Gypsy Moth & Management

See Also Pages 3-4 for Identification and Actual Size!

Pupa, female (top) & male, July

Milan Zubrik, Forest Research Institute - Slovakia, Bugwood.org

Gypsy moth male (not to scale)

Gypsy moth male & female (top)

USDA APHIS PPQ, Bugwood.org

Egg mass new & old (top), August - May

Linda Williams, WI DNR

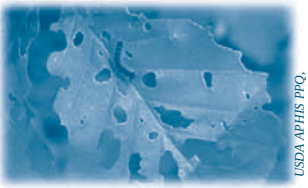
Caterpillar in late June - July

Bill McVey, WI DNR

Front cover photos: Female moth, USDA Forest Service, Russ Haskell, Univ. Fla. Bugwood.org

Gypsy Moth & Management

Landesforstpräsidium Sachsen Archive, Bugwood.org



USDA APHIS PPQ, Bugwood.org

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The Wisconsin Cooperative Gypsy Moth Program consists of partners from:

- *Department of Agriculture, Trade, and Consumer Protection*
- *Department of Natural Resources*
- *University of Wisconsin – Extension*

DATCP manages a program called Slow the Spread (STS) that aims to eradicate small, isolated populations of gypsy moth in non-quarantined counties in Wisconsin. DNR works with local governments to conduct spraying of residential and wooded areas where gypsy moth populations are rising to levels that could cause defoliation. UW - Extension provides public education.

Dr. J.A. Davidson, University of Maryland, College Park

Introduction

The gypsy moth is a foreign pest that was introduced to Massachusetts in 1869. Since then, it has moved south and west and has become a significant pest of forest and shade trees.

Gypsy moth populations naturally explode to very high numbers, called outbreaks, about every 10 years. During outbreaks, the caterpillars are a nuisance and can strip trees of their leaves, defoliating entire neighborhoods or forests by late June. Most healthy trees can survive one such defoliation, but trees that are weak or stressed prior to defoliation may die.

The gypsy moth was detected in Wisconsin in the 1990s and as of 2008 is firmly established throughout the eastern and central part of the state. Eventually, it will become established across the entire state. Gypsy moth will never be eradicated from Wisconsin but its populations can be managed, minimizing the damaging effects of outbreaks.

How it Spreads

The gypsy moth is an expert at hitching rides and establishing new populations in areas previously free from infestation. Just about anything you would find in your backyard or woodlot, even your vehicle, can be a suitable place for the female moth to lay her egg mass. Egg masses and caterpillars can easily be moved to another location across town, across the state, or across the country, creating the likelihood of a newly infested area.

Gypsy Moth Quarantine

To help prevent the spread of gypsy moth, state and federal regulations require that all outdoor items being moved from an infested area into a non-infested area be inspected to ensure that they are free of gypsy moth in any life stage. To determine if you are in a quarantine county, please visit http://gypsymoth.wi.gov.

For more information on quarantine regulations pertaining to households, nurseries, and firewood, visit http://gypsymoth.wi.gov and link to "Don't Move Gypsy Moth - DATCP Quarantine Details."

Dr. Francis Eugene Wood, University of Maryland, College Park

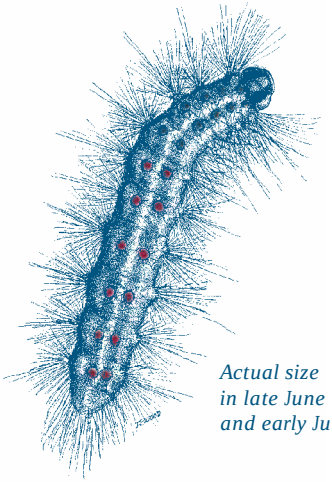
Andrea Diss, WI DNR

You can help prevent the spread of gypsy moth. If you live in an area where gypsy moth is established, check vehicles or outdoor items for egg masses before moving them to unquarantined areas.

Firewood is a favorite hiding place for gypsy moth. Be especially vigilant during and after an outbreak when egg masses will be abundant.

Identification

Larva (Caterpillar)



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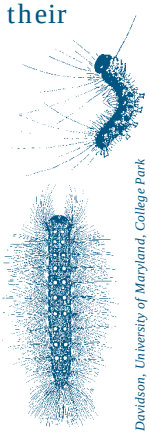
Actual size in late June and early July

In Wisconsin, gypsy moth larvae (caterpillars) are present from May through mid-July. They can be hard to identify when they are small, but by June they are large enough to see distinctive features.

