XV ENCONTRO DE QUÍMICA DOS ALIMENTOS

BIOACTIVITIES AND GC-MS CHARACTERIZATION OF *CUPRESSUS SEMPERVIRENS* L. AND *ROSMARINUS OFFICINALIS* L. ESSENTIAL OILS

Virginie Xavier [1,2], Sandrina Heleno [1], Miguel A. Prieto[2], Joana S. Amaral[1], Filipa Mandim[1], Josiana Vaz[1], Tânia Pires[1], Irene Mediavilla Ruiz[3], Luis Saul Esteban Pascual[3], Isabel C.F.R. Ferreira[1], Lillian Barros[1,*]

[1]*Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal;*
[2]*Grupo de Nutrición y Bromatología, Departamento de Química Analítica y Alimentaria, Facultad de Ciencias de Ourense, Universidad de Vigo-Ourense Campus, E-32004 Ourense Bragança, Portugal;*
[3]*CEDER-CIEMAT, Autovia A-15 salida 56, 42290-Lubia, Soria, Spain.*
*lillian@ipb.pt

Bio-based products will play an increasingly important role in the transition towards a green and circular economy that will reduce fossil-based products consumption [1].

The European Project "BeonNat" aims at developing different bio-based products from underutilised shrubs and trees, which will be used as raw-materials for the bio-based industries. Within this scope, *Cupressus sempervirens* L. and *Rosmarinus officinalis* L. were selected for evaluation. In this work, the essential oil of *C. sempervirens* (common cypress) and *R. officinalis* (rosemary) cultivated in Spain, were characterized for their chemical composition and potential biological properties. The assessment of antioxidant, antimicrobial, cytotoxic and anti-inflammatory properties of the essential oils were evaluated. The GC-MS analysis enabled the identification of 85% of total compounds in common cypress and 94% in rosemary. The major compounds were α-pinene, 3-carene, cedrol, limonene and terpinolene for *C. sempervirens* and α-pinene, 1,8-cineole, camphor, camphene and β-myrcene for *R. officinalis* essential oils. From a qualitative point of view, the obtained results are in good agreement with the data available from the literature, considering the genetics and environment variations that may occur [2,3]. Both samples showed antibacterial activity against a panel of bacteria selected according to their importance in public health, highlighting *R. officinalis* that revealed the strongest activity for *Escherichia coli, Klebsiella pneumoniae, Morganella morganii, Pseudomonas aeruginosa, Enterococcus faecalis, Listeria monocytogenes* and methicillin resistant *Staphylococcus aureus.* Concerning the antioxidant activity, reducing power and cellular antioxidant assays were performed. The cypress essential oil presented an EC_{50} value of 1.518 ± 0.004 mg/mL using reducing power assay and a % of oxidation inhibition of 73% with cellular antioxidant assay, while rosemary essential oil showed an EC_{50} value of 3.12 ± 0.01 mg/mL using reducing power assay and 84 % of oxidation inhibition according to cellular antioxidant assay, evidencing that both samples revealed capacity to inhibit the oxidation process. The tested essential oils showed anti-inflammatory (IC_{50} value of 11±1 μg/mL and 20±1 μg/mL for *C. sempervirens* and *R. officinalis*, respectively) and cytotoxic activity, with best results being obtained for *C. sempervirens* essential oil on the inhibition of breast, MCF-7, (GI_{50} value of 62±6 μg/mL) and lung cancer, NCI-H460, (GI_{50} value of 14±1 μg/mL) cell lines. After screening the essential oils for their bioactivities, the results revealed that essential oils from common cypress and rosemary are a potential and natural source of bioactive substances to use in food, cosmetic and medicinal industry, encouraging the valorisation of underexplored resources.

Acknowledgments: Foundation for Science and Technology (FCT, Portugal) for financial support through national funds FCT/MCTES to the CIMO (UIDB/00690/2020). L. Barros and S.A. Heleno thank the national funding by FCT, P.I., through the institutional and individual scientific employment program-contract, respectively. This project has received funding from the Bio Based Industries Joint Undertaking (JU) under grant agreement No 887917 BeonNAT. The JU receives support from the European Union's Horizon 2020 research and innovation programme and the Bio Based Industries Consortium.

References:

[1] Leipold, S, Petit-Boix, A. (2018). *Journal of Cleaner Production. 201,* 1125-1137.;
[2] Mazari, K., Bendimerad, N., Bekhechi, C., Fernandez, X. (2010). *Journal of Medicinal Plant Research, 4(10),* 959-964.;
[3] Salamon, I., Kryvtsova, M., Bucko, D., Tarawneh, A. H. (2019). *Journal of microbiology, biotechnology and food sciences. 8(3),* 965-969.