From Science to Field
Grapevine Case Study – Guide Number 3

Mating Disruption For The Control Of Grape Berry Moths

Bottlenecks and conditions for adoption in different European grapevine-growing regions

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Clockwise from top left: Female *Lobesia botrana* moth; Female *Eupoecilia ambiguella* moth; RAK dispenser; Isonet dispenser; Healthy grapes. © D. Thiéry and P. Goetgheluck, INRA, France and C. Hoffmann, JKI, Germany.

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Mating disruption for the control of grape berry moths

About mating disruption

Mating disruption is an innovative and sustainable technique which makes it possible to reduce insecticide use in viticulture. Using this technique, air above and between the grapevines is saturated by female sexual attractants, naturally used by female moths to call males for mating.

So-called dispensers (see cover photographs) constantly emit the pheromone into the vineyard. The ubiquitous presence of pheromone leads to disorientation of the males and suppressed calling behaviour of the females, and possibly induces additional behaviours antagonistic with mating. The overall effect is to reduce the number of offspring produced by the pest and thus the damage.

In viticulture the technique is mainly used against two pests: the tortricid moth species *Lobesia botrana* and *Eupoecilia ambiguella* (Lepidoptera: Tortricidae). As an additional benefit, the technique could be developed rather rapidly against the leaf rolling *Sparganothis pilleriana*.

Why sustainable?

> Only affects the target pests (it is species specific).
> There are no negative documented effects on the environment, professional users or consumers.
> Easy to handle as it only needs to be applied once.
> No timing problems.

Despite these positive characteristics, mating disruption is not used on a large scale in Europe.

Prerequisites for the application of mating disruption

> Mating disruption is only effective in areas with a minimum size of around 5-10 hectares. In many parts of Europe it is unusual to find a single enterprise with such extensive vineyards. This means it is necessary for different winegrowers to cooperate.
> Low populations of the pest are required. This means that sometimes populations have to be reduced by insecticides at the beginning of the treatment.

Biotic and abiotic factors affecting the efficacy of mating disruption

> Too many additional landscape components between vineyards (such as hedges, woods, other cultures or fallows) may negatively influence the efficacy of mating disruption. These components should be treated with pheromones as well as the vineyards. This makes mating disruption more expensive in such richly structured areas.
> The deployment of the dispensers must be adapted to the topography.
> In areas with dispensers charged only with pheromone for two grape berry moth generations the efficacy will quite often be low in the case of a third generation. This might cause an increased population in the following year.
> In years with extreme temperatures there might be a premature cleanout of the dispensers.

Factors influencing the decision of growers to use mating disruption

> In areas where insecticide sprays are mandatory, for example against the leafhopper *Scaphoideus titanus*, using mating disruption is of no interest to growers.

> Compared to the spraying of insecticides, which can be impossible after heavy rain, the control of grape berry moths is less dependent on weather conditions during the vegetation period.
> Mating disruption is easier to manage than insecticide treatments because it does not require the monitoring of oviposition periods.
> The environmentally positive image of mating disruption can be used for marketing purposes.
> Mating disruption is currently more expensive than insecticide treatment.

Bottlenecks for mating disruption in different European countries

Table 1: Nature of limiting factors in different European countries (Y/N: in some regions yes and in others no)

	Registration RAK	Registration ISONET	Registration further products	State- aided	Suitable landscape agricultural structure	Too expensive	*Scaphoideus* control	% of vineyard area treated	Product price per ha (€)	Difficult to build up groups of cooperating growers
Chile	No	No	No	No	Y/N	Yes	No	0.0	N/A	Yes
France	Yes	No	No	No	Y/N	Yes	Y/N	2	200	Yes
Germany	Yes	No	No	Yes	Y/N	No	No	60	198	Y/N
Hungary	No	Yes	No	No	Y/N	No	No	0.1	120	Yes
Italy	Yes	Yes	No	Y/N	Y/N	Yes	Y/N	2	150	Yes
Netherlands	No	No	No	No	Y/N	No	No	2	200	Yes
Switzerland	Yes	Yes	Yes	Y/N	Y/N	No	Y/N	55	220	Yes

The absence of registered mating disruption products is a bottleneck in Chile and the Netherlands. Until now, only Switzerland and Italy has offered a choice between two different products. In general there is a lack of competition which makes the products expensive. Huge price differences are also observed between countries, for example France and Hungary. There are price differences between different dispenser types and also the products themselves can be charged with different amounts of active ingredient and different pheromone components. The dispensers can be charged only for one grape berry moth species or for both. But this can only partly reflect the different prices in Europe.

For all countries only parts of the area under viticulture are suitable for pheromone application because of the agricultural structure. In Germany and Switzerland, financial support is provided by regional governments, which promotes the high proportion of vineyards treated with this technique. In Italy, the application is only common in some regions where this support exists. The extension of Flavescence dorée and its vector, which is controlled by insecticides, can be a limiting factor to this technique. As the products require a certain area (at least 5ha) to be effective it is often a problem to gather together all the winegrowers in an area to apply the technique collectively.

Bottlenecks for mating disruption in different European countries

How to promote mating disruption in Europe

> Different European countries or regions provide government aid for the application of mating disruption. As a consequence, in Germany around 60% of the vineyard area is under mating disruption. One main reason for this is the financial state aid for the growers.

> Vine growers have to organise themselves into collaborative networks. Here private or official consultants can play a crucial role as moderators who can bring together vine growers in the same area.

> Pheromone application may be used as a marketing instrument for vine growers.

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About ENDURE

ENDURE is the European Network for the Durable Exploitation of Crop Protection Strategies. ENDURE is a Network of Excellence (NoE) with two key objectives: restructuring European research and development on the use of plant protection products, and establishing ENDURE as a world leader in the development and implementation of sustainable pest control strategies through:

> Building a lasting crop protection research community

> Providing end-users with a broader range of short-term solutions

> Developing a holistic approach to sustainable pest management

> Taking stock of and informing plant protection policy changes.

Eighteen organisations in 10 European countries are committed to ENDURE for four years (2007-2010), with financial support from the European Commission's Sixth Framework Programme, priority 5: Food Quality and Security.

Website and ENDURE Information Centre:

www.endure-network.eu

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