BIO-SUSTENTABILIDADE E BIO-SEGURANÇA ALIMENTAR, INOVAÇÃO E QUALIDADE ALIMENTAR

23-26 de outubro de 2022

Castelo Branco

Sociedade Portuguesa de Química

Instituto Politécnico de Castelo Branco

Instituto Politécnico de Castelo Branco
Escola Superior Agrária

Câmara Municipal
Castelo Branco

EuChemS
European Chemical Society
Division of Food Chemistry

Livro de Resumos

XVI Encontro de Química dos Alimentos

Ficha Técnica

Título

Livro de Resumos do XVI Encontro de Química dos Alimentos - Bio-Sustentabilidade e Bio-Segurança Alimentar, Inovação e Qualidade Alimentar

Autores

Ofélia Anjos, Soraia I. Pedro, Carlos Antunes

Edição

Ofélia Anjos, Soraia I. Pedro, Natália Martins Roque, Carlos Antunes

Outros colaboradores:

Fátima Peres

Cecília Gouveia

Cláudia Adriana Fernandes Vitória

Ilustrações

Luísa Ferreira Nunes

Editor

Sociedade Portuguesa de Química

Esta publicação reúne os trabalhos apresentados no XVI Encontro de Química dos Alimentos: Bio-sustentabilidade e Bio-segurança alimentar, Inovação e qualidade alimentar, Castelo Branco 2022, e inclui ainda o programa científico do encontro.

As doutrinas expressas em cada um dos resumos são da inteira responsabilidade dos autores.

ISBN

978-989-8124-36-4

Data

Outubro de 2022

Vibrational spectroscopy applied to *Arbutus unedo* fruit spirit characterization

Antunes C.A.L.,[1] Caldeira I.,[2,3] Pedro S.I.,[4,5] Canas S., [2,3] Anjos O.,[1,4,5]

[1] *Instituto Politécnico de Castelo Branco, 6001-909 Castelo Branco, Portugal*

[2] *Instituto Nacional de Investigação Agrária e Veterinária, Pólo de Dois Portos/Estação Vitivinícola Nacional, 2565-191 Dois Portos, Portugal*

[3] *MED–Mediterranean Institute for Agriculture, Environment and Development & CHANGE – Global Change and Sustainability Institute, Instituto de Investigação e Formação Avançada, Universidade de Évora, Pólo da Mitra, Ap. 94, 7006-554 Évora, Portugal*

[4] *CEF, Instituto Superior de Agronomia, Universidade de Lisboa, Tapada da Ajuda, 1349-017 Lisboa, Portugal*

[5] *Centro de Biotecnologia de Plantas da Beira Interior, 6001-909 Castelo Branco, Portugal*

Arbutus unedo spirit (AUS) is a typical beverage of Mediterranean countries, which is usually produced without wood ageing. However, nowadays there is a trend related to the innovation and search for new market options related to this beverage. This work aimed to identify a technique to distinguish the AUS aged with different times and different toasting levels by an easier and cheaper way. For this propose the AUS, aged for three and six months with oak wood (*Quercus robur* L.) submitted to three different toasting levels (light, medium and medium plus) were analyzed. Concerning its chemical composition, identified by GC-MS and quantified by GC-FID, and its sensory analysis, a previously work [1] showed that is quite easy to distinguish these modalities, and the best one was produced using oak wood with medium toasting levels during three months of ageing. Concerning these results, all samples were analyzed using FTIR-ATR, FT-RAMAN and NIR to understand the faster methodologies to differentiate the studied ASU sprits.
The spectra of AUS samples were obtained in each equipment according to the following methods:

1) FTIR-ATR – with a Bruker spectrometer (Alpha, Bruker Optic GmbH, Germany), equipped with a flow-through cell with controlled temperature, with 128 scans per spectrum at a spectral resolution of 8 cm^{-1} in the range of 4000 to 450 cm^{-1};
2) FT-RAMAN –with a spectrometer (Bruker, MultiRAM, Germany) equipped with a Ge Diode detector, an integrated 1064 nm and Nd:YAG laser with a maximum output power of 500 mW. The spectra were collected with 100 scans per spectrum at a spectral resolution of 8 cm^{-1} in the wavenumber range from 3500 to 70 cm^{-1};
3) NIR –using a NIR spectrometer (MPA Bruker, Germany) in a transmitted light mode with 1 mm quartz cells. The samples were measured with an 8 cm^{-1} spectral resolution and 32 scans in the wavenumber range of 12,500 to 4000 cm^{-1}.

