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MOLECULAR FINGERPRINTING OF TRADITIONAL FOOD PRODUCTS BY ULTRA-HIGH RESOLUTION ESI-FT-ICR MASS SPECTROMETRY

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Mass spectral characterization of food materials has advanced rapidly in the past few years due in large part to the development and now routine availability of electrospray ionization (ESI) [1]. However, it is now apparent that food products exist as such complex mixtures that Ultra-High resolution electrospray ionization Fourier transform—ion cyclotron resonance mass spectrometry (ESI FT-ICR MS) at high magnetic fields is currently the only technique capable of resolving individual molecules [2]. In this work, a Mass Spectrometry-based phytochemical screening was performed on several traditional food products produced in the Basilicata region (Italy). Ultra-High Resolution ESI-FT-ICR Mass Spectrometry data obtained from food sample analysis were used to perform a rapid analysis of metabolome by converting accurate m/z values in putative elemental formulae. Molecular formula maps, or molecular fingerprints, were obtained by making 2D Van Krevelen plots, that lead to a direct identification of different classes of metabolites [3]. The presence of important metabolite classes, i.e. fatty acid derivatives, tannins, amino acids and peptides, carbohydrates and polyphenolic derivatives, was assessed. Moreover, differences among Van Krevelen plots could be noticed from their direct comparison, thus reflecting differences in promoted biochemical pathways and suggesting the presence of biomarkers, that can eventually be identified by a target approach. Thus, molecular fingerprints prove to be an innovative tool, unique and full informative about food product metabolic content, that could be useful for food authentication and traceability.

References
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