

## **Development of a Statistical and a NIR-based and Approach to Detect Mild Thermal Treatment of Olive Oils**

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There is an increasing demand for extra virgin olive oil, but the quantity of high quality olive oils is limited. Therefore, one of the most frequently adulterated foods in the EU is extra virgin olive oil. One popular technique to improve the quality of oils with sensory defects is “soft” or “mild” deodorization. Lampante or virgin oil with sensory defects are treated at low temperature (80°C-110°C) under vacuum with superheated vapor or nitrogen.

Due to a lack of specificity and sensitivity, the official analytical procedures and other analytical strategies, focusing on single analytes, seem to be inappropriate to reveal this thermal treatment, which is illegal for extra virgin olive oil and virgin olive oil<sup>1</sup>.

In order to find a strategy which enables to detect the application of mild deodorization, a new statistical approach was developed. The approach uses known analytical parameters such as K-values, free fatty acid content, anisidine value, 1,2-diacylglycerides, pyropheophytins and the total polar compound fraction (as used for the analysis of deep frying fats) to differentiate between virgin oils and refined oils, even if only mild thermal conditions were applied. The reliability and correctness for the prediction of adulterated oils (refined/virgin) was validated statistically with a probability of more than 99 %.

In addition, a NIR method was developed to measure the extent of the thermal stress of vegetable oils e.g. the extent of refining, the presence of adulterated olive oils and/or other refined vegetable oils. The method has been validated with more than 2000 olive oils and more than 500 other refined and non-refined vegetable oils.

<sup>1</sup> Aparicio-Ruiz et al. (2017), Food Chemistry 220, 42-50