# EPPO Datasheet: *Choristoneura rosaceana*

Last updated: 2022-06-02

## IDENTITY

**Preferred name:** *Choristoneura rosaceana*
**Authority:** (Harris)
**Taxonomic position:** Animalia: Arthropoda: Hexapoda: Insecta: Lepidoptera: Tortricidae
**Other scientific names:** *Archips rosaceana* Harris, *Cacoecia rosaceana* Harris, *Loxotaenia rosaceana* Harris, *Teras vicariana* Walker, *Tortrix gossypiana* Packard, *Tortrix rosaceana* Harris
**Common names:** oblique-banded leaf roller
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**EPPO Categorization:** A1 list
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**EU Categorization:** Quarantine pest ((EU) 2019/2072 Annex II A)
**EPPO Code:** CHONRO

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### Notes on taxonomy and nomenclature

Owing to variation in forewing pattern and size, especially those of females, and its remarkably broad host range, this species has been described three different times: *Loxotaenia rosaceana* by Harris, *Teras vicariana* by Walker, and *Loztaenia gossypiana* by Packard. The oldest species name, *rosaceana*, has priority. Although historically assigned to *Loxotaenia*, *Cacoecia*, and *Archips*, over the past 60 years the species has been assigned to the genus *Choristoneura*, where it appears to have found a permanent home.

