Novel sensory and instrumental tools to grasp the flavour of Italian Extra Virgin Olive Oils

Eugenio Aprea[a,b], Iuliia Khomenko[b], Danny Cliceri[a], Franco Biasioli[b], Flavia Gasperi[a,b]

[a] *Center Agriculture Food Environment University of Trento/Fondazione Edmund Mach, San Michele all'Adige (Italy)*
[b] *Department of Food Quality and Nutrition, Research and Innovation Centre, Fondazione Edmund Mach, San Michele all'Adige (Italy)*
e-mail: eugenio.aprea@unitn.it

High quality Extra Virgin Olive Oils (EVOOs) represent an excellence of the Italian food production. European Union, through 42 Protected Designation of Origin (PDO) and six Protected Geographic Identification (PGI) labels, has recognised this excellence. The aim of the Violin project (Project AGER2-Rif.2016-0169) is the **v**alorisation of **I**talian **o**live products through **In**novative analytical tools.
In the present contribution, we briefly describe our analytical approach for the characterisation and the valorisation of the Italian EVOOs and our recent results obtained within the Violin project. We tested a fast and non-invasive fingerprinting of oil volatilome based on Proton Transfer Reaction-Mass Spectrometry with Time-of-Flight (PTR-ToF-MS) [1] for a rapid classification of Italian EVOOs origin. For example, we developed and validated a classification model based on Partial Least Squares Discriminant Analysis (PLS-DA) to classify, with acceptable accuracy, EVOOs from Apulia, Sicily, Lazio, and Tuscany.

Table 1: Misclassification table

	Members	Correct[2]	Apulia[3]	Lazio[3]	Tuscany[3]	Sicily[3]
Apulia[1]	47	83%	**39**	2	4	2
Lazio[1]	35	69%	3	**24**	7	1
Tuscany[1]	85	93%	3	1	**79**	2
Sicily[1]	44	82%	1	0	7	**36**
Total	239	**84%**	50	33	101	55

[1]Actual class; [2]rate of correct classification; [3]predicted class

Table 1 reports the misclassification table summarising the classification accuracy of the model after the cross validation procedure. The best performances were obtained for Tuscany class while the worst for Lazio class. On average, the model correctly classified 84% of the samples, an acceptable rate for a fast screening method.

We used PTR-ToF-MS also to measure volatile compounds exhaled through the nose (nose-space) during sensory evaluation of EVOOs samples [2]. The coupling of dynamic sensory and instrumental techniques allowed the study of the interactions between volatile compounds and flavour during the tasting of olive oil, consumed alone or in combination with other food matrices (bread or chickpeas). We observed the influence of both inter-individual differences and food carriers on the release of EVOOs volatile compounds in the oral cavity. Tasters showed different sensibility to oral sensations critical for EVOOs acceptability (bitterness, pungency and astringency) with a selective effect of suppression on flavour sensations suggesting a different sensory experience because of individual characteristics [3]. On the other hand, we observed an enhancing or suppressing effect of the food carrier on specific volatile compounds that may

influence flavour perception. For example preliminary data analysis showed that bread increased the release of (E)-2-hexenal (a compounds associate to herbaceous flavour) during eating while chickpeas had a negligible effect as reported in Figure 1.

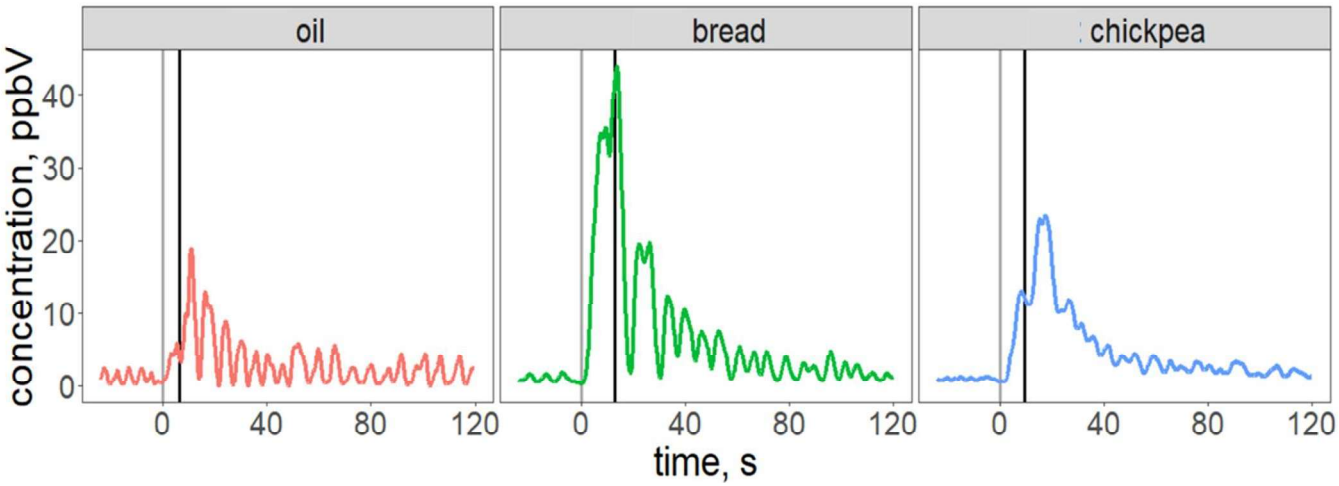

Figure 1: Temporal exhaled nose-space profiling of the signal attributed to (E)-2-hexenal during tasting of extra virgin olive oil alone (oil) or in combination to bread (bread) or chickpeas (chickpea).

The acquired data are now under further elaboration to investigate the relationship occurring between volatile compounds release during eating, individual food oral processing, and sensory response.

References

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