IPM SOLUTIONS TO REDUCE PESTICIDES RELIANCE IN GRAPEVINE

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OBJECTIVES

The general objective of this activity is to identify, test and validate innovative IPM solutions in grapevine both on-station and on-farm experiments.
Specific objectives are:

- to assess the relative weights of the most critical grapevine pest and pathogen problems in the different areas studied in the project,
- to identify new and more sustainable IPM solutions,
- to adapt and test them in some of the most important grape growing areas in Europe.

The IPM solutions will be evaluated for efficacy under field conditions and a cost-benefit evaluation will indicate the most efficient in term of risk and economic sustainability.

APPROACH

This activity established a database (DB) of alternatives to pesticides, expert models and vineyard management procedures. In its first step, the DB included existing commercial and experimental solutions; however it is constantly updated during the project with innovations developed in the project.
IPM solutions combining existing techniques (for advanced systems) and including new techniques (for innovative systems) have been designed and assessed *ex-ante* in terms of cost, benefit, risk, feasibility and adoptability.
Some representative farming system have been identified in four geographic areas, which represent the most relevant grape growing conditions in Europe (Atlantic, Continental North of the Alps, Continental-like South of the Alps, Mediterranean). With the contribution of stakeholders (farmers, advisors, policy makers, representatives of industries), the design of IPM solutions have been adapted to the specificities of these farming types, giving particular emphasis to the most relevant problems in each one.
After *ex-ante* assessment, some candidate solutions have been identified and tested in experimental stations. They include:

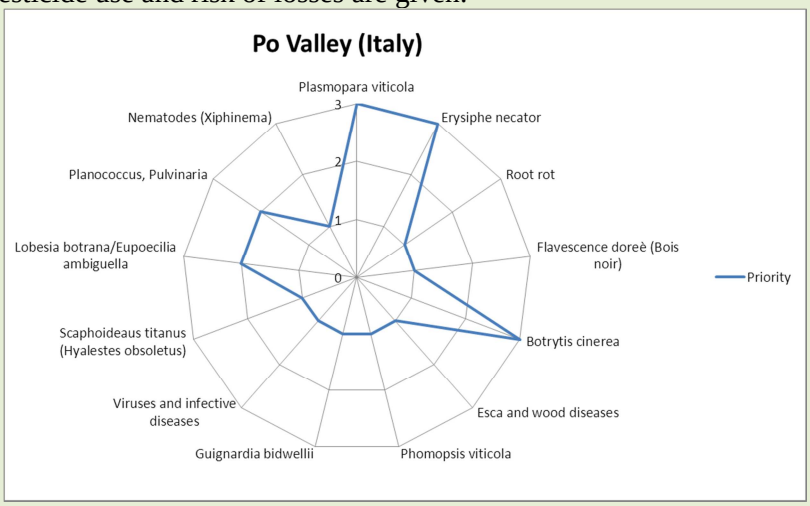
- The use of biopesticides against grey mold, powdery mildew and insects;
- The use of decision support systems (DSSs) to optimize time and dose of chemical treatments;
- The inclusion of agronomic practices and resistant varieties to reduce pest and disease susceptibility.

In farms, DSSs and biofungicides to reduce the powdery mildew inoculum have been tested.
The IPM solutions are evaluated *ex-post* together with stakeholders (farmers, advisors, policy makers, representatives of industries and consumers associations) in order to select the most suitable solutions to be further disseminated to farms.

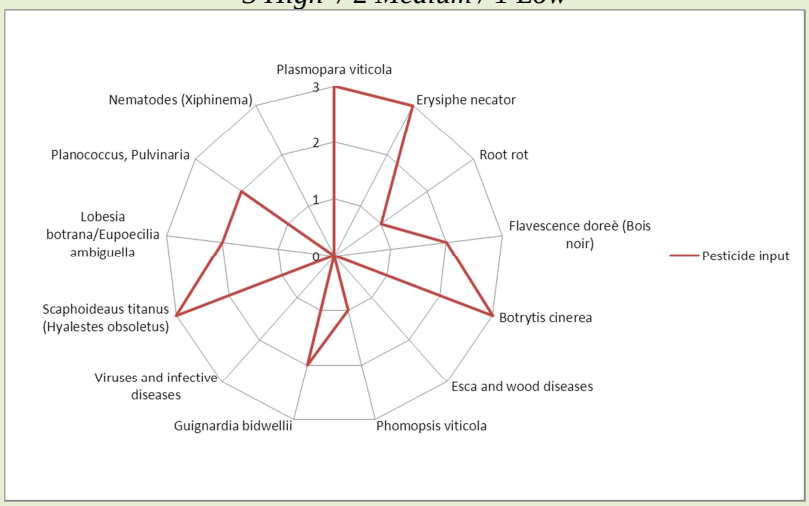
FIRST RESULTS

Four study areas, representative of the most relevant grape growing areas in Europe have been selected: Atlantic (Western France), continental - North of the Alps (Northern France and Germany), continental-like - South of the Alps (Northern Italy) and Mediterranean (Southern France, Central Italy). In each study the relative weights of the most critical grapevine pest problems in each was slightly different and reflected the environmental conditions (*i.e.* downy mildew and grey mold is more important in

