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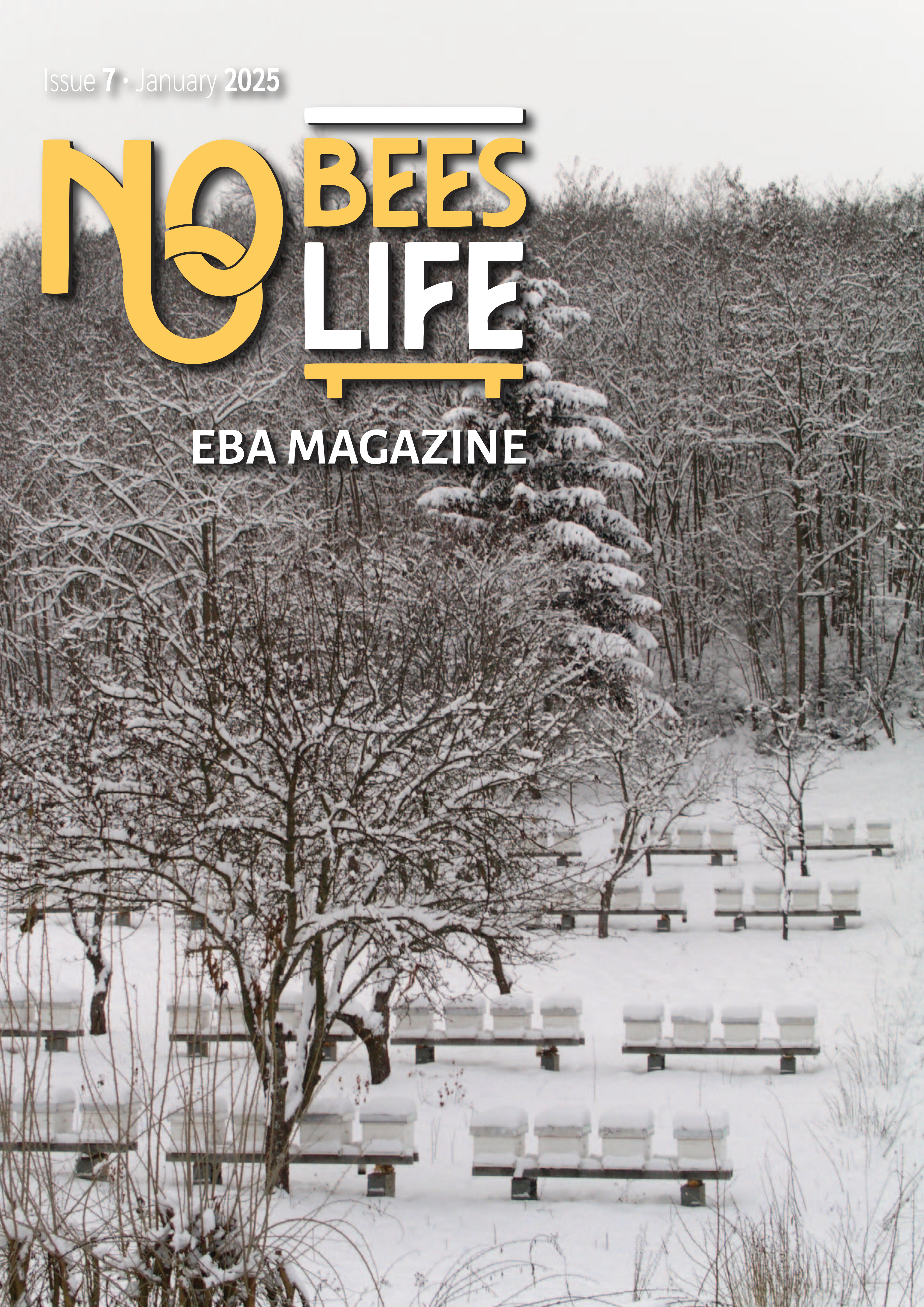
NO BEES NO LIFE

EBA MAGAZINE



28 COUNTRIES

FROM WHICH EBA HAS MEMBERS

(43 beekeeping organizations)

In order of confirmation of the Statute of EBA

366.421 beekeepers

Serbia
Slovenia
North Macedonia
Bulgaria
Greece
Romania
Malta
Germany
Hungary
Ukraine
Montenegro
Lithuania
Bosnia and Hercegovina
Sweden
Croatia
Czech Republic
Poland
United Kingdom
Netherlands
Italy
Ireland
Belgium
Cyprus
Türkiye
Switzerland
Prishtina
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SEVEN FAIRYTALE-LIKE YEARS

ON DECEMBER 20, 2017, THE UNITED NATIONS IN NEW YORK UNANIMOUSLY DECLARED

WORLD BEE DAY

The number seven is often called a magical, fairytale number, and on the seventh anniversary of the proclamation of World Bee Day by the United Nations (UN), we can recall that the initiative for this day was unanimously supported by all UN member states. We could say that it is a fairy tale spreading awareness about the importance of bees and other pollinators across the globe. Awareness that life cannot exist without bees and other pollinators, and that every third spoonful of food depends on the pollination by these insects, is growing every day. In this respect, both the proclamation of World Bee Day and the awareness of its purpose have exceeded our initial expectations. World Bee Day and its annual celebration on May 20 have contributed to improving conditions for bees and the field of beekeeping worldwide.

Boštjan Noč, President of the Slovenian Beekeepers' Association and the European Beekeeping Association, stated on this occasion:

"World Bee Day is a wonderful fairy tale, but, unfortunately, the current reality in beekeeping is far from a fairy tale!

Around the world, awareness of the importance of bees and other pollinators is growing, the use of bee-harming plant protection products (PPP) has significantly decreased, the conditions for registering bee-harming PPP are being tightened, and the recognition of beekeepers' work has increased, leading to greater promotion of bee products and their use.

I would like to highlight both the first and the most recent major successes, which are also a result of the growing awareness of the importance of bees brought about by World Bee Day.

One of the first and most important measures introduced by the EU was that the European Commission and the European Parliament listened to our wishes and demands, which we highlighted during the promotion of the World Bee Day "project", and, as a result, increased funding for the beekeeping sector by 70%. The European Parliament has tightened the conditions for the use and registration of bee-harming plant protection products (PPP), while also encouraging the planting of nectar-rich plants, organic beekeeping, and more.

The most recent major success is that the European Commission and the European Parliament listened to Slovenia, which, together with Portugal, submitted a proposal to amend the Honey Directive, finally establishing that all honey must be labelled with its exact country of origin. It is a 'revolution' in terms of protecting consumers and beekeepers! Unfortunately, the transitional period is much too long!

These seven years have not entirely been a fairy tale, as the special status of the 'pollination service' performed by bees is still not recognised. More than 30% of food depends on bee pollination, and the value of pollination is even greater in maintaining biodiversity in nature. Accordingly, bees are not only a part of agricultural policy but also a very important part of environmental policy. It is high time that bees are granted the status they deserve for preserving the environment, and that financial resources from environmental measures are allocated to beekeepers as support for maintaining bee colonies, for every bee colony, and for all beekeepers! Pollination services cannot be imported, which is why such support through environmental measures is crucial!

Another pressing issue is adulterated honey, as, according to the European Commission, 46% of honey on the market is adulterated. It is high time to protect consumers. We urgently need parallel initiatives: first, to quickly establish the appropriate legislation so that inspection services can remove adulterated honey from the market, and second, a joint promotional campaign to raise consumer awareness that honey is consumed to strengthen health and that adulterated honey can harm health... This is why consumers should buy honey directly from beekeepers or buy honey of a local origin. Unfair competition will destroy beekeeping worldwide. Who will then provide the pollination service when there are no bees, which, sadly, cannot survive without beekeepers?

Between 2014 and 2017, when we Slovenians collectively convinced the world of the urgent need to declare World Bee Day, we were united in Slovenia, Europe, and globally. It is up to all of us to once again show unity after seven years, to be aware of the goals of World Bee Day, and to boldly move forward with the realisation of two key objectives: the preservation of bees and beekeepers, and the protection of consumers. It is precisely due to the desire to achieve the two aforementioned goals that the European Beekeeping Association was established in April 2024, with its headquarters in Slovenia. I believe that the EBA will help us realise these objectives."

Thoughts on World Bee Day and the current state of beekeeping were also shared by the following:

Peter Kozmus, Vice President of Apimondia: World Bee Day and Global Beekeeping

World Bee Day has significantly contributed to solving many problems in beekeeping at the global level. Its key positive effects are:

1. Increased awareness of the importance of bees:

World Bee Day has drawn significant attention to the various challenges faced by global beekeeping. The main challenges include: the


NG WITH LOVE

use of bee-harming pesticides, global climate change, habitat loss, new bee diseases, pests, and other related challenges. This leads to a better understanding of the needs of pollinators as an important part of both the ecosystem and the food system.

2. Support for more bee-friendly policies and legislation:

Some countries have introduced measures to reduce pesticide use, promote more sustainable farming, and protect bee-friendly habitats. WBD (World Bee Day) encouraged politicians at both the national and international level to ban or at least limit bee-harmful pesticides.

3. Promotion of education and research:

Increased global attention has led to a rise in funding for research aimed at addressing the challenges faced by bees. Educational programs for children and adults have expanded in countries where beekeeping was not previously a priority.

4. Promoting beekeeping as a tool for development:

World Bee Day has highlighted beekeeping as an important agricultural activity for improving the economic position of local communities, especially in impoverished regions of the world. Support for beekeeping in some developing countries has contributed to the creation of additional jobs and increased farmers' incomes.

5. Strengthening international cooperation:

Events organised on World Bee Day brought together scientists, beekeepers, and decision-makers. This has strengthened the exchange of knowledge and solutions, such as sustainable beekeeping practices that are better suited to local conditions.

World Bee Day has become an important platform for global action to protect bees and promote sustainable agriculture, directly contributing to food security and the preservation of biodiversity.

Dejan Židan, Minister of Agriculture, Forestry and Food at the time of the proclamation of World Bee Day

Anniversaries are a time to reflect on the successes we have achieved in the past, with the goal of evaluating whether the path we are planning is ambitious enough and moving in the right direction. When we fought for World Bee Day, we were fighting not only for the recognition of the beekeeping sector worldwide but also to ensure that people understand that our actions will determine whether there will be enough food for everyone or if more and more people will go hungry on the planet. We succeeded! We succeeded on a symbolic level – at this very moment, the world recognises us as the champion of bees, pollinators, and the fight against hunger. But what we always need to ask ourselves is how we should act if we notice that our energy is running low. We are expected to continue the fight for pollinators, bees, and the fight against world hunger, and I sincerely hope that all the government bodies, NGOs, and other organisations that have supported us will continue to find this enthusiasm for promoting beekeeping and advancing beekeeping on an international level in the future. Slovenia may not be recognised for many things, but it is recognised for its beekeeping. Therefore, we are obligated to continue promoting Slovenian beekeeping and the Slovenian approach to both preserving pollinators and food production in the future. This is what is expected from us.

Tanja Strniša, State Secretary at the Ministry of Agriculture, Forestry and Food at the time of the proclamation of World Bee Day

World Bee Day also holds significance in diplomacy. Through various initiatives, Slovenian diplomats around the world raise awareness about the global importance of bees and pollinators for food security, the preservation of biodiversity, and the improvement of social conditions in rural areas. At the Slovenian Embassy in Prague, we educated others about bees by example, having our own beehive in the garden. From my experience in Czech Republic, I can say that the topic of bees opens all doors. Everyone can understand that bees are extremely significant for both people and the environment, and that we must protect them from the challenges that endanger their survival. In a world where political and economic divisions are becoming more pronounced, so-called 'bee diplomacy' is a positive and uncontroversial story that connects us, and through which we are also recognised and valued globally.

REPUBLIC OF SLOVENIA

HUMAN RIGHTS OMBUDSMAN

Human Rights Ombudsman
Dunajska cesta 56
1109 Ljubljana

BEES LIFE

Ms Louise Holck
Chair
ENNHRI

Ms Debbie Kohner
Secretary General
ENNHRI

By Email: debbie.kohner@ennhri.org

Date: 16 December 2024

Dear Ms Holck, dear Ms Kohner, distinguished colleagues,

The Human Rights Ombudsman of the Republic of Slovenia attaches great importance to the fact that the right to health and a healthy environment are fundamental human rights that must be fully guaranteed to everyone. It is the responsibility of every state to take measures to protect the environment, which includes creating conditions for achieving the highest level of physical and mental health. In this context, it is important to emphasize that the international concept recognises the right to health as an essential element of social well-being, which goes beyond the mere absence of disease and also includes preventive action or measures to ensure the maximum benefit for each individual and for the community as a whole.

One of the key elements in ensuring these rights is access to quality food, which is increasingly under threat from a number of factors. This is exacerbated by the growing prevalence of counterfeit food, which has unfortunately become a more common choice due to its affordability, despite the fact that it directly undermines public health, challenges consumer rights, and jeopardises the integrity of our food chain, while at the same time destroying the environmental and agricultural foundations of sustainable development. When counterfeit food reaches our plates, consumers are often unaware that they are consuming products of dubious origin, which can be detrimental to their health. Not only does this pose a risk to the individual, but it also places an additional burden on the healthcare system, which has to deal with the consequences of long-term consumption of such foods. However, the problem of counterfeit food goes much further and affects our environment. One of the most obvious examples is the crisis in bee-keeping. Due to unfair competition from fake honey, bee-keeping is being abandoned around the world, leading to a decline in the number of bees. Without bees, one of nature's most important pollinators, agriculture suffers, affecting rural employment and income for many farmers, biodiversity, and our entire ecosystem. The consequences of reducing the diversity and variety of our diet could soon be seen in human health and well-being. Bees also play an important role in mitigating climate change, the effects of which are becoming more severe every year. The Republic of Slovenia has been actively promoting the importance of bees for more than a decade and we proposed to the United Nations that 20 May be declared World Bee Day. The proposal was unanimously supported on 20 December 2017.

The right to health and a healthy environment is therefore inextricably linked to our ability to protect the food chain from counterfeiting. At the Human Rights Ombudsman of the Republic of Slovenia, we believe that, in addition to appropriate monitoring mechanisms, support for local farmers and beekeepers, as well as raising consumer awareness about the importance of choosing quality food, are essential. Only through joint efforts can we ensure that future generations will be able to enjoy these rights.

The Human Rights Ombudsman of the Republic of Slovenia supports the efforts of the Beekeepers' Association of Slovenia to protect agriculture and bee-keeping from unfair competition, without which it is impossible to maintain a healthy food chain. We are convinced that together, through cooperation and wider involvement of decision-makers and other stakeholders, as well as through an appropriate regulatory framework, we can ensure that only authentic, natural bee and other products will be available on the market, thus ensuring the continued healthy development for future generations.

For this reason, the Human Rights Ombudsman of the Republic of Slovenia has held meetings with the President of the Beekeepers' Association of Slovenia and the European Beekeeping Federation, Mr. Boštjan Noč. During these meetings, the Human Rights Ombudsman of the Republic of Slovenia expressed his support for the entire community. We believe that it is very important to raise awareness and take active measures at the international level regarding the role of bees, as well as the broader protection of health and a healthy environment, and to address the increasingly widespread problem of counterfeit food. Genuine bee products, for example, should remain an exceptional gift of nature, valued for their health benefits and long-standing role in traditional medicine. It is worrying that almost half of the honey on the market is of illicit origin, threatening both consumers and the survival of beekeepers across Europe. This situation is unsustainable, so it is commendable to highlight the issue and call for action.

As a result, the Human Rights Ombudsman of the Republic of Slovenia addresses a call to the European Network of National Human Rights Institutions (ENNHRI) and its members, stressing the need to establish a system of awareness and warning about the importance of all the above issues, in particular the protection of bees and the bee-keeping. If the bee-keeping continues to suffer from the influx of counterfeit products, as stated, the consequences for food production and the environment will be significant and harmful. It is therefore essential for that States take measures to prevent this from happening. For this reason, it would be necessary to address the problem by highlighting the need to create appropriate legal frameworks and promote the adoption of legislation with effective monitoring and sanctioning mechanisms to prevent the entry of illicit honey and other counterfeit food products into our daily lives. In addition to raising awareness of the public right to a healthy environment and health, ombuds and national human rights institutions could advocate for a more ambitious and effective targets in this regard. This is of paramount importance, not only for the protection of consumers, but also for the preservation of the integrity of the European food system and the invaluable services provided by bees.

In light of the above, we propose to inform the members of the European Network of National Human Rights Institutions (ENNHRI) of these urgent concerns. We propose to discuss this issue at one of our forthcoming ENNHRI meetings to explore together how our network can contribute to promoting and addressing this important issue. ENNHRI's broad reach and influence provides a unique platform to raise awareness, promote dialogue, and advocate for stronger policies and regulations to safeguard the right to health, a healthy environment, and the integrity of our food systems. By working together, we can amplify the call for action and ensure meaningful progress in protecting these fundamental human rights.

Thank you for your attention to this critical issue. We look forward to further cooperation and joint efforts to address these pressing challenges.

Yours sincerely,

Peter Svetina
Human Rights Ombudsman of the Republic of Slovenia

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HONEY IS ONE UNIQUE PRODUCT – THE PRODUCT MADE BY BEES

THERE IS NO ALTERNATIVE HONEY, IMITATION HONEY, ARTIFICIAL HONEY, SUBSTITUTE HONEY, OR VEGAN HONEY

This article serves as a response to a publication titled "The 'alternative honey' that replaces sugar – lowers blood pressure and regulates blood sugar." The original article was published on a well-known Greek website focused on consumer health and referred to research conducted at Laval University in Quebec, Canada, regarding maple syrup. Canada produces 70-80% of the world's maple syrup, 90% of which is produced in Quebec.

Throughout the article, maple syrup is referred to as "alternative honey" and "vegan honey," yet there is no reference to the specific study by researchers from Quebec nor any comparison with honey that justifies these labels.

The research from Quebec scientists, published in 2024 (Journal of Nutrition 2024, 154, 10: 2963-2975), follows a related study on maple syrup from 2014 (https://doi.org/10.1016/j.jff.2014.10.001).

An internet search reveals no additional clinical studies, research, or findings that confirm the health benefits of maple syrup for the human body.

In contrast, there are 470 publications on honey's role in healing chronic wounds and burns, 29 clinical studies highlighting honey as an anti-diabetic product, 11 publications on its effects on weight management, 26 studies showcasing honey's superiority over other sweeteners, 7 clinical studies proving honey's cardiovascular benefits, 8 studies on honey's unique ability to produce higher amounts of liver glycogen to fuel the brain without metabolic stress, 4 studies on honey's use in alleviating menopause symptoms, 4 publications on its positive effects on gut health, 7 studies on its improvement of mental health, 3 studies on reducing blood pressure, and many other studies addressing various health-related topics.

Unlike honey, maple syrup is a processed product. It is obtained by severely injuring trees to extract sap, which is then heated to 104°C for extended periods until it reaches the desired density (66 Brix). Notably, 40 liters of maple sap yield only one liter of syrup. This prolonged high-heat treatment strips the final product of nutrients such as enzymes, vitamins, natural volatile compounds, and other elements, classifying it as a processed sugar.

The sugars in maple syrup differ significantly from those in honey. Maple syrup primarily consists of sucrose (60-68%), a simple sugar. Its glucose and fructose content is minimal, almost negligible (0.5-3%). In contrast, honey contains approximately 38% fructose, 31% glucose, and only up to 3% sucrose.

These significant differences play a vital role in health. Honey’s balanced fructose-to-glucose ratio helps maintain glucose homeostasis in the blood. Honey's fructose slows intestinal absorption, prolongs stomach emptying, reduces food intake speed, and results in slower absorption. It also activates the enzymes glycogen synthase and glycogen phosphorylase, aiding in glucose uptake, synthesis, and storage as glycogen in the liver. This unique action of honey’s fructose is not observed in processed sugars, high-fructose syrups (HFCS, HFIS), or maple syrup.

Additionally, honey contains a total of 11 oligosaccharides, comprising 5-10% of its composition. These oligosaccharides are not digested in the upper gastrointestinal tract but pass largely undigested to the large intestine, where they serve as prebiotics. The fermentation of oligosaccharides by gut microbes produces short-chain fatty acids (SCFAs) such as acetate, propionate, and butyrate, which promote gut health and provide systemic benefits. The oligosaccharides in honey also contribute to its anti-diabetic and other beneficial properties. In contrast, maple syrup contains only trace amounts of oligosaccharides, which offer no significant health benefits.

Honey is a natural, unprocessed product derived directly from flowers, processed by bees themselves, and offered to consumers without any human intervention. Its benefits have been substantiated by dozens or even hundreds of clinical studies published in international medical journals, and its therapeutic properties remain undisputed.

There is no substitute for honey, no alternative honey, no artificial honey, no imitation honey, or vegan honey. There are sugar syrups, palm syrups, maple syrups, rice syrups, inulin syrups, high-fructose syrups (HFCS and HFIS), invert syrups, carob syrups, and others that flood the market and are promoted by "smart" marketing, even on platforms advocating healthy eating. Of course, anyone can include them in their daily diet but should be aware of the adverse health effects for themselves and their family, without the illusion that they are consuming honey. Bee honey is a unique product that no other product can replicate.

