

Gypsy Moth

Lymantria dispar



Photo: Dieder Descouens

Background

The gypsy moth has been a costly and persistent problem in Massachusetts since its introduction in 1869. Despite control efforts by federal and state agencies, gypsy moth populations continue to defoliate our forests here in Massachusetts and expand their range in the U.S.

Life Cycle and Identification

Gypsy moths have one generation per year. During their lifecycle they complete four distinct life stages: egg, larvae (caterpillar), pupae, and adult (moth).

Egg: Female adult moths lay egg masses by early August on trees, houses, outdoor furniture, or cars where they will overwinter. Egg masses are buff colored, approximately 1-1.5 inches long, and contain 100-1000 eggs.



Photo: Charlie Burnham, Mass DCR

Larvae: Small, mostly black caterpillars (~1/16 in long) will emerge in early May: exact timing depends upon climate conditions (~145-200 GDD). It is at this small size that the gypsy moth disperse by wind, until they land on a host tree where they begin to feed on foliage. Caterpillars will continue to feed and progress through 5-6 instars until they reach a final size up to



Photo: Milan Zurbik, Forest Research Institute

2.5 inches. Larger caterpillars can be identified by their hairy bodies and five pairs of blue dots and six pairs of red dots down their back.

Pupae: Around the third week of June, caterpillars will find a safe, protected location to pupate. Pupae are reddish brown and 0.75- 1 in. long. Pupation takes 10-15 days to complete.



Photo: USDA APHIS PPQ

Adult: Adult moths will emerge in mid-July. Female moths are larger (2-2.5 in.), white with brown chevron markings, and flightless. Male moths are smaller (1.5 in.) and light brown with dark brown chevron markings. Males will fly to females to mate and complete their lifecycle.



Photo: USDA APHIS PPQ

Gypsy Moth Impacts

Damage to trees and forests by gypsy moths primarily occurs through defoliation by the caterpillar life stage. Dense feeding populations can consume all the leaves on a tree, defoliating entire stands. The preferred host tree species are deciduous oaks, maple, birch, poplar, willow, apple, and hawthorn. Other, less preferred deciduous trees and even conifers, like white pine or eastern hemlock, will be attacked by gypsy moths when there are large outbreaks. Typically, a healthy deciduous tree can survive one complete defoliation event, because they have enough energy reserved to produce new foliage in the same growing season. However, multiple years of defoliation or additional stress can cause deciduous tree mortality. Conifers will die after only one heavy defoliation event.

Population Dynamics

Across Massachusetts, gypsy moth density can fluctuate greatly from year to year. Gypsy moths have cyclical periods of small persistent populations and large outbreaks. Population trends are primarily driven by climate conditions and the balance of natural predators and disease. Predation from small mammals, birds, and insects, as well as, parasitic infection from flies and wasps regulates small populations.

Under certain conditions, gypsy moths can be significantly impacted by disease. Nucleopolyhedrosis virus (NPV) is a wilt disease that causes high mortality in caterpillars and pupa when populations have been maintained high density in an area. The introduced fungus *Entomophaga maimaiga* (EM) causes high mortality in during both periods of low and high density



Photo: Charlie Burnham, Mass DCR

infestations, but requires specific moisture and temperature conditions to effectively spread and infect the caterpillars. EM has kept gypsy moth populations from reaching large outbreak stages since the late 1980's. However, dry conditions in Massachusetts can lead to large outbreaks

due to lack of EM fungal success.

Management Strategies

There are several steps Massachusetts residents can take to protect their trees from mortality caused by gypsy moths. The first step in gypsy moth management is assessing and monitoring the population. Be aware of the caterpillars seen feeding in the spring, the presence and location of adult moths, and the abundance of egg masses.

The recommended insecticide treatment for gypsy moth is *Bacillus thuringiensis* spp. *kurstaki* (Btk) or another biological pesticides.



Photo: Rich Anair, Mass DCR

Applications should be done by licensed applicators with the specialized equipment required to completely coat a tree's leaves. Btk should be applied directly to foliage soon after caterpillar emergence where it will be consumed during feeding. Btk is most effective in young caterpillars and will not be effective on large caterpillars. Treatments should typically be applied at 90-400 GDD. Often, by the time caterpillar feeding is noticeable on a tree, it is too late to treat. This is why it is important to check for egg masses before emergence and look for the small caterpillars in early May.

Many commonly recommended treatment options are not effective in decreasing gypsy moth population or minimizing damage to trees. These include burlap strips, duct tape bands, or moth traps.

If trees have been defoliated by gypsy moth, assess and monitor tree health and recovery. Trees may require additional watering, fertilizing, or mulching to promote refoilation. Avoid additional stressors, such as, mechanical or chemical damage or soil compaction.

Finally, an important effort in management is to minimize gypsy moth spread. Egg masses can be located on more than just trees; common locations include cars, trucks, storage and moving containers. Anytime after eggs are laid in August, check for hidden egg masses to avoid spreading gypsy moths. Viable egg masses will be firm to the touch and have no holes.

For more information:

DCR Forest Health Program

Phone: (413) 253-1798 x204

Website: <http://www.mass.gov/eea/agencies/dcr/conservation/forestry-and-fire-control/forest-health.html>

MDAR Pesticide Program

Phone: (617)626-1700

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Photo: Felicia Andre, Mass DCR

