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The Gypsy Moth in Michigan – A Guide for Homeowners and Small Woodlot Owners
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Cooperative Extension Service
Michigan State University



*The
Gypsy Moth
in Michigan:*

**A Guide for
Homeowners
and
Small Woodlot
Owners**

The gypsy moth feeds on the leaves of many types of hardwood trees. It was originally introduced into this country from Europe in 1869. Experiments to produce silk using the insect failed, but the gypsy moth did succeed in establishing itself in the northeastern United States. It has moved slowly, but steadily, westward, and was first recorded in Michigan in 1954. The gypsy moth can now be found

in every county in the lower peninsula and in certain areas of the upper peninsula.

Gypsy moth caterpillars can be annoying, especially during outbreaks. Caterpillars are found munching on leaves of a variety of hardwood trees, including oak, birch, basswood and aspen. Unhealthy trees are weakened by defoliation. This makes them susceptible to other insect and disease problems that can kill such trees.

Healthy trees are far less susceptible to the effects of gypsy moth feeding. Fertilize trees in the spring and fall, water them frequently during dry spells, and avoid mechanical damage and soil compaction to keep your trees in good condition. A healthy hardwood tree can be stripped of all its leaves two or three years in a row without being killed. Three to four weeks after defoliation, the tree will grow new leaves. Healthy trees reserve nutrients in their roots to replace those lost to leaf-eating insects such as the gypsy moth. Still, defoliation is a nuisance and, in some cases, a potential threat. There are a number of techniques the homeowner can use to help protect trees during years when gypsy moths are numerous.

To control or not to control...

Gypsy moth numbers are cyclic. Weather, parasites and predators work to keep populations of gypsy moth (and other insect pests) at a tolerable level in most years. Approximately every ten years, established populations of the moth temporarily overcome this "natural control" system and cause extensive defoliation. These high populations normally last about three years. At this time, the natural control systems regain a foothold

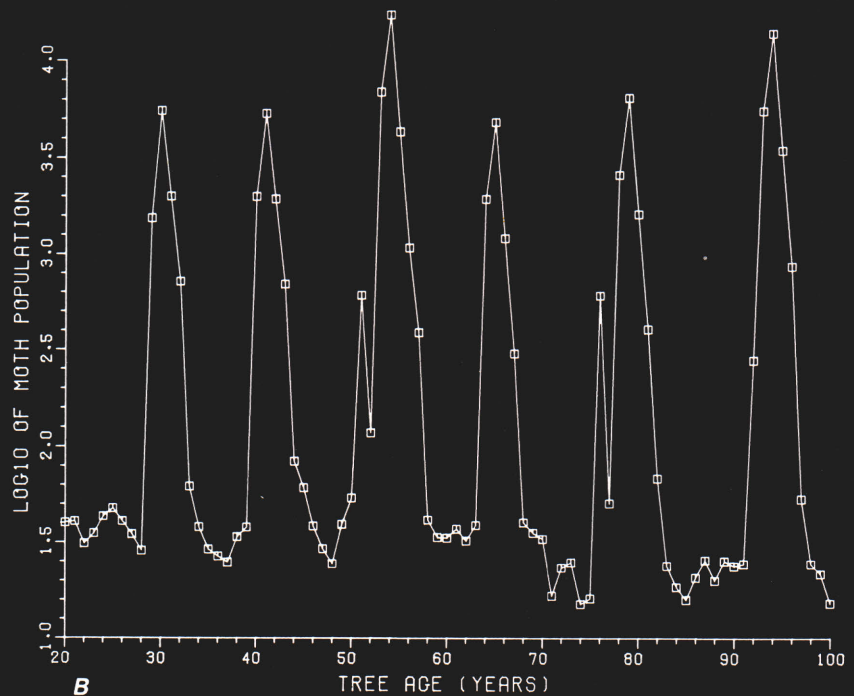


Figure 1. Changes in gypsy moth population over a 100 year period. Note average period between outbreaks is approximately 10 years.

and gypsy moth numbers are sharply reduced (figure 1).

"Control" refers to the reduction of an insect population to nondestructive levels over a wide geographic area. "Management" refers to an attempt to minimize the effects of a current insect population using a variety of biological, mechanical, and chemical techniques. It is important to distinguish between these two terms.

