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## **BTK INSECTICIDE**

*Bacillus thuringiensis* subspecies *kurstaki* Berliner (Btk) 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. Strains of the subspecies *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 spongy moth (*Lymantria dispar dispar* – formerly known as the gypsy moth).

All formulations of Btk registered for spongy moth control contain dormant bacterial spores along with crystals of a toxic protein, called delta-endotoxin, that the bacteria produce. Spongy moth caterpillars (larvae) must eat these spores and crystals for the Btk 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 spongy moth control with any insecticide depends on proper spray timing, good spray weather, and thorough spray coverage. Because Btk 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 Btk than for chemical insecticides. Under ideal conditions, Btk 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 Btk (single application) usually averages below 90 percent. Therefore, when spongy moth populations are healthy and building, a single application of Btk cannot be consistently relied upon to give total population reduction or total nuisance abatement. However, if the user is willing to accept limited defoliation and the nuisance of the remaining caterpillars, Btk normally provides foliage protection (70+ percent) adequate to reduce tree stress and related tree mortality.

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

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