The caterpillar is bristly and has two rows of colored "warts" running the length of its back. There are blue warts near the head and red warts near toward the rear. The head is yellowish and has two vertical black stripes.

Gypsy moth caterpillars can also be identified by their behavior. Starting in June, when they are about 3/4 of an inch long, they crawl out of the tree canopy during the day to look for hiding places to rest. You may find them resting on the trunk of the tree or on nearby buildings or other outdoor surfaces.



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Actual size in early June

Pupa

Gypsy moth caterpillars complete their growth by late June to mid-July, then pupate to transform into an adult moth. The pupa has a hard outer shell to protect it during the transformation. The process takes approximately two weeks. Male caterpillars pupate earlier than females and their pupae are smaller.

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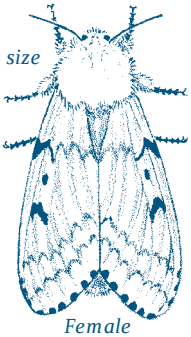
male *female*

Actual size of pupa

Moth

Male

Actual size



Female

In Wisconsin, the gypsy moth adult starts emerging in July and may be observed into September in the north. The female moth is white with small V-shaped markings on her wings. Although she has wings she cannot fly. She gives off a pheromone to attract male moths who come to her.

The male gypsy moth is smaller than the female, brown with large, feathery antennae. They are similar to several native moths. A distinguishing feature is that the male flies during the day searching for female moths. Clouds of male moths can be seen fluttering at sites where females are concentrated.

Adult moths do not eat; they mate and die within two weeks.

Egg Mass

The gypsy moth egg mass is the easiest life stage to find during most of the year. They are present from August until the following May.

Actual size

Egg masses are slightly oval and range in size from 3/4 of an inch to two inches long. Each mass may contain up to 1,000 individual eggs. An egg mass produced in the current season is firm to the touch, covered with tiny hairs, and colored a light tan to golden yellow. Egg masses from previous years are bleached white to pale yellow, are soft and spongy, and tattered.

Egg masses can be found just about anywhere. They can be found on logs or debris on the forest floor or on the uppermost branches of trees and anywhere in between. Female moths will also deposit egg masses on firewood piles, lawn furniture, play sets, houses and other human-made structures.

Illustrations by Cooperative Extension Service, University of Maryland System

USDA

Gypsy moth caterpillar

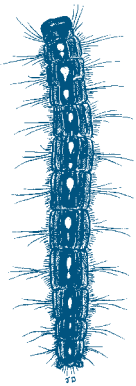
It's NOT a Gypsy Moth If

- It's a moth in the spring or early summer
- It's a caterpillar in the late summer
- It's building a silk nest or tent with other caterpillars
- It's not hairy and it doesn't have blue and red spots on the caterpillar's back.

Eastern Tent Caterpillar

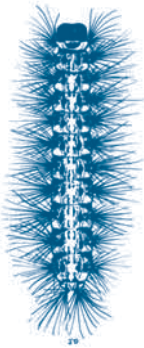
- dark brown or black with a pale yellow stripe running the length of the body and blue and white spots on side
- most often found on cherry, crabapple and apple trees in spring
- builds a dense silk tent in the crotch or a branch fork of a tree in the spring
- may cause defoliation, but is seldom a serious threat

Forest Tent Caterpillar



- black stripe down back, a row of white or pale yellow keyhole-shaped markings down the center of the stripe
- sides are sky blue
- does not construct a silk tent, but makes a "mat" that may be seen on trees
- outbreaks occur in spring about every 10 years in parts of the northern third of Wisconsin

Fall Web Worm



- appear late in the summer and early fall
- constructs a large, loosely woven silk web at the outer edge of the tree canopy.
- nests may be found on many hardwood trees including birch, willow, walnut, and hickory
- can be an eyesore, but rarely threatens the tree

Illustrations by Dr. J.A. Davidson, University of Maryland, College Park

Is Gypsy Moth a Threat to My Trees?

In most years the answer to this question is no. Gypsy moth is only a threat to your trees when its population increases to very high numbers, called an outbreak. Outbreaks occur in cycles, about every ten years or so in most areas where gypsy moth is established. You can predict an outbreak up to nine months before it starts by making some simple observations. This allows plenty of time to take action to prevent defoliation and damage to your trees.

