An area wide program in the vineyards of Cariñena (Spain) for the control of *Lobesia botrana* by mating disruption: approach, implementation, first results

Andrea Lucchi\(^1\), Paolo Sambado\(^2\), Ana Belen Juan Royo\(^2\), Alejandro Narvaiza Martinez\(^3\), Bruno Bagnoli\(^4\)

\(^1\)DISAAA-a, University of Pisa, Italy; \(^2\)CBC Iberia S.A., Spain  
\(^3\)Terruño, Spain; \(^4\)DIBAF, Tuscia University, Viterbo, Italy
Introduction

**Location:**

Country: Spain  
Region: Aragon  
Capital: Zaragoza

Cariñena DOP

- Historical wine producing area
- Total grape surface is 14,388 ha
- 14 towns are included in the DO
- Around 1,540 grape growers

Grape growing and wine production is the region's main source of income
Cariñena DOP

Composed by 33 cooperative and private wineries

- Bodegas San Valero
- Grandes vinos y Viñedos
- Covinca
- Bodegas Paniza

Main varieties
- Garnacha
- Tempranillo
- Mazuela
- Viura
- Moscatel
- Cabernet

Altitude
From 400 to 800 m above sea level
Cariñena DOP
Plant Protection Problems

**Climate**
medium warm, with a significant trend towards a continental climate with cold winters and very hot summers

Strong dry winds
Dominant is blowing from north “Cierzo”

**Pluviometry**
350-450 mm/year

**Semi-arid landscape**

**Diseases**

<table>
<thead>
<tr>
<th>Name</th>
<th>Average spray/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downy mildew (Plasmopara viticola)</td>
<td>1.5</td>
</tr>
<tr>
<td>Powdery mildew (Uncinula necator)</td>
<td>3.5</td>
</tr>
<tr>
<td>Grey mold (Botrytis cinerea)</td>
<td>(1)</td>
</tr>
</tbody>
</table>

Very limited number of fungicide applications
## Plant Protection Problems

### Pests

<table>
<thead>
<tr>
<th>Name</th>
<th>Average sprays</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGVM (Lobesia botrana)</td>
<td>3.5</td>
</tr>
<tr>
<td>Leaf-rolling tortrix (Sparganothis pilleriana)</td>
<td>0.2</td>
</tr>
</tbody>
</table>

EGVM
- 3 generations per year
- High pest pressure
- Cheap insecticides (OPs or Pyretroids)
- Direct yield loss (no mold)
Area Wide Pest Management

Preliminary MD application in Cariñena area in 2010 (100 ha; Regional subsidy)

In January 2012 DO Cariñena and two mayor coop wineries (BSV and GVV) decided to contact CBC Iberia/Shin-etsu to evaluate the possibility for AWPM.

Very good pest control results. Farmers decided to discontinue because of the costs and difficulties to achieve a homogeneous area of application.

- Yield loss
- Residue problems in wine
- Human and environmental safety
- Develop a more sustainable plant protection strategy
- Marketing

AWPM Technical working group
- Cariñena DO advisors
- Technicians of the local wineries
- CBC Iberia personnel
- Applied entomologists

AWPM started in April 2012

Shin-Etsu – Isonet L
AWMP Technical group

GOALS
- Pest control
- Reduce insecticide applications
- Affordable costs

Technical group directives
- Understand pest biology
- Farmer education
- Homogeneous application
- Coop management
- Technical follow-up
- Training technicians
- Integrate MD in the IPM strategy

2 general meetings per year
10 speeches per year in the main cooperatives

Grape area mapped with GIS software
- Creation of a vineyard database
- Limit the expansion of MD area
- Dispensers rate

Complementary insecticides applications
- Monitoring
- Infestation assessment
- 20 technicians/advisors
**AWPM monitoring & infestation assessments**

**Monitoring**

(MD)
- 60 trap stations
- 60 pheromone traps
- 10 wine traps

**Field assessments**

Assessment on each generation
- G1: 50-100 clusters per plot
- G2 and G3: 25-50 clusters per plot

Infested clusters
- Nº of nests

In the vineyards that registered more than 15% larval infestation in the previous gen. (G2 & G3)

More than 10% oviposition

We reduce the number of clusters inspected in order to increase the number of samplings

Oviposition assessments

Suggested an insecticide application
AWPM surfaces

Promoters in 2012
- Bodega San Valero
- Bodega Grandes Vinos y Viñedos
- DO Cariñena
- CBC Iberia

Strong leadership

2015

Participants in 2015
- 4 cooperatives
- 24 private wineries
- 95% of the DO grape surface

EU subsidy in 2015
- 35 €/ha

13,200 Ha
### AWPM Results

#### 2012

- **nests/100 clusters**

<table>
<thead>
<tr>
<th>Generation</th>
<th>MD strategy</th>
<th>Conventional strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sprays</td>
<td>Samplings</td>
</tr>
<tr>
<td>G1</td>
<td>0.7</td>
<td>126</td>
</tr>
<tr>
<td>G2</td>
<td>0.2</td>
<td>59</td>
</tr>
<tr>
<td>G3</td>
<td>0.1</td>
<td>116</td>
</tr>
</tbody>
</table>

#### 2013

- **nests/100 clusters**

<table>
<thead>
<tr>
<th>Generation</th>
<th>MD Strategy</th>
<th>Conventional strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sprays</td>
<td>Samplings</td>
</tr>
<tr>
<td>G1</td>
<td>0.5</td>
<td>505</td>
</tr>
<tr>
<td>G2</td>
<td>0.1</td>
<td>350</td>
</tr>
<tr>
<td>G3</td>
<td>0.1</td>
<td>472</td>
</tr>
</tbody>
</table>
## AWPM Results

### 2014 Data

<table>
<thead>
<tr>
<th>Generation</th>
<th>MD strategy</th>
<th>Conventional strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sprays</td>
<td>Samplings</td>
</tr>
<tr>
<td>G1</td>
<td>0.3</td>
<td>1</td>
</tr>
<tr>
<td>G2</td>
<td>0.1</td>
<td>583</td>
</tr>
<tr>
<td>G3</td>
<td>0</td>
<td>729</td>
</tr>
</tbody>
</table>

### 2015 Data

<table>
<thead>
<tr>
<th>Generation</th>
<th>MD strategy</th>
<th>Conventional strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sprays</td>
<td>Samplings</td>
</tr>
<tr>
<td>G1</td>
<td>0.1</td>
<td>1382</td>
</tr>
<tr>
<td>G2</td>
<td>0</td>
<td>1254</td>
</tr>
<tr>
<td>G3</td>
<td>0</td>
<td>1474</td>
</tr>
</tbody>
</table>

The graphs illustrate the data from 2014 and 2015, showing the comparison between MD strategy and Conventional strategy in terms of sprays, samplings, and checked clusters.
2013: extraordinary population breakout
AWPM Results

MD strategy
nests/100 clusters by year of MD use

- G1
- G2
- G3

1st, 2nd, 3rd, 4th
Grandes Vinos y Viñedos

4,160 – 4,454 ha vineyards

Farmer’s field books

Courtesy of: Grandes vinos y viñedos technical department
AWPM Secondary pests

*S. pilleriana* population increase could not be a consequence of MD application because the phenomenon started before 2012 and affects both pest control strategies.
Knowledge acquisition

GIS tools

Technical support

Progressive reduction of the infestation

Reduction in insecticide use

Minor risk of residues in wine

More affordable costs

MD application against *L. botrana* can be the backbone of an AWPM in Cariñena
Thanks to:
Cariñena DO
Wineries and Cooperatives involved
All the farmers

Technical group
of the project

&

For your attention