



CANADIAN FOREST SERVICE

Insect Production Services

Whitemarked Tussock Moth

(*Orgyia leucostigma*)

Biology

Introduction

The whitemarked tussock moth (*Orgyia leucostigma*), a native species to North America, is found in the entire eastern U.S. and in Canada from Newfoundland to Alberta. Tussock caterpillars (larvae) belong to the Lymantriidae family of moths and are aptly named for the dense tufts of hair that protrude from the backs of some species. Whitemarked tussock moth is a highly polyphagous insect that feeds on both hardwood and softwood trees and, at times, many plant species, including agricultural crops. Epidemics have occurred in deciduous stands of herbaceous oak, birch, cherry, apple and beech and in coniferous stands of balsam fir, spruce, hemlock and tamarack. In Ontario, infestations occur in urban areas in elm and Manitoba maple.

Life Cycle

Whitemarked tussock moth overwinters during the egg stage. Eggs hatch from late June to early July and the larvae or caterpillars feed for five to six weeks until they reach pupation. Female larvae moult their skins five times and therefore have six larval stages, called instars, whereas males have only five instars. During their third instar, larvae develop their characteristic tufts of hair: two long, black tufts on either side of the head (horns), four shorter whitish-grey tufts on the back, one long, black tuft near the hind end (tail), and two small, raised, red tufts just before the tail. These irritating hairs easily break off and serve the insect as a highly effective defense mechanism throughout its life cycle. Larvae incorporate these hairs into their cocoons to discourage predation, and the female moths use them first for camouflage and then as protection for her eggs. Caterpillars are also identified by their red heads and the two light yellow stripes that extend lengthwise on their backs. By mid-August, larvae change to pupae within dark grey cocoons spun of silk and body hairs. The pupae may be found on twigs, branches and crevices in bark. Adults emerge by late August and early September. Males are dark grey, possess a wingspan of approximately 30 mm, and are characterized by their plumose antennae. Females are creamy white in colour, hairy and wingless. Since they are egg-laden and flightless, immobile females mate immediately and lay their eggs, in a foamy white mass, on or near empty cocoons.



Care Instructions

Whitemarked tussock moth eggs are shipped during diapause and will begin to hatch within 10–12 days of the shipping date. Artificial diet is not normally included.

1. Upon receipt, place the eggs in rearing containers with artificial diet (e.g., 200–300 eggs, or one egg mass, per container when using 6 oz. [177 ml] cups of artificial diet). Turn the rearing containers upside down so that the diet is at the top. The hatching larvae will move upward to find food. Maintain the eggs at 22°C, 50% relative humidity and a 12h:12h light:dark cycle.
2. Transfer the larvae to fresh diet weekly and ensure that you reduce the rearing density. During the first two weekly diet changes, the rearing density should be maintained at about 100 larvae per 6 oz. (177 ml) cup, then reduced to 50 and 25 per cup during successive weeks. Inverting the cups is no longer necessary after about 3 weeks.
3. Natural foliage may also be used for feeding, although this is not recommended because natural foliage is a potential source of microbial pathogens that may infect the insects. Washing the foliage will reduce this risk. For early instars, use young tender shoots (e.g., apple, balsam fir, beech, birch, cherry, hemlock, oak, spruce or tamarack); as the larvae mature, older hardened shoots may be used. Ensure that rearing containers are breathable (e.g., paper lids) and provide sufficient ventilation to avoid excess moisture buildup. Remember to reduce the rearing density as the larvae mature. Daily replacement of the foliage may be necessary.
4. Larvae will begin to pupate about five weeks after hatch and may be removed from the diet. Insect Production Services recommends storing pupae at 20°C, 80% relative humidity and a 16h:8h light:dark cycle.
5. Adults will emerge approximately 10 days after pupation (i.e., 45 days after egg hatch).

Damage and Nuisance

Young larvae typically skeletonize deciduous leaves. As they mature, they start consuming the entire leaf except for main veins and the petiole. Once trees are defoliated, larvae will spin down from branches on silken threads and, because of their light weight and long hairs, younger instars are easily transported by the wind to new hosts. On conifers, not only are the needles consumed but also the tender bark on twigs, causing the twigs to curl and branches to deform. For conifers, repeated years of defoliation in excess of 90 percent results in significant wood loss and ultimately tree mortality. Top-kill may occur on trees that have undergone 75 percent defoliation for two consecutive years or more. In urban areas especially, tussock moth may also pose another threat. Their larvae's hairs, like those of many other "fuzzy caterpillars," are hollow and contain a toxin that is released when they penetrate an animal's skin. When these urticating or nettling hairs brush up against people, many experience allergic reactions such as painful rashes; when the hairs are inhaled, they may cause respiratory problems. Children catching and handling these caterpillars are especially vulnerable. The hairs and shed skins persist long after the larvae have disappeared and continue to cause reactions.

Natural Control

Outbreaks of whitemarked tussock moth normally last from two to four years. Although epidemics of this species are usually terminated primarily by a naturally occurring nucleopolyhedrosis virus, other factors, including parasitoids, natural predators and diseases such as fungi, contribute to suppressing population numbers. Natural predators such as birds have a limited effect on populations, since they only eat young larvae before their hairs develop and become troublesome. High population densities are usually necessary in order for diseases and parasitoids to be

effective. *Bacillus thuringiensis* (Bt) is a naturally occurring bacteria that is commercially available as a biological insecticide and has been proven to be effective against tussock moth larvae. Bt is only effective on lepidopteran species and does not harm non-target insects, including beneficial pollinators. However, because Bt degrades in sunlight and easily washes away in rain, it offers a very narrow window for control.

What Can I Do?

Home or woodlot owners can control small infestations manually by collecting and destroying egg masses. However, if egg masses are missed, it may be necessary to prevent serious damage by initiating control procedures using a registered insecticide before caterpillars become too large. Small trees or small lots can be sprayed with portable mist blowers or conventional orchard blowers. For taller trees or large lots, aerial applications are necessary. If spraying is required, Bt is available at most gardening centres and is much safer to use than chemicals. Spraying chemical insecticides might also greatly affect natural predators of tussock moth and non-target species, so read the label carefully before using any insecticide, use proper protective wear and follow instructions strictly.

Contact

John Dedes, Insectarium Supervisor
Natural Resources Canada
Canadian Forest Service
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie, Ontario P6A 2E5
(705) 541-5673
John.Dedes@NRCan-RNCan.gc.ca