

AUTENTIFICATION OF GEOGRAFICAL ORIGIN OF WINES BY INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPECTROSCOPY (ICP-AES)

^{1,2}Sturza Rodica, ¹Bilici Constantin, ³Prida Ion

¹Technical University of Moldova – Chişinău, Moldova

²National Center of Alcoholic Beverages Testing – Chişinău, Moldova

³Oenolab SRL – Chişinău, Moldova

It is known that macro- and trace element composition of plants and living organisms depends on the elemental composition of the environment. European researchers found that even 10 years after bottling, the wine continues to bear the "chemical signature" of the vineyard and forest, from which the barrel was made in which the wine is matured. Naturally, this fact can be used to confirm the origin of wines with geographical appellation, as well as to detect wine falsification [1,2].

The identification of the product at the place of origin means that it has some special features related to this area because of the unique natural and climatic conditions and existing traditions. Also, the geographical appellation bears the information that there is some control over this production. Starting 2011, OIV (International Organization of Wine and Wine) first introduced in the book of recommended methods of analysis for wine, must and grape juice the multi-elemental analysis - OIV-Oeno 344-2010 [3], which can be carried out by atomic emission spectrometry with inductively bound argon plasma (ICP-AES or ICP-AES) and mass spectrometry with inductively coupled argon plasma (ICP-MS or ICP-MS).

This paper presents the results of tests carried out in order to validate trace elements analysis of wines by ICP-AES. Studies were carried out by atomic emission spectrometry with inductively bound argon plasma at ICPE-9000 instrument (ICP-AES, Shimadzu Co., Japan). We used standard for ICP, Fluka TraceCERT-ISO/IEC 17027, ISO Guide 34 (Sigma-Aldrich GmbH). For preparation of calibration solutions, water and nitric acid class TraceSELECT Ultra were used. For the multi-elemental analysis of wine two sets of standards were used: series (1), including trace elements: zinc, copper, arsenic, lead, cadmium, iron, aluminum, etc., and series (2), including macro-elements sodium, potassium, calcium, magnesium, lithium. For the first series, the multi-elemental standard is prepared with a 5% solution of ethanol, and for the second series (2) the influence of alcohol is not taken into account, since a significant dilution of the samples (25-100 times) negates its effect.

It is established that the content of trace elements depends not only on the composition of the soil, but also on applied technological operations. The content of micro and macro-elements also depends on the crop year. In particular, relatively low levels of elements such as copper and iron indicates the absence of exogenous metals, of agronomic or technological origin. Relatively low levels of potassium suggests that technological operations such as sulfitation with potassium metabisulfite, demetallization (potassium ferrocyanide), clarification with alginate potassium or caseinate, etc. were not used. The multi-elemental analysis performed by ICP-AES method is of considerable interest to confirm the geographical origin of the product, as well as an informative source on applied

technological methods. In fact, such an analysis is primary for wines of designated origin (VDO). Also, the method can be used to identify counterfeit products.

References

1. A. González, A. Llorens, M.L. Cervera, S. Armenta, M. Guardia. Elemental fingerprint of wines from the protected designation of origin Valencia. *Food Chemistry*, *Volume 112, Issue 1*, **2009**, Pages 26-34.
2. Mònica Iglesias, Emili Besalú, Enriqueta Anticó. Internal Standardization–Atomic Spectrometry and Geographical Pattern Recognition Techniques for the Multielement Analysis and Classification of Catalanian Red Wines. *J. Agric. Food Chem.*, **2007**, 55 (2), pp 219–225
3. COMPENDIUM OF INTERNATIONAL METHODS OF ANALYSIS-OIV, **2011**, vol. 1, 2.