

Presentation of activities of European Cooperation in Science and Technology (COST) action CA22105-BeSafeBeeHoney

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ABSTRACT

Honey has been popular for its nutritional and health properties since ancient times due to the presence of bioactive compounds with antioxidant, antimicrobial, anti-inflammatory and anti-cancer properties. The European bee (*Apis mellifera*) is the most important pollinator and extremely important in agriculture. The number of bees is decreasing worldwide due to anthropogenic activities, climate change and the application of pesticides. This led to a decrease in honey production. Europe imports 40% of the honey it consumes annually. The EU tries to prevent and help to achieve international cooperation and exchange of innovative scientific and professional knowledge and achievements in the following topics: honey and bee products' nutritional and medicinal properties, abiotic stressors and anthropogenic contaminants in the environment using hive products as indicators, prevalent diseases and biotic stressors threatening honeybee colonies, honeybees as pollinators in agriculture and consequences of lost colonies in agrarian ecosystems and policy research and market analysis related with beekeeping activities. The COST action CA22105 brings together beekeeping, veterinary, agriculture engineering, chemistry, biology, nutrition, economy and policy to deliver scientific developments. Cost action takes care of achieving gender equality, young researchers. The implementation of the tasks of this COST action is carried out within several working groups.

Keywords: bee, honey, bee products, dissemination of knowledge

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Overview of working groups (WG) inside CA22105 (COST Association, 2024; Nebot et al., 2024)

WG1: Nutritional and medicinal properties of honey and by-products: quality criteria in motion

This working group focuses on bee products, their nutritional and medicinal properties and aspects related to their authenticity. The objective is to have an overview of current knowledge, emerging data, as well as the analytical methods available and applicable in different laboratories. Information regarding honey, royal jelly, wax, propolis and pollen, among others, must be reviewed and compiled to explain and promote the benefits of these products on human health.

WG2: Biomonitoring of abiotic stressors or anthropogenic contaminants in the environment

This working group's goals are to monitor the environment, collect specific data on the use of contaminants, and contribute to the global improvement of environmental pollution monitoring.

As a prerequisite, inside this working group, it is necessary to review anthropogenic contaminants in honeybees and their products, select contaminants more prevalent and problematic in different regions, assess the modern methodologies for the identification of contaminants in beehive products, provide food safety challenges related to honey and honeybee products and their importance depending on their origin and implement Geographic Information System (GIS) by organizing collected data in a specific database.

WG3: Evaluation of prevalent diseases and biotic stressors that threaten honeybee colonies - endemic and possible imported threats

Veterinary medicine protects the health of bees. Regular meetings and training for veterinarians and beekeepers have strengthened ties between the veterinary profession and the beekeeping sector, promoting the responsible distribution and use of veterinary medicines. Given the dynamic nature of beekeeping in agriculture, beekeepers must adhere to good practices. BeSafeBeeHoney supports beekeeping associations and individual beekeepers.

The tasks within this working group are mapping diseases and biotic stressors in European honeybee colonies, assessing crossover threats, then identifying implemented prevention national and international control strategies, including novel control agents for treatment in beekeeping. Evaluation of novel and emerging real-time sensors that can be used for field pathogen detection by beekeepers in their honeybee colonies is also of interest here, and the assessment of challenges in parasite/virus control in laboratory/research and regulatory/market, with the aim of the data integration into the Geographic Information System (GIS) database.

WG4: Honeybees as pollinators in agriculture: consequences of lost colonies in agrarian ecosystems

Bees are crop pollinators, and farmers use pesticides that harm bees and potentially contaminate bee products. One of WG4's goals is to encourage those interested in overcoming these problems and finding sustainable solutions with the help of scientists and experts.

WG4's tasks also include summarizing current knowledge of interactions between agriculture and bees/bee products, encouraging stakeholders involved in the interactions to engage in discussion, gathering stakeholders' opinions on the interactions between bees and agriculture and potential conflicts, and working on solutions with stakeholders, including estimating the impact of agricultural pollutants on bee products.

WG5: Biomonitoring of abiotic stressors or anthropogenic contaminants in the environment

This group aims to design and formulate European policies to promote bee production, including preventing, reducing and controlling biotic and abiotic stressors for bees. It will be realised through mapping existing national and EU policies and regulations regarding honey and related products as developed, an online survey to analyse the applicability and implementation of the beekeeping policies at international and national levels, and an assessment of the effect, use and effectiveness of current policies to support apiculture. It also implies the analysis of the current market for honey in European regions, including the degree of self-sufficiency, import and export, the market operators and other relevant market indicators, including the loss of colonies. The final goal is the development of recommendations of best practices related to production, market, research and policies for sustaining further social and economic development and expansion of the European apiculture sector and the design of a BeeSafeQATool to comfort the social and economic development and expansion of the European apiculture sector.

WG6: Coordination, dissemination, and stakeholder involvement

The activity and achievements of BeSafeBeeHoney should be widely disseminated to the general public and specific target groups that could use the Action results for their future work. The goal of this WG is to maximise the visibility and attractiveness of the Action, create and continuously update the website and social media profiles, publish the newsletter of the CA22105 to be delivered twice a year, organise international conferences to promote and spread the latest achievements and, define relevant changes and additions to create the BeSafeBeeHoney protocols.

Achieved results up to now in CA22105

1. The 1st International Conference BeSafeBeeHoney was held on May 28 and 29, 2024, in Larissa, Greece. The event featured esteemed keynote speakers, fruitful oral communicators, and poster presenters, bringing together approximately 100 bee experts, researchers, and specialists.

2. Dissemination of activities of BeSafeBeeHoney through social media:

LinkedIn: <https://www.linkedin.com/company/besafebeehoney/posts/?feedView=all>

Facebook: <https://www.facebook.com/BeSafeBeeHoney.CA22105>

Instagram: <https://www.instagram.com/besafebeehoney/>

3. TheBeeLetter contains the latest news of the Cost Action “Beekeeping products valorization and biomonitoring for the safety of bees and honey” (BeSafeBeeHoney, CA22105).

4. Dissemination through other media, like blogs:

<https://www.pmf.ni.ac.rs/chemianaissensis/new-actions-to-preserve-honeybees-and-honest-beekeeping/>

Our experience as a recommendation to participate in CA22105

Although launched in September 2023, CA22105 has achieved significant results up to now because it is a very dynamic group of people dedicated to collaborating and even generation, during the duration of the project, visible results not only for scientists but also for the general public. Prof. dr Danijela Kostić and Dr Biljana Arsić are involved in the activities of several working groups. Prof. dr Danijela Kostić takes part in the tasks related to WG1 and WG5, and dr Biljana Arsić in the activities of WG1, WG5 and WG6. There are so many online meetings with useful frequent trainings related to achieving results related to *e.g.*, the generation of systematic reviews and using software tools. They both participate now in two systematic reviews, and dr Biljana Arsić is also now a coordinator for writing the systematic review related to propolis.

Conclusion

Honey production has declined drastically in recent years, both in quantity and quality. This action aims to protect bees, increase the number of hives, produce honey and honey products, and improve their quality, with the significant involvement of science and the professional community at the European level. All interested parties are welcome to take part in this COST action to implement its tasks.

Acknowledgement

CA22105

Conflict-of-Interest Statement

The authors declare no conflict of interest.

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