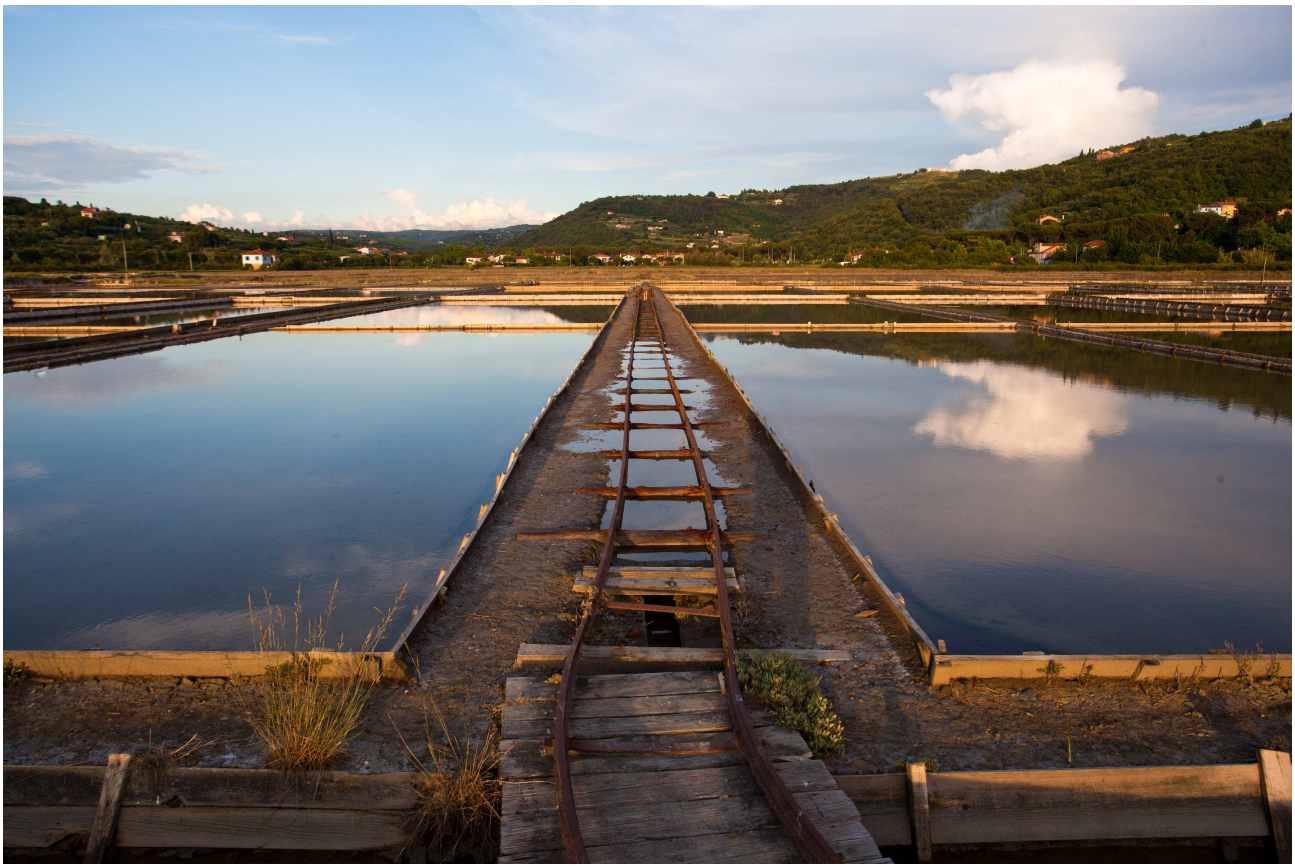
1st ISO-FOOD International Symposium on Isotopic and Other Techniques in Food Safety and Quality

Portorož, Slovenia

April 1-3, 2019



ISO Fd Food ERA Chair Safety Quality Traceability

Jožef Stefan Institute, Ljubljana, Slovenia

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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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Edited by:
David Heath, Milena Horvat, and Nives Ogrinc

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PO-22

How to establish stable isotope databases for authenticity assessment of aromas

Lidija Strojnik[1], Jože Hladnik[2], Nika Weber[2], Darinka Koron[2], Matej Stopar[2], Emil Zlatič[3], Doris Kokalj[3], Mateja Naglič Gril[4], Nives Ogrinc[1]