Andreas Thrasyvoulou

Emeritus Professor
Aristotle University of Thessaloniki (AUTH)
Hellenic Republic (Greece)

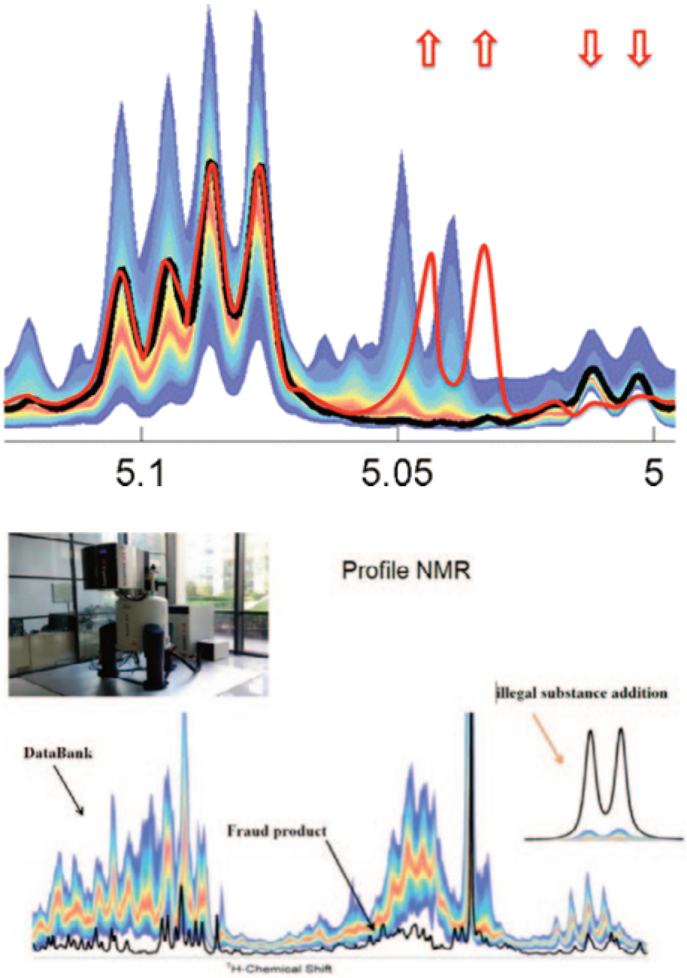
CHALLENGES IN ANALYTICAL METHODS FOR HONEY AUTHENTICITY

Ensuring the authenticity of honey has become a critical challenge in today's global market. Analytical techniques such as Nuclear Magnetic Resonance (NMR) Profiling, Liquid Chromatography-High Resolution Mass Spectrometry (LC-HRMS), are commonly employed to verify the purity and origin of honey samples. However, despite their advancements, these methods face significant limitations when it comes to distinguishing authentic honey from adulterated samples. Here we explore the inherent challenges of these analytical methods and how modern technological innovations can effectively bypass these methods.

Reliance on Chemical Markers

One of the primary issues with methods such as NMR Profiling and LC-HRMS is their dependence on chemical markers and reference databases. These markers are compounds present in sugar syrups, but not in natural honey that are expected to differentiate it from natural honey. As a result, these methods struggle to distinguish between authentic honey and adulterated samples blended with such syrups.

For example, NMR Profiling relies on identifying specific spectras unique and specific to honey type. However, sophisticated adulterants can produce adulterated honey which are made by blending honey with ultrapure sugar syrups and in that way replicate spectra which is by little diluted but which has all right peaks in all right places and that mirror the profile of honey (Picture 1).



Picture 1: NMR Profiling - when adulterated product is compared to the database it can be detected as such, but if tailored-made washed sugar syrup is blended with natural honey in some ratio, NMR honey spectra peaks will be diluted but they can stay in the reference ranges and thus overcome the test

Similarly, LC-HRMS, which analyzes complex mixtures to detect minute chemical differences, can fail when the adulterant's composition closely matches the chemical markers of genuine honey.

Non-Targeting Methods and Database Dependency

Another significant limitation of current analytical techniques is their reliance on non-targeting approaches and proprietary databases. Non-targeting methods, while comprehensive, lack the specificity required to pinpoint unique markers of adulteration. Instead, they analyze a broad spectrum of compounds and compare results against databases of known authentic honey profiles.

These databases are often closed and privately maintained, posing several problems:

- **Restricted Access**: Laboratories without access to these databases face difficulties in interpreting results accurately.
- **Limited Representation**: Databases may not account for the full diversity of honey types globally, leading to potential misclassification of authentic samples.
- **Dependence on Comparison**: The efficacy of these methods hinges on the availability of reference data. When an adulterant's profile is absent from the database, it may go undetected.

Emerging Threats and Overcoming Limitations

Adulterators are increasingly employing advanced technologies like use of immobilized enzymes in sugar syrup production to obtain protein free matrixes, cross-flow nano-filtration and chromatographic techniques to produce highly tailored sugar syrups without any tails which would contain only glucose and fructose. These processes remove chemical markers typically targeted by analytical methods, creating syrups that can evade detection. Those syrups are then sold as a base for honey adulteration either through direct (blending) or indirect (feeeding) honey adulteration.

Immobilized enzyme in sugar syrup production to get protein free syrups:

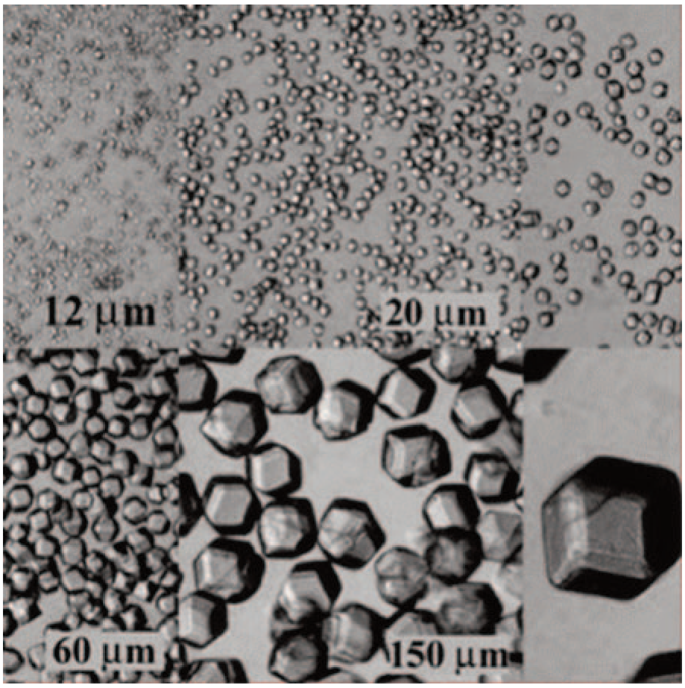
The use of enzymes in their immobilized form is almost a daily practice today. Enzymes that are mostly used in starch production are amylases and isomerases.

In order to reduce energy costs and increase production capacity, biochemical engineering increasingly uses immobilized enzymes that are packed into flow columns (reactors) and bioconversion, that is, catalysis is carried out in a continuous flow.

One of the most widely used sugar syrups for feeding, but also for falsifying honey, is high-fructose sugar syrup (HFS). In the first place, it is obtained from glucose syrups, which can originate both from corn and sorghum (C4 plants), as well as from representatives of C3 types of plants such as wheat, potatoes, rice, barley, or from all starchy raw materials. Another way of obtaining glucose-fructose syrups is from sucrose originating from sugar beet (C3 based plant) or sugar cane (C4 based plant). The enzyme used for inversion (alpha-fructofuranosidase) is an industrial enzyme that is also heat resistant.

By enzymatic isomerization of glucose syrups using glucose isomerase (xylose isomerase), glucose is converted into fructose, so that the final product of glucose isomerization is a solution of glucose and fructose in a different ratio, i.e. glucose/fructose, which, depending on the applied conditions in the process, can be in the range of G/F = 58/42 to G/F=45/55.

Thanks to Finnish scientists glucose isomerase (xylose isomerase), is very studied, considering that Finland is a big producer of high-fructose syrups. In the previous 25 years, the technology of immobilizing glucose isomerase and other industrial enzymes was developed using the cross-linking method using cross-linking agents such as gutaraldehyde ($C_5H_8O_2$), which connects protein structures by making bridges between protein chains, while at the same time there **is no significant decrease in the biocatalytic activity of the enzyme itself**. The result of this process is a cross-linked enzyme that is usually immobilized in a crystal lattice that increases the capacity of industrial flow reactors. **Such cross-linked immobilized enzymes can be active for several months at high temperatures and carry out continuous isomerization of glucose into fructose and obtaining high-fructose syrups (HFS - High Fructose Syrup.**



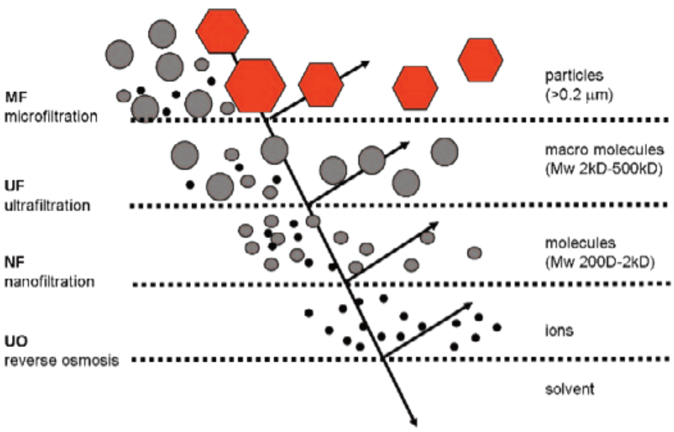
Picture 2: The picture shows a thermostable crystal of xylose isomerase (glucose isomerase), which is active at temperatures above 60 ° C and is used in industry to obtain HFS

With further steps in the process procedure, there is a possibility of chromatographic separation of glucose and fructose and their subsequent mixing in other ratios. With an increase in the proportion of fructose, the possibility of crystallization of such a sugar syrup decreases, and conversely, with an increase in the proportion of glucose, the possibility that such a solution will crystallize quickly increases. **By using cross-linked immobilized enzymes in sugar syrup production in this way protein free invert sugar syrup can be obtained.**

Cross-Flow Nano-Filtration: Cross-flow Nano filtration is a membrane-based separation technology that operates by using semi-permeable membranes to selectively filter substances based on their size, molecular weight, and charge. In the context of honey adulteration, this technique enables the production of sugar syrups that closely mimic the chemical composition of honey by removing detectable markers. The process involves passing liquid sugar solutions tangentially across the surface of the

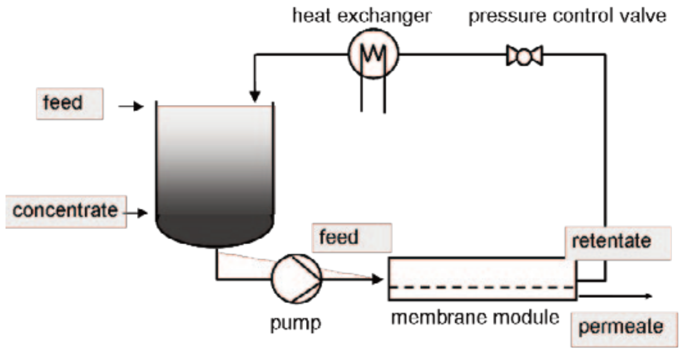
membrane under controlled pressure. This tangential flow, combined with precise filtration properties of the membrane, ensures the retention of desired components while unwanted compounds are removed.

The most commonly used membrane processes are microfiltration (MF), ultrafiltration (UF), nanofiltration (NF) and reverse osmosis (UO). These are all pressure-driven processes. It ranges from typically 1 bar for microfiltration to 40 bar and more for reverse osmosis. As it is shown on picture 3 this removing can go to the level of ions (picture 3).

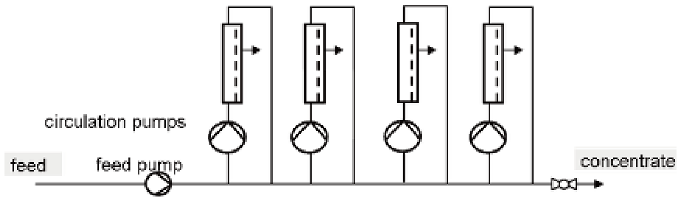


Picture 3: Separation ranges of reverse osmosis, nanofiltration, ultrafiltration and microfiltration. By means of cross-flow filtration it is possible to remove all tails of chemical and DNA markers from the matrix

These filtration systems can be in batch or continuous as shown at the following pictures 4 and 5:



Picture 4: Batch plant



Picture 5: Continuous plant

Key principles of cross-flow nano-filtration include:

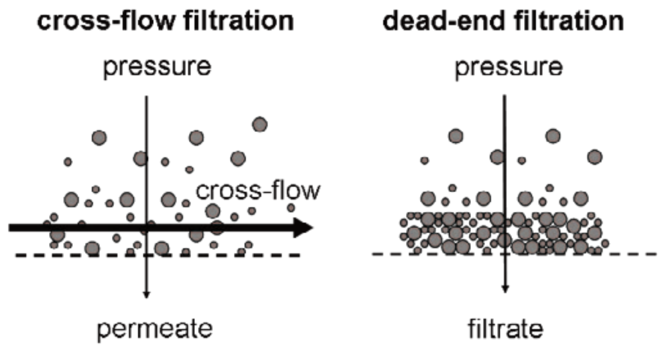
1. **Selective Permeability**: Membranes are designed to allow small molecules like water and salts to pass through while retaining larger molecules or targeted compounds such as chemical markers.

2. **Concentration Polarization**: As the liquid flows across the membrane, components are concentrated near the surface, optimizing the filtration process.

3. **Dynamic Operation**: Unlike dead-end filtration, cross-flow systems minimize clogging by continuously sweeping away rejected particles.

This process is highly adaptable, allowing for the customization of filtration parameters such as membrane material, pore size, operating pressure, and flow rate.

By leveraging this adaptability, adulterators can fine-tune the syrup's composition, ensuring that it remains indistinguishable from natural



Picture 6

honey when analyzed using conventional techniques.

Additionally, nano-filtration operates under relatively mild conditions, preserving the physical and chemical integrity of the syrups being processed.

Chromatographic Techniques

Industrial chromatographic techniques, such as preparative liquid chromatography, enable the isolation of specific compounds.

Adulterators use these techniques to strip away unwanted impurities. when blended with authentic honey, these syrups pose a significant challenge for conventional analytical methods.

DNA Analysis

Although a new analytical approach is currently being presented for determining the authenticity of honey and detecting the presence of cheaper industrial sugar syrups in honey using DNA analysis of honey samples, I must admit that this approach is also short-lived. Although I greatly respect the work of colleagues in the fight against honey counterfeiting, I have to say that technology will overtake this method in the next 2-3 years.

However, in my humble opinion, I think that DNA analysis has another, much more important impact on the examination of the authenticity of honey, and that is the detection of botanical species from which plant nectar has reached and the identification of plants in polyfloral honeys.

The detection of the botanical origin of sugar with this method is currently only possible because fraudsters have not taken this approach into account, but adding another step in the production of purified and washed sugar syrups that will additionally extract DNA material from those syrups by means of nanotechnologies previously explained will make it impossible to use this method for detecting counterfeits honey.

By mixing such DNA-free sugar syrups with natural honey, the DNA that is isolated from the samples will originate only from the honey part, and thus the detection of the presence of sugar syrup will be absent.

Innovations to Counteract Adulteration

Modern technologies offer promising solutions to address these challenges:

1. Advanced Isotopic Techniques: Techniques such as Elemental Isotope Ratio Mass Spectrometry (EIRMS) can detect subtle differences in isotopic ratios that are challenging to replicate artificially. By focusing on isotopic signatures rather than chemical markers, these methods bypass the limitations of traditional approaches.

2. Marker-Free Detection: Emerging methods aim to detect adulteration without relying on specific markers. For example, spectroscopic methods combined with multi-elemental analysis can identify presence of illegal additions, even when markers are absent.

3. Open-Source Databases: Establishing collaborative, publicly accessible databases would enhance the accuracy and inclusivity of analytical methods. By pooling data from diverse regions and honey types, these databases can better represent the global diversity of honey.

4. Process Analysis: Rather than solely analyzing end products, focusing on the production process of honey and syrups can provide critical insights. Techniques that track production parameters, such as environmental isotopes or microbiological markers, offer an additional layer of verification.

5. Certification processes: certification processes and increasing transparency, as well as determining traceability in the process of obtaining honey is another way to ensure the quality of the final products and to determine the origin of the product and its authenticity through a step-by-step procedures. These procedures also ensure that the end consumer is convinced of the quality of the product, and that he would come back and buy again, but also recommend the product to other people.

Conclusion

While current analytical methods provide valuable tools for detecting honey adulteration, their reliance on chemical markers and database comparisons renders them vulnerable to increasingly sophisticated adulteration techniques. Innovations in isotopic analysis and process tracking offer pathways to overcome these limitations. By integrating these advancements with existing methods, the industry can enhance its ability to ensure honey authenticity and protect consumers from fraudulent products. Collaboration and transparency, particularly in the development of accessible databases, will be essential to staying ahead of emerging adulteration threats.

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RESPONSIBILITY

FOR INTERNAL CONTROL LIES WITH THE BEEKEEPER

Beekeepers are responsible for conducting internal control to ensure the safety and quality of their bee products marketed to the public.

They must adhere to good beekeeping practices and the Guidelines for Good Hygiene Practices in Beekeeping, while the quality of the products must be confirmed with analytical reports.

In Slovenia, beekeepers have access to numerous free analyses of honey and other bee products, provided through the Public Advisory Service in Beekeeping. Annually, approximately 200 honey samples are analyzed for physicochemical parameters, including water content, electrical conductivity, hydroxymethylfurfural (HMF) content, glucose, fructose, and sucrose content.

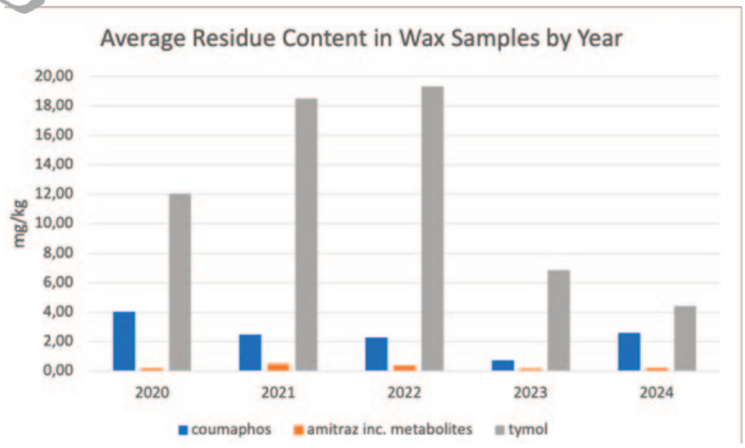
The beekeepers are most commonly interested in the type of honey, which is determined based on electrical conductivity and sensory analysis, carried out by a panel of at least three trained honey assessors.

Bee Products Analysis Program

This program is part of the Regulation on the Implementation of Interventions in the Beekeeping Products Sector under the Strategic Plan of the Common Agricultural Policy and is financed by the national budget and the European Union. Each year, the program enables 175 beekeepers to receive free analyses for honey samples, including: 100 samples for safety parameter analyses (residue levels of amitraz inc. metabolites, coumaphos, and antibiotics), 75 samples for quality parameter analyses (water content, electrical conductivity, HMF content, pollen analysis, and sensory analysis). When samples are submitted, the accuracy of labeling is also verified. Additionally, the program offers analyses of 30 wax samples, 10 propolis samples and 10 pollen samples for residues of amitraz inc. metabolites, coumaphos, and thymol. These analyses are performed by partner accredited laboratories and are also free for beekeepers. For all analyses performed, the beekeeper receives an analytical report along with advice based on the findings.

Final reports on analyses are published annually on the website of the Slovenian Beekeepers' Association. All published analyses are anonymous, as samples are labeled with codes.

Example of results presentation in final reports:



Graph 1:
Average Residue Content in Wax Samples by Year

Honey Contests

In Slovenia there are around 5 honey evaluations organized annually, providing beekeepers with feedback on the quality of their honey samples. In 2024, we hosted the first European Honey Contest, receiving 114 samples from 11 different countries. All samples were analysed for water content, electrical conductivity, and HMF content, along with a sensory analysis. Each participant received an analytical report with the results. The top three samples in each of the five categories (a total of 15 samples) were further sent to an accredited German laboratory for authenticity verification and analysis of amitraz and coumaphos residues before the awards ceremony. Beekeepers participate in these evaluations by paying a registration fee determined by the event organizer.