In a forest or woodlot where the pest is established, it is impossible to shorten the period of heavy defoliation. Likewise, the homeowner cannot control an established pest like the gypsy moth with pesticides. This does not mean, however, that you must sit back helplessly and watch the gypsy moth caterpillars defoliate your property. Proper use and timing of management techniques can help



This symbol denotes information specifically for homeowners



This symbol denotes information specifically for small woodlot owners

minimize defoliation during an outbreak and avoid many of the problems associated with gypsy moth feeding.

Your most effective approach to managing the gypsy moth is to maintain strong, healthy trees capable of withstanding repeated defoliations.

The gypsy moth: what to look for

Eggs

Gypsy moth eggs are laid in fuzzy, buff-colored clusters during the months of July and August (figure 2). Each cluster contains 50 to 1,000 eggs. The female deposits these egg masses on any convenient surface, including the bark of trees, the underside of cars and trailers, on picnic tables and on rocks and twigs. The gypsy moth overwinters

in the egg stage until the following May. Gypsy moth eggs are quite cold-resistant and can survive temperatures as low as -20°F.

Larvae (caterpillars)

The eggs begin to hatch in May. Hatch occurs earlier if the weather has been unusually warm. The tiny black gypsy moth larvae begin crawling into the tree tops, attracted by the overhead light. They can disperse in the wind, first dropping from branch tips by single strands of silk, then sailing through the air when caught by a strong gust of wind. Long body hairs enable them to travel up to a few hundred yards.

Following this dispersal period, small larvae feed during the day and rest at night. As they continue to grow, the larvae develop 5 pair of blue spots and 6 pair of red spots on their upper side (figure 3). They begin feeding at night and resting during the day in bark crevices on the trunk and branches. At the end of this feeding period, which lasts from about 4 to 6 weeks, the larvae are about 2 inches long.

Pupae (cocoons)

During the pupal stage, the gypsy moth begins to transform from a larva to an adult gypsy moth. The dark brown pupal cases hang in clusters, attached to the base of branches, in tree crotches, and in bark crevices (figure 4). The insect is immobile during this stage and does not feed. It remains in this form for about ten days.

Adults (moths)

The adults emerge, leaving the pupal cases behind, and begin to search for mates. The tan male moths are about an inch long and are strong fliers. The males search for female moths in a rapid zig-zag

pattern. Female moths are larger, white, and cannot fly. Females emit a potent sex attractant which lures the male moths. Eggs are laid shortly after mating, often on tree trunks (figure 5 and page 1 photo). The adult gypsy moth does not feed.

Dealing With the Gypsy Moth: Some Techniques

Natural controls (year-round)

A number of natural enemies of the gypsy moth are active during all of the insect's life stages. For example, parasites and predators can effectively reduce gypsy moth numbers by 10 percent to 60 percent in a given year, depending on weather conditions and the health of the current generation of gypsy moths. Several natural enemies are listed below.

Natural enemy	Life stage affected
low temperature	eggs
a parasitic wasp	eggs
ants (several species)	eggs
parasitic wasps (2 species)	larvae
flies (2 species)	larvae
spiders, ants, beetles, birds, shrews, mice, and squirrels	larvae
NPV (a virus lethal to the gypsy moth, figure 6)	larvae
flies (1 species)	pupae
ground beetles, mice	pupae
birds (several species)	pupae

Preventive tree maintenance (April through October)

Healthy trees are the best defense against the gypsy moth. A deciduous tree which loses 60 percent, or more, of its leaves will produce new leaves and continue to grow. The tree pays a price, however — it must use its energy reserves for the following year. This can place the tree under considerable stress.

Coniferous trees, such as pines and spruces, are more likely to die from a single defoliation. However, they are not preferred by the gypsy moth and are only fed upon when other food is depleted. Stressed trees are more likely to recover if they have adequate water, sunlight and nutrients.

Watering

A tree will better withstand the effects of defoliation if ample water is available. Watering is most important during periods of drought. Generally, 1 inch of water per week is considered adequate during the growing season. Use an open container or rain gauge to determine when supplemental water is needed. Periodic, heavy waterings are more effective than frequent, light waterings. To fully utilize the available moisture, do not disturb or compact soil near the trees. Such disturbances can adversely affect tree growth and health.

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Recognizing and Managing *The Gypsy Moth*

Figure 2. Gypsy moth egg mas. Approximate size: 1 inch x 2 inches.

Figure 3. Mature gypsy moth larva resting on a leaf.

Figure 4. Larva and pupa of the gypsy moth.

Figure 5. Female gypsy moth depositing eggs on tree trunk.

Figure 6. Larva killed by the nucleopolyhedrosis virus (NPV).

