The use of the FTIR as a tool to discriminate flavored oils

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Introduction and Objectives

Olive oil is one of the most consumed vegetable oils in the world and its production has increased in recent years. The market has been betting on new ways of consuming olive oils, such as flavored oils. However, flavored oils can suffer several frauds, such as the addition of other vegetable oils. Thus, it is necessary to develop fast, low-cost and non-invasive analytical techniques that allow the identification of the flavoring agent, as well as discriminating non-flavored oils from flavored oils. In this context, techniques based on spectroscopy have gained great importance for allowing a fast and non-destructive analysis using a small volume of oil, as is the case of Fourier Transform Infrared Spectroscopy (FTIR).

Material and Methods

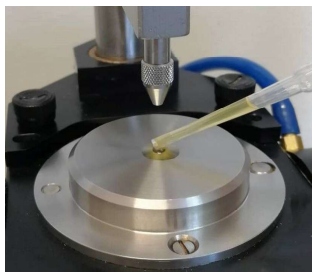

Olive oil, proportion on 1.5 % w/v


Dried rosemary


Powdered garlic


Powdered cinnamon


Four independent bottles for each oil


Horizontal cell equipped with a diamond crystal

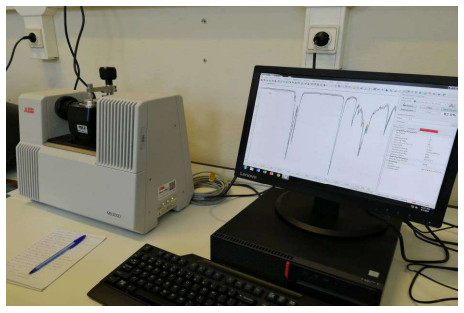


ABB FTIR MB3000 (Zurich, Switzerland)
32 scans/min; resolution 4 cm-1; reading range between 4000 and 500 cm-1

