

IPM Fact Sheet Series

UMass Extension Fruit Team

Fact Sheet #AI-012

Apple – Oriental fruit moth (*Grapholita molesta*)

Overview (from NETFMG)

Native to China, OFM is now found throughout much of the world. The adult OFM is approximately 1/4 inch (6.5mm) long and has a faint gray-brown salt-and-pepper pattern on its wings. Pupae are reddish-brown. Fully developed larvae are about 1/2 inch (12.5mm) long, pink to white in color. Eggs are about 1/32 inch (0.7mm) in diameter, yellow-white, and laid singly on leaves or twigs.

ID/Life Cycle:

The adult Oriental fruit moth (OFM) is approximately 1/4 inch long. Its wings are mottled grayish brown with black flecking. The eggs are flat, yellow-white. Fully developed larvae are 1/2 inch long, pinkish white with a black head. The presence of a black anal comb on the bottom of the last segment differentiates it from codling moth larvae.



Oriental fruit moth adult (left) and full-grown larva (right). The insert shows the black anal comb on the bottom of the last segment. Photo credits: Mark Dreiling; G. Morvan, INRA, Montfavet; Todd Gilligan,

OFMs overwinter as fully-grown larvae in silken cocoons on tree trunks or on the ground. First-generation moths appear in May. OFM females lay eggs singly on leaves, shoots, and twigs. Early-instar larvae tunnel into shoots or flower stems. Late-instar larvae continue feeding in shoots or tunnel into fruit. Fully developed larvae leave the fruit or shoot and construct a cocoon on the tree or in leaf litter. In New England, OFM has 3 generations (flights)/year.

Damage: Early larval feeding in an apple orchard results in dying back of the new growth of twigs in spring, commonly called “flagged shoots”. Young orchards are susceptible to this injury. OFM larvae typically bore into the apple creating random tunnels through the fruit. Infested fruit has a collection of frass at the exit hole, often the calyx end. Damage in pome fruit is similar to

that of the codling moth and lesser appleworm. Unlike codling moth larvae, OFM larvae do not usually tunnel into the core and feed on apple seeds.

Management Strategies

Monitoring:

- Place standard pheromone traps inside the canopy at 5-6 feet high at the pink stage to monitor adult activity.
- One trap/10 acres is the minimum number recommended for commercial orchards. A few traps should be placed on the forest edge to intercept immigrating moths.
- Check pheromone traps at least 3 times a week until biofix is established. The 'biofix' is the date on which pheromone traps sustain a catch of two or more moths. For this, it is necessary to check monitoring traps often (at least three times per week). Begin to accumulate degree days (base 45°F) at biofix. Once the biofix is determined, traps can be inspected once per week throughout the season to establish action thresholds (see chemical control).
- Pheromone-baited traps also catch lesser appleworm, so it will be important to know how to distinguish between the two.



The apple lesserworm is native to eastern North America. Adults are gray-brown moths quite similar to OFM but smaller (about 1/3 inch long with 7/16 inch wingspans) and with more brown-orange patches on the wings. When the moth is at rest, a gold band becomes evident across its back. Photo credit: NY State Ag Experiment Station.

Cultural/Biological

- Remove and destroy infested apples so they do not increase the OFM population of the next generation.
- Although there are parasitoids that attack OFM (primarily at the larval stage) their role in controlling OFM in commercial orchards is minimal because of their low natural populations and high susceptibility to commonly used insecticides.

Chemical

- Refer to the [New England Tree Fruit Management Guide](#) for specific materials and rates recommended for managing Oriental Fruit Moth.
- Chemical control of OFM can be improved by using pheromone trap data and a degree-day (DD) model to establish optimum timing of insecticide sprays targeting newly hatched larvae.
- For first-generation OFM, one insecticide spray between $350_{45^\circ}-375_{45^\circ}$ DD after biofix is recommended. Note: The normal petal fall spray should control OFM larvae hatching early in the season.
- After the first spray, 2nd-generation populations are expected to be very low and might not need sprays at all. A second insecticide spray may be necessary if >10 moths/trap/week are caught when $1450_{45^\circ}-1500_{45^\circ}$ DD have accumulated after the initial biofix. For the 3rd generation, sprays are needed after 3-4 days if >10 moths/trap/week and if there is fruit damage.

- Rotate insecticides from different IRAC groups to reduce the chance of resistance development in the pest.
- Consider using mating disruption, a technique that involves the deployment of pheromone dispensers to confuse males and limit their ability to locate females. Mating disruption is only recommended for orchards >5 acres in size.

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