Statistical parameter	Water content (%)					Electrical conductivity (mS/cm)					HMF (mg/kg)				
	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024
MIN	13,4	13,5	13,3	13,4	13,7	0,22	0,21	0,13	0,17	0,15	< 0,3	< 0,3	< 0,3	<0,3	<0,3
MAX	19,7	18,7	22,1	18,8	21,5	2,24	1,55	1,96	1,67	1,83	6,23	18,2	6,73	26,53	29,63
AVERAGE	**15,6**	**15,2**	**15,6**	**15,5**	**15,7**	**0,94**	**0,97**	**0,72**	**0,83**	**0,78**	**1,77**	**5,82**	**1,47**	**2,48**	**2,82**

Table 1:
Statistical Parameters of Water Content, Electrical Conductivity, and HMF Content by Year

Self-monitoring in beekeeping

When a beekeeper receives the analytical report, they gain confirmation of their good prac-

tices or insight into shortcomings and mistakes, which they can then address to improve in the future. This allows beekeepers to implement self-monitoring in their operations with the support of the Public Advisory Service and without significant financial investment.

Sources:

- *Debelak A. 2024. Report on the Implementation of the Sub-Intervention Program "Analysis of Bee Products for 2024," Part 3: Analyses of Residues of Chemical Agents for Varroa Control in Bee Products (wax, pollen, propolis).*
- *Debelak A. 2024. Report on the Implementation of the Sub-Intervention Program "Analysis of Bee Products for 2024," Part 1: Analysis of Honey for Quality Parameters According to the Honey Regulation. Slovenian Beekeeper's Association.*

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HARD AND SOFT VARROA TREATMENTS?

In a very influential paper, Dr. Peter Rosenkranz and colleagues talked about “hard and soft varroa treatments”. This was often misunderstood as related to the efficacy of the respective substances and created the completely opposite effect of what was intended. This may be an example of how the attempt to make things easier to understand sometimes goes completely wrong. Maybe also an example of how important it is to really listen or read and not to interpret too fast.

For many, “hard varroa treatments” (the synthetic ones) meant that it was hard on the mites, so killed a lot of them. “Soft”, i.e. treatments based on organic substances, on the other hand for many sounded as if this was a feeble attempt to get rid of the mites. But nothing that could really help. Maybe as a measure in between. This opinion was especially common in some countries and much less in others. Here in Germany, for instance, with a great percentage of hobby beekeepers, this doubt didn’t come up. Another factor may have been the many bee institutes. They have a strong connection to the associations and there were a lot of training sessions after developing the organic treatments. Most

German beekeepers use formic acid in summer and oxalic acid in winter.

It's different in countries with more professional beekeepers. Here, mainly because of time constraints, the quick and easy strip solutions are more popular. But this isn't the only reason. For instance, I know professional beekeepers in Italy who successfully treat with oxalic acid in summer – queen caging included. Even with the large number of colonies you need to live from beekeeping alone. So, it's also a matter of organization. And training. If you need some basics on how to decide on varroacides, I wrote about a strategy some time ago. Check it out. The myth about "hard and soft" came up in South America, as far as I know. This situation also shows how important it is to collaborate. More on that later.

What "hard and soft varroa treatments" really means

But back to "hard and soft varroa treatments". The thought behind this wording was completely different. It was actually about hard or soft impact on the bees. Let that sink in.

You may have heard it already: Every medicine (veterinary or not for that matter) not only has an effect, but also side effects. During the registration process, the most important question is whether the benefits are larger than the risks.

This is the case for the registered varroa treatments. There are side effects, but if you treat correctly, i.e. according to the label, you will kill the mites without noticeable effects for the bees. Some side effects, may be deemed much less dangerous than the risk of the parasite. So, even if you see agitated colonies after a treatment, this

isn't as bad as losing the colony to varroa. Especially as the agitation is transitory.

But we can go a step further: Thinking also about long-term effects like residues or resistance against the substance in question. And here's where "hard and soft" comes in. "Hard" varroacides, i.e. those with synthetic active substances, have a higher risk of residues and resistance than "soft" ones. This is what Rosenkranz and colleagues wanted to express with their classification.

Availability of varroacides

I hope it became clear that you can treat safely with "soft varroa treatments". They do kill the mites, sometimes even better than the "hard" ones. Read the paper yourself to get the details. I also wrote a bit more on what to know about varroacides, if you need a refresher on that.

Independent of how you call them, for having varroa mites under control, it's important to have them available to you. Especially, to avoid illegal use and make sure veterinary medicine is used

correctly. For that, the paper I discussed last week is really helpful: In a big table, the authors summarized the information of the different varroacides we have and how available they are (legally) in different parts of the world.

I made some maps out of this and corrected some misunderstandings and mistakes I noticed. However, the important thing: We don't have much information on many countries. Which is bad. That doesn't mean that there are no problems with varroa (at least not always), but that there's no real framework for beekeepers to act upon. And that carries all the problems of illegal treatments.

Hard and soft varroa treatments: Availability of synthetic ("hard") varroacides all over the world

Availability of synthetic (i.e. "hard") varroa treatments in different countries all over the world. Blue means that the substance is available in that country. Orange are the countries where the respective substance isn't available. And, finally, grey are those countries we don't have information – or no varroacide may be registered at all. Map according to the data in Jack & Ellis (2021), with some corrections where I new it's a mistakes.

Hard and soft varroa treatments: Availability of "soft" substances

Map of the availability of varroacides with active substances of natural origin (aka "soft"). The colours and the disclaimer are the same as for the synthetic substances. As you can see, thymol is the most common one – despite oxalic acid being the most efficient substance we have currently. Australia, rethink that! (If this info is correct…). I didn't include hop beta acids, which are registered only in North America.

The EU had doubts about the safety for the treated animal, i.e. honey bee colonies with these substances.

In many countries there are only very limited options. Maybe only one or two substances that are registered. This increases the risk of illegal treatments, resistance, etc. Beekeepers aren't isolated, most of them know how to use social media. They will take up every "tip" they could get their hands on and what seems doable. So, a legal framework is extremely important. And edu-

cation. As always. To limit the rumours and pass along good information.

The three levels of responsibility

Keeping their honey bee colonies healthy, is first of all the responsibility of the beekeeper. However, if you leave them alone, they can't take this responsibility. They can't know things, if nobody ever tells them. This applies also to varroa treatments and varroa itself. To deal with an issue, you need to have the right tools. And you have to learn about them. Remember the situation in Germany and the good collaboration between beekeeping associations and bee institutes?

Here's where the "three levels of responsibility" come in, how I like to call it:

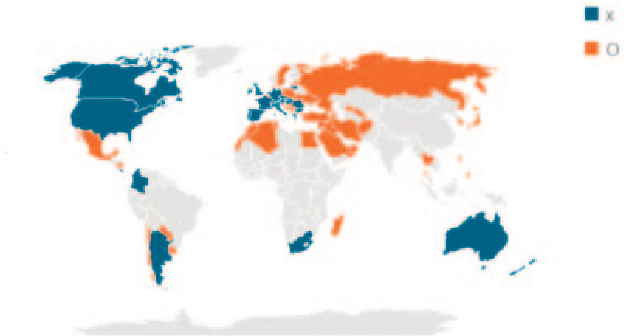
The individual level. This is the beekeeper who has to respect good practices, use legal treatments, stay informed. This level is the most visible, the one which will always get blamed if something goes wrong. On the other hand, the next two levels carry great parts of the responsibility as well.

The community level. This includes everything from small groups of beekeepers who discuss their common problems to large training programs by associations. Or courses at the bee institutes. We're social animals, so the first step usually is to ask somebody else for advice. The one who's asked – be it a neighbour, an association, or a scientist – has the responsibility to give the best advice possible.

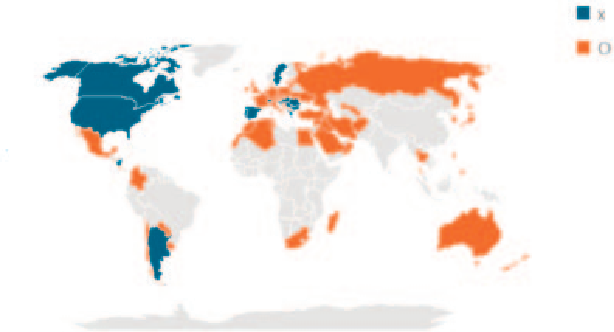
Availability of varroacides:

Map according to the data in Jack & Ellis (2021), with some corrections where I knew it's a mistake

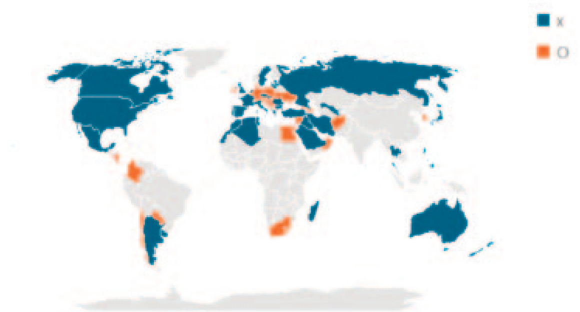
Amitraz



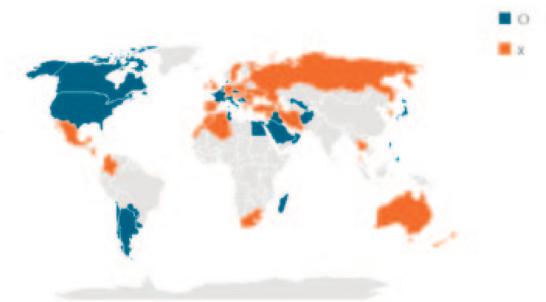
Coumaphos



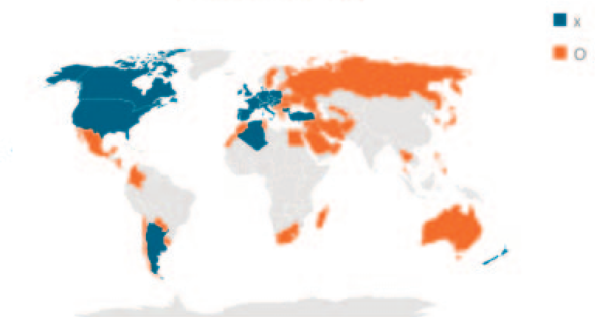
Fluvalinate



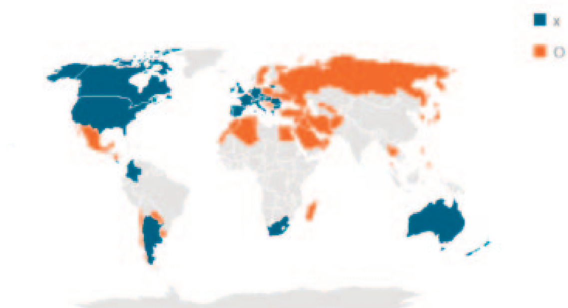
Flumethrin*



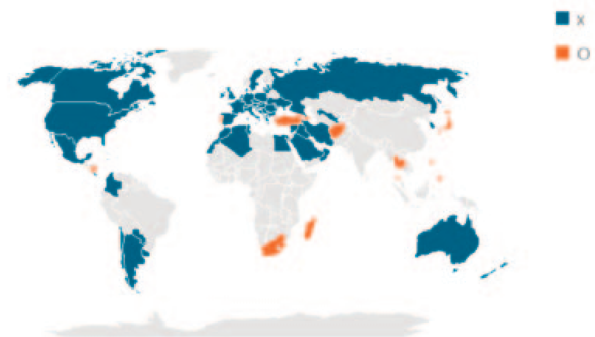
Oxalic acid



Formic acid



Thymol



The political level. Yes, politics. This is the level who has to give the framework the other levels have to follow. So, by making good varroa treatments accessible, for instance. With a serious registration process. By allocating money for training and consulting, as well as applied science.

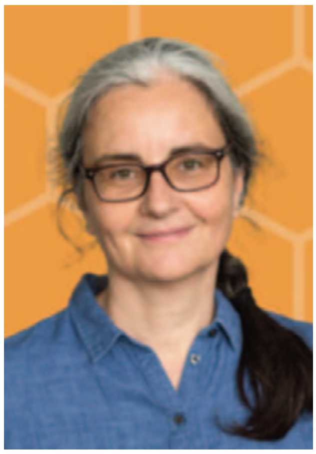
All of these levels interact with each other. However, in my opinion, the community level is the most powerful. I've seen active associations do a lot for good practices. Both in countries with a mostly hobbyists or with a lot of professional beekeepers. Or many or little bee institutes. While inactive associations only fed a sense of helplessness and mistrust. The community level can also build up the necessary pressure for politics to take up their responsibilities. Being in between is an uncomfortable position, but also a very crucial one.

Everyone doing their part

However, the individual beekeeper has to open up for the collaboration at the community level. Talk openly about his problems, so that others can help him. Give him the tools he needs. Not stay at the level "scientists and vets don't know about my practice". Tell them. That helps. Same is true for scientists or vets, obviously. They have to open up and listen to beekeepers. Also, policy makers need to think further than only in the administration period they're in. Really try to take their responsibility and give this framework they have to care for. And keep it current…

So, to be honest, I don't care about wording like "hard and soft varroa treatment", "natural or synthetic", or what other buzz word is currently "hip". Words can be just empty vessels if the meaning, the responsibility, behind them is missing. What I care about is everyone doing their part. To get ahead.

How does that proverb go? If you want to go quick, go alone. But if you want to go far, go with others. I surely butchered it. But you may get what I intend to say. This is good advice in general. But my area of expertise is bee health, so I talk about that. And it applies perfectly.



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This article was published as a blog post on www.bee-safe.eu

VARROA DESTRUCTOR AND VIRUSES ASSOCIATION IN HONEY BEE COLONIES UNDER DIFFERENT CLIMATIC CONDITIONS

Summary

Honey bee colonies are threatened by multiple factors including complex interactions between environmental and diseases such as parasitic mites and viruses. We compared the presence of honeybeepathogenic viruses and Varroa infestation rate in four apiaries: commercial colonies that received treatment against Varroa and non-treated colonies that did not received any treatment for the last 4 years located in temperate and subtropical climate. In addition, we evaluated the effect of climate and Varroa treatment on deformed wing virus (DWV) amounts. In both climates, DWV was the most prevalent virus, being the only present virus in subtropical colonies. Moreover, colonies from subtropical climate also showed reduced DWV amounts and lower Varroa infestation rates than colonies from temperate climate. Nevertheless, non-treated colonies in both climate conditions are able to survive several years. Environment appears as a key factor interacting with local bee populations and influencing colony survival beyond Varroa and virus presence.

Introduction

Apis mellifera plays an important role in global economy as honey producer and as the main pollinator of food crops (Decourtye et al., 2010). Honey bee colonies are threatened by a wide variety of diseases and parasites, including bee pathogenic viruses (Brutscher et al., 2015). Growing attention is being paid to viruses infection since the increased number of colony losses seems to be explained by a combination of variables including co-infections with Varroa destructor (Genersch and Aubert, 2010; Francis et al., 2013). Viruses differ in their geographical distribution (De Miranda et al., 2010; Genersch and Aubert, 2010). Primarily, deformed wing virus (DWV) is globally distributed (De Miranda and Genersch, 2010) and its presence was linked to colonies losses (Francis et al., 2013). Acute bee paralysis virus (ABPV) was linked to colony loses in Europe while the Israeli acute paralysis virus (IAPV), and Kashmir Bee Virus (KBV) were proposed as the causes of colony losses in United States (Genersch and Aubert, 2010). Together with these viruses, chronic bee paralysis virus

(CBPV), black queen cell virus (BQCV) and sacbrood virus (SBV) were also detected in Argentina (Reynaldi et al., 2010; 2011; Castilla et al., 2015). On the contrary, the Kashmir bee virus (KBV) has been detected mostly in North America and New Zealand (De Miranda et al., 2010) but so far no detection has been reported in Argentina or other countries from South America (Antunez et al., 2006; Teixeira et al., 2008; Reynaldi et al., 2010; 2011). Varroa destructor plays an important role in the transmission and virulence of DWV. The mite causes a suppression of the immunocompetence of the host, giving to this virus the opportunity to infect bees (Yang and Cox-Foster, 2005). Besides, chemical treatment not only directly affects the immunity of the honey bees (Boncristiani et al., 2012; Locke et al., 2012) but also has an important influence on parasite–host relationship. Active Varroa control by beekeepers would disrupt any association between Varroa infestation rates and the virus epidemics (Mondet et al., 2014). Abrupt losses may occur triggered by the combination of these diseases with environmental factors such as climate conditions. Colony life histories including Varroa management, related to brood-free periods during periods without flowering, have a significant influence on Varroa infestation rates and consequently can affect associated virus presence or distribution (Meixner et al., 2015). The objective of this study was to evaluate the effect of climate and Varroa mites treatment on the prevalence of the main viruses present in honey bee colonies from Argentina.

Materials and methods

The presence of seven virus species (DWV, ABPV, CBPV, BQCV, KBV, IAPV and SBV) was evaluated in 25 colonies distributed in two different climatic conditions from Argentina: 13 in the subtropical climate and 12 in the temperate climate. In each climate, there were also compared Varroa infestation and viruses prevalence between commercial colonies (six per climate) that received annual treatment against Varroa mites ('Treated colonies' from now on) and 'non-treated' colonies (six in temperate and seven in subtropical) that did not received any treatment against Varroa mites. These non-treated colonies were set up in 2011 from brood nuclei and selected queens from a network of evaluation of honeybee stocks for Varroa tolerance (Merke et al., 2014a). This network is funded by the Beekeeping Program from the National Institute for Agricultural Technology (PROAPI-INTA) and it was originated from the genetic improvement program for honey bee brood diseases (Palacio et al., 2000; 2003; 2012). Since 2007, this program had been also selecting colonies with Varroa tolerant traits following the same breeding protocol. Queen selection and stock reproduction was based on the capacity of the colonies to reduce Varroa population growth, either by defensive behaviour or mite reproduction interruption under different climate conditions (Merke et al., 2014b). All samples were taken from asymptomatic colonies just before beekeepers applied the Varroa treatments to the treated colonies group at the beginning of autumn 2015 (late March). The subtropical climate colonies were located in a region with annual mean temperature of 19.98C (max: 25.98C and min: 14.58C) and

mean annual precipitations of 1408 mm (2981400000S 5985600000W). The most relevant production is intensive livestock (dairy farms and wintering animals on alfalfa-based pastures) combined with sunflower, sugar cane and cotton crops and natural forest. Temperate climate colonies were located in a region with annual mean temperature of 188C (max: 258C and min: 12.18C), with average annual precipitations under 800 mm (3181600000S 6182900000W). The most relevant production is also intensive livestock but it is combined with agriculture production based on extensive soya, wheat, and corn crops (Giorgi et al., 2008).

Sampling and virus analysis

About 40 worker bees were collected alive from the central frames of the brood chamber in each colony. Samples were immediately freezer frozen (within 2 h) and sent to the laboratory where they were macerated in mortar and homogenized with 7 ml of pH 7 phosphate buffer (PBS). The mixture was centrifuged at 4500 rpm at 88C for 45 min and the supernatant was collected and stored at 2208C. Pools of 30 bees were homogenized in 15 ml PBS and total RNA was extracted using TRIzolVR Reagent (Invitrogen) following the manufacturer recommendation. RNA samples were dissolved in 10–50 ml ultra-pure water (Distilled Water DNAse, RNAse Free; Invitrogen). Real Time PCR (RT-qPCR) was carried out to determine the presence of DWV, BQCV, ABPV, CBPV, IAPV and KBV. Copy DNA was synthesized by reverse transcription reaction from the extracted RNA. The reaction mixture contained 1 ll of RNA, 1 ll of reaction buffer 5x (Promega), 0.5 ll dNTP 10 mM (Promega), 0.125 ll of ARNsin 40U/ll (Promega), 0.25 ll of random primers 2 lg/ll, 0.175 ll of reverse transcriptase 200 U/ll (Promega) and completed with volume of 1.95 ll of ultra-pure water (Distilled Water DNAse, RNAse Free; Invitrogen) to obtain

a total volume of 5 ll of mixture. The reaction was developed in a Biometra Trio-Thermoblock. The thermal cycling profiles were: 428C for 45 min, 948C for 10 min and 48C for 4 min. For the RT-PCR amplification, the reaction mixture contained 0.4 ml 1.5 uM of each pair of primers selected and described by Locke et al. (2012), 2.5 ml Master mix SYBER green PCR kit QuantiTect (cat 204143), 1.45 ml ultra-pure water (Distilled Water DNAse, RNAse Free; Invitrogen) and 0,5 ml of cDNA. Samples were amplified using the LightCycler 2.0 Roche Thermocycler with the following thermal cycling profiles: 958C for 10 min, 45 cycles at 958 for 15 s and 568C for 1 min. The fluorescence emission of the samples was performed at 530 nm. Samples having a geometric increase in fluorescence emission in the two previous successive cycles of cycling number 45 were considered positive. It was considered the first of these emission lifting cycles as first cycle of positivity. Negative (H2O) and positive control (recombinant plasmid DNA with virus insert into pGEM-T Easy vector) were included in each run of the RT-PCR reaction. Quantification of DWV was performed by RT-qPCR with the reference gene DWVgp1 according to Chen et al. (2005). The estimation of the viral loads of positive samples was performed using standard curves prepared with threshold cycle (Ct) data obtained for known concentrations of cDNA fragments copies of the virus studied.

