

Data Sheets on Quarantine Pests

*Choristoneura fumiferana***IDENTITY****Name:** *Choristoneura fumiferana* (Clemens)**Synonyms:** *Tortrix fumiferana* Clemens
Harmologa fumiferana Meyrick
Cacoecia fumiferana Swaine, Craighead and Bailey
Archips fumiferana McDunnough
Choristoneura fumiferana Freeman
Tortrix nigridia Robinson
Lozotaenia retiniana Walsingham
Archips retiniana Fernald
Cacoecia retiniana Meyrick
Choristoneura retiniana Freeman
Choristoneura lambertiana lindseyana Obraztsov**Taxonomic position:** Insecta: Lepidoptera: Tortricidae**Common names:** Spruce budworm (English)
Tordeuse des bourgeons de l'épinette (French)**Bayer computer code:** CHONFU**EPPQ A1 list:** No. 206**EU Annex designation:** I/A1**HOSTS**

C. fumiferana occurs mainly on *Picea* and *Abies*, but can also be found on *Pseudotsuga*, *Pinus* and occasionally on *Tsuga* and *Larix*. It especially attacks *Abies balsamea*, *Picea glauca* and *P. rubens* in eastern North America and *A. lasiocarpa*, *Picea engelmannii*, *P. glauca* and *Pseudotsuga menziesii* in the West.

Several significant host plants of *C. fumiferana* are widely grown in European forests and plantations (e.g. *Pseudotsuga menziesii*, and for Northern Europe *Abies lasiocarpa*, *Picea engelmannii* and *P. glauca*).

GEOGRAPHICAL DISTRIBUTION

C. fumiferana is present in eastern USA and Canada. It extends westward across Canada throughout the boreal forest region to the 67th parallel in Northwest Territory.

EPPQ region: Absent.**North America:** Canada (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Northwest Territories, Nova Scotia, Ontario, Prince Edward Island, Quebec, Saskatchewan, Yukon Territory), USA (eastern States from New York, Ohio, Pennsylvania, Virginia to the North (Maine, Michigan, Minnesota, Wisconsin), extending to Idaho, Montana, Oregon, Utah and Washington).**EU:** Absent.

Distribution map: See CIE (1971, No. 283).

BIOLOGY

The adults appear in July or August, depending on geographical area, and females lay egg masses on the undersides of needles. Each female lays approximately 200 eggs. The eggs hatch in about 8-12 days, and the tiny larvae soon spin silken hibernation shelters in old staminate flower cups, under bark scales or lichens, and in bark crevices. They moult in the newly constructed hibernacula and remain there until spring. No feeding occurs before hibernation. The overwintered larvae emerge from the hibernation shelters shortly before the vegetative buds begin to expand, and mine within the old needles or into the unopened buds, or feed upon the early-opening staminate flowers if available. Eventually, the growing larvae move to the opening vegetative buds, where they feed under a protective silken cover. As the shoots expand, the larvae spin loose webs among the needles, from which they move onto the new foliage. Six larval instars are observed. Larvae then pupate in the feeding webs or in lower branches to which they drop. One generation per year is the general rule for *Choristoneura* species except *C. biennis*.

For more information on the biology of *C. fumiferana* refer also to Prebble & Carolin (1967), Furniss & Carolin (1977) and USDA (1979).

DETECTION AND IDENTIFICATION

Symptoms

In light and moderate infestations, damage is restricted to partial loss of the new foliage, especially in the upper portion of the crown. Partially consumed needles on the webbed branch tips turn bright reddish-brown at midsummer. In heavy, persistent infestations, the complete crop of new foliage may be consumed during several successive years, vegetative buds and developing shoots being killed at early stages. For example, in *Abies*, tree mortality may be observed after approximately 5 years of successive defoliation. In addition, trees which have been infested are more susceptible to secondary pests.

Morphology

Eggs

The light-green eggs are laid in masses of about 20, usually on the underside of the needles. The eggs overlap like shingles.

Larva

The mature larva is dark-brown with light dots on the back and has a black head. Feeding habits and most features of the life cycle are similar to those of *C. occidentalis*.

Adult

Adults are predominantly grey with dark-brown markings and slightly smaller than those of *C. occidentalis*; their wingspan is approximately 20 mm.

MEANS OF MOVEMENT AND DISPERSAL

Extensive dispersal of *C. fumiferana* occurs during outbreak periods. Passive wind dispersal may occur in the first larval instar in late summer, or in the second larval instar in early spring, aided by their habit of spinning down on long threads. Dispersal may also occur during moth flight. However, international movement is only likely to occur on plants or cut foliage of hosts, carrying first-instar hibernating larvae.

PEST SIGNIFICANCE

Economic impact

C. fumiferana is one of the most widely distributed forest insects in North America and is considered as a highly destructive pest in *Abies* and *Picea* forests of the eastern USA and Canada. Severe outbreaks have been recorded since the mid-1930s in Ontario, then through Quebec into the Atlantic region and many trees have been killed. Outbreaks have also been recorded in the West, in British Columbia, Idaho, Montana, Oregon and Washington.

Control

Chemical control (aerial spraying) is the most commonly used method against *C. fumiferana*. However, natural enemies (e.g. *Apanteles fumiferanae*, *Omotoma fumiferanae*) can limit populations of the pest and inundative releases of *Trichogramma minutum* have been made (Smith *et al.*, 1990). *Bacillus thuringiensis* subsp. *kurstaki* has also been used (Valero, 1989; Fleming & Van Frankenhuyen, 1992). Sex pheromones are under investigation for trapping and mating disruption. Finally, silvicultural methods like thinning and fertilization are envisaged in integrated pest management programmes.

Phytosanitary risk

C. fumiferana has recently been added to the EPPO A1 list, but is not regarded as a quarantine pest by any other regional plant protection organization. Of the North American *Choristoneura* species, it is probably the most dangerous as it attacks a rather large number of conifers which are present in Europe and can lead to tree mortality. Therefore, it presents a serious risk to European forests and plantations.

PHYTOSANITARY MEASURES

Prohibition of the import of plants and cut foliage of *Abies*, *Larix*, *Picea*, *Pinus* and *Pseudotsuga* from infested countries, as recommended by EPPO (OEPP/EPPO, 1990) for other North American insect pests of conifers, is the appropriate measure to prevent introduction of *C. fumiferana*.

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