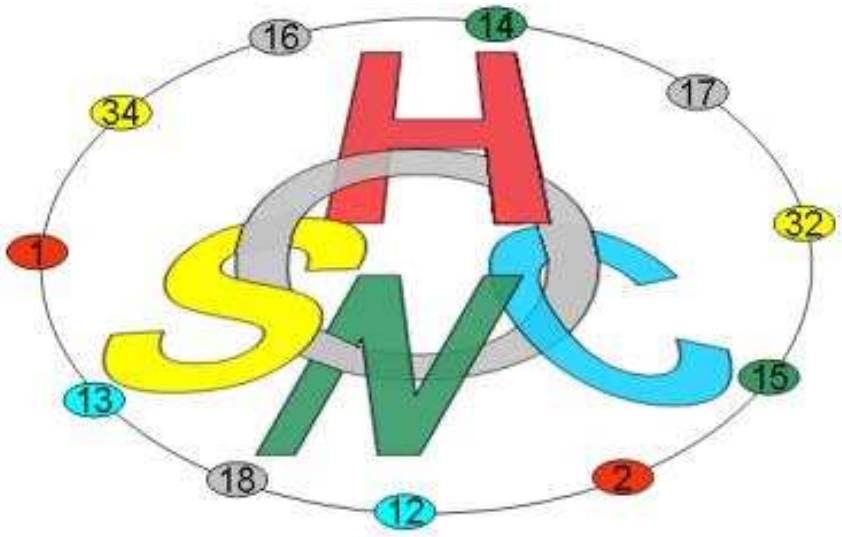
Società Chimica Italiana
Divisione di Spettrometria di Massa

FONDAZIONE EDMUND MACH

The 1st Isotope Ratio MS DAY



May 9-11, 2016

Fondazione Edmund Mach

S. Michele all'Adige (Trento, Italy)

BOOK OF ABSTRACTS

PROCEEDINGS OF THE 1st ISOTOPE RATIO MS DAY

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OR4 - Using GC/c/IRMS analysis to improve food traceability

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Bulk analysis of the stable isotope ratios of carbon, nitrogen, sulphur, oxygen and hydrogen in food samples is a common tool for assessing origin and/or food fraud. Many studies have shown that bulk isotope analysis of agricultural products is able to distinguish between organic and conventional agriculture systems and to separate the geographical areas from which food originates.

In the last few years methods aimed at compound specific stable isotope analysis using gas chromatography-isotope ratio mass spectrometry (GC/IRMS) have been developed in many research areas. The ability to separate compounds and then determine the isotopic ratio of each of them represents a significant advance in isotopic analysis, obtaining a more in-depth understanding.

In different studies we proved the accuracy of the information obtained by applying compound specific analysis in comparison to bulk analysis. Compound groups such as amino acids and fatty acids can help to provide further detailed information on physiological pathways and local conditions (soil and water availability) and can therefore add further information.

$\delta^{15}N$ and $\delta^{13}C$ determination of single amino acids after N-acetylisopropyl derivatisation was used to discriminate between conventional and organic wheat grown using synthetic nitrogen fertilisers and animal manure or green manure from nitrogen-fixing legumes respectively. The results demonstrated that the $\delta^{13}C$ of glutamic acid and glutamine in particular, but also the combination of the $\delta^{15}N$ and $\delta^{13}C$ of 10 amino acids (alanine, aspartate, glutamate, glycine, isoleucine, leucine, phenylalanine, proline, threonine and valine), can significantly improve discrimination between conventional and organic wheat (Paolini et al., 2015).

The $\delta^{15}N$ of wine proline has been shown to be an additional isotopic marker for tracing the geographical origin of wine. Indeed, measurement of the variability of nitrogen isotopic values along the wine production chain has shown that the $\delta^{15}N$ value of proline is very close to the $\delta^{15}N$ value of the growing soil (Paolini et al., 2016).

Finally the $\delta^{13}C$ of palmitic, stearic, oleic and linoleic acids after ethanol transesterification of oil triglycerides, considerably improved geographical differentiation between European and non-European extra-virgin olive oil.

References

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