Sampling and Varroa analysis

Adult bees were examined to diagnose the presence of Varroa mites in all tested colonies. Approximately 250 bees per colony were collected from both sides of three unsealed brood combs in a jar containing 50% ethanol. The mites were separated from the bees by pouring the jar content into a sieve with a 2 mm mesh size (Dietemann et al., 2013). The intensity of mite infestation on adult bees was calculated dividing the number of mites counted by the number of bees in the sample to determine the proportion of infested individuals and multiplying by 100 to obtain the infestation rate per colony (Dietemann et al., 2013). In addition, the number of adult bees and number of cells with pollen and honey reserves of all colonies were estimated according to the Liebefeld method (Imdorf and Gerig, 2001). Statistical analysis Only DWV amounts were statistically assessed as it was the most prevalent virus and was found in all groups. The mite infestation rate and DWV amounts between subtropical and temperate climate and between treated and non-treated colonies were compared using a T student-test. DWV amounts was analysed with full factorial ANCOVA using climate (subtropical/temperate) and Varroa treatment (yes/no) as fixed factors and mite infestation rate as covariate. Since is not possible to log transform zero values, the response variable was Log10 of (DWV copies 11) in order to include all values (negative and positive samples).

Results and discussion

In both climate DWV was the most prevalent virus being present in 3 of 13 and 12 of 12 colonies in subtropical and temperate climate, re-

spectively (P < 0.0001). Colonies from subtropical climate showed only infections with DWV. On the contrary, in temperate climate 3 of 12 of the colonies had co-infection with BQCV and 3 of 12 with ABPV. Similarly, 1 of 12 colonies had been coinfected with CBPV and 1 of 12 with SBV also in colonies from temperate climate. No colonies tested positive for KBV or IAPV. Both treated and untreated colonies from temperate climate had co-infections. Colonies from temperate climate presented higher infestation rate with Varroa mites (9.32% 6 8.55%) than subtropical colonies (2.49% 6 2.54%) (t 5 2.75; P 5 0.01). Varroa infestation rate was higher in treated than in non-treated colonies from subtropical climate (t 5 22.97; P 5 0.01) while it was similar in both groups from temperate climate (t 5 20.67; P 5 0.52). Mean mite infestation rate in colonies without virus was 2.04% 6 1.99%, while colonies with single DWV infection had 7.39% 6 4.29% and colonies with co-infected DWV had 9.02% 6 10.59% (F 5 2.85; P 5 0.07). No differences were found in mite infestation rate between colonies with and without the other detected viruses. Also, adult bee population and honey reserves were similar in all groups (F: 1.059; P 5 0.39 and F: 0.36; P 5 0.783, respectively). On the other hand, pollen cells in treated and non-treated colonies from temperate climate were significantly lower than pollen cells from the subtropical climate colonies (F: 6.9; P 5 0.002). The presence of BQCV, DWV CBPV, SBV and ABPV has been previously reported in Uruguay (Antunez et al., 2005; 2006); Brazil (Teixeira et al., 2008) and Argentina (Reynaldi et al., 2010). With the exception of DWV, viruses prevalence reported here were similar to preceding reports in Argentina (Castilla et al., 2015) and lower than Viruses prevalence in France (Tentcheva et al., 2004), Denmark (Francis et al., 2013) and Uruguay (Antunez et al., 2006). Previous studies also reported the presence of IAPV in Argentina (Reynaldi et al., 2011; Castilla et al., 2015) although samples from both climates in this study were not infected with this virus or with KBV. High prevalence and more species diversity were found in both groups of colonies from temperate climate suggesting an influence on infection prevalence (Meixner et al., 2014). As temperate colonies showed also higher infestation rate with Varroa mites than subtropical colonies, it seems possible that it favours the occurrence of more than one virus species simultaneously. Mondet et al. (2014) suggested that the presence of Varroa increases the number of viruses that can be detected in a colony. Co-infection of DWV with other species occurred when varroa infestation was over 9%. Varroa mites are associated to ABPV and DWV occurrence (Ball and Allen, 1988; Bowen-Walker et al., 1999; Chen and Siede, 2007) but transmission of BQCV and CBPV by varroa mites appears to be less probable (Tentcheva et al., 2004; Chen and Siede, 2007). Nevertheless, viruses whose active transmission by Varroa is less certain still may benefit from Varroa weakened colonies (Mondet et al., 2014; Amiri et al., 2015).

Colonies from temperate climate showed higher DWV amounts compared with subtropical climate (t 5 6.86; P < 0.0001); (Fig. 1). Similar DWV amounts was found between treated and non-treated colonies from temperate climate (t 5 1.41; P 5 0.19) and from subtropical climate (t 5 0.96; P 5 0.36). DWV amounts in the autumn of 2015 were significantly influenced by climate and secondarily by the treatment against Varroa mites (Table 1).

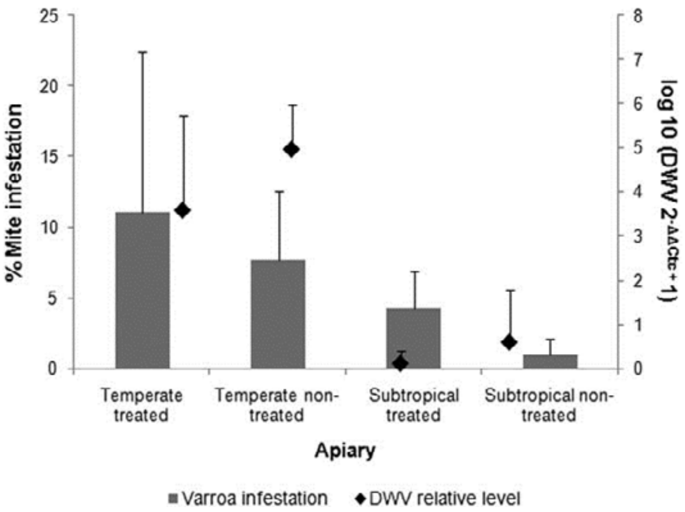

Fig. 1. Deformed wing virus relative virus level and mite infestation rate in honey bee colonies treated and non-treated against Varroa destructor from temperate and subtropical climate

Table 1. Full factorial ANCOVA for Deformed Wing Virus (DWV) amounts in temperate and subtropical climate for honey bee colonies with and without annual treatment against *Varroa destructor.*

	F	df	*P*-value
Model intercept	25.62	1	< 0.001
Climate	32.74	1	**< 0.001**
Varroa treatment	4.57	1	**0.045**
Climate x Varroa treatment	0.76	1	0.39
Varroa infestation rate (covariate)	2.27	1	0.15

Levene's test F: 2.71; P = 0.07.

Table 1. Full factorial ANCOVA for Deformed Wing Virus (DWV) amounts in temperate and subtropical climate for honey bee colonies with and without annual treatment against Varroa destructor

Deformed Wing Virus appears to be the most prevalent virus in honey bee colonies from Argentina independently of the climate. As in previous studies, DWV was more common than other viruses such as ABPV (Tentcheva et al., 2004; Meixner et al., 2014). However, there were noticeable differences in DWV prevalence and amounts as well as in Varroa infestation rates in temperate and subtropical colonies (Lodesani et al., 2014; Meixner et al., 2014). One possible explanation may be related to a better nutritional source provided by subtropical climate as the pollen reserves in these colonies were significantly higher than in temperate colonies. As previously reported, nutritional status has an outstanding impact on colony health (Alaux et al., 2010; Giacobino et al., 2014; DeGrandi-Hoffman et al., 2016). When climate is included in the analysis, we found a less significant contribution of the autumn infestation level of Varroa mites to DWV amounts (Meixner et al., 2014). Environmental factors, particularly climate and landscape may play a key role in mediating the host– parasite interaction, and perhaps honey bee health in general (Muli et al., 2014). DWV is known to be associated with Varroa destructor and has been detected in the mites (Genersch and Aubert, 2010). Heavy infestation during winter of either Varroa mites or DWV spread by the mite has been shown to be highly predictive of colony failure (Dainat et al., 2012). The lower infestation registered in subtropical climate may explain partially the differences in DWV amounts between geographical zones. At the same time, these differences in Varroa infestation may be supported by a higher impact of the Africanized bees in subtropical colonies (Sheppard et al., 1991; Rosenkranz, 1999) as honey bee race play a crucial role in resistance to Varroa (Camazine, 1986). Recently, Straus et al. (2015) showed that colonies of A. mellifera scutellata that did not present any signs of disease or collapse and were developing normally in the presence of Varroa mites. Similarly, new parasites and pathogens invading honey bee populations in East Africa seem no to directly impacted on Kenyan bee populations (Muli et al., 2014). More accurately, the lower Varroa levels in colonies from subtropical zone could be explained by the fact that Africanized bees in South America have higher levels of hygienic behaviour, higher levels of grooming mites off of adult bees and lower levels of mite reproduction on pupae than European bees (Camazine, 1986; GuzmanNovoa et al., 1999). However, although they were not part of this study, previous results obtained in these apiaries showed that the proportion of Africanized bees in both places was similar (J. Merke, pers. comm.). Climate type had a highly significant influence on the mite infestations and apparently may be more important than race (Moretto et al., 1991). Climate effect on the number of Varroa mites might be explained by longer brood presence, however regardless of the temperate climate in most regions from Argentina there is no broodless period (Marcangeli et al., 1992; Giacobino et al., 2015). Yet, assuming that bees from subtropical climate had, in fact,

a relative longer season with brood and consequently higher mite populations than colonies in temperate climate (Vetharaniam, 2012), this does not explain why treated and non-treated colonies from subtropical climate presented similar DWV relative virus levels.

The non-treated colonies, for which yearly treatment is not required, were selected for their capacity to limited Varroa population growth and therefore it was expected to have lower Varroa infestation rate than treated colonies (Francis et al., 2013; Merke et al., 2014b). Moreover, treated and non-treated colonies from subtropical climate differed significantly in their Varroa infestation rate but DWV relative virus levels were similar in both groups.

On the contrary, Varroa infestation rate and DWV amounts were similar between both groups in temperate climate. It seems that environmental condition might influence colony-specific epidemic factors, so they can exhibit low levels of DWV even with significant Varroa infestation rates, and vice versa (Mondet et al., 2014). Non-treated colonies from temperate climate showed the highest Varroa infestation rate and DWV relative virus levels but however had survived for the last 4 years.

Climatic and other environmental conditions have been demonstrated to influence on the mite infestation level a colony is able to tolerate (Meixner et al., 2014) and therefore to affect the probability of colony survival under multiples stress factor such as co-occurrence with virus species. For instance, it was mentioned before the relationship between climate conditions, bee race and Varroa mite levels (Camazine 1986; Moretto et al., 1991). Colonies from subtropical climate showed reduced virus prevalence and DWV amounts together with lower Varroa infestation rates compared to colonies from temperate climate, independently of Varroa control management. However, non-treated colonies are able to survive several years under different stress level in both climate conditions, probably because local populations of bees show better survival in the presence of pathogens than introduced bees (Meixner et al., 2015). Environment appears as a key factor interacting with local bee populations and influencing colony survival beyond Varroa and Virus presence.

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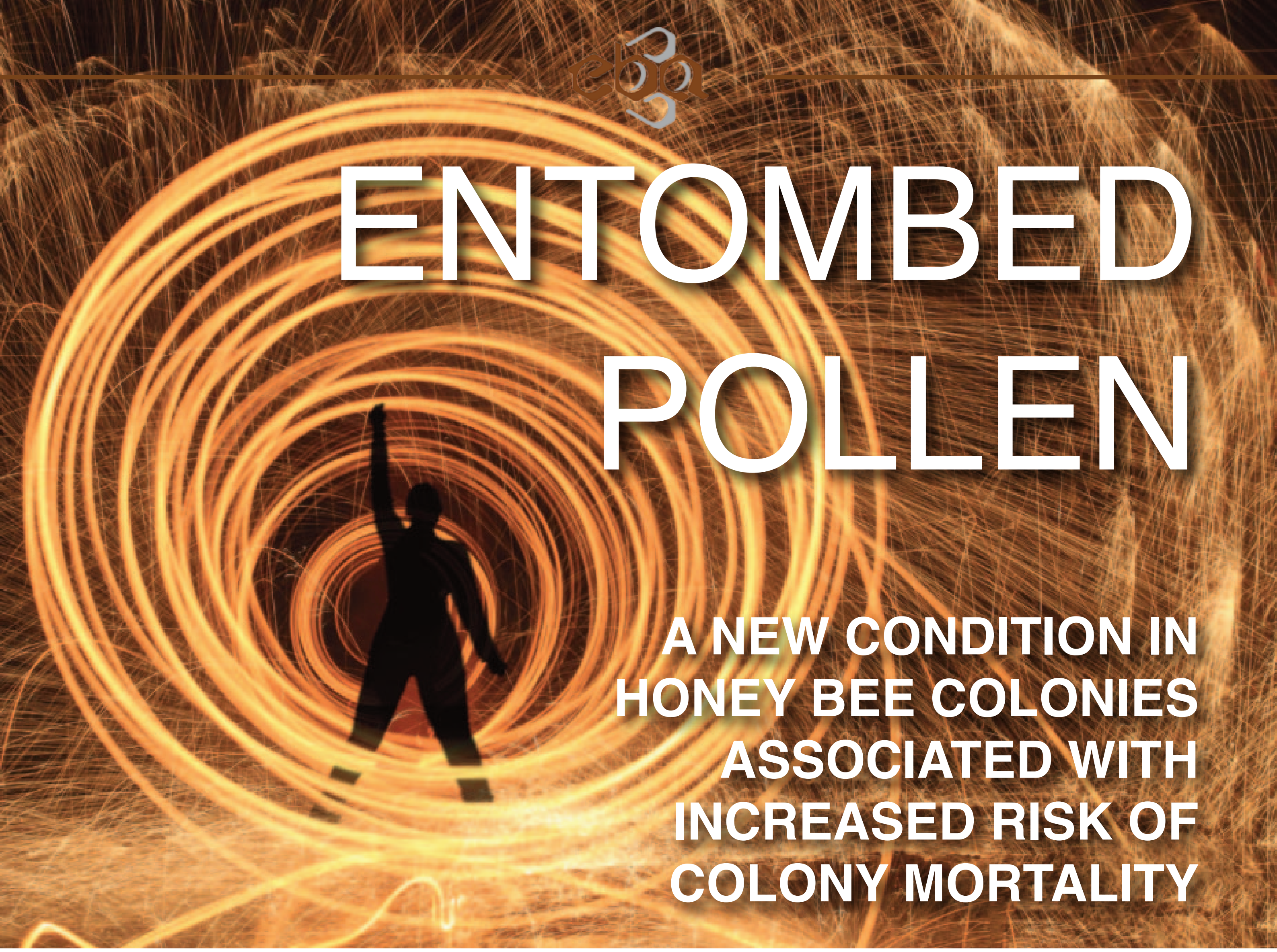

ENTOMBED POLLEN

A NEW CONDITION IN HONEY BEE COLONIES ASSOCIATED WITH INCREASED RISK OF COLONY MORTALITY

Abstract

Here we describe a new phenomenon, entombed pollen, which is highly associated with increased colony mortality. Entombed pollen is sunken, capped cells amidst "normal", uncapped cells of stored pollen, and some of the pollen contained within these cells is brick red in color. There appears to be a lack of microbial agents in the pollen, and larvae and adult bees do not have an increased rate of mortality when theyare fed diets supplemented with entombed pollen in vitro, suggesting that the pollen itself is not directly responsible for increased colony mortality. However, the increased incidence of entombed pollen in reused wax comb suggests that there is a transmittable factor common to the phenomenon and colony mortality. In addition, there were elevated pesticide levels, notably of the fungicide chlorothalonil, in entombed pollen. Additional studies are needed to determine if there is a causal relationship between entombed pollen, chemical residues, and colony mortality.

Entombed pollen

Honey bee populations have been declining rapidly over the past 40 years (NRC, 2007). Much of this decline, particularly over the last two decades, can be attributed to known causes such as the parasitic mite Varroa destructor. More recently, however, extensive losses of honey bee colonies in the continental United States have been attributed to a poorly understood phenomenon referred to as Colony Collapse Disorder or CCD (vanEngelsdorp et al., 2007, 2008). CCD is defined by a specific set of symptoms, including the rapid loss of the adult population with no dead bees in or in proximity to the hive (Cox-Foster et al., 2007). In an attempt to elucidate the causes of poor colony health in general, and CCD in particular, two longitudinal studies were initiated in the spring of 2007. One of these studies monitored three US migratory beekeeping operations, while the other studied the effects of various comb treatments on 200 colonies established from packaged bees imported from Australia. Honey bee populations have been declining rapidly over the past 40 years (NRC, 2007). Much of this decline, particularly over the last two decades, can be attributed to known causes such as the parasitic mite Varroa destructor. More recently, however, extensive losses of honey bee colonies in the continental United States have been attributed to a poorly understood phenomenon referred to as Colony Collapse Disorder or CCD (vanEngelsdorp et al., 2007, 2008). CCD is defined by a specific set of symptoms, including the rapid loss of the adult population with no dead bees in or in proximity to the hive (Cox-Foster et al., 2007). In an attempt to elucidate the causes of poor colony health in general, and CCD in particular, two longitudinal studies were initiated in the spring of 2007. One of these studies monitored three US migratory beekeeping operations, while the other studied the effects of various comb treatments on 200 colonies established from packaged bees imported from Australia.

Pollen is a honey bee colony's only source of protein, lipids, vitamins, and minerals. Forager bees collect pollen from flowering plants, pack it on their hind legs, transport it back to the colony, and deposit it in the wax comb near the brood nest. Foodhandler bees then add an assortment of enzymes and honey to the stored pollen to help preserve it and make it available for eventual

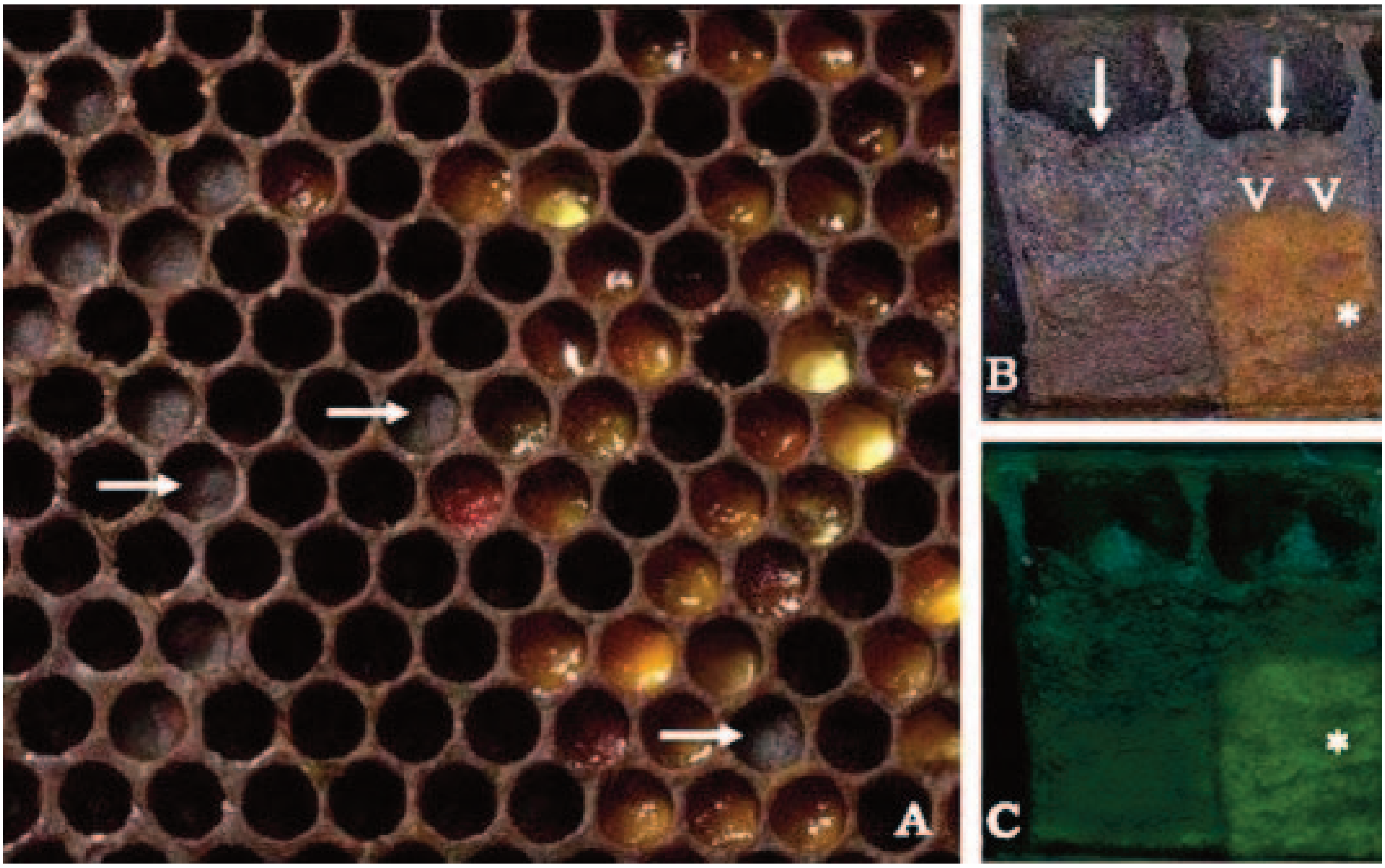

Fig. 1. 'Entombed' pollen (→) is readily identified as having sunken, wax-covered cells amidst "normal", uncapped cells of bee bread (A). Unlike capped honey and brood cells, the entombed cells are capped below (↓) the comb surface, appearing to be sunken into the cell (B). At least some of the pollen contained within these cells is brick red in color, and this pollen does not fluoresce under ultraviolet light like most non-red colored pollen (, C). In rare cases, cells contained the characteristic red, non-fluorescing pollen on top of otherwise normal-looking, fluorescing pollen (BV).*
(For interpretation of color in Fig. 1, the reader is referred to the web version of this article)

consumption as "bee bread" (Chauvin and Lavie, 1956).

