The European Grape Vine Moth NOT Found In California: *Eupoecilia ambiguella* (Hübner)

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Figure 1. The Instituto Agrario di San Michele all'Adige (IASMA) Research Centre in Trento Province, Italy

The European grape vine moth (EGVM), *Lobesia botrana* ([Denis & Schiffermüller]), an invasive Palearctic grape pest, was discovered in Napa Valley in September 2009. The species is in the Lepidoptera family Tortricidae, a group commonly known as leaf-roller moths. Another European tortricid grape pest, *Eupoecilia ambiguella* (Hübner), is sometimes confused with EGVM because the two species are often referenced by the same common names: European grape vine moth, European grape berry moth, grape berry moth, vine moth, grape leaf roller, or grape fruit moth. The two species also share nearly identical larval biology, their native distributions overlap, and the larvae cause similar damage to grape. *Eupoecilia ambiguella* is widely distributed across the Europe and parts of Asia, where it is more common in cooler and humid climates than *L. botrana*, and it is not considered established outside of the Palearctic.

In late August 2010 we visited the IASMA (Instituto Agrario di San Michele all'Adige) Research Centre in the Trento Province of northern Italy (Figure 1). Both *E. ambiguella* and *L. botrana* are found in Trentino-Alto Adige vineyards, although *E. ambiguella* occurs at higher elevations and *L. botrana* is more common in the lower valleys. Here we compare and contrast these two grape moths and provide some basic diagnostics to identify *E. ambiguella* adults and larvae.

Recognition

Adult

The forewing is yellow or yellowish orange with a well defined dark brown to black median fascia (Figure 2A, Figure 4). Males and females exhibit no sexual dimorphism in wing pattern although females may be slightly larger than males. Males lack a forewing costal fold. Male genitalia are distinguished by a reduced uncus, short socii, prominent transtilla, distally triangular valva, and large aedeagus (Figure 3A). Female genitalia are distinguished by a broad, short ductus burase and a corpus bursae with numerous sclerotizations and spines (Figure 3B).

The adult forewing length is 6.0-7.5 mm. Although this overlaps in size with *Lobesia botrana*, the two are easily separated: *L. botrana* has leaden gray, brown and cream-colored forewings (Figure 2B) in contrast with the yellow *E. ambiguella*. *Eupoecilia ambiguella* may be confused with other species of *Eupoecilia* or European members of the tortricid tribe Cochylini, although *E. ambiguella* is the only species in this group commonly associated with grape. A genitalic dissection can be used to confirm *E. ambiguella* adults if necessary.

Larva

Late instar larvae are approximately 10-12 mm in length (Figure 5). The head, prothoracic shield, and legs are dark brown to black. Body color varies from brown to yellow and green. Pinacula are large, conspicuous, and brown. The anal shield is pale brown.

Larvae cause damage similar to *Lobesia botrana* and the two species can be found sympatrically. Other tortricid grape pests include: *Argyrotaenia franciscana*, *Argyrotaenia ljungiana*, *Epiphyas postvittana*, *Paralobesia viteana*, *Platynota stultana*, and *Proeulia* species. Larvae of *E. ambiguella* can be separated from

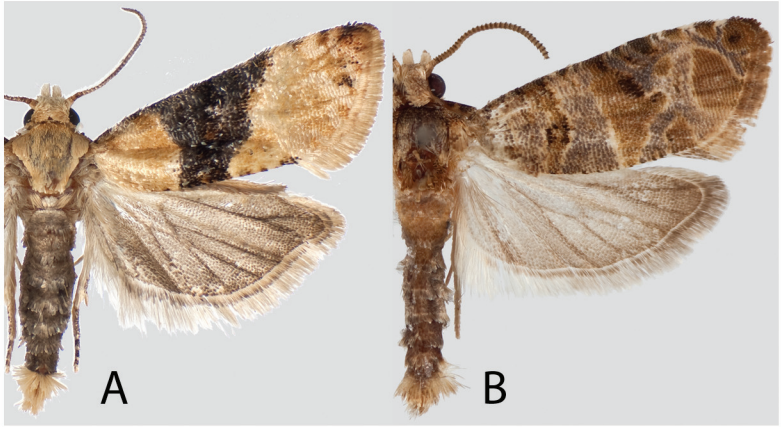

Figure 2. A: *Eupoecilia ambiguella* adult; B: *Lobesia botrana* adult .

