PennState Extension

Yes, the spongy moth caterpillars have emerged and are 'ballooning' to disperse using silky threads. The hairs of the caterpillars can cause skin irritation- I had the pleasure of experiencing this first hand the other day!

Spongy moth treatments can be important for overall forest health but options should be considered on a case-by-case basis. I've broken treatment options down with additional resources to help with decision-making for landowners.

A few thoughts about aerial sprays that can be helpful in the decision-making process.

1. There are two types of aerial sprays that can be used. *Bacillus thuringiensis* subspecies *kurstaki (Btk)* is a native fungus biocontrol, and tebufenozide is a growth inhibitor that mimics the insect-produced chemical to trigger molting. Application for these treatments is done *before* native pollinators and lepidopterans are out, minimizing non-target impacts.

2. Aerial treatments are recommended for areas with high spongy moth densities on forestland with oak stands and the following desirable native trees at-risk of damage (taken from DCNR Spongy Moth Factsheet, listed in Resources below):
    a. Apple
    b. Alder
    c. Aspens
    d. Basswood
    e. Birches
    f. Hawthorn
    g. Hemlock
    h. Tamarack (larch)
    i. Pines
    j. Spruces
    k. Willows
    l. Witch hazel

For smaller tracts of land with lower spongy moth densities, consider individual systemic tree treatments:

1. Soil injection- active ingredient, Acephate
    a. Readily taken up by plants
    b. lasts for 40 days in plants, degrades in soil within a few days of application
    c. fewer non-target impacts
    d. cheaper

2. Stem injection- active ingredients, Emamectin benzoate or Abamectin
    a. lasts through the growing season
    b. more non-target impacts
    c. more expensive

Mechanical treatments:

1. Burlap wraps
    a. cheap
    b. time consuming

c. only viable for a few select trees

d. less effective

e. less non-target impacts

Spongy moths will walk up and down tree trunks and find refuge under burlap wraps at night. Landowners using burlap need to monitor their trees daily, scraping moths into soapy buckets of water, or smashing on sight for control. This is not as effective as insecticides and biocontrols and requires diligent maintenance. I only recommend this method if control is needed on a few trees.

Resources:

1. My Forestry and Wildlife Extension Team does a bi-monthly Forest Snapshot with timely topics and forest phenology pieces. In March, Sarah Johnson, Forest Health Program Specialist of DCNR, discussed spongy moth. https://extension.psu.edu/forest-snapshot-march-2024

2. DCNR *Lymantria dispar dispar* factsheet https://www.dcnr.pa.gov/Conservation/ForestsAndTrees/InsectsAndDiseases/SpongyMoth/Pages/default.aspx

3. Attached: factsheets for aerial sprays, Btk and Tebufenozide

4. Acephate biomonitoring factsheet, CDC https://www.cdc.gov/biomonitoring/Acephate_BiomonitoringSummary.html

February 2022

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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Mimic™ 2LV (Tebufenozide) Insect Growth Regulator

Mimic is an Insect Growth Regulator (IGR) that acts upon the larvae (caterpillar stage) of lepidopteran pests and is used throughout North America to combat important forest defoliator pests such as *Lymantria dispar dispar* (spongy moth, formerly known as gypsy moth), tent caterpillars, budworms, tussock moths, and others. It selectively controls the insect pest with minimal or no impact upon their natural enemies or upon the environment.

Mimic™ 2LV is considered a low risk 'biorational' insecticide that controls specific insects by affecting their growth cycle. Mimic acts in a unique way whereby the active ingredient, *tebufenozide,* triggers the molting hormone of the target insect. When foliage sprayed with Mimic is eaten by the spongy moth caterpillar, the active ingredient 'mimics' the insect hormone that triggers molting as the caterpillar goes through its growth stages. As the spongy moth larvae feed, they molt and shed their outer cuticle several times as they grow larger; the larvae that consume the Mimic deposited upon the leaves undergo a premature molt and quickly cease eating and die shortly thereafter. The caterpillar stops feeding almost immediately resulting in less defoliation, which in turn helps to maintain a healthier forest.

In agriculture, tebufenozide is also used to protect many crops from caterpillar pests; this product is known as Confirm®, and is used to protect fruits, vegetables, and many field crops from harmful caterpillar pests.

Mimic does <u>not</u> affect any other orders of insects, including honey bees, native bee pollinators, ants, wasps, beetles, dragonflies, grasshoppers, or flies. Spring defoliating forest insects occur earlier, or are in different locations than many of the attractive butterflies (such as the monarch butterfly) that are associated with pastures, parkland, and roadside areas. Mimic also does not affect beneficial insect parasites, parasitoids, and predators that help to naturally control the populations of the forest defoliator pests.

Mimic has no direct effect on birds as they do not have the insect ecdysone hormone which is triggered by Mimic; and exposure to the spray or consumption of affected larvae by birds has no direct impact upon them either. In addition, spray programs only treat a small percentage of the forest in any single year minimizing any non-target impacts.

Additionally, Mimic has no impact upon wild or domesticated animals, or upon fish or amphibians. In research studies, it was noted that Mimic can affect water fleas, but only if a sufficient quantity is introduced into their environment (the bottom of shallow water bodies). Subsequent field studies have shown that this species has tremendous reproductive capacity and if impacted, populations rebound quickly.

Mimic has no effect upon vegetation or soil organisms. Mimic quickly binds to soils and potentially may run off into streams, but only if sufficient rainfall occurs to dislodge significant amounts of soil. This is not considered as an issue in forest protection programs as there is very little bare soil in most forest landscapes that are proposed for treatment.

Mimic has no impact upon humans, but as with any pesticide, applicators should wear the required Personal Protection Equipment (PPE) identified on the insecticide label when handling the concentrate and minimize unnecessary exposure to the concentrate.

Due to its unique mode of action, and its minimal impact upon the environment, Mimic is considered a good candidate for inclusion in an Integrated Pest Management Program (IPM) for the management of forest defoliators.