In June and July, be on the lookout for gypsy moth caterpillars coming out of the trees to rest on tree trunks and the sides of buildings. The presence of caterpillars – even in small numbers – may indicate that a population is on the rise and could be a bigger problem next year. Starting in August, look for gypsy moth egg masses. The number of egg masses is a good indicator of the number of caterpillars to expect in your area next spring.

Keep in mind, healthy trees will recover from a defoliation. Trees that are weak from drought, previous defoliation, age or other stressors may not survive unless they are protected from gypsy moth.

What Does the Gypsy Moth Caterpillar Eat?

Gypsy moth caterpillars can feed on about 500 different kinds of trees and shrubs.

Preferred: *oak, aspen, willow, apple and crabapple, tamarack, white birch, witch hazel, mountain ash, basswood, ironwood, and linden*

Acceptable: *maple, walnut, chestnut, hickory, cherry, hemlock, elm, hackberry, yellow birch, beech, cottonwood, box elder, and ironwood . . . older caterpillars may also eat pine and spruce*

Seldom: *green, white or black ash, balsam and fraser fir, locust, scotch pine, red cedar, tulip poplar, catalpa, sycamore, and dogwood*

Predicting Tree Damage from Gypsy Moth

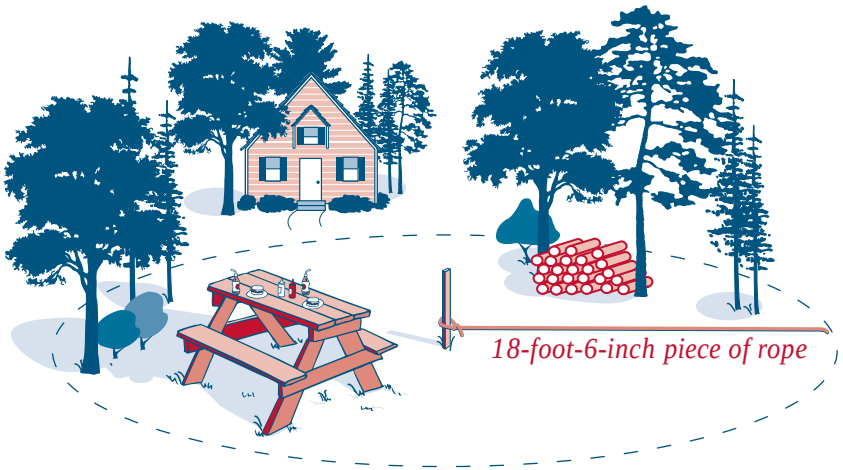
In the fall, take a walk around your woodlot or neighborhood. If you don't see any egg masses or only a few within a ten minute walk, it is unlikely that the population will be high enough to cause defoliation next year. However, be aware that if you see some egg masses you should monitor again next year as the population may be increasing.

If you see egg masses regularly on your walk, you should consider doing a few 1/40th acre surveys to get a better idea of whether you will have defoliation from gypsy moth next year.

Complete instructions on how to do a 1/40th acre predictive survey can be found at http://gypsymoth.wi.gov.

Quick Survey Guide

- *Measure rope 18 feet 6 inches*
- *Stake one end of the rope and with the other end "draw" a circle around a typical piece of your property*
- *Count all new egg masses you can find in that circle*
- *The gypsy moth population is predicted to be a nuisance and cause heavy defoliation if you see:*
  - *An average of 13 or more egg masses per circle in residential areas*
  - *An average of 25 or more egg masses per circle in woodlots*
- *Check the Web for complete instructions*



Managing Gypsy Moth: Physical Controls for Yard Trees

Managing gypsy moth in your backyard changes throughout the year as the moth develops through its lifecycle.

Lifestage: *Egg Mass*

The gypsy moth egg mass is present in Wisconsin from August until May. Each egg mass you destroy prevents several hundred caterpillars from hatching in the spring.

The female gypsy moth will lay her eggs on any surface so it's important that you inspect your entire yard.

Wait until after the first hard frost before destroying egg masses by either of the two methods. There are natural enemies of the gypsy moth that will attack the eggs . . . a benefit to you!

There are two factors to consider before deciding which option to use

- the time of year
- whether you live in a potential "suppression spray" area

If you plan to participate in the state aerial suppression program, you should oil egg masses and then leave them alone. Surveyors will need to count the egg masses on your property to determine if the area qualifies for participation.

