Sustainable Viticulture: Reviewing the terraces geometry in the Douro Region. Guidelines to growers and policymakers'

Fernando Alves[1]; Joana Valente[1]; João Carvalho[2]; Carlos Bateira[2,3]

[1]Symington Family Estates, Vinhos S.A. Rua do Barão de Forrester 86, Vila Nova de Gaia
[2] FLUP, UPorto
[3]RisKam, CEG, ULisboa / FLUP, UPorto
corresponding author: fernando.alves@symington.com

Abstract

The Douro Region constitutes over 50% of the world vineyard mountain area. The first generation of terraced vineyard layouts with wider terraces supported two rows of vines. The narrower single vine row is dominant at the present vineyards planting layout. The terrace riser gradient is a key element in the vineyard's construction. Bibliography on the subject is relatively scarce and there is little consensus in the definition of the best riser gradient. The recommendation made by the official institutions to the riser gradient is about 175% to 200%. However, empirical observation and practical experience revealed that is impossible to fulfil these criteria leading to a reappraisal of the terraces building techniques, namely related to a viable riser gradient. A study was carried out to assess the values of the riser gradient (with 900 measurements), and with of GIS supported data and high-precision digital elevation models and continuous gradient measurements over large areas. The results showed that the riser gradients range from 90% to 110%. The resultant geometry implies lower plant densities, which means less efficient land usage and lower financial income to the vine growers. However, these numbers are in accordance with established parameters in regions with hillside vineyards, including issues such as terrace stability, and erosion control. The results point the advantages of adopting less steep risers in the terraces construction and served also to evaluate erosion susceptibility in varying terrace geometries. With the aim to develop a code of good practices, a study is conducted in an Estate in Pinhão to evaluate bank gully erosion modeling and riser instability in a one wine row terrace layout. The validation process is based on a rainy episode of 120mm/h (May 28th, 2018). Two detailed digital elevation models, one before the erosion process and other two days after, support de terrain information for the modelling and validation framework. These results contribute to the proper evaluation of vineyard parcels, following EU guidelines, whilst also addressing the reality of Douro vineyards and mountain viticulture in general.