

## PROOF OF ORIGIN WITH AGRICULTURAL PRODUCTS, FOOD AND FEED

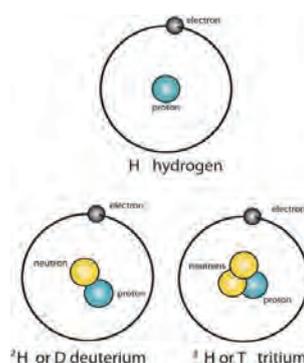
The clear analytical proof of the geographical origin of a product is usually ascertained through the tracing of delivery notes, invoices or labelling information, which generally means that it is carried out on the basis of good faith through the inspection of documents. But what happens when gaps appear within the chain of documentation or the data is

unclear or could even be manipulated?

For this purpose, in cooperation with a specialist partner laboratory, for many cases, the AGROLABGROUP can offer a secure and accredited analytical verification via so-called **stable isotope analysis**.

Numerous chemical elements exist in the form of different versions which, with the same number of protons, have a different number of neutrons in their atomic nucleus. With the same atomic number in the periodic table, different atomic weights occur. When the heavy isotopes of an element do not attempt to return to their stable energetic mass under the transfer of energy (radiation), they are referred to as being stable isotopes.

The practical thing about these stable element versions is that their mass ratio is not distributed identically in every location in the world. This means that minimal differences in the mass ratio of the different isotopes can enable the deriving of conclusions about the geographical, climatic and anthropogenic effects.



The most important stable isotopes for the analytical practice are:

- Hydrogen <sup>1</sup>H, <sup>2</sup>H
- Carbon <sup>12</sup>C, <sup>13</sup>C,
- Nitrogen <sup>14</sup>N, <sup>15</sup>N,
- Oxygen <sup>16</sup>O, <sup>18</sup>O and
- Sulphur <sup>32</sup>S, <sup>33</sup>S, <sup>34</sup>S

These ratios can be combined to create a clear “fingerprint” for a product, with the help of which it is possible to check its identity, authenticity and/or region of origin.

### HOW DOES THIS WORK IN PRACTICE?

It is easiest if one is able to access one or several product samples as reference sample(s), the geographical/regional origin of which is unequivocal. These reference samples are then tested for their typical stable isotope ratios. A high resolution mass spectrometer is used for this purpose. The results are then saved in a customer-specific database.

A sample, the origin of which is unknown or in doubt, is measured in the same way and the isotope pattern is compared with the reference data. If both of these match within the reference cluster, the geographical origin is confirmed. If the samples deviate from each other strongly, however, it can, in contrast, be safely ruled out that the unknown sample originates from one of the reference regions. On the basis of this particular reference comparison, it is not possible to safely state the precise origin of the sample.

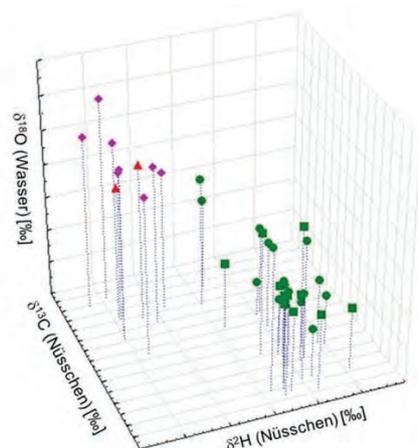


Fig.: Differentiation of strawberry samples (seedlings) according to their origin using the stable isotope method (δ<sup>2</sup>H, δ<sup>13</sup>C, δ<sup>18</sup>O); green data points ■: regional comparative samples; red data points ▲: Strawberry samples with clinical suspicion of wrong origin; pink data points ◆: Strawberry samples of Spanish origin. (Source: CVUA Freiburg 2014)

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## BIOLOGICAL-ORGANIC OR CONVENTIONAL PRODUCTION?

In many cases, questions of this kind can also be clarified with the use of stable isotope measurement. Although the products have neither visual nor sensory differences and the examination of pesticide residues does not provide any information on which sample originates from organic

cultivation, and which sample originates from conventional cultivation, the ratio of the nitrogen and sulphur isotope can provide the decisive information. Depending on the type of fertiliser - organic or mineral - the fingerprint generally shows clear disparities in the isotope patterns.

## AREAS OF APPLICATION

- Security of origin through the direct analysis of fruit, vegetables, meat and milk products
- Differentiation between biological-organic and conventional production (agricultural products such as cereals, fruit, vegetables, eggs, milk, animal fodder).
- Protection against food fraud and product tampering (wine, cooking oil, grape vinegar, honey, fruit juice).
- Identification of batches/products through preventive stable isotope labelling

The possibilities surrounding the analysis will initially be discussed with the prospective customer on a realistic, confidential and individual basis, and an estimate of the costs will take place.

In accordance with the general scope of analysis which can be expected, the AGROLABGROUP also contributes to the initial costs of the required collection of the reference data. On this basis, for a limited period, we offer an attractive introduction to the sustainable, analysis-based testing of origin and authenticity of both food and animal fodder products.

## CONTACT

Have we triggered your interest and sparked your analytical imagination?

Then please address your enquiry directly to:

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