

BUILDING A DATABASE FOR PROVENANCE STUDIES OF ORIGIN WINES FROM THE DOURO VALLEY

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Aim To produce high quality analytical data suitable for evaluating the provenance of Port wine and Douro wine and integrating an authentic wine reference database.

Introduction Port and Douro wines are produced within the same geographical area, the Douro Valley, but follow different vinification procedures; leading to distinct end products. The mineral composition of plants reflects the soil and the environmental conditions under which plants were grown. Minerals and trace elements, as well as their isotopes, are potential biomarkers in authenticity studies. Two analytical strategies, multielemental analysis and stable isotopes, were used and combined with chemometric tools to characterize the geographical region and both wines.

Material and Methods Fifteen samples of each type of wine, Port and Douro, were characterized for 26 elements. Li, Be, B, Al, Cr, Mn, Co, Ni, Cu, Zn, As, Se, Rb, Sr, Mo, Ag, Cd, Sn, Tl, Pb, Fe, Mg, P, Ca, Na, K), by ICP-MS and ICP-OES; and two isotopic systems: ⁸⁷Sr/⁸⁶Sr and ¹⁸O determined by MC-ICP-MS and IRMS, respectively. Analytical results were combined with chemometric tools, Principal Components Analysis (PCA) and Hierarchical Cluster Analysis (HCA), capable of performing multivariate data analysis.

Results Ag, Cd and Tl were mostly below the level of quantification and were therefore removed from statistical analysis. ⁸⁷Sr/⁸⁶Sr varied between 0,71652 and 0,72290. Cr was significantly higher in Port wine (Fig 1). PCA revealed 6 principal components that explained 84,6% of the total variance (Fig 2).

