P44 – Phenotyping of Croatian native grapevine (*Vitis vinifera* L.) varieties in susceptibility to the causal agent of downy mildew (*Plasmopara viticola*)

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Abstract

A long history of grapevine cultivation in diversified geographical regions in Croatia gave rise to a high number of native varieties. In the era of sustainable production, there is a growing demand to define their differences in susceptibility to downy mildew. By applying leaf disc bioassay in controlled laboratory conditions, it has been found that native varieties react differently to the infection of *Plasmopara viticola*. Therefore, they were ascribed to classes of resistance according to the OIV descriptor 452-1 [Leaf: degree of resistance to *Plasmopara* (leaf disc test)]. Chlorophyll fluorescence and multispectral imaging traits have been measured in time points before and upon inoculation to define which of them could be used as an early detector of infection and are these methods suitable for distinguishing genotypes of different susceptibility to downy mildew. Moreover, the leaves were analysed using high-performance liquid chromatography (HPLC) to define if their chemical background, i.e., polyphenolic composition, is responsible for native varieties' different levels of resistance. It has been found that the leaf disc test is a simple method to perform, and it brings about trustworthy results when genotypes with a known level of resistance are comparatively evaluated. Chlorophyll fluorescence and multispectral imaging are promising tools for precise monitoring of the photosynthesis transmission inside a leaf tissue upon *P. viticola* inoculation. This utility could be used as a phenotyping method in the absence of the pathogen to define the level of genotype's resistance to *P. viticola*. As far as secondary metabolites are concerned, polyphenolic compounds proved to be responsible for the discrimination of varieties among the OIV classes of resistance. It has been found that the constitutive polyphenolic profile contributes to the separation of susceptible OIV classes (1, 3, and 5) into three groups. The content of resveratrol-3-*O*-glucoside and total stilbenes discriminated non-infected and infected samples, whereas the content of piceatannol and total stilbenes discriminated completely resistant OIV class 9 (*V. riparia*) and the remaining OIV classes. Less susceptible grapevine varieties that belong to OIV class 5 (Malvazija istarska, Ranfol, Teran) could be interesting to use in breeding programs aiming to produce high-quality genotypes resistant to main fungal diseases.

Keywords: *Vitis vinifera* L., downy mildew, biotic stress, chlorophyll fluorescence, polyphenols