

CORNELL COOPERATIVE EXTENSION

Oriental Fruit Moth

Grapholitha molesta (Busck)

The Oriental fruit moth (OFM), native to China, was introduced to the United States from Japan about 1913 on infested nursery stock. The OFM is now found in all regions of North America where peaches are grown. Although it is most important as a pest of peach, the OFM has an extensive host range that includes apple, quince, pear, plum, cherry, apricot, nectarine, and some rosaceous ornamentals. In the northeastern United States, the OFM has three generations (flights) per year. In areas with a longer growing season, it may have up to five generations per year.

The Adult

The adult OFM (fig. 1) is a small, grayish moth with a wingspan of approximately 13 mm (0.5 in.). Adults of the overwintering generation begin to emerge about the time of apple bloom, and females begin to lay eggs after a two- to five-day pre-oviposition period. Each female can lay up to 200 eggs during her seven- to ten-day oviposition period.

The Eggs

Eggs are found on upper leaf surfaces, frequently on the terminal leaf of a young shoot. Each egg is slightly oval, measuring 0.6 x 0.7 mm (.02 x .03 in.). It is translucent

white when first laid, changing later to an amber color (fig. 2). The incubation period varies with temperature, ranging from three to four days at midsummer, to seven to fourteen days during the cooler part of the season. Just before the larva hatches, the dark head capsule can be seen through the egg. This is known as the "black head" stage.

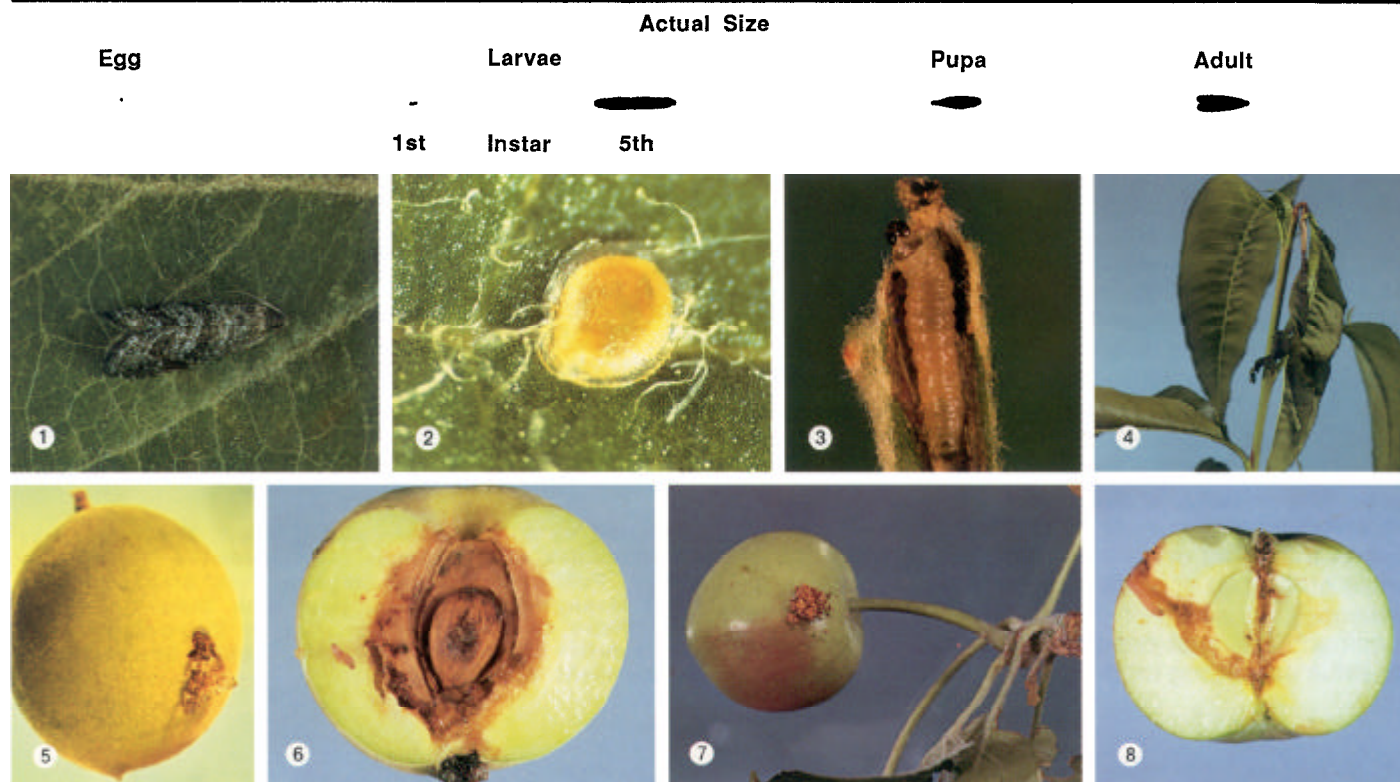
The Larvae

Shortly after hatching, larvae enter young terminals or fruit and begin to feed. The larvae pass through four to five instars, and range in length from 1.5 mm (.06 in.) when newly hatched to approximately 12 mm (.5 in.) when mature. Newly hatched larvae are white, with a black head capsule. Mature larvae are dirty white to pink in color, with a reddish brown head capsule (fig. 3). If a terminal becomes unsuitable as a food source before larval development is complete, larvae seek other terminals, or move to fruit to complete their development.

