adults. These adults are active in July and August. In warm areas, there may even be a third generation. Larvae of this brood often penetrate fruit but do not complete development before harvest or winter

Codling moth
Cydia pomonella Linnaeus
Immature showing damage

Sampling and thresholds In major fruit-growing areas, spray notes are sent from local Extension offices. In orchards where mating disruption is not used to control codling moth, monitor adult moths with pheromone traps baited with 1-mg lures set in the lower canopy at eye level. If pheromone trap catches exceed one to two per trap for 2 consecutive weeks, control with insecticides may be necessary.

When mating disruption is used, monitor the orchard with pheromone traps baited with 10-mg lures set in the upper third of the canopy. If more than five moths are captured in a trap over the first generation, check the orchard for fruit damage or apply a conventional insecticide. If fruit damage exceeds 0.5% at the end of the first generation, use conventional insecticides to provide supplemental control against the second generation. If more than two moths are captured in a trap during the second generation, a conventional insecticide may be necessary.

Management-biorational control: COMMERCIAL USE ONLY

Stages 5-6: Pink application

Mating disruption (Isomate C+, Isomate CTT, NoMate, CheckMate) at 200 to 400 dispensers/a. Detailed knowledge of insect biology and the limitations of this technique is needed in order to use it successfully. Substantial fruit damage could result from improper use. Sprayable formulations and aerosol devices (also called puffers) for releasing pheromones are available, but experience with these products is limited.

Pheromone dispensers must be placed in the tree before first moth flight; this usually is around full bloom on Red Delicious. Place within 2 ft of the top of the canopy.

If the orchard has a history of codling moth problems, use one or two conventional insecticide sprays against the first generation. If a codling moth source exists nearby, use border sprays (five to six rows) of conventional insecticides.

Management-biological (microbial) control: COMMERCIAL USE ONLY

- codling moth granulosis virus (Carpovirusine, Cyd-X, Virosoft CP4)-Check label for rates. PHI 0 days. Granulosis virus is a selective biological insecticide that must be ingested in order to be effective. Thorough coverage is important. The virus degrades when exposed to UV light. If a grower relies only on granulosis virus for codling moth control, frequent applications are necessary (every 7 to 10 days), especially when codling moth pressure is high. The virus controls larvae, but some damage, primarily stings, may be evident.

Management-chemical control: HOME USE

After petal fall spray

Apply about 10 days after full petal fall (all petals are off) or 17 to 21 days after full bloom.

- acetamiprid
- azadirachtin (neem oil)-Some formulations are OMRI-listed for organic use.
- carbaryl
- esfenvalerate
- gamma-cyhalothrin
- insecticidal soap-Some formulations OMRI-listed for organic use.
- kaolin-Applied as a spray to leaves, stems, and fruit, it acts as a repellant to some insect pests. Some formulations are OMRI-listed for organic use.
- lambda-cyhalothrin
- malathion
- mating disruption pheromones-See biorational control above. Not effective for orchards less than 10 acres.
- permethrin
- pyrethrins (often as a mix with other ingredients)-Some formulations are OMRI-listed for organic use.
- spinosad-Some formulations are OMRI-listed for organic use.
- zeta-cypermethrin

Spring and summer

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Management-chemical control: COMMERCIAL USE

After petal fall spray

Apply about 10 days after full petal fall (all petals are off) or 17 to 21 days after full bloom.

Generation Codling Moth: Apply ovicides at Biofix plus 100 degree days (this is usually close to petal fall).

- chloranthraniliprole (Altacor) at 3.0 to 4.5 oz/a in no less than 100 gal of water per application. Do not apply more than 9 oz/a per growing season. Do not apply more than 4 applications per season. Do not use an adjuvant within 60 days of harvest. PHI 14 days. [Group 28]
- methoxyfenozide (Intrepid 2F) at 16 oz/a in up 100 gal of water per application. For use against low- to moderate-pressure situations, with alternate control measures such as mating disruption. Use adjuvant; see label. Do not exceed 64 oz/a per growing season. PHI 14 days. [Group 18A]
- novaluron (Rimon 0.83EC Insecticide) at 30 to 50 oz/a in up to 100 gal of water per application with a second application 14 to 17 days later. Do not apply more than 4 applications per season. Do not apply more than 150 oz per growing season. PHI 14 days. [Group 15]
- pyriproxyfen (Esteem 35WP IGR) at 4 to 5 oz/a in up to 100 gal of water per application. Do not exceed two applications per season. Do not exceed 10 oz/a per growing season. Do not apply earlier than 14 days after last Esteem 35 WP treatment. PHI 45 days. [Group 7C]

