

## The rootstock control on the scion transpiration even at night

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### Abstract

Water is the main limiting factor for yield in viticulture. Improving drought adaptation in viticulture will be an increasingly important issue under climate change. Genetic variability of water deficit responses in grapevine partly results from the rootstocks, making them an attractive and relevant mean to achieve adaptation without changing the scion genotype. The objective of this work was to characterize the rootstock effect on the diurnal and nocturnal regulation of scion transpiration.

A large panel of 55 commercial genotypes were grafted onto Cabernet Sauvignon. Three biological repetitions per genotype were analyzed. Potted plants were phenotyped on a greenhouse balance platform capable of assessing real-time water use and maintaining a targeted water deficit intensity. After a 10 days well-watered baseline period, an increasing water deficit was applied for 10 days, followed by a stable water deficit stress for 7 days. Pruning weight, root and aerial dry weight and transpiration were recorded and the experiment was repeated during two years. Transpiration efficiency (ratio between aerial biomass and transpiration) was calculated and  $\delta^{13}\text{C}$  was measured in leaves for the baseline and stable water deficit periods.

A large genetic variability was observed within the panel. The rootstock had a significant impact on nocturnal transpiration which was also strongly and positively correlated with maximum daytime transpiration. The correlations with growth and water use efficiency related traits will be discussed. Transpiration data were also related with VPD and soil water content demonstrating the influence of environmental conditions on transpiration. These results highlighted the role of the rootstock in modulating water deficit responses and give insights for rootstock breeding programs aimed at identifying drought tolerant rootstocks. It was also helpful to better define the mechanisms on which the drought tolerance in grapevine rootstocks is based on.

**Keywords:** nocturnal transpiration, vapour pressure deficit, water deficit, plasticity, grapevine