

Verification of the geographical origin of virgin olive oil on basis of a non-targeted LC-qToF-MS-based approach for the profiling of the polar compounds

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Ensuring the authenticity of virgin olive oil is a major challenge, because today this oil belongs to the top 10 of the most counterfeited food items worldwide. Possible fraudulent practices include not only wrongly labelled quality or illegal processing but also wrong indication of geographical origin. According to regulation (EU) No 29/2012 on marketing standards for olive oils this labeling is obligatory. But so far the search for appropriate methods which enable the determination the geographical origin of olive oils is an ongoing challenge.

In the present study a set of 95 olive oils from Spain, Italy, Greece and Portugal were extracted by liquid/liquid extraction with methanol/water (80/20 (v/v)) and analyzed by a non-targeted LC-qToF-MS approach for the profiling of the polar compounds.

The resulting data were analyzed by applying a stepwise data processing approach, including steps like peak detection, bucket table generation and reduction of features by statistical tools such as ANOVA with Tukey post-hoc-test. Finally, 68 buckets were used for linear discriminant analysis to build a statistical model for the discrimination of olive oils from different geographical origins. For a training set (n=75) a correctness of prediction of more than 80% was found for Spain, Greece and Italy, while the correctness of prediction for Portugal was only 67%. The test set (n=20) showed a correctness of prediction of 100% for the four countries. The presented approach might be useful to verify the geographical authentication of virgin olive oil.