

2019 Gypsy Moth Aerial Spray

Frequently Asked Questions

About Gypsy Moth

What is European gypsy moth?

Gypsy Moth (Lymantria dispar)

European Gypsy moth (EGM) is an invasive insect from Europe and Asia that established in North America in the late 1860's near Boston. Gypsy Moth caterpillars are 5 to 60 millimetres in length, dark and hairy, with five pairs of blue dots and six pairs of red dots on the back. They feed on a wide range of coniferous as well as deciduous trees, but show a preference to oak trees.

Where does European gypsy moths come from?

Gypsy moths are an invasive pest originally from Europe and Asia. They were brought to North America in the late 1800's to conduct experiments for silk production, but escaped captivity and have since established themselves across much of the northeastern portion of North America

How does European gypsy moth cause damage to trees?

Caterpillars begin by chewing small holes, but as they mature can completely strip a tree of its leaves depending on their age and population.

How much damage can they cause?

High levels of gypsy moth caterpillars can cause trees to experience severe loss of leaves, which could cause them to enter a state of decline and make them more susceptible to further harm from other insects, diseases, and weather fluctuations.

What does the damage look like?

Gypsy moth caterpillars chew small holes in the new leaves. As the caterpillars begin to grow, they eat more and the holes become larger until only the leaf veins remain. When population levels are high, gypsy moth caterpillars have the ability to strip trees of all of their leaves.

What types of trees do these caterpillars affect?

Gypsy moth are known to feed on hardwood trees such as apple, birch, cherry, elm, hickory, oak, willow, and maple species. Other deciduous trees, and even conifers such as pine or spruce, could be susceptible when populations are high.

What is defoliation?

Defoliation is the widespread loss of leaves on a tree and other plants.

Why does it matter if trees lose a few leaves from hungry caterpillars?

Tree damage can range from light to severe defoliation. As the caterpillars grow, they consume more and more leaves. As the growth cycle winds down, usually in late June, trees can look as if they have lost their leaves overnight. Under normal circumstances, defoliation caused by gypsy moth caterpillars won't kill a tree. Healthy trees should regrow their leaves two to three weeks after defoliation, or by early July depending on the year. However, when a tree uses energy to replace damaged leaves, it reduces the energy available for annual tree growth and to fight potential new diseases and other insect attacks.

The urban tree canopy provides health, social, environmental, and ecological benefits to communities. Trees help to:

- Improve air quality and reduce smog and pollution
- Provide shade
- Reduce energy demand for cooling in summer (shades buildings) and heat in winter (windbreak)

- Reduce the negative effects from urban heat (reducing the 'heat island' effect by shading paved surfaces and provides water vapor that cools the air)
- Prevent flooding and reduce peak storm water run-off volumes
- Increase property values and aesthetics
- Strengthens communities
- Improve emotional well-being and mental health (stress reduction)
- Increase outdoor activity and walkability, leading to improved health (e.g., cardiovascular health)

Why are there so many gypsy moths in Toronto?

Gypsy moth has been present in Toronto for at least 20 years. Their populations rise and fall in a cyclical manner. In 2007, the first aerial spray was done to mitigate high gypsy moth populations. Since then, the City has continued to monitor and managed these pests for City-owned trees using a variety of treatment methods.

Why are they such a nuisance?

Besides defoliating trees, caterpillars can become quite a nuisance to homeowners. They can be heard munching on leaves and their droppings can create a mess on the surfaces below. As the caterpillars complete their feeding, they tend to crawl everywhere including up the sides of homes, on outdoor toys, decks and patio furniture in search of suitable hidden spots to pupate. Exposure to gypsy moth hairs, silken threads, and shed skins can cause skin rashes and upper respiratory tract irritation in some people.

Do they have any natural predators?

