

## Use of Front-Face Fluorescence Spectroscopy and Multiway Analysis for the Prediction of Olive Oil Quality Features

**Authors :** Omar Dib, Rita Yaacoub, Luc Eveleigh, Nathalie Locquet, Hussein Dib, Ali Bassal, Christophe B. Y. Cordella

**Abstract :** The potential of front-face fluorescence coupled with chemometric techniques, namely parallel factor analysis (PARAFAC) and multiple linear regression (MLR) as a rapid analysis tool to characterize Lebanese virgin olive oils was investigated. Fluorescence fingerprints were acquired directly on 102 Lebanese virgin olive oil samples in the range of 280-540 nm in excitation and 280-700 nm in emission. A PARAFAC model with seven components was considered optimal with a residual of 99.64% and core consistency value of 78.65. The model revealed seven main fluorescence profiles in olive oil and was mainly associated with tocopherols, polyphenols, chlorophyllic compounds and oxidation/hydrolysis products. 23 MLR regression models based on PARAFAC scores were generated, the majority of which showed a good correlation coefficient ( $R > 0.7$  for 12 predicted variables), thus satisfactory prediction performances. Acid values, peroxide values, and Delta K had the models with the highest predictions, with R values of 0.89, 0.84 and 0.81 respectively. Among fatty acids, linoleic and oleic acids were also highly predicted with R values of 0.8 and 0.76, respectively. Factors contributing to the model's construction were related to common fluorophores found in olive oil, mainly chlorophyll, polyphenols, and oxidation products. This study demonstrates the interest of front-face fluorescence as a promising tool for quality control of Lebanese virgin olive oils.

**Keywords :** front-face fluorescence, Lebanese virgin olive oils, multiple Linear regressions, PARAFAC analysis

**Conference Title :** ICSSA 2019 : International Conference on Spectroscopy and Spectral Analysis

**Conference Location :** Paris, France

**Conference Dates :** April 18-19, 2019