Adaptation of *Plasmopora viticola* isolates against defense mechanisms conferred by different resistance genes in grapevine.

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INTRODUCTION

Grapevine breeding for disease resistance is an essential strategy to promote the sustainability of grape and wine production. Resistance durability play a central role particularly for perennial crops, such as grapevine. The resistance durability is dependent on the resistance mechanism of the genes and the evolutionary potential of the pathogen. In the highlands of Santa Catarina the *Plasmopara viticola* reproduces sexually and asexually (BITENCOURT et al., 2021) and the populations are genetically diverse (TOMAZZETI, 2021). Thus, the main aim of this work was to evaluate the level of adaptation of two *Plasmopara viticola* populations to resistant grape varieties/genotypes carrying different combinations of R-Gene alleles in Santa Catarina state, Southern Brazil.

Figure 1. Map of Santa Catarina state describing the places where *P. viticola* were collected.

MATERIAL AND METHODS

P. viticola inoculum was collected from two sites of the Santa Catarina State, Southern Brazil, at the end of the grape season 2020/21. The inoculum was composed of a mixture of sporangia sampled from hosts containing the R-alleles *Rpv3*, *Rpv10*, *Rpv1+3* and *Rpv3+10*. Two sporangia suspensions were prepared from each site: 1) A bulking of sporangia collected from all hosts (PC21: Curitibanos; PU: Urussanga); 2) A bulk of sporangia collected from hosts containing the R-allele(s) combination (SPRpv3; SPRpv10; SPRpv1+3; SPRpv3+10). The suspensions were used to inoculate leaf discs of the susceptible variety 'Cabernet Sauvignon' and a panel of ten cultivars/genotypes containing different R-alleles combinations. Seven days after inoculation, the following parameter were measured: disease severity, resistance level (OIV 452-1 descriptor), severity and sporangia production.

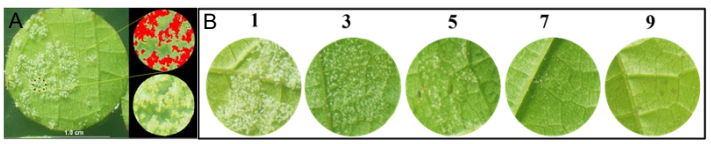

Figure 2. Severity analysis by ImageJ software (A) , OIV 452-1 scale (B).

Results

- The *Rpv12* and *Rpv10* R-alleles were the most effective source of resistance.
- An erosion of the resistance conferred by *Rpv3* haplotypes was observed.
-The combination of Rpv3 with *Rpv1*, increased the level of resistance.
- Isolates were able to sporulate in hosts carrying *Rpv1+3* (in Curitibanos) and Rpv3+10 (in Urussanga), bringing concerns about the resistance durability.

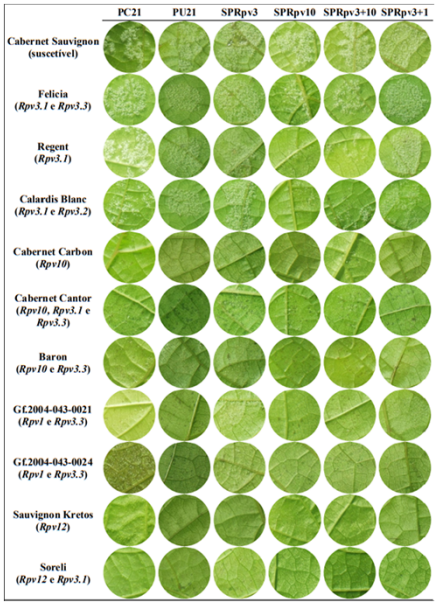

Figure 3. Leaf discs containing different *Rpv* genes inoculate with populations and subpopulations of *P. viticola.*

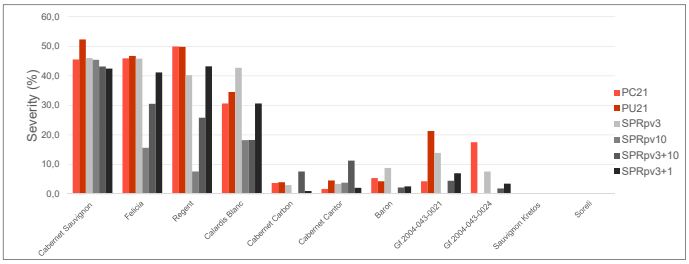

Figure 4. Disease severity resulting from *P. viticola* isolates inoculation in different genotypes leaf discs.

CONCLUSION

- The results obtained are fundamental to delineate breeding strategies for the development of new varieties with durable resistance to *P. viticola.*
- The results indicate the presence of isolates that overcome the resistance conferred by *Rpv* alleles in Southern Brazil.

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