Gypsy moths do have natural predators: a fungus (*Entomophaga maimaiga*), a virus (*Nucleopolyhedrosis*) and a small wasp (*Encyrtidae* family). The fungus and virus can be very effective at naturally controlling populations however they require a cool wet spring to be effective. The wasp only kills eggs that are near the surface of an egg mass, but can't parasitize any of the eggs that are hidden beneath the eggs on the outer surface of the mass.

What is Integrated Pest Management (IPM)?

IPM focuses on the long-term prevention and mitigation of pests or their damage through techniques such as monitoring, biological control, habitat manipulation, and modification of cultural practices, such as the use of gypsy moth resistant tree varieties.

The City's Urban Forestry branch has had a full IPM program for gypsy moths since 2006. A major component of this program consists of egg mass surveys in the fall and winter to predict defoliation levels for the following year. Following that, prescription and implementation of various control strategies can be undertaken.

What has the City been doing to manage gypsy moths?

The City has been implementing a number of control measures to manage gypsy moth populations. As part of these measures, egg masses are monitored every fall and winter season wherever staff receive reports of gypsy moth sightings throughout the growing season. Control measures include:

- Egg mass removal
- Ground-based spraying using *Bacillus thuringiensis* subspecies *kurstaki* (Btk)
- Stem injections using TreeAzin

While these methods can be effective to reduce the damage to an individually treated tree, these controls have not been effective in managing widespread gypsy moth populations at a level where there would be minimal impacts to the tree canopy.

What can residents do to help?

Residents can help by:

- Remove egg masses off of trees and other hard surfaces. Soak them in soapy water for a minimum of 48 hours.
- Install burlap skirts around tree trunks at beginning of June. Caterpillars will find shelter under the burlap, making it easy for residents to collect and dispose of them.
- Destroying pupae/cocoons.
- Consult with private arborist companies when larger trees require attention for control for gypsy moth.

Though effective, these control options are time sensitive. They must be implemented at the appropriate time to be effective. The City recommends these IPM techniques as well as their associated appropriate timing:

- **September to beginning of May:** Scrape gypsy moth egg masses off of trees and other hard surfaces leaves, tree trunks and branches. Soak them in soapy water for a minimum of 48 hours to destroy them.
- **May to Mid-August: Burlapping:** Install burlap wraps around tree trunks and then collect and destroy the caterpillars, pupae, adults, and egg masses.
- **End of June-Mid-August:** Collect, crush or otherwise destroy pupae/cocoons when you see them.
- **Beginning of May- Mid June:** Consider chemical treatments such as Btk-based products or TreeAzin; however, they are extremely time sensitive for them to be effective at controlling gypsy moth. It is highly recommended that you consult with a private arborist no later than the end of April if you are looking at having your trees treated/sprayed to allow the private arborist time to properly schedule your work. Once the caterpillars get too large (approximately mid-June is the cut off point for treatment), pesticide treatments are no longer effective at controlling gypsy moth and can be a costly mistake on the homeowner's part. Some private companies will conduct egg mass removal for your trees during the winter months. The earlier you can consult with an arborist, the better

Does the City inspect trees on private property?

The City does not inspect trees on private property.

AERIAL SPRAY

Why is the City planning an aerial spray?

The City is facing a gypsy moth population rise that is affecting Toronto's tree canopy. Elevated levels of gypsy moth have caused severe defoliation of trees in certain areas of the city in 2018. This has led to potential negative impacts on the overall health of many trees on both City and privately-owned property.

While the City will continue to implement ongoing IPM measures, it will also conduct an aerial spray in areas predicted for severe defoliation. Aerial spraying has proven in the past to be very effective in lowering gypsy moth populations. Although the aerial spray won't eradicate all traces of the insect, it will naturally lower populations to a more manageable level.

Which areas are being sprayed?

The spray will treat roughly 1,350 hectares (3,336 acres) of private and public land in Wards 1, 2, 3, 4, 11, 12 and 15. The aerial spray blocks, along with the other control measures Urban Forestry will be implementing can be seen on this [interactive map](#).