[1]Jožef Stefan Institute, Department of Environmental Sciences, Slovenia

[2]Agricultural Institute of Slovenia, Slovenia

[3]University of Ljubljana, Biotechnical Faculty, Slovenia

[4]Frutarom Etol, Slovenia

The demand for flavourings is increasing and today's consumers, more than ever, demand naturally flavoured products. Because flavour compounds are commonly falsified by either dilution, mixing with synthetic compounds, or false declaration of origin of natural resources there is a demand to control authenticity. At this point, gas chromatography isotope ratio mass spectrometry (GC-IRMS) is the most suitable method capable of distinguishing between natural and synthetic aromas. To verify the authenticity of commercial apple and strawberry distillates, δ13C values of different aroma compounds must be determined and confirmed by comparison to δ13C values of authentic compounds held in stable isotope databases. Any sample with one or more compounds outside this range is then suspected of being adulterated. Consequently, it is important to develop databases containing flavour compounds with well-defined origins. In this study, we developed stable isotope databases for apple and strawberry aroma compounds. First, we characterised 18 apple and 9 strawberry laboratory produced recovery aroma samples and 32 pure synthetically derived aroma compounds. We then used the results to establish a database of δ13C values of 17 apple aroma compounds and 27 strawberry aroma compounds with regards to their origin (synthetic and natural). In the second step, we expanded these two databases by adding more authentic natural samples. Because sampling aroma volatiles, recovered in the water phase after steam distillation, is a timely and costly process, we also tested the fruits directly. The results show that raw samples or juices can be used for building a database, with the limitation that the number of aroma compounds that can be analysed is lower. By testing other fruits (peach, blueberry, watermelon, pear, banana, raspberry) we also determined if the type of fruit is an important parameter when creating a database. The results revealed differences in certain aroma compounds in different types of fruits. For most of the selected aroma compounds, there is good discrimination between the range of values for natural and synthetic authentic aromas, but despite this, certain aroma compounds had overlapping δ13C values, meaning it was not possible to discriminate between natural and synthetic aromas with a high degree of confidence. An accurate determination of authenticity is, however, feasible using a multi-analysis approach such as GC-C/P-IRMS (δ13C and δ2H measurements).

PO-23

Using stable isotope databases for authenticity assessment of commercial flavoured products

Lidija Strojnik[1], Matteo Perini[2], Silvia Pianezze[2], Federica Camin[2], Nives Ogrinc[1]

[1]Jožef Stefan Institute, Department of Environmental Sciences, Slovenia

[2]Fondazione Edmund Mach (FEM), Italy

Flavour is an important quality trait of food and beverage, and is determined by taste and aroma. However, the growing demand for natural aromas and that natural raw materials are becoming more expensive, which is putting increasing pressure on prices and quality. Moreover, owing to the price advantage that synthetic aromas have over natural ones together with the difficulty in differentiating between natural flavours from their synthetic analogues, means that synthetic flavours are being passed off as being natural. Apart from fraud, the addition of non-authentic compounds could pose a potential health risk. Consumer confidence can also be put at risk by passing off an inferior product as the genuine item. When assessing authenticity, the two most valuable assets are (1) a suitable analytical technique that can distinguish between the natural and synthetic compounds and (2) a database of authentic natural and synthetic aroma compounds of the compounds most important in defining the aroma. In regards to the former, gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS) with headspace solid phase microextraction (HS-SPME) is an appropriate tool for assessing the authenticity of fruit aromas. For example, HS-SPME GC-IRMS analysis of δ2H and δ13C can be used to distinguish between natural and synthetic vanillin. In regards to the latter, we have used the database of authentic samples of apple and strawberry aroma compounds constructed within our laboratory to assess authenticity of natural flavouring products: natural commercial distillates, pure aroma compounds and powder flavour supplements, apple flavoured water and commercial food products flavoured with natural vanillin (yoghurt, ice cream, pudding and tea) were all tested. The authenticity of each was assessed by comparing δ13C values, and in case of vanillin also δ2H values (determined using GC-P-IRMS), with the isotopic values of authentic samples. The results of commercial samples show possible falsification for several fruit aroma compounds and that all the samples reported as being flavoured with natural vanillin contained synthetic vanillin. As these result indicate, significant doubt exists about the authenticity of flavoured products on the market and extensive testing of products is necessary.

PO-24

Parameters for discrimination between organic and conventional production: a case study for chicory (Cichorium intybus L.)

Lovro Sinkovič[1], Marijan Nečemer[2], Nives Ogrinc[3], Vladimir Meglič[1]

[1]Agricultural Institute of Slovenia, Crop Science Department, Slovenia

[2]Jožef Stefan Institute, Department of Low and Medium En-