



UNIVERSITÀ  
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Dipartimento  
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## PLANT DEVELOPMENT AND CROP PRODUCTIVITY FOR SUSTAINABLE AGRICULTURE



PROGRAMME

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## BREEDING STRATEGIES TO DEVELOP NEW GRAPE ROOTSTOCK CANDIDATE

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*grapevine rootstocks, phenotyping, abiotic stress*

Wine grapes are usually grafted onto rootstocks, which may sense water availability in the soil and influence adaptive abilities of plant to drought. Rootstocks control the supply of water and are considered to have a role in stomatal movements of scions. Present commercial rootstocks have a narrow genetic base since only 10 varieties are grown on 90% of vineyards worldwide. They are hybrids of wild *Vitis* species selected in the late 18<sup>th</sup> century to prevent grape phylloxera feeding damage. The diversity within *Vitis* genus provides a good resource not only to protect modern viticulture against pests, but also to better adapt to various environmental conditions. Among these conditions, water availability is particularly important because of its large influence on fruit yield and quality.

Our study aims to contribute to new rootstocks development by providing molecular tools as well as new materials and methods for drought resistance screening. Drought stress response of four commercial rootstock genotypes (101.14, SO4, Riparia Glorie de Montpellier and 110 Richter) was investigated under controlled conditions. Plants were subjected to progressive drought stress during two consecutive seasons in a semi-sealed greenhouse. Plant and soil water status, leaf photosynthetic parameters and stomatal conductance were regularly measured. The expression level of selected stress-responsive genes, including candidate identified in a previous GWAS experiment, was measured in the leaves at different time points. The same varieties were grown in a hydroponic system cultured with 2% PEG solution, which creates a negative osmotic potential ( $\psi\pi$ ) comparable with moisture deficit stress. Our results show that there are differences in stomatal sensitivity and in physiological parameters among the studied genotypes along with different stress responses in the two experimental settings. Embryogenic calli were obtained from all varieties by cultivation of anthers and immature embryos *in vitro* in order to start genetic transformation studies. In addition, resilience to drought was assessed on several *Vitis vinifera* ssp. *sylvestris* genotypes in a pot experiment by withholding water. Undeniable benefits for the scions (e.g better compatibility, higher yield and stress tolerance) could actually be imparted by next-generation rootstocks obtained from the ancestor of domesticated grapevine.