

## Data Sheets on Quarantine Pests

*Cydia packardi***IDENTITY****Name:** *Cydia packardi* (Zeller)**Synonyms:** *Grapholitha packardi* Zeller  
*Steganoptycha pyricolana* Murtfeldt  
*Enarmonia packardi* (Zeller)  
*Enarmonia pyricolana* (Murtfeldt)  
*Laspeyresia packardi* (Zeller)  
*Laspeyresia pyricolana* (Murtfeldt)**Taxonomic position:** Insecta: Lepidoptera: Tortricidae**Common names:** Cherry fruitworm (English)

Phalène des cerises (French/Canadian)

**Notes on taxonomy and nomenclature:** Chapman & Lienk (1971) suggested that *C. packardi* might include more than one species or might include food-adapted strains, because of reported differences in the life history and seasonality on different hosts. Miller (1987) cited Chapman & Lienk (1971) as a justification for his treatment of *C. packardi* as a "complex" although the latter authors had finally concluded that, pending further research, *C. packardi* should be considered as a single species. It should be noted that the biological characteristics of the species on apple shoots were based on a few early studies that did not describe the methodology of rearing, i.e. whether they were field or laboratory studies, and these characteristics have not subsequently been confirmed by more clearly defined studies. Based on uniformity of morphological characters among specimens of *C. packardi*, present opinion is that only one species is involved.**Bayer computer code:** LASPPA**EPPQ A1 list:** No. 209**EU Annex designation:** II/A1 - as *Enarmonia packardi***HOSTS**

The major cultivated hosts are cherries, apples and *Vaccinium* spp. Other cultivated hosts that have been reported include plums, peaches, roses, pears, *Pyracantha* sp. and quinces. Wild hosts that have been reported include *Crataegus* spp. and *Prunus virginiana*. Except for *Vaccinium* (Ericaceae), all hosts are members of the Rosaceae.

The potential host range in the EPPQ region would include species of *Prunus*, *Vaccinium* and *Malus*, as well as other cultivated and wild hosts listed above, especially those in the family Rosaceae.

**GEOGRAPHICAL DISTRIBUTION***C. packardi* is indigenous to North America.**EPPQ region:** Absent.

**North America:** Canada (Nova Scotia, Ontario and British Columbia), Mexico (unconfirmed), USA (throughout eastern states, California, Colorado, Texas).

**EU:** Absent.

## **BIOLOGY**

The mature larva is the overwintering stage. Pupation occurs within the larval overwintering quarters during May or early June. For larvae that develop on cherries the pupal stage lasts about 29 days (Hoerner & List, 1952; Oatman & Ehlers, 1962); however, a pupal period of 10-14 days has been reported for larvae that develop on apple shoots (Sanderson, 1901; Garman, 1918). Adults emerge from mid-June to early July. Eggs are laid singly on terminal leaves of apple shoots or on fruits of other hosts, usually on sutures or rough areas, but sometimes on fruit stems. Eggs hatch in 7-10 days, and larvae bore into fruits (cherries, *Vaccinium*, *Crataegus*, rarely apples) or terminal shoots (apples).

In cherries and *Vaccinium*, larvae mature in about 3 weeks and emerge from fruits in mid-July to mid-August and begin to construct overwintering quarters. Larvae may tunnel into broken or pruned branches, lining the cavity with silk and sealing the opening, or may spin cocoons in crevices of bark or in the soil. All accounts indicate one generation annually (Hoerner & List, 1952; Vergeer, 1954; Dever, 1957; Oatman & Ehlers, 1962; Neunzig & Falter, 1966). Habits of larvae on *Crataegus* are similar, but two generations occur on this host in New York (Chapman & Lienk, 1971).

In apples, larvae penetrate the outer terminal leaves of the shoot and bore into the twig for a distance of 25-50 mm. As the twig dies, new shoots from lateral buds are penetrated. Terminal shoots of nursery stock and young orchard trees, and the tender "water sprouts" on trunks of old trees, may be attacked. Larvae mature during late June, and moths emerge during July. A third generation results in emergence of moths in August, and the resulting larvae overwinter in silk-lined tunnels of shoots or in cocoons in crevices of bark (Sanderson, 1901; Chapman & Lienk, 1971).

