Studies on the resistance locus *Rpv12* against downy mildew of grapes (*Plasmopara viticola*)

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Plasmopara viticola, a heterothallic obligate biotrophic oomycete, is the causative agent of grapevine downy mildew, a widespread severe disease. In 1878, *P. viticola* was imported from North America to Europe, together with grape phylloxera resistant rootstock vines. Since then, the pathogen has caused considerable yield losses. Because of that *P. viticola* research and breeding of resistant grape varieties is essential for sustainable viticulture. Only with precise knowledge of the resistance mechanisms and the genetic location of resistance factors in targeted breeding it is possible to reduce the annual amount of consumed pesticides. In 2013 Venuti *et al.* identified the resistance locus *Rpv12* using QTL analysis of *V. amurensis*. *Vitis amurensis* is native to the cool climates of the Far East (China and Russia) and shows resistance against *P. viticola*. In the early 20th century the Asiatic species *Vitis amurensis* `Ruprecht´ was crossed with *Vitis vinifera* `Getsh´ to yield `Michurinets´. Other interesting cultivars are `Kunbarat´ and `Kunleany´. They possess resistance characteristics due to *Rpv12*. This locus was detected on Chromosome 14 and is inherited independently of other resistance loci. Within the locus *Rpv12*, 12 NBS-LRR genes (nucleotide binding site – leucine rich repeats) have been identified within the reference genome (PN40024).

We have checked the parentage of different *Rpv12*-carrying genotypes to improve the selection of breeding material and support a better SSR-Marker-Analysis. Besides we analyzed differences between *Rpv8,* a locus described on Chromosome 14 in 2011 by Blasi *et al.,* and *Rpv12* by SSR-Marker-Analysis and microscopy.

For identification of the responsible gene for the resistance, we compare susceptible grapevine with resistant cultivars by leaf disc assay and light-, fluorescence- and cryo scanning electron microscopy.

Using this we detected a dosis effect by homozygous genotypes and an additive effect with *Rpv3*, since *Rpv12* confers a foliar resistance to strains that are virulent on *Rpv3* cultivars. The aim is to identify physiological responses of the cell. These investigations should reveal molecular mechanisms and the candidate genes involved, which shall be further evaluated by amplification, comparative sequencing, gene expression analysis and functional testing.