

# Lobesia Workshop, April 5-6, 2011, Rhodes

## Workshop Summary of Control Measures against *Lobesia botrana*

### Introduction

In Europe, two lepidopteran grape vine pests occur: *Lobesia botrana* (*Polychrosis* = older genus name) and *Eupoecilia ambiguella* (*Clysia* = older genus name). *Lobesia* is also called the European Grape vine moth (EGVM) and besides being the prevalent species in most of Europe, it has established itself recently in Argentina, Chile and California (USA). *Eupoecilia* is called the grape bud moth; it occurs mainly as secondary species and has one dark band across the wings. This workshop covered mainly *Lobesia botrana* (Eudémis, Bekreutzter Traubenwickler), see picture below.



### Hosts for Lobesia

Regarding population dynamics, *Lobesia* has a number of wild plant hosts on which it can feed. Some of these hosts are suitable during the spring time, a few others throughout the year. These wild hosts provide a source of *Lobesia* to re-infest grape. *Lobesia* can develop locally on up to a dozen hosts and worldwide on more than 2 dozen wild hosts such as *Thymelaea hirsuta*, honey suckle spp (*Caprifoliaceae*), *Malva* spp, *Rubus idaeus* (raspberry), *Rosmarinus officinalis* (rosemary), etc.

### Lobesia life stages and infestation

In many European countries *Lobesia* has two or more generations. In warmer climates around the Mediterranean a 3<sup>rd</sup> or 4<sup>th</sup> generation occurs depending on local climatic conditions. Adults emerge from pupa when the air temperature exceeds 10 °C for 10 – 12 days. In various countries with *Lobesia* infestations phenological models are available from extension or research institutes to predict the progression of the pest throughout the season.

In Italy, the peak of the first generation adult flight is around end of April-beginning of May, with the second flight around June 25<sup>th</sup> and the 3<sup>rd</sup> generation flight in August. In the south of France the 1<sup>st</sup> *Lobesia* flight is in the 2<sup>nd</sup> week of May. In warmer local climatic areas the first flight is in early April, with a second one in early-mid June.

## Lobesia Workshop, April 5-6, 2011, Rhodes

Table 1 provides a general indication of the duration of each of the life stages of *Lobesia*. At the beginning of the grape growing season *Lobesia* females deposit eggs on grape stems and flower clusters, while for other generations the eggs are laid on or near the grape berries. The first generation caterpillar feeds on grape flower buds. This is in general not considered of economic importance, although there are exceptions (see figure 1 and 4). However if left untreated this population will provide the basis for increased *Lobesia* pest infestation during the summer.

Table 1. Duration of life stages of *Lobesia botrana*

|                    | Egg         | Larva    | Pupa      | Adult     |
|--------------------|-------------|----------|-----------|-----------|
| First Generation   | 8 – 11 days | ~30 days | 6-14 days | 1-3 weeks |
| Summer Generations | 4 – 7 days  | ~20 days |           |           |
| Over-wintering     |             |          | As pupa   |           |

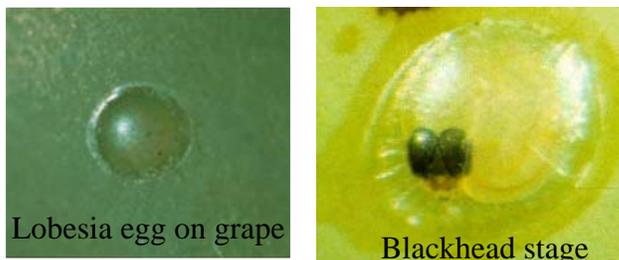
Figures 1 – 5. *Lobesia* larvae on respectively grape flower buds, green grapes and ripe grapes. Early and late season grape damage are shown.



## Lobesia Workshop, April 5-6, 2011, Rhodes

### Lobesia pest monitoring

Pest monitoring for either one or both grape caterpillar species (*Lobesia* and *Eupoecilia*) is done using pheromones. Only males are attracted to the pheromones. In addition to monitoring with pheromone trapping, egg laying and egg development are carefully monitored. Egg development can be tracked by observing the development of the caterpillar embryo through the translucent egg shell. Various stages of egg development are “milky” and “black head” stages (see pictures below). More precise timing for insecticide applications can be obtained with monitoring egg development.



Figures 6, 7: Lobesia pheromone trap for monitoring adult flight, and catch.



