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Gypsy Moth, the most serious forest and urban landscape pest in the United States, is now in Indiana. In 1990 it defoliated over 8 million acres of U.S. forest, and, in 1992, defoliated over 650,000 acres in Michigan, alone. Oak leaves are their preferred food, but gypsy moth caterpillars can eat the foliage of 500 species of trees and plants. While most trees will produce new leaves after defoliation, repeated annual defoliation may kill trees in two to four years.

Gypsy moths are not native to the United States. Since their accidental introduction to Massachusetts in 1869, they have spread steadily westward. In 1998 gypsy moth became established in Steuben County, Indiana, and it is expected to spread to more counties each year in the near future.

Because adult female gypsy moths in North America cannot fly, natural spread of the gypsy moth occurs by other means. Young caterpillars crawl to treetops and are blown by the

wind. People can increase the rate of gypsy moth spread when they unknowingly carry them from infested areas. You can help reduce losses from gypsy moth as they move through Indiana in the following ways.

Slow the spread. Learn the gypsy moth's biology, how to recognize its life stages, and where it can be found so you do not transport it to uninfested parts of the state or country.

Maintain tree health. Keep trees watered, particularly during dry periods in the summer. Apply a 2-inch mulch of composted hardwood chips around the base of your trees to avoid wounding trunks with lawn mowers or weed trimmers.

Diversify your new plantings. When designing new plantings, be sure to include a few trees that are less preferred by gypsy moth. (See tree species preference list on page 2.)


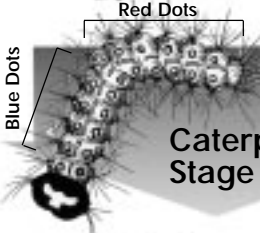



Gypsy Moth Management Approach

The battle to rid the Midwest of the gypsy moth was lost long ago. Treating isolated infestations with insecticides outside the generally infested area will slow the spread of gypsy moth. But spraying insecticides will only temporarily reduce the numbers of caterpillars. The wide range of insects, diseases, and animals that feed on gypsy moth provide more long-lasting control. These natural enemies are the reason that trees and forests still thrive in areas where this pest has been present for over 100 years.

Where gypsy moth has already been established in Indiana, environmentally safe tools that foster and conserve the natural enemies of gypsy moth will be used to maintain the appearance of urban forests and the health of woodland ecosystems. Where it's not yet established, the Indiana Department of Natural Resources will continue the trapping program it began in 1973 to detect man-made introductions.

Gypsy Moth Biology and Identification

The gypsy moth goes through four developmental stages during its life: egg, caterpillar, pupa, and adult.

 <p>August-April Egg Stage</p>	<p>Eggs—After mating, female moths lay eggs on any convenient surface. They will hide their eggs just about anywhere. This could be a branch, firewood, a picnic table, a tent, a recreational vehicle, or an automobile. Between 500 and 1000 eggs are laid in a mass that is covered with tan or buff-colored hairs. Eggs do not hatch until the following spring.</p>
 <p>April-June Caterpillar Stage</p>	<p>Caterpillars—In late April, small black-headed caterpillars hatch from eggs and climb to treetops, where they feed on foliage or dangle from silk strands until they are blown to other trees. After establishing themselves on a tree, caterpillars molt into a second instar that is nearly 1/2-inch long and largely black, with irregularly shaped yellow marks visible on the upper body surface. Older caterpillars (4th - 6th instars) have distinct color markings on their backs, with five pairs of blue dots followed by six pairs of red dots. Each caterpillar consumes 11 square feet of foliage over the course of its life. Most of the feeding occurs at night. Caterpillars move to the base of the tree during the day, protecting themselves from extreme heat and predation by birds.</p>
 <p>June-July Pupa Stage</p>	<p>Pupae—By early June, caterpillars stop feeding and change into pupae, their transition stage from caterpillars to adult moths. Pupae are dark brown shell-like cases that are about 2 inches long and sparsely covered with hairs. They do not spin webs or make a cocoon.</p>
 <p>July-August Adult Stage (female)</p>	<p>Adults—Adults emerge from pupal cases in July and August. Females have creamy white wings, a tan body, and cannot fly. Males are smaller, dark brown, and have feathery antennae. Both have a distinct inverted V-shape mark that points to a dot on their wings.</p>
 <p>Adult Stage (male)</p>	

