

**The Winter Moth** (*Operophtera brumata* (L.))

Insect Order: Lepidoptera

Family: Geometridae



**Origin:** Winter moth is an insect pest that was introduced to North America from Europe. Its introduction has been known for years in various regions of eastern Canada, including: Nova Scotia, Prince Edward Island, and parts of New Brunswick. It has also been a pest in the northwestern region of North America, namely Vancouver, British Columbia. Winter Moth was introduced into the United States and has warranted control measures in Washington and Oregon. It is also a problem in the United Kingdom (England and Scotland).

This pest is now in Massachusetts in coastal areas from the North Shore, down around Boston, through Plymouth County, South Shore and out onto Cape Cod as far as Chatham (approximately mid-Cape). It is the first known occurrence of it in outbreak proportions in New England.

**Injury and Host Plants:** Many different deciduous plants are susceptible. These include: oaks, maples, basswood, ash, crabapples, apple, blueberry, and certain spruces such as Sitka spruce (Scotland). Young larvae (caterpillars) are tiny inchworms and they tunnel into buds where they feed. They especially seem to prefer fruit trees such as apple, blueberry, and cherry, and crabapple. However, they also tunnel into the buds of maples. These caterpillars move from bud to bud as they feed. Delayed bud opening due to cool weather conditions can lead to bud death as the caterpillars have longer time to feed. Older larvae feed in the expanding leaf clusters and are capable of creating defoliation in high populations. Research in Canada has shown that four consecutive years of partial defoliation of deciduous hosts can lead to branch mortality while complete defoliation in each of those years leads to tree mortality. In certain regions of Nova Scotia, this pest is responsible for a 40% red oak mortality in forested stands.

**Life Cycle:** Moths (the adult stage) of the winter moth emerge from the soil usually in late November and can be active into January. The adults are strongly attracted to lights and can often be found flying around outside lamps or holiday lights. The male moths are small, light brown to tan in color and have four wings that are fringed with small elongate scales that give the hind margins a hairy or fringed appearance. The female is gray, wingless and, therefore, cannot fly. She emits a sex pheromone or scent that often attracts clouds of male moths. Females are usually found at the base of trees but can be found almost anywhere. After mating, the female deposits an egg cluster on tree trunks and branches, in bark crevices, under bark scales, under loose lichen, or elsewhere. The adult moths then die and the eggs over-winter. Eggs hatch when temperatures average around 55 °F. It is believed that egg hatch in Massachusetts occurs when 20 – 50 Growing Degree Days (base 50) have accumulated. This means that egg-hatch usually occurs in the spring, before bud break of most of its host plants. Newly hatched larvae often crawl up tree trunks and produce a long silken strand of silk which makes them air buoyant. This larval dispersal method is known as “ballooning”. In certain situations, winter moth caterpillars can arrive in areas where they are not expected to be a problem, given topography and wind patterns.

Larvae are pale green caterpillars with a white longitudinal stripe running down each side of the body. Winter moth larvae are loopers or inchworms and have just 2 pairs of prolegs. At maturity, these caterpillars will be approximately one inch long. They will feed voraciously until mid-June, whereupon they migrate to the soil for pupation. They will stay in the soil in the pupa stage until they emerge in late November as adult moths.

**Feeding:** In certain years, winter moth eggs may hatch in March. After ballooning, the larvae will tunnel into buds, especially the flower buds of fruits (apple, blueberry, cherries, and flowering trees). They will feed on both fruit and foliar buds but fruit buds are preferred. Once a bud has been devoured from within, the caterpillar will migrate to other buds and repeat the process. Once leaf buds open, the small caterpillars can be found within the tight clusters of new leaves during the day. During cool springs, if weather hinders leaf expansion, the winter moth caterpillar can cause high levels of injury to these leaves. Winter moth caterpillars often leave these clusters to become free feeders at night. They may also "drop" or "balloon" to plants that are located beneath infested trees. These caterpillars may then feed on a whole host of herbaceous perennials, roses etc. that are near or beneath these trees. Winter moth caterpillars are often found in association with both the fall and spring cankerworms, which look and have similar feeding patterns to the winter moth caterpillar.

**Controls:** In the states of Washington and Oregon, as well as Canada, various natural controls have been introduced to combat this pest, with varying levels of success. These include parasites such as flies and wasps. Certain native beetles, like carabids (ground beetles) and staphylinids ("oil" beetles) may act as predators of this pest, especially in the pupal stage, in the leaf litter or soil. A **dormant oil spray** to the trunks and branches of trees may be helpful to kill the over-wintering eggs before they hatch. However, some egg clusters are under bark flaps and loose lichen and may be protected from oil sprays. Eggs may also be in other locations on or off the host plant. Caterpillars may also invade host plants by ballooning onto them after treatment has been applied. Some products are available that act as a barrier to climbing caterpillars or for the climbing adult female moths in late fall to early winter. This is known as "tree banding". These are generally heavy weight paper strips that are covered with a sticky substance that snares climbing caterpillars (or female moths). **However, research does yet support their effectiveness and they are not recommended.** If utilizing such practices is desired, NEVER place a sticky substance directly onto the bark of the host plant; it may be toxic to the plant.

*Bacillus thuringiensis* (*B.t.* (kurstaki), which is a bacterium and specific to caterpillars of butterflies and moths, works very well on the younger larvae of both winter moth and cankerworms while they are free feeders (not in the buds).

**Spinosad**, which is available to licensed pesticide applicators, as well as homeowners, is another biorational compound that works well against winter moth and cankerworms. Two of the homeowner products are labeled as "Bulls Eye BioInsecticide" and "Monterey Garden Spray". One of the commercial labels (for licensed applicators) is Conserve SC.

**Insecticidal soap** may be effective against the younger caterpillars but only when they are exposed on the host plant.

**Chemical insecticides.** Many compounds, such as Sevin and Malathion are labeled for these pests. Consult your local supplier and always read, understand and follow all label directions for pesticide products.

**Trees heavily defoliated** by winter moth caterpillars will be severely stressed. Trees must put out a second flush of growth in order to survive. **Water is critical to trees at that time.** Supplemental watering of trees will be necessary if a drought or little rainfall occurs naturally. Fertilizer application is not recommended for trees that have been defoliated.

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