Results and Discussion

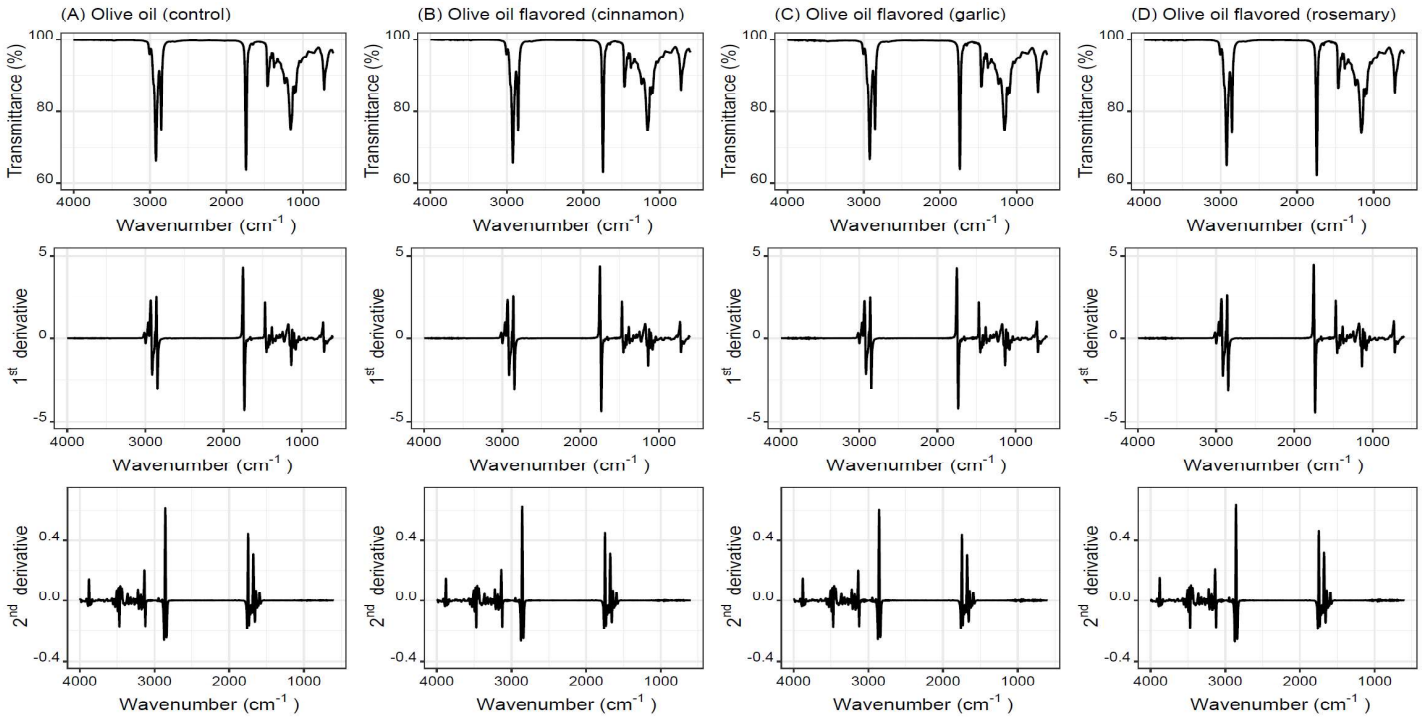


Figure 1 - FTIR spectra (4000 to 500 cm^{-1}) and respective 1st and 2nd derivatives for unflavored and flavored olive oils

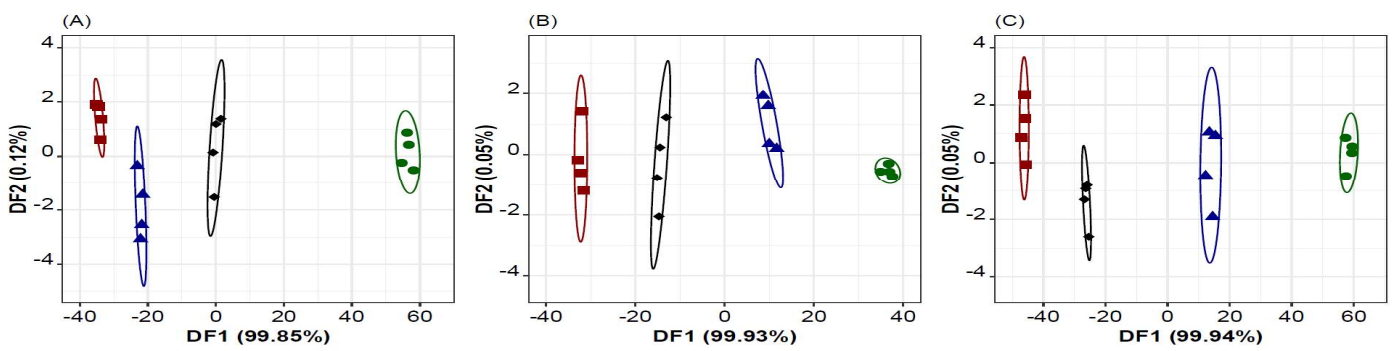


Figure 2 - Olive oils supervised discrimination (●: Oil flavored with cinnamon powder; ▲: Unflavored oil (control); ■: Oil flavored with garlic powder, ♦: Oil flavored with dried rosemary)

The study revealed that raw and transformed data can be used to successfully discriminate the oils under study, allowing the LD-SA-FTIR models to correctly classify (100% sensitivity) of all samples to the original pooled data as well as for leave-one-out cross-validation procedures. The results showed that the models were able to correctly classify 98, 100 and 100% of the samples based on the raw, 1st derivative or 2nd derivative models, respectively.

Conclusion

In conclusion, these results demonstrate the potential use of the FTIR chemometric approach as an authentication tool for flavored and unflavored oils.

Acknowledgements The authors are grateful to the Foundation for Science and Technology (FCT, Portugal) for financial support by national funds FCT/MCTES to CIMO (UIDB/00690/2020) and to Associate Laboratory for Green Chemistry-LAQV (UIDB/50006/2020). Nuno Rodrigues thanks to National funding by FCT- Foundation for Science and Technology, P.I., through the institutional scientific employment program-contract.

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