### Lobesia pest management

#### *Changes in EU agriculture.*

In many countries of the European Union it will become more difficult to solely rely on conventional insecticide treatments for *Lobesia* and other pests. Judicious use of conventional chemical insecticide together with the use of biorational (*Bacillus thuringiensis*, others) and biotechnological (pheromones) control products makes good common sense. This approach will be mandated by EU regulations in a few years. Directive 2009/128/EC of the European Parliament and EU Regulation (EC) No 1107/2009 as well as country specific programs have established a framework to achieve the sustainable use of pesticides, which includes an increase in importance of biological and biotechnological control. Submission of national pest control plans will be required by 2012 with mandated implementation by 2014. Due to these regulatory mandates, a number of grape experts see the market for Bt use in grapes increasing.

## Lobesia Workshop, April 5-6, 2011, Rhodes

In addition to the change in EU regulations, managing insecticide pest resistance remains an important aspect of any good pest control program. The best strategy to avoid conventional insecticide pest resistance is by incorporating a completely different mode of action product into the treatment program. Alternative mode of action chemical insecticides such as DiPel® and XenTari® can be easily incorporated into any treatment program via either simultaneous (tank mix) or alternating (rotation) application with the conventional insecticide of pest resistance concern. Bt products have a unique mode of action and there have been no cases of cross resistance between chemical insecticides and Bt sprayable products in more than 40 years of use. Lastly, EU consumers and large food companies are demanding lower and lower chemical residue levels on food crops, which again provides opportunities for biological and biotechnological pest control products. During the workshop we learned that in areas of Spain 90% of the table grapes are for export. It is now compulsory to have no chemical residue on/in the grapes grown in those areas.

### *Lobesia control options*

During the workshop we learned that in some areas of Europe indoxycarb and flufenoxuron do not provide sufficient control against *Lobesia* due to resistance issues. In those areas better control of *Lobesia* is obtained with rynaxypyr or flubendiamide (these active ingredients have the same Mode of Action), emamectin benzoate, spinosad, and *Bacillus thuringiensis*. In some countries Bt is mixed with sulfur and applied as a dust. Pyrethroids are not much in use on grapes in Italy, France or Spain. Pyrethroids, in addition to being harmful to beneficial arthropods, can cause a sudden increase (flare-up) of secondary pests (mealy bugs and mites).

In terms of *Lobesia* control options, the distinction must be made between the grape crops: Table or wine.

--Wine grapes in general have fewer profits and less costly pest control programs are followed. A typical pest control program can consist of pest scouting in the vineyards and the use of mainly organophosphates (chlorpyrifos, etc) and insect growth regulators (IGRs).

--Table grapes on the other hand require more investment in pest control. Because of export, the MRL of chemical insecticides needs to be taken into consideration. MRL concerns force export table grape growers to apply chemical insecticides against the 1<sup>st</sup> *Lobesia* generation, if that population becomes too high, or against the 2<sup>nd</sup> generation of larvae. Growers use Bt in the weeks before harvest to avoid having chemical residues on the crop.

In several cases across Europe combinations of various products are used in best grape management practices. Bt plus sulfur dusting is done frequently in Greece. Tank mixing among chemical insecticides is performed, for example pyrethroids plus an IGR (Greece) against 2<sup>nd</sup> generation *Lobesia* larvae. This combination of insecticides not only improves *Lobesia* control

## Lobesia Workshop, April 5-6, 2011, Rhodes

efficacy but also controls multiple other insect pests. In some instances IGR and Bt or pyrethroid and Bt are applied in a tank mix.

The use of pheromone mass confusion for *Lobesia* control or *Lobesia* and *Eupoecilia* combination control is promoted in many areas of Europe. This technique was first developed in grapes in the 1980's with technology advancements in 1999. Pheromone use is complimentary with Bt or insecticide use and is becoming more common in many table grape areas and areas with high value wine grapes. Pheromone use is particularly common in areas with government subsidies to the growers. Pheromone mass confusion devices are placed before the start of the 2<sup>nd</sup> adult generation or at the onset of the 1<sup>st</sup> adult flights. Field efficacy longevity of pheromone dispensers has to be taken into account by the grower at time of placement. In many wine producing areas of France, the use (and cost) of pheromones has not been accepted by the growers. In Germany, government large money subsidies to growers have led to a 65% acceptance of the pheromone mass confusion technique for *Lobesia* and *Eupoecilia* control.

### *Other insect pests on grape*

*Lobesia botrana* is not the only pest on grapes. In some areas the main insect pest is *Frankliniella occidentalis* (Western Flower Thrips) and other thrip species occur during bloom and post bloom periods. In other cases there can be mite flare-ups later in the summer.



