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# The GREASE project: application of dendrosciences to analyse the mechanisms for Greco grapevine acclimation to environmental variability and cultivation factors

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Vineyard productivity and grape quality are strictly linked with the pedoclimatic characteristics (e.g. soil and climate) as well as with cultivation techniques (e.g. canopy and soil management, plant nutrition). Each grapevine cultivar is characterized by specific morpho-physiological traits which determine the ability to cope with stressors. The knowledge of the plasticity of such traits is needed to forecast how vineyards would respond to climate changes. Indeed, viticulture in some areas of the Mediterranean basin, is facing sustainability problems due increase in severe and prolonged drought periods, responsible for reduction in yield and grape quality. Although to achieve quality and/or geographical indication labels, the Italian legislation imposes rainfed cultivation for grapevine, the need for irrigation introduction and management in the vineyard is becoming more and more evident. For designing the best strategies for water use in the vineyard, it is fundamental to gain knowledge on hydraulics of the specific cultivar in its pedoclimatic context. The application of dendro-sciences techniques, based on the fine study of anatomical and isotopic traits of tree-rings in the vine main stem and of their relations with environmental parameters, can help reconstructing the past plant's eco-physiological behaviour. Here we report the results of one of the activities carried out within the GREASE project, funded by the Campania Region through the Rural Development Programme 2014-2020, in the framework of improving grapevine productivity, resource use efficiency and resilience for the sustainable management of vineyards.

The study was conducted in a vineyard of *Vitis vinifera* L. subsp. *vinifera* 'Greco' at the premises of Feudi di San Gregorio farm, in southern Italy (Avellino). In this study, we aimed to analyse the relations between anatomical and isotopic wood traits with climate parameters in tree-ring series from vines of two age classes which were subjected to a change in pruning technique in the past years. Wood cores and stem disks were sampled and tree-rings were dated according to dendro-

chronological techniques. Then semi-thin sections of the tree-ring series were cut and analysed through light and fluorescence microscopy. Digital image analysis allowed the quantification of wood anatomical traits linked with hydraulic conductivity and vulnerability to embolism. The tree-ring series were then dissected to prepare samples for the determination of d13C and evaluate intrinsic water use efficiency. The overall wood anatomical and stable isotope parameters were analysed together with climatic data through multivariate statistical analysis.

The application of dendro-sciences technique proved to be useful to reconstruct how vines have used the water resources before and after the changing in the pruning technique. Understanding how the vine has reacted to past environmental variability and changes in cultivation factors can help forecasting how it will behave under the different climate change scenarios.