

MEETING ABSTRACTS

Open Access



BeSafeBeeHoney - BeeForward: Exploring Beekeeping Innovations and Science

Sarajevo, Bosnia-Herzegovina. 6-7 May 2025

Published: 7 October 2025

I1

Exploring Beekeeping Innovations and Science: Proposals and Conclusions from the 2nd Conference in Sarajevo

Marta Leite^{1,2}, Ana R. Mateus^{2,3,4}, Midhat Jasic⁵, Andreia Freitas^{1,2}

¹Associated Laboratory for Green Chemistry (LAQV) of the Network of Chemistry and Technology (REQUIMTE), Porto, Portugal; ²National Institute for Agricultural and Veterinary Research (INIAV), Vila Do Conde, Portugal; ³Associated Laboratory for Green Chemistry (LAQV) of the Network of Chemistry and Technology (REQUIMTE), University of Coimbra, Faculty of Pharmacy, Coimbra, Portugal; ⁴Faculty of Pharmacy, University of Coimbra, Coimbra, Portugal; ⁵Faculty of Pharmacy, University of Tuzla, Bosnia and Herzegovina

Correspondence: Marta Leite
BMC Proceedings 2025, 19(28):I1

On 6 and 7 May 2025, the COST Action BeSafeBeeHoney held its 2nd International Conference — BeeForward: Exploring Beekeeping Innovations and Science, at the Hollywood Hotel, Sarajevo, Bosnia and Herzegovina. As in 2024, the event was once again a success: around a hundred researchers, beekeepers and policy makers discussed the latest challenges and opportunities for bee health, honey quality and agricultural sustainability.

The Conference reaffirmed its interdisciplinary nature, successfully uniting stakeholders across the beekeeping and bee product value chain. The event provided a platform for presenting both scientific research and professional practice, while fostering dialogue among veterinarians, food technologists, nutritionists, medical doctors, agronomists, pharmacists, experienced beekeepers, and related professionals. Discussions highlighted the critical role of beekeeping as a driver of rural development, poverty reduction, and youth engagement, while emphasizing the need for innovation, competitiveness, and harmonization with European regulations.

Key recommendations addressed pressing challenges in legislation, standardization, and quality assurance of bee products. Participants underlined the importance of strengthening surveillance for bee health, providing institutional support for queen rearing, and

promoting high-value products such as royal jelly, propolis, and geographically designated honeys. Greater attention was also called to organic production pathways, the adoption of good beekeeping and manufacturing practices, and the development of harmonized sensory evaluation methodologies to ensure consumer trust and market differentiation.

The conference further emphasized the need for standardization and evidence-based validation of apitherapy, recognizing its potential to support pharmaceutical, cosmetic, and related industries. Education emerged as a central theme, underscoring the necessity of continuous training for beekeepers and professionals across the production, processing, and distribution chain to enhance sustainability, quality, and innovation.

By bringing together diverse expertise and perspectives, the Second Conference provided a comprehensive set of recommendations toward advancing beekeeping practices, protecting bee health, and improving the competitiveness of bee products in both domestic and international markets.

Acknowledgement

This publication is based upon work from COST Action BeSafeBeeHoney, CA22105, supported by COST (European Cooperation in Science and Technology).

S1

Tackling honey fraud together: how to detect adulteration with syrups using portable devices

Marco Ciulu

Department of Biotechnology – University of Verona, Italy

BMC Proceedings 2025, 19(28):S1

Honey fraud has a significant impact on the beekeeping sector. It is estimated that around half of the samples available on the market derive from illicit activities such as adulteration with exogenous syrups or origin falsification. Honeys produced in countries with inadequate



replacing synthetic preservatives and a promising green alternative to petroleum-based synthetic plastics, contributing to the extended shelf life of food products through environmentally sustainable methods.

P19

The role of botanical origin in defining the bioactive potential of honey

Soraia Sousa Santos¹, Irene Gouvinhas², Miguel Maia³, Nuno Capela¹, Ana Barros²

¹ University of Coimbra, Coimbra, Portugal; ² Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB)/ Institute for Innovation, Capacity Building and Sustainability of Agri-Food Production (Inov4Agro), University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal; ³ APISMAIA, Produtos & Serviços, Póvoa de Varzim, Portugal

