

FOREST Pest LEAFLET

Douglas-fir tussock moth

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Introduction

The Douglas-fir tussock moth, *Orgyia pseudotsugata* (McDunnough) (Lepidoptera : Lymantriidae), is a destructive native defoliator of Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco, in semi-arid portions of southern British Columbia, including the dry, warm subzone of the interior Douglas-fir, ponderosa pine and bunchgrass biogeoclimatic zones. Specifically the IDFxh2, IDFxw, PPxh2, BGxh2 and BGxw classifications. Severe infestations occurred in 1916-21, 1928-31, 1945-49, 1961-64, 1971-76, 1981-84, and 1991-93, resulting in top-kill and extensive tree mortality.

Hosts

The major host of Douglas-fir tussock moth is Douglas-fir, although in the United States it may also attack grand fir, *Abies grandis*. In British Columbia, ponderosa pine, western larch and Engelmann spruce adjacent to infested Douglas-fir have occasionally been severely defoliated during outbreaks. Single, scattered, Douglas-fir and ornamental spruce in urban settings have also been defoliated both on the southern coast and in the interior.



Douglas-fir tussock moth larva

Distribution

Severe infestations of tussock moth have occurred in British Columbia every decade except the 1950s since the beginning of this century. Since 1948, infestations were recorded 18 of the 46 years; on average, infestations affected 3500 ha (range 8-25 750 ha) per year. The data from Forest Insect and Disease Survey files show that most outbreaks occurred in the Kamloops Forest Region. The largest

outbreak in recent recorded history peaked in 1983 when 25 750 ha were lightly to severely defoliated from the southern Okanagan to Cache Creek. Severe defoliation was again recorded from Ashcroft to Chase between 1991-93. The largest area damaged totalled 1875 ha in 1992. In other years infestations have occurred from north of Lillooet east along the Thompson River Valley to Shuswap Lake; north of Kamloops along the North Thompson River Valley to Barriere; south of



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Salmon Arm through the Okanagan Valley; west along the Similkameen River Valley to Princeton and along the Kettle River Valley from Rock Creek to Christina Lake. Scattered individual trees were infested in parts of the lower Fraser Valley and Victoria from 1967-72 and 1982-84. Scattered small patches of Douglas-fir were moderately to severely defoliated from 1990-92 in the Chilliwack area in the Fraser Valley.

