

Author's Accepted Manuscript

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PII: S0039-9140(18)30597-6
DOI: <https://doi.org/10.1016/j.talanta.2018.05.095>
Reference: TAL18736

To appear in: *Talanta*

Received date: 20 March 2018
Revised date: 24 May 2018
Accepted date: 28 May 2018

Cite this article as: Marta Ferreiro-González, Estrella Espada-Bellido, Lucía Guillén-Cueto, Miguel Palma, Carmelo G. Barroso and Gerardo F. Barbero, Rapid quantification of honey adulteration by visible-near infrared spectroscopy combined with chemometrics, *Talanta*, <https://doi.org/10.1016/j.talanta.2018.05.095>

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Rapid quantification of honey adulteration by visible-near infrared spectroscopy combined with chemometrics

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Abstract

Honey is a pure product for which the addition of any other substance is prohibited by international regulations. Therefore, it is necessary to develop reliable analytical methods to guarantee its authenticity. Visible-near infrared spectroscopy (Vis-NIRS) combined with chemometric tools, like hierarchical cluster analysis (HCA), principal component analysis (PCA), linear discriminant analysis (LDA), has been used for the discrimination of honey adulterated with high fructose corn syrup (HFCS). Different honey samples from the Granada Protected Designation of Origin (Spain) were adulterated with HFCS at different percentages (10 – 90%). LDA was able to discriminate 100% of the samples. Partial least squares regression (PLS) was used to predict the level of adulteration. The best prediction model used 10 factors with a high coefficient of determination near 1. The developed method showed high precision (coefficient of variation below 4%). Vis-NIRS combined with chemometrics can be used for the rapid and non-destructive detection of honey adulteration. The obtained results demonstrate that the application of this technique as a screening method could be a useful tool for quality monitoring analysis in routine laboratories.

Keywords

Adulteration; Authenticity; Chemometrics; Honey; Partial least squares regression; Visible-near infrared spectroscopy

¹ These authors contributed equally to this work.

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