EPPO Datasheet: *Choristoneura conflictana*

Last updated: 2022-04-08

IDENTITY

[more photos...]

Preferred name: *Choristoneura conflictana*
Authority: (Walker)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Lepidoptera: Tortricidae
Other scientific names: *Archips conflictana* (Walker), *Cacoecia conflictana* (Walker), *Heterognomon conflictana* (Walker), *Tortrix conflictana* Walker
Common names: aspen borer, large aspen tortrix
[view more common names online...]
EPPO Categorization: A1 list
[view more categorizations online...]
EU Categorization: A1 Quarantine pest (Annex II A)
EPPO Code: ARCHCO

Notes on taxonomy and nomenclature

The species *conflictana* was originally described in the genus *Tortrix* by Walker (1863). Walsingham (1879) transferred it to *Heterognomon*, Meyrick (1913) transferred it to *Cacoecia*, and Forbes (1923) placed it in *Archips*. Prentice (1955) moved it to *Choristoneura* where it has remained for the last 65 years (e.g., Powell 1983, Brown 2005).

HOSTS

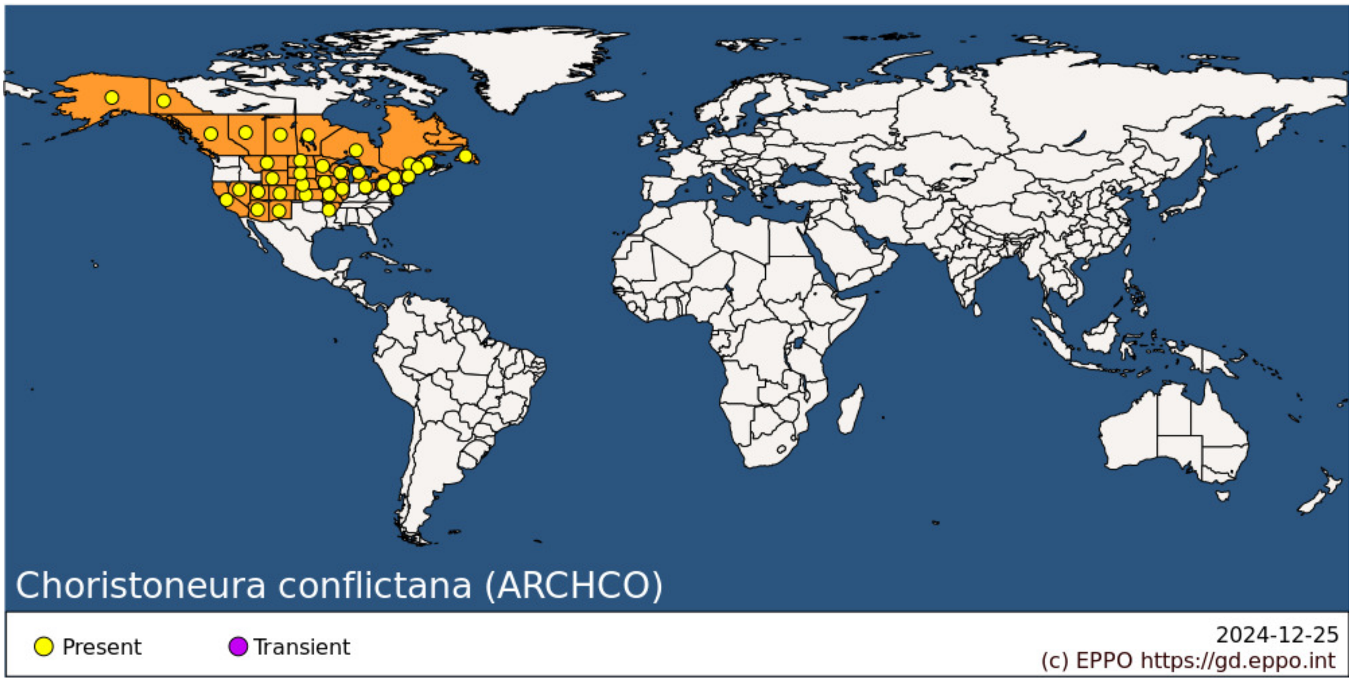
Although associated primarily with quaking aspen (*Populus tremuloides*), the larvae of *Choristoneura conflictana* feed commonly on the foliage (buds and leaves) of several Salicaceae (e.g., *Populus* spp. and *Salix* spp.) and Betulaceae (e.g., *Alnus incana*, *Betula* spp., and *Corylus* sp.), and have been recorded less frequently from *Acer* (Aceraceae), *Cornus* (Cornaceae), *Vaccinium* (Ericaceae), *Pinus* (Pinaceae), *Prunus*, *Rosa*, and *Sorbus* (Rosaceae) (Schaffner 1950, 1959, MacKay 1962, Powell 1964, Prentice 1966, Beckwith 1973, Furniss & Carolin 1977, Witter & Waisanen 1978).

