The sensitivity to ABA affects the cross-talk between scion/rootstock in tolerant grapevines to drought stress

Alberto Rodriguez-Izquierdo[1*], David Carrasco[1], María Ángeles Revilla[2], Josefina Bota[3], Rosa Arroyo-Garcia[1†]

[1] *Centro de Biotecnología y Genómica de Plantas (CBGP-INIA), CSIC - Universidad Politécnica de Madrid, Campus Montegancedo, Madrid, Spain.*
[2] *Department of Organisms and Systems Biology, Institute of Biotechnology of Asturias, University of Oviedo, Oviedo, Spain.*
[3] *Research Group on Plant Biology under Mediterranean Conditions, Departament de Biologia, Universitat de les Illes Balears (UIB) – Agro-Environmental and Water Economics Institute (INAGEA). Carretera de Valldemossa Km 7.5, 07122 Palma, Illes Balears, Spain.*
† ***In memoriam of Rosa Arroyo-Garcia.***
*Corresponding author: alberto.rodriguez@inia.csic.es / david.carrasco@inia.csic.es **

Abstract

Drought caused by climate change has a dramatic incidence on the vineyard. Despite employing specific rootstocks tolerant to drought like *110 Richter*, the vineyard continues to experience various losses, revealing the importance of the scion cultivar in the adaptation to drought stress. In this regard, *Merlot*, a widely cultivated grapevine, exhibited reduced drought tolerance compared to less cultivated varieties like *Callet,* a local cultivar originating from the Balearic Islands that demonstrated greater resilience to drought. Therefore, understanding the drought stress response in both cultivars and the cross-talk between scion and rootstock is key to unveiling possible differences that could affect to the adaptation to drought in vineyard. Plants from both cultivars grafted in the tolerant rootstock, *110 Richter*, underwent different drought stages. For each stage, samples from leaves and roots were analyzed at metabolic, hormonal, physiological and transcriptomic level. The results revealed differences at most levels, increasing the production of osmolytes and antioxidant molecules involved in response to drought stress in *Callet*. However, hormonal analysis showed similar ABA production in both cultivars, indicating lower sensitivity to ABA in the case of *Merlot* compared to *Callet.* Moreover, the transcriptomic analysis revealed a modulation of genes involved in response to ABA and miRNA in leaves and roots of *Callet*, whereas in *Merlot* was mostly absent in roots, evidencing a poor cross-talk between *Merlot* and rootstock and increasing the value of the correct combination scion/rootstock for the vineyard adaptation to climate change.

Keywords: rootstock, drought, cross-talk, transcriptomics, ABA.