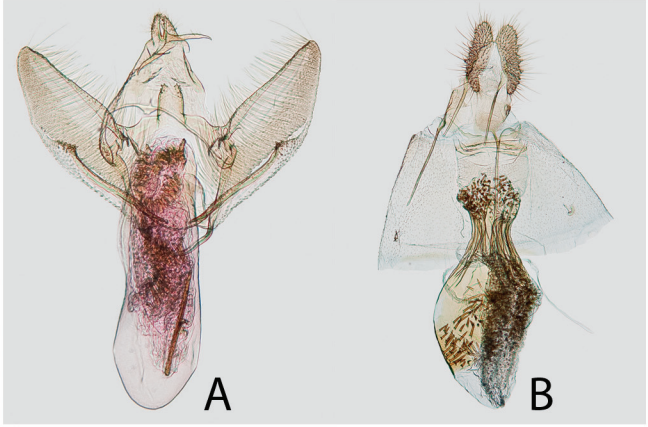

Figure 3. A: *Eupoecilia ambiguella* male genitalia; B: *E.ambiguella* female genitalia

the larvae of the other tortricid grape-feeding pests listed here by the L-group (or prespiracular) pinaculum on T1, which extends horizonally beneath the spiracle in *E. ambiguella*. *Lobesia botrana* larvae are easily separated by having no extension of this pinaculum below the spiracle and having light-colored, less conspicuous pinacula.

Biology

The life cycle of *E. ambiguella* is similar to that of *Lobesia botrana*, with the exception of two generations for *E. ambiguella* versus three or more generations for *L. botrana*. Over most of its range, adults are present in May and June for the first generation and again in August and September for the second generation.

Females deposit eggs singly on buds, pedicels, and flowers during the first generation and on grape berries during the second generation. Early instar larvae burrow into the buds or berries and feed internally; later instars web together buds or berries, and a single larva can feed on up to a dozen berries. Pupation occurs in leaves for the first generation and under bark for the second generation. Overwintering occurs as a second generation pupa. Development time is highly dependent on temperature and humidity. The optimum relative humidity level for development is 70% or higher; eggs will fail to hatch at low relative humidity levels.

Economic losses on grape are caused by direct feeding damage and secondary infections. Feeding damage is similar to that of Lobesia botrana, with larvae of the first generation causing minor damage by feeding on flower buds, and those of the second generation causing the most damage by feeding on grape berries. The most significant losses are due to secondary infection of feeding sites on berries and clusters by *Botrytis cinerea*. Economic thresholds vary with the type of grape and cultivar.

Host plants

Although grape (*Vitis vinifera*) is the most economically important host, *E. ambiguella* has been recorded from plants in several families (Table 1).

Summary

The recent discovery of *L. botrana* in Napa Valley demonstrates that California vineyards are vulnerable to invasive tortricid grape pests. Although not yet recorded from North America, *E. ambiguella* is an important pest of grape in the Palearctic and could become a significant threat if introduced into California. This contribution provides information that can be used to identify *E. ambiguella* adults and larvae and characters to separate them from *L. botrana*.

Table 1: Partial host list for *E. ambiguella*.

Family	Scientific Name	Common Name
Aceraceae	*Acer campestre* L.	hedge maple
Araliaceae	*Eleutherococcus* Maxim.	Siberian ginseng
Araliaceae	*Hedera helix* L.	English ivy
Araliaceae	*Hedera* L.	ivy
Caprifoliaceae	*Lonicera* L.	honeysuckle
Caprifoliaceae	*Lonicera periclymenum* L.	European honeysuckle
Caprifoliaceae	*Lonicera ramosissima* Franch. & Sav. ex Maxim.	
Caprifoliaceae	*Symphoricarpos* Dunham.	snowberry
Caprifoliaceae	*Viburnum* L.	viburnum
Cornaceae	*Cornus* L.	dogwood
Cornaceae	*Cornus mas* L.	Cornelian cherry
Cuscutaceae	*Cuscuta* L.	dodder
Cuscutaceae	*Cuscuta reflexa* Roxb.	giant dodder
Grossulariaceae	*Ribes* L.	currant
Oleaceae	*Ligustrum* L.	privet
Oleaceae	*Syringa* X *persica* L.	Persian lilac
Rhamnaceae	*Frangula alnus* Mill.	glossy buckthorn
Rhamnaceae	*Rhamnus* L.	buckthorn
Rosaceae	*Prunus* L.	
Vitaceae	*Parthenocissus quinquefolia* (L.) Planch.	Virginia creeper
Vitaceae	*Vitis vinifera* L.	wine grape

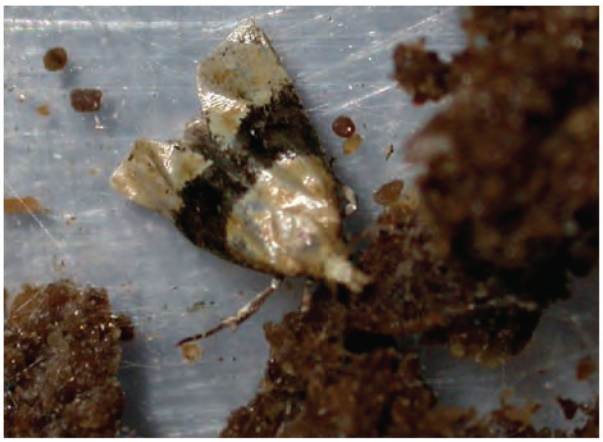

Figure 4. *Eupoecilia ambiguella* adult in IASMA lab colony in Italy

Figure 5. *Eupoecilia ambiguella* larva in lab colony in Italy

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