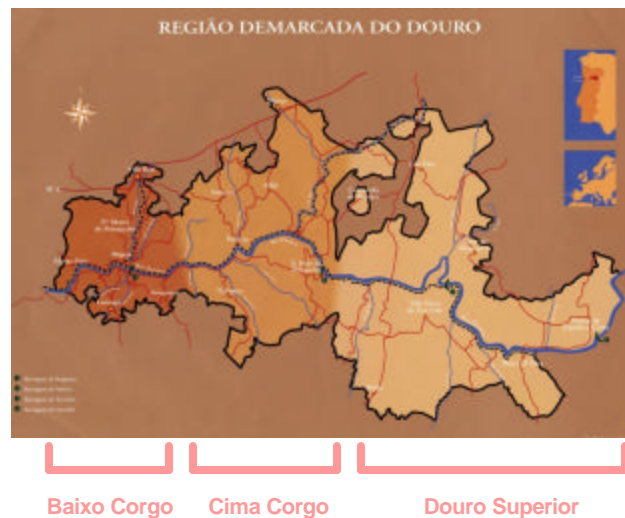


Influence of elevation and slope exposure upon productivity and must quality of “Touriga Nacional” (sub-region of Douro Superior)

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- The Douro region of Portugal has a great climatic diversity, which creates 3 sub-regions, from West to East: *Baixo Corgo*, *Cima Corgo*, and *Douro Superior* (next to the border with Spain). Douro Superior (High Douro) shows the highest summer temperature and the lowest annual rainfall. Touriga Nacional is one of the main varieties planted in the Douro, and is one of the last ones to ripen, so a favorable exposure and altitude are crucial.



- These authors selected 18 vineyards of Touriga Nacional along the Douro Superior covering a range of elevations (>300m, 200-300m, 100-200m) and a range of slope exposures (N, S, NE, NW, SE, SW) and studied their effect on vine vigor, fruit maturation, and polyphenolic content. Each of the 18 plots had 5 replicates of 6 vines each, in a randomized complete block design.

- **Effect of elevation.** 1) As elevation increased, there was a significant reduction in yield (from 2.2 kg/vine at 100-200 m. to 1 kg/vine at >300 m. This was due to fewer clusters per vine, lower cluster weights, and lower berry volumes. This effect might be the result of lower soil fertility and lower water availability at higher elevations. 2) Vigor (pruning weights) was also reduced with elevation. 3) In general, as elevation increased, alcohol, maturation index (Brix/acidity) and color intensity all had lower values. 4) The big exception were the values for phenolic compounds (polyphenol index, total anthocyanins), which were significantly higher at higher elevations.

• **Effect of exposure.** 1) The Southwest exposure showed a significant reduction of yield (1.3 kg/vine). The largest yields were found in SE and NE exposures (2.3 kg/vine), yields which did not to be coupled to any loss in quality. 2) Vigor was not influenced by exposure. 3) The exposures with a South component (S, SE, and SW) resulted in increased sugar accumulation, better maturation index and higher alcohol, compared with the N, NE, and NW exposures. 4) The SW and NW exposures had the highest values of phenolic compounds.

In brief, the highest elevations (> 300 meters), as well as the Southwest exposures, were more favorable for accumulation of phenolic compounds, but reduce yields by half, and the alcohol content was also reduced. In contrast, the lower elevations (between 100 and 200 meters), as well as the Northern and Eastern exposures, produced better yields that did not seem to compromise quality. In the authors' opinion, **the best yield/quality relationship for Touriga Nacional in the Douro Superior is between 100 and 200 meters (330 and 660 feet) and in Southern exposures.**

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