

## **An evaluation of the physiological responses of young grapevines planted and maintained under water constraint**

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### **Abstract**

The aim of this ongoing study is to evaluate the degree of adaptability of grapevine scion:rootstock combinations to different conditions of water constraint. Here we present results from the young vine development phase, using three scenarios of water constraint that were implemented from planting. The experimental vineyard was established in 2020 and the data presented will cover the 2021/2022 and 2022/2023 seasons. The experiment consisted of the cultivars Pinotage (PIN), Shiraz (SHI) and Cabernet Sauvignon (CAB), grafted on two rootstocks, Richter 110 (R110) and USVIT-8-7 (US87). The different scion:rootstock combinations were planted and maintained under well-watered conditions, a 50% reduction of irrigation, as well as no irrigation (dryland). Morphological, phenological, physiological and carpological measurements were gathered in addition to soil moisture measurements and environmental monitoring. Results indicated a strong negative vegetative response to the increased water constraint, especially in vines grafted on R110. Moreover, all of the different scion:rootstock combinations reduced stomatal conductance to conserve water use under reduced irrigation conditions. Phenological progression and ripening monitoring indicated that vines advanced their phenology when they experience recurring water constraint. A lowering in total vine yield was observed in the dryland vines, though the difference was not as pronounced in the CAB combinations. A high degree of phenotypic plasticity was observed in most plant-level measurements. The data will be discussed from the perspective of evaluating adaptability to the stressors and to draw attention to the importance of experiments where the responses to water constraint are followed from planting onwards.

**Keywords:** adaptation, viticulture, dryland, water stress, phenology