

DVINE – THE DOURO VINEYARDS, WORLD HERITAGE PATRIMONY: ASSESSING THE IMPACT OF AN ANCIENT ACTIVITY IN THE QUALITY OF SEDIMENT AND WATER IN THE DOURO

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This project aims assessing the effect of vine cultivation in sediments, water and biota of the Varosa River dam. The Varosa is a tributary of the Douro River and the dam is located in the Demarcated Region of Douro Wine (Portugal). The proposed research intends establishing patterns of inorganic and organic pollution arising from the application of pesticides, herbicides, fungicides and insecticides in the vineyards. The most common herbicide used in the region is glyphosate while sulphur and copper sulphate are applied in significant amounts to prevent fungus development. Relationships between pollutants concentrations in vineyard soils, stream and dam sediments, and waters will be investigated to establish the importance of vineyard soils as a pollution source. The temporal geochemical record of vine cultivation will be established through isotopic analysis of sediments cores, namely ^{210}Pb and $\delta^{34}\text{S}$.

Soil samples were collected in 3 vineyards of different ages. Water and stream sediments were collected in tributaries and in the dam. Sediments cores were collected at 6 sites within the dam, providing a composite sample representative of the reservoir.

Glyphosate concentrations were below the detection limit ($<0.10 \mu\text{g L}^{-1}$) in all samples. The stream sediments geochemistry indicates that elements concentrations are similar or lower to that reported for European stream sediments (Salminen et al., 2005), with the exceptions of Cu and Fe that have higher levels. However the study on the metal solid phase distribution shows that both elements are mainly in the form of Fe-oxyhydroxides, indicating a probable geogenic source. Depending on the physical-chemical conditions, Fe-oxyhydroxides can be soluble phase and Cu is a toxic element. Therefore determining Cu concentrations in pore-water samples will be important to assess

metal bioavailability. Also the results indicate that soil erosion and metal leaching down slope are not significant and that metals are retained in the soil profile. The project's ultimate objective is to be able of delivering recommendations on future environmental strategies for the catchment and sustainable agriculture practices in the vineyards.



FIGURE 1 and 2

Sediments sampling using a piston and gravity corer device.