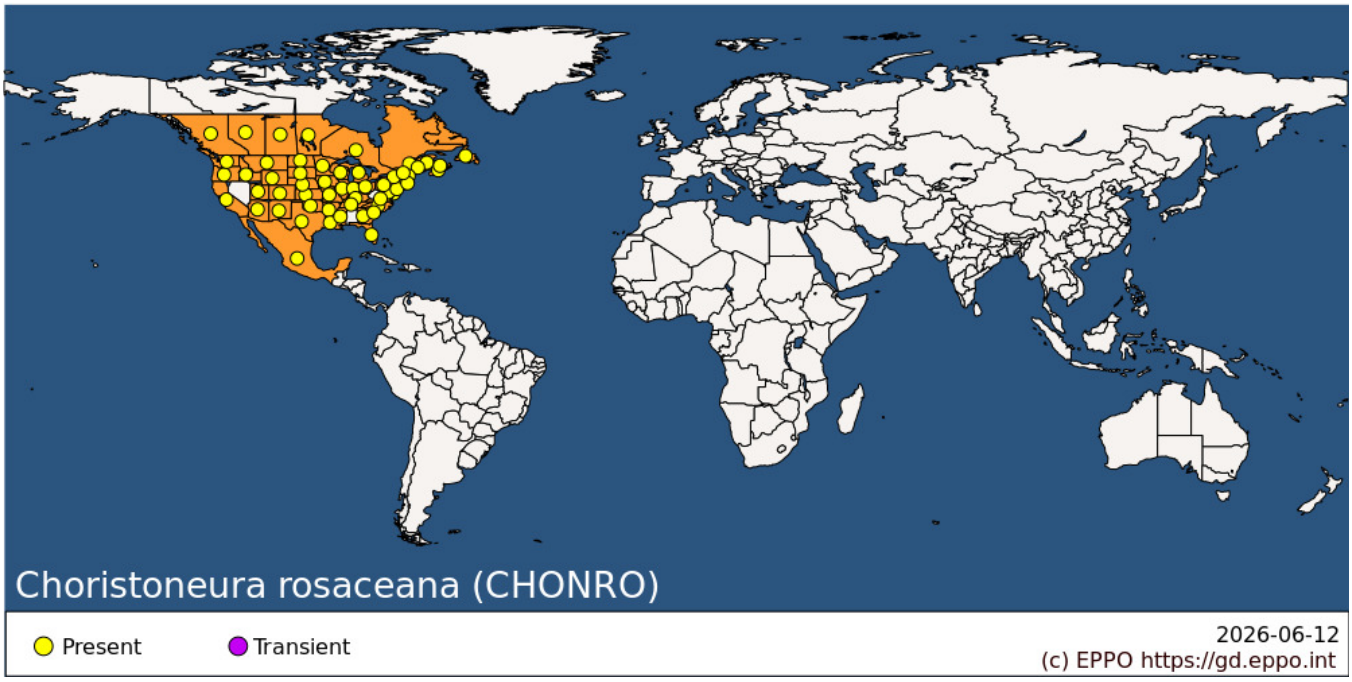
## HOSTS

*Choristoneura rosaceana* is a polyphagous leaf-roller, recorded from over 80 plant species in 24 plant families (e.g., Schuh & Mote 1948; Prentice, 1966). Its preferred hosts are Rosaceae, and it has been considered a pest of apples (*Malus domestica*) (Chapman & Lienk, 1971) and to a lesser extent of pears (*Pyrus communis*) and peaches (*Prunus persica*). Historically, *C. rosaceana* was found primarily on wild apples and other native plants, and seldom encountered in orchards (Glass, 1975); however, it now infests a wide range of cultivated plants. It has been reported from raspberries (*Rubus idaeus* and *R. strigosus*) (e.g., Knowlton & Allen, 1937; Schuh & Mote, 1948, Li *et al*., 1999) and blueberries (*Vaccinium*), on ornamental shrubs, and on a wide variety of broadleaved trees (*Acer*, *Betula*, *Platanus*, *Populus*, *Salix*, *Ulmus*). It rarely causes significant damage to forest trees or berry crops. Foliar damage has also been reported on hazelnuts (*Corylus avellana*) (Gangavalli & AliNiazee, 1985a, b; AliNiazee, 1986; Walton *et al*., 2009) and pistachios (*Pistacia vera*) (Rice *et al*., 1988). In oviposition trials, Carriere *et al*. (1995) discovered that apple and snowberry (*Symphoricarpos albus*) hosts were preferred over wild rose (*Rosa* sp.).

**Host list:** *Acer negundo*, *Acer rubrum*, *Acer saccharinum*, *Acer sp.*, *Aesculus californica*, *Alnus incana*, *Ambrosia sp.*, *Amelanchier x spicata*, *Amorpha fruticosa*, *Aster sp.*, *Betula alleghaniensis*, *Betula papyrifera*, *Betula populifolia*, *Betula sp.*, *Calycanthus occidentalis*, *Ceanothus integerrimus*, *Celtis occidentalis*, *Cercis canadensis*, *Comandra umbellata*, *Cornus florida*, *Cornus racemosa*, *Cornus sp.*, *Corylus avellana*, *Corylus sp.*, *Crataegus sp.*, *Dianthus caryophyllus*, *Fraxinus sp.*, *Geranium sp.*, *Helianthus annuus*, *Hypericum sp.*, *Lonicera periclymenum*, *Lonicera sp.*, *Malus domestica*, *Malus sp.*, *Ostrya virginiana*, *Phaseolus vulgaris*, *Pistacia sp.*, *Pistacia vera*, *Platanus orientalis*, *Populus balsamifera*, *Populus sp.*, *Populus tremuloides*, *Prunus avium*, *Prunus ilicifolia*, *Prunus pensylvanica*, *Prunus persica*, *Prunus sp.*, *Prunus virginiana*, *Pyrus communis*, *Pyrus sp.*, *Quercus agrifolia*, *Quercus alba*, *Quercus macrocarpa*, *Quercus rubra*, *Quercus sp.*, *Rhododendron sp.*, *Rhus coriaria*, *Rosa sp.*, *Rubus flagellaris*, *Rubus idaeus*, *Rubus sp.*, *Salix lasiolepis*, *Salix sp.*, *Solidago sp.*, *Spiraea sp.*, *Symphoricarpos rotundifolius*, *Syringa sp.*, *Syringa vulgaris*, *Tilia americana*, *Tilia sp.*, *Trifolium pratense*, *Typha latifolia*, *Ulmus americana*, *Ulmus sp.*, *Vaccinium corymbosum*, *Vaccinium sp.*, *Verbena sp.*, *Viburnum lentago*, *Viburnum sp.*

## GEOGRAPHICAL DISTRIBUTION

*Choristoneura rosaceana* is widely distributed across temperate North America, from Canada (e.g., Prentice 1966) to Northern Mexico (Brown, 2004; Bautista-Martínez *et al*., 2011), and from the Atlantic to the Pacific (e.g., Freeman, 1958; Powell 1964; Reissig, 2016). It is most commonly encountered at low altitudes, except in the more arid regions of the South-Western U.S. (Powell, 1964). It may be found in urban areas, gardens, greenhouses, orchards, parks, and forests.