Populus spp. are cultivated throughout much of Europe for timber and ornamental landscaping. In natural environments, *Populus alba* occurs commonly in riparian forests of Central and Southern Europe; the distribution of *Populus nigra* ranges from the British Isles to the Mediterranean coast; and *Populus tremula* is found predominantly in Denmark and Sweden.

Host list: *Acer negundo*, *Acer sp.*, *Alnus incana*, *Amelanchier sp.*, *Betula alleghaniensis*, *Betula papyrifera*, *Betula populifolia*, *Betula sp.*, *Cornus alternifolia*, *Corylus sp.*, *Malus sp.*, *Picea glauca*, *Pinus banksiana*, *Pinus strobus*, *Populus alba*, *Populus balsamifera*, *Populus grandidentata*, *Populus sp.*, *Populus tremuloides*, *Populus trichocarpa*, *Prunus pensylvanica*, *Prunus sp.*, *Prunus virginiana*, *Rosa sp.*, *Salix sp.*, *Sorbus sp.*, *Vaccinium sp.*

GEOGRAPHICAL DISTRIBUTION

Choristoneura conflictana is broadly distributed across the North America continent, from the Atlantic to the Pacific oceans, from Newfoundland and Labrador, Canada to Alaska, south to California, Arizona and New Mexico (Freeman 1958, Powell 1964).



North America: Canada (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Ontario, Québec, Saskatchewan, Yukon Territory), United States of America (Alaska, Arizona, Arkansas, California, Colorado, Illinois, Iowa, Kansas, Maine, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Pennsylvania, South Dakota, Utah, Wisconsin, Wyoming)

BIOLOGY

Choristoneura conflictana is a univoltine species, completing one generation per year, and overwintering in the larval stage. The flat, scale-like eggs are laid in large clusters of 60-450 on the upper surface of the host leaves from mid-June to early July, and hatch 7?10 days after oviposition. First-instar larvae are partially gregarious, congregating between leaves that they web together with silk. The larvae skeletonize the foliage, but feeding damage is not conspicuous during this stage. Starting in early August, larvae begin to disperse from foliage to overwintering sites such as bark crevices and other protected places, an activity that is completed by the end of September. Larvae then moult once and spin a white silken chamber in which they overwinter. The following May, these second instar larvae become active, mining new buds and feeding on epidermal leaf tissue, sometimes causing complete defoliation before the buds open. From the third instar until pupation, the larvae roll or fold the host leaves to make a shelter within which they feed, eating all but the larger leaf veins. It is during this period that most foliar damage occurs. Larvae complete their development and pupate from early to mid-June, and adults emerge 7?14 days following pupation, flying from late June through July.

Because second and third instar larvae remain in mined buds and developing leaf clusters for a period of 10?14 days in the spring, sampling at this time may provide an estimate of the potential population, and hence may be used for potential defoliation forecasts. For more detailed information on the biology, see Prentice (1955), Davidson & Prentice (1968), Furniss & Carolin (1977) and USDA (1979).

