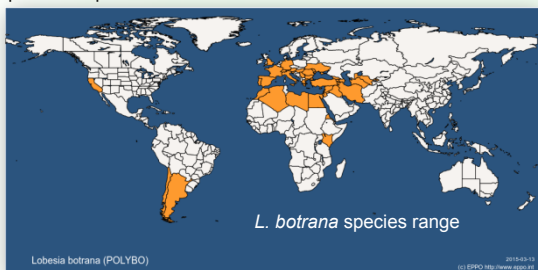


### Lobesia botrana - Background

*Lobesia (=Polychrosis) botrana* (Denis et Schiffermuller) (Lepidoptera: Tortricidae), also known as the European grapevine moth (EGVM) is traditionally a major vineyard pest throughout Europe, the Middle East, North and West Africa, and Southern Russia. Native of South Europe, it was more recently reported in Chile and Argentina (2008) and found in the United States (Napa Valley) in October 2009. *Lobesia botrana* is regulated as a quarantine pest in a number of countries.



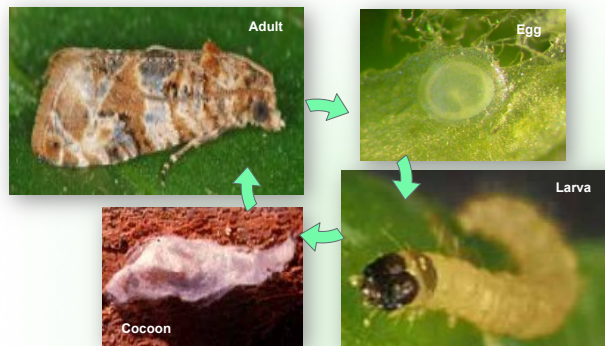
*L. botrana* is a major cause of economic damage to grape for its direct damage to the berries and for providing entry sites to fungal infections. Potential instances of *Lobesia* resistance to organophosphate, pyrethroid, oxadiazine and spinosyn insecticides have been reported in the scientific literature.

### Damage and Symptoms

In spring, the 1st generation *L. botrana* larvae web and feed on the flower clusters whilst the subsequent generations bore and feed on berries. Larval feeding can lead to desiccation of significant bunch portions and, under wet seasons, actively favours the establishment of fungal infections (e.g. *Botrytis* and other secondary fungi). Losses up to 40% in the harvest can occur as a result of direct damage to the fruit and subsequent fungal infections.



### Life Cycle



*Lobesia botrana* can have two to four generations per year depending on the climatic conditions and the date of grape harvest.

### Key Management Strategy: Integration of Control Measures

The basis for effective and sustainable management of *L. botrana* is the integration of cultural, behavioral, biological and chemical control tactics.

#### Cultural

- Varietal susceptibility
- Fertilizing practice
- Vine training and canopy management
- Quality spray equipment
- Harvest date

#### Biological and behavioural

- Preservation of predators and parasitoids
- Pheromone-baited traps
- Mating disruption technique
- Organic insecticides

#### Chemical

- Adopt insecticides compatible with natural enemies
- Avoid exposing two subsequent generations to the same MoA
- Applications on risk thresholds, based on local advisory tools
- Prefer ovicidal timing to prevent larval penetrations



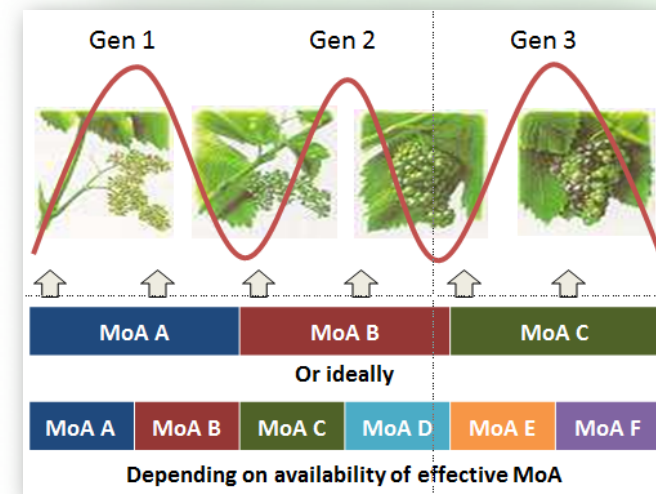
### Insecticide Resistance Management

Control of *Lobesia botrana* may require multiple insecticide applications in one season. Foliar sprays are mostly targeted to the control of the 2<sup>nd</sup> generation in wine grapes, and the 2<sup>nd</sup> and 3<sup>rd</sup> generations in table grapes. Normally 1 to 3 applications are needed in wine grapes and up to 6 in late-maturing table grapes.

#### Insecticide Resistance Management (IRM)

Sustainable IRM management programs are based on the integration of as many pest management tools as possible. Use insecticides only when needed, based on established thresholds and alternating effective insecticides belonging to different MoA groups. The adoption of all applicable control measures (including mating disruption) together with MoA group alternation remains best IRM strategy, as it minimizes the selection pressure for resistance.

#### Insecticide Mode of Action (MoA) Window Approach



The basic rule for adequate rotation of insecticides by MoA is to avoid treating consecutive generations of the target pest with insecticides in the same MoA group, by using a scheme of "MoA treatment windows" in which every single *L. botrana* generation is regarded as a "window" where an insecticide MoA could be applied once or twice.

**Note:** For a comprehensive list of existing insecticides classified by MoA group, visit the IRAC website (<http://www.irc-online.org/research/modes-of-action>). In the "window rotation scheme", use as many effective MoA groups as locally registered/available and always follow product labels for specific directions of use.