Bee-bread provisions are easily identified in the combs as they remain uncapped and are often brightly colored, reflecting the diversity of floral sources visited by pollen-collecting bees.

"Entombed" pollen, a condition described here for the first time, is bee bread covered by a sunken capping (Fig. 1A).

At least some of the pollen stored in these cells is brick red in color (Fig. 1B); this brick red pollen does not fluoresce under ultraviolet light (Fig. 1C).

In most cases the entire cell content is brick red in color, however in some rare instances the characteristic color appears only on the top section of cells (Fig. 1B and C).

In subsequent, unrelated surveys of colonies in Florida and Pennsylvania, similarly capped bee bread was observed, but the cells did not contain pollen that was characteristically brick red in color (hereafter referred to as "capped pollen").

Melting point tests revealed that the cappings on entombed pollen were composed mostly of propolis but did contain beeswax (n = 21). In contrast, the cappings on capped pollen were made up of propolis alone (n = 18).

Further comparative examinations of the contents of cells classified as entombed, capped, and normal revealed that all cells contained pollen grains from a variety of different floral sources. However, normal and capped cells contained full pollen grains, while entombed cells contained only empty pollen grain husks.

The first study monitored three migratory beekeeping operations that transported honey bees among Florida, Pennsylvania, New Jersey, New York, Massachusetts, and Maine for the purposes of crop pollination, honey production, or both. In all, 60 colonies (鉮20 from each operation) were monitored and periodically evaluated between March 2007 and January 2008, so that each colony was examined and sampled a total of 7–8 times. Appreciable amounts of entombed pollen were first observed in these colonies in June 2007; 40.5% (n = 49) of monitored colonies had the condition with some having more than 100 cells of entombed pollen. By November 2007, colonies with entombed pollen had a higher rate of mortality (43%) than those without entombed pollen (20%; Fisher's exact test, $P < 0.05$). The presence of entombed pollen in colonies in June represented a relative mortality risk of 3.1. Only 1 of 20 colonies with entombed

pollen in June died with symptoms indicative of CCD, thus entombed pollen is not likely associated with CCD.

Capped pollen was not observed in any of the colonies in this longitudinal study, so future studies that quantify its effect, if any, on colony health are needed.

The second longitudinal study monitored 200 colonies that had been established with packages of bees imported from Australia in March of 2007. The packaged bees were introduced following standard practices into previously used beehives belonging to one of four treatment groups: (1) combs from colonies that had recently died while exhibiting CCD-like symptoms ('non-irradiated'); (2)combs from colonies that had recently died while exhibiting CCD-like symptoms and were subsequently irradiated ('irradiated'); (3) combs from colonies that died while exhibiting CCD-like symptoms and were subsequently fumigated with acetic acid ('acetic acid'); and (4) combs from seemingly healthy colonies that had only previously been used for honey storage ('honey comb'). By August 2007, the incidence of entombed pollen differed significantly among treatment groups ($F = 6.60$, $df = 3$, $P < 0.001$), withthe honey comb control group having fewer colonies with entombed pollen (10.7%, n = 28) than all other treatment groups (non-irradiated: 53.4%, n = 58; irradiated: 52.9%, n = 34; acetic acid: 59.3%, n = 27). These observations suggest that the occurrence of entombed pollen is associated with comb type and that comb treatment did not remove any risk factors found in comb from colonies that died from CCD.

Because irradiation had no measurable effect on the incidence of entombed pollen, the underlying cause of the phenomenon does not appear to be pathogenic. This supposition is further supported by attempts to quantify and compare the fungal and bacterial loads in entombed and normal pollen. Generic primers for bacteria (16rRNA) and fungi (ITS; Evans, 2006) were used to screen Chelex-extracted DNA from all pollen sources. Levels of both bacteria and fungi were undetectable in all samples following 35 cycles of PCR. Additional assays were then conducted to test for possible inhibition of PCR by pollen compounds, using standard (bacterial) controls for PCR efficiency. While all pollen extracts inhibited PCR to some extent, those from the entombed pollen samples were inhibitory at a 10-fold lower concentration than were extracts from apparently normal pollen. The agent(s) behind this inhibitionwas heat stable and water soluble. This factor need not be involved with bee disease but will be a factor in attempts to quantify microbial associates of entombed pollen. The fact that no bacterial or fungal microbes were identified in this survey might also reflect the extraction method: Chele extractions are most sensitive for vegetative cells and we might have under-reported dormantspores in pollen.

POLLEN

Pesticide levels were determined (Mullin et al., in preparation) for each pollen type: entombed pollen (‘entombed’, n = 6); capped pollen (‘capped’, n = 6); seemingly normal pollen from colonies in which entombed pollen occurred (‘normal’, n = 11); and seemingly normal pollen from colonies lacking entombed pollen (‘control’, n = 3). In total, 30 different pesticides and metabolites were found in the samples. The most commonly occurring pesticides were the miticides coumaphos (detected in 100% of samples) and fluvalinate (detected in 96% of samples) and the fungicide chlorothalonil. Chlorothalonil was found in 100% of the samples of entombed pollen, but only in 45.5% of samples of normal pollen, 16.7% of samples of capped pollen, and 0% of samples of control pollen (Fisher’s exact test, $P < 0.01$). However, amounts of this fungicide were more than 40-times higher in entombed pollen compared to any other type of pollen (Fig. 2). Levels of chlorothalonil, coumaphos, and fluvalinate were either numerically or significantly lower in normal and control pollen (samples were pooled for analysis) when compared to entombed and capped pollen (Fig. 2; Coumaphos: $F = 6.60$, df = 23, $P = 0.005$; Chlorothalonil: $F = 4.71$, df = 23, $P = 0.019$; Fluvalinate: $F = 4.55$, df = 23, $P = 0.021$).

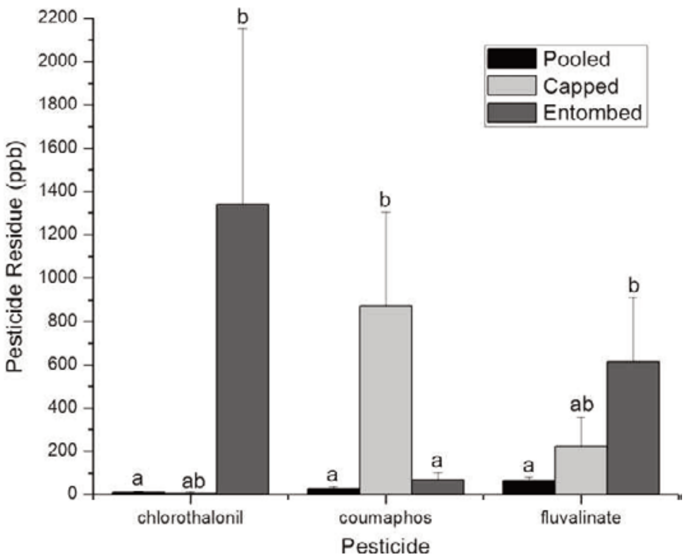

Fig. 2. Comparison of pesticide levels in normal and control (pooled; n = 14), capped (n = 6) and entombed (n = 6) pollen. Differences in the residue levels for a given pesticide (Tukey-Kramer HDS, P < 0.05) are indicated by different letters above bars

Survivorship studies were performed to determine the potential toxicity of entombed pollen on adult bees. Approximately 30 twenty-hour-old adult workers were introduced into a 16.5 × 12.25 × 13.35 cm cage and fed 50% sucrose solution and either: (1) seemingly normal pollen collected from a colony lacking entombed pollen (‘positive control’); (2) seemingly normal pollen collected from a colony in which entombed pollen occurred (‘normal’); (3) entombed pollen (‘entombed’), or (4) no pollen (‘negative control’). Each treatment was replicated three times using bees from three different colonies. Bees in all groups consumed the provided pollen equally. Bees feeding on pollen, regardless of pollen type, had a higher survivorship rate than those bees feeding on sucrose solution alone (v2 = 93.84, df = 3, $P < 0.001$), but survivor ship did not differ among the pollen-fed treatments.

To test for effects of entombed pollen on larval growth, groups of eight larvae were reared in vitro from the first instar to the prepupal stage (8 days) following Kucharski et al. (2008). Supplemental food consisted of 1 ml of 66% royal jelly,

10% fructose, and 10% glucose supplemented with either 50 mg of entombed pollen (three replicates), 50 mg of seemingly normal pollen (six replicates), or no additional pollen (three replicates). Survival of the larvae did not differ significantly among the three diets, although a one-tailed Fisher's exact test between larvae reared on entombed versus normal pollen bordered on significance (35/48 survivors on normal pollen, 13/24 survivors on entombed pollen; P = 0.09). Pollen-free aqueous extracts were then prepared from the same normal (n = 6) and entombed (n = 3) pollen sources by suspending 0.1 g of pollen in 1.0 ml distilled water for 48 h, pelleting the pollen grains by centrifugation and adding 50 ll of the supernatant to 950 ll of the larval diet described above. Again, there was a trend toward lower survival for larvae raised on a diet with entombed-pollen extract (15/24 survivors versus 39/48 survivors when fed an extract of normal pollen and 18/24 survivors on a pollen-free diet), but this difference only bordered on significance (P = 0.09).

Conclusion

These results provide compelling evidence that entombed pollen indicates exposure to a risk factor that is detrimental to honey bee colony survival. Entombed pollen is not directly responsible forincreased mortality, as there is no significant reduction in the longevity of larvae or adult bees fed entombed pollen. Nor is entombed pollen directly associated with CCD, as few of the dead colonies showed symptoms that define this condition. The higher rates of entombed pollen documented in colonies established on old brood comb suggests that one potential factor may be the accumulation of pesticides (Wallner, 1995; Frazier et al., 2008). Of particular note is the fungicide chlorothalonil, which was ubiquitously detected in entombed pollen samples. This fungicide may be responsible for the diagnostic color change observed in entombed pollen, as it is highly reactive and forms metabolites that may lead to colored products (Chaves et al., 2008).

This is the first study to document "capped" and "entombed" pollen. This study did not examine the possible risk associated with the presence of capped pollen, however did document increased mortality associated with the presence of entombed pollen. Chlorothalonil appears to be linked to the entombed pollen, but it cannot fully explain pollen-capping behavior; a majority of cases of capped (but not entombed) pollen did not exhibit detectable levels of chlorothalonil. Considering the increased risk of colony mortality associated with the presence of entombed pollen, continued research should be conducted to elucidate the role and potential threats of this condition.

https://www.academia.edu/14740341/_Entombed_Pollen_A_new_condition_in_honey_bee_colonies_associated_with_increased_risk_of_colony_mortality?email_work_card=view-paper

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APITHERAPY IN VETERINARY MEDICINE:

BENEFICIAL EFFECTS OF BEE PRODUCTS IN MAINTAINING AND IMPROVING ANIMAL HEALTH

In the text below, there is an overview of the review work of the research team from Serbia, Slovenia and Turkey, in which they presented the results of original research on the effectiveness and possibilities of applying honey bee products in the treatment of numerous conditions and diseases of animals.

Originality of work: Due to the large number of studies in this field, as well as the intention to present the most recent and relevant results to the public, the authors set the following criteria for selecting studies: published in the last 15 years in peer-reviewed scientific journals, containing results obtained from experiments on live animals (in vivo), and publicly available in full-text format. Therefore, this review paper is unique because all previous review papers on this topic (the effectiveness of bee products in the therapy and treatment of human and animal health problems) included results that were published in various magazines without a scientific review, but also summaries from Proceedings from various meetings (which do not provide insight into the methodology and all results). Moreover, this paper is the first to focus on the findings from in vivo studies (conducted on either laboratory or farm animals, or pets).

The paper extensively presents the results of research and the potential applications of the most important bee products (honey, propolis, bee venom (apitoxin), pollen, royal jelly, and drone larvae) in veterinary medicine. Here, we provide a brief overview of the effects of each of these products, while for detailed information, we refer you to the paper available at https://www.mdpi.com/1424-8247/17/8/1050.

HONEY

When it comes to honey, a critical review of the "advantages" of mānuka honey (originating from the Leptospermum scoparium shrub) compared to other types of honey (originating from other plants) is particularly interesting. We explained why most types of honey have exceptional healing effects, especially in treating wounds, citing papers in which this effect has been proven in different species of animals (horses, cats, dogs, mice). In addition, we presented the original results of treating extensive leg wounds and skin losses in different animals (cats, dogs and cows) using medical and raw honey, along with the original photo documentation of the co-author, prof. Dr. Vladimir Erjavec from the Small Animal Clinic, Veterinary Faculty, University of Ljubljana. In addition, we described the effectiveness of honey in protecting the pancreas and stomach, gastric ulcer healing, and its antioxidant, anti-diabetic, and anti-atherogenic effects (established in experiments on mice).

PROPOLIS

Unlike the majority of publications (which mainly present in vitro results), in this paper, we present the in vivo efficacy of propolis, both in suppressing pathogenic microorganisms and various parasites (in laboratory or farm animals, such as mice, rats, dogs, pigs, chickens, bees), as well as in the healing of wounds (in pigs, dogs, rats) and numerous inflammatory conditions in the oral cavity, eyes, and ears (in dogs and rats). Findings on the chemopreventive and gastroprotective effects of propolis are also presented, along with its antitumor and anticarcinogenic potential (affirmed in experiments on mice and rats). Additionally, an overview of the mechanisms through which propolis exerts these effects is provided.

BEE VENOM (APITOXIN)

The general public associates bee venom (apitoxin) with the painful experience of a bee sting, while those familiar with the power of apitherapy are mostly aware of its application in the treatment of rheumatoid arthritis. However, our paper provides a comprehensive overview of the complex potential of apitoxin in animal therapy, primarily for neurodegenerative diseases such as Parkinson's disease, multiple sclerosis, intervertebral disc degeneration, neuropathies caused by nerve injuries or chemotherapeutics. The paper also presents findings that suggest the benefits of adding apitoxin to animal feed, as it positively influences growth and immunity (based on experimental evidence from studies on rabbits and broiler chickens). Finally, its gastroprotective properties and antidiabetic potential, demonstrated in experiments on rats, are also outlined.

POLLEN

Pollen collected by bees (known as "bee pollen") is used as a supplement in human nutrition, and it is the pollen that beekeepers take from bees, then dry and put on the market. When it comes to its application in animals, the effects of bee pollen as a feed additive for broilers were mainly investigated, and the best proven effectiveness of bee pollen was in improving growth performance, feed conversion rate, immune response and intestinal microflora.

On the other hand, bee pollen has potential as a medicine in cases of benign hyperplasia, prostate inflammation and diabetes-induced testicular dysfunction, which was experimentally proven in rats.

ROYAL JELLY

Since ancient times, royal jelly has been attributed to a very wide range of actions, however, for many claims there is still no reliable scientific evidence. As in the case of other bee products, the authors have selected only the results obtained in experiments performed according to all the rules of scientific research on live animals (mice, rats and rabbits). Respecting the mentioned criteria, the authors emphasized the scientifically proven protective effectiveness of royal jelly in individuals receiving chemotherapy, then the potential of royal jelly in the fight against cancer, aging and osteoporosis, but also against metabolic, endocrine and neurological disorders.

DRONE LARVAE

The very fact that human ancestors, in addition to honey, also collected and ate bee larvae (and in some parts of the world people still eat them as a delicacy) testifies to their importance in human nutrition. Many animals also like to feast on bee larvae. However, beekeepers consider it a sin to take larvae, so only the use of drone larvae attracted to the "trap frame" (used to control the honey bee ectoparasite Varroa destructor) is tolerated.

The authors highlighted the potential of drone larvae in veterinary medicine due to the help in solving reproductive problems of males (proven in rams, broilers and experimental rodents), as well as females (for example in gilts), but also in animal husbandry due to the anabolic effect that ensures an increase in live weight, average daily gain and slaughter yield.

For all other effects, appendices (photos and table), precautions when conducting apitherapy, as well as references that are the original source of information on the effects and potential of bee

products for veterinary use, we refer readers to the article available at: https://www.mdpi.com/1424-8247/17/8/1050.

The presentation of the article:

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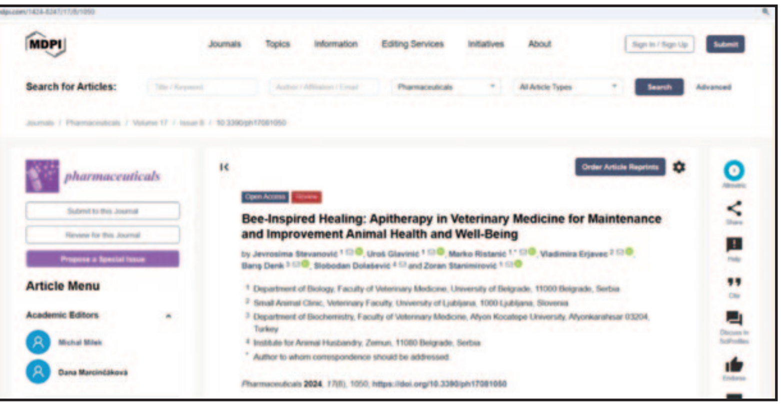

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Bee-Inspired Healing: Apitherapy in Veterinary Medicine for Maintenance and Improvement Animal Health and Well-Being
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Review

Bee-Inspired Healing: Apitherapy in Veterinary Medicine for Maintenance and Improvement Animal Health and Well-Being

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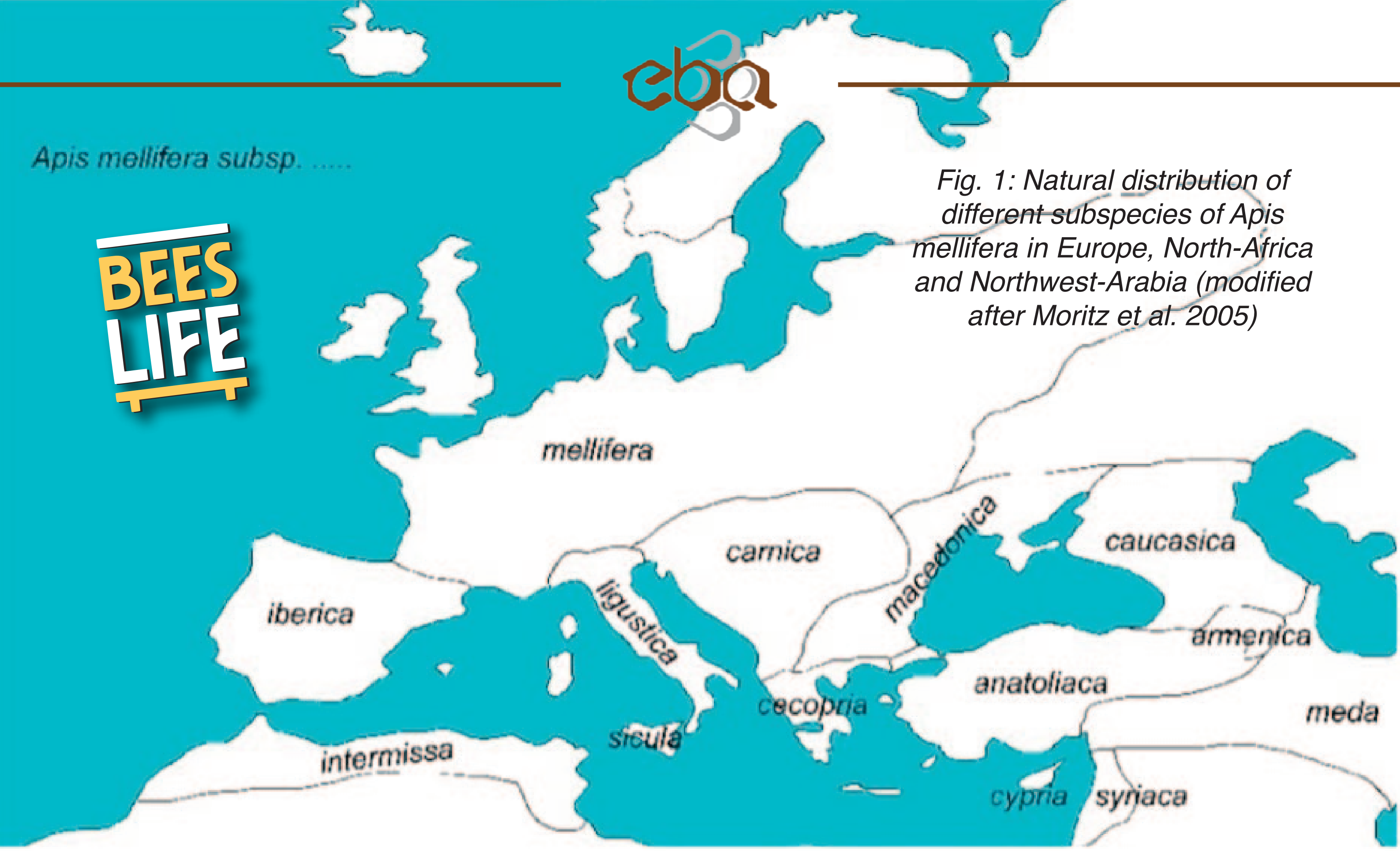

Fig. 1: Natural distribution of different subspecies of Apis mellifera in Europe, North-Africa and Northwest-Arabia (modified after Moritz et al. 2005)

REVEALING THE ROLE OF COMPETITION IN HONEYBEE AND WILD BEE INTERACTIONS

A LITERATURE REVIEW

Abstract

Most Central European wild bee species and their populations have come under severe pressure in recent decades and are now listed on the Red List of Threatened Species. This pressure is influenced by a variety of factors and processes, such as habitat fragmentation, the intensification of agriculture or the loss of nesting habitats and uses of pesticides. Further, competition for floral resources (pollen and nectar) between the Western honeybee (Apis mellifera L.), which is kept by beekeepers at the vicinity of wild habitat, and most wild bee species can further exacerbate this dramatic situation. This is the case wherever the shared floral resources are not sufficiently available. Nevertheless, competitive pressure between these two groups does not necessarily mean a disadvantage for the wild bee species, as they can sometimes switch to other floral resources and foraging times. This review presents the results of a European and some global literature study on the topic of food competition be-

tween honeybees and wild bees and introduces a new approach for a field experiment to determine this possible food competition.