What type of pesticide is being used?

The City of Toronto will be using a product that contains *Bacillus thuringiensis* subspecies *kurstaki* (Btk). The product is registered under the trade name Foray® 48B. Btk is a naturally occurring bacteria found in soil. Btk is not a chemical. Btk was successfully used by the City of Toronto in 2007, 2008, 2013 and 2017 to control gypsy moth populations. The Cities of Mississauga and Oakville have completed similar spray programs in the past. The City of Hamilton will be conducting an aerial spray program with this same product this spring as well.

What organisms does Btk pesticide affect?

Btk only works against organisms that go from egg to larvae to pupae to moth (lepidopterans). Btk does not affect adult moths and butterflies, including the monarch butterfly, as it is not in the caterpillar stage and feeding on plant material at this time of the year. Btk does not affect other insects, honeybees, fish, birds, or mammals.

How does Btk work?

Btk produces a protein that is toxic only to the larvae (caterpillars) of specific insect species. When ingested by susceptible insects, the toxic protein molecules break down the walls of the insect's stomach causing the insect to stop feeding. The insect usually dies within two to five days.

For Btk toxins to be activated, the alkaline conditions that exist only in certain insects' digestive systems must be present. The acidic conditions in the stomachs of humans and animals are not present and do not activate Btk toxins, which is why the pesticide is not toxic to humans and animals. Btk has been used in many countries without health impacts to individuals on medications or vulnerable populations.

What is the formulation of the Btk product?

The registered name of the pesticide that will be used by the City is Foray® 48B Biological Insecticide Aqueous Suspension. It is registered under the Pest Control Products Act (PCP # 24977). It is comprised of 3% Btk bacteria, 75% water and 22% food grade inerts. The term 'food grade inerts' refers to a special blend of additives that give the formulation protection against ultraviolet light and help make it stick to foliage. They do not pose any health risks. Btk remains effective for approximately one to four days before it breaks down in the presence of sunlight.

What is the concentration of Btk?

A small amount of liquid covers a large area: 4 litres will cover 1 hectare (2.5 acres). Comprehensive spray drift modelling has been done to ensure accurate and effective application.

Who regulates Btk use in Canada?

Btk has been approved by the Pest Management Regulatory Agency, an agency of Health Canada, for aerial use over urban areas.

Is Btk safe?

Btk is an effective pesticide that has been shown to successfully manage many lepidopteran species such as gypsy moth. It has been extensively studied by Health Canada and the US Environmental Protection Agency (EPA). Research shows that Btk poses minimal risk to human health when used as directed.

Btk is approved by Health Canada for aerial use over urban areas. It has been used by many countries over the last 30 years, including Canada and the United States. The City of Toronto has used Btk in multiple aerial spray programs in the past. Its use did not result in any reported health impacts to the general population.

The public is unlikely to experience any symptoms and no special precautions are necessary. Btk aerial spraying is also not expected to have adverse effects on vulnerable populations including children with asthma, people with weakened immune systems, pregnant women or the elderly. However, infrequently there may be some residents who are more sensitive and may experience skin, eye or respiratory irritation.

In addition to the Btk active ingredient, other ingredients called formulants have also been studied broadly and do not have any significant health risks. Formulants normally include water and other ingredients to make the product stick to leaves and needles of trees.

While the aerial spray will not eradicate the gypsy moth populations currently present, it will reduce populations to more manageable levels to protect tree canopies.

Another subspecies of *Bacillus thuringiensis* bacterium, called Bti, has been used to control mosquitos in surface water in the GTA for over a decade as part of the efforts to protect against West Nile Virus. Btk has been used successfully in aerial sprays as well as ground-based spraying for the past 10 years by the City of Toronto to control gypsy moth populations.

Research shows that Btk (used in aerial spray programs) has not shown to have any negative environmental effects. Once applied, Btk biodegrades quickly, (approximately 1 to 4 days), through exposure to sunlight and other micro-organisms.

