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BIOACTIVE NATURAL PRODUCTS RESEARCH MEETING

13-14 July 2023 | Lisbon, Portugal and Online (A Hybrid Conference)

Venue: Universidade Lusófona, Campo Grande 376, 1749-024 Lisbon, Portugal

Session IV: Other fields related to Natural Products, Natural Products Chemistry, Natural Products in Drug Discovery, and Bioactivity of Natural Products

A New Approach to the Production of *Schisandra* Lignans using Plant Biotechnology Methods

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Abstract:

Schisandra lignans, namely dibenzocyclooctadiene lignans, are the main secondary metabolites specific to the *Schisandra* genus of confirmed high medicinal activities, e.g., hepatoprotective, anticancer, antioxidant, anti-inflammatory and adaptogenic. Our studies aimed to investigate the lignan production in *S. chinensis*, *S. chinensis* cv. Sadova, *S. henryi*, and *S. rubriflora* microshoot cultures using different comprehensive and innovative biotechnological methods (e.g., elicitation, cultivation in plant bioreactors). The high production of lignans in agar, agitated, and PlantForm bioreactor cultures of *S. chinensis* and *S. chininsis* cv. Sadova (238, 195, 547 and 574, 375, 313 mg/100 g DW, respectively) were confirmed. For the first time the production of dibenzocyclooctadiene, aryltetralin, dibenzylbutane, tetrahydrofuran lignans and neolignans has been confirmed in *S. henryi* (874 mg/100 g DW) and *S. rubriflora* male and female lines (251 and 221 mg/100 g DW). The high antioxidant, anti-inflammatory and antimicrobial potential of obtained tissue extracts were confirmed. The results show the new possibilities of bioactive *Schisandra* lignans production using biotechnological methods.

Acknowledgements:

Funded by National Science Centre, Poland (2016/23/D/NZ7/01316 and 2020/37/N/N27/02436), and Polish Ministry of Science and Higher Education (N42/DBS/000273).

Discrimination of *Quercus pyrenaica* Honeydew Honey through the Volatile Profile

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Abstract:

Honey is a natural product produced by *Apis mellifera* bees from the nectar of flowers, and called nectar honey, or secretions of plants or excretions produced by plant-sucking insects and called honeydew honey. The production of these honey can be observed in the north of the Iberian Peninsula, where forests of black oak (*Quercus pyrenaica*) exist, from the honeydew secretions produced in the plant, which result of the insect's injuries or through phloem sap exudate in its acorns. The aim of this work is the discrimination of the black oak honeydew honey through its volatile profile. For that, forty-two samples, obtained in September of 2021, from four apiaries located in black oak forests within Montesinho Natural Park, Portugal, where characterized by the volatile profile. Also, acorn secretions were collected in *Q. pyrenaica* trees located near the apiaries. Volatiles were sampled by headspace solid phase microextraction (HS-SPME) and the chemical identification was performed by

gas chromatography-mass spectrometry (GC-MS). A complex total ion chromatogram was obtained. The alcohols, aldehydes and terpenic derivatives were the most likely to relate the honeydew honey to its botanical origin, being 1-nonanol, α-terpineol, nonanal, hotrienol and phenylethyl alcohol the most abundant volatiles. Compounds such as 2,3-butanediol and cis-linalool oxide were presented and previously described in honeydew honey with forest origin. The above methodology was suitable for the isolation of low-molecular-weight aroma compounds that are important for authentication of *Q. pyrenaica* honeydew honey.

Natural Hydrophobic Deep Eutectic Solvents for the Extraction of Bioactive Compounds from Complex Samples

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Abstract:

The valorization of plants and their products is fundamental in terms of sustainable development. In recent years, public attention to environmental sustainability has increased dramatically, and regulatory agencies are developing strategies and designing roadmaps to promote the efficient use of resources the restoration of biodiversity, and the reduction of waste. In this sense, natural products can be used as a valuable source of phytochemicals to produce more environmentally friendly solvents for various applications, including more sustainable extraction methods, according to the principle of Green (Analytical) Chemistry. In particular, deep eutectic solvents (DESs) represent a more environmentally friendly alternative to conventional solvents, thanks to their easy preparation and low costs of raw material. They consist of two or more components that form a hydrogen bonding network, which is the key to the formation of DESs. Natural compounds, such as those isolated from essential oils, can be used as hydrogen bond donors or acceptors to form hydrophobic (H)DESs. In this communication, the potential of natural HDESs for the extraction of bioactive compounds from complex samples is presented. The possibility of isolating non-volatile compounds from natural resources and volatile potential allergens from cosmetic products using the described HDESs is reported, as well as the possibility of combining (micro)extraction with analytical characterization by various chromatographic techniques.

Thioesterase-mediated Macrocyclization of Non-ribosomal Peptides and Polyketide Natural Products

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Abstract:

Macrocyclic bacterial polyketides and non-ribosomal peptides are macrocyclized as one of the last steps in their biosynthesis by thioesterases (TEs). These enzymes catalyze the offloading of the covalently bound linear natural product from the biosynthetic enzyme complexes. In addition to macrocyclization, some TEs catalyze hydrolysis of the intermediate to generate the free acid. Efforts to elucidate the underlying mechanism that controls TE selectivity for hydrolysis versus