

# 1st ISO-FOOD International Symposium on Isotopic and Other Techniques in Food Safety and Quality

Portorož, Slovenia

April 1-3, 2019



Organised by

ERA Chair ISO-FOOD in Isotope Techniques in Food Quality,  
Safety and Traceability  
Department of Environmental Sciences  
Jožef Stefan Institute

**Programme and Book of Abstracts**

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# Programme and Book of Abstracts

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Edited by:

**David Heath, Milena Horvat, and Nives Ogrinc**



was found between the apple and the soil  $87\text{Sr}/86\text{Sr}$  ratios, with the latter depending on the local geological features. On average, no significant difference was measured between the results of the  $87\text{Sr}/86\text{Sr}$  ratios of apples collected in 2017 and 2018, confirming that the  $87\text{Sr}/86\text{Sr}$  ratio does not significantly vary from year to year. However, the results of the  $87\text{Sr}/86\text{Sr}$  ratio analysis did not allow a complete separation of apples according to their provenance, as the soil from some areas had similar  $87\text{Sr}/86\text{Sr}$  ratios. To improve the output of the study, a multivariate approach was tested combining the  $87\text{Sr}/86\text{Sr}$  ratio analysis with the multielement analysis. A classification model based on the linear discriminant analysis (LDA) was developed, with satisfying preliminary results (accuracy of 88-78% in calibration and prediction, respectively). This study represents a first effort to enhance the tutelage of high-quality apples cultivated in the Italian districts using objective and reliable analytical tools and a good starting point for future works.

## Food Authenticity and Traceability

### Monday After-lunch Session Apr 01, 15:00 - 15:30

OR-09

#### Elemental content and strontium isotope characterisation of Slovenian wine

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Slovenia has 15,800 hectares of vineyard area divided into three major grape-growing regions, Podravje, Posavje and Primorska, which are further divided into 9 sub-regions. The composition of wine is influenced by the characteristics of the production areas, such as grape variety, soil and climate, as well as winemaking process and wine storage. The elemental compositions of wine as well as the isotopic compositions of each element may be influenced by several process; the uptake of minerals from soil, which can be of both natural and anthropogenic origin (i.e. the use of fertilizers and pesticides), and by the winemaking processes, such as the use of various additives.

In the presentation the first data on the characterisation of the Slovenian wines will be presented. Namely, the results of multi-elemental and Sr isotope compositions determination in wines from three main Slovenian wine production regions. Two wine grape varieties were analysed; white wine, the Pinot (gris or/and blanc), and the red wine, Merlot. The aim was to evaluate the differences in elemental composition and Sr isotope ratio of the same wine variety growing in different regions in order to find the characteristic tracers for the investigated wine production areas. Major and trace elements, rare earth elements and  $87\text{Sr}/86\text{Sr}$  isotope ratio were determined in total of 10 wine samples from Podravje (Štajerska sub-region), Posavje (Bizeljsko-

Sremič sub-region) and Primorska (Goriška brda, Slovenian Istria and Vipavska valley sub-regions). Cr was elevated in wine samples from Primorska region, most probably as a consequence of the flysch bedrock that is rich in Cr, and was an important discriminator for the wines from Primorska region. The  $87\text{Sr}/86\text{Sr}$  isotope ratio ranged from 0.708715 to 0.71420, with the highest values found in the Podravje region, which was therefore the important discriminator for this region.

Although Slovenia is a small country, it is geologically very heterogeneous. On its approx. 20.000 km<sup>2</sup> various types of bedrocks exist, thus reflecting in different mineral composition and  $87\text{Sr}/86\text{Sr}$  signatures. The results of the present study confirm that by the use of multi-elemental and Sr isotope ratio analysis combined with the statistical analysis it is possible to find characteristic tracers for the different wine production regions, even though they are not far away between each other.

OR-10

#### $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ analyses of amino acids of grape

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$\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values of free amino acids in grape reflect the source of C and N of grapevine and the metabolic pathways involved in their biosynthesis. In this study, carbon and nitrogen isotope ratio analysis of whole amino acids extracted from several Italian musts and wine through ion-exchange chromatography and of proline after protein hydrolysis and derivatization were carried out by elemental-analyse- (EA) and by compound-specific gas chromatography-combustion- (GC-C) coupled with an isotope ratio mass spectrometry (IRMS). The sugar fraction isolated from must was also analysed.  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values of amino acids are not correlated. Our results showed a good correlation between the  $\delta^{13}\text{C}$  of sugar and amino acid fractions. This could be effective in improving detection of the illegal addition of exogenous sugar to grape must. Both  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  of amino acids of must are related with those of wine. The  $\delta^{15}\text{N}$  of amino acid seems to be related with the isotopic composition of soil, agricultural practices and with the climatic condition during ripening.

We concluded that stable isotope ratio analysis of amino acids represents a novel analytical tool to support and improve certification and control procedures.

## Food Quality and Safety

### Monday Afternoon Session Apr 01, 16:30 - 18:00