Introduction

Large parts of Europe (except for the far north), all of Africa (except for the central Sahara), the entire Middle East and regions in Central Asia are considered to be the original distribution area (before people brought them to other continents) of the western honeybee (Apis mellifera; hereafter referred to as the honeybee) [Han et al. 2012; Fontana et al. 2018; Dogantzis et al. 2021; Panziera et al. 2022] (Fig. 1). Some of the economically relevant honeybee subspecies from Europe, especially the four subspecies mellifera, carnica, ligustica and iberica, have spread across the globe [Goulson 2003; Paini & Roberts 2005; Geslin et al. 2017; Wojcik et al. 2018; Fontana et al. 2018; Burger 2018]. The origin and distribution range of the honeybee play an important role while evaluating the literature regarding the area to which the respective publication refers in terms of possible competition between the two pollinator groups.

For at least 10,000 years (petroglyphs from Africa), honeybees have been an important animal species for humans as a source of honey and wax [Roffet-Salque et al. 2015]. Depictions of targeted beekeeping dating back around 7000 years are known from Anatolia. At the tomb of Abu Ghorab (Egypt 2400 B.C.), images of beekeepers and beehives are known in the wall relief [Cane 1999; Tourneret & de Saint Pierre 2017]. The Western honeybee has been around for about 40 million years - long before the first Stone Age humans discovered honey as food - and since this long period of time, there has been coexistence and coevolution between Apis species and the many wild bee species in its original range [Cane 1999; Roffet-Salque et al. 2015; David 2019]. However, in contrast to the honeybees that have been cared for and supported by beekeepers for thousands of years, numerous wild bee species in their native habitat areas across the world have been increasingly confronted with problems in recent decades. Wild bee species generally require two important habitat elements to survive, namely species-specific food resources and nesting habitats. These are primarily caused by numerous anthropogenic factors, the strongest one is anthropogenic land use, intensification of agriculture in recent decades, the increase in environmentally active (agro)chemicals, the loss of heterogeneous landscape structures and the fragmentation of habitats. All of this leads to a reduction in the supply of flowers and nesting habitats for wild bees in the intensively utilised cultural landscape [Potts et al. 2010; Hellerstein et al. 2017; Burger 2018; Herbertsson et al. 2021]. An additional factor is the introduction or release of exotic plant species, which may significantly increase these dangers due to their restricted supply of pollen and nectar.

For at least three millennia, European landscapes have been undergoing anthropogenic changes to become cultivated landscapes

Fig. 2: Some Examples of wild bee species in North Bavaria (Germany). From left to right: 1st row: Hylaeus signatus, Anthidium manicatum; 2nd row: Heriades truncorum, Coelioxys elongata, Chelostoma florisomne; 3rd row: Halictus subauratus, Halictus sexcinctus, Xylocopa violacea. Photos: Stefan Traßl (2024).

(which, incidentally, also happened in most non-European colonies of European settlers). Since the beginning of agricultural use, the vast majority of these cultivated landscapes have been open spaces, making them abundant in flowering plants and providing a variety of habitats for honeybees and wild bee species. As beekeeping became more prevalent in the cultivated landscape, honeybees also became more involved in pollinating cultivated plants. However, because European cultivated landscapes were still widely used until the beginning of the 20th century, there was still an adequate supply of flowers and nesting places for wild bee species. This changed with the increasing mechanisation, chemicalisation and intensification of agriculture from the 1950s onwards. The result is well known: 53 % of the 570 wild bee species found in Germany are on the Red List [Westrich et al. 2011; Burger 2018]. In Fig. 2, we have given some examples of those wild bee species.

Key research questions

In this literature study, we investigated the following questions:

1. Under what conditions does foraging competition between honeybees (Apis mellifera) and wild bees have a negative effect on wild bees?

2. Does honeybee foraging competition have a greater impact in areas without co-evolution with wild bees (outside their origin of distribution area)?

3. Can a carrying capacity be defined for honeybees / honeybee colonies in habitats of our central European cultural and natural landscapes, up to which competition with wild bees remains ineffective?

Competition for resources

Apis mellifera is omnipresent throughout the day, with slightly higher activity in the early morning hours [Schaffer et al. 1979; Horskins & Turner 1999; Neumayer 2006] and in the afternoon and early evening hours [Semida & Elbanna 2006; Noguera 2015]. Honeybees are generalists that collect pollen and nectar from a variety of plant species [Schmazel 1980; Goulson 2003; Pfiffner 2016]. As the only pollinator insect in Central Europe that spends the winter awake, they also have a need to replenish their winter supply as quickly as possible, which explains their preference for flowers that occur in large quantities at the same time, such as dandelion, rapeseed, fruit trees, and lime trees [Arzt et al. 2023]. Combined with an effective communication system and an action radius of several kilometers, the honeybee can use nectar and pollen very effectively over a large landscape area [Conner & Neumeier 1995; Pickhardt & Fluri 2000; Cane & Sipes 2006; Zurbuchen & Müller 2012; Pfiffner 2016; Hung et al. 2019; Rasmussen et al. 2021]. Due to their polylectic foraging behavior and their adaptability to seasonal and diurnal conditions, honeybees can be active over a large period of the year [Zurbuchen & Müller 2012; Park & Nieh 2017]. However, this causes a potential temporal and spatial overlap with the resource requirements of many wild bee species [Sugden et al. 1996; Goulson 2003].

In nature, competition between two species groups that use the same resources is inevitable. Without competition, evolution and adaptation to shifting environmental conditions would be very difficult. Potentially negative interactions for food resources with Apis mellifera can occur [Paini 2004; Potts 2010; Mallinger 2017], as most wild bee species (except the parasitizing species) depend on pollen and nectar to feed their offspring. The protein-rich pollen plays the most important role in the reproduction of wild bees. A better pollen quality also ensures higher resistance of the offspring to pathogens. The quantity of pollen also regulates the size of the offspring [Roulston & Cane 2002; Minckley et al. 2003; Di Pasquale 2013; Venjakob et al. 2022]. Nectar serves the wild bees as a source of energy, e.g. for flying. For both pollen and nectar, many wild bee species have species-specific preferences with regard to plant species [Venjakob et al. 2022; González-Teuber & Heil 2009]. For more than 40 years, there has been discussion about the competition between honeybees and wild bees, as well as the potential harm to wild bee species [Schaffer et al. 1979; Prendergast et al. 2022]. Competition in flying insects is not easy to assess scientifically, which means that relatively little has been studied and published on the subject to date.

Wild bee species exhibit significant diversity in body structure, which allows for optimal adaptation to specific flower forms. Additionally, these flower forms influence body structure through co-evolution [Rasmussen et al. 2021]. Most flower-visiting wild bees in Central Europe are solitary, polylectic species [Cane & Sipes 2006; Wojcik et al. 2018], but about one third are oligolectic [Zurbuchen & Müller 2012; Böcking 2013]. This specialization on certain flowers or plant families leads to a seasonally restricted lifespan for these oligolectic wild bee species. Another aspect in dealing with competitive situations is the short flight distance that many wild bee species have during their often short life span [Pfiffner 2016; Neumayer 2006; Burger 2018]. In contrast to honeybees with their large action radii of several kilometers [Steffan-Dewenter & Tscharntke 1999; Steffan-Dewenter & Kuhn 2003; Couvillon et al. 2014; Danner et al. 2016] most of the wild bee species have a life action radius of only a few hundred meters around their nest habitat [Zurbuchen et al. 2010a und 2010b]. Despite the mass flowering resources available at agriculturally important crops (e.g. oil rape, fruit trees), big flower resources are not always sufficiently in the cultural landscape, available for colonies [Wojcik et al. 2018]. Thus, in these gaps of mass flowering (e.g. between the flowering of oilseed rape and lime trees), they use other available resources of the flora next to the agricultural areas that are particularly important for wild bees. The temporal, geographical, and resource overlap of a basic demand, coupled with insufficient understanding of the competition between the two species groups, renders this topic particularly significant for research, nature and species conservation efforts, beekeeping, and policymakers.

If the competition between these two pollinator groups actually becomes effective (usually negatively effective for the wild bee species), this ultimately has an impact on reproductive capacity, the sex ratio and population size [Stout & Morales 2009; Geslin 2017]. However, the question of competition must always be considered in four dimensions: in the habitat with its available resources (three dimensions) and on the time scale (over the course of the day and year) [Thomson 2006; Herbertsson et al. 2016; Rasmussen et al. 2021]. Another decisive factor is the density of beekeeper-managed honeybee colonies in the landscape [Cane & Tepedino 2017] and the dis-

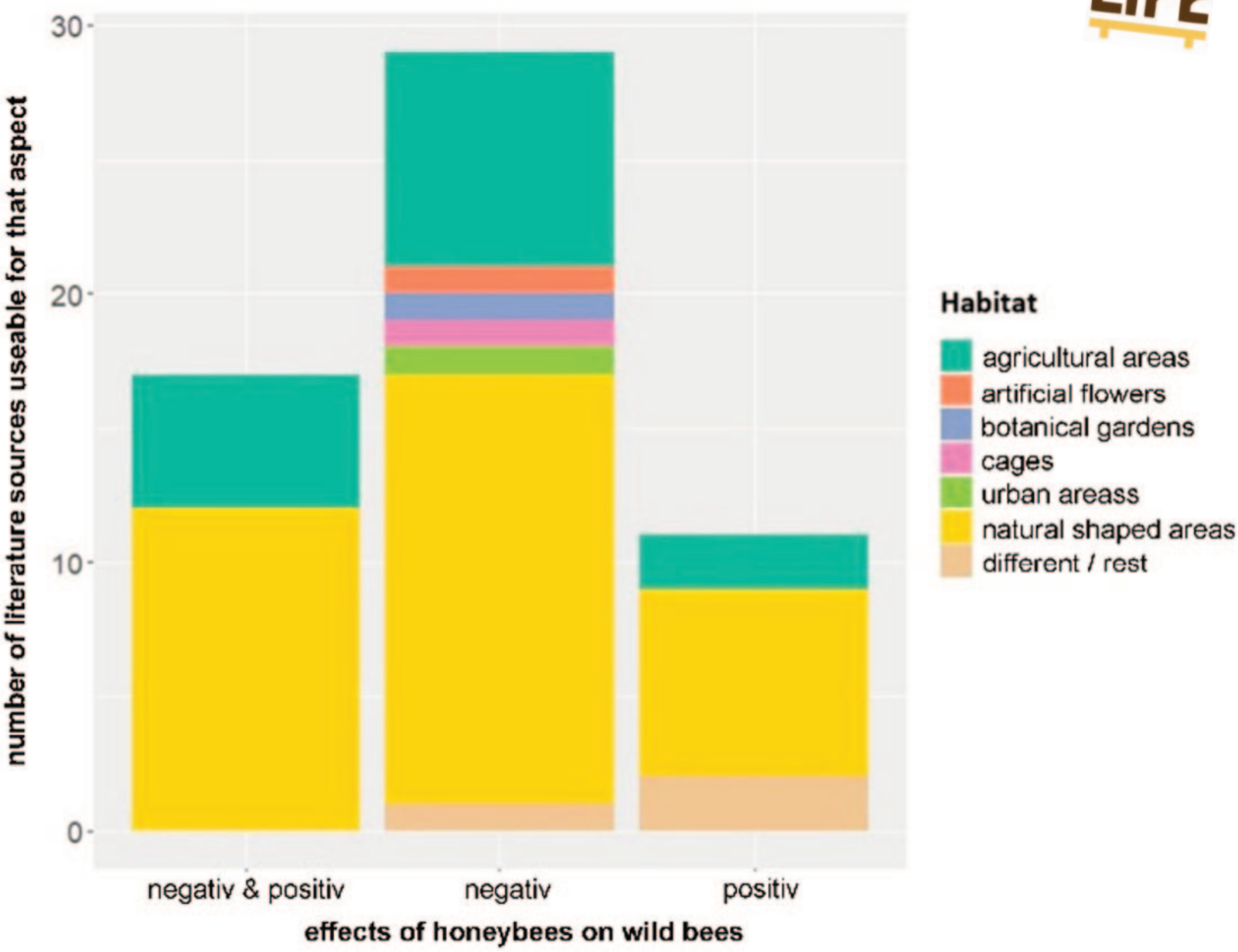

Fig. 3: Overview of the different habitats, where the analysed studies were conducted, grouped in effects of honeybees on wild bees.

tances from these to the nesting and foraging habitats of wild bees [Thomson 2004; Neumayer 2006; Elbgami et al. 2014, Henry & Rodet 2018]. However, the density of honeybee colonies managed by beekeepers has fluctuated greatly over the years. In Germany in the 1960s, for example, there were almost twice as many honeybee colonies as there are currently, with the same number of beekeepers. In fact, competition between honeybees and wild bees should have decreased significantly over the last 60 years. However, it must be borne in mind that the density of bee colonies managed by beekeepers in Central European cultivated landscapes is always higher than it would be in a natural landscape (knowing that there are hardly any natural landscapes left in Central Europe. Especially in agricultural monocultures (oilseed rape, sunflowers, buckwheat, berries, fruit trees), the density of honeybee colonies is seasonally increased far above a natural density of colonies in order to exploit the flower resources available at short seasons and maintain optimal pollinator performance [Zurbuchen & Müller 2012; Hellerstein et al. 2017; Mallinger et al. 2017; Burger 2018; Policarová et al. 2019].

Results

Overall, 51% of the evaluated literature sources indicate negative effects for wild bee species when honeybee colonies are present. The remaining 49 % are divided into 30 % of sources, where the effects cannot be clearly assigned to a negative or neutral impact. Sources that clearly show no negative impacts (we call it neutral effects) on wild bees are found in 19 % of all analysed publications [Steffan-Dewenter & Tscharntke 1999; Kühn et al. 2006; Shavit et al. 2009; Balfout et al. 2013; Balfout et al. 2015; Goras et al. 2016; Ropars et al. 2020; Wignall et al. 2020].

However, if this literature assessment is filtered within and outside the original range of honeybees, a different picture emerges [von Heßberg et al. 2024]. The clear majority of studies with negative outcomes (69 %) were observed in countries or regions, where Apis mellifera has been introduced by humans in recent centuries (e.g. North America [Schaffer et al. 1979; Pleasants 1981; Conner & Neumeier 1995; Martins 2004; Thomson 2004; Pinkus-Rendon et al. 2005; Thomson 2006; Tepedino et al. 2007; Artz et al. 2011; Rogers et al. 2013; Thomson 2016; Angelella et al. 2021], South America [Aizen & Feinsinger 1994; Smith-Ramirez et al. 2014; Garibaldi et al. 2021], Australia, New Zealand, many islands). According to a US study [Angelella et al. 2021], the abundance and species richness of native pollinators declines by 49 % and 22 %, respectively, in the presence of honeybees. The same trend is evident in Brazil, where Apis mellifera is an invasive, highly dominant species, especially since the breeding of the "Africanised bee", which is very lucrative for beekeeping. Furthermore, it has been noted that the number of native wild bee species abundance is declining on island habitats such as Tenerife, Tasmania, New Zealand, and Indonesia [Gross & Mackay 1998; Goulson et al. 2002; Dupont et al. 2004; Kato & Kawakita 2004; Murphy & Robertson 2019; Ing & Mogren 2020; Widhiono et al. 2022]. Our results therefore agree with those of some previous studies or review articles [Paini 2004; Paini & Hons 2004; Moritz et al. 2005; Noguera 2015; Goras et al. 2016; Mallinger et al. 2017; Requier et al. 2019; Herrera 2020]. However, not all researchers share this opinion [Mallinger et al. 2017; Wojcik et al. 2018]. Even

Fig. 4: Landscapes of food and nesting: top left: sunny, slightly sandy embankment with low vegetation cover as nesting habitat for wild bees; top right: flower-rich forest canopy gap with low ground cover as foraging habitat for wild bees; bottom left: foraging habitat for honeybees with mass production of a single flower species.

outside their original distribution range, honeybees do not always exert negative pressure on their native competitors [Pedro & Carmargo 1991; Tepedino et al. 2007; Roubik & Villanueva-Gutiérrez 2009; Pick & Schlindwein 2011; Cane & Tepedino 2017; Hung et al. 2019].

Regarding the statements on the habitats of wild bees in the studies we examined, two main groups could be filtered out: natural (wild) habitats and agriculturally used areas. Additionally, a small proportion of studies investigated both habitats together, or other areas, for example botanical gardens or urban spaces (Fig. 3). An interesting detail is the distribution within these literature sources that show a negative impact on wild bees. 55 % of these studies with a negative impact on wild bees were conducted in semi-natural habitats, while 28 % took place in agricultural environments. These results support the assumption that a coexistence between the two pollinator groups has apparently existed in the European cultivated landscape for centuries, while in natural landscapes the placement of honeybee colonies has a more negative impact. Consequently, consideration must always be given to when and how many bee colonies can be placed in such natural environments. For large parts of Europe, it can be assumed that wilderness and natural landscapes only remain in small fragments and then mostly in inaccessible mountain regions. Three examples of landscapes used by wild bees or honeybees are shown in Fig. 4.

The foraging resource overlap and competition for these resources does not automatically mean that there are disadvantages for the wild bees. It is possible that the wild bees will switch to alternative forage plants/flowers. On the other hand, this can also be pollen of lower quality, or the pollen has to be brought from greater distances [Pechhacker & Zeillinger 1994; Goulson 2003; Walther-Hellwig 2006; Herbertsson et al. 2016]. For many wild bee species, the quality and species-specific requirements of the nesting sites are essential for survival (e.g. a certain soil type, snail shells, dead wood in a certain state of decay, a wall with a specific exposition to the southeast). For the next generation the nesting habitats are often the same as those from which the current adults emerged. Therefore, foraging wild bees are more likely to try to extend the radius of action around a once found nesting habitat than to leave this place to be closer to a potential food source. For many wild bee species with small action radii, however, the long search inevitably leads to a loss of own fitness, and so to direct effects on their population, to the fitness health, the size, the sex and the number of their next year generation [Neumayer 2006; Pfiffner & Müller 2016].

Another factor that can contribute to the competitive situation is the short seasonal occurrence of many wild bee species. Many of these short-lived species, especially those that hatch in March and April, are not disturbed or affected by the placement of honeybee colonies in summer (from May onwards) [Gross & Mackay 1998; Roubik & Wolda 2001; Cane & Tepedino 2017]. The observed shifts in wild bee visitation rates to flowers after honeybee colonies are positioned close by are frequently characterized as unfavorable. However, this often ignores the fact that alternative pollen and nectar sources may be available in sufficient quantities or that wild bees adapt their foraging to another time of day [Paini et al. 2005]. These foraging adaptations do not necessarily mean a loss of fitness for the wild bee species [Wojcik et al. 2018].

Impacts on the reproductive success

There are also many literature sources that indicate that the presence of honeybees have negative effects on reproduction [Thomson 2004; Paini et al. 2005; Roubik & Villanueva-Gutiérrez 2009; Elbgami et al. 2014; Hudewenz & Klein 2015]. For example, if the female wild bees were unable to collect enough pollen for the food packages of the offspring, the larvae develop smaller. This leads to a loss of fitness and a shift in the sex ratio towards more male offspring [Goulson & Sparrow 2009; Elbgami et al. 2014]. In bumblebee colonies, it was observed that the general fitness of the animals as well as the production of new bumblebee queens was lower in the vicinity of honeybee colonies [Elbgami et al. 2014; Walther-Hellwig et al. 2006].

