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The GREASE project: Sustainable cultivation of Greco grapevine - Resource use efficiency and application of the footprint family indicators

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Climate change is one of the main challenges for future agriculture since it can severely affect plant growth and development. The Mediterranean area is one of the most vulnerable regions where climatic models have forecasted a significant increase in frequency and severity of drought events. Ongoing climate change is aggravating some critical issues in the production of the autochthonous grape variety Greco, 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.

The Greco variety may represent a study model to introduce innovative and integrated management of cultivation techniques, such as pruning and soil management, with the aim to resolve similar problems affecting other autochthonous regional cultivars. They include issues, such as low fertility, that cause an unbalanced ratio among sugars, acids, and affect grape metabolites important for the oxidative stability and sensory quality of wine.

The GREASE project, funded by Campania Region within the Rural Development Programme 2014-2020, falls within the framework of sustainable management of vineyards (from economic, environmental and social viewpoints) with an insight to climate change. The general objective 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 parameters is important in order to achieve a good vegetative and reproductive balance that enhances grape and wine quality, improves farm profitability and environmental sustainability. This project is conducted in a vineyard of Vitis vinifera L. subsp. vinifera 'Greco' located in southern Italy (Feudi di San Gregorio farm).

The projects has 3 main inter-disciplinary actions: A1) to determine the effect of diverse vine pruning systems on plant resource use, through the reconstruction of vine eco-physiological history (dendro-anatomical and -isotopic analyses); A2-A3) to analyse the effect of soil management and of vine training systems on the continuum soil-plant-atmosphere system. Specific activities include: pedoclimatic, vegetative and reproductive, physiological and hydraulic characterization; microvinification and characterization of grapes and wine produced in the different trials; evaluation of resources use efficiency, pests, footprint family markers; model development.

The impact of the project on other wineries of the Campania Region will be significant due to an increased understanding of how cultivation systems influence the efficient use of available resources in the Greco vineyard. Such knowledge would be useful to design simple modifications to the presently used agronomical practices, to achieve production and economic gains without long-term structural investments. This know-how will also favour other downstream technologies and biotechnologies of viticulture and enology production, as well as the associated companies (e.g., producers of fertilizers, seeds for green manure) to realize products and services better adapted to the development of cultivar-specific viticultural and enological production systems.