

Genomic approach applied to grapevine genetic improvement: objectives, strategies and first results in the case of downy mildew

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A wide range of pathogens threatens French viticulture. The current strategy to control grapevine diseases relies totally on the use of fungicides. This practice not only is expensive but also causes a slow and progressive damage to the environment. A cost-effective and environment friendly alternative to the use of chemicals is the use of varieties resistant to pathogens. All cultivated European grapevine varieties are susceptible to the main pathogens responsible to the chemical treatments. Fortunately *Vitis* species closely related to cultivated grapevine were already shown to be potential sources of resistance to a wide spectrum of grapevine diseases. Identifying the genetic resources carrying resistances to diseases and deciphering the genetic determinism underlying these resistances are necessary steps to design efficient strategies for the deployment of resistances to the field.

The absence of private grapevine breeders in France justifies the INRA involvement in grapevine research activities that are dedicated to new variety creation through breeding programmes. The main goals of this programme is i) to create varieties durably resistant to downy and powdery mildews with a berry quality suitable to produce high quality wines and ii) to use the results of the research programmes carried out on the determinism of resistance to downy and powdery mildew, berry composition, sex and phenology and, in the future, berry quality components. In order to successfully reach the double objective of high efficiency and durability of resistance, the use of multiple sources of resistance was planned as soon as it was designed. This project was developed in close interconnection with upstream research projects aiming first at understanding the genetic bases of the resistance to downy mildew derived from grapevine-related wild species.