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ISOBIO *Project results*

Exploratory project
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Exploring the isotopic tool for the certification of organic products

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Certifying the organic nature of food products is a major challenge given the rise in the number of frauds. Stable isotopes, which have been used for more than 50 years to certify geographical origin, have an enormous potential because organic and non-organic growing conditions can lead to differences in isotopic abundance (either directly or through changes in plant physiology).
ISOBIO aimed to explore the use of isotopic signatures to differentiate organic and non-organic products, using wine as a case study. The project took advantage of a collection of organic and non-organic red wines from the Bordeaux region, and four grape varieties (Cabernet, Merlot, Syrah, Surprise) from different plots. Its initial goal was to determine which isotopes to use, which type of analysis is appropriate, and then to compare the isotopic approach with proton nuclear magnetic resonance (NMR) metabolomics used in other research projects.

The final results are not yet available, but the preliminary results are encouraging and show differences in the metabolic profiles of organic and non-organic wines:

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- Isotopic analysis of the natural abundance of deuterium (δ^2H) makes it possible to distinguish between grape varieties based on their evaporative properties (water loss through the leaves via transpiration), but does not reveal any significant differences between organic and non-organic origins. Analyses of carbon-13, nitrogen-15 and sulfur-34 are underway.
- Metabolomic analyses (proton NMR) distinguish only two of the four grape varieties but show a generally satisfactory separation between organic and non-organic wines. These analyses will be supplemented by other methods.
- The first intramolecular NMR isotopic analyses of carbon-13 in organic acids (lactic and malic) highlighted the need for sample preparation to pre-purify the target molecules and thus helped establish standards for future analyses. The two-dimensional intramolecular isotopic analysis (^{13}C, ^{2}H) appears to be the most promising avenue to differentiate organic and non-organic wines.

Analyses are ongoing, and the final results will supplement–or even confirm–these initial findings.

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