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The GREASE project to unravel how soil and canopy management can mitigate climate change effects on Greco grapevine

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The pedo-climatic conditions can determine the grape varieties that can be cultivated as well as have deep influence on wine quality. Climate change has already caused significant warming and drought in most grape-growing areas of the world, particularly in the Mediterranean area where viticulture is suffering yield and grape quality reductions due to the increased frequency and duration of drought periods. Ongoing climate change is aggravating some critical issues in the production of the autochthonous grape variety 'Greco' (*Vitis vinifera* L. subsp. *vinifera*), widely cultivated in the Campania Region (southern Italy) and used alone or blend in many quality label wines. Nowadays, there is a high risk for the economic sustainability of Greco cultivation due to the following main issues: reduced vine productivity, low selling price of grapes, and territory fragmentation. Such criticisms induce the abandonment of small/medium-sized farms due to either crop conversion or consolidation into larger farms.

Although pedo-climatic conditions can affect vineyard productivity and grape quality primarily, the application of adequate cultivation techniques, such as soil and canopy management, can help alleviating the increasing constraints to vineyard sustainability. In the framework of the Rural Development Programme 2014-2020, Campania Region funded the GREASE project to contribute to the main topic of improving grapevine productivity, resource use efficiency, and resilience for the sustainable management of vineyards.

The general objective of Grease project is to improve the potential production of Greco concerns the management of major cultivation practices in viticulture by the realization of a cultivar-specific model for vine canopy and soil management. Optimization of such cultivation factors is important in order to achieve a good vegetative and reproductive balance that enhances grape and wine quality, improves farm profitability and finally provides environmental sustainability. The project is carried out in a Greco experimental vineyard of Feudi di San Gregorio winery in southern Italy (Avellino, Campania region). One of the main activities is to analyse the effect of soil management

and vine training systems on the *continuum* soil-plant-atmosphere system. The growth and the eco-physiological traits of vines were monitored in the main phenological phases by measuring morphological parameters, fertility, leaf gas-exchanges, chlorophyll *a* fluorescence emission, leaf water potentials, and leaf anatomical characteristics. The meteorological data and soil water content were collected through weather stations and time-domain reflectometry (TDR) technique. Proximal sensing techniques were applied to monitor the whole vineyard performances. The production of each experimental plot was evaluated in terms of chemical characterization of musts and wines in order to assess the treatments-induced changes in oenological traits.

The preliminary results of two-years experimental trials are presented to highlighting how the canopy and soil management can influence the vine eco-physiological behavior and productive performance.

An increased understanding of how cultivation factors influence the efficient use of available resources in the Greco vineyard will allow *know-how* transfer to other grapevine productive systems.