Beginning in October,

manage egg masses in either of two ways:

#1 Spray them with a horticultural oil labeled for gypsy moth

- Horticultural oil suffocates the eggs
- it is formulated to penetrate the mass of hairs and coat the eggs thoroughly.
- it requires a couple weeks to completely suffocate the eggs . . . do not use this technique after the middle of April since it might not kill all the caterpillars before they hatch

Don't handle caterpillars or egg masses with your bare hands. The gypsy moth's hair often causes a mild allergic reaction. Wear gloves or use a putty knife to handle them.

Or

#2 Scrape them off and kill the egg masses

- kill eggs by placing them in a container and microwaving them on high for two minutes or
- drown them in soapy water for two days
- killed egg masses may be thrown out in the trash
- don't merely scrape the egg masses to the ground. They will still survive and hatch in the spring!

Sticky barrier and collection bands work well when populations of gypsy moth caterpillars are low to moderate. In outbreaks, these methods will have limited results.

Lifestage: *Young Caterpillar*

By late April, place a sticky barrier band on each tree trunk (about waist high) to help prevent caterpillars from climbing into the tree. Bands can be bought or made using duct tape (silver side out) around a tree trunk and coated with a horticulture grade sticky trap material, available at most lawn and garden centers.

- Never put the sticky trap material directly on the tree trunk
- On thin-barked trees such as birch, place a layer of paper bags around the trunk before using the duct tape.
- Sticky material may need to be re-applied
- Collect and kill any caterpillars at the base of the tree
- *Never use automotive greases on trees. It can kill them.*

Illustration by Cooperative Extension Service, Univ. of Maryland System

A word About Gypsy Moth Traps . . .
Over-the-counter pheromone traps available at garden centers or from the Internet kill only males and are not helpful in reducing outbreaks. They are more helpful in detecting gypsy moth in areas where populations are very low.

Lifestage: *Older Caterpillar*

In early June, add a cloth or burlap collection band above the sticky barrier (about chest high). Collection bands can be made from heavy dark cloth or burlap that's approximately 12-18 inches wide and long enough to completely wrap around the tree.

- Tie a piece of twine around the middle of the cloth band
- Fold the top half of the cloth down over the twine to cover the bottom half
- Caterpillars are attracted to these "skirts" when looking for a place to hide during the day
- Destroy caterpillars each afternoon by scraping them into a container of soapy water or snipping them in half

Lifestage: *Pupa & Moth*

In July, begin inspecting all outdoor surfaces in your backyard for gypsy moth pupae. The pupa is a brown shell, often attached to tree bark or other surfaces with strands of fine silk.

- Those in reach are easily destroyed by crushing
- Crush those that are out of reach with an extendable pole or dislodge them with water from a garden hose and destroy those that fall to the ground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The female moth is also an easy target for control. Since it can't fly, crush those that you find on your property.

Avoid directly touching female moths as their pheromone will get onto you and you will be mobbed by male moths.

Each female moth eliminated before it produces an egg mass will prevent the emergence of several hundred caterpillars the following spring.

Biological Controls

Natural enemies can help moderate gypsy moth cycles. Native predators can delay outbreaks and specialist diseases often end outbreaks. The DNR has introduced specialist parasites and diseases to bring the gypsy moth into a more natural balance. These are now established over the range of gypsy moth in Wisconsin. For images of these allies, go to http://gypsymoth.wi.gov and link to biological controls.

Our most important native predator is the deer mouse which attacks caterpillars and pupae. Where deer mice are excluded by mowing under oaks, gypsy moth populations increase to defoliating levels sooner than in stands where there is natural undergrowth. Encourage deer mice to patrol your oaks by under-planting them with shrubs and other plants that provide cover from cats and owls.

Ooencyrtus kuvanae is a tiny wasp that parasitizes the eggs of gypsy moth. While it is hard to see this gnat-sized wasp, you can see the pin-holes it left when exiting new egg masses in early fall. If you wait to oil or remove egg masses until after a hard frost,

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this tiny insect will repay you by killing eggs higher on the tree than you can reach!

Two diseases typically end outbreaks. *Entomophaga maimaiga*, a fungus, is most effective when the weather is wet in May and June. Gypsy moth nucleopolyherdrosis virus (NPV) kills caterpillars that are weak due to starvation or other factors. Both of these only effect gypsy moth.

