

DISSECTING THE EFFECT OF SOIL ON BERRY TRANSCRIPTIONAL PLASTICITY IN TWO ITALIAN GRAPEVINE VARIETIES (V. VINIFERA L.)

VANNOZZI A.*, PERIN C.*, PALUMBO F.*, SANDRI M.**, ZUCCOLOTTO P.***, ZENONI S.****, BARCACCIA G.*, PINDO M.*****, CESTARO A.*****, SONEGO P.*****, LUCCHIN M.*

*) Department of Agronomy, Food, Natural resources, Animals and Environment (DAFNAE), University of Padova Agripolis, 35020 Legnaro, Italy

**) Department of Computer, Control and Management Engineering, Sapienza University of Rome, Rome, Italy

***) Big&Open Data Innovation Laboratory, University of Brescia

****) Department of biotechnology, University of Verona, I-37034 Verona, Italy

*****) Research and Innovation Centre, Fondazione Edmund Mach, via E. Mach 1, 38010 San Michele all'Adige, Italy

phenotypic plasticity, GxE interactions, terroir, transcriptomics, gene expression

Grapevine embodies a fascinating species as regards phenotypic plasticity and genotype-per-environment interactions. The terroir, understood as the set of agri-environmental factors to which a variety is subject, can profoundly influence the grape phenotype at the physiological, molecular, and biochemical level, representing a phenomenon of growing interest as regards the typicality of productions. This study was aimed at investigating the determinants of phenotypic plasticity, isolating the effect of one of its main components, the soil, on phenology, physiology, and transcriptional response in a red and a white variety of great economic value: Corvina and Glera. Using concrete caissons filled with soils collected from different geographical locations, we conducted a field-experiment in which all the terroir variables, except for soil, were kept as constant as possible and using NGS technologies, we analyzed gene expression on a global scale. Molecular results, together with physio-phenological parameters, suggest a specific effect of soil on grapevine plastic response, highlighting a higher transcriptional plasticity of Glera

variety respect to Corvina and a marked response of skin tissue compared to flesh. Moreover, using a novel statistical approach, we identified clusters of plastic genes which appear to be particularly subject to the specific influence of the soil factor. Dissecting the terroir factors and identifying soil-specific gene networks represents an issue of great scientific and applicative value, since it represents the founding basis for implementing targeted agricultural practices to obtain the desired characteristics for any soil/cultivar combination, leading to a more efficient use of resources and better vineyards management, and maximizing the terroir-effect on the vine to highlight the uniqueness of vineyards.