Raffinose: a sweet solution for grapevine drought tolerance

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Water tolerance in plants is often associated with the accumulation of osmotic protectants, which are secondary metabolites that can help the plant to cope with water stress. One of the key osmotic protectants is a sugar called Raffinose, which is synthesized by a family of enzymes called Raffinose synthases. In this work, we focused on one of these enzymes, VviRAF2, which is a gene that shows different expression levels and genetic variants (SNPs) among different grapevine cultivars, ranging from tolerant to susceptible to water stress, and the transcription factors that may regulate the expression of this gene family. We analyzed the transcriptome data of these cultivars and constructed a gene co-expression network based on the reference genome, which revealed the involvement of the MYB transcription factor named 'AQUILO'. To test the function of VviRAF2 and 'AQUILO' in water-stress tolerance, we engineered such genes via *Agrobacterium tumefaciens* using both, transgenic and cisgenic approach: one VviRAF2 under the control of the 35-s promoter, and another with the insertion of AQUILO controlled by its own promoter. During this study, we performed gene expression experiments on transformed lines to compare the DEGs in response to water-stress. Finally, we present the preliminary results related to stress response underlying the pathways of water stress tolerance.

Keywords: Raffinose, Metabolites, Drought, Abiotic stress, sugar.