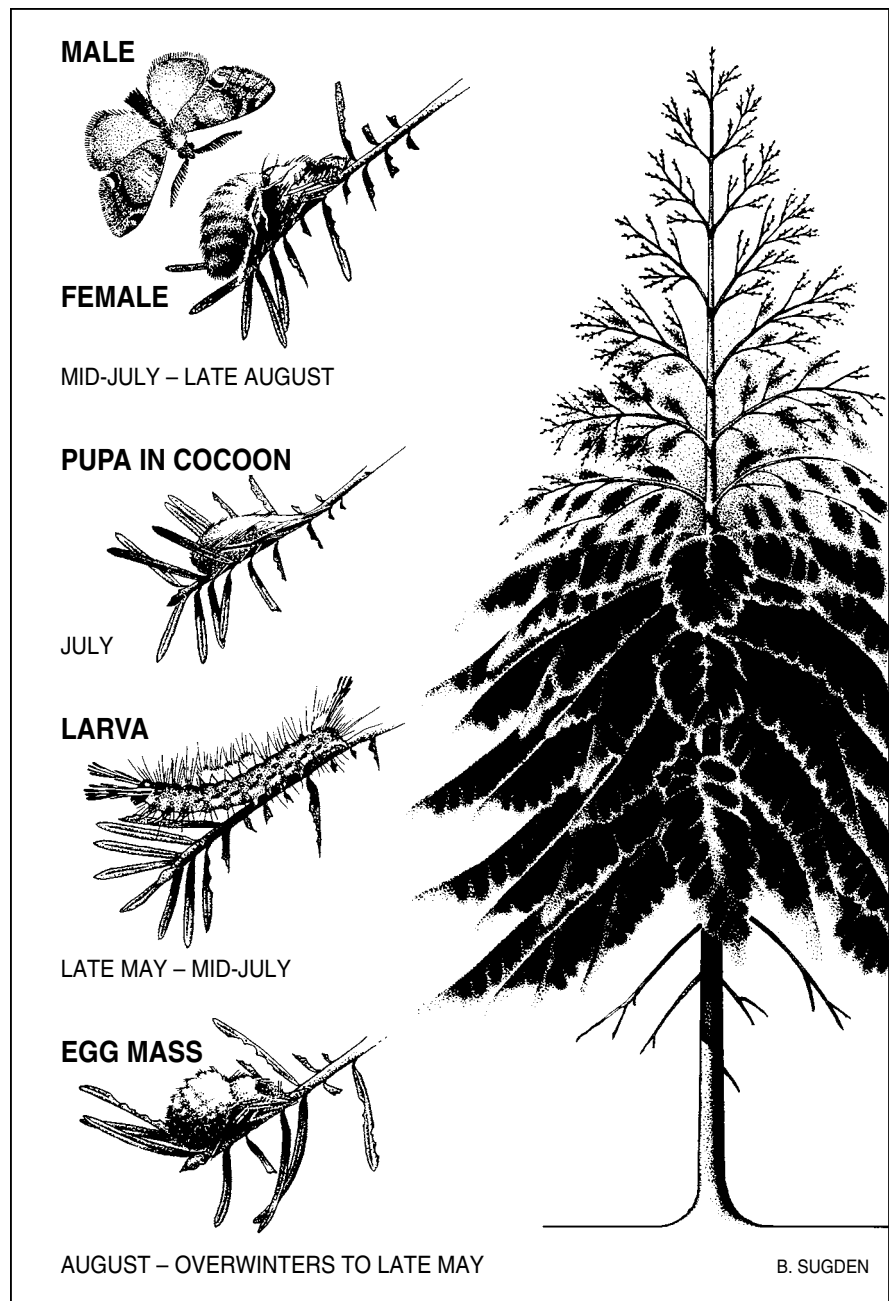
Description

Egg: The eggs are laid on the empty female cocoon in a mass of about 200, embedded in a frothy "cement" covered with hairs from the female's body. The eggs are white, and spherical in shape. Eggs containing parasites are usually grey.

Larva: Final instar larvae measure up to 30 mm long; the head is glossy black; the body is hairy, grey and black with small red tubercles, and a broken orange-yellow stripe on each side. On the fore-part of the body are two prominent black lateral pencil-tufts; on the posterior is one black dorsal pencil-tuft preceded by a shorter recurved rust-colored tuft. Dense rust-tipped tooth-brush-like tufts occur on the back of the mid-body.

Pupa: The larva spins a 20-25 mm long grey-brown spindle-shaped cocoon of silk and larval hairs in which it changes into a stout brown pupa. Tussock moth cocoons are usually found on the lower sides of foliage and twigs. During infestations they can also be found on tree boles, fences and nearby buildings.

Adult: The grey to dark brown female moth has a stout abdomen and is wingless, and about 16 mm long. The male has a slender body and a wing-span up to 32 mm. The full-sized fore-wings are brownish grey with a small white spot in the posterior angle. The hindwings are uniformly brown.



Douglas-fir tussock moth life cycle

Life History

The tussock moth has a one-year life cycle and overwinters in the egg stage. Egg hatch occurs in late May or early June. Dispersal occurs in the first larval stage when larvae are small. These light, hairy larvae may be borne by air currents on long silken threads they produce. The larvae feed voraciously on the foliage until late July when pupation occurs. Male tussock moth larvae go through five lar-

val instars and the females six. The adults emerge, mate, and the females deposit eggs on their own cocoons shortly afterwards.

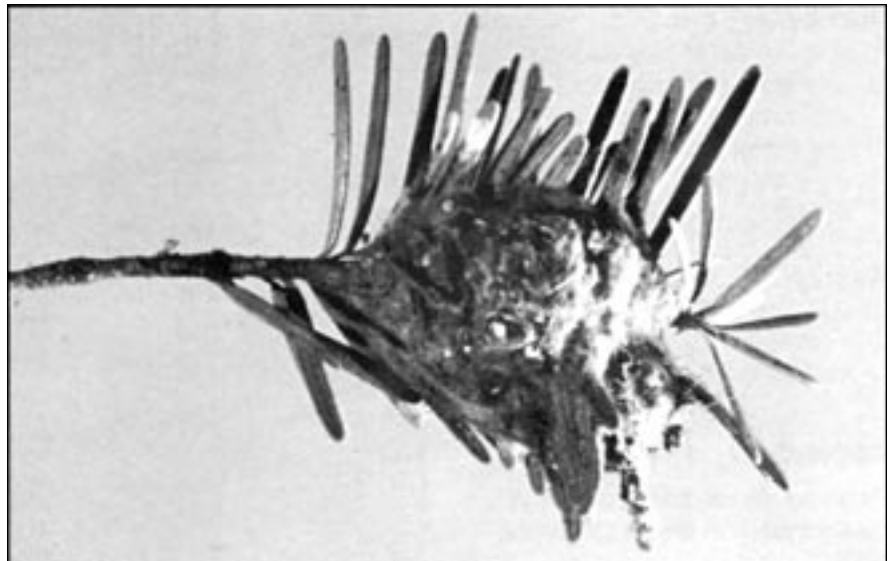
In severe infestations, cocoons and eggs may be concentrated in or near defoliated trees on the undersides of lower branches and boles. During light infestations egg masses will be scattered throughout the crown.

