Methodological challenges in the assessment of virgin olive oil (VOO) adulteration using FTIR spectroscopy and chemometrics

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Literature survey indicates a plethora of published research efforts over the decades to address VOO adulteration, an ever existing problem in the market (Casadei et al., 2021). Since early 90’s when FTIR spectroscopy was first applied to this field, its proof-of-concept was explored in many studies on substitution of VOO by cheap seed oils (e.g. sunflower, corn, soybean and canola oil) or nut oils, such as peanut and hazelnut (Nenadis & Tsimidou, 2017). The studies employ FTIR spectroscopy alone or in combination with other spectroscopic techniques to assess VOO adulteration using either targeted or non-targeted methods of data analysis. This work critically analyses literature findings regarding the methodological strategy from sampling design, spectra acquisition to data modelling, after searching the Web of Science and Scopus databases.The need to develop guidelines covering the criteria for the selection of the “reference” oil samples and the preparation of admixtures, measurement conditions (type of Attenuated Total Reflectance cell, resolution, number of scans, replicates) and steps for the development and validation of models was revealed. Existing issues of sensitivity, specificity or reliability are challenging and discussed in depth.

**Keywords:** virgin olive oil, adulteration, seed oils, FTIR spectroscopy, PCA, PLS, SIMCA

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