Gypsy Moth Preference for Common Indiana Trees

Most Preferred	Somewhat Preferred	Least Preferred
Aspen (<i>Populus</i>)	Alder (<i>Alnus</i>)	Arborvitae (<i>Thuja</i>)
Apples and crabapples (<i>Malus</i>)	Balsam fir (<i>Abies</i>)	Ash (<i>Fraxinus</i>)
Birches (<i>Betula</i>)	Black walnut (<i>Juglans</i>)	Azalea (<i>Azalea</i>)
Blue spruce (<i>Picea</i>)	Butternut (<i>Juglans</i>)	Black locust (<i>Robinia</i>)
American beech (<i>Fagus</i>)	Cherry (<i>Prunus</i>)	Catalpa (<i>Catalpa</i>)
Basswood (<i>Tilia</i>)	Eastern hemlock (<i>Tsuga</i>)	Dogwood (<i>Cornus</i>)
Hawthorn (<i>Crataegus</i>)	Easter redbud (<i>Cercis</i>)	Eastern redcedar (<i>Juniperus</i>)
Hazelnut (<i>Corylus</i>)	Elm (<i>Ulmus</i>)	Horsechestnut (<i>Aesculus</i>)
Oaks (<i>Quercus</i>)	Hickory (<i>Carya</i>)	Lilac (<i>Syringa</i>)
Poplar (<i>Populus</i>)	Honey locust (<i>Gleditzia</i>)	Rhododendron (<i>Rhododendron</i>)
Sweetgum (<i>Liquidambar</i>)	Hophornbeam (<i>Ostrya</i>)	Tuliptree poplar (<i>Liriodendron</i>)
Serviceberry (<i>Amelanchier</i>)	Hornbeam (<i>Carpinus</i>)	Viburnum (<i>Viburnum</i>)
Mountain ash (<i>Sorbus</i>)	Maples (<i>Acer</i>)	
Witch hazel (<i>Hamamelis</i>)	Paw Paw (<i>Asimina</i>)	
White pine (<i>Pinus</i>)	Plum (<i>Prunus</i>)	
	Sassafras (<i>Sassafras</i>)	
	White and Norway spruce (<i>Picea</i>)	

Distinguishing Gypsy Moths from Other Fuzzy Caterpillars

Time of Year

Gypsy moths are only in the caterpillar stage from late April through early June. Other common caterpillars present at this time of year do not have the gypsy moth's distinctive pairs of blue and red dots.

Presence of Webs

Several web-producing caterpillars have been fairly abundant in recent years, so it is particularly important not to confuse them with the gypsy moth. Gypsy moths do not produce extensive webbing.

Eastern tent caterpillars are present in April and May, but, unlike the gypsy moth, they spend their days in masses of white webs in the centers of trees. Eastern tent caterpillars have a distinctive white stripe on their backs and lack the gypsy moth's paired blue and red dots.

The *fall webworm* is a white hairy caterpillar with black dots that will web branch ends and is commonly visible in late summer from roadsides.

Moving Out of Generally Infested Areas

People moving to uninfested parts of the country or state from generally infested areas are required to inspect their household items prior to moving. They can either do the inspection themselves or hire a Qualified Certified Approved Inspector (QCA). Guidelines for self-inspection are detailed in USDA APHIS Program Aid 1329, "Don't Move Gypsy Moth." This guide and a list of QCA Inspectors can be obtained from the Indiana Department of Natural Resources (317) 232-4120.

F A Q ' S

Frequently Asked Questions

Will gypsy moth kill my trees?

Not always. If an oak or other hardwood tree is completely defoliated during the summer, it may look like it's dead. If the trees are affected by other stress factors, such as drought, disease, or poor growing conditions, there is a good chance that they will die.

In contrast, healthy hardwood trees can have a greater chance of surviving complete defoliation. These trees will produce a second set of leaves, usually in late July or August, that will help the tree produce enough energy for it to survive the winter. Repeated complete defoliation can kill even healthy trees.

If coniferous trees, like pines and spruces, are completely defoliated, they will die. Partial defoliation may not always kill them.

Can the gypsy moth ever be eliminated from Indiana?

No. The gypsy moth is already established in parts of Indiana. Current efforts focus on slowing the spread to uninfested areas.

Can I get a trap for my lawn to control the gypsy moths in my yard?

No. The only traps available are sex pheromone traps. These attract males and do not kill enough moths to protect your trees.

How can I kill the gypsy moth to protect my trees?

You are the first line of defense for protecting your trees. Learn what the gypsy moth looks like, and inspect your yard for egg masses hidden on

trees, firewood, and outdoor structures. Destroy what you find. Use cloth or barrier bands to trap and kill gypsy moth caterpillars as they crawl up and down the trunks of your trees.

Timely application of biological insecticides like *Bacillus thuringiensis* when caterpillars are less than 1-inch long can protect the health of valued trees in your landscape without harming the natural enemies of gypsy moth and other landscape pests. Commonly available chemical insecticides, such as Orthene, Sevin, and Malathion, can kill caterpillars when applied in accordance with label directions, but may harm the natural enemies that keep other landscape pests from becoming problems.

How will the gypsy moth change the forest?

The first wave of defoliation will cause the most substantial changes to the forest. Changes include:

- Reduction in numbers of preferred trees, like oaks, in the forest,
- Increased surface water runoff in areas where large numbers of trees have been killed, and
- Forest regeneration in open areas.

