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Using Bt to Control Gypsy Moth

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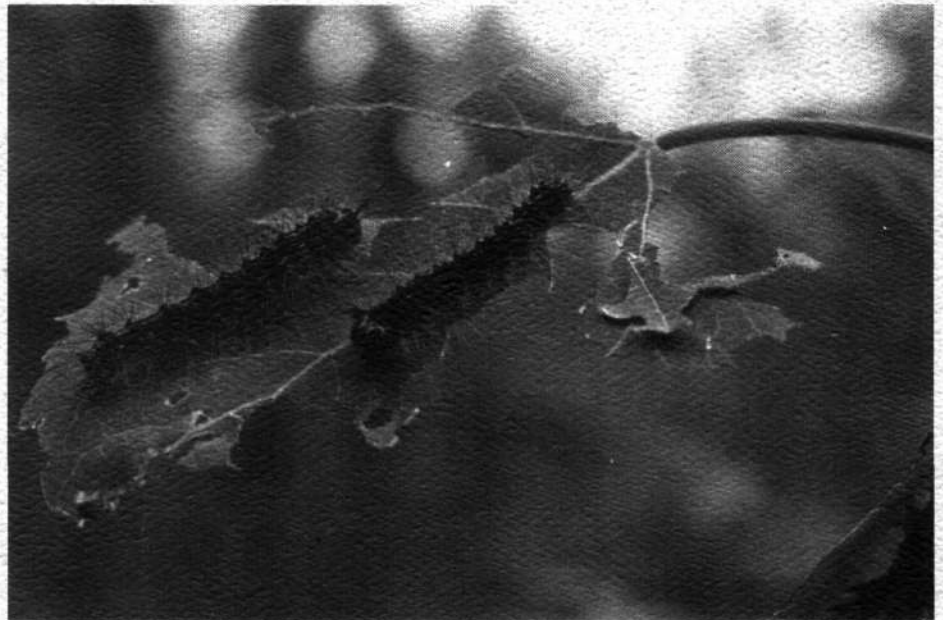
By Leah S. Bauer, Deborah G. McCullough, and Norman R. Dubois¹

Did you notice trees with partly or completely eaten leaves last summer? Did you see lots of big, hairy caterpillars feeding on the leaves? Even worse, were you plagued by the frass (feces) and the many caterpillars that fell from the trees? If so, the offender was probably the gypsy moth caterpillar. Other caterpillars feed on trees in Michigan, but the gypsy moth is the most common and annoying in many areas.

Why get rid of gypsy moths?

Gypsy moth caterpillars not only strip trees of their leaves but also their frass and decaying bodies can cause a nuisance in picnic areas, recreation areas and backyards. In addition, people living where gypsy moth populations are high can experience skin or eye rashes or allergies due to caterpillar hairs.

To prevent defoliation from occurring again this year, you may see airplanes, helicopters, and truck-mounted sprayers spraying insecticide in the spring. The insecticide used in Michigan is called Bt, also known as Thuricide, Foray, or Dipel. Bt is used around the world to control many kinds of caterpillars, including pests of agricultural crops. It has proven to be very safe and effective over the years. Bt has been used in the northeastern United States to control gypsy moth caterpillars since 1961.



What is Bt?

Bt is the nickname for *Bacillus thuringiensis*, a bacterium found naturally on leaves and in the soil. In the early 1900s, scientists discovered that when caterpillars ate Bt, the insects stopped eating and died. Scientists took advantage of Bt's natural ability to kill caterpillars and used it to develop a new type of insecticide. Insecticides

made with microorganisms like Bt are called either microbial or biological insecticides.

How was Bt developed as a microbial insecticide?

Insecticides that use Bt as the active ingredient are available now because of a tremendous effort made during the last 80 years by government, university, and industry researchers throughout the world.

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Is Bt different from chemical insecticides?

Chemical insecticides are manufactured poisons. We know that such a poison can kill insects that consume it or come in contact with it. Since insects are biologically similar to animals, people will react to high dosages of these poisons in the same way. In addition, many chemical insecticides remain in the environment for a long time and create problems for humans and other animals.

Microbial insecticides like Bt use a naturally occurring microorganism such as a bacterium, fungus, virus, or nematode as the active ingredient. Such a microorganism causes specific insects to get sick and eventually die. They often affect only one or a few species. Like manufactured poisons, microorganisms must be eaten or must invade the insect's skin or other natural opening. However, microbial insecticides kill only certain insects — they are harmless to people, other animals, and even most insects. In addition, microbial insecticides usually break down quickly and don't build up in the environment.

What does Bt do to gypsy moths?

Gypsy moth larvae pass through different life stages: egg, caterpillar, cocoon and adult. Trees are endangered by the gypsy moth at only one stage — the caterpillar.

Therefore, in order for an insecticide to be effective, it must be able to kill caterpillars. The active ingredient of most insecticides prepared from Bt is 1) a crystal protein made by Bt and 2) the spore or resting stage of Bt. When larvae eat leaves sprayed with Bt, the crystal dissolves and releases the protein that damages their stomachs. At this point, the caterpillars become sick and stop eating. During the next 2 to 3 days, bacteria enter the caterpillar's blood, eventually killing them.

Is Bt dangerous to people, pets, livestock, or honeybees?

One of the advantages of Bt is that only young caterpillars are affected. Bt is harmless to people, even at very high doses. Bt does not harm other mammals, birds, or fish. Most beneficial insects, including honeybees and ladybugs, are not affected by Bt. Furthermore, Bt does not affect plants. It is considered so safe that it can be sprayed on food crops until the day they are harvested.

Does Bt contaminate the environment?

After Bt is sprayed, most of it is quickly destroyed by sunlight and other microorganisms. Larvae killed by Bt will drop to the soil and decay harmlessly. Bt does not multiply or accumulate in the environment.

Why is Bt sprayed so early in the season?

Young caterpillars are much more sensitive to Bt than older, larger caterpillars. The best time to spray is just after gypsy moth eggs have hatched and before larvae grow too big.

Who produces Bt?

Several private companies produce the Bt products that will be sprayed in Michigan. The large market for Bt has stimulated many new and existing companies to begin research on Bt and to develop improved Bt products.

Is it possible to buy Bt to spray caterpillars in my own garden?

Yes, there are several commercially available biological insecticides that use Bt. Both wettable powders and liquid formulations are available from local garden shops. Be sure to follow directions on the label.

Are there other types of Bt for control of other garden or urban insect pests?

Yes, many types of Bt exist. The most common type of Bt affects caterpillars like the gypsy moth. Another important type is used to control mosquito and black fly larvae in places like ponds, streams, and gutters. A third type of Bt is used to control the larvae of the Colorado potato beetle and the cottonwood leaf beetle.

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