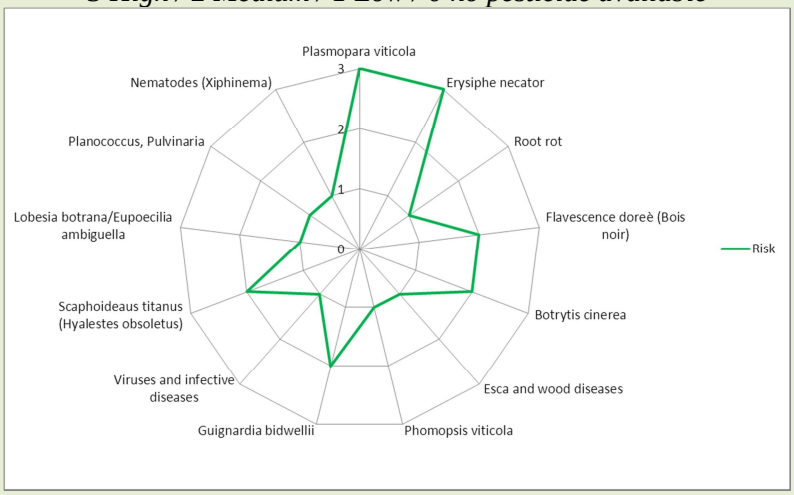
central zones and powdery mildew is more relevant in the southern zone). Moreover IPM solutions are implemented in the different levels (in some areas mating disruption against major Lepidoptera are implemented, while in other areas they are commonly treated with insecticides).
In the following figure an example of priority in term of need of pesticide reduction, current pesticide use and risk of losses are given.



Legend:: Priority in term of need of pesticide reduction
3 High / 2 Medium / 1 Low

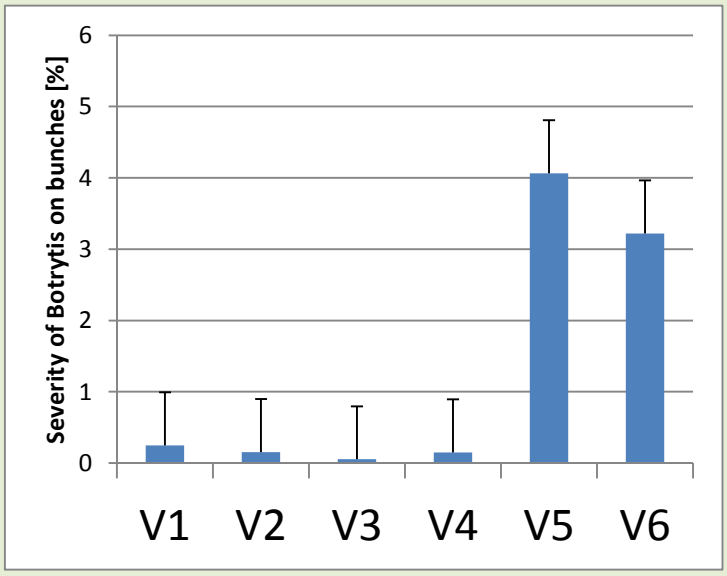


Legend: Current pesticide input
3 High / 2 Medium / 1 Low / 0 no pesticide available



Legend: Risk of losses due to the pest/pathogen
3 High / 2 Medium / 1 Low

Although the level of the disease was very low, the use of a combination of experimental biofungicides based on microbial active ingredients (a residue colonizer at bunch closure, a sugar consumer at veraison and a microorganism active by direct antagonism before harvest) gave promising results against grey mold (in 2011 and 2012). The trials will be repeated to verify if the promising results will be confirmed with high disease pressure. In the following figure the results obtained in Italy (Montepaldi, 2011) are presented as an example.



Integration of microbial biofungicides with different mechanism of action against Botrytis cinerea. V1: (dead tissue colonizer; sugar consumer; microorganism with direct antagonism); V2: 1 treatment: before grape closure (dead tissue colonizer) V3: 1 treatments: veraison (sugar consumer) V4: 1 treatment: before harvest (microorganism with direct antagonism) V5: non-treated control; V6: positive control with chemical.

In farms, the use of *Ampelomyces quisqualis* to reduce overwintering inoculum (first results on parasitization of mycelium and chasmothecia) gave successful results on the reduction of the severity of primary infections (Italy in 2011-12), which may help in postponing the beginning of treatments in the following season or resulted in lower risk of losses. A reduction of use of pesticides was possible by using downy mildew resistant/tolerant varieties (Germany, 2011) as well as with the use of a DSS (Italy, 2011 and 2012).

NEXT STEPS

The different IPM solutions will be further tested in the experimental station on order to optimize their application: for example the identification of the right time for the application of the biofungicide to optimize the overwintering inoculum parasitization or the right environmental condition for the application of the biofungicides against grey mold. DSSs will be further validated in additional farms and in the following years.
Under farm conditions the different IPM solutions tested singularly in the experimental farm will be combined in more complex strategies.

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