

Douglas-fir Tussock Moth — Biology & History

Tussock moth outbreaks begin as localized epicentres, spreading and coalescing into larger areas of defoliation. Areas of tussock moth defoliation are very elevationally delimited, occurring in low-elevation stands only. The delimited pattern of defoliation is largely due to:

- the inability of flightless adult females to disperse
- the windblown dispersal of first and second instar larvae



By combining the historical occurrence of outbreaks, both in terms of area affected and periodicity of outbreaks, with stand parameters influencing hazard, the relative risk in a particular area can be estimated.

The Outbreak Cycle

The building phase of a tussock moth outbreak takes one to two years. Detection of increasing insect populations during the building phase is critical, and unless detected at this stage, significant damage could occur. High population levels persist for one to four years, then collapse due to natural control agents which include parasites, predators (mainly birds and ants), pathogens, and starvation due to the forced consumption of older, less nutritious foliage.

Another factor in the collapse of the population is caused by a species-specific NPV (nucleopolyhedrosis virus), which is always present in the population at low levels. The virus is spread through insect-to-insect contact, causing populations to decline rapidly. Six to eight years elapse before populations again reach damaging levels.



Silk webbing produced in a Douglas-fir tussock moth infestation. High population levels persist for one to four years, then collapse.

Population density, year in the outbreak cycle, and the current incidence of disease in the population will affect next year's damage levels. Egg sampling can be used to predict the level of defoliation for the coming year, but this level will be reduced if the outbreak is in its third or fourth year. If dead larvae are commonly found, or if egg masses are small, distorted and incompletely covered with hairs, the population is infected with virus and no significant additional defoliation will occur.

Traits

Host trees: Primarily Douglas-fir, occasionally ponderosa pine and western larch.

Description and life cycle: The tussock moth has a one year life cycle. Adults appear from late July to early September. The adult female is stout bodied, wingless and sedentary, usually remaining camouflaged on her cocoon. Males are slender bodied with about a 30 mm wingspan. Males emerge before females and fly in search of females.



Females attract males by emitting a sex pheromone and mating occurs on the cocoon, typically, on the same day that the female emerges. Each female lays approximately 200 eggs in a single mass on her empty cocoon. The action of depositing her eggs dislodges hair from her abdomen which mixes with a frothy cement produced during oviposition.

The egg masses overwinter. Larvae hatch in late spring and feed voraciously on the current year's foliage. As the larvae mature, they feed on both old and new foliage. In late July the larvae pupate in cocoons on the underside of foliage and emerge two weeks later as adults to begin the cycle again.

Damage symptoms: The upper part of the crown and the branch tips are defoliated first. The remainder of the foliage is destroyed as the larvae migrate down the crown. By July, defoliated trees appear scorched. Trees may die after one or more years of severe defoliation.

Frequently, the top third of the crown is completely defoliated, which leads to damage in the form of top-kill and branch dieback. Douglas-fir trees that have been weakened by tussock moth defoliation may also be susceptible to attack by other insect pests, such as the Douglas fir beetle.

