Advanced analytical approaches for "sensomic" investigations of high quality food matrices of vegetable origin

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Over the years, the importance of food quality evaluation has dramatically gained of importance because of the remarkable increase in the legal and consumers demand about safety, traceability and sensory impact (flavour and appearance). In this context, *Omics* is one of the approach of choice to evaluate food attributes. *Sensomics* focuses on analytical exertions to elucidate sensory-active compounds responsible for the multimodal perception (aroma, taste, texture, chemesthesis, etc) and aims at mapping the combinatorial code of aroma and taste-active key molecules (Chemical Odour and Taste Code) which generate the food perception. Multidimensional analytical platforms are often adopted in sensomics investigations to reach this objective, combining sample preparation-separation-detection-odour description-data mining. Comprehensive two-dimensional gas chromatography (GC×GC) coupled with Mass Spectrometric detection (MS) represent the most advanced GC platform for detailed odorant characterization.
In this perspective, the PhD project has been divided in different blocks concerning the development of the analytical platform, the characterization of food volatiles and the data processing.
A GC×GC platform equipped with parallel dual secondary column – dual detection (MS and FID) has been developed for the detailed analysis (identification and quantitation) of complex fractions of volatiles and semi-volatiles isolated and extracted from plants of food interest (tea, hazelnuts, cocoa) [1]. Furthermore, an innovative GC×GC platform based on microfluidic flow technology instead of cryogenic modulation has been experienced and efforts have been directed to the optimization of pattern matching procedures to enabling reliable methods translation between the two systems.
GC×GC platform has been used for the characterization of volatiles of food matrices of vegetable origin. In particular, the combination of different and complementary sampling approaches (Solid Phase Microextraction, SPME, Stir Bar Sorptive Extraction, SBSE, Head Space Sorptive Extraction, HSSE and Dynamic Headspace technique) with the separation power of GC×GC-MS, allowed to obtain information useful for fingerprinting and profiling studies of black tea volatiles (leaves and resulting infusions), considering that tea is a matrix of great interest for industry being one of the most consumed beverages worldwide.
Finally, different data processing tools have been adopted in the investigation of Extra Virgin Olive oils (EVOO) volatiles: in particular, *UT* (untargeted and targeted) fingerprinting approaches revealed to be consistent and reliable in defining optimal ripening indicators of olive fruits useful for olive oil classification [2].

REFERENCES

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