Subsequent gypsy moth outbreaks will occur and continue to change the forest to a lesser extent. However, despite regular incidences of gypsy moth infestation, parts of the country that have had gypsy moth for over 100 years still have a thriving forest. Forests will continue to be prominent features of Indiana landscapes long after the gypsy moth has become established.

FAQ's

How will the gypsy moth change urban areas?

As with forests, the first wave of gypsy moths will cause the most shocking effects. Although much of the urban forest can be protected during an outbreak, gypsy moth will be a nuisance. Expect an abundance of caterpillars dropping fecal material from trees, allergic reactions to airborne caterpillar hairs, and pupae and egg masses plastered to homes and outdoor items.

When large numbers of gypsy moths are killed by diseases or pesticide applications, the abundance of unsightly decaying caterpillars and their associated odor will add to the nuisance. Fortunately, because gypsy moth populations cycle, these problems will not be a permanent feature of any one landscape.

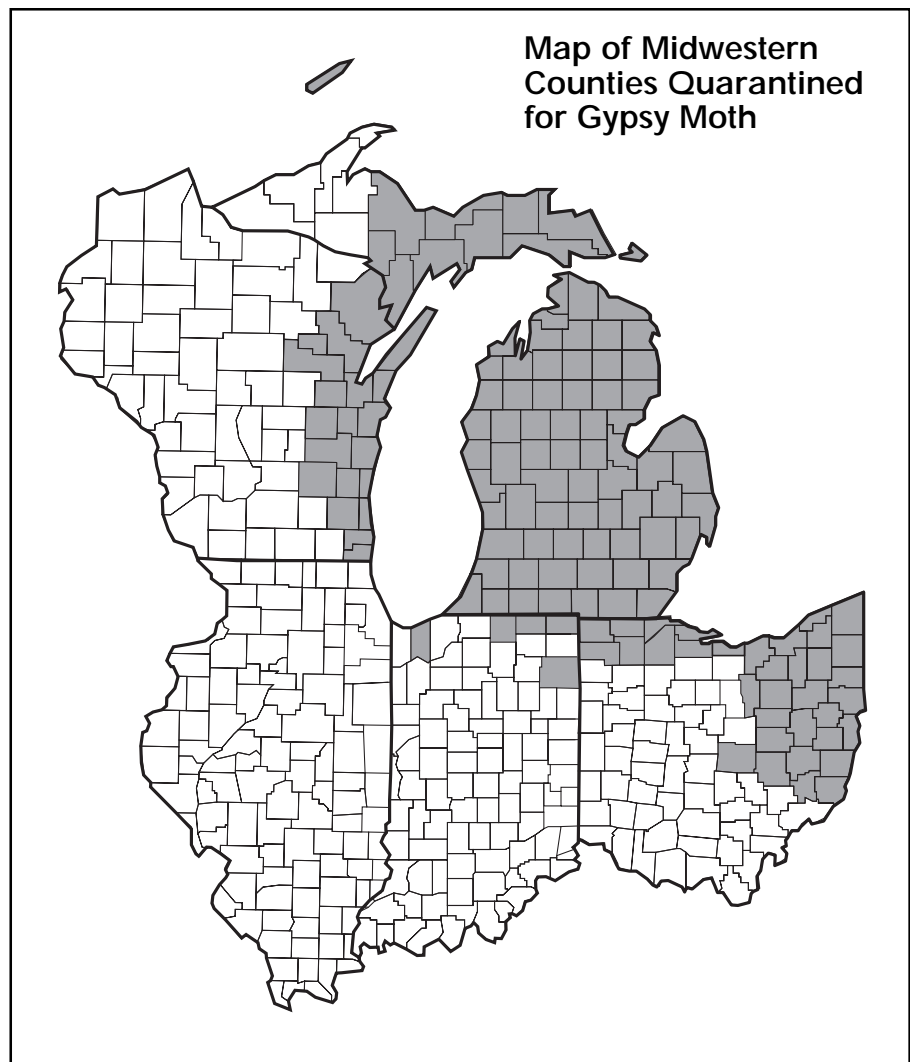
My county has been quarantined for gypsy moth. What does this mean?

Counties become quarantined after spot infestations of gypsy moth can no longer be eradicated. This action is designed to prevent accidental shipment of live gypsy moths to uninfested counties.

Outdoor items, including lumber, Christmas trees, and nursery stock, will need to be inspected and certified to be free of gypsy moth before they're shipped to uninfested counties. Shipment within the area regulated for gypsy moth (see map) is not restricted. (Also see the section above on "Moving Out of Generally Infested Areas.")

For More Gypsy Moth Information

- Order the GM series bulletins at your county office of Purdue Extension or by calling 1-888-EXT-INFO.
- Visit Purdue Extension Entomology's Gypsy Moth Information Web site <<http://www.entm.purdue.edu/Entomology/ext/Moth/index.htm>> to download free GM series bulletins and get the latest information.
- Contact the Department of Entomology, Purdue University, W. Lafayette, IN, 47907-1158 (765) 494-5983, or Indiana Department of Natural Resources at (317) 232-4120.



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