



Gypsy Moths

Quick Facts about Gypsy Moths

- ♦ First introduced into the United States in 1869 in a failed attempt to start a silk industry.
- ♦ In Canada, gypsy moths were first found in Québec in 1924, then in New Brunswick around 1936.
- ♦ Has become established in Ontario, Québec, New Brunswick and Nova Scotia, and has been reported in some areas along the west coast.
- ♦ Caterpillars are able to feed on more than 500 different tree species—deciduous and coniferous—and can be transported by wind.
- ♦ Defoliation from gypsy moth results in added stress to a tree, and can eventually result in death after several consecutive years of this stress.
- ♦ A single gypsy moth caterpillar can eat an average of one square metre of foliage before it enters the cocoon stage.

All About the Gypsy Moth in Hamilton

The European Gypsy Moth (*Lymantria dispar* L.) has been a forest pest in Canada for nearly a century. This species is able to travel by attaching itself to various objects, and is considered the most significant tree defoliator in North America. The last severe gypsy moth infestation in the Hamilton area occurred in 1991. Of the Hamilton Conservation Authority properties, the most affected area was the Dundas Valley Conservation Area. This outbreak also affected many of the surrounding municipalities, and most of southwestern Ontario. In 1992, HCA sprayed a biological pesticide called "Btk" in areas of the Dundas Valley to help bring the infestation under control. It was in that year that the gypsy moth population crashed in southwestern Ontario and did not become a substantial problem again until 2005.

In 2006, gypsy moths were found in Ancaster and in a few areas on the Hamilton Mountain. Gypsy moth hot spots were reported around Caistorville and Caistor Centre in the Niagara Peninsula, the town of Simcoe and the north shore of Lake Erie in Norfolk, Brantford and all around Six Nations near Caledonia, and around the Milton area. In anticipation of a potentially bad year of gypsy moths, HCA has taken a proactive approach to help educate the public about this pest and how they can help control the problem on their own properties.



Why should I worry about Gypsy Moths on my property?

- **Loss of tree foliage**—Foliage loss robs your property of shade, affecting the temperature of your house and yard, as well as the well being of your lawn and any shade-tolerant plants. This also weakens a tree, as it no longer has a means to produce its own energy.
- **Death of trees**— After repeated infestations, trees can become significantly weakened and eventually die. Mature trees are difficult to replace because of their age and size, and buying large trees can be expensive. Loss of mature trees on a property can also decrease its value.
- **Spread of infestation**—If a local infestation is not treated or controlled, it can easily spread to other unaffected areas, broadening the problem in future years. This can not only create problems in your neighbour's yard, but also in large parks and forests where problems can go unnoticed for many years.
- **Caterpillar frass**—With their ability to consume so much leaf matter in such a short period of time, the amount of fecal matter, or "frass", produced by caterpillars can become very overwhelming to the private landowner. Frass can quickly cover driveways, patios, picnic tables, and other areas frequently used in your yard, and can become a nuisance to clean up and to endure during outdoor activities.



Identifying Egg Masses

- ♦ Adult females lay egg masses in late June through August (see above)
- ♦ Eggs are laid in buff-coloured masses about 3-4 cm long and 1-2 cm wide.
- ♦ Egg masses appear like the texture and colour of a car chamois.
- ♦ A live egg mass has hundreds of tiny, hard and round eggs that can be felt within them.
- ♦ Hatched egg masses are lighter in colour, have tiny exit holes on their surface, and will not feel hard inside.

What do Gypsy Moths Look Like?

There are 4 stages in the gypsy moth's life cycle, all which appear very different. In order to control these pests, it is important to be able to recognize each life stage.

- ♦ **Egg Mass**—The gypsy moth egg mass, shown on the left, contains thousands of tiny eggs which are easily carried by wind currents for distances up to one kilometre. Egg masses are usually the size of an oblong one-dollar coin, and appear to be the colour and texture of a car chamois.
- ♦ **Larvae**—When eggs hatch in the spring, very tiny (and very hungry) larvae, or caterpillars, exit the egg mass and begin to travel to their food source—the leaves of trees. The gypsy moth caterpillar (cover page) grows to be about 6cm long, consists of 11 segments, and is partly covered with coarse black hairs. Each segment has a pair of coloured dots: the first five segments have blue dots, and the last six have red spots.
- ♦ **Pupae**—Once the invasive feeding stage is over, the mature caterpillar will commonly seek a protected area on a tree or other structure, such as a crevice in tree bark or a crack in a rock, to enter their "cocoon" stage and become a fully fledged moth. The cocoon, or pupae, is about 3cm long and dark brown in colour. It has a hard and somewhat shiny appearance. This stage lasts about 10 days in female and 13 days in male gypsy moths.
- ♦ **Adult**—The adult, or moth stage of the life cycle, produces very different looking males and females. The adult female is white with a few dark-coloured stripes across its wings, and has prominent white fuzzy head. Despite having fully-functional wings, the female does not fly, but relies on the release of pheromones (chemical attractants) to lure males to the site where she will lay her eggs. The adult male is a mottled dark beige to brown colour with feathery brown antennae. During this week-long stage, the adult moths do not feed and focus all of their energy on reproducing.