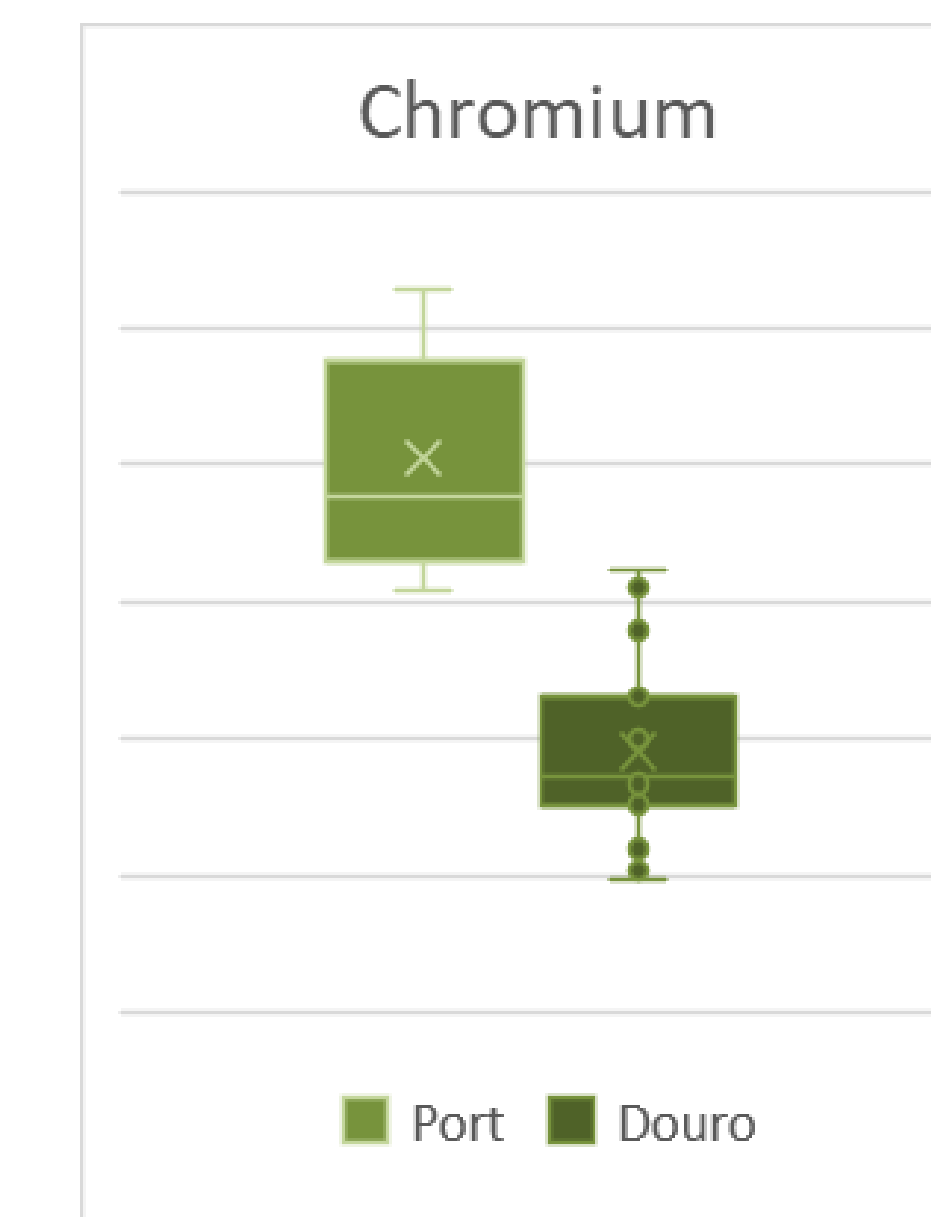


Fig 1 - Variation of Cr content between to type of wine

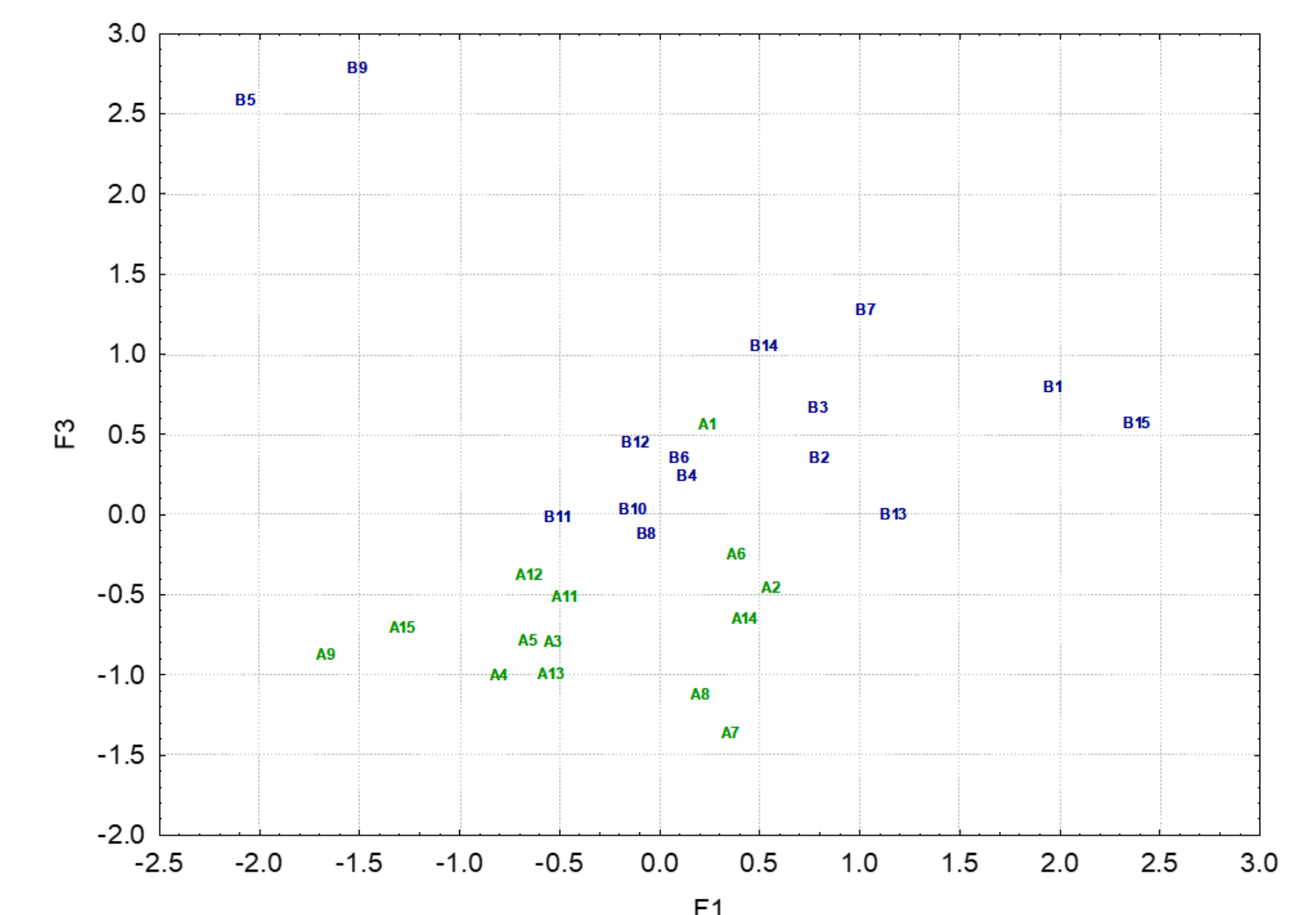


Fig 2 - Score plot for wine samples (Douro wine in blue and Port wine in green).

Conclusions The vinification method did not affect significantly stable isotopes, either ⁸⁷Sr/⁸⁶Sr or ¹⁸O. On the other hand, some elements; namely Cr, Co, Cu, Rb, Se, Ca and Na; showed significant differences between the two types of wine. The produced data can be integrated into an authenticity system for Port and Douro wines.