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Use of ATR-FTIR spectroscopy coupled with chemometrics for the authentication of avocado oil in ternary mixtures with sunflower and soybean oils

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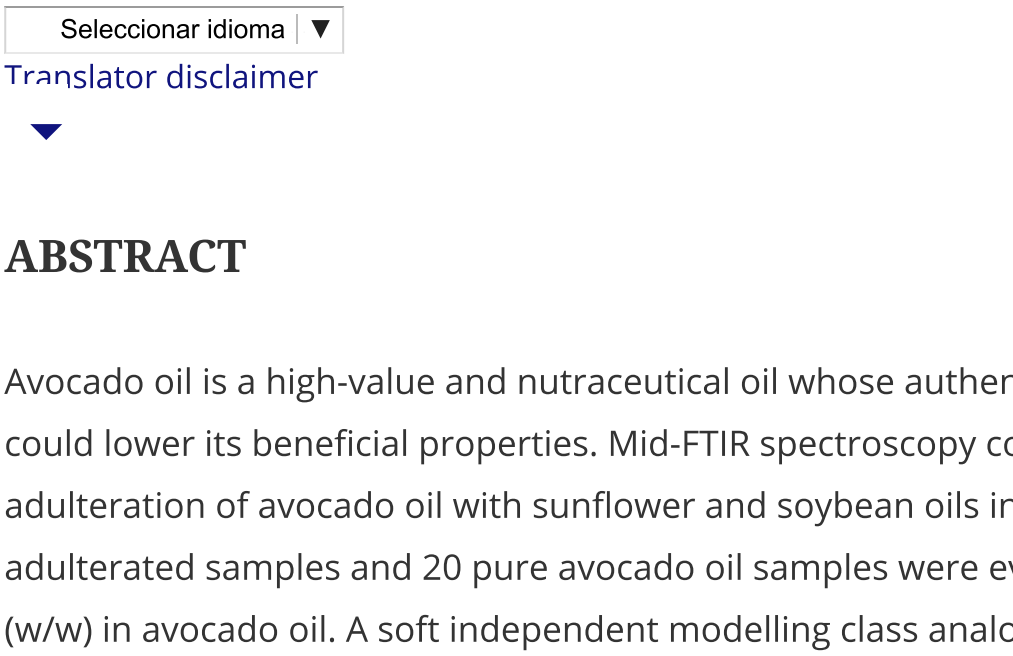
ABSTRACT

Avocado oil is a high-value and nutraceutical oil whose authentication is very important since the addition of low-cost oils could lower its beneficial properties. Mid-FTIR spectroscopy combined with chemometrics was used to detect and quantify adulteration of avocado oil with sunflower and soybean oils in a ternary mixture. Thirty-seven laboratory-prepared adulterated samples and 20 pure avocado oil samples were evaluated. The adulterated oil amount ranged from 2% to 50% (w/w) in avocado oil. A soft independent modelling class analogy (SIMCA) model was developed to discriminate between pure and adulterated samples. The model showed recognition and rejection rate of 100% and proper classification in external validation. A partial least square (PLS) algorithm was used to estimate the percentage of adulteration. The PLS model showed values of R^2 > 0.9961, standard errors of calibration (SEC) in the range of 0.3963–0.7881, standard errors of prediction (SEP estimated) between 0.6483 and 0.9707, and good prediction performances in external validation. The results showed that mid-FTIR spectroscopy could be an accurate and reliable technique for qualitative and quantitative analysis of avocado oil in ternary mixtures.



KEYWORDS: Avocado oil, ternary mixture, adulteration, mid-FTIR, SIMCA, chemometrics

Additional information

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