

## Gypsy Moth Questions & Answers

By: Neal Swanson, Midland County Gypsy Moth Suppression Program Director

Q) What is a gypsy moth? What do they look like? What are some signs that a property may be experiencing a gypsy moth infestation?

A) Gypsy Moths (*Lymantria dispar*) are an invasive insect from Europe originally introduced in the Boston area around 1876. They are a silk-worm and were intended for use in silk production but escaped and have spread throughout the Northeast and Midwest United States since escaping. Gypsy moth populations go through cycles of high and low numbers every 6-10 years. When populations are high, nuisance from the presence of larvae (caterpillars) and their feeding activity, and the associated defoliation and damage to trees can be extensive.



**Gypsy Moth Life Cycle.** Egg masses are laid by adults in fall and will over-winter. Larvae (caterpillars) hatch in late April/early May and may last into early July. Adults emerge mid-July and will survive up to 1 month. Brown males fly 24 hrs/day, the white females are flightless.



Several (4) fresh egg masses on bark.  
Each egg mass may contain 500-1,000 eggs.



Third instar (juvenile) larvae, on leaf.



Sixth instar (mature) larvae, may be 2-3" long.



Pupae, where larvae metamorphosizes.



Defoliated trees and frass-stained pavement.



Frass (droppings) and leaf fragments.

Q) Why do we think we are seeing elevated gypsy moth infestations this year when it has not been an issue in previous years?

A) There are natural environmental controls that act on growing gypsy moth populations. These controls include a virus called Nucleopolyhedrosis virus (NPV), egg parasitoid wasps called *Ooencyrtus sp.*, and a fungus called *Entomophaga maimaiga*, which together limit exponential population growth in most years. A key control (*E. maimaiga*) requires cool, wet conditions in early-mid June to multiply fungal spores and infect the caterpillars. Unfortunately, we have not been getting the rain we need at the right time for the last 4 years, so the *E. maimaiga* has not been acting on the populations like we expect, resulting in a region-wide infestation of much higher-than-normal numbers.



Larvae likely killed by *E. maimaiga* fungus.



Dead larvae in inverted "V" characteristic of NPV.

Q) What does it mean when the Gypsy Moth Suppression Program says their methods follow an Integrated Pest Management (IPM) approach?

A) The Gypsy Moth Suppression Program performs egg mass surveys in the fall of the year prior to treatment to identify rising populations, spray to contain spreading into the surrounding area, and reduce caterpillar numbers to limit defoliation and nuisance in wait of latent natural controls to kick in. We use low environmental footprint (biological) pesticides only as needed to keep operating costs low, while maintaining control of the populations. This approach is known as Integrated Pest Management (IPM) and is the standard in gypsy moth suppression. The program is not intended to treat every forested acre in the county in any given year, as this would be highly cost-prohibitive and damaging to the ecosystem.

Q) What does the program spray? How does it work? Can it be sprayed multiple times? How does the spray effect humans or pets?

A) We spray a biological (bacterial) insecticide called *Bacillus thuringiensis var kurstaki* (Btk) that is effective only on moth or butterfly caterpillars that eat the Btk at the time it is active. A liquid formulation is sprayed in a fine mist on leaves, the leaves are consumed by the caterpillars, and a toxic crystal is released into the caterpillar's digestive tract. This will cause the caterpillar to stop eating, and it will die within 3-4 days. There is an inverse relationship to Btk effectiveness and caterpillar size. Larger caterpillars must consume a larger dose of the Btk, so may not die even if they eat the Btk. Given this fact, the best strategy is to spray the highest proportion of the smallest possible caterpillars. This usually happens in mid-late May. Multiple sprays are not usually necessary and are intended primarily to treat a wider range of egg hatch conditions and would not target the same cohort twice. There is no evidence that the spray has harmful effects on people or animals, or even any other insects outside of the target genus (butterflies & moths). Various formulations of Btk are even used in organic gardening and beekeeping.

Q) How long might this infestation spike last?

A) Gypsy moth populations loosely follow a 6-10 year cycle where populations spike and crash. The population spikes may last for 2-3 years or longer if conditions are right for prolonged infestation. The Btk spray is intended to suppress the populations, limiting tree defoliation and reducing nuisance (ideally to tolerable levels). It is impossible to eliminate the populations, and we can't expect to. The spray is intended to lessen the effects of an infestation until latent natural controls begin to act again (causing a population crash). This will reduce populations to unnoticeable levels once again. In a few years, the cycle will begin again, hopefully less severe the next time.

