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SOMACLONAL VARIATION AS BIOTECHNOLOGICAL TOOL FOR INCREASING GRAPEVINE TOLERANCE TO BIOTIC/ABIOTIC STRESSES

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Few cultivated species have shown such limited receptiveness to genetic innovation as the wine grapevine, which is firmly bound to the vine-terroir relationship due to cultural, oenological practices, and commercial requirements. However, plants inhabit ecosystems where pathogens evolve continuously trying to force plant defenses and where environmental adversities such as drought are now exacerbated by the ongoing climate change, making plant genetic improvement absolutely necessary. New Breeding Techniques (NBTs) are extremely promising in the field of the fruit crops and wine viticulture in particular, since allow to transfer/mutate the desired gene in a single step, preserving all the quality traits selected in elite genotypes and appreciated by the market and bypassing linkage drag issues. Unfortunately, despite an initial opening of the Italian legislation, the current law regulations limit the use and exploitation of such methods in Europe. At the same time, the European Commission further strengthened the restrictions on the number of chemical treatments allowed in field and on the use of copper fungicides used in organic viticulture, as well as current European policies affecting water use in agriculture are in place. This implies that significant environmental challenges need to be addressed, and there is an urgent requirement for the development of innovative and sustainable genetic improvement strategies.

Somatic embryogenesis (SE) can provide a powerful green biotechnology tool ready-to-use without any restrictions associated with GMO regulations or potential future regulations concerning NBTs. The SE process consists in the formation of non-zygotic embryo from somatic cells, a phenomenon possible thanks to their pluripotency, and it is the most used method for grapevine regeneration. It can generate new genetic variability called somaclonal variation that can be exploited for genetic improvement purposes. We developed innovative protocols of *in vitro* culture to apply a selective pressure driving towards the production of regenerants with acquired tolerance to stresses. Results regarding the production of 110R rootstock and 'Brachetto' somaclones, exhibiting enhanced tolerance to drought and biotic stresses, respectively, will be presented.