Figure 7. Sticky tape in place. Migrating larvae are unable to cross the barrier. Note the hiding band in place above the tape.

Figure 8. Hiding band in place. Band flap has been lifted to expose larvae.

Figure 9. A systemic insecticide capsule.

Figure 10. A systemic insecticide capsule being inserted into the base of an infested tree.



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Fertilizing

Trees defoliated by the gypsy moth will benefit from additional nutrients. While healthy trees growing on well-fertilized lawns do not normally benefit from added nutrients, those growing in, or near, areas where gypsy moth is established may need to be fertilized. Slow release fertilizers containing a high percentage of nitrogen are recommended. These are available at your local nursery or garden store. Be sure to follow the label directions.

Thinning (year-round)

Proper forest management through thinning can prevent dead trees. Thinning provides trees with additional sunlight and more room to grow. When thinning a stand, cut trees which are stressed, decadent or otherwise unhealthy. Leave those which appear to be growing well. Thin between gypsy moth outbreaks. Thinning is a tricky process involving a number of factors, including soil conditions, tree species and age. If you are unsure about how to do this, consult your county agent, professional forester or arborist.

Planting

Proper planting can help minimize future gypsy moth problems. Plant tree species less desirable to the gypsy moth as an effective, long-term approach. Ash, maple, hickory, dogwood, mountain ash, and most conifers are largely ignored by the pest and are an attractive alternative for use in landscaping. While elimination of oaks from a woodlot may not be desirable, it is important to maintain species diversity.

Mechanical techniques (year-round)

The following techniques can be used by the homeowner to protect some foliage. They are generally impractical for woodlots.

Scraping

Remove egg masses from tree trunks, wood piles, and outdoor furniture and destroy them by immersing them in soapy water, burying, or flushing down the toilet. Remember, less than 25 percent of the egg masses in an area are within reach from the ground. Of these, only a fraction are likely to be located even after an intensive search. Thus, significant defoliation may still occur, particularly during periods of high gypsy moth populations.

Sticky bands and barrier bands

Place bands of sticky material, such as *Tanglefoot*, around tree trunks to trap larvae as they move across. Replace frequently, because these can become ineffective due to weathering and “loading up” of the bands with larvae. Barrier bands can be made using materials such as axle grease or vaseline applied to an impermeable band (for example, tin foil or tar paper). Wrap the tree trunk about 4 feet above the ground with a 3- to 6-inch band. Secure it with string or duct tape. Coat the band with a generous amount of grease. This helps to prevent larval migration from tree to tree, since larvae will rarely cross the barrier. Place bands in a shady location on the tree to minimize the risk of scorching thin-barked species when the band absorbs the sun’s heat (figure 7). Do not apply directly to the trunk, since it can damage the tree.

Hiding bands

Take advantage of the gypsy moths’ daily migration habits by providing them with homemade “hiding places”. Secure a double fold of heavy material, such as burlap, to the tree trunk to attract larvae looking for a place to rest dur-

ing the day (figure 8). The band should be at least 12 inches wide. Larvae beneath the bands must be removed and destroyed before dusk each day to prevent them from returning to the tree tops to feed.

Place both hiding bands and barrier bands on the same trees to increase the effectiveness of this technique. Place hiding bands a few inches above the barrier bands. Remember to check hiding bands daily for larvae and to replace barrier bands when effectiveness is noticeably reduced. Banding trees is not an efficient alternative for woodlot owners.

Useless methods

Swatting larvae may provide some personal satisfaction but will do little to reduce defoliation. Foliage loss is not reduced by removing pupae and trapping adult moths, since only the gypsy moth larvae feed.

Biological techniques (May)

Bacillus thuringiensis

Several commercial preparations of the bacterium *Bacillus thuringiensis*, or *Bt*, are available. They are the safest pesticides currently labelled for use against the gypsy moth. *Bt* kills only caterpillars, is safe for use near water, harmless to mammals (including humans) and birds **when used as directed**, and does not affect the natural enemy complex of the gypsy moth.

To be effective, *Bt* must be applied when the larvae are less than 1 inch long. For satisfactory results, watch populations carefully to determine when larvae are at this susceptible stage. More than one application may be needed. *Bt* can be applied from the ground, but it must reach the tops of trees to be effective. A certified commercial pesticide applicator may be needed to apply this insecticide to large trees.

Chemical techniques (May)



When making a decision to use an insecticide during a gypsy moth outbreak, it is important to remember that it will not shorten the infestation period. It may, if applied correctly and at the right time, help decrease defoliation during the outbreak.