Q) What can homeowners do to combat the gypsy moth population on their own property?

A) A few home remedies have been proven effective on various life stages of the gypsy moth. Different activities may be more or less effective, but any reduction in population helps.

**Small Caterpillars:** Sticky barrier bands can be placed on tree trunks at chest height beginning in early-mid April. These bands will help keep small caterpillars from climbing up less infested trees from neighboring trees and any caterpillars that may fall to the ground.



Source: University of Wisconsin Extension

Barrier bands should consist of some sort of tape or fabric backing to be placed around the tree for 8-12" to ensure the sticky substance does not directly contact the tree bark. Do NOT put the sticky substance directly on tree bark, this may cause permanent staining and damage to the tree bark. The sticky substance is the homeowner's decision; Vaseline, inverted duct tape (sticky side out), or a product called Tanglefoot or similar caterpillar trapping paste are options. Sticky substance should be checked after rains, dust, caterpillars to maintain stickiness. On rough bark, a sheet of cotton batting may be placed underneath tape intended to block caterpillars from passing under and past the barrier.

**Larger caterpillars:** In early-mid June, sticky barrier bands may be switched out for burlap barrier bands, and/or burlap barrier bands may be added to the defense. Larger caterpillars may travel up/down the tree trunk at various times in the day, so the burlap band can act as a trap or a place of refuge, concentrating the caterpillars for easier collection/killing.



At chest height, wrap 10-20" of burlap around the tree. Tie a string in the middle of the burlap sheet allowing the sheet to flop over into an inverted U or V. The caterpillars will then be able to travel down the tree and over the folded burlap, but as caterpillars crawl back up, they tend to get caught within the fold. Periodically check the burlap for caterpillars throughout the day, especially in the afternoon. Any caterpillars collected may be crushed or scraped off into a container of dish soap solution, left in the solution the caterpillars will die.

**Dish soap solution:** Combine 2 cups of water with 3 Tbls of dish soap

This solution can be used on caterpillars and egg masses.

When the live caterpillars are dropped into the solution, the soap will kill the caterpillar. Once dead, the caterpillars can be thrown out. The solution can also be used in a hand sprayer and sprayed directly on the caterpillars, soaking them. The addition of several ounces of vinegar has been shown to be even more effective on caterpillars, and if the water/soap/vinegar solution is sprayed on siding or surfaces, it may act to deter the caterpillars from climbing up surfaces.

Fresh egg masses can also be scraped off from tree bark, decks, etc, into the dish soap solution, submerging the egg mass. The egg mass should be left in the solution for at least 3 days, and the soap will kill the eggs within the egg mass and the egg mass can be discarded in the trash.

**50/50 Water & Oil solution:** Mix 1-part water with 1-part horticultural oil (mineral or Neem oil), vegetable oil will also work, but may not be as effective. Add a few ounces of dish soap to solution to act as an emulsifier.

This solution can be used on fresh egg masses.

Egg masses that are visible but may be out of reach for scraping into dish soap solution, can be sprayed with 50/50 oil water solution. The solution can be loaded into pump hand or backpack sprayers and sprayed in a stream onto egg masses. The goal is to saturate the egg mass with the solution, to the point the egg mass darkens and looks saturated. The oil in the solution will smother the eggs inside so the egg mass won't hatch the following spring. Be advised, this process can be messy, so wear clothing you don't mind getting some vegetable oil on.

**Killing Adult Moths:** Adult gypsy moths will emerge after pupation, generally in early-mid July and may be present through late August. The white female moths are flightless and will be visible on tree bark, deck railings, and siding. The brown male moths fly erratically and can be seen flying 24hrs/day. The female moths are easier to locate and squish due to the fact that they will not fly away. Any female that is killed prior to laying an egg mass can reduce next year's potential population by 500+ caterpillars. Male moths are hard to kill due to erratic flying patterns, but bug zappers have been effective at killing male moths in higher densities.



Adult female gypsy moth laying egg mass



Adult male gypsy moth in flight