TREE FRUIT CROPS

CORNELL COOPERATIVE EXTENSION

IPM Integrated Pest Management

Insect Identification
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Codling Moth

Cydia pomonella (L.) (Lepidoptera:Tortricidae)

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The codling moth (CM) is a pest introduced from Eurasia. The larvae feed on the fruit of a wide range of host plants including apple, pear, quince, hawthorne, crabapple, and walnut. CM completes 1.5–3.5 generations annually, depending on locality and length of growing season. It is the major fruit-feeding pest in fruit growing regions of the western United States. It is also a significant pest in the East, but has generally been managed by sprays used to control plum curculio and apple maggot. However, with the advent of trapping-based sprays for apple maggot, and a potential decrease in cover sprays, growers may begin to see more CM damage.

Adults

The spring flight of CM adults begins when apples are in bloom. In New York, second and third flights begin in early to mid-July and mid-August, respectively. Frequently, the second and third flights overlap, resulting in the presence of adults from early July through the remainder of the growing season.

CM adults are 10–12 mm (0.5 in.) long, with a wing span of 15 to 20 mm (0.75 in). The moths are an iridescent gray color with a chocolate-brown patch, containing copper to gold markings, located at the tip of each forewing (fig. 1). The hind wings, which are not visible when the moth is at rest, are a lighter, copper brown color.

During the day, CM adults remain at rest, well camouflaged, on the bark of trees. If the temperature is above 10–15.5 C (50–60 F) at dusk, the moths become active, mate, and the females lay their eggs. Under similar conditions, the moths can also be active at dawn. A female may lay up to 100 eggs.

Eggs

CM eggs are laid singly, generally on the upper surface of leaves, or on the fruit. The eggs are flat, oval discs measuring 1.0 by 1.25 mm (0.04 by 0.05 in.). When first laid, an egg is translucent. It later develops a reddish embryonic ring; this is called the "red ring stage" (fig. 2). Shortly before hatching, the dark head capsule of the developing larva can be seen; this is called the "black head stage".

Egg hatch occurs in 6–20 days depending on prevailing temperatures. First generation egg hatch begins at petal fall and continues for 2–3 weeks.

Figure 1.

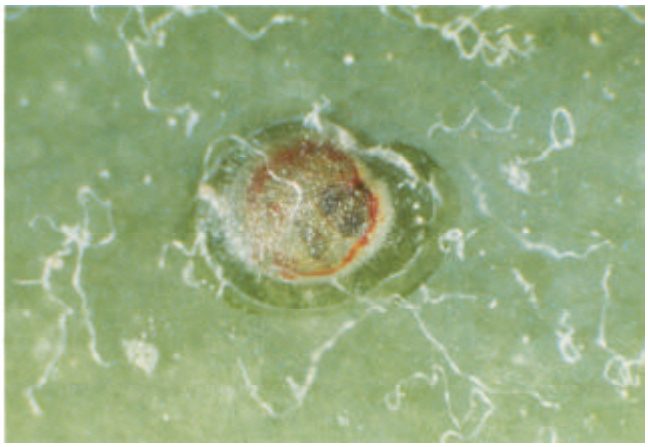

Figure 2.

Figure 3.

Figure 4.

Figure 5.

Larvae

CM larvae go through 5 instars in 3–5 weeks. At egg hatch, larvae are about 2 mm (0.08 in.) long and white with a black head and thoracic and anal shields. Larvae are 13–19 mm (0.5–0.75 in.) long when fully grown. The body is pinkish white, while the head and thoracic and anal shields are brown (fig. 3).

Newly hatched larvae seek fruit, which they enter to feed and develop. Entry may be through the calyx or the opposite side of the fruit. Larvae discard their first bites of epidermis, then either feed beneath the surface or tunnel directly to the center of the fruit. CM larvae deliberately feed on the seeds of the fruit. As larval development nears completion, they eat out an exit tunnel, which they plug with frass (fig. 4).

Larvae leave the fruit and construct a thick silken cocoon under loose bark or in some other protected spot. The cocoon serves as a hibernaculum for the overwintering larva.

Pupae

CM pupae are about 13 mm (0.5 in.) long and brown. The pupal period ranges from 7–30 days, depending on temperatures.

Injury

CM larvae are fruit feeders and cause little or no injury to other plant parts. A larva may take a bite or two of a fruit causing an injury known as a "sting". Or, it may continue feeding, producing a deep entry into the fruit (fig. 5). A "sting" causes a surface blemish , but unlike a deep entry, it does not result in interior breakdown of the fruit. Fruit with "stings" from the first generation usually remain on the tree, while those with deep entries usually fall during the "June drop." Subsequent generations may or may not cause premature drop, depending on the variety. Second generation larvae are active in fruit throughout August. This later, deep entry damage is a more significant problem because affected fruit must be culled. Failure to cull may downgrade a load.

Management

Predators and parasites feed on CM, but these natural enemies cannot keep this pest from reaching damaging levels in commercial orchards. In New York, sprays to control plum curculio at petal fall usually control the first generation of CM; apple maggot sprays control the second. In blocks that are not treated for either of these pests, sprays specifically aimed at CM may be warranted.

Pheromone traps can be used to monitor flight activity of adults, but numbers of moths caught in these traps do not relate to the level of fruit damage by larvae. However, trap catch can be used to time sprays using a degree day-based model developed in Michigan that provides fairly accurate predictions in New York. As many as two insecticide applications may be made during each of the two generations, depending on the severity of pressure.

Degree days (DD), calculated from base 50 F, are accumulated from the date of first sustained moth catch (the **biofix**). The first spray is applied at 250 DD_{50} after the biofix. This timing corresponds to a predicted 3% egg hatch. A second spray may be applied 10–14 days later. If pressure is not overly severe, one spray, applied at 360 DD_{50} after the biofix, is sufficient. A spray for the second generation should be applied 1260 DD_{50} after the biofix date. If CM pressure is severe, that application should be followed by another one in 10–14 days.

CM is controlled by the same synthetic insecticides as plum curculio and apple maggot. It can also be controlled by biorational insecticides such as bacteria (*Bacillus thuringiensis*), insect growth regulators, viruses, and botanicals, though these materials tend to be less effective than the synthetic chemicals. The use of pheromones to disrupt CM mating is being investigated in western United States fruit producing regions. Consult the latest Cornell Cooperative Extension *Recommendations for Commercial Tree-Fruit Production* for the most current information on insecticide selection and pest management.

Guide to Stages

Stage	Timing	Where to Look
Adults		
1st flight	Bloom-30 days past petal fall	Pheromone traps
2nd, 3rd flights	30 days past petal fall through harvest	Pheromone traps
Eggs	Bloom through harvest	Upper leaf surface and fruit
Larvae	Petal fall through harvest	In the fruit
Overwintering	August through tight cluster	In cocoons under bark on trunk or lower scaffolds
Pupae	Half-inch green through one week past petal fall	In cocoons under bark on trunk or lower scaffolds

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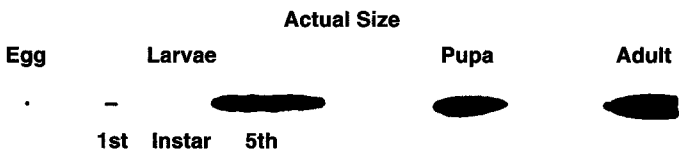

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