

## **Discrimination and identification of geographical origin virgin olive oil**

The results of a Moroccan study provide promising perspectives for the use of a low-cost and rapid system for the verification of geographical origin of the olive oils based on their volatile profile.

Virgin olive oil represents the main source of fats in the countries of mediterranean basin where the olive oil production is concentrated.

Virgin olive oil aroma is characterized by various volatile compounds that include carbonyl compounds, alcohols, esters and hydrocarbons.

Top quality virgin olive oils are generally characterized by their particular sensorial attributes, but this is strongly affected by the operative conditions of the virgin olive oil mechanical extraction process. In this context, five geographical Moroccan virgin olive oils varieties having the same conditions of extraction were used in the experiment.

PCA, Radar plot representations and LDA were elaborated to find similarities or differences between the asked geographical virgin olive oils.

Olives have been harvested in the period from November to December 2010. Once collected, the olives have been extracted in the same conditions and then pressed. Olive oil samples (10 mL) were put in a glass vial and heated at 30 °C for a headspace generation time of 10 min. Then the volatiles were transferred into the sensor chamber by means of a carrier gas (pure nitrogen) at a constant flow-rate for 10 min. The response of the sensors was collected and stored every 2 s. After each measurement, the sensor chamber was opened and cleaned with pure nitrogen gas to generate the sensor baseline. Each time that a new set of virgin olive oil was analyzed, new glass vessels were employed.

The score plot of the PCA exhibited good classification between the different virgin olive oil samples with 97.90 % of the variance in the database.

An overlap between 4 and 5 samples was observed. Indeed, Radar plot representations found a clear pattern variation between all geographical virgin olive oils except 4 and 5. Finally, when performing LDA statistical method coupled to leave one out cross-validation of the data, it was possible to deduce a satisfactory accuracy of identification showing more than 96 % of success rate in the recognition of the five Moroccan virgin olive oil clusters.

The results of this study provide promising perspectives for the use of a low-cost and rapid system for the verification of geographical origin of the olive oils based on their volatile profile.

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