Study of a Rapid Untargeted Chromatographic Approach to Discriminate Virgin Olive Oils with a different Geographical Origin

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Over the last 40 years many investigations have been focused on understanding what claims and attributes are important determinants in consumer choice, evidencing that the geographic origin of the product is one of the most influencing factors in the olive oil case. In order to ensure that consumers are not mislead, the fourth article of the EU Reg. n. 29/2012 establishes that *"Extra virgin and virgin olive oil shall bear a designation of origin on the labelling"*. This means that for oils commercialized within EU is mandatory to specify on the label of the product its geographical provenance following specific rules. However, the regulation does not specify an analytical procedure to verify the information reported on the label and this has raised the interest of researchers to develop a reliable and effective method for authentication purposes.

The aim of this work was to study the application of a Flash Gas Chromatography-E-Nose, based on an ultra-fast GC separation of head space volatile compounds, for a rapid screening of virgin olive oils (VOOs) characterized by a different geographical origin. For this purpose, 210 VOOs, different for their geographical origin (from single EU countries, from single extra-EU countries and blends) were collected and analyzed. Next, a chemometric elaboration applied, with an untargeted approach, to the chromatographic traces was realized. The PLS-DA model built for the data elaboration was validated both by a full cross validation and an external one. For both approaches, satisfactory results were obtained: by using the cross validation the 87% and the 79% of samples from EU and extra-EU countries, respectively, were correctly classified; by the external validation the 88% and the 80%.