Numerous studies, however, have also been reviewed and shown no detrimental impact of honeybee colonies on wild bees' ability to reproduce. [Steffan-Dewenter & Tscharntke 1999; Paini & Roberts 2005; Paini et al. 2005; Kühn et al. 2006; Roubik & Villanueva-Gutiérrez 2009].

The bigger problem: Loss of nesting habitats

As previously stated, the radius of activity for many wild bee species is only a few hundred meters. Thus, in addition to the competition for food noted above, appropriate nesting locations close to food supplies are essential for successful reproduction. However, honeybees and wild bees do not compete for nesting sites. Many analyzed studies show that it is not the competition for food with honeybees, but the limited supply of nesting habitats in our cultural landscape that is essential [Pechhacker & Zeillinger 1994; Butz Huryn 1997; Goras et al. 2016]. Additionally, this is dependent on the anthropogenic elements of land use and management that were discussed at the outset, both in rural and urban regions. As long as the other environmental parameters are optimally adjusted, the ecological network between species is arranged so that, in theory, the populations of all species have a certain resilience to external impacts (see paragraph on best practice). However, every natural system also has its upper limits, above which the effects become quantitative and visible [Butz Huryn 1997]. It is therefore possible that many of the studies on competition between honeybees and wild bees that were evaluated in this review were carried out in situations where these upper limits had not yet been reached, or that the wild bees studied did not react sensitively enough.

Best Practice

A good example of a study that also deals with the upper limits of food resource availability also shown by a recent repeat study in the Ecological-Botanical Garden of the University of Bayreuth (Germany), where the entire wild bee population from March to October has been recorded several times in the past on an area of 13.5 hectares. In 2002, 147 wild bee species were recorded. The fact that so many wild bee species could be found in such a small area is

quite astonishing. Even more astonishing is the result from the resurvey 2022 (using the same recording method): 214 species [Schanz 2022; Schanz et al. 2023]. Many Red List species, including several with the greatest endangered status, are present among these 214 wild bee species.

Approximately 50 honeybee colonies are located within a radius of 800 m around the study area Ecological-Botanical Garden. Honeybees are omnipresent in the Botanic Garden and certainly exert highly competitive pressure on the wild bee species due to the high density of colonies. The substantial increase in species compared to the previous survey and the long species list (214 of approx. 550 wild bee species in Bavaria on only 13.5 ha) clearly show that the high competition from the many honeybee colonies does not have a negative effect. The reasons are obvious: an (almost) year-round, very rich and varied supply of flowers, no chemical or synthetic pesticides, many weeds left standing by the gardeners, and a wide variety of nesting habitats evenly distributed over the large area. If there is enough of everything for everyone, there won't be any conflicts or issues, and the number and species of wild bees will increase.

A new field experiment

Since January 2024, the IBI (Bavarian Institute of Apiculture and Beekeeping) and the University of Bayreuth are conducting a research project funded by the Bavarian Ministry of Food, Agriculture, Forestry and Tourism to investigate possible competition between honeybees and wild bees in a field study. In selected forest areas in Bavaria, which have so far been free of beekeeper-managed honeybee colonies, the effects on wild bees are being investigated when a large number of honeybee colonies are placed there. To guarantee that the scientists engaged can detect a distinct signal, a deliberate attempt is being made to bring the competitive situation above the threshold value of a negative impact. As indicators the abundance of the wild bee species, the size of the off spring in the next year(s) or the genetical variability are recorded. Each of the nine forest areas has an assigned control area nearby without the introduction of honeybees. One of the aims of this research project is to determine the maximum viable habitat capacity for bee colonies in forest areas, which is dependent on many external conditions (e.g. different weather situations in the years under investigation). In any case, conducting a field experiment to measure competitiveness scientifically is an extremely challenging task. However, an attempt should be made to provide a basis with the latest scientific data on the potential impacts of competition between honeybees and wild bees for discussions to address this challenge. These discussions are being conducted with increasing vehemence and lack of objectivity by sections of society, nature conservation associations, beekeepers and politicians. The beekeeping community must know that competition is always present and that good beekeeping practice in our cultural landscape must always consider the needs of other flower visitors. A negative impact on wild bees however remains ineffective or minimal if the general conditions are right for all pollinating insects, as the best practice example shows. The issue of competition between honeybees and wild bees in our cultural landscape (not in areas, where the honeybee is introduced) is often pushed by groups of people who want to divert attention from the actual causes.

Conclusions

A broad spectrum of anthropogenic induced factors has led to the massive loss of wild bee populations and wild bee species in Central European cultivated landscapes over the past few decades. The most effective factors include the deterioration of habitats due to the intensification of agriculture (monocultural crops) and the resulting loss of floral abundance and nesting habitats [Burger 2018]. Competition with honeybees can have a further negative impact on wild bee populations that are under severe pressure from the aforementioned factors [Mallinger et al. 2016; Mallinger et al. 2017]. Competition is difficult to define and even more difficult to measure [Paini 2004], and it depends on many factors that can hardly be described in an all-encompassing way. Additionally, a very positive example of the best practice is provided, supporting the notion that both pollinator groups are clearly promoted by ideal habitat conditions. Better information will be available in the upcoming years, thanks to a recently started research effort in Bavarian woodland areas.

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SLOVENIA HAS STANDARDIZED GLASS JAR

AND BOTTLE FOR HONEY, HONEY-BASED SPIRITS AND OTHER BEE PRODUCTS

Slovenia, renowned for its rich beekeeping tradition and high-quality bee products, has taken a significant step towards enhancing the recognition and distinction of its local honey and other bee products. The introduction of standardized glass jars and bottles, governed by specific regulations set forth by the Slovenian Beekeepers' Association, marked a new era for Slovenian apiculture.

The use of standardized jar and bottle are regulated

The Regulation about the use of honey jar and bottle for honey-based spirits outlines the conditions under which these glass containers can be used. The primary goal of this regulation is to promote the production and sale of bee products originating from Slovenia. The unique design and labelling of these jars and bottles will help consumers easily identify local products, ensuring that they support Slovenian beekeepers and the integrity of their craft.

Purpose of the glass jar and bottle

According to of the regulations, Slovenian Beekeepers' Association has established these jars and bottles to encourage the consumption of Slovenian honey and bee products. The use of standardized packaging not only enhances the marketability of these products but also fosters a sense of pride among local beekeepers. The distinctive design serves as a mark of quality, differentiating Slovenian bee products from those sourced from other regions.

Specifications of the containers

The glass jars come in four specific sizes, designed to accommodate various quantities of honey:

- 720 ml for 900 g of honey
- 580 ml for 700 g of honey
- 370 ml for 450 g of honey
- 210 ml for 250 g of honey
- 98 ml for 120 g of honey

The accompanying glass bottle for honey-based spirits, such as honey liqueur and honey brandy, is standardized at 350 ml. These specifications ensure that consumers receive consistent quantities and quality in their purchases.

Quality control and accountability

One of the key aspects of this regulation is the accountability it demands from beekeepers and producers. According to regulations, beekeepers must ensure that the honey and other bee products filled in these jars originate exclusively from Slovenia. Furthermore, at least 50% of the product's weight must consist of bee products. This commitment to quality and provenance reassures consumers that they are supporting local agriculture and craftsmanship.

The benefits of standardized packaging

Standardized jars and bottles provide numerous benefits for both producers and consumers. For beekeepers, the use of distinctive packaging can enhance brand recognition, potentially leading to increased sales and consumer loyalty. Additionally, these jars serve as a marketing tool, conveying the message of quality and authenticity associated with Slovenian bee products.

For consumers, the clear labelling and uniformity of these containers simplify the decision-making process.

They can trust that products packaged in these jars and bottles meet the high standards set by the Slovenian Beekeepers' Association, ensuring that they are enjoying genuine Slovenian honey and bee products.

Mojca Pibernik
Consultant for beekeeping economics

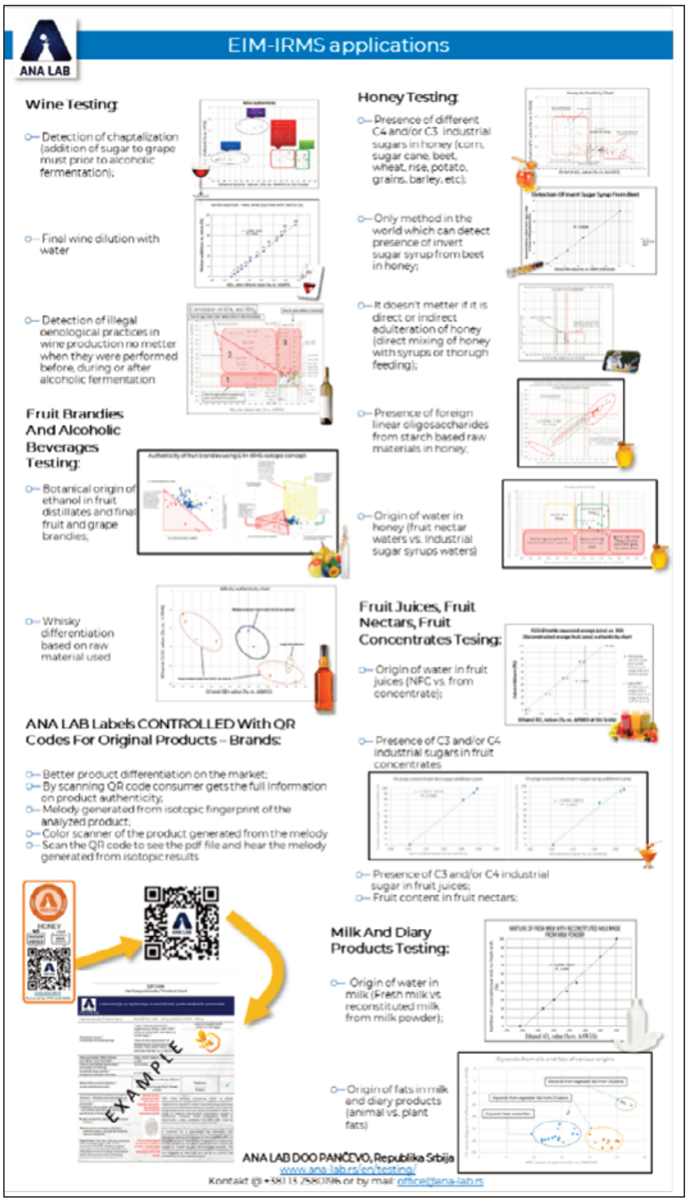
NATIONAL INNOVATION SPOTLIGHT:

SERBIAN OFFICIAL INSTITUTIONS HONOR IVAN SMAJLOVIĆ'S GROUNDBREAKING WORK

We are proud to announce that Ivan Smajlović and his team have received a prestigious Certificate of Appreciation and an award for the "Best Innovation with Market Impact for the first 20 years" in the Republic of Serbia. This recognition highlights their groundbreaking innovation based on the analytical isotope concept, which focuses on detecting and preventing economic fraud in food and beverages. The award was presented by the organizing team of the national competition for the best technological innovation in Serbia comprising of the Ministry of Science and Technological Development, the Chamber of Commerce, the Faculty of Technology and Metallurgy at the University of Belgrade, the Faculty of Technical Sciences at the University of Novi Sad, the Institute for Applied Chemistry, Technology and Metallurgy (IHTM), and Serbian National Television, commemorating the first 20 years of the competition's existence at the national level. The Certificate of Appreciation was

signed by the Minister of Science and Technological Development, Dr. Jelena Begović, further underscoring the significance of this achievement.

Ivan Smajlović's innovative EIM-IRMS isotopic concept has been instrumental in address-



ing critical challenges in the food and beverage sector. The set of over 10 high end analytical methods developed under the umbrella of the EIM-IRMS technology by Ivan and his team allow for the precise determination and detection of economic fraud in products such as wine, honey, fruit brandies, milk and dairy products, fruit juices, fruit nectars, and fruit concentrates.

This analytical concept has had a profound impact on the market in the Republic of Serbia. It has been particularly effective in identifying fraudulent practices that undermine the competitiveness of domestic producers and in uncovering hidden defects in imported goods. Last year, during a consumer protection initiative in Serbia, the EIM-IRMS isotopic approach played a pivotal role in detecting serious non-conformities in goods predominantly imported into the country. These findings revealed the extent to which such practices negatively affect the domestic market, further emphasizing the importance of this innovation in protecting both producers and consumers.

The significance of this innovation was first recognized in 2015 when Ivan Smajlović and his team "Analytics" participated in the national competition for the best technological innovation in the Republic of Serbia. Their innovation was acknowledged as a groundbreaking technology capable of enabling a serious fight against unfair competition, curbing value-added tax evasion, and protecting the state budget from tax fraud while ensuring equal contribution and income tax collection.

The EIM-IRMS concept's ability to uncover and address these issues is a testament to its technological sophistication and market relevance. This recognition not only celebrates the team's achievements but also reinforces the importance of fostering innovation to enhance transparency, quality, and fairness in the food and beverage industry.

SMALL BEEKEEPING SCHOOL

Every fall season since 2007, when the workload of the beekeepers is reduced, Zagreb Beekeeping Society has held a course in beekeeping. This 'Small Beekeeping School' is completely free for all the participants and is partially funded by the City of Zagreb. It consists of theoretical and practical segments. Participants can attend the theoretical segment online or in person at the society, and the practical segment is held partially at the society and partially at the beehives of one of our most experienced members, Luka Šebelić.

This year 71 people have applied to participate, of those 24 attended in person and 47 attended online. The course accepts anyone, whether they have interest in bees and how they function, novice beekeepers, experienced beekeepers who want to refresh their knowledge, nature lovers who want to learn about the impact of bees on the environment or people who want to learn about the health benefits of bee products.

First part of the course is theory, during five evenings lecturers tackled different beekeeping subjects. A new handbook was prepared for the

top and hat, so they could observe the bees up close. They had the opportunity to observe the inner workings of the hive and see first hand how the bees are treated for varroa.

The second practical part of the course was held at the society. M.Sc. Damir Salopek, Dragutin Vedak and Darko Makarun presented different types of hives. The LR (hive) and AŽ (Alberti – Žnideršič hive) were presented, as these are the two types most commonly used in Croatia. It was explained to attendees how the hives work and

attendees and everyone received a copy at the start of the course. First evening M.Sc. Nenad Strižak introduced the attendees to the basics, in a lecture about the life of bees. Evening after, Luka Šebelić had an informative presentation on the subject of types of beehives and beekeeping tools. Third day, current president of the beekeeping society, Dragutin Vedak spoke on beekeeping technology. On evening number four M.Sc. Jasminka Papić thought about bee products for consumption and health benefits. For the final evening Assoc.Prof. Lidija Svečnjak, PhD talked about production, composition and quality of beeswax.

The first practical part of the course took place at the beehives of aforementioned member, Luka Šebelić. Here the attendees were instructed to come equipped with a beekeeping

how a beekeeper wires and prepares the frames for the hive.

This course in beekeeping grows with every year. It is not only one of the rare opportunities for people interested in bees to start their beekeeping journey but also an informational free workshop for our fellow citizens. It provides education about the work of beekeepers and demystifies the life of bees and their place in our everyday life. But above everything the course provides the needed knowledge for novice beekeepers to start beekeeping properly, so they can properly care for their bees and give their bees the best chance to survive and thrive in the increasingly perilous environment.

Nina Rac
Member of Beekeeper
Society Zagreb

A new book

MY BEES, MY DREAMS: A TRIBUTE TO WOMEN IN BEEKEEPING

The remarkable book My Bees, My Dreams was recently published, the result of work by the president of the Croatian Apitherapy Society, Gordana Hegić, and a group of eleven authors. Among them are ten Croatian beekeepers—Gordana Hegić, Jadranka Luketa-Marković, Nataša Bronzović, Josipa Kujundžić, Valentina Salopek, Tanja Schleis, Romina Kanjer, Maja Trstenjak, Nikolina Kralj Vlahek, and Vesna Kovačević—and one beekeeper from Slovenia, Nina Ilič from Kočevje, the author of Apipedagogy.

Editor Dr. Gordana Hegić conceived this book as a tribute to women in beekeeping, a field that is still predominantly seen as male-dominated. With this work, she aims to demonstrate that women not only make significant contributions to the development of beekeeping but also bring fresh ideas, perspectives, and innovation with their enthusiasm, hard work, and creativity.

"Each author in the book My Bees, My Dreams can serve as an inspiration to women, both in urban and rural areas. Their stories prove that it is possible to live your dreams, no matter how big or small the first step may be," emphasizes Gordana Hegić. "A special place in the book is dedicated to Nina Ilič from Slovenia, who has demonstrated with her innovative approach to pedagogy—Apipedagogy—what can be achieved when a woman has the knowledge, the right support, and determination."


Gordana Hegić

Nina Ilič

Jadranka Luketa-Marković

Nataša Bronzović

Josipa Kujundžić

Valentina Salopek

Tanja Schleis

Romina Kanjer

Maja Trstenjak

Nikolina Kralj Vlahek

Vesna Kovačević

PČELARKE SU POSEBNE ŽENE. Snažne su i pune ljubavi. Imaju hrabrosti živjeti svoje snove i pri tome čitav svijet, a posebno svoje okruženje, čine boljim i ljepšim mjestom i to ne samo kroz svoj posao nego i kroz volonterske aktivnosti u zajednici u kojoj žive. Baš poput pčela one svojim radom i djelima utječu na ljepotu i kvalitetu života ljudi oko sebe.

Često se susrećemo sa ženama koje su izgradile uspješne karijere kao modne dizajnerice, frizerke, kozmetičarke, novinarke ili političarke. No jeste li ikada upoznali ženu čija je želja baviti se poljoprivredom, konkretnije pčelama i pčelarstvom? Živjeti u ruralnom području ili pokrenuti svoj vlastiti posao?

Nadamo se da će ova knjiga doprijeti do što većeg broja žena u ruralnim sredinama koje će imati hrabrosti ostvariti takve svoje želje i suočiti se s izazovima koje nosi samozapošljavanje i poduzetništvo. Također se nadam da će ove priče doprijeti do onih koji mogu pomoći da se pčelarstvu kao profesiji udahne suvremeni trend razvoja koji se temelji na profesionalizaciji pčelarstva i životu od svojega rada.

dr. sc. Gordana Hegić

Predsjednica
Hrvatsko apiterapijsko društvo

ISBN 978-953-46321-0-9

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Stories of Women Living Their Dreams

The book gathers eleven stories, each uniquely reflecting the love, dedication, and innovation of women in beekeeping. From exploring apitherapy—which uses bee products to support health—to family stories of life with bees, and educating children and adults through Apipedagogy, each story demonstrates the need to better recognize and appreciate the role of women in beekeeping.

Gordana Hegić firmly believes that women in beekeeping deserve greater recognition. “It often seems that the role of women in beekeeping is limited to baking honey cakes and making other products. But the reality is far more complex. Women have an incredible ability to create, build communities, and connect people through their work with bees,” highlighted the editor.

Gordana Hegić: A Life Dedicated to Bees

Gordana Hegić has dedicated her life to working with bees and bee products. Through a candid and personal narrative, she guides readers along her journey—from overcoming her initial fears and taking her first steps in beekeeping to her love for learning and committing herself to advancing apitherapy in Croatia. She vividly recounts her entry into entrepreneurship, the story of patenting her cosmetics line, her ups and downs, her impactful work in the Apitherapy Society, and the challenges of navigating an unregulated market. She also shares the profound loss of her father, a period in her life that co-shaped her path. She collaborates with doctors and pharmacists in her work. Without her, apitherapy in Croatia would not be as successful and professional.

With love and gratitude, Gordana highlights her mother's unwavering support, who has stood by her side through all the challenges. Despite numerous obstacles, she optimistically looks toward the future, fueled by her passion and determination to create a better world for beekeepers and the broader community.

More Than Just a Book

My Bees, My Dreams is not just a collection of stories but also a call to action. It is intended for all women who want to enter the world of beekeeping or simply draw inspiration for achieving their dreams. Dr. Hegić hopes that the book will reach a wide audience and encourage relevant institutions to support women beekeepers who are creating new products and innovative projects.

Female beekeepers are extraordinary women. They are strong, full of love, and have the incredible courage to follow their dreams. At the same time, like bees, they create a more beautiful world. Their work improves their lives and the lives of the communities in which they operate. Let this book prove that dreams are achievable and that each of us has the power to make the world a better place.

Final Thoughts

The book My Bees, My Dreams is a testament that women beekeepers, with their effort, knowledge, and love for nature, are not only guardians of bees but also pillars of development, innovation, and community. Their stories remind us that the connection between tradition, knowledge, and new ideas is the key to a successful future for beekeeping.

This book is essential reading for all lovers of nature, beekeeping, and life stories—full of warmth, inspiration, and invaluable insights into women who prove with their work that all dreams are achievable if we believe in them.

The book is currently available in Croatian and will be translated into English within a year. If you would like to order the book, please contact: info@api-had.hr.

