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ABSTRACT BOOK

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COVER IMAGE:

Aerial cityscape image of Turin during sunset.

Application of stable isotope techniques to detect the authenticity of high value food products

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Consumers are increasingly interested in products having a specific Geographical Indication (GI) (e.g., PDO, PGI or TSG), healthy food, food supplements and natural compounds, which are usually expensive and therefore more subject to attempts at adulteration. Methods to test the authenticity of these products are thus needed and the analysis of stable isotope ratios (SIRA) of bioelements such as carbon ($^{13}C/^{12}C$), nitrogen ($^{15}N/^{14}N$), sulfur ($^{34}S/^{32}S$), oxygen ($^{18}O/^{16}O$) and hydrogen ($^{2}H/^{1}H$) could meet this requirement. Some recent applications of the SIRA are here presented. The isotope ratio analysis of bulk samples was performed using an isotope ratio mass spectrometer interfaced with an elemental analyzer and a pyrolizer. Furthermore, the $^{2}H/^{1}H$ and $^{13}C/^{12}C$ compound-specific analyses of the single ingredients of different products (e.g., single amino acids or fatty acids) were carried out by using an isotope mass spectrometer connected to a combustion/pyrolysis gas chromatograph. Incorrect labeling and/or adulteration (consisting in, for example, samples watering, addition of exogenous sugars or incorrect geographical origin labelling) can be easily detected in products such as GI wine and must, balsamic vinegar of Modena (Perini et al., 2014) or cheese like Parmigiano Reggiano (Pianezze et al., 2020). In various types of food and dietary supplements the fraudulent use of synthetic or biosynthetic products instead of the natural ones can be identified. Products like Monacolin K, which is naturally present in fermented red yeast rice (Perini et al., 2017), natural L-theanine (extracted from *Camellia Sinensis*) (Perini et al., 2021), vanillin (from the *Vanilla* species) (Perini et al., 2019a), curcumin (from *Curcuma Longa*) and *Serenoa repens* oil (from *Saw Palmetto*) (Perini et al., 2019b) are frequently subject to this type of adulteration.

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