



How can we support irrigation management in viticulture to preserve grape quality in southern Italy?: the case study of Aglianico grapevine.

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The viticultural sector is one of the agricultural sectors most challenged by Climate change(CC), needing specific adaptation and mitigation actions to make local farming communities and production resilient. In this context, it is important to guarantee not only the achievement of production but also, above all, the achievement of a cultivar-specific grape quality able to support the oenological goal and, thus, the expression of terroir.

In viticulture, the plant's water stress is therefore important, representing, unlike other crops, a necessary condition for achieving the quality and typicality of the wine. This is because the vine water status represents the main regulator of the hormonal balance of grapevines, affecting berries' characteristics such as sugar, anthocyanins, flavonoid concentration, and acidity.

For this reason, under climate change, the introduction of irrigation represents a complex issue. In fact, it is not only important to guarantee water to the plants, but to maintain a specific water stress during the ripening phase of the grapes.

From this perspective, the aim of this contribution is to show the first results of a task of Spoke 3 of the National Research Center for "Agriculture Technologies - Agritech" (NextGenerationEU European program) on the identification of procedures for the optimized management of the water resource in vineyards.

The research adopts multidisciplinary approaches and methods to support irrigation optimization in the vineyard. It has been based on two main steps: (i) the identification of the functional homogeneous zones (fHZs) present in the vineyard through an environmental analysis based on the determination of the soil spatial variability, the micro-morphology of the vineyard (LIDAR) and the spatial variability of the crop response at different resolutions (UAV); (ii) use and test of field sensors to monitor plant and soil water status in the fHZs in order to define the optimal timing and volume of irrigation to achieve the desired field oenological goals while preserving the water resource.

The experiment has been realized in an Aglianico vineyard (2 ha) of Tenuta Donna Elvira winery (Montemiletto – AV), where climate, plant, and soil are monitored through the use of commercial and non-commercial sensors. In particular, two weather stations and seven monitoring nodes (soil TDR probes at three soil depths) have been distributed within the irrigated and non-irrigated long plots. The plants were monitored continuously (hourly time step) by means of a new in vivo sensor developed by IMEM CNR institute, Bioristor, (applied to 16 plants to monitor the plant status) and discontinuously (weekly or two-weekly time step) plant measurements (e.g., UAV multispectral measurements, LWP, yield production, grapes quality,..etc..).

The irrigation supply was realized through an automated irrigation system (MySOLEM) and defined according to the leaf water potential (LWP) measured in the field, maintaining its value between 1.2 and 1.4 bar during the ripening period.

At the end of the first year, the analysis of collected data to develop a vineyard water management model able to support achieving oenological goals and facing climate change has been realized.