# *In vitro* regeneration of grapevine cv. Aglianico *via* somatic embryogenesis: preliminary studies for next genome editing applications

Carmine Carratore[1*], Edoardo Bertini[2], Luca Cattaneo[1], Clizia Villano[3], Riccardo Aversano[3], Mario Pezzotti[1], Sara Zenoni[1,2]

[1] *Department of Biotechnology, University of Verona, 37134 Verona, Italy*
[2] *Edivite s.r.l, San Pietro Viminario, Quartiere San Mauro 30, 35020 Padova, Italy*
[3] *Department of Agricultural Sciences, University of Napoli Federico II, 80055 Portici, Italy*

[*] *carmine.carratore@univr.it*

Italy is a rich hub of viticultural biodiversity harboring hundreds of indigenous grape varieties that have adapted over centuries to the diverse climatic and geographic conditions of its regions. Preserving this biodiversity is essential for maintaining a diversified genetic pool, crucial for addressing future challenges such as climate change and emerging plant diseases. Rising temperatures, precipitation pattern variations, and extreme weather events can affect grape ripening, crop quality, and contribute to disease development. Integrated disease management necessitates exploration of novel strategies. Biotechnologies emerge as a significant player in tackling modern viticulture challenges. New plant breeding technologies (NpBT) can be employed in grapevine cultivation and, in particular, genome editing through CRISPR/Cas9 system has been shown to be a valid application for targeted mutagenesis, by until now its application is restricted on a few cultivars. Genetic improvement via *in vitro* delivery of desired constructs requires the regeneration of genome-edited plants. *In vitro* plant regeneration, a pivotal process in genetic engineering, encounters obstacles, particularly in grapevines, due to factors like genotype and explant-dependent responses. Therefore, reliable *in vitro* regeneration and propagation systems are imperative. Understanding and enhancing regeneration across different genotypes are critical steps in advancing genetic improvements and gene functional studies in grapevines. The study focuses on developing an efficient *in vitro* plant regeneration protocol by somatic embryogenesis (SE) of the grapevine cv. Aglianico, the most important grapevine variety of southern Italy regions. The embryogenic materials obtained will be used for future functional studies through genome editing approaches.

**Keywords:** *Vitis vinifera*, Biodiversity, Genome Editing, Somatic Embryogenesis, Aglianico.