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Gypsy Moth - About

The introduction of the gypsy moth into the United States is a great example of an experiment gone extremely wrong. Native to Europe and Asia, the gypsy moth was brought into Medford, Massachusetts in 1869 by E. Leopold Trouvelot, a French artist and amateur entomologist, looking to develop a new strain of silkworm for silk production. He was culturing egg masses on trees in his back yard when some larvae (caterpillars) escaped into the surrounding community. Local entomologists were notified, but no action was taken to eradicate the pest. The first outbreak of the gypsy moth occurred on Myrtle Street, in Medford, Massachusetts in 1882. Since the first escape, the gypsy moth has advanced throughout the New England states, south to North Carolina, and west through portions of the Great Lake states and Canada despite control efforts and natural enemies.

In Ohio

The first male moths were trapped in Ashtabula County in 1971. Two years later, 1973, the first chemical treatments were implemented to eradicate a localized populations. Between 1973 and 1987, eradication efforts continued, but populations still grew. In 1987, Ashtabula County became the first county to have gypsy moth quarantine regulations imposed on it. Today, 49 counties in Ohio are under the quarantine regulations.

In 1989, the Ohio department of Agriculture in conjunction with the USDA-Forest Service initiated the Gypsy Moth Suppression Program. This program continues today as a way for landowners in areas considered generally infested to voluntarily receive assistance in suppressing this exotic pest.

In 1998, pheromone traps were placed over the entire state of Ohio in an 8 kilometer grid system to estimate the infestation densities across the state. With this information an infestation line (10 moth line) was drawn, with the area to the east of this line being considered generally infested.

In 1999, the Slow the Spread Program was added by the USDA (Forest Service and APHIS) in Ohio as a means of monitoring the advancement and to eradicate isolated populations ahead of the infestation line. A 100 kilometer swath, paralleling the infestation line to the west was established and is referred to as the STS Action Zone. Monitoring and treatment projects continue today.

Life Cycle

The gypsy moth completes one life cycle (4 stages) per year.

- **1. Egg:** Eggs are laid in a hairy like, brownish tan mass in late July thru early September. The size of each egg mass ranges from 1 to 1 1/2 inches in length. The number of eggs in each mass can range from 500 to 1000. They remain in this stage until April to early May. The eggs can tolerate temperatures as low as -22° F as long as they do not persist for any length of time. Egg masses are placed in sheltered areas of trees, buildings, fire wood, outdoor furniture, lawn equipment, and even rocks.
- **2. Larvae:** In mid April, tiny larvae (1/8 inch) will begin emerging from the egg masses. Hatching depends on warming weather. After a few days of hanging around the egg mass they begin to move up into the tree canopy and start feeding on the leaves. Some will hang from silken threads they produce to be blown by the wind to new locations. Gypsy moth larvae do not build nest like the tent caterpillar. The larvae grow by molting. Male larvae will molt 5 times and female larvae will molt 6 times before they reach adult size (2 to 2 1/2 inches). Feeding occurs during the periods between moltings (instar) and are mainly at night. During the daylight hours they usually seek shelter from the sun. But under heavy infestations feeding can go on around the clock. The larvae stage is the only period in which damage is caused to the trees (leaf feeding) during the pest's life cycle. This stage lasts approximately 6 weeks.
- **3. Pupa:** In early June the larvae will stop feeding, shed their skins for the last time and pupate. While in the pupa cases they transform into moths. This process usually takes about 2 weeks.
- **4. Moth:** In late June, early July the moths emerge from the pupa cases. Usually the males will emerge first followed by the females. Their only mission is to mate and lay eggs. They do not feed during this stage. Since the female does not fly, she has to put out a pheromone scent to attract the males to her. Once they mate and lay their egg, the moths die. This stage lasts approximately 2 weeks.

How They Spread

The European gypsy moth spreads in two ways, either by natural or by artificial dispersal.

Natural dispersal occurs when newly hatched caterpillars hang from tree branches on silken threads, allowing themselves to be picked up in the wind. The wind can carry them for several hundred yards to a mile, to reach another food source. This is called ballooning. As the caterpillar grows larger, their mode of transportation changes to crawling from one food source to another.

Artificial dispersal occurs when people inadvertently transport one of the life stages from an infested area on a car or recreational vehicle, lawn furniture, firewood, logs, nursery stock and other outdoor items. Before leaving an infested area, check your outdoor items to be sure you are not taking any hitch-hikers with you.

Damage

The impact gypsy moth will have on a particular forest stand depends on how much defoliation occurs in the stand and how well the trees in the stand can tolerate that level of defoliation. How much defoliation a stand experiences depends on the gypsy moth population level, tree species composition, and the quality of larval hiding places. Egg mass counts in excess of 250 per acre generally indicate that a noticeable defoliation is imminent. Stands that contain a high proportion of preferred species are more likely to be defoliated than those with more species variability. Stands that contain numerous larval hiding places should support higher population levels, and thus experience more defoliation.