Correspondence: Nuno Capela
BMC Proceedings 2025, 19(28):P19

Honey has emerged as a natural food source highly valued by consumers for its flavour, nutraceutical properties and potential therapeutic purposes, such as antioxidant and anti-aging activities. These biological activities are commonly attributed to its phenolic composition, which varies depending on the botanical source. Since honey bees act as vectors, transferring the compounds from plants to the honey, the surrounding floral diversity significantly influences its phenolic profile variations, biological activities and organoleptic characteristics. Despite the variations, only a few monofloral honeys achieve higher commercial value. This work aimed to analyse the phenolic composition and biological activities (antioxidant and anti-aging) of Portuguese mono- and multifloral. Total phenolic content ranged from 20.8 (lavender honey) to 112.13 (heather honey) mg GA/100 g; from 10.25 (citrus honey) to 103.26 (chestnut honey) mg GA/100g for orthodiphenols; and from 2.94 (lavender honey) to 40.96 (chestnut honey) mg CAT/100g for flavonoids content. Antioxidant capacity varied from assays, with values between 0.06 (citrus honey) and 2.27 (chestnut honey) mmol Trolox/100g for ABTS, from 0.04 (lavender honey) to 0.335 (lavender honey) mmol Trolox/100g for DPPH and from 0.05 (citrus honey) to 0.69 (viper's bugloss honey) mmol Trolox/100g of sample, FRAP. Anti-aging capacity was assessed through tyrosinase and elastase inhibition, with values ranging from 2.23% (heather honey) to 33.20% (raspberry honey), and from 20.34% (chestnut honey) to 61.39% (multifloral honey), respectively. These findings highlight the importance of botanical sources for the selection of honey in its applications on food, cosmetic and/or pharmaceutical industry.

P20

Evaluation of Honey Authenticity and Quality Using HPLC-PAD and Fluorescence with MCR-ALS

Dragana Bartolić, Mira Stanković, Vuk Maksimović, Miloš Prokopijević, Miroslav Nikčević, Ksenija Radotić
University of Belgrade - Institute for Multidisciplinary Research, Belgrade, Serbia

Correspondence: Dragana Bartolić
BMC Proceedings 2025, 19(28):P20

Fake honey can negatively impact human health by introducing harmful substances and affecting nutritional quality, making its detection essential to prevent potential risks. This study investigates the sugar profiles of pure honey samples and fake honey using High-Performance Liquid Chromatography (HPLC) with a Pulsed Amperometric Detection (PAD) method. The goal was to determine if spectrofluorimetry, combined with multivariate analysis, could differentiate authentic honey from honey adulterated with artificial sugars. In this study, HPLC-PAD and spectrofluorimetry with Multivariate Curve Resolution-Alternating Least Squares (MCR-ALS) were employed to distinguish

genuine honey from counterfeit honey. The results from HPLC-PAD analysis revealed the presence of monosaccharides Glucose (Glu), Fructose (Fru), and Sucrose (Suc) in meadow honey, while the adulterated honey contained only glucose. Spectrofluorimetric analysis identified three emission components: at 350-360 nm (which corresponds to proteins), 400 nm, and 440 nm (which corresponds to phenols) for natural honey and fake honey. Fluorescence spectroscopy combined with multivariate curve resolution-alternating least squares (MCR-ALS) was used to determine the ratio of the spectral components originating from phenol and proteins. Furthermore, the phenolic-to-protein ratio in fake honey was significantly lower at 1.716, compared to the ratio of 3.1967 found in authentic honey. These findings demonstrate the potential of these methods in detecting honey adulteration and ensuring the authenticity of honey products, contributing to better public health safety.

P21

Preparation and characterization of propolis emulsions using different emulsifiers

Jelena Zivkovic, Katarina Šavikin
Institute for Medicinal Plants Research "Dr Josif Pancic", Belgrade, Serbia

Correspondence: Jelena Zivkovic
BMC Proceedings 2025, 19(28):P21

Propolis is typically marketed as a hydroalcoholic solution since its active ingredients are highly soluble in ethanol but poorly soluble in water. However, alcohol limits its use for certain groups, leading to the development of aqueous mixtures, which are more biologically friendly but contain 10–20 times fewer active compounds. Adding co-solvents and modifying production conditions can increase the concentration of active compounds in water-based solutions (Monteil et al., 2022). The objective of this study was to formulate emulsions containing propolis extracts using various surfactants (Macrogol 400, Polysorbate 80, Polysorbate 20, Labrasol, Labrafal, Transcutol HP, Labrafac and Kolliphor) and to evaluate their physicochemical characteristics and stability. The obtained emulsions were tested for their free radical scavenging activity and total phenol content. Total phenolic content was determined using the colorimetric Folin-Ciocalteu method and antioxidant activity using DPPH assay. It was concluded that best emulsion properties were obtained using Labrafac as emulsifier. Results suggest that tested formulations had a good stability over time, with Polysorbate 80 emulsion being the least stable.

P22

Implementation of quality management systems in honey production

Senem Suna
Bursa Uludag University, Bursa, Turkey
BMC Proceedings 2025, 19(28):P22

Turkey plays a pivotal role in the field of beekeeping, owing to its favourable climatic conditions and diverse flora. In addition to the production of honey, beekeeping also supports agricultural productivity through pollination, positioning it as a vital component of the agricultural sector. Despite the ongoing reliance on traditional methods for honey processing, ensuring food safety has become increasingly crucial in guaranteeing the final product's safety and quality. In this context, quality management systems and one of the most important "Hazard Analysis Critical Control Points (HACCP)" system emerges as a reliable and efficient framework for monitoring and managing critical processes. Widely recognized within the food industry HACCP provides an effective means of safeguarding the safety of food products while contributing to sustainability. This study aims to explore the necessity and application of the HACCP system in the honey production by addressing critical control points.