DETECTION AND IDENTIFICATION

Symptoms

Evidence of early infestation includes skeletonized foliage and rolled leaves; affected foliage typically has a clumped, irregular appearance (Ciesla & Kruse 2009). As feeding progresses, the crowns of infested trees become thin, and the foliage becomes yellow-brown. During heavy infestations, aspens may be completely defoliated and have a somewhat grey or brown colour. Severely affected trees may be covered with silken webbing from larvae, and understory non-host vegetation may also show evidence of larval webbing (Ciesla & Kruse 2009).

Infested trees may be completely defoliated for a year or two but normally recover with only loss of growth. Usually, defoliation occurs in early summer, and attacked trees put on new growth in mid- to late summer, but new foliage is sparse, individual leaves are smaller, and tree crowns are thinner. Outbreaks characteristically last 2 or 3 years.

Morphology

Eggs

Eggs are small, ovoid, flat, and pale green, laid in irregularly rounded, imbricate or shingle-like clusters of 60-450 eggs. They are typically found on the upper surface of leaves in June and July.

Larva

Early instar larvae are pale yellow with light brown legs and a brown head capsule. Mature larvae are variable from pale grey-green to nearly black, with small, dark brown, spot-like pinacula. The head and anal shield are uniformly reddish-brown to black, and the prothoracic shield is dark amber to black. Last instar larvae are 15?25 mm in length. The chaetotaxy, or arrangement of setae, is typically tortricine with a trisetose L-group on the first thoracic segment and a dorsal 'saddle' on abdominal segment 9, representing the fusion of the SD2 setae on that segment. Below the anal shield is a well-developed anal fork (MacKay, 1962). Detailed drawings of morphological features of the larvae can be found in Prentice (1955) and MacKay (1962), and images may be found in Ciesla & Kruse (2006), among other online publications.

Pupa

Pupae are 10?17 mm in length, and pale green when first formed, soon becoming reddish brown or black. Abdominal segments 3?8 each have two transverse rows of tiny spines on the underside, and segment 10 is produced into a rectangular cremaster with slender, hook-tipped setae. The last larval exuvium (shed skin) is often attached to the base of the pupa.

Adult

Adult moths have a wing span of 25?35 mm. The forewings are grey with three indistinct and variable darker brown fasciae: one at the base of the wing, one near the middle of the wing, and one in the apical region; the hindwings are nearly uniformly pale brownish. Although male genitalia are often characteristic for many species of Tortricidae, those of the large aspen tortrix are not particularly suitable as a diagnostic feature. Illustrations may be found in Freeman (1958) and Powell (1964).

Detection and inspection methods

Visual inspection in late May and early June may reveal rolled and/or skeletonized leaves with a clumped, irregular appearance (Ciesla & Kruse, 2009), often with webbing and frass. However, small or localized infestations may be difficult to detect. Sex pheromones also may be used to detect the presence/absence of adults during the peak flight period from late June through July.

Werner & Wheatherston (1980) discovered that the compound cis-11-tetradecenal attracted males of large aspen tortrix in stands of quaking aspen in Alaska. They indicated that the pheromone can be dispersed from polyethylene caps using Pherocon 2 traps placed 1.5 m above the ground. Over two decades later, Evenden and Gries (2006) found that traps baited with (Z)11-14-hexadecanal alone can be used to successfully monitor mated and unmated males of *C. conflictana* throughout their flight period. Jones & Evenden (2008) and Jones *et al.* (2009) provide additional information on the use of pheromones for detection of this species.

PATHWAYS FOR MOVEMENT

Passive wind dispersal of larvae via 'ballooning' can occur, and moths are capable of flight, but probably only over short distances. In international trade, *C. conflictana* may be transported in nursery stock and cut foliage of *Populus tremuloides* and other host plants.

PEST SIGNIFICANCE

Economic impact

Defoliators are by far the most important and damaging insect pests of poplars, but the extent of damage depends on the severity and frequency of defoliation, and the time of the year when defoliation occurs.

