

# 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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and Other Techniques in Food Safety and Quality

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# Programme and Book of Abstracts

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at IDPA-CNR Venice.

This multiparametric approach will allow us to define which parameters are more useful for trace back the geographic provenience of Cannabis sativa and its derived products.

PO-03

#### **Application of chemometric tools for determination of authenticity of Serbian pear spirits**

Biljana Marosanovic, *Maja Lojovic*, Aleksandra Bauer  
SP Laboratorija, Serbia

In recent years, many food products have been losing their authenticity, uniqueness and characteristic of the area from which they originate. The authenticity of fruit spirits is one of the important issue regarding the consumer protection and it is based on the identification and elimination of fraud in the market. Pear spirit is a national, Serbian, alcoholic beverage with a great tradition and it becomes subject of falsification. Counterfeiting is related to ethanol content increasing, by adding sugar from sugar beet (C3 plant) or sugar cane and corn (C4 plant).

The determination of  $\delta^{13}\text{C}$ ,  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  isotope ratios by Elemental Analyzer - Isotope Ratio Mass Spectrometry (EA-IRMS by Thermo) is a precise analytical method that can be used to check the authenticity, botanical and geographical origin of fruit spirits.

For detection of the adulteration, we have made laboratory control samples of spirits of pear, sugarcane and corn in SP Laboratorija. At the same time, we have prepared samples of pear spirits with different amount of added beet sugar (3%, 5%, 10%, 20% sugar was added on the weight of fruit during fermentation), from different geographical origin (South and North part of Serbia). Also, we collected pear spirits produced in Serbia in the period from 2005 until 2017. Combined results of  $\delta^2\text{H}$  and  $\delta^{13}\text{C}$  values gives an important information about botanical origin of ethanol and possibility of distinguishing between fruit spirits and spirits with non-fruit origin (made from beet sugar, maize, cane sugar). In the aim of geographical classification for spirit samples, originating from different locations in Serbia, spirits has been determined by isotope ratio  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$ .

Application of Chemometrics has established a linear correlation between the concentration of sugar values (derived from sugar beet) and  $\delta^2\text{H}$  values. Applying this equation, it is possible to calculate the amount of added sugar in the unknown sample.

The application of the formed database enabled the classification of commercial pear spirits on the basis of botanical and geographical origin.

PO-04

#### **Characterization of truffles (*Tuber* sp.) in Slovenia using stable isotope approach and elemental composition**

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The high cost of several species from the genus *Tuber* attracts more or less exquisite adulteration practices. The most known of the *Tuber* species in Europe are: *Tuber magnatum* Pico 1788 and *Tuber melanosporum* Vittadini 1831, followed by other commercially interesting species such as *Tuber aestivum* Chatin 1887, *Tuber macrosporum* Vittadini 1831, *Tuber brumale* Vittadini 1831, *Tuber borchii* Vittadini 1831, etc. Truffles are used in culinary as fresh fruiting bodies or as ingredients in the processed product. Since 2011 the truffle hunting is again legal in Slovenia and majority of Slovenian truffles comes from hunting wild truffles. While some of the species can be found in different parts of Slovenia, the two most appreciated *T. magnatum* and *T. melanosporum* are found only in Slovenian Istria.

In season 2017-2018, six truffle samples were collected in Slovenian Istria. Two samples of *T. magnatum*, one *T. borchii*, one *T. melanosporum*, and two *T. aestivum* were analyzed for elemental composition by X-ray fluorescence (XRF) and for stable isotope composition (H, O, C, N, and S) by isotope ratio mass spectrometry (IRMS). Stable isotope composition of carbon was also determined for the main volatile organic compounds by the use of headspace solid-phase microextraction (HS-SPME) coupled with IRMS.

There was high variability of  $\delta^2\text{H}$ ,  $\delta^{15}\text{N}$ , and  $\delta^{34}\text{S}$  observed between different truffle species. The statistical evaluation of elemental and stable isotope compositions indicated that samples can be separated according to  $\delta^{15}\text{N}$ , Pb and P.  $\delta^{13}\text{C}$  values in VOC were also significantly different between different truffle species. It was also speculated that different VOC components can be produced not only by the truffle but also or exclusively by the microbes such as yeasts or bacteria.

These preliminary results of the ongoing study show that elemental composition and stable isotope composition could be used for determination of species variety and trophic status of truffles. It was also indicated that truffles offer a unique opportunity to better understand the ecological function of microbes associated with fungi and their involvement in aroma formation.

**Acknowledgement:** The research was performed within ARIMnet REALMed project with the aim of "Pursuing authenticity and valorization of Mediterranean traditional products".

PO-05

#### **Establishing reproducibility in compound-specific stable isotope measurements for food authentication and adulteration**

*Chris Yarnes*

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