**North America:** Canada (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Prince Edward Island, Québec, Saskatchewan), Mexico, United States of America (Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, Wisconsin, Wyoming)

## BIOLOGY

In the northern half its range and at higher elevations (e.g., Nova Scotia to British Columbia, northern Utah, mountains of California), the obliquebanded leaf roller is univoltine (one generation per year). However, in the southern half of its range at lower elevations there are two generations per year, with adult capture records extending from 11 May through 3 October in Virginia (Lam *et al*., 2012). In univoltine populations, adults emerge in early summer. Eggs laid by those females, oviposited between 04:00 and 24:00 hr (with a peak around 20:00 hr), hatch in late summer, producing first instar larvae that crawl about in search of protected places, such as buds, under the calyx of fruit, or along the midrib of a leaf. After feeding for 3?4 weeks, the larvae construct a hibernaculum, described as ‘loose cocoon’ by Venables (1924) and a ‘tightly woven silken chamber’ by Knowlton and Allen (1937), under bark, bud scales, or other protected sites, and enter an overwinter diapause. The larval stage for overwintering has been reported as the first, second or third instar (e.g., Chapman & Lienk, 1971). Larvae begin feeding again in late spring of the following year, and pupate in their leaf shelter in early summer, resulting in adults that emerge in mid- to late summer (June?August).

In bivoltine populations, overwintering larvae begin feeding earlier in the spring, producing an earlier generation (adults in May to mid-June). Larvae of this brood continue to feed through late summer, rather than entering diapause, producing a second generation of adults (flying in August?September). Eggs of this brood result in larvae that usually seek a hibernation site in October (Powell, 1964).

Gangavalli & AliNiazee (1985b) reported that an average of 111.9 degree-days (above 10°C) is required from oviposition to hatching, typically 7?10 days; 435.6 degree-days for the development of six larval instars, 22?46 days at 26.7°C.; and 117.4 degree-days (above 9.5°C) for pupal development, which is reported to last from 5?8 in New Hampshire to as long as 7?18 days in Nova Scotia (Powell, 1964). Females require 35.2 degree-days before oviposition.

At constant temperatures of 24, 20 and 16°C, larval diapause is induced by short photoperiods. A critical photoperiod of 14?15 hr of light per day at 20°C and 16°C was documented by Gangavalli & AliNiazee (1985a).

For more information on the biology of *C. rosaceana* refer also to Furniss & Carolin (1977) and Reissig (1978).

## DETECTION AND IDENTIFICATION

### Symptoms

Although *C. rosaceana* is primarily a leaf feeder, damage to buds and developing fruits (apples and peaches) (Simmons, 1973), or to fruit adjacent to leaves, can result in economic damage. On apples the most serious damage is caused by overwintering larvae which can be found inside bud clusters feeding on various floral parts. Larvae continue to feed on the flowers during bloom and developing fruit after petal fall. Afterwards they feed on both fruit and new foliage. Most damaged fruits drop before harvest, and those remaining on the tree may show corky scars and deep indentations. Newly hatched larvae of the second generation also damage fruits and may induce serious injury to the fruit skin.

On peaches, larvae not only feed on the foliage but also on the surface of the fruits, especially on peaches with open split pits, where they feed around the opened stem end and into the fleshy areas around the pit.

Although larvae are similar to those other leaf-rolling tortricids, in apples, *C. rosaceana* is by far the most frequently encountered leaf-roller (Chapman & Lienk, 1971).

### Morphology

*Eggs*

Egg masses are usually deposited on the upper surface of leaves and may contain 250 or more eggs in an overlapping pattern. The masses are generally irregularly rounded in shape, with average dimension of 5.3 x 9.2 mm (Chapman & Lienk, 1971), and covered with a translucent green colleterial secretion.

*Larva*

Last instar larvae, which are similar in color to those of the preceding instars, are green to yellowish green, 25?30 mm long, and the head is black to light brown. The prothoracic shield varies from uniformly dark (black to brown) to lacking shading altogether (concolourous with body); and the thoracic legs are dark brown to black (Chapman & Lienk, 1971; Gilligan & Epstein, 2014). The larvae are somewhat variable and similar to many other tortricids. As in most tortricids, the last abdominal segment bears a distinctive anal comb (= anal fork) below the shield.

*Pupa*

The pupa is initially pale greenish brown, becoming dark reddish brown as the adult develops. It is 10?11 mm in length, and has two rows of tiny spines across the dorsum of most abdominal segments. It also has a pronounced cremaster with four pairs of tiny hook-tipped setae at the end of the abdomen.

*Adult*

Forewing length is 7.5?11.0 mm in males, 11.5?14.0 mm in females. The forewing pattern is variable, but the majority of individuals have three, variably expressed, oblique facia extending from the costa to the hind margin. The costal margin is slightly sinuate, giving the resting adult a bell-shaped silhouette, more pronounced in females than in males. Males have a characteristic, feather-like, forewing costal fold. Colour images of adults and genitalia are available in Gilligan & Epstein (2014).

