

BT Insecticide Information Bulletin

Bacillus thuringiensis Berliner (Bt) is a rod-shaped bacterium that causes disease in certain insect larvae. Some varieties and strains of this organism affect the larvae of many moths and butterflies while others affect fly and beetle larvae. Strains of the variety *kurstaki* are grown under controlled conditions by several manufacturers and are then formulated into biological insecticides for control of many forest and agricultural pests, including the gypsy moth (*Lymantria dispar*).

All formulations of Bt registered for gypsy moth control contain dormant bacterial spores along with crystals of a toxic protein, called delta-endotoxin, that the bacteria produce. Gypsy moth caterpillars (larvae) must eat these spores and crystals for the Bt to work. Once eaten, the crystals dissolve in the alkaline gut of the caterpillar and cause paralysis of the digestive system. Feeding usually ceases at this point. Cells in the gut wall then break down allowing dormant spores to invade the body cavity. If the caterpillar has not died by this time, the spores germinate and multiply in the body cavity causing a lethal infection. In small larvae the action of the crystal alone is usually fatal, but in larger larvae it is the later infection by the spores that causes death.

Successful gypsy moth control with any insecticide depends on proper spray timing, good spray weather, and thorough spray coverage. Because Bt is a living organism subject to mortality-causing factors such as desiccation and ultraviolet light, its residual effect is much shorter than most chemical insecticides. As a result, timing, weather, and coverage are more critical for Bt than for chemicals. Under ideal conditions, Bt remains active on the foliage of treated trees for 7-14 days and will kill the caterpillars that ingest it. Unfortunately, conditions are not always ideal and, as a result, larval control with Bt (single application) averages below 80 percent. Therefore, when gypsy moth populations are healthy and building, a single application of Bt cannot be consistently relied upon to give population reduction and total nuisance abatement. However, if the user is willing to accept limited defoliation and the associated caterpillars, Bt normally provides foliage protection (70+ percent) adequate to reduce tree stress and related mortality. Plus, it will do this with the highest known degree of safety to human health and the environment of any insecticide currently on the market.

Many formulations of Bt are currently registered by the U. S. Environmental Protection Agency for gypsy moth control and are sold under various trade names. Some of the more common brands include Dipel, Foray, and Thuricide.

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