According to Furniss and Carolin (1977), under outbreak conditions, which are rare, *C. conflictana* may be considered a pest of spruce, aspen, and birch in the northern part of Western North America. Outbreaks have been reported sporadically in large stands of trembling aspen in the western provinces of Canada (i.e., Alberta, Manitoba, Saskatchewan), and during 1966?1968, a large outbreak was recorded in Central Alaska (Furniss and Carolin, 1977). Outbreaks usually last 2?3 years, and although trees may be completely defoliated for a year or two, they typically recover (Cerezke, 1992). Under outbreak conditions on aspen, larva of *C. conflictana* feed on other broad-leaved trees growing nearby. Owing to the ability of most host trees to quickly recover, limited economic damage occurs.

Control

Because severe outbreaks of the large aspen tortrix are sporadic and rare, and aspen is quite tolerant of defoliation, control measures are usually not necessary. Outbreaks tend to be short-lived (2?3 years) and are usually allowed to run their course without intervention. In addition, under outbreak conditions, large numbers of larvae may starve or move to alternative, less appropriate hosts owing to competition.

However, if it is determined that control measures are necessary, owing to severe outbreaks in heavily used recreation sites or home sites in urban-wildland interface areas, application of chemicals such as malathion are effective. Although small-scale control programs have been implemented, the level of damage by the large aspen tortrix rarely warrants the spraying of extensive stands of forest, plantations, or landscaped areas. Holsten & Hard (1985) reported that *Bacillus thuringiensis* provides significant protection of foliage against this species, but indicated that the timing of application was critical for *Bacillus* efficacy.

Sex pheromones have also been investigated for trapping and possible mating disruption (Wheatherston, 1976), and these may be used together with pheromones for control of tent caterpillar (*Malacosoma* sp., Lasiocampidae) (Jones & Evenden, 2008; Jones *et al.* , 2009).

Under natural conditions, an array of native predators and parasitoids help keep large aspen tortrix populations in check (e.g., Prentice, 1955; Cranshaw, 2016), with over 20 species of insects reported to attack eggs, larvae, and pupae, notably tachinid flies and parasitic wasps, such as *Omotoma fumiferanae* (Diptera: Tachinidae) and *Glypta* sp. (Hymenoptera: Ichneumonidae) (e.g., Torgersen & Beckwith, 1974). Predaceous insects, such as ants, wasps, and large ground beetles, also attack and feed on larvae; in addition, birds, including chickadees, vireos, and woodpeckers, consume larvae when high densities populations are found (Evenden *et al.,* 2006; Ciesla & Kruse, 2009). Fungi and viral diseases also help control populations; Burke and Percy (1982) identified eight pathogens that contribute to population collapse during *C. conflictana* outbreaks (Cerezke, 1992).

Older aspen forests tend to be more prone to dieback and tree death following defoliation. Therefore, timely harvesting of mature stands encourages development of young, vigorous aspen forests that are more tolerant and resilient to defoliator outbreaks (Ciesla & Kruse, 2009).

Phytosanitary risk

In Ontario, Canada, *C. conflictana* is considered a major defoliator of *P. tremuloides*, resulting in reduction in growth. However, data on tree mortality from defoliation is rather inconclusive (Thomas, 1978). Hence, although *C. conflictana* may present a low risk to plantations of aspen and other *Populus* spp. in Europe, it is considerably less significant than other *Choristoneura* spp. on conifers.

PHYTOSANITARY MEASURES

Prohibition of the import of plants and cut foliage of *Populus* from countries where the pest is present (i.e., USA and Canada), is an appropriate measure to prevent the introduction and spread of *C. conflictana*.

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https://gd.eppo.int

Datasheet history

This datasheet was first published in 1997 in the second edition of 'Quarantine Pests for Europe', and revised in 2022. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', ‘Hosts’, and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

CABI/EPPO (1997) *Quarantine Pests for Europe (2nd edition).* CABI, Wallingford (GB).

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