RÉPUBLIQUE FRANÇAISE
Liberté Égalité Fraternité

INRAE

ISOBIO

EXPLORATORY PROJECT

2023-2024

Exploring the isotopic certification tool for organic products

Coordination

Guillaume Tcherkez,
UMR IRHS
guillaume.tcherkez
@inrae.fr

Keywords

Wine
Metabolism
Organic certification
Stable isotopes
Biomarkers
Metabolomics

Food products authentication as organic is a major challenge given the increasing incidence of fraud. However, determining whether a product is organic is not easy since it is not always possible to spot potential inputs that are not authorized for organic agriculture (e.g., products that are difficult to detect or confined to certain parts of the plant).

The use of natural isotopic abundances has an enormous potential. In fact, organic and non-organic growth conditions can directly lead to differences in specific isotopic abundance (source effect), or modify the physiology of the plant, impacting isotope fractionations (physiological effect).

Stable isotopes have been used for over 50 years to authentify geographical origin, botanical origin, etc., but are rarely used for organic certification. Several studies have shown the potential of raw isotopic signatures of commercialised plant products, but with limited efficacy.

Contact METABIO
metabio@inrae.fr

INRAE units

IRHS, Angers
BFP, Bordeaux
Œnologie, Bordeaux

Partners

Université de Nantes / CNRS

© INRAE

That said, specific isotopic analyses targeted to individual compounds, or within molecules themselves (intramolecular signatures), have some potential to become a powerful tool. The aim of this project is to explore such refined analyses, using wine as a raw material, in order to answer the following questions:

1. Can natural isotopic signatures be used to differentiate organic and non-organic products, in particular, using several isotopes simultaneously?
2. At what level analyses should be carried out: raw, compound-specific or intramolecular?
3. How does the performance of the isotopic approach compare with that of biometric approaches such as NMR[1], LC-MS[2] and NIRS[3]?

This project mobilizes skills in isotopic biochemistry, analytical chemistry, plant physiology and metabolism. It also requires statistical analysis (machine learning) and comparison with biometric methods.

[1] NMR: nuclear magnetic resonance;
[2] LC-MS: liquid chromatography mass spectrometry;
[3] NIRS: near-infrared spectroscopy

Contact METABIO
metabio@inrae.fr