Joint Event

3rd International Conference on
Food Science & Technology

World Congress on
Biotechnology & Medical Microbiology
October 25-26, 2018 | Frankfurt, Germany

Detection of extra-virgin olive oil adulteration mixed with refined seed oils by using chromatograhic and spectroscopic analytical techniques

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Extra-virgin olive oil (EVOO) is characterised by one of the highest economic value in comparison with other vegetable oils, thanks to its well-known nutritional and sensory qualities. Unfortunately, EVOO is also easy to falsify; because of its prestige, it has always been illegally mixed with cheaper or low-quality oils, especially to obtain EVOO sold in supermarkets and discount stores at low cost. Detection of EVOO adulteration is a difficult and challenging analytical problem since olive oil consists of complex mixtures of triacylglycerols (TAGs), partial glycerides, fatty acids, hydrocarbons, tocopherols, pigments, sterols, aliphatic alcohols, triterpene dialcohols, waxes, alkyl esters and phenolic compounds. A large number of analytical methods have been developed to detect and quantify other vegetable oils in olive oil. These analytical methodologies comprising mainly the use of chromatographic techniques, namely Gas Chromatography (GC), High Performance Liquid Chromatography (HPLC) and Gas or Liquid Chromatography coupled with Mass Spectrometry (GC-MS, LC-MS). Recently some researchers have proposed new methodologies more rapid and non-destructive advantages will be required with suitable sensitivity, selectivity and accuracy to detect those fraudulent practices based on Fourier Transform Near-Infrared (FT-NIR) Spectroscopy, Nuclear Magnetic Resonance (NMR) Spectroscopy, Differential Scanning Calorimetry (DSC) and Total Synchronous Fluorescence Spectroscopy (TSyFS). This study is meant to detect adulteration of EVOO by lower cost refined seed oils. Consequently, various blends of EVOO and soybean, corn or sunflower oil were prepared and analyzed for fatty acid, triglyceride and sterol compositions.

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