SECONDARY METABOLISM CHANGES INDUCED BY MANAGEMENT OF CANOPY MICROCLIMATE THROUGH LEAF REMOVAL IN PINOT NOIR VINEYARD

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Profiles of grape phenolic compounds are not strictly dependent on genotype, but can be significantly modulated also by environmental conditions (Guidoni et al., 2008). Although it is not possible to influence the macroclimate and/or site mesoclimate, the grapevine canopy microclimate on the other hand can be (up to certain level) under control of modern winegrowers. Such manipulation can have an important effect on gene expression behavior inside the phenylpropanoid biosynthetic pathway, affecting the yield of some technologically very important grape berry compounds.

Leaf removal (defoliation) is one of the viticultural techniques that can be used to manipulate microclimate conditions within grape area (Haselgrove et al., 2000; Sternad Lemut et al., 2011). Performance of this technique at different grape development stages was thus designed in Vipava Valley (Slovenia) 'Pinot Noir' vineyard. The trial was done on completely randomized plots, in order to observe how leaf removal timing affects canopy microclimate conditions associated with flavonols and anthocyanins biosynthesis in grapes during maturation. Leaf removal was applied manually, removing the basal 4-6 leaves of all shoots at the pre-flowering stage *(i*), at berry set *(ii)* and at veraison *(iii)* (later than the most frequently used timing of leaf removal performance in Vipava Valley). Untreated vines were used as control *(iv).* Novel and innovative viticulture approach of pre-flowering leaf removal (Poni et al., 2009) was applied for the first time in the Vipava Valley geo-climatic conditions.

The results revealed that anthocyanins were slightly, but significantly affected by leaf removal timing, while flavonols were strongly affected by different microclimate scenarios under observation. Their concentration was clearly related to the higher light exposure, which is in agreement with literature (Price et al., 1995).

To provide a wider picture of plant behaviour under these modified and monitored microclimate conditions, we have integrated the HPLC-Vis analyses of flavonols and anthocyanins in grape skins with a more comprehensive LC-MS/MS metabolic profiling approach (Vrhovsek et al., 2012) in order to cover a number of other, up to date, poorly studied phenolics.

Observing the quantitative change of several dozens of phenolic compounds during grape ripening revealed their occurrence peaks as well as highlighted that also the biosynthetic behavior of some less studied grape phenolics were clearly influenced by induced environmental conditions.

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