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BULLETIN 88

Frontline EXPRESS

Canadian Forest Service – The Great Lakes Forestry Centre

Spongy moth

INTRODUCTION

Spongy moth (*Lymantria dispar*), also referred to as gypsy moth or European gypsy moth, is a non-indigenous insect whose larvae defoliate trees in North America and can cause significant tree damage and nuisance. Its preferred food is oak leaves (*Quercus* spp.), but it will feed on the leaves of many other trees, both broadleaf and conifer, as well as shrubs. This insect was introduced to North America in 1869 near Boston, Massachusetts and was first discovered in Canada in British Columbia in 1912. Since that time, populations have become established in eastern Canada in Ontario, Quebec and the Maritime provinces (Figure 1). Spongy moth continues to expand its range north and west aided in part by climate change and the movement of infested materials. Occasionally, the insect is detected in western Canada but so far, eradication efforts have been successful.

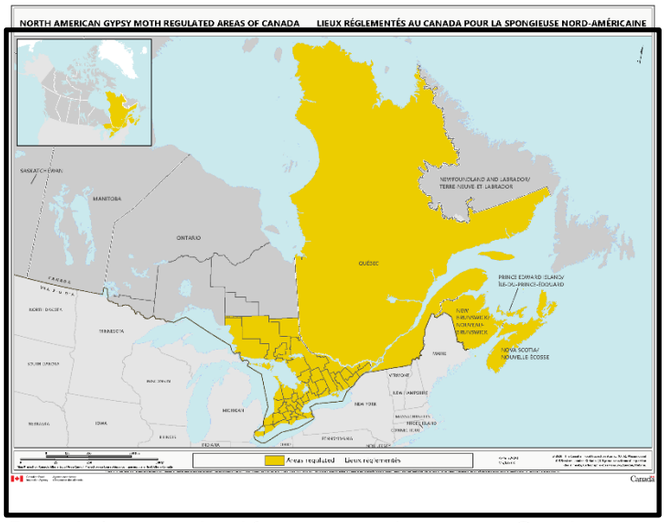

Figure 1. Areas regulated for spongy moth in eastern Canada Canadian Food Inspection Agency, 2020).

LIFE CYCLE

In eastern Canada in late July to early August, the flightless female moth lays up to 1200 eggs in a single buff-coloured, spongy egg mass shortly after mating (Figure 2). Egg masses are laid in sheltered locations on trees, rocks, logs, as well as artificial outdoor structures. In mid-May, larvae emerge and climb to the top of trees where they begin feeding on newly expanding leaves. These early larvae may also use long silk threads to "balloon", or disperse with the wind, to other host trees, which facilitates spread to distant locations. Young larvae are mostly black and feed mostly during the day. As they grow, the larvae develop through five (males) or six (females) instars before forming a pupa. The appearance of the older larvae is distinctive, with long hairs and pairs of blue and red dots in a row along their backs (Figure 3). With each instar, the larvae eat progressively more foliage; the last instar larva is 5-6 cm long, feeds mostly during the night and can consume an area of foliage equivalent to 10 to 15 large oak leaves. Similar to tent caterpillars, larvae will migrate to new areas in search of food when the local foliage is depleted or when seeking pupation sites. Once feeding is complete, usually by early July, larvae form dark brown pupae often concealed in a location on their host tree or nearby.

The pupal stage lasts approximately two weeks. The adult moths then emerge in late July to early August. Male and female moths have different appearances: males are light brown (Figure 4) whereas female moths are very pale with dark markings (Figure 2). Female moths (forewing length 31-35 mm) have noticeably larger wings than male moths (forewing length 20-24 mm) and have thicker bodies (Figure 4) but are flightless. Since females cannot fly to find a mate, they attract male moths using a chemical they release into the air. After mating, the female deposits her eggs nearby in a hair covered mass (Figure 2).

Figure 2. Female spongy moths are whitish in colour and can be found near a buff-colored egg mass, which can contain up to 1200 eggs.

Figure 3. Late instar larvae of spongy moth with double rows of blue and red spots.

DAMAGE

Spongy moth feeds early in the spring, so hardwood trees suffer few lasting impacts and are often able to flush a new set of leaves before the end of the season. Trees will typically re-flush if they lose 50% or more of the first set of leaves. Continued re-flushing over several years can stress a tree, as it uses up its energy reserves. Such stressed trees, esp. combination with other stressors (e.g. drought), can become susceptible to secondary pests, which can cause tree mortality. Defoliation may be more pronounced in urban areas where trees are subjected to more stress. Conifer trees, such as white pine, store energy in the needles and so can suffer mortality if they lose 100% of their foliage to feeding by spongy moths.

