

MEETING ABSTRACTS

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# BeSafeBeeHoney - BeeForward: Exploring Beekeeping Innovations and Science

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

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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.

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S1

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

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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



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Godocikova, J., Hrnčiarova, M., Deglovic, J. et al. Differences in the anti-bacterial efficacy of honey against oral and non-oral bacterial pathogens in artificial human saliva. *Eur Food Res Technol* 25<sup>1</sup>, 1353–1362 (2025). <https://doi.org/10.1007/s00217-025-04709-x>.

### P3

#### Types and usage of preparations based on propolis in Serbia

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Propolis is a natural product produced by bees (*Apis mellifera*) for the protection and defence of hives. It is a very complex mixture of biologically active compounds (fatty acids, aliphatic and aromatic acids, polyphenols - predominantly flavonoids, alcohols, terpenes, sugars, various types of esters, etc.) characterized by antibacterial, antifungal, antiviral, antiparasitic, hepatoprotective and immunomodulatory effects. Propolis is widely used in cosmetics, food and pharmaceutical products. The most common galenic forms on the market of the Republic of Serbia in which propolis is the active ingredient are liquid preparations i.e. drops (21.8%) and sprays (20.6%), followed by syrups (12.2%) and gels (11.6%). Pastilles, powders, vaginal tablets, oriblets and ointments are also represented. The conducted survey on the population's awareness of the medicinal properties of propolis and its use included 213 respondents (67.5% male; 32.5% female). The majority of respondents live in urban areas (71.2%), in villages 22% and 6.6% in suburban settlements. More than 76% of respondents stated that they are familiar with the medicinal properties of propolis. More than a half of respondents (54.2%) occasionally use preparation based on propolis, while 12.3% use it every day. Nearly half (49%) of the respondents learned about propolis preparations from friends or family, while only 18.2% received a recommendation from a pharmacist and 5.1% from physician while 50.8% of respondents always buy propolis products in a pharmacy. Regarding side effects, only 10% of respondents stated that they had side effects, but 89% were not informed to whom they should report side effects.

### P4

#### BEE Well with the Magical Recipe of Venom

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Bee venom (apitoxin) is a fascinating and potent biochemical cocktail produced by honeybees (*Apis mellifera*). This natural marvel, rich in peptides, enzymes, and low-molecular-weight compounds, not only triggers pain and inflammation but also holds groundbreaking medical potential. The primary component, melittin, makes up 40–60% of the venom's dry weight. This small yet potent 26-amino-acid peptide integrates into cell membranes, disrupting their structure and causing cell death. Melittin's destructive power shows promise in treating cancer and immune-related diseases. Another key player, phospholipase A2 (PLA2), accounting for 10–12% of bee venom, plays a crucial role in inflammatory and immune responses. The neurotoxic peptide apamin specifically blocks SK channels in neurons, altering neural excitability and offering potential therapeutic applications for neurological disorders like Parkinson's disease. Hyaluronidase enhances the venom's spread by breaking down hyaluronic acid in tissues, while amines such as histamine, dopamine, and norepinephrine contribute to immediate pain and vasodilation. Additionally, peptides like Adolapin, Secapin, and Tertiapin provide unique therapeutic effects: Adolapin offers anti-inflammatory and analgesic properties, Secapin exhibits antimicrobial activity, and Tertiapin influences cardiac function and neuronal

signalling by inhibiting potassium channels. In conclusion, bee venom is more than just a defence mechanism; it's a biological treasure trove that can revolutionize future medical treatments.

### P5

#### Evaluation of Hygienic Behaviour in Honey Bees (*Apis mellifera intermissa*) Through Pin-Test

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The hygienic behaviour of *Apis mellifera intermissa* is a crucial defence mechanism against brood diseases and parasites. This study assessed hygienic behaviour in eight colonies located in Boumerdes, Algeria, from March to September 2024, using the pin test. The objective was to evaluate seasonal variations in brood removal efficiency and identify colonies with high hygienic potential for selective breeding. The pin test involved perforating capped brood cells, and removal rates were recorded at 6-hour, 24-hour, and 48-hour intervals. Statistical analysis (ANOVA,  $p < 0.05$ ) confirmed significant differences in removal rates across months and colonies. The highest removal rates were observed in spring and early summer (March–July), reaching 98% within 48 hours, while lower rates were recorded in late summer, possibly due to environmental stressors. Some colonies exhibited consistently strong hygienic responses, highlighting their potential for breeding programs aimed at improving disease resistance. The results suggest that environmental conditions influence hygienic efficiency, and selective breeding for this trait could enhance colony health. These findings provide valuable insights for beekeepers seeking to strengthen honeybee resilience and improve sustainable beekeeping practices in Algeria.

### P6

#### Riboflavin and thiamine in some homemade honey products from Serbia

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Honey is a source of natural macro- and micro-nutrients including a wide range of water-soluble vitamins. The content of vitamins in honey is rather variable and depends primarily on its floral source and origin. Honey is not the main source of B vitamins. However, it can contribute to achieving their optimal intake, particularly in disease conditions. This study aimed to determine riboflavin and thiamine in homemade honey products. Two kinds of natural honey products were examined: pine honey with propolis and a mixture of pollen in honey. HPLC analysis with fluorescence detection was conducted on C18 column using the mobile phase of 30.0% methanol and 70.0% 0.005M NH<sub>4</sub>Ac (pH 5.0). Riboflavin was analysed directly after filtration through a membrane filter. To analyse thiamine supernatant was derivatized with alkaline potassium ferricyanide. The concentrations of riboflavin and thiamine found in pine honey with propolis were 0.005 mg/kg (RSD 2.2%) and 0.011 mg/kg (RSD 1.5%) respectively. For pollen in honey, the values of riboflavin and thiamine were 0.3 mg/kg (RSD 0.8%) and 0.172 mg/kg (RSD 1.1%) respectively. The content of B1 and B2 vitamins is significantly higher in the mixture of pollen in honey compared to pine honey with propolis. Pollen is very rich in B vitamins; therefore, these results were expected. On the other hand, pine honey is a honeydew of a different origin than nectar flower honey. This