TOOLS AND CHALLENGES IN PESTICIDE USE AND RISK REDUCTION ON GRAPEVINE

I. Pertot, A. Pellegrini, D. Angeli, S. Siozoz, G. Puopolo, V. Mazzoni

IASMA Research and Innovation Centre, Fondazione Edmund Mach, Via E. Mach 1, 38010 San Michele all'Adige (TN), Italy

e-mail: ilaria.pertot@fmach.it

Keywords: Grape protection, Pest management, Pesticide

Grape protection currently requires a precise and careful protection management. Several pest and pathogens can threat grape and very few resistant varieties, mainly against downy mildew, are currently cultivated for wine production (Gessler et al., 2011). In spite of the advances in IPM programs and the hopes in the new breeding programs, chemical pesticides are still the most relevant tools used worldwide to cope with pest and pathogens. However, the overuse of chemical pesticides poses the risk of exceeding the maximal residue levels on the final product fixed by the current regulations. Residues can be transported to surface and ground water through infiltration, surface runoff, leaching, artificial drainage, and spray drift and thus harm the environment (Brown et al., 1995). The recent directive, establishing a framework for Community action to achieve the sustainable use of pesticides, implicitly calls for alternatives to chemical pesticides (Directive 2009/128/EC). However, achieving a chemical-free grapevine production is still a big challenge.

Downy mildew, powdery mildew and grey mould are the most important diseases worldwide. Some microbial biofungicides are available on the market (i.e., based on *Ampelomyces quisqualis, Bacillus amyloliquefaciens, B. subtilis, Aureobasidium pullulans*, etc.). Their efficacy is strictly related to the correct application timing and suitable environmental conditions. Strains of *Trichoderma* spp. are proposed for the control of wood and root diseases. Recent studies have pointed out new mechanism of actions (Perazzolli et al., 2008) and novel promising bio-based fungicides; however, the way to the market is most probably still very long.

The use of bio-based fungicides needs a change in the mentality, as they cannot simply substitute a chemical. The right positioning requires a deep knowledge of the crop and the environmental conditions. If they are correctly used, we can currently achieve a substantial reduction in the use of chemical fungicides, but not a complete substitution.

A better picture on pest control exists. Pheromone mating disruption can completely solve the problem of controlling *Lobesia botrana* and *Eupoecilia ambiguella* when used on wide areas. *Bacillus thuringiensis* is also a well-established tool. New challenging environmentally friendly techniques are emerging. In particular the vibrational mating disruption is a pest-control tactic, which is a masking of the vibrational signals used in mate recognition and location. First results in the vineyard indicate that when disruptive vibrational signals were applied to grapevine plants through a supporting wire, mating frequency of the leafhopper pest *Scaphoideus titanus* may be reduced to 4 % in a mature vineyard.

Several new pest and disease control tools are currently under development; however the,ir market achievement will depend not only on their intrinsic technical quality, but also on several factors as the attitude of regulatory bodies, private and public investment and policy support.

References

Brown C.D., Carter A.D. and Hollis J.M., 1995 Soils and pesticides mobility. In: Roberts TR, Kearney PC, editors. Environmental behaviour of agrochemicals, vol. 9. Chichester: John Wiley & Sons Ltd.

Eriksson A., Anfora G., Lucchi A., Lanzo F., Virant-Doberlet M., Mazzoni V. 2012. Exploitation of Insect Vibrational Signals Reveals a New Method of Pest Management. PLoS ONE, **7**, e32954.

Gessler C., Pertot I. and Perazzolli M., 2011. *Plasmopara viticola*, the causal agent of downy mildew of grapes. P*hytopathol. Mediterr.* **50**, 3-44.

Perazzolli M., Dagostin S., Ferrari A., Elad Y. and Pertot I., 2008. Induction of systemic resistance against *Plasmopara viticola* in grapevine by *Trichoderma harzianum* T39 and benzothiadiazole. *Biol. Control* **47**, 228-234.