Damage

The young larvae feed only on new foliage while older larvae consume both old and new foliage. Open growing trees, such as those around farm buildings and clearings and Douglas-fir forest at elevations below 760 m (2500 feet) are vulnerable to attack. The upper part of the crown and the branch tips are defoliated first, the remainder of the foliage is then destroyed as the larvae feed down the crown. By July, severely infested trees appear scorched; eventually, as defoliation continues, the tree will be completely stripped. Trees may die after one or more years of severe defoliation, and top-killing and branch dieback are common even in stands only moderately defoliated. Tree mortality has averaged 32% of all trees in severely defoliated stands in the Kamloops Forest Region and 39% in similar stands in Oregon and Washington.

Larger trees (above 50 cm dbh) if severely defoliated may become more susceptible to attack by Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopkins. A successful attack by Douglas-fir beetle is usually fatal; however, severe defoliation by itself, in these dry biogeoclimatic zones, may be sufficient to kill the tree. All ages of trees are equally susceptible to mortality from severe defoliation by Douglas-fir tussock moth.

Tussockosis (a rash and irritation of the skin) and respiratory problems can occur from contact with hairs from the caterpillars or egg masses. The hairs covering the cocoon on which the eggs are laid are the most likely to cause reactions. These hairs disperse readily when disturbed and the fine particles from them can be inhaled or deposited on exposed skin. They can cause irritation and allergic reactions in many people, even those with no previous record of allergies or similar problems. Reactions are most common and severe in people exposed over an extended period.



Douglas-fir tussock moth egg mass

Control

Natural controls such as parasites and predators normally control endemic populations. Eggs, larvae and pupae are parasitized; newly hatched larvae are vulnerable to attack from birds. Appendix I lists parasites reared from tussock moth in British Columbia. During outbreaks, a nuclear polyhedrosis virus usually appears and is a major contributing factor in the collapse of the outbreak. Starvation occurs as well, as larvae are forced to feed on older, less nutritious foliage. The virus may persist in the stands for several years following the population collapse, preventing another population increase.

Applied control

Due to the relatively high frequency of outbreaks and the destructive nature of the insect, the virus has been used on a small scale as a bio-control agent experimentally since 1961 and operationally since 1991. For more information contact the Forest Insect and Disease Survey at the Pacific Forestry Centre.

Damage reports and esquires should be accompanied by insect specimens and the damage found

associated with it. Larval samples should contain foliage for food during transit.

Selected references

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Appendix I

Parasites reared from Douglas-fir tussock moth in British Columbia

Diptera

Agria housei Shewell
Carcelia yalensis Sellers
Compsilura concinnata (Mergen)

Hymenoptera

Coccygomimus pedalis (Cresson)
C. tenuicornis Cresson
Ephialtes ontario (Cresson)
Hyposoter annulipes (Cresson)
Iseropus stercorator orgyiae (Ashmead)
Itoplectus viduata (Gravenhorst)
Meteorus sp.
Pediobius crassicornis (Th.)
Perilampus hyalinus Say
Phobocampe clisiocampae (Weed)
P. pallipes (Provancher)
Pteromalus sp.
Scambus hispae (Harris)
Schizonotus sp.
Telonomus californicus Ashm.
Theronia atalantae fulvescens (Cresson)
Trichogramma minutum Riley



Douglas-fir severely defoliated, Kamloops Forest Region

Additional Information

Additional copies of this and other leaflets in this Forest Pest Leaflets series, as well as additional scientific details and information about identification services, are available by writing to:

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May 1995

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