## **DETECTION AND IDENTIFICATION**

### **Symptoms**

Fruit or shoot tips of hosts may be infested by larvae. Infested cherries have a narrow, brown, irregular tunnel leading from a small entrance hole (visible with a hand lens) to a sunken brownish area over the larval feeding site; mature infested cherries are black and distorted, as figured by Oatman & Ehlers (1962). External evidence of infestation of cherries by young larvae is occasionally not detectable (Hoerner & List, 1952). Infested apples may be detected by the presence of larval mines just below the skin of the fruit; fruit damage is less common than shoot damage, which is indicated by blight of terminals and the formation of new shoots from lateral buds (Garman, 1918). The presence of a larva in an apple shoot is often indicated by a zigzag, knotty shoot that retains a leaf petiole at its tip, as figured by Sanderson (1901).

### **Morphology**

#### **Eggs**

Oval, about 0.55 x 0.65 mm, initially opaque and pale-cream in colour, with embryo and head capsule of larva becoming visible before hatching (Oatman & Ehlers, 1962; Chapman & Lienk, 1971).

#### **Larva**

First instar white with black head; final instar with pale-pink body, head light-brown with darker-brown pattern near stemmata, prothoracic shield pale-brown, anal shield brown, dorsal pinacula on eighth and ninth abdominal segments large, brown, and often confluent

(paler and smaller in *C. molesta* and *C. prunivora*), anal fork present, body length 7.5-9 mm, head width 0.85-0.94 mm (Garman, 1918, figure of setation; MacKay, 1959, figure of setation; Chapman & Lienk, 1971, colour figure of head and thorax).

#### **Pupa**

Golden-brown, about 6 mm long, abdominal segments two to nine with one or two rows of dorsal spines, segments four to six with double row or very irregular row of spines (single, regular row in *C. molesta* and *C. prunivora*), spiracles round; in tightly woven cocoon (Garman, 1918, figure; Chapman & Lienk, 1971).

#### **Adult**

Forewing length 4-5 mm, wing-span 9-11 mm, colour greyish-brown, darker in females, with broad, transverse band across middle, less distinct in females, male underside with brown spot from near base to midwing; male hindwing with large, dark-brown spot on basal half, female hindwing with basal half pale. Adult male figured by Garman (1918), Chapman & Lienk (1971) (colour) and Miller (1987); male and female genitalia figured by Heinrich (1926) and Miller (1987).

### **MEANS OF MOVEMENT AND DISPERSAL**

*C. packardi* could be transported as larvae in raw fruit or as overwintering larvae on host plants, especially nursery stock. The pest has been intercepted by USDA inspectors in fruit imported from Mexico (e.g., USDA, 1960; 1963). The adults could be dispersed for short distances by wind.

### **PEST SIGNIFICANCE**

#### **Economic impact**

Fruits of all recorded hosts, except peaches, are known to be attacked, although larvae have been recorded infrequently from fruits of apples, pears and plums. In apples, terminal shoots are usually attacked, and on peaches one questionable record of feeding on shoots is known (Garman, 1918). *C. packardi* has not been considered a significant pest of either apples or peaches since the early part of the 20th century.

*C. packardi* was considered a major pest of cherries from 1914 to the 1960s, although it was primarily a problem in poorly sprayed orchards (Hoerner & List, 1952; Oatman & Ehlers, 1962). In Colorado, infestations of 2-3% were reported as common, and a few of 6-8% were noted (Hoerner & List, 1952).

*C. packardi* has been reported as an occasional pest of *Vaccinium* in North Carolina, Michigan and New Jersey (Vergeer, 1954; Neunzig & Falter, 1966).

#### **Control**

Insecticide treatments for control of *Cydia pomonella* (codling moth), *Rhagoletis pomonella* (apple maggot) and *R. cingulata* (cherry fruit fly) provide incidental control of *C. packardi*.

Parasites reported for *C. packardi* include *Chelonus grapholithae* (Braconidae), *Phanerotoma fasciata* (Braconidae), *Scambus transgressus* (Ichneumonidae), *Glypta rufiscutellaris* (Ichneumonidae), *Psychophagus omnivorus* (Pteromalidae) and *Euderus cushmani* (Eulophidae) (Krombein *et al.*, 1979).