### **Application and coverage**

Many modern insecticides act through the pest ingesting the insecticidal product. This is also the case with Bt products. The efficacy of Bt products is greater in smaller caterpillars than for the older larval stages (instars), therefore timing is important for optimizing the efficacy of a Bt application. Best timing of a spray application can be determined with a short egg laying period, i.e. a more “defined” adult flight period. The *Lobesia* flight periods can be monitored with pheromone traps. The start of egg laying as well as egg development can be determined through field scouting. These techniques are commonly employed in large grape growing areas. Agricultural services play an important role for growers by putting out *Lobesia* occurrence alerts, providing pest development updates, and issuing insecticidal spray advisories.

## Lobesia Workshop, April 5-6, 2011, Rhodes

In the France and Spain, tests were carried out to determine optimal timing of Bt applications in a vineyard. The best program against the 2<sup>nd</sup> generation of *Lobesia* was a Bt application followed by a chemical (spinosad or other) application with an interval of 10 days. The first spray application was timed with a certain stage of egg development. Development of the *Lobesia* embryo in the egg is especially visible with the pronounced back head capsule (Tête Noir, Cabeza Negra). The best timing for Bt efficacy seems to be just before development of the black head stage. This is in contrast with applications of contact insecticides such as chlorpyrifos. These types of insecticides have insecticidal action aimed for already hatched larvae.

Good targeted spray coverage in any pesticide treatment is essential for pest control efficacy. Good coverage however is not synonymous with using large volumes of spray mixture. Large volumes tend to dilute the active ingredients, and since many newer insecticides (rynaxypyr, flubendiamide, indoxacarb, spinosad) need to be ingested by the pest, a more concentrated AI spray by using moderate water volumes is advised. Directional spray tips help with target placement of AI on the plant surfaces. Several spray techniques are available such as spraying with hydraulic pressure (boom sprayer) or air-assist (airblast, pneumatic) sprayers. Please remember that some of the chemistry insecticidal products are prohibited from airblast spraying. There are no such restrictions with DiPel<sup>®</sup> and XenTari<sup>®</sup>.



When grape clusters are firming up and closing, the use of adjuvants may help in improving penetration of the spray liquid. In addition positive field results have been found by adding sugar to the spray tank (1 Kg/100 L) to entice the young *Lobesia* larvae to continue surface feeding on the insecticidal spray deposits. All *Lobesia* insecticides have better efficacy while the larvae remain on the surface feeding longer and not entering the grape berries. Quality Bt products such as DiPel<sup>®</sup> and XenTari<sup>®</sup> quickly stop *Lobesia* feeding after the larvae have ingested the active ingredient. The speed of feeding inhibition is similar to that of the new conventional chemistries such as rynaxypyr and flubendiamide.

Further information on DiPel<sup>®</sup> and XenTari<sup>®</sup> can be found on various websites including:

[www.biorationalapproach.com](http://www.biorationalapproach.com) and in Spanish [www.btbioracional.com](http://www.btbioracional.com)

## Lobesia Workshop, April 5-6, 2011, Rhodes

### Acknowledgements

Valent BioSciences Corporation and Sumitomo Chemical Agro Europe thank all participants of the workshop for their contribution. The summary was prepared by Dirk Avé (VBC).

Thanks go out to Georges Kassis (SCAE), Roberto Barbolini (Isagro-Italia), Patricia Valle (Kenogard), Jean-Luc Comptour (Philagro France) for organizing the speakers, and thanks also to Denis Troalen (SCAE), Pieter van Blommestein (SCAE) and John Hren (VBC) for contributions during the workshop.

Special thanks for Julie Ruchon (SCAE) for her great organizational skills to keep the workshop on track.

**Above all, a warm appreciation to all speakers for making the Tuta Workshop a success. The expert presentations, opinions and discussions were greatly appreciated.**

**This Summary has been assembled from contributions of the following experts during the Lobesia Workshop on April 5, 2011, sponsored by Valent BioSciences Corporation and Sumitomo Chemical Agro Europe.**

**Dr. N. Reditakis** (NAGREF-PPIH, Lab. of Entomology & Ag. Zoology, Greece).

**Dr. M. Boselli** (Plant Protection Service, Emilia-Romagna Region, Italy)

**Dr. J. G<sup>a</sup> de Otazo** (Plant Protection Service, Lleida, Cataluña Region, Spain)

**Mr. A. Lucas** (Plant Protection Service, Murcia Region, Spain)

**Mr. M. Guissett** (Chambre of Agriculture, Roussillon, Pyrénées-Orientales, France)