

Oriental Fruit Moth

(*Grapholita molesta*)



Fig. 1A. Pinned adult oriental fruit moth. Photo by: Todd M. Gilligan and Marc E. Epstein, Tortricids of Agricultural Importance, USDA APHIS PPQ, Bugwood.org #5482466



Fig. 1B. Adult oriental fruit moth on a leaf. Photo by: Elizabeth Beers, Washington State University

Oriental Fruit Moth *Grapholita molesta* (Busck) (Lepidoptera: Tortricidae) is an important peach pest in many parts of the world. OFM is native to Asia and was introduced to the United States in 1913. It is well established in Illinois. OFM caterpillars are responsible for plant damage, with both shoot and fruit infestation. In addition to stone fruits, OFM also infests other fruit trees like apples.

Identification and Life Cycle

The adult is a small gray moth, about ¼-inch long (Fig. 1A). Their wings have alternating light and dark patterns, giving them a mottled appearance (Fig. 1B). Adults are crepuscular, flying after sunset and before sunrise. OFM eggs are small, flat, whitish, and laid singly, usually on the top of the leaves or twigs. Newly hatched caterpillars are white with a black head, turning pinkish white as they grow. Fully grown caterpillars are about ½-inch long (Fig. 2). OFM looks like a couple of other worms in the fruit, including the codling moth and plum curculio (Table 2). OFM caterpillars have a black anal comb on the bottom of the last segment (Fig. 3), which differentiates them from codling moth caterpillars, and the presence of legs differentiates them from plum curculio larvae.

OFM overwinters as a fully grown caterpillar inside a reddish-brown cocoon on the tree or the ground. They emerge in April to May, depending on temperature, before or near the peach bloom time. They mate, and females start laying eggs on twigs or leaves. A female can lay up to 200 eggs. Eggs hatch at petal fall, and the young caterpillars

feed on the shoots and tunnel into twigs. These caterpillars may move into fruit as they grow. For later generations, the caterpillars skip the twigs and bore into the fruit. The fully grown caterpillar exits the fruit, pupates, and either emerges as an adult or overwinters, depending on the time of year. OFM has four generations in central Illinois and five in southern Illinois.

Damage

OFM caterpillars are responsible for crop damage and yield loss. The newly hatched caterpillars feed on and bore into new terminal growth, causing wilt. This early damage is categorized as shoot flagging (Fig. 4). The subsequent generations of caterpillars feed on the developing fruit. They tunnel inside the fruit to feed around the pit or core, making the fruit unmarketable. In peaches, gummosis can occur when the mature larvae exit the fruit.

Monitoring and Management

In both conventional and organic production, pheromone traps can be used to monitor adult moths in the orchard. Pheromone traps should be deployed before bloom in the upper third of the canopy at a height of 5 to 6 feet. Check traps frequently in the early season, at least two times a week until biofix. Biofix is established when the traps contain more than one moth. Once the biofix date is determined, check traps weekly throughout the season. Insecticide application times can be determined using degree day models using the [Specialty Crop Pest Degree Day Calculator](#).



Fig. 2. Oriental fruit moth larvae. Photo by: Elizabeth Beers, Washington State University

Mating disruption is also useful in an integrated pest management program for OFM. The disruption is approved for both organic and conventional production. MD dispensers are placed throughout the orchard at pink. The dispensers release a pheromone that prevents the males from finding females to mate with, leading to a decrease in egg laying and OFM population in the orchard. Mating disruption is recommended for use in orchards larger than five acres. For more details about the products and rates of MD, view the [Midwest Fruit Pest Management Guide](#).

There are several conventional insecticides recommended for OFM control as listed in Table 1. As this is a tree fruit pest, recommendations are specific to the crop and the tree phenology. For detailed information on effective doses and application guidelines, please refer to the [management guide](#). There are also several labeled organic insecticides for OFM control, although their effectiveness is largely unknown (Table 1).



Fig. 3. Anal comb on the last segment inside the red circle. Photo by: Todd Gilligan- LepIntercept, USDA APHIS PPQ, Bugwood.org #5515951



Fig. 4. Damage caused by oriental fruit moth larvae – shoot flagging. Photo by: Jonas Janner Hamann, Universidade Federal de Santa Maria, UFSM, Bugwood.org #5556412

Table 1. Insecticides labeled and recommended for OFM control. Documented chance of resistance is based on published literature with evidence of resistance in the active ingredient.

Conventional

Trade Name	Active Ingredient	Documented Chance of Resistance	Type of Insecticide
Altacor 25WDG	chlorantraniliprole	no	diamide
Asana XL	esfenvalerate	yes	pyrethroid
Assail 30SG	acetamiprid	no	neonicotinoid
Baythroid XL	beta-cyfluthrin	yes	pyrethroid
Danitol 2.4EC	fenpropathrin	yes	pyrethroid
Delegate WG	spinetoram	no	spinosyn
Imidan 70W	phosmet	yes	organophosphate
Mustang Maxx (0.83EC)	zeta-cypermethrin	yes	pyrethroid
Verdepryn 100SL	cyclaniliprole	no	diamide

Organic

Trade Name	Active Ingredient	Documented Chance of Resistance	Type of Insecticide
Entrust SC (2SC)	spinosad	no	spinosyn
Neemix 4.5	azadirachtin	no	unclassified
Surround WP	kaolin clay	no	unclassified

Note: The inclusion of an insecticide brand name does not imply endorsement; it is for educational reference only. **ALWAYS READ INSECTICIDE LABELS BEFORE USE.** All users are required by law to follow the label and use all insecticides with care.

Table 2. Important internal feeders of tree fruits. The damaging life stage or larva stage listed for all four of the main internal fruit feeders look alike.

	Apple Maggot	Oriental Fruit Moth	Plum Curculio	Codling Moth
Scientific Name	<i>Rhagoletis pomonella</i> (Walsh)	<i>Grapholita molesta</i> (Busck)	<i>Conotrachelus nenuphar</i> (Herbst)	<i>Cydia pomonella</i> (L.)
What is it?	A fly	A moth	A beetle/weevil	A moth
Adult	Small ¼ inch long fly, clear wings with black bands, and an obvious white spot on the rear end of thorax	Small 1/4-inch gray moth, wings with a mottled appearance	Small 1/4-inch snout weevil, humped back, and brownish black in appearance	1/2-inch-long mottled grey moth, wings with alternate gray and white bands, and a bronze-colored spot on the tip
Larvae	Typical maggot, cream color, legless, and no distinct head, 1/4 to 3/8 inch long	White with a black head, ½ inch when fully grown	Whitish body, brown heads, and no legs, 3/8 in when fully grown	Pinkish white with a black head and 1/2 to 3/4 inch when fully grown
Number of Generations	1	4 to 5	1 to 2	2 to 3
Signs of Damage	Sunken and dark spots on the fruit skin	Wilting, shoot flagging	Crescent-shaped scar, small round holes on fruit skin	Stings and deep entries
Crop Damage	Apples and crab apple	Peach and other stone fruit	Plum, peaches, apples, cherry, apricot, blueberry	Apples, crabapple, pears
Monitoring	Yellow sticky trap and red sphere mimicking a ripe apple	Pheromone trap and mating disruption	Fruit volatile and aggregation pheromone	Pheromone trap and mating disruption

References

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