Nina Ilič
Apitherapist and Coordinator of the API Kindergartens and Schools Network
APIS RETIS
Slovenia

SERBIAN FEDERATION OF BEEKEEPING ORGANIZATION'S

XVI STATE BEEKEEPING FAIR

February 8-9, 2025

Hall 2 of the BELGRADE FAIR

Additional information on the website:

https://spos.info/konacni-program-xvi-drzavnog-pcelarskog-sajma/

(Choose English on the Menu)

FINAL PROGRAM OF THE XVI STATE BEEKEEPING FAIR IN BELGRADE

Entry for citizens, consumers of bee products is still free, as the entry for Serbian Federation of Beekeeping Organization's (SPOS) members (members must bring their SPOS ID card, which provide a free entry, but they must be a member for 2025 in order for active ID card), and entrance for beekeepers who are not in SPOS is 4.3 EUR for one entry.

You can read everything about parking at the link: https://spos.info/promene-po-pitanju-parkinga-na-sajmu/.

This year too, the Fair will be organized with the significant support of GIZ, to whom we sincerely thank for their support!

Working hours:
9.00-18.00 (Saturday), 9.00-16.00 (Sunday)

SATURDAY, February 8th 2025

10.00-10.30 Opening ceremony with awarding of prizes for the best hones within the Second National Honey Evaluation.

10.30-12.00 **EUROPEAN SYMPOSIUM "SCIENCE AGAINST FORGERS"**

European Beekeeping Association (EBA)
Serbian Federation of Beekeeping Organizations (SPOS)

Organize

EUROPEAN SYMPOSIUM "SCIENCE AGAINST FORGERS"

The symposium "SCIENCE AGAINST FORGERS" will gathered the leading European laboratories for the detection of fake honey, which threaten beekeepers and beekeeping today like never before, leading it into a bottomless abyss, considering that honest beekeepers and businessmen can no longer do their business, because they are completely defeated by disloyal competition.

The following guests were invited as participants of the Symposium who will presenting their views and achievements, and also participate in a panel discussion:

- Representatives of the leading European laboratories for detecting fake honey
- Representative of the European Commission of the European Union
- Representative of the competent Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia
- Representative of the competent Ministry of Internal and Foreign Trade
- Representative of the consumer movement
- President of the European Beekeeping Association Boštjan Noč (Slovenia)
- President of the Serbian Federation of Beekeeping Organizations, spec. Dr. med. Rodoljub Živadinović

Simultaneous translation into Serbian language will be provided through loudspeakers for all gathered visitors, and into English language through headphones for the invited participants of the Symposium.

Attendance at the Symposium is free for all visitors to the XVI National Beekeeping Fair. Entrance fee to the fair is 4.3 EUR, and it is free for members of the Serbian Federation of Beekeeping Organizations.

12.00-15.00 **PROFESSIONAL LECTURES**

12.00-14.00 Lecturer: **Derek Mitchell PhD, United Kingdom**, University of Leeds, School of Mechanical Engineering,

Dr Derek Mitchell researches into the heat transfer of man-made and natural honeybee nests at the School of Mechanical Engineering of the University of Leeds where he recently completed his Phd with a thesis entitled "The Thermofluid engineering of the honeybee nest (Apis Mellifera). This curiosity has resulted in his ground breaking and often controversial research into honey bees. He has had articles published in Beecraft, Bee Culture, American Bee Journal and Natural Honey bee husbandry in addition to his published academic work in the Royal Society Journal and International Journal of Biometeorology.

Lecture 1: "NEW KNOWLEDGE ABOUT THE VENTILATION OF THE BEEHIVE AND THE NATURAL HABITAT OF BEES WITH AN ANALYSIS OF THE INFLUENCE OF WATER VAPOR OBTAINED FROM THE EVAPORATION OF NECTAR ON THE CONTROL OF VARROA DESTRUCTOR"

Lecture 2: "HOW THE DESIGN, THE THERMAL CONDUCTIVITY OF THE HIVE AND THE ENERGY ASPECTS OF REMOVING EXCESS WATER FROM THE NECTAR CAN INFLUENCE THE IMPROVEMENT OF HONEY YIELD IN CORRELATION WITH THE DISTANCE OF THE HONEY PASTURE FROM THE HIVE".

Translator: Jevrosima Stevanović, Prof. PhD, Faculty of Veterinary Medicine.

14.00-15.00 Lecturer: **Asli Özdemir Özkirim, Prof. PhD, Turkey**, Hacettepe Department of Biology, Ana Sayfasi University, Ankara

She is the director of the Laboratory for Bee Diseases, the international coordinator of the Nosema experiment, a member of COLOSS, an expert in microbiology, a member of the Scientific Committee for Bee Health of the European Beekeeping Association and a scientific advisor to the Beekeeping Association of Turkey.

Lecture: "EFFECT OF CHITOSAN AGAINST VARROA AS A MEDICINE FOR WOUND HEALING AND PREBIOTIC"

SUNDAY, February 9th 2025

INNOVATIONS IN BEEKEEPING

11.00-12.30 **Presentation of all reported innovations in the lecture hall - competitive part**

(The main criteria for evaluating innovations will be: 1. Simplicity of application in practice; 2. Improving the economics of beekeeping through innovation)

All applications should be sent to the e-mail address of the chairman of the Commission for Evaluation of Innovations, Dejan Milošević from Požarevac (pcelar.milosevic@gmail.com), or by post to his address: village Drmno, 12208 Kostolac, no later than December 31, 2024. Contact phone: 063/221–501. The innovation application should contain a short technical description, photos or a video. Bring all innovations to the fair no later than Sunday, February 9, 2025, by 9 a.m.

Innovations that apply for the competitive part can be exhibited at the Fair without compensation (exclusively without sales), but with a prior application to the e-mail spos.rs@gmail.com, in order to determine the place of exhibition (innovators themselves provide a stand no larger than one square meter, or exhibit without a stand on the same surface). All exhibitors take care of their exhibits from the opening to the closing time of the Fair.

13.00-13.30 **Winners Awarding for beekeeping innovations** (1st, 2nd and 3rd place)

The best innovator also gets a free stand at the Beekeeping Fair in Celje, Slovenia in 2024.


Bienvenue!
Welcome!
Добро дошли!


INOVACIJE
ZLATNA DOLINA
BERGAM PETEK
SVE ZA PČELARE ZLATNA DOLINA
apivita

EXHIBITION CONDITIONS AT THE FAIR

Each exhibitor of beekeeping equipment is obliged to hand over the privileged fair price list of all products to the organizer immediately before the start of the fair, as well as to display it in a visible place on the stand and to strictly respect it. Raising prices during the fair is not allowed, and if it happens, the exhibitor will not be able to exhibit at the fair for the next two years, and will be removed from the fair immediately upon establishing the violation, the same applies if he does not display the price list in a visible place on the stand.

SPOS again provided significantly more favorable prices for the exhibition area than regular fair prices, since the fair proved to be an exceptional opportunity for the placement of larger quantities of honey from our beekeepers, placement of equipment at favorable prices for beekeepers and especially for contracting future jobs - which is an increasingly frequent phenomenon that it brings the biggest profit to the exhibitors, due to the visit of a large number of foreign buyers of wholesale equipment.

This year too, we managed to keep the exclusive Hall 2 for our fair, which we used for the first time in 2013.

EXHIBITION PRICE LIST

The full registration fee for all exhibitors is 232 EUR (+VAT 20%), for stalls and stands up to 6 m2. For SPOS members who exhibit only bee products, the price is reduced to only a third of the full price, i.e. is 77.33 EUR (+VAT 20%).

It is forbidden to use one stand for more than one exhibitor, otherwise the holder of the stand will be obliged to pay double registration fee to SPOS at the next SPOS national beekeeping fair in which he participates, plus he will be removed from the fair immediately after the violation is established. Selling products outside Hall 2 is strictly prohibited by the rules of the Belgrade Fair, and in addition to bearing the consequences in accordance with the rules of the Belgrade Fair, the person who is found to be engaged in such activities is also obliged to pay double registration fee at the next SPOS beekeeping fair in which he participates, plus immediately after establishing the violation, he will be removed from the fair.

The sale of raw materials (hourly basis...) and equipment is strictly prohibited, at the stands intended for the sale of honey bee products and bee products, and those exhibitors' will be immediately removed from the fair, and they are also obliged to pay double registration fee at the next SPOS beekeeping fair in which he participates

The registration fee for the exhibition of beekeeping literature is preferential in a special way.

Rented stands can ONLY have an EVEN number of occupied square meters, and cannot be narrower than 2 m wide.

REGISTRATION PRICES (excluding VAT 20%)

Equipment and other (for stalls and stands up to 6 square meters)*: 485 EUR

Equipment and other (for stands from 8 to 12 square meters)*: 537 EUR

Equipment and other (for stands from 14 to 24 square meters)*: 589 EUR

Equipment and other (for stands from 26 to 60 square meters)*(For stands bigger than 60 square meters, for every started new 10 square meters, it should be paid additional 19 EUR): 743 EUR

Bee products (for companies and non-members of SPOS)*: 485 EUR

Bee products (for SPOS members)*: 162 EUR

Literature (in written and electronic form)*: 29 EUR

Occupying space outside of the exhibition stand is not allowed. If any of the exhibitors does that, they will be immediately removed from the fair.

It is not allowed to sell any products other than bee products (including mixtures and products based on bee products) on stands for which

a preferential registration fee has been paid for SPOS members for the display of bee products and products based on them. In the event that this happens, the exhibitor will be immediately removed from the stand, and he is also obliged to pay double the registration fee to SPOS at the first subsequent SPOS national beekeeping fair in which he participates. Exhibiting beekeepers - members of SPOS, who pay a preferential registration fee, on the day of payment of the registration fee, must be members of SPOS in both 2024 and 2025 in order to exhibit under preferential conditions.

All exhibitors are obliged to market their goods at the fair in accordance with legal regulations, otherwise they bear full legal responsibility.

Application for participation in the fair is carried out according to the following procedure. First, make a payment to the SPOS account and a payment slip with information written on the prescribed form (name and surname, full address, telephone numbers, e-mail, list of everything you are exhibiting, name of the beekeeping company through which you member of SPOS) you send to the address of SPOS with the indication "For the fair". You must also submit the exact text that you want to be placed above the stand, on the surface intended for that purpose that is part of the stand (name of the company, name of the beekeeping farm, letter on which the text will be written - Cyrillic/Latin, your first and last name, etc. desire). If you do not provide this text, the organizer will write your first and last name. Printing is included in the price of the stand.

Exhibitors from abroad for payment instructions they must contact SPOS accountant Jagoda Milenkovic on phones (011) 61-28-071, (060) 444-01-24, working days from 9 until 12 noon, or by e-mail: sposbg@sezampro.rs or spos.rs@gmail.com.

MANDATORY FAIR STANDS FOR EVERYONE

In addition to the registration fee, ALL exhibitors are required to rent a stand from the Belgrade Fair, with no exceptions (except: innovations without sales, historical exhibits). The marketing performance should be adapted to the chosen stand.

So, to clarify, the total amount for exhibiting at the fair is obtained when the value of the registration fee and the price of renting a stand from the Belgrade Fair are added.

The Belgrade Fair offers exhibitors the rental of several typical stands or stands of their choice. To rent standard stands, contact the Fair directly, i.e. Ljiljani Andrejević at 063/342-771 and 011/2655-121, email: ljiljana.andrejevic@sajam.rs, no later than January 15, 2025. Exhibitors who do not rent a stand exclusively from the Belgrade Fair until December 31, 2024, will not be allowed to exhibit at the Fair, and have the right to a refund of 50% of the value of the paid registration fee without VAT, which SPOS will return to them no later than May 31 in 2025.

Basic stand 4 m^2 (trisi structure, company inscription above the stand, counter 2×1 m, two chairs with a place to stand 2×1 m), at a price of 65 EUR (+VAT) for the entire duration of the fair (2 days).

Typical standard stands (3 types) were also offered at a price of 21 euros i(+VAT) per m^2. For the same price, you can also order stands of your choice. The minimum size of the stand is 6 m^2.

Other prices apply to exhibitors from abroad for stand construction, and these exhibitors must contact the aforementioned Ljiljana Andrejević for additional information.

THE OTHER

It is provided: free parking for exhibitors located right next to the Hall, heating of Hall 2 on both days of the fair, the hall available for setting up stands and other elements the day before and one day after the fair, cleaning of the Hall during all days. According to commercial conditions, all exhibitors can get electricity, water, telephone, internet connection, rental of marketing spaces outside Hall 2 (contact Ljiljana Andrejević directly at 063/342-771 and 011/2655-121, email: ljiljana.andrejevic@sajam.rs, no later than December 31, 2024). After that date, you won't be able to get these add-ons.

OBTAINING MARKETING SPACE IN HALL 2

Obtaining marketing space in the Hall, outside the exhibitor's stand, is paid to SPOS in addition to the registration fee, 25 EUR (+VAT), per meter of the longer side of the advertisement, or 15 EUR (+VAT) for advertisements whose longer side is shorter than one meter. The exhibitor himself creates the advertisement and chooses a place for it on the fence of the gallery and places it himself (in accordance with the safety regulations), as well as in other places in Hall 2 that the Fair and SPOS can offer. There is an additional fee for placing advertisements by the Fair.

Placing advertisements in the dimensions of the stand is allowed free of charge, but if it is noticed that the exhibitor has placed advertisements outside the dimensions of the stand or on the external panels of the stand, without paying for it in advance, he is obliged to immediately pay and bring a payment slip to the organizer in a value that is 3 times higher than regular, or to remove the ad immediately.

APPLICATION FOR PARTICIPATION IN XVI NATIONAL BEEKEEPING FAIR

Company name with name and surname of the owner; Name and surname (for those who do not have a company); Full address; Landlines; Mobile phones; Mail; Name of the company/association through which you pay the membership fee to SPOS (for exhibitors of bee products who do not have a company); Amount of registration fee paid to SPOS; Date of payment of registration fee to SPOS; The type of exhibition space (stall or stand) that you will rent from the Fair; Square footage of the stall or stand you will rent; The text you want to be printed on the stall or stand; Exhibitor's signature; A list of everything you exhibit.

EBA MADE A FLAG

EBA made flags.
You can buy it
for 50 euros + shipping

Orders to ines.zunic@czs.si

BEES LIFE

Ulster Beekeepers Association

ANNUAL CONFERENCE

Friday 14th to Saturday 15th February 2025

CAFRE, Greenmount Campus, 45 Tirgracy Road, Antrim BT41 4PS

READING OUR BEES

THE NEXT CHAPTER

Two days of Science, Practical Beekeeping & Workshops covering:

Introductory Beekeeping, Microscopy, Working with Wax, Encaustic Art, Skep Making, the ever popular Mead Making, and more!

Featuring an Extensive Trade Exhibition

EXPERT SPEAKERS INCLUDE:

Prof Lars Chittka – Queen Mary University of London

Dan Basterfield - BBKA Master Beekeeper

Colm O'Neill – North Kildare Beekeepers Association

Ruth Wilson – AIPP Farmland Pollinator Officer

Dr Rowena Jenkins – Microbiologist, Swansea University

Ass. Prof Dalial Freitak – University of Graz, Austria

Richard Noel – Brittany Bee Farmer

Prof Robert Paxton – Martin Luther University, Germany

Lock this important conference into your diary now!

BOOKING OPENS ON 1st OCTOBER 2024 ON-LINE AT:

https://buytickets.at/ulsterbeekeepersassociation/1321240

For more information contact: Brian Grzymek - Conference Organiser
Email: bgrzymek@icloud.com or Visit our Website: www.ubka.org

Discover opportunities and inspiration at APIS Slovenia I Europe, the key event for all beekeeping enthusiasts and business opportunities!

We invite you to visit the beekeeping fair in Slovenia, which has a tradition of over 45 years and takes place alongside the Beekeeping Association of Slovenia at the Celje Fair. The fair is one of the five March fairs that attract nearly 20,000 visitors every year. It will be held from March 15th to 16th, 2025. This time, we are expanding the fair to include European exhibitors – the fair will become APIS Slovenia I Europe. Many exhibitors have already signed up, and this is an opportunity for you too!

If you would like to attend as an exhibitor, please register as soon as possible via the link below. If you are coming as a visitor, make sure to mark these dates in your calendar. It is no coincidence that this fair event takes place in Slovenia – the headquarters of the European Beekeeping Federation is also located here, led by Boštjan Noč, president of the Beekeeping Association of Slovenia. This connection strengthens Slovenia's position as a globally recognized country in the field of beekeeping.

At the Celje Fair, we take the most pride in introducing new content to our fair events. We have recognized beekeeping as an area with a strong mission. With APIS Slovenia I Europe, we are taking the next step – connecting and expanding the influence of this industry, not just in Slovenia but across Europe. The fair will offer excellent opportunities for knowledge exchange, networking, and showcasing innovations. The rich exhibition and educational program will include the presentation of the latest equipment, technology, and innovations for the preservation of bees and sustainable production.

The Beekeeping Association of Slovenia organizes interesting lectures every year, where experts, members of scientific commissions, and prominent speakers discuss the most promising topics in beekeeping, such as the quality and safety of bee products and bee health protection.

Exhibitors will have the opportunity to present their products and services to a


Celjski sejem


Celjski sejem

broader beekeeping community, establish business contacts, and contribute to the sustainable development of the industry.

When you visit APIS Slovenia I Europe, you will also have the chance to explore four other exceptional fairs – Hunting Days, Sports Shooting Days, Altermed & Flora, and the KulinArt Festival, starting a day before the beekeeping fair, on March 14th, and lasting until March 16th.

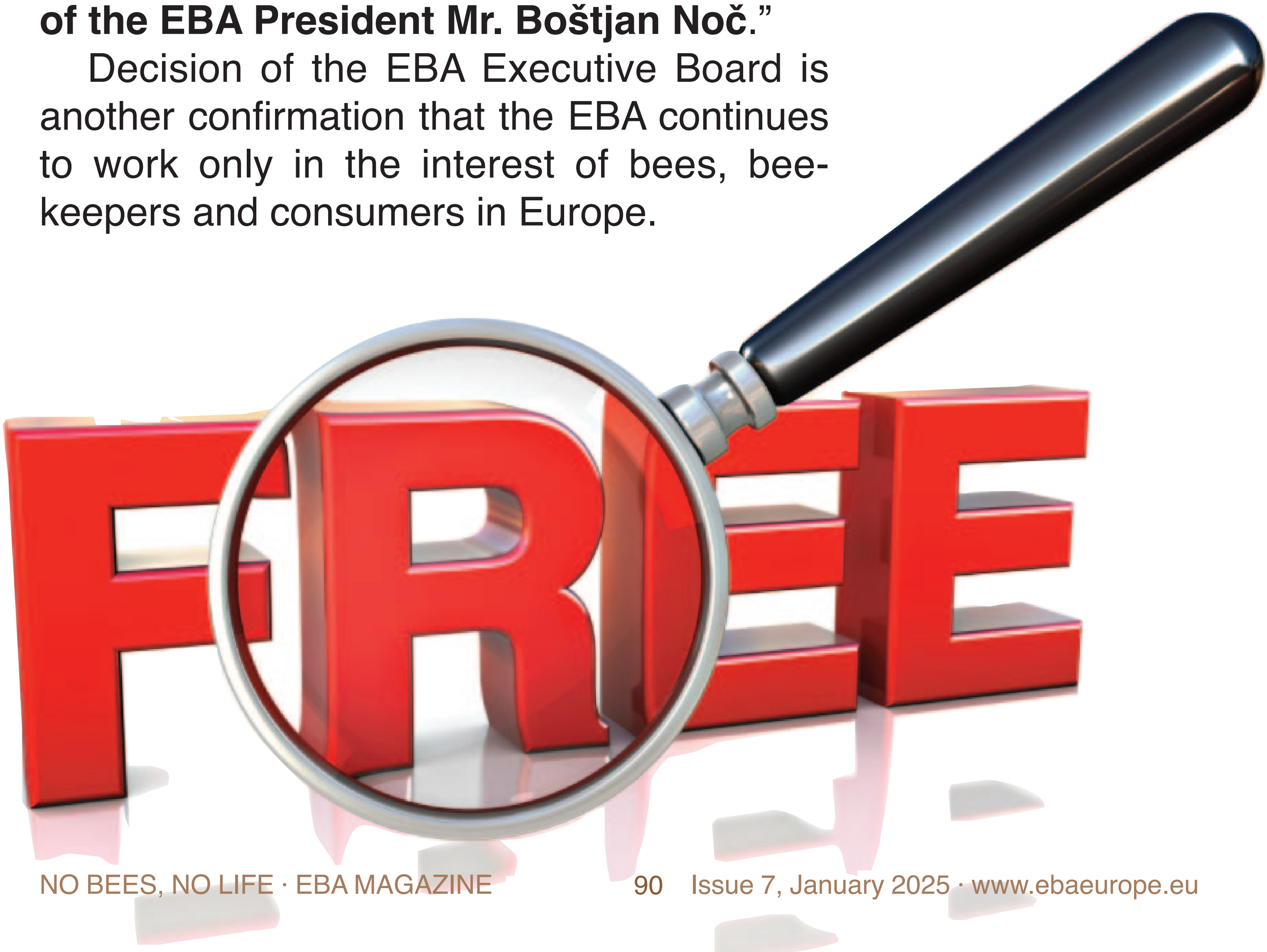
Believe us, this is an event you cannot miss, as you will not only gain insight into the latest in beekeeping, but also discover new and incredibly diverse and fascinating content in hunting, sports shooting, healthy lifestