

The use of pheromones and plant odours for the moth pest control in vineyards

Thomas Degen¹, Pierre-Joseph Charmillot¹, Cyrille Verdun¹ and Patrick Guerin²

¹ Swiss Federal Research Station for Plant Production, RAC, Changins, CH-1260 Nyon 1, Switzerland

² Institute of Zoology, University of Neuchâtel, Emile-Argand 11, Case Postale 2, CH-2007 Neuchâtel, Switzerland
E-mail: Thomas.Degen@rac.admin.ch

Grapevine moth *Lobesia botrana* and grape berry moth *Eupoecilia ambiguella* are the two main pest insects in Swiss vineyards. Classical insecticide application is still the dominant control method for these two tortricid species in Switzerland. Yet, it is more and more replaced by mating disruption, which has been rapidly and successfully adopted by many winegrowers over the last five years and covered already about one third of the vineyard surface in 2002. However, there are still concerns with respect to efficiency under particular circumstances (high population densities, small non-isolated vineyards) and relatively high costs. Therefore our project aims at evaluating alternative pheromone- and kairomone-based control methods to substitute classical control and complement mating disruption (e.g. “attract and kill”, auto-confusion).

In a first step, we intend to develop an “attract and kill”-method: with wind tunnel assays and field trials we tested whether an attracticide that contains a combined pheromone blend for *Lobesia* and *Eupoecilia* may effectively control both species. Trapping experiments with different combinations of pheromones and formulations, which were carried out at six field sites along Lake of Geneva, indicated that blends including pheromone components of both species were in most cases as attractive as separate blends for each species. Formulations containing low purity pheromone components originating from dispensers for mating disruption worked well for *Lobesia*, but less so for *Eupoecilia*. Persistence of attractiveness over a flight season was variable depending on the formulation substrate, with one gel losing its attractiveness already after a relatively short period of time. Different attracticide formulations were applied at a density of about 3000 gel droplets/ha to small square plots of about 1000m² inside of two vineyards. Reduction of catches in traps located at the centre of the plots and mating of tethered females was assessed in comparison to control plots. Attracticide droplets were furthermore applied on a practical control scale to parcels of about 1 ha and trap captures as well as damage levels were compared to an untreated control parcel and/or a parcel treated with pheromone dispensers for mating disruption. The findings were promising, but data were not yet robust enough to draw a final conclusion regarding effectiveness of moth control.

The aim of another part of this research project is to identify host or non-host plant odours that may either act as attractants for females and thus could be used for new control methods or monitoring purposes, and/or may enhance attractiveness of pheromones to males. GC-EAD recordings are to be conducted with extracts of host and non-host odours to restrict the range of potential behaviourally active compounds, which then are to be tested for attractiveness in laboratory assays and in field trials. Seasonal and circadian variation of volatile release by grapevines as well as variability among different grape varieties are assessed by collecting odours from the headspace around grapevine shoots in the field. This may allow a quantitative and

qualitative estimation of "background" odour emission in vineyards, against which potential synthetic attractants would have to compete, and at the same time provides odour samples to be screened for potential attractants with electrophysiological methods (GC-EAD).