Mature larvae leave their feeding sites to spin cocoons in which they either pupate, or enter diapause to overwinter. Diapause is a resting period that allows many species of insects to suspend development until weather conditions become favorable. In the OFM, diapause is induced by decreasing day length in late summer.

The Pupae

Pupae are found within cocoons on the trunk (usually



GUIDE TO STAGES

Stage	Timing	Where to look
Adults First flight (late April)	Half-inch green (apple); Half-inch green to bloom (peach); until mid-June	Pheromone traps
Second and third flights	Early July through harvest	Pheromone traps
Eggs (late April)	Tight cluster through harvest (apple); pink through harvest (peach)	Upper leaf surface and fruit
Larvae (Overwintering)	Bloom through harvest August to mid-March	In tender shoots and fruit In cocoons under bark scales and in leaf litter under tree
Pupae	Early spring through summer	In cocoons under bark scales and in leaf litter under tree

within two feet of the ground) or in debris on the ground under the tree. The cocoons are constructed of silk, and are covered with particles of the surface on which they are spun. Early in the season, nearly all of the larvae pupate soon after spinning a cocoon. The pupal stage lasts from twelve to fifteen days in the summer, and somewhat longer at cooler temperatures during the spring. Later in the season, as day length decreases, an increasing proportion of larvae enter diapause to overwinter. Diapausing larvae pupate and emerge the following spring.

Damage

On peach, the OFM feeds in both vegetative growth and fruit. The first generation, which is feeding when terminals are succulent and tender, develops almost exclusively in the vegetative growth. The larvae often enter the terminal at the base of a young leaf, and tunnel toward the base of the shoot. Infested terminals wilt and die back to the margin of feeding, and are commonly called "strikes" or "flagged shoots" (fig. 4). Heavy twig infestations of nursery stock can adversely affect the shape of the tree. Axillary buds often begin to grow when the terminal shoot is killed, causing the tree to have a bushy appearance.

Fruit that are infested when very small often drop. Early-infested peaches that do not drop have obvious entrance holes with frass and gum exuding from them (fig. 5). Larvae attacking nearly ripe peaches usually enter the fruit near the stem, leaving only a very small, inconspicuous entrance hole. The larvae tunnel in the fruit, and frequently excavate cavities near the pit (fig. 6).

Terminal feeding on apple is similar to that on peach. Infested apples have a collection of frass at the exit hole of the insect's feeding tunnel (fig. 7), or at the calyx end. It is difficult to distinguish between OFM damage and codling moth damage. OFM larvae feed randomly in the apple, and usually do not feed on the seeds (fig. 8), while codling moth larvae usually tunnel directly to the core of the apple and feed on the seeds. Later instar larvae of the two species may be distinguished by the presence or absence of the anal comb at the tip of the abdomen. The anal comb is present in the OFM and absent in the codling moth (fig. 9).

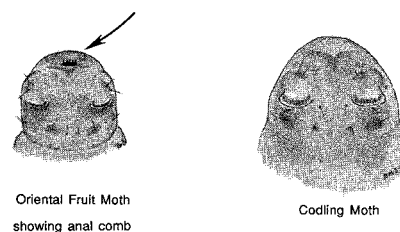


Figure 9.

Control

More than 130 species of parasitoids have been reported attacking OFM; however, parasitism probably plays a very minor role in OFM control in today's commercial orchards because of the sensitivity of many parasitoids to commonly used insecticides. Before the advent of DDT, attempts were made to supplement naturally occurring biological control of the OFM. Inundative releases of the braconid wasp *Macrocentrus ancilivorus* provided an average 50% reduction in number of infested fruit. However, because of the large pest complex on apple, biological control of one pest is difficult to achieve, since broad-spectrum insecticides are still needed for other pests.

Research has shown that if a synthetic sex pheromone is released in high concentrations in an orchard, male Oriental fruit moths cannot locate a female to mate. This control method, known as mating disruption, has proven effective in field tests.

The OFM is rarely a problem in orchards with a regular insecticide program, but could become a more important pest as patterns of insecticide use change, or if insecticide resistance develops. Check local Cooperative Extension recommendations for the best materials and timing for OFM control in your area.

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