

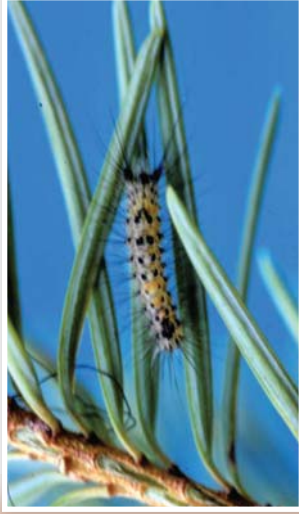
Introduction

The Douglas-fir tussock moth (DFTM) is a native defoliator that reaches outbreak levels every 7 to 14 years in the western United States and Canada. The larval (caterpillar) stage of DFTM feeds on both new and old needles and can completely defoliate trees in one season.

Douglas-fir tussock moth defoliates Douglas-fir, true firs, and spruce in rural forested and urban environments. Defoliation from DFTM can result in top and branch kill, reduced vigor, growth loss, increased susceptibility to attack by other insects and diseases, increased short-term fire risk, impacts to other resources such as water and visuals, and tree death. Fortunately, DFTM outbreaks typically last only 3-5 years before natural enemies or starvation cause populations to collapse. Several management options including thinning and insecticide treatments may reduce damage and potential mortality from DFTM.

Description

A young larva is about 1/4" long, light tan to dark gray, with long body hairs. The 1" mature larva is gray to brown, with a shiny black head. Two long, horn-like dark tufts project forward from its head and a similar but longer tuft projects from its posterior end. Four dense, buff-colored "tussocks" with red tips are located on its back. The rest of the body is covered with short white hairs that protrude from red tubercles (knoblike bumps), and an orange stripe on each of its sides.



Young larva



Mature larva

Female and male adults differ greatly in appearance. Females are gray, wingless, have small threadlike antennae and a large abdomen, and are about 3/4" long. Males have gray-brown forewings with dark bar markings and whitish colored spots, and hind wings that are reddish-brown. They are 1/2" to 3/4" long with a wingspan of 1-1/4". Male antennae are feathery.



Adult female and male DFTM



Life History and Habits

Douglas-fir tussock moths produce one generation per year. About 350 overwintering eggs hatch in late May or early June. These newly hatched larvae feed on the current year's foliage, turning it tan or reddish brown. As they mature, and if populations are high, larvae may feed on old foliage after consuming new foliage. They typically feed in the upper tree crown foliage, then disperse and feed on lower foliage on a silken thread. Larvae may totally defoliate trees in one season.



Cocoon with egg mass

Evidence of Infestation

Douglas-fir tussock moth can be found year round by looking for the following signs on host trees:

- May-August: Hairy larvae; silk webbing on tree tops and outermost tips of upper branches; defoliation.
- July-November: Grayish-brown cocoons on foliage, branches, tree trunks, understory, or nearby objects when defoliation is severe; appearance of adult moths; defoliation.
- July-May: Empty cocoons with hardened egg masses; defoliation.

Upper crown defoliation of Colorado blue and Engelmann spruce in urban settings can be an indicator of outbreaks in surrounding rural forest lands. Outbreaks in rural forests have been known to occur 1 to 2 years after detected damage in urban trees.



Upper crown defoliation of Colorado blue spruce

Monitoring

An early detection system using pheromone-baited sticky traps can be placed in susceptible forest settings to trap male moths. Forested areas with a higher proportion of Douglas-fir, grand fir, or white fir would likely be more prone to higher incidence of defoliation. Trend data from traps can be used to help land managers make informed decisions regarding DFTM potential impacts on forest resources.

Management Options

Microbial and chemical insecticides, and mating disruption pheromones can be effective at reducing DFTM populations and subsequent damage. State or Federal Forest Health Specialists should be consulted for treatment options and the most current information on registered insecticides. In addition, State and Federal Forest Health Specialists can provide information on silvicultural management practices to help minimize the impacts of DFTM.

Microbial Insecticides:

- *Bacillus thuringiensis* (Bt), an environmentally safe bacterium specific to Lepidoptera larvae. It is used in sensitive areas such as campgrounds or along riparian areas where chemical use is restricted or prohibited.
- *TM Biocontrol-1*, a virus specific to DFTM larvae. The virus is currently not available for public use.

Chemical insecticides:**

- *Carbaryl*, a broad spectrum, general purpose carbamate.
- *Dimilin*®, a growth regulator that affects insect larvae mainly in the Lepidoptera and Diptera orders.

Mating disruption:

- *Disrupt*® DFTM, a pheromone that interferes with male-female mating communication.

**Pesticides used improperly can be injurious to humans, animals, and plants. Follow directions and read all precautions on the label. Consult your local county agriculture agent or State extension agent about restrictions and registered use of particular pesticides.

Silviculture:

- Thin Douglas-fir and true fir overstory and understory to help reduce susceptibility to DFTM and favor non-host leave trees such as pine, larch, or spruce.
- In post-fire or post-management restoration planning, consider planting non-host species.
- Prescribed fire can be used to reduce DFTM-susceptible fir overstory and reduce competition and improve stand vigor.

Natural Controls

Populations of DFTM are usually kept in check by a combination of predators, parasites,

pathogenic microbes, adverse weather conditions, and food that is either scarce or of poor

quality. Major factors in ending outbreaks in forested settings appear to be starvation or viral infection. In urban settings, cultural practices such as thinning, watering, and fertilizing will help promote tree vigor, which may help trees survive repeated DFTM attacks.

Maintaining a diverse habitat for insectivorous birds, mammals, and predatory insects can also help keep DFTM populations at lower levels. This may be achieved through proper snag management and leaving adequate woody residues on managed site.



Parasitic wasp ovipositing on DFTM eggs

Conclusion

Forest management of true fir and Douglas-fir should include the ongoing process of assessing the potential impacts of DFTM by evaluating forest and site conditions. The greatest potential for preventing or reducing the severity of DFTM outbreaks is to maintain tree vigor and healthy and diverse forests.

For additional information, contact any USDA Forest Service or State Forestry Office in your area.

USDA Forest Service
Forest Health Protection:

Ogden Field Office
801-476-9720

Missoula Field Office
406-329-3308

Coeur d'Alene Field Office
208-765-7342

Boise Field Office
208-373-4227

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Douglas-Fir Tussock Moth in the Interior West



Extensive mortality caused by a Douglas-fir tussock moth outbreak