Gypsy Moth Diseases

A fungus native to Japan called *Entomophaga maimaiga* was deliberately released in the United States around 1910-1911 to help control gypsy moths. Although the exact means by which this fungus made it to Canada are not known, its presence in our forests has become quite evident as it has been responsible for bringing past gypsy moth infestations under control. The amount of wet weather experienced in the spring months is directly related to the success of this fungus, with wetter springs showing greater declines in gypsy moth caterpillars than in drier springs. Caterpillars killed by this fungus appear shrivelled and elongated, hanging in a vertical position (top right).



A virus known as the "nuclear polyhedrosis virus", or NPV, was also released in the United States in the 1960's as an alternative to DDT and other chemical pesticides. While most caterpillar mortality can be attributed to the fungus, it has been shown that NPV controls caterpillars effectively, and has been responsible for mass die-offs. The advantage of this disease is that it is directly specific to gypsy moth caterpillars, and does not affect any other species. Caterpillars killed by this fungus hang downwards in a "V" shape and ooze a dark fluid (bottom right).



What can I do to control Gypsy Moth on my property?

Private landowners can do a number of things to keep gypsy moths under control on their property:

- ♦ **Egg mass scraping**— the removal of egg masses in the fall or winter is the most effective way to keep gypsy moths under control on your property. Scrape egg masses off into a container where the eggs can be burned, scalded with boiling water, or crushed.
- ♦ **Caterpillar removal**—if caterpillars appear on your trees in the spring, several methods can be used. They can be sprayed off the tree with a high pressure hose that can apply an insecticidal soap. Adhesive tree bands (Bug Barrier Tree Band®) can be purchased and applied tree trunks to prevent caterpillars from reaching the leaves. Hiding bands (right), which are simply cloth bands tied around the tree trunk allowing a hiding space under the fabric for caterpillars to seek refuge in the heat of the day, can be used to collect caterpillars that can then be killed.



- ♦ **Pheromone traps**—these traps come in a variety of shapes and sizes (left) and can be baited with a powerful chemical attractant called a “pheromone”. Traps can be deployed in mid to late summer in infested areas when male moths are seeking their pheromone-releasing mates. These traps attract male moths and prevent them from reproducing with the females.
- ♦ **Biological pesticides**—commercial products like Foray® or Javelin® are common forms of Btk (see below) available at nurseries and garden centres. Liquid suspensions of Btk can be sprayed to treat trees heavily infested with gypsy moth caterpillars. This method should be used as a last measure when infestations cannot be managed through manual controls.



Bacillus thuringiensis kurstaki (Btk) - A Biological Pesticide

This biological pesticide consists of dormant bacteria that contains a potent toxin lethal to gypsy moth caterpillars. When applied to infested areas, this toxin becomes activated in the gut of a caterpillar, disrupting its ability eat, and weakening the individual to its death.

This pesticide is very specific to gypsy moth caterpillars when applied to infested areas as the pH of their guts is ideal for the release of the toxin. Under normal conditions, this pesticide cannot be broken down to release the toxin, therefore it is safe to humans, fish and wildlife, and other insect forms.

Although the application of this pesticide on individual properties can be relatively cost-efficient, widespread spraying initiatives, such as the aerial sprayings performed in the City of Mississauga in 2006, are often cost-prohibitive and are used as a last resort when infestations reach severe levels and manual removal methods are no longer effective to keep populations under control.

Integrated Pest Management (IPM) is the preferred method to keep gypsy moth populations under control and minimize the use of pesticides in our environment. IPM is a sustainable approach to managing pests by combining biological, chemical, physical and cultural tools to minimize both costs and environmental risks. The Hamilton Conservation Authority has used this approach for over a decade to manage problem species, and combines annual monitoring of affected areas, manual egg mass removal, site-specific pesticide applications (when necessary), and public education and awareness to deal with gypsy moth problems in a given area.

Hamilton Conservation Authority – Current Initiatives

HCA has used Integrated Pest Management for many years to keep gypsy moth populations under control on their properties like the Dundas Valley Conservation Area.

HCA ecology staff perform annual gypsy moth **egg mass monitoring** to count the number of egg masses in affected areas and watch for possible infestations. Counts of egg masses in 10m x 10m plots can be used to predict whether unhealthy levels of defoliation can be expected in the spring, once caterpillars emerge.

To keep gypsy moth populations under control, **egg mass removals** are done at each plot in an attempt to keep predicted defoliation levels at a healthy level. Throughout the spring and summer months, staff also monitor affected areas and destroy caterpillars and adult moths when possible.

HCA ecology staff have recently become a part of a multi-stakeholder group comprised of local municipalities, the Canadian Food Inspection Agency, and other local conservation authorities and non-governmental organizations which will meet throughout the year to discuss several tree pests, including gypsy moths, and to coordinate efforts to keep staff and the public informed about infestations and initiatives to control them.



Great Resources on the Web

There are a number of excellent websites that can help you learn more about gypsy moths and controlling them on your property.

Canadian Forest Service

http://www.glfsc.cfs.nrcan.gc.ca/frontline/PDFFiles/bulletin_no.20_eng.pdf

<http://www.atl.cfs.nrcan.gc.ca/index-e/what-e/science-e/entomology-e/gypsy-moth-e/gypsy-moth-e.html>

City of Mississauga

<http://www.mississauga.ca/portal/residents/pestmanagement>

Health Canada

<http://www.pmr-arla.gc.ca/english/consum/gypsymothes-e.html>

Hamilton Conservation Authority

<http://www.conservationhamilton.ca/environment/watersheds/Invasive.asp>

For more information on gypsy moths and other invasive pests in Hamilton, please contact:

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