Individual tree responses to defoliation will be affected by the amount of defoliation and the tree's overall health. With broadleaf deciduous trees, light defoliation will weaken but usually not kill a tree. Heavy defoliation (> 50%) will often cause them to lose their remaining leaves and develop a second set of smaller, less efficient leaves. Weakened, less vigorous trees are more susceptible to secondary pests (insects and disease). Repeated annual defoliation will result in the death of the tree. In contrast, conifers (pines, spruce, fir, etc.) often die as a result of the initial heavy defoliation because they are unable to produce a second set of leaves.

To put things into perspective, one 2 inch larvae will consume 1 square foot of foliage every 24 hours. When you have 500 to 1000 larvae emerging from a single egg mass and have 250 or more egg masses per acre, this pest becomes one big eating machine.

Preferred Tree Species (Native to Ohio)

High preference: American crab apple, American hophornbeam, Bigtooth aspen, Black oak, Bur oak, Chinkapin oak, Red oak, Scarlet oak, Shumard oak, White oak, Cockspur hawthorn, Common witch-hazel, Eastern larch, Pussy willow, River burch, Smooth sumac, Staghorn sumac, Sweetgum.

Moderate preference: Allegheny service berry, Downy service berry, American beech, American hornbeam, Bitternut hickory, Mockernut hickory, Black maple, Red maple, Sugar maple, Black walnut, Blackhaw, Butternut, Canadian hemlock, Common chokeberry, Common pawpaw, Eastern cottonwood, Eastern wahoo, Flowering dogwood, Fringetree, Hoptree, Shining sumac, Sorrel-tree, White pine, Wild black cherry.

Adverse Effects of Defoliation and Mortality

On People:

- Loss of shade, causing increased heating and cooling cost.
- Decrease property value due to loss of aesthetics.
- Safety hazard due to dead trees and the expense of tree removal.
- Skin rashes or irritations, development of allergies in sensitive individuals because of contact with the pest.
- Caterpillars and their frass (droppings) staining homes and sidewalks.

On Environment:

- Decline in tree health.
- Increase tree mortality.
- Increase in fire danger.
- Increase in stream temperatures.
- Decrease in aquatic life.
- Reduction in food supply for small animals (nuts).
- Decrease in population of small animals (squirrels).
- Reduction in food supply for some song birds.
- Increase in nest predation of song birds due to lack of cover.
- Increase in nesting failures of grouse and turkeys.
- Migration of turkey and deer to non defoliated areas.

Managing Gypsy Moth at Home

Cultural Practices:

Keep your trees and shrubs healthy. Should defoliation occur, irrigate affected trees and shrubs. Adequate water will help in the recovery process. Avoid nitrogen fertilizer as they will encourage leaf growth at the expense of building food reserves in the roots.

Do not move outdoor lawn furniture, garden equipment, or fire wood without first inspecting the items for gypsy moth life stages. If moving to a new area, check to see if you are required to follow quarantine regulations of this state or any other state.

Physical Practices:

Scrap egg masses and pupa cases off buildings, trees, shrubs, or any outdoor items and destroy them by submerging them in soapy water for at least two days or by burning them. Egg masses can also be killed by spraying them with a spray oil labeled for gypsy moth.

Barrier bands can be placed around tree trunks to prevent larvae from climbing back into the trees. Place a non-porous material around the tree trunk and coat it with a commercially available sticky material. Never apply the sticky material directly to the tree trunk. The larvae will become entangled in the sticky material and die. The sticky material will need to be re-applied periodically.

Collection bands, 12 to 18 inches wide, made of burlap, rapped around a tree, and folded over to make a skirt attract larvae looking for shade during the day. Each day you will need to remove and destroy the

larvae. Recently, collection band products have come onto the market that contain an insecticide in the band that kills the larvae.

Chemical Treatments:

Pheromone traps can be placed to attract the male moths and prevent them from mating with the females. Some traps contain soapy water in the bottom to kill the moths and some contain an insecticide strip.

Chemical treatments are most successful when applied to the foliage during the larvae's early instar stages. Trees and shrubs can be treated with a biological pesticide like *Bacillus thuringiensis (Bt)* or with chemical pesticides labeled for gypsy moth. These products are available at your local garden center or nursery. Please read and follow all label directions.

If you live in the quarantine area of the state and the area needing to be treated is 50 acres or more, then you and/or your neighbors can apply for an aerial treatment through the Suppression Program.

For help in your area, contact your local certified arborist, OSU Extension Office, or ODNR Urban Forester.

U.S. Forest Service Pest Alert

http://www.na.fs.fed.us/spfo/pubs/pest_al/gm/gm.htm

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