The following chemicals are registered for use against the gypsy moth and will kill larvae when used according to label directions. Like *Bt*, they should be used only as a means of protecting foliage, and then preferably only when other methods are inadequate. Chemical pesticides are not a long-term solution, and may actually delay the collapse of gypsy moth populations, if used improperly. In most cases, it is best to wait at least one year following noticeable defoliation before applying a chemical spray. Often, populations will decline naturally during this period. Conifers growing in an area where defoliation is heavy may require treatment in the year that feeding is observed, since they can be killed by a single defoliation.

Follow the pesticide label directions. To obtain effective control, you may want to have a certified commercial applicator apply these insecticides.

Acephate (Orthene) —used as both a ground and an aerial spray; toxic to gypsy moth parasites and insect predators.

Carbaryl (Sevin) —used as both a ground and an aerial spray; toxic to gypsy moth parasites and insect predators; extremely toxic to honeybees.

Malathion —nonspecific insecticide which kills a wide variety of insects, including gypsy moth parasites and predators.

Methoxychlor —nonspecific insecticide which is toxic to several types of insects, including gypsy moth parasites and predators.

Phosmet (Imidan) —used primarily as a ground spray; not toxic to bees, but will kill gypsy moth parasites and predators.

Trichlorphon (Dylox)—used as an aerial spray against the gypsy moth; not toxic to bees, but will kill gypsy moth parasites and predators.

Chemical systemics

A number of chemicals are available (figure 9) in a form which can be taken up directly by the tree (e.g. *Acccaps*). These implants can be inserted directly into the tree trunk where they are absorbed and transported up to the foliage (figure 10). They are effective in reducing defoliation when used as directed on the label. Systemic implants are an alternative to the homeowner or commercial pesticide applicator interested in reducing defoliation but concerned about the effects of spraying. Because they are relatively expensive and time-consuming to use, they are not practical for large scale use.

The gypsy moth need not be a major concern to the Michigan homeowner or woodlot manager. Applying some of the techniques outlined here can decrease the effects of gypsy moth feeding. Preventive maintenance remains the most effective method available in dealing with the pest. Remember, healthy trees are well equipped to handle gypsy moth defoliation.

Pesticides must be registered with the U.S. Environmental Protection Agency and the Michigan Department of Agriculture before they can be used legally in Michigan. This bulletin suggests using pesticides in the management of gypsy moth. Purchase only those pesticide products that are labeled

for, 1.) the plant you wish to use it on, and 2.) the pest you wish to manage on that plant. Remember that the pesticide label is the legal document on pesticide use. The label must be read carefully and all instructions and limitations followed closely. The use of a pesticide in a manner not consistent with the label can lead to the injury of crops, humans, animals, and the environment, and also lead to civil fines. Pesticides are good management tools for the control of pests on plants but only when they are used in an effective, economical, and environmentally sound manner.

PESTICIDE EMERGENCY INFORMATION

Human Pesticide Poisoning

Eastern Michigan

(within Detroit City proper)

(313) 745-5711

(within the 313 area code)

(800) 462-6642

(statewide)

(800) 572-1655

Poison Control Center
Children's Hospital of Michigan
3901 Beaubien
Detroit, MI 48201

Western Michigan

(within Grand Rapids City proper)

(616) 774-7854

(within the 616 area code)

(800) 442-4571

(statewide)

(800) 632-2727

Blodgett Regional Poison Center
Blodgett Memorial Medical Center
1840 Wealthy, S.E.
Grand Rapids, MI 49506

Upper Peninsula

(within Marquette City proper)

(906) 225-3497

(Upper Peninsula only)

(800) 562-9781

U.P. Poison Control Center
Marquette General Hospital
420 West Magnetic Street
Marquette, MI 49855

Animal Pesticide Poisoning

Your Personal Veterinarian

() _____

and

Animal Health Diagnostic Laboratory
Michigan State University
East Lansing, MI 48824

(517) 353-1683

8:00 a.m.-5:00 p.m.

Pesticide Product Involved in a Fire

Local Fire Department

() _____

and

Fire Marshal Division, State Police

(517) 322-1924

Pesticide Product Involved in a Traffic Accident

Local Police Department, Sheriff's
Office, or State Police

() _____

and

Motor Carrier Division, State Police

(517) 373-3700

Pesticide Pollution Accident in the Environment

Pollution Emergency Alerting System
Michigan Department of Natural
Resources

3500 N. Logan

Lansing, MI 48909

(800) 292-4706

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