

## Effect of different canopy managements on microclimate and carbon allocation in *Vitis vinifera* cv Chardonnay

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### Abstract

Climate change strongly affects the wine-growing sector which increasingly requires *in situ* adaptation strategies aimed at preserving the sustainability of production. Investigating microclimate becomes crucial in comprehending environmental pressures on plants. The microclimatic investigation conducted in the Orvieto PDO (central Italy) allowed us to highlight the climatic dynamics occurring in the last 25 years and the frequency and intensity of abiotic stresses. Two management strategies for the canopy were identified: early defoliation (ELR) and foliar application of Basalt Flour® (FB) compared to the ordinary management (C) of the company (bud selection and topping). The effects on plant vigour indices (LAI), resource allocation in terms of carbon stored in the above-ground organs of the vine, and the microclimate of the canopy and the berry were evaluated. In particular, microclimate was evaluated through a network of sensors connected wirelessly (Wireless Sensor Network), dedicated to collecting information on temperature and humidity in the canopy and clusters. The results highlight how the two canopy management techniques influence leaf biomass (higher LAI for ELR application) and, indirectly affect the microclimate of the canopy in terms of daily temperature fluctuations and extreme thermal events. The two strategies also modulate the photosynthetic efficiency of the canopy, contributing to increased carbon storage in the aboveground organs of the plant (vegetative and productive biomass), especially for ELR. Overall, the results show how the adopted strategies contribute to increasing the resilience traits of the vine and its ecosystem functions.

**Keywords:** ground sensor platform, leaf removal, plant corroborant, canopy management strategies, viticulture.