PTR-ToF-MS FINGERPRINTING OF ITALIAN EVOO

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Extra Virgin Olive Oil (EVOO) is the highest quality olive oil available, extracted from the olive fruit without the use of any heat or chemicals. Among the high quality EVOOs recognized by the European Union (Protected Designation of Origin, PDO, and Protected Geographic Identification, PGI), almost the 40% come from Italy with 42 PDO and 4 PGI EVOOS followed by Spain and Greece having 29 recognized EVOOs each. Due to its economic value, high quality EVOO is susceptible to fraud. A high quality EVOO is distinguished for its aroma. Many factors influence the composition in Volatile Organic Compounds (VOCs) such as cultivar, agronomical practices, geographical origins, harvesting periods, processing technologies, storage conditions [1].

The study of volatile compounds could be a way to trace the origin and quality of EVOOs. The gold standard for this task is the use of GC-MS providing detailed information on VOCs profiling. On the other hand, such approach is not always a convenient and practical choice when dealing with large sample set (time and cost consuming). Fast fingerprinting can be a valid alternative, at least as screening tool, to characterize a population fast. Proton Transfer Reaction-Time of Flight-Mass Spectrometry (PTR-ToF-MS) was already successfully applied for screening of olive oils [2], apples [3], and other food products allowing a fast screening of large sample set.

In the present study, we applied PTR -ToF-MS to obtain a fast VOCs fingerprint of high quality EVOO samples collected within the Violin project (Project AGER2-Rif.2016-0169). Up to now, 200 EVOOs (monovarietals and blends) from 12 Italian regions and three other countries, harvested in two different years, were measured. Preliminary data elaboration suggests the possibility to discriminate EVOOs according to the origin. For example, EVOO from Sicily seems to present a peculiar fingerprint that allows a separation from all other EVOO analyzed to be achieved. On a reduced dataset (for which a sufficient number of samples per each location was available), including EVOOs from Apulia, Sicily, Lazio, and Tuscany, classification models based on Partial Least Squares Discriminant Analysis (PLS-DA) were tested.

References

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