Appropriate chemometric tools were applied to extract information from the spectral data. Principal component analyses (PCA) of spectra were used to distinguish between the different groups of samples included in this experimental design. This analysis was made using the Unscrambler® X, version: 10.5.46461.632 (CAMO Software AS, Oslo, Norway). For spectral acquisition and first evaluation the software OPUS®, version: 7.5.18 (Bruker Optik, Germany) was used.
The spectra (Figure 1) were similar do those reported for AUS spirit [1] and for other similar spirits [2,3]. The observed bands are in accordance with the previously works and display a strong influence of the different compounds (mainly alcohols) present in this matrix.
Spectroscopic techniques, namely FTIR–ATR, were applied to discriminate the different beverages produced. The results highlighted an increase in *Arbutus unedo* spirit's quality with the wood contact, mainly based on the sensory attributes.
As conclusion all techniques are able to distinguish AUS It was possible to identify the potentiality of FTIR-ATR to distinguish AUS ageing time with oak wood and the three different toasting levels. However, the most accurate results were obtained using the FTIR-ATR technique.

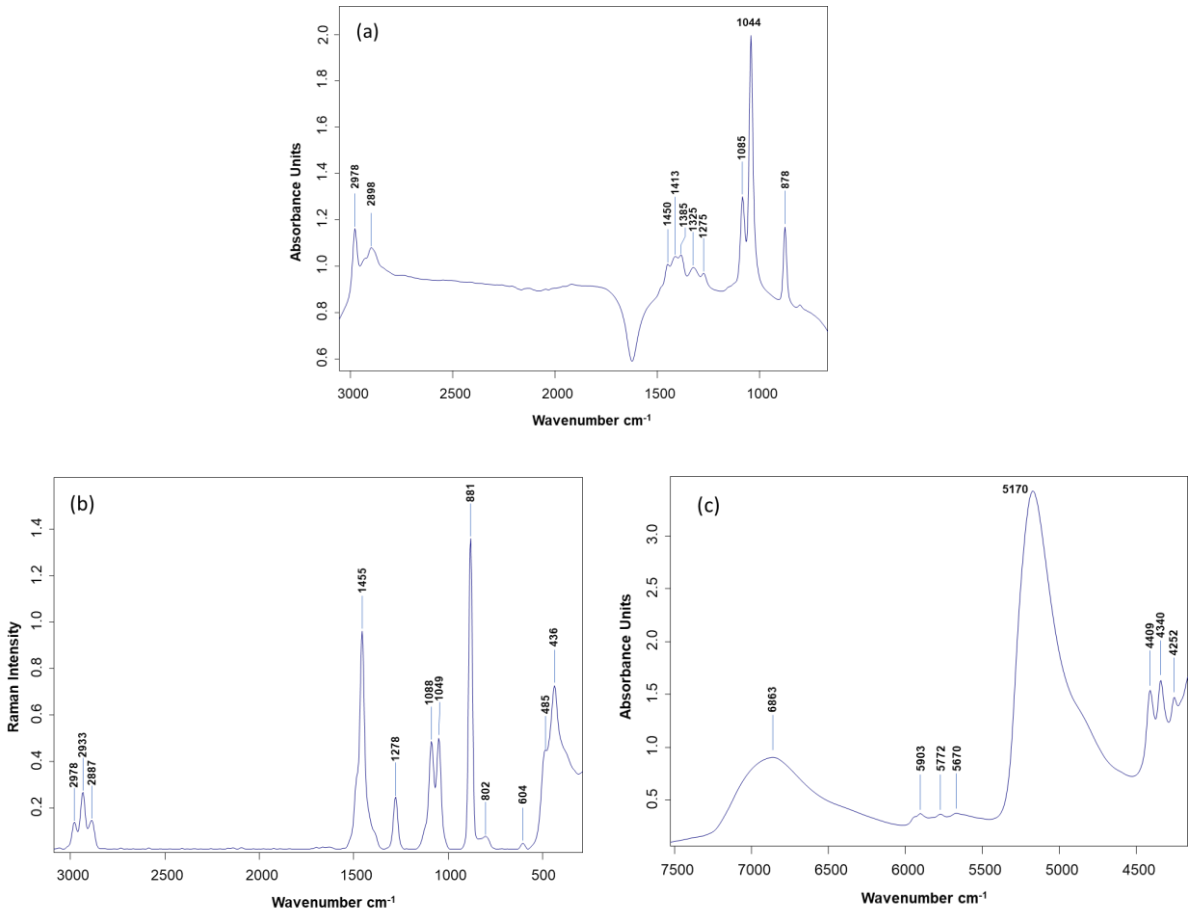

Figure 1: FTIR-ATR (a), FT-Raman (b) and NIR (c) spectrum of AUS samples.

Acknowledgements: This research was funded by National Funds through FCT—Foundation for Science and Technology under the Project UIDB/00239/2020 [CEF] and UIDB/05183/2020 [MED].

References:

1. O. Anjos, S.I. Pedro, D. Caramelo, A. Semedo, C.A.L. Antunes, S. Canas, I. Caldeira. Applied Sciences. 11(11) **(2020)**, 50652021.
2. O. Anjos, I. Caldeira, S. I. Pedro, S. Canas. LWT - Food Science and Technology. 134 (**2020**), 110179
3. O. Anjos, I. Caldeira, T.A. Fernandes, S.I. Pedro, C. Vitória, S. Oliveira-Alves, S. Catarino and S. Canas. Sensors, 22(1), 286 (**2022**): 1-15