

Detection of extra virgin olive oil adulteration using Fourier transform infrared, synchronous fluorescence spectroscopy and multivariate analysis

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This research describes an appropriate method for determining the adulteration of extra virgin olive oil (EVOO) with sunflower oil (SO) and pomace olive oil (POO). Three different methods are combined: Fourier transform infrared (FTIR), synchronous scanning fluorescence (SynFS) spectroscopic techniques, and chemometrics analysis. The measurements were made on pure vegetable oils: EVOO, POO, SO which were adulterated with a varying concentration of adulterant agent. The performance of the model was evaluated by the coefficient of determination (R^2) and the root mean square error of cross validation (RMSECV). The quantification of SO in EVOO was obtained from different botanical origin. Therefore, the normalization concerning normal, first and second derivative FTIR spectral analyses were needed for a suitable technique of calibration. Knowing that EVOO and POO oils have the same botanical origin, SynFS was required as an additional technique to FTIR in order to determine POO models. The methodology presented in this study stands as a useful tool for analyzing and detecting adulteration of extra virgin olive oil with pomace olive or sunflower oil.

Keywords: Extra virgin olive oil; Edible oils; FTIR; Synchronous fluorescence; Chemometric analysis.

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