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Application of metabolomics and chemometrics for authentication of vegetable oils and adulteration detection: a review

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Abstract

The authentication and detection of adulteration in food are critical for ensuring food safety, quality and consumer protection. Vegetable oils are one of the significant diets in human nutrition, and hence its authenticity as well as safety are of utmost importance to ensure safe consumption and fairness of international trade. Metabolomics coupled with chemometrics, have been widely used as an accurate measurement of complex metabolite profiles in vegetable oils. This integrated methodology allows for the full identification of chemical compositions of vegetable oils and the detection of potential adulterants. This review outlines recent advances and applications of metabolomics in combination with chemometrics for the authentication and adulteration detection in vegetable oils. Various chromatographic and spectroscopic techniques combined with chemometrics such as multivariate statistical analysis for interpretation of big data sets enables the discovery of potential characteristic markers for authentication and adulteration detection in vegetable oils. Identifying the most suitable analytical technique and chemometrics tool helps in the marker discovery for authentication purposes, and can be further explored for the development of rapid detection technique for safety assessment by authorized regulatory bodies. © The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2025.

Author keywords

Authentication; Metabolomics; Multivariate analysis; Rapid detection; Vegetable oils

Indexed keywords

Engineering controlled terms
Chemical detection; Chromatography; Consumer protection; Food safety; International trade; Metabolites; Nutrition; Reviews; Safety engineering

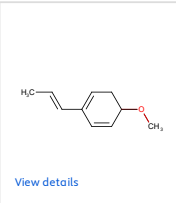
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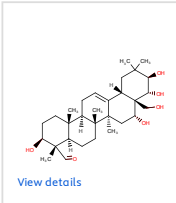
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Authentication; Multivariate analysis

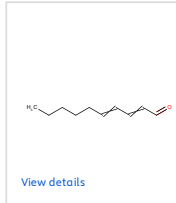
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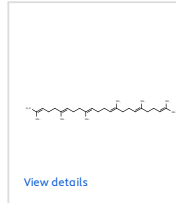
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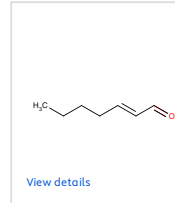
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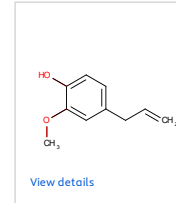
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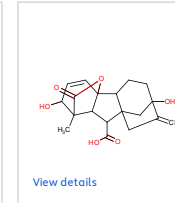
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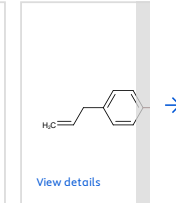
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