Adults are similar to other species of *Choristoneura*, especially *C. fractivittana* and *C. parallela*, although these species are considerably less common, and their males lack a costal fold (Gilligan & Epstein, 2014). Many species of *Pandemis* have a similar forewing pattern, but males of these species are easily distinguished from those of obliquebanded leafroller by the absence of a costal fold and the presence of a notch at the base of the antenna.

### Detection and inspection methods

Rolled leaves are the most obvious signs of the presence of leaf roller larvae as the larvae feed in webbed terminals, buds, and rolled leaves.

Monitoring techniques for obliquebanded leafroller vary depending on the number of generations (i.e., one vs. two) in specific regions. To survey for overwintering larvae, which are present during the period between bloom and petal fall, five terminal shoots and five fruit buds in 10 trees (50 terminals and 50 fruit buds in total) should be checked for signs of caterpillar feeding activity or overwintering shelters.The presence and density of adults can be monitored with pheromone traps (Delisle, 1992), but Thomson *et al*. (1991) provide evidence of regional differences in response to pheromone blends. Trap data can be used to establish biofix (i.e., the beginning of day-degree calculations) and to estimate population density.

## PATHWAYS FOR MOVEMENT

Local spread of *C. rosaceana* is ensured by moth flight, and by larval ‘ballooning’ on a fine line of silk (Chapman et al., 1968). In international trade, *C. rosaceana* may be moved via the transport of infested plants and/or foliage of its hosts. Since the larvae feed externally on the fruits, it is unlikely that they would be transported via commercially traded fruits.

## PEST SIGNIFICANCE

### Economic impact

*Choristoneura rosaceana* can be an economically important pest in orchards, especially on apples, but it is not considered a problem in forests or gardens. Larval feeding in buds may reduce yield, and feeding on the surface of developing fruit results in cosmetic damage that reduces fruit quality and marketability.

### Control

Obliquebanded leafroller may be controlled with insecticides that are effective against other similar sized larvae applied at petal fall. If necessary, another spray may be applied in the summer when most of the summer brood eggs have hatched. An alternative strategy is to control overwintering larvae at petal fall and apply sprays during June to kill the first summer brood adults and newly hatching larvae. Conventional organophosphate insecticides can be used in this type of program. When adult activities are monitored using pheromone traps, the first spray should be applied about 7 days after the first male moth is captured. Subsequent sprays should be applied at 14-day intervals as long as the flight period continues. In Ontario, Canada, obliquebanded leafroller has developed resistance to organophosphate insecticides in most commercial orchards. Dunley *et al.* (2006) discuss pesticide resistance in apple orchards in Washington. Cross resistance to pyrethroids and certain insect growth regulators also has been documented in some obliquebanded leafroller populations (Carriere *et al*., 1996).

Dormant oil spray followed by bloom sprays of*Bacillus thuringiensis*or sprays of spinosad (e.g., Entrust) can be used to control obliquebanded leafrollers on organically certified crops. Delayed dormant treatments and bloom time applications for other pests usually keep leafroller populations under control.

The use of sex pheromones for mating disruption may be an effective tool as part of an integrated pest management plan (Knight *et al*., 1998; Trimble & Appleby, 2004). Although several parasitoids (e.g., *Macrocentrus iridescens* and *Glypta variegata*) are known to attack obliquebanded leafroller, none adequately controls the pest. *Macrocentrus iridescens* has been observed attacking obliquebanded leafroller larvae in apple orchards of the Central Valley, Central Coast, and North Coast areas of California. *Itoplectis conquisitor* and *Meteorus trachynotus* also may play a role in integrated pest management programmes. The use of *Bacillus thuringiensis* can be highly compatible with parasitoids (Cossentine *et al*., 2013). For more information see also Hagley & Barber (1991) and Delisle (1992).

### Phytosanitary risk

Although *C. rosaceana* was added to the EPPO A1 list, it is not regarded as a quarantine pest by any other regional plant protection organization. Owing to its extremely broad host range and its wide distribution in the temperate regions of North America, *C. rosaceana* presents a risk for the EPPO region, especially for fruit trees, apples in particular.

## PHYTOSANITARY MEASURES

Measures recommended against other quarantine leafrollers, including *Choristoneura conflictana*, *Archips argyrospila*, and *Epiphyas postvittana*, should be effective against *C. rosaceana*, including the inspection of potential host plant material at ports of entry.

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### How to cite this datasheet?

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### 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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