Development of a phenotyping platform for assessment of resistance to grape downy and powdery mildews

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Breeding for downy and powdery mildew resistant varieties is an alternative to the intensive use of pesticides which have a negative effect on environment and on human health.
After the identification of some resistant sources among wild *Vitis* species, their genetic determinism are unraveled by associating genotypic information with corresponding phenotyping data. If progress in DNA markers enable high throughput genotyping of large plant populations, phenotyping for resistance is still laborious. Field and greenhouse screening using resistance scale are widely used by breeders. However, this approach is time consuming and may be affected by environmental conditions which have an inpact on disease progression.

To overcome this weak point, a phenotyping platform for resistance assessment has been developed. This tool is based on a laboratory leaf disc bioassay and is suitable for the following skills: 1) to provide large plant populations grown in homogeneous and controlled conditions, 2) to manage simultaneous inoculations with different strains of a pathogen, 3) to improve the throughput, accuracy and reliability of resistance assessment, 4) to reduce the time and the space needed to achieve the phenotyping process. For this purpose, several steps of the phenotyping process were standardized or automated by the acquisition or the development of new facilities such as specific climate chambers, robots and image analysis system.
The phenotyping platform, from plant material production to resistance assessment, will be presented.