Elucidating the biological function of EPFL9 in grapevine roots

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Epidermal Patterning Factors are a class of cysteine rich peptides known to be involved in many developmental processes. The role of EPF1, EPF2 and EPFL9 in controlling leaf stomata formation has been well described in model plants and cereals, and recently also in grapevine, while little is known about their activity in other organs. The aim of our study is to investigate whether *VviEPFL9*-2 can have a specific biological function in grapevine roots, where it resulted to be expressed. As grapevine is cultivated in the form of a grafted plant, we focused our study on the commonly used rootstock Kober 5BB (*Vitis berlandieri* x *Vitis riparia*). *VviEPFL9*-2 was edited in Kober 5BB plants using *Agrobacterium tumefaciens* transformation of embryogenic calli and the CRISPR/Cas9 technology. The phenotypic evaluation in greenhouse indicated that, as expected, the leaves of knock-out (KO) plants have a significant lower stomatal density compared to WT, associated with a lower stomatal conductance. At the root level, preliminary results showed that edited plants have shorter, but ticker roots compared to WT. In addition, to further analyze the root physiology, biological replicates of two *VviEPFL9*-2 KO lines and WT were planted in rhizotrons and subject to a water deprivation experiment. Our results will allow us to understand if *VviEPFL9*-2 might be an interesting target for the application of new genomics techniques in grapevine rootstocks to make them more resilient to drought conditions. If so, a new tool will be available to face the challenges that climate changes pose to viticulture.

Keywords: *Vitis* species, rootstocks, Epidermal Patterning Factors, CRISPR/Cas9, resilience to drought