#### **Phytosanitary risk**

*C. packardi* was recently added to the EPPO A1 list of quarantine pests, but is not listed as a quarantine pest by any other regional plant protection organization. Originally, EPPO recognized that it presented a rather minor risk for the EPPO region, which could be

adequately covered by measures taken against more important North American pests (*Rhagoletis cingulata*, *R. indifferens*; EPPO/CABI, 1996)

## PHYTOSANITARY MEASURES

Measures taken against *Rhagoletis pomonella* and other North American *Rhagoletis* spp. (OEPP/EPPO, 1990; EPPO/CABI, 1992; 1996) will be effective against *C. packardi*.

## BIBLIOGRAPHY

- Chapman, P.J.; Lienk, S.E. (1971) *Tortricid fauna of apple in New York (Lepidoptera: Tortricidae); including an account of apples' occurrence in the State especially as a naturalized plant*, 122 pp. New York State Agricultural Experiment Station, Geneva, NY, USA.
- Dever, D.A. (1957) Notes on the biology of the cherry fruit worm in Wisconsin. *Wisconsin Academy Sciences, Arts and Letters Transactions* **45**, 111-124.
- EPPO/CABI (1992) *Rhagoletis* spp. In: *Quarantine pests for Europe* (Ed. by Smith, I.M.; McNamara, D.G.; Scott, P.R.; Harris, K.M.). CAB International, Wallingford, UK.
- EPPO/CABI (1996) *Rhagoletis cingulata. Rhagoletis indifferens. Rhagoletis pomonella*. In: *Quarantine pests for Europe*. 2nd edition (Ed. by Smith, I.M.; McNamara, D.G.; Scott, P.R.; Holderness, M.). CAB INTERNATIONAL, Wallingford, UK.
- Garman, P. (1918) Comparison of several species of Lepidoptera infesting peach and apple in Maryland, with additional notes on the oriental peach moth. *Maryland Agricultural Experiment Station Bulletin* No. 223, 103-126.
- Heinrich, C. (1926) Revision of the North American moths of the subfamilies Laspeyresinae and Olethreutinae. *United States National Museum Bulletin* No. 132, 216 pp.
- Hoerner, J.L.; List, G.M. (1952) Controlling cherry fruitworm in Colorado. *Journal of Economic Entomology* **45**, 800-805.
- Krombein, K.V.; Hurd, P.D.; Smith, D.R.; Burks, B.D. (1979) *Catalog of Hymenoptera in America North of Mexico*. Smithsonian Institution Press, Washington, DC, USA.
- MacKay, M.R. (1959) Larvae of the North American Olethreutinae (Lepidoptera). *Canadian Entomologist* Suppl. No. 10, 1-338.
- Miller, W.E. (1987) Guide to the olethreutine moths of midland North America (Tortricidae). *United States Department of Agriculture, Forest Service, Agriculture Handbook* No. 660, 104 pp.
- Neunzig, H.H.; Falter, J.M. (1966) Insect and mite pests of blueberry in North Carolina. *North Carolina Agricultural Experiment Station Bulletin* No. 427, 34 pp.
- Oatman, E.R.; Ehlers, C.G. (1962) Cherry insects and diseases in Wisconsin. *Wisconsin Agricultural Experiment Station Bulletin* No. 555, 43 pp.
- OEPP/EPPO (1990) Specific quarantine requirements. *EPPO Technical Documents* No. 1008.
- Sanderson, E. D. (1901) Three orchard pests. I. The apple bud-borer. II. The fruit-tree bark-borer. III. The periodical cicada. *Delaware College Agricultural Experiment Station Bulletin* No. 53, 3-19.
- USDA (1960) *List of intercepted plant pests, 1959*, 86 pp. United States Department of Agriculture, Agriculture Research Service, Plant Quarantine Division, Washington, DC, USA.
- USDA (1963) *List of intercepted plant pests, 1962*, 88 pp. United States Department of Agriculture, Agriculture Research Service, Plant Quarantine Division, Washington, DC, USA.
- Vergeer, T. (1954) The cherry fruitworm (*Grapholitha packardi*) as a blueberry pest in Michigan. *Michigan Agricultural Experiment Station Quarterly Bulletin* No. 36, 370-373.