The urban tree canopy provides social, environmental, and ecological benefits to communities. Trees improve air quality and reduce smog and pollution, provide shade, reduce energy demand for cooling in summer and heat in winter, prevent flooding, and promote physical health (improves walkability, improves cardiovascular).

Does Toronto Public Health have any concerns about Btk use?

Toronto Public Health is not anticipating human health impacts associated with Btk from the aerial spray. We understand that the City of Toronto is committed to administering the program in a manner consistent with provincial and federal regulations, guidelines, and best practices.

What personal precautions can be taken in preparation for aerial spraying?

Members of the public are unlikely to experience any health effects, and no special precautions are necessary or required. Individuals who have concerns should take reasonable precautions to avoid exposure during an application period of the program.

While no special precautions need to be taken, the following measures may be considered by residents living in treatment areas:

- o Whenever possible, remain indoors for 30 minutes after spraying to allow for the droplets to deposit onto the tree leaves.
- o Bringing laundry, toys and pets indoors before spraying begins.
- o Practice good personal and food hygiene (e.g., hand washing after outdoor activities, especially after gardening; leaving outdoor shoes at the door; washing all fruits and vegetables before eating or cooking).
- o Covering lawn furniture, outdoor tables, pools, BBQs, play equipment and sandboxes and/or rinsing them off with water after spraying is finished.
- o Minimize opening and closing windows and doors during the spraying.
- o Shutting off the heating/cooling vents or selecting the recirculate setting.
- o Contacting your family physician if you are concerned that a personal medical condition may be aggravated by the spraying.

Does Btk spraying pose a risk to residents who might have sensitivities?

Members of the public are unlikely to experience any symptoms and no special precautions are necessary or required. However, infrequently there may be some residents who are more sensitive and may experience skin, eye or respiratory irritation. Btk aerial spraying is not expected to have adverse effects on vulnerable populations including children with asthma, people with weakened immune systems, pregnant women or the elderly.

What should I do if I experience an adverse reaction?

If you experience an adverse reaction or worsening medical condition, speak to your physician or, in an emergency, call 9-1-1.

Can gypsy moth affect my health directly?

Extreme gypsy moth outbreaks have been associated with skin rashes and upper respiratory tract irritation in some people exposed to airborne gypsy moth hairs, silken threads, or shed skins.

There is a potential for some people to develop minor skin irritations or rashes when they come in contact with these insects. If this is a concern, it is recommended that you try and avoid contact whenever possible.

Is Btk safe for animals?

According to Health Canada, Btk is only effective during the larval (caterpillar) stage of the gypsy moth life cycle. Btk does not affect adult moths and butterflies, including the Monarch Butterfly, as it is not in the caterpillar stage at the time of the spray. Btk does not affect other insects, honeybees, fish, birds or mammals. There is also no impact on animals or pets if they are exposed to or ingest Btk.

Where does Btk go in the environment?

Research shows that Btk used in aerial spray programs has not been shown to have any negative environmental effects. Once applied, Btk biodegrades quickly, approximately 1-4 days, through exposure to sunlight and micro-organisms. There are no groundwater contamination concerns, as Btk does not travel through the soil beyond 25 cm.

How long does Btk remain effective?

Btk is applied to leaves when caterpillars are feeding. It breaks down quickly (approximately 1 to 4 days) when exposed

to sunlight and micro-organisms.

Is this the first time the City is doing an aerial spray?

The City has conducted four similar aerial spray programs in the past to mitigate gypsy moth populations in various locations across the city, the first being in 2007. Annually, the City monitors and manages this pest on City-owned trees typically resulting in gypsy moth populations being kept at manageable levels.

Who is conducting the spray for the City?

Zimmer Air Services has been contracted to conduct the spray on behalf of the City. They are an experienced Ontario-based company who have conducted the 4 previous aerial spray programs for the City of Toronto. The City of Mississauga conducted a large aerial scale spray program in 2018 as well as the Town of Oakville and the City of Hamilton using this same company.

