TRACKING WINE QUALITY AND ORIGIN WITH ^{1}H-NMR: FROM DATA TO TRACEABILITY

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Wine is a premium agri-food product and, as such, is particularly susceptible to fraud. Efforts to combat counterfeiting primarily focus on verifying the consistency between the product and its labeled attributes — such as grape variety, vintage, and geographical origin. Achieving this level of verification requires robust analytical techniques combined with advanced data processing methods. Among these, quantitative ^{1}H-NMR spectroscopy has proven to be a powerful approach, enabling rapid, non-destructive analysis of a wide range of compounds with minimal sample preparation [1,2,3].

In this study, we present the development and validation of an open metabolomic strategy based on ^{1}H-NMR spectroscopy to assess wine traceability. The proposed approach relies on standardized, flexible, and accessible protocols for both analytical procedures and data processing. In addition, several application examples are provided to illustrate the method's relevance and versatility in real-world scenarios.

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