

## The role of vine trunk height in delaying grape ripening: insights for viticultural adaptation strategies

Miguel Puelles<sup>1\*</sup>, Pedro Balda<sup>2</sup>, Andreu Mairata<sup>1</sup>, David Labarga<sup>1</sup>, Álvaro Galán<sup>1</sup>, Fernando Martínez de Toda<sup>1</sup>, Alicia Pou<sup>1</sup>

<sup>1</sup>*Instituto de Ciencias de la Vid y del Vino (CSIC, Gobierno de la Rioja, Universidad de La Rioja), Finca La Grajera, Ctra. Burgos Km. 6, 26007 Logroño, Spain*

<sup>2</sup>*Universidad de La Rioja, c/ Madre de Dios, 51, 26006 Logroño, Spain*

e-mail: [miguel.puelles@icvv.es](mailto:miguel.puelles@icvv.es)

Global changes in temperature patterns necessitate the development of viticultural adaptation strategies. One promising approach involves modifying the training system and elevating trunk height. This study explored the potential of raising the vine trunk as an adaptive strategy to counteract the effects of increasing temperatures and delay ripening. Thermal conditions, radiation levels, and must composition were measured at different heights (10 and 150 cm) in a commercial vineyard of the minority variety Maturana Blanca, trained on a vertical cordon. The results showed a significant delay in grape maturation in the upper part of the vertical cordon, characterized by lower Brix levels and higher titratable acidity than the lower section. These outcomes can be partly explained by observed variations in the Winkler index measured inside the canopy, indicating a 15.59% reduction in the upper zone. However, the radiation percentage in the fruiting zone was significantly higher in the upper part of the vine. In summary, the change in trunk height significantly impacted grape ripening. The study underscores vineyard management's importance in improving wine quality and preserving its typicity. These findings open avenues for future research, guiding potential adjustments in viticultural practices under evolving environmental conditions.

**Keywords:** climate change, temperature gradient, viticulture, training system, vertical cordon.