

## INTERPRETING ISOTOPE DATA OF THE ITALIAN WINE DATABANK FOR REGIONAL DISCRIMINATION: COMPARISON BETWEEN UNIVARIATE AND MULTIVARIATE STATISTICAL METHODS

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Wine derives its economic value partly from its geographical origin, which has a significant impact on the quality of the wine, and falsely declaring a certain origin of wine is a simple and relatively common fraud. There are official EC/OIV methods based on stable isotope ratio analysis and univariate statistical analysis [1, 2, 3, 4] usable to detect frauds.

Wine and related product quality is primary concern for the European Union, which has set up a system of official databanks for all wine-producing countries within its territory since 1991 [5, 6]. According to the current EU Regulation [4], every year a number of representative samples (at least 400 in Italy) of the wine production of each member states are collected. For each sample about 10 kg of fresh grapes are harvested, vinified under controlled condition and analysed. The final aim of the databank is to collect the H, C and O isotope ratios ((D/H)<sub>1</sub>, (D/H)<sub>2</sub>, R,  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$ ) of ethanol and vegetal water as standard to detect frauds in wine, such as unpermitted sugar enrichment, addition of water or false declaration of origin. The analytical data from the selected reference samples have then to be computed to produce for each isotopic parameter a mean value and the confidence limits as a function of reference samples with a recommended level of confidence of 95%. The isotopic data of the control wine are compared with the data of databank which are as close as possible (in terms of variety, geographical location and year of vintage) to the sample.

At the Fondazione Edmund Mach a huge wine database from 1989 until now is available. Besides isotopic parameters, many other parameters are also included (the date of collection, grape cultivar, exact geographical location, fermentation times...). Using this database, we have tested if multivariate (statistical) methods are able to improve the discrimination between wines produced in the different Italian regions. Improvement in discrimination would allow to improve fraud detection in wine. We concluded that multivariate methods provide much greater possibilities for regional discrimination than univariate methods foreseen in the regulations. In this poster we will present the results of this study and illustrative examples from several Italian regions and several years.

### References:

- [1] OIV MA-E-AS2-09-MOU018
- [2] OIV MA-E-AS312-06-ETHANO
- [3] OIV-OENO 426-2011
- [4] E.C. Regulation No. 555/2008
- [5] E.C. Regulation No. 2347/91
- [6] E.C. Regulation No. 2348/91