Larvae will crawl over picnic tables, play structures, and the exterior of dwellings, or they fall into swimming pools. Their droppings, which consist of digested leaf material, may stain paint and cloth. When this material falls on roofs or other structures it may mimic the sound of rain. Diseased larvae give off a foul odour. Their body hairs contain histamine, which cause skin or lung irritation. People will avoid areas experiencing population outbreaks, which can impact businesses specializing in outdoor recreation.

NATURAL CONTROL

Numerous natural enemies, both native and introduced, help reduce populations of spongy moth. The insect is particularly susceptible to fatal infections during outbreaks because it clusters in groups. Diseases such as nucleopolyhedrovirus (NPV) and a fungus *Entomophaga maimaiga* are particularly effective at reducing populations of the spongy moth. However, the effectiveness of *E. maimaiga* can be reduced in a dry spring, and the impact of both diseases is lessened when density of spongy moth larvae is low. Small mammals can reduce high-density spongy moth populations, but only a few insect predators and parasites (e.g., *Ooenncrytus* wasps that attack eggs) are occasionally effective in North America. Winter temperatures are largely responsible for limiting the range of spongy moth in Canada, with prolonged cold spells (below -30° C) killing overwintering larvae. Emerged larvae are also susceptible to cold weather. Unfavorable spring weather may also kill young larvae, reducing potential impacts to trees.

WHAT CAN I DO?

Most spongy moth outbreaks end because of unfavourable weather, lack of quality food and the action of diseases, predators and parasitic insects. When a management response is required, there are several products registered for use in Canada. For forest treatments, aerial sprays of the biological insecticide *Bacillus thuringiensis kurstaki* (Btk) are used to protect foliage provided that application is timed to impact young larvae (less than 2.5 cm long), but its use may affect other moth and butterfly species feeding in the treatment area so a risk assessment should be done before applying this product. Btk is applied in the spring when the larvae are small and the leaves are about 50% expanded, therefore early scouting is critical. Once large larvae are noticed, it is often too late for an insecticide application to be effective. Pheromone-baited traps can be used to monitor moth populations.

For treating individual or small groups of trees, systemic insecticides (e.g., Azadarachtin, Acephate) can be injected into trees to reduce larval defoliation. Most of these systemic solutions must be applied early in the growing season, so scouting for egg masses in the year prior to treatment is important.

For ornamental trees, burlap bands installed on the trunks of trees can be used to collect older larvae seeking shelter during the day. The bands should be checked daily and all larvae removed and destroyed. However, dead-looking larvae (similar to those pictured in Figure 5) could be left in place as those individuals could potentially infect other larvae. Always use gloves when handling spongy moth larvae, as their hairs can cause a rash to develop on exposed skin.

Physical removal of adult female moths and egg masses can be attempted, but it is unclear if this impacts spongy moth populations. Contaminated household articles should be cleaned of all spongy moth life stages before moving items from infested to spongy moth-free areas in the US and Canada.

Figure 4. Adult male spongy moths are brownish in colour with feathery antennae.

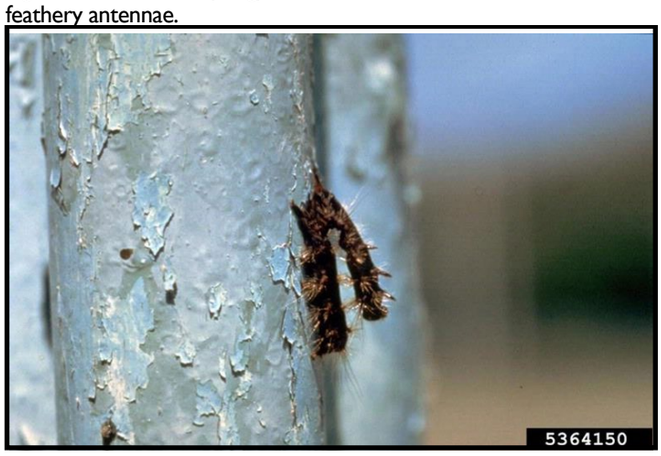

Figure 5. Diseased spongy moth larva containing a nucleopolyhedrovirus. Diseased specimens should be left in place to disseminate the disease to healthy larvae.
(Photo: Hannes Lemme, Bavarian State Research Center for Agriculture, Bugwood.org).

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