



PRACTICE ABSTRACT - N°3

How to exploit somaclonal variability for priming grapevine adaptability to environmental stress

Viticulture is extremely sensitive to environmental conditions that challenge production both quantitatively and qualitatively, therefore calling for a better management of water resources in the vineyard and for an improvement of breeding platforms. **Somatic embryogenesis** (SE) (i.e. the initiation of embryos from somatic tissues) can generate new genetic variability, called **somaclonal variation**, which can be favored by adding priming agents in vitro, for regenerating more resilient genotypes. Within the **Shield4Grape** project, we have been testing if vines in vitro regenerated through SE, namely **somaclones**, can endure multiple stress factors better.



How can we test the improved stress adaptability of the regenerated somaclones?

Once acclimated *in vivo* under controlled conditions, somaclones are subjected to dedicated trials to identify those plants with improved stress tolerance. For instance, to select somaclones better adapted to **water deprivation**, vines are exposed to water deficit and dynamic changes in **eco-physiological parameters** are evaluated during the whole experiment duration. Biometric and anatomical modifications were also checked and integrated with data on antioxidant and defensive secondary metabolites. Besides the analysis of key transcript changes, the genomes of the best and worst performing lines are sequenced in search for **genetic alterations associated with tolerance** traits. Physiological, biochemical, and molecular data, once integrated, allow identifying those somaclones worth of **investigation in the vineyard** to prove their agronomic and physiological performances. Indeed, unlike other genetic improvement approaches, somaclones are similar to spontaneous variants that could arise naturally in the vineyard and are therefore **exempt from compliance with GMO regulations**. The exploitation of somaclonal variability hence provides a **ready-to-use genetic improvement strategy** for implementing clonal selection and breeding programs in grapevine.

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PROJECT KEYWORDS

- # Pest/disease control in plants
- # Genetic resources
- # Outdoor horticulture and woody crops (incl. Viticulture, olives, ornamentals)
- # Biodiversity and nature
- # AKIS, incl. Advice, training, on-farm demo, interactive innovation projects