Controls for Woodlots (many trees)

The key to managing gypsy moth in woodlots is to maintain a healthy forest. If trees are healthy they are able to recover from a single year of heavy defoliation. Proper spacing will keep trees growing steadily at a moderate pace. Such trees are better able to rebound from stress, including defoliation. Trees are more likely to die after a single defoliation if they are crowded or unhealthy.

Tree species preferred by gypsy moth will always be defoliated more severely during outbreaks than those that are less favored. In deciduous stands, you should maintain a mix of favored and less favored species. This will reduce losses and help reduce the secondary effects of defoliation of all the trees in a stand. These secondary effects include increased runoff, loss of cover, and reduction of food for birds and animals. Continue to maintain oaks in your stand where appropriate as gypsy moth is only one of the pests and diseases that attack trees in our area.

There will be situations where a woodlot owner may want to use a suppression spray to prevent defoliation of the stand. If the trees are stressed due to a recent drought, none may be in condition to recover from the additional stress of defoliation. Recently planted and young oaks may also need protection from a gypsy moth outbreak to survive.

Woodlot management with gypsy moth in mind can be complicated and may require the services of a professional forester. For additional information, consult the DNR publication Gypsy Moth Silvicultural Guidelines for Wisconsin, visit http://gypsymoth.wi.gov, call 1-800-642-MOTH (6684), or email dnrfrgypsymoth@wisconsin.gov

Insecticide Options for Yard Trees

There are many insecticides available to control the gypsy moth in your backyard. When selecting a pesticide, some things to consider are:

- Presence of young children or pets
- Proximity to water resources (stream, decorative pond, etc.)
- Presence of other desirable insect species
- Nearby vegetable or fruit gardens

Most available insecticides are used by spraying them onto the tree's leaves. If general exposure (through spraying) is an issue, you might consider systemic application. A systemic approach applies pesticide directly into the tree through injections or into the ground around it where it is taken up by the roots. Older trees might show less response to a systemic application than younger ones.

For a list of pesticides for gyspy moth control, visit http://gypsymoth.wi.gov and link to "Pesticide Information."

Unless your trees are relatively small – less than about 12 feet tall – you will likely need to hire an arborist or certified pesticide applicator to thoroughly and safely treat your trees. You may find one through the Wisconsin Arborist Association's Web site at www.waa-isa.org.

J. Maentanis

Aerial Insecticidal Control for Large Acreages

. . . on Property of 20 Acres or More

The Wisconsin Department of Natural Resources offers a Gypsy Moth Suppression Program to counties to suppress gypsy moth outbreaks. This voluntary, aerial insecticide program focuses on reducing high populations of the pest to tolerable levels that do not threaten the trees.

Participation in the Suppression Program increases access to aerial spraying in residential areas. The USDA Forest Service may share the expense of these aerial treatments along with the associated administrative costs.

County officials initiate and coordinate the program with assistance from the DNR. Participating counties provide a local coordinator who acts as a contact for both the

public and the DNR, and is responsible for a number of duties at the local level. To apply for the suppression program, landowners should contact their county government officials or gypsy moth coordinator.

Contact information is available through the DNR Suppression Spray Program link at http://gypsymoth.wi.gov. Areas proposed for treatment are determined in autumn. Applications are due from counties by early December.

The treatment methods employed during the spray season include a formulation of the bacterial insecticide Bacillus thuringiensis kurstaki (Btk) or, if endangered butterflies or moths are present, Gypchek, a viral insecticide that specifically targets gypsy moth caterpillars.

The aerial suppression program is an option primarily in those Wisconsin counties that have been quarantined for gypsy moth. To get the latest information regarding the gypsy moth suppression program, visit http://gypsymoth.wi.gov, call the toll-free gypsy moth information line at 1-800-642-MOTH (6684), or email dnrfrgypsymoth@wisconsin.gov.

Whether or not the county or community chooses to participate in the voluntary suppression program, property owners also have the options of arranging for a private spray. For guidance on how to do this, visit http://gypsymoth.wi.gov.

Contacts & Information

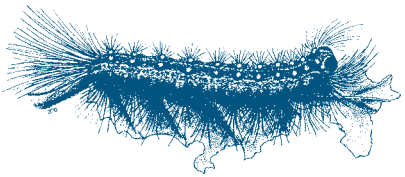
On the Web

http://gypsymoth.wi.gov

DNR Gypsy Moth Email:
dnrfrgypsymoth@wisconsin.gov

Gypsy Moth Information Line:
1-800-642-MOTH (6684)

This booklet is also available online to download and print by section at http://gypsymoth.wi.gov



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