

58TH ANNUAL MEETING

of the **SOCIETY**

FOR ECONOMIC BOTANY

BRAGANÇA - PORTUGAL

JUNE 4-9, 2017

Living in a global world:

local knowledge and sustainability

BOOK OF ABSTRACTS

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SPRINGER NATURE



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BRAGANÇA - PORTUGAL
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Economic botany: approaches from Archaeobotany, Ethnography and History – Session 3

Chair: Valentina Savo, Simon Fraser University, Canada
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Chair: Michael Heinrich, University College London, School of Pharmacy, United Kingdom
 Tuesday, June 6, 11h00 – Auditório Dionísio Gonçalves

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Chair: Patrick Van Damme, Ghent University, Plant Production, Belgium
 Tuesday, June 6, 14h30 – Auditório Dionísio Gonçalves

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Chair: Joan Vallés, Universitat de Barcelona, Laboratori de Botànica Facultat de Farmàcia i Ciències de l'Alimentació, Spain
 Thursday, June 8, 11h00 – Auditório Dionísio Gonçalves

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Globe amaranth as an alternative source of natural red-violet colorants: an optimization study addressing current needs of the industrialized world.

Authors: Roriz, Custódio Lobo [1], Pinela, José [1], Pereira, Carla [1], Fernandes, Ângela [1], Prieto, Miguel Angel [1], Barros, Lillian [1], Oliveira, M. Beatriz P.P. [2], Carvalho, Ana Maria [1], Barreiro, Maria Filomena [3], Ferreira, Isabel C.F.R. [1].

Plant-derived colorants have an extensive history of use around the world for enhancing food and clothing. However, artificial colorants are nowadays massively used in the food industry due to their abundance, cheaper prices, and bright colors. These additives are recognized for their potentially toxic and allergic effects to humans, and contribution to environmental pollution. This leads the current, more conscientious consumer to opt for foods containing natural coloring agents, which may also have health-promoting effects. A current challenge is to find natural matrices rich in molecules with coloring capacity and optimize their recovery and stabilization. A chemical prospecting study allowed us to select globe amaranth (*Gomphrena globosa* L.) as a rich source of betalains, a group of chromoalkaloids that can be divided in betacyanins (red-violet pigments) and betaxanthins (yellow pigments). Given the powerful colorant capacity of these molecules and the great interest to use natural colorants in the food industry to replace the artificial counterparts, this study aimed to optimize the production of a natural colorant from globe amaranth using efficient and more sustainable processes. The non-conventional methods of microwave-assisted extraction (MAE) and ultrasound-assisted extraction (UAE) were used for samples processing. For production of the coloring ingredients, a full factorial design was implemented combining the independent variables of processing time (t), temperature (T) or power (P), ethanol concentration (Et) and solid/liquid ratio (S/L) and response surface methodology was used for optimization. The extraction yield and coloring capacity of the extracts was maximized based on different responses: extracted residue, determined by gravimetric analysis; betacyanins levels, monitored by high-performance liquid chromatography coupled with mass spectrometry; and color intensity, measured by UV-Visible spectroscopy and colorimetry. The optimum processing conditions for MAE ($t= 8$ min, $T= 60$ °C, $Et= 0\%$, and $S/L= 5$ g/L) originated 39.6 ± 1.8 mg/g, while for UAE ($t= 22$ min, $P= 500\%$; $Et= 0\%$, and $S/L= 5$ g/L) led to 46.9 ± 4.8 mg/g, which supports the use of UAE for recovery of betacyanins from the studied plant. This study highlighted globe amaranth as an alternative source of red-violet colorants with high potential to be used as natural food additives.

Keywords: *Gomphrena globosa* L., Globe amaranth, Natural colorants, Optimization study, Natural food colorant.

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Incense plants: interdisciplinary approaches to species diversity and ethnobotanical uses.

Authors: Selliah, Sugir [1], Heinrich, Michael [2], Weckerle, Caroline [1].

Since incense plants are often related to religious rituals, little attention has been paid to investigate their species diversity and ethnomedical uses. However, investigations on traditional medicinal use of smoke and its chemical composition suggest that incense plants may also have pharmacological activity. Our aim is to provide an integrated understanding of ritual and medicinal uses of incense plants across Eurasia and to assess the factors that drove their selection (i.e.: whether it is cultural or/and pharmacological). In order to explore and disentangle these neglected resources, we have integrated perspectives and knowledge from different disciplines such as ethnobotany, phylogenetic research and phytochemistry. As first step, a review of the ethnobotanical literature provided an overview of the diversity of local incense plant use in medicinal and ritual settings across Eurasia. We have constructed an incense plants database by compiling data related to uses and botanical information from the existing scientific literature such as books and articles. Then, data exploration was performed using a basic descriptive statistical approach. In total, 556 species (374 genera, 114 families) with 1033 use-reports have been recorded. The most commonly reported families are: Asteraceae, Solanaceae, Lamiaceae, Fabaceae, Burseraceae, Cupressaceae, Apiaceae, and Poaceae. Beside Cupressaceae and Poaceae, this distribution is similar to what we generally find for medicinal plants. Solanaceae revealed to be commonly used for medicinal purposes while Cupressaceae is typically used for ritual purposes. Our data suggest that incense plant species are mainly used as mono-ingredients and their most used parts are the leaves, the stem and exudates, respectively. Furthermore, for medicinal purposes the smoke tends to be actively inhaled while in ritual use it is passively inhaled. This study supports the relevance of exploring the chemical composition of incense plants smoke for bioactive compounds that potentially be useful for treating specific disorders.

Keywords: Incense plant, Ethnobotany, Medicinal use, Ritual use.

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