Spring and summer

- acetamiprid (Assail 70WP) at 1.7 to 3.4 oz/a in up to 100 gal of water per application. Do not make more than 4 applications per year or exceed 13.5 oz/a per growing season. Adding a low rate of horticultural mineral oil improves effectiveness against codling moth. PHI 7 days. [Group 4A] [ovicidal + larvicidal]
- *Chromobacterium subtsugae* (GRANDEVO) at 1 to 3 lb/a. Under heavy pest populations, apply a knockdown insecticide prior to or in a tank mix, use the higher label rates, shorten the spray interval, and/or increase the spray volume to improve coverage.
- clothianidin (Belay Insecticide) at 6 to 12 fl oz/a (0.1 to 0.2 lb ai/a). For control of first generation codling moth in areas with light pressure and suppression of first generation codling moth in areas of heavy infestation. Do not apply more than 12 fl oz (0.2 lb ai) of Belay Insecticide per acre per season. PHI 7 days. Do not feed or allow livestock to graze on cover crops from treated orchards. Belay Insecticide must not be applied during bloom or if bees are actively foraging. [Larvicidal].[Group 4]
- chlorantraniliprole (Altacor) at 3.0 to 4.5 oz product/a in no less than 100 gal of water per application. Do not apply more than 9 oz per acrea per growing season. Do not apply more than 4 applications per season. Do not use an adjuvant within 60 days of harvest. PHI 14 days. [Group 28] [ovicidal + larvicidal]
- emamectin benzoate (Proclaim 5SG) at 3.2 to 4.8 oz/a in up to 100 gal of water per application. For use in low to moderate pressure situations with alternate control measures such as mating disruption. Do not exceed 14.4 oz/a per season. PHI 14 days. [Group 6] [larvicidal]
- fenpropathrin (Danitol 2.4 EC) at 16 to 21.3 oz/a in up to 100 gal of water per application. Will also reduce mite populations, but may cause resurgence the same season. Do not exceed 42.7 oz per acre per season. PHI 14 days. [Group 3A]
- flubendiamide (Belt SC) at 5.0 oz/a in a minimum of 100 gal of water per application. Do not exceed three applications or 15 oz/a per growing season. PHI 14 days. [Group 28] [larvicidal]
- granulovirus (Carpovirusine - OMRI) at 6.8 to 13.5 oz/a in 100 gal of water per application. Start at the beginning of first generation egg hatch. Apply every 7 to 10 days. PHI 0 days. [larvicidal]
- indoxacarb (Avaunt) at 5 to 6 oz/a in up to 200 gal of water per application. Make no more than 3 applications prior to hand-thinning. No hand thinning after the 4th application. Make no more than 4 applications per growing season. Do not apply more than 24 oz/a per growing season. For use in low- to moderate-pressure situations, with alternate control measures such as mating disruption. PHI 14 days. [Group 22A]

- methoxyfenozide (Intrepid 2F) at 16 oz/a in up to 100 gal of water per application. For use against low- to moderate-pressure situations, with alternate control measures such as mating disruption. Use adjuvant; see label. Do not exceed 64 oz/a per season. PHI 14 days. [Group 18] [ovicidal + larvicidal]
- novaluron (Rimon 0.83EC) at 30 to 50 oz/a in up to 100 gal of water per application. See label for application timing. Do not exceed four applications or 150 oz/a per season. PHI 14 days. [Group 15] [ovicidal]
- phosmet (Imidan 70W) at 2.125 to 5.33 lb/a in up to 100 gal of water per application. Do not apply more than 30 lb/a per growing season. PHI 7 days. [Group 1B]
- pyriproxyfen (Esteem 35WP) at 4 to 5 oz/a in up to 100 gal of water per application. Do not exceed two applications or 10 oz/a per growing season. PHI 45 days. [Group 7C] [ovicidal]
- spinetoram (Delegate WG) at 6 to 7 oz/a in up to 100 gal of water per application. Do not exceed four applications or 28 oz/a per season. PHI 7 days. [Group 5] [larvicidal]
- spinosad (Entrust 80WP or 2SC) at 2 to 3 oz or 6-10 fl oz /a in up to 100 gal of water per application. Do not exceed 9 oz or 29 fl oz /a per season. PHI 7 days. [Group 5] larvicidal] OMRI-listed for organic use.
- thiacloprid (Calypso 4F) at 4 to 8 oz/a in up to 100 gal of water per application. Do not exceed 16 oz/a per season. PHI 30 days. [Group 4A] [ovicidal + larvicidal]
- thiamethoxam/chlorantraniliprole (Voliam Flexi) at 4 to 7 oz/a in up to 100 gal of water per application. Do not apply exceed 16 oz/a per season and do not use an adjuvant within 60 days of harvest. Do not apply by air. Minimum interval between applications is 10 days. PHI 35 days. [Group 4A] [ovicidal + larvicidal]

Related Links

- Degree-day model for codling moth WSU model

Hollingsworth, C.S. (Ed.). 2018 Pacific Northwest Insect Management Handbook.

Use pesticides safely!

- Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use.
- Read the pesticide label—even if you've used the pesticide before. Follow closely the instructions on the label (and any other directions you have).
- Be cautious when you apply pesticides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

Trade-name products and services are mentioned as illustrations only. This does not mean that the participating Extension Services endorse these products and services or that they intend to discriminate against products and services not mentioned.