Is there a certain season or window of time the spray has to happen within?

The best time to first apply Btk is mid-May when caterpillars are small, hungry and feeding. The seasonal spray window is set for May 16th to June 15th, 2019. On the day of the sprays, the helicopters will begin spraying just before sunrise (5 A.M.) and will take approximately 2.5 hours to complete. Applications can occur any day of the week, including weekends. Once the leaves are a certain size, the caterpillars have reached almost 90% emergence and the caterpillars begin feeding, the spray window can be narrowed. Once it is determined that those factors are met, the weather conditions then need to be monitored.

The Btk application is weather dependent. Ideal application conditions consist of:

- Calm winds (1-16 km/h)
- High humidity (> 40%)
- Temperatures between 2 and 25 degrees Celsius
- No precipitation within the spray window and ideally not for 24 to 48 hours after application

What type of aircraft will conduct the spray?

For this program, two helicopters with spray systems will fly approximately 15 metres above the treetops. It is anticipated to take 2 days to complete one application and there will be a total of two spray applications.

The spray zones were created using scientifically designed methods. Comprehensive spray drift modelling has been done to ensure accurate and effective application. All zones and their boundaries were critically reviewed by City staff and Zimmer Air.

Why are only certain areas of Toronto getting sprayed?

The spray zones were created using scientifically designed methods. Comprehensive spray drift modelling has been done to ensure accurate and effective application. All zones and their boundaries were critically reviewed by City staff and Zimmer Air.

The spray zone areas we have defined have been refined on the basis of scientific data. Areas that are being sprayed are those where there is no other IPM control option available that would reduce the populations significantly enough to meet acceptable thresholds.

Areas predicted for severe defoliation, designated as "high priority target areas for management", were considered as critical areas which are included in the spray. The spray zones were refined using extensive data gathered from these areas.

What happens if the spray is cancelled?

Bad weather or wind may cause the aerial spray to be postponed with little advanced notice. The City will issue a communication to the public 48 hours before each treatment and provide up-to-date information through 3-1-1, online at www.toronto.ca/gypsymoth, through the City's social media channels (Twitter and Facebook) and through Aerial Spray Email News Alerts. The spray may be cancelled up to 24 hours in advance if the weather conditions change.

If the weather isn't co-operative and spraying can't be done – what are the City's next steps?

The City will continue to monitor pest population levels and consider appropriate treatment methods.

Why is spraying from the air seen as more effective than spraying from the ground?

Evaluation of previous programs over the past few decades have shown that aerial sprays are highly effective for controlling many forest pests including gypsy moths. Large areas can be treated in just a few hours. Most droplets reach the ground within 10 minutes of application.

Aerial spraying can treat remote or difficult-to-access areas, providing even coverage throughout the target area. Also, the droplets can penetrate the crowns of even the tallest trees.

How is the City going to measure the success of the spray program?

Success will be measured by evaluating tree health through the months following the spray (if the trees are green and covered with leaves versus completely defoliated). As well, egg mass counts will be conducted in the fall/winter of 2019-2020.

Residents are encouraged to implement healthy tree practices and to consult with qualified arboricultural companies to develop healthy tree management plans for their own trees.

If the spray isn't successful, what's next?

We will monitor immediately following the first spray to determine initial results and will readjust if required for the second spray.

Will spraying become an annual thing?

We are confident this year's spray will be enough to bring the gypsy moth population back down below a tolerable threshold to prevent severe canopy damage from occurring. Spraying this spring is the best approach for the health of the trees, our environment, and residents.

Proactive prescribed treatments do not follow the approach of Integrated Pest Management as it is nearly impossible to determine if population levels of gypsy moth will require an aerial spray a year in advance. Decisions regarding whether to treat with an aerial spray will be left after extensive egg mass surveying has been completed to determine if treatment is warranted or not.

PREPARING FOR THE SPRAY

How will I know when the spray is happening?

48 hours in advance of the spray, the City will inform residents of the specific areas of the flight path, treatment plan, and any other relevant information.

- o Notification signs will be posted along local roads to announce the approximate spray window.
- o Social media will be used to update the public on current spray operations. Check out or follow the below social media platforms to receive updates:
Twitter: @cityoftoronto, @TOtrees and #2019AerialSprayTO
Facebook: City of Toronto, Toronto Parks, Forestry and Recreation and Nature in the City - Toronto
- o The public are encouraged to sign up for Aerial Spray Email News Alerts regarding the aerial spray at www.toronto.ca/gypsymoth
- o For questions or for up-to-date information about what you can do to control gypsy moth on your property, aerial spray details like spray dates, times and locations call 3-1-1 or visit www.toronto.ca/gypsymoth, where you can also sign-up for Aerial Spray Email News Alerts.
- o Residents with questions or concerns related to the health impacts of aerial spraying with Btk should call Toronto Public Health at 416-392-7685 or speak to their family physician

Should I cover items in my backyard?

It is recommended to cover things you don't want sprayed like patio furniture, outdoor tables, play equipment and sandboxes or you can simply rinse them off with water after spraying is finished. The spray does not damage paints or

finishes on automobiles, houses, boats or trailers. If it is left to harden, the spray can be removed with water but may require more effort. The sooner it is washed off, the easier it is to remove.

Can my pool remain open?

If possible, cover pools during the spray period. After the spraying has been conducted and the pool cover has been removed, consider testing the water to ensure chemistry balance in water chemistry prior to swimming in the pool. If the pool has not been covered during the spray, test the water to ensure chemistry balance in the water chemistry prior to swimming.

AFTER THE SPRAY

There is a film on my patio furniture, will it come off with water?

The spray does not damage paints or finishes on automobiles, houses, boats or trailers. If it is left to harden, the spray can be removed with water but may require more effort. The sooner it is washed off, the easier it is to remove.

Can I use my BBQ?

If possible, prior to the spraying, close and cover your BBQ or bring it into a covered area. BBQs left open or uncovered should be rinsed with water prior to use. If left to harden, it may require more effort to remove.

Is it safe to go swimming in my pool after the spray?

Btk biodegrades quickly through exposure to sunlight. If possible, cover pools during the spray period. After the spraying has been conducted and pool cover has been removed, consider testing the water to ensure chemistry balance in water prior to swimming in the pool. If the pool has not been covered during the spray, test the water for chemistry balance prior to swimming.

Can my dog be outside when the spray occurs? Is it harmful to pets?

Individuals who live in the treatment areas should bring pets indoors before spraying begins. This will reduce pets bringing Btk indoors; However, Btk is not considered a risk to pets or animals.

Where can residents get more information? What is the best way to stay informed?

- Contact 3-1-1 (416-392-2489 from outside the city limits) or by email at 311@toronto.ca
- Visit www.toronto.ca/gypsymoth to see further details pertaining to the aerial spray program. Information such as areas affected by gypsy moth by visiting the interactive spray map and getting up-to-date information on spray dates or cancellations as they become available.
- Follow us on social media for updates on current spray operations as they become available. Check out or follow any of the below social media platforms for updates:
 - Twitter: @cityoftoronto, @TOtrees and #2019AerialSprayTO
 - Facebook: City of Toronto, Toronto Parks, Forestry and Recreation and Nature in the City - Toronto
- Sign up for Aerial Spray Email News Alerts regarding the aerial spray at
- www.toronto.ca/gypsymoth As updates become available, an email will be sent out to those who subscribe with updated details pertaining to the program
- Residents with questions or concerns related to the health impacts of aerial spraying with Btk can call Toronto Public Health at 416-392-7685 or speak to their family physician