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NMR based metabolomics in food authentication assessment

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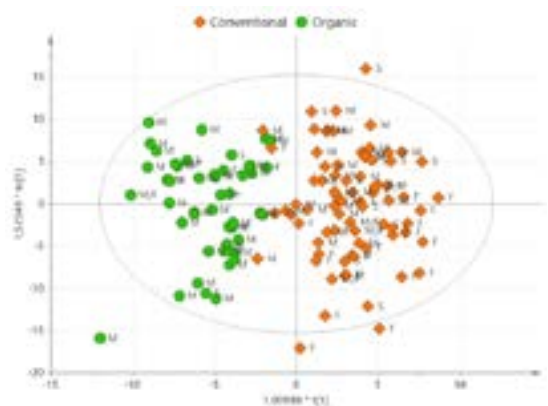
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Background: NMR is the elective technique for structure elucidation of molecules and nowadays is largely adopted to investigate complex mixtures. As a matter of fact, NMR has been largely adopted in food characterization assessment in these last decades. In the era of the “omics” techniques, NMR was rapidly enrolled as one of the most powerful methods to approach metabolomics studies. Its analytical use, characterized by rapid and reproducible measurements, made it a routinely technique providing the identification of a wide range of chemical compounds within the mixture under investigation simultaneously, revealing potential markers, disclosing sophisticated frauds or addressing the geographical origin. Now-a-days high quality or guaranteed foods are subjected to fraudulent practices which cause high economic damages to food industries and decrease the consumer confidence to labelled declarations. The demands of highly refined characterization tools is strongly required to protect consumers and the productions of valuable foods. The large potentiality of NMR spectroscopy is here presented through specific applications and using different techniques also focused on authentication process on different food products.

Methodology & Theoretical Orientation: Different techniques of NMR spectroscopy combined with chemometrics.

Findings: Fraud detection, assessment of geographical origins, shelf life deterioration, authentication.

Conclusion & Significance: NMR based metabolomics represent a valid tool in authentication process of foods.



Recent Publications

1. Consonni R, Bernareggi F and Cagliani LR (2019) NMR based metabolomic approach to differentiate organic and conventional Italian honey. *Food Control* 98:133-140.
2. Consonni R, Polla D and Cagliani LR (2018) Organic and conventional coffee differentiation by NMR spectroscopy. *Food Control* 94:284-289.

Food Safety And Regulatory Measures

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3. **Ordoudi SA, Cagliani LR, Melidou D, Tsimidou MZ and Consonni R (2017) Uncovering a challenging case of adulterated commercial saffron. Food Control, 81:147-155.**
4. **Petrakis EA, Cagliani LR, Tarantilis PAR, Polissiou MG and Consonni R (2017) Sudan dyes in adulterated saffron (*Crocus sativus* L.) identification and quantification by 1H NMR. Food Chemistry 217:418-424.**
5. **Consonni R, Ordoudi SA, Cagliani LR, Tsiangali M and Tsimidou MZ (2016) On the traceability of commercial saffron samples using 1H NMR and FT-IR metabolomics. Molecules 21(3):286.**

Biography

Roberto Consonni has a broad expertise in NMR techniques applied to different fields: Synthetic polymers, bio-macromolecules, materials microstructural characterization, foods, plants extracts, nutraceuticals etc. His expertise cover chemometrics and statistical methods applied to NMR data. He is author of more than 120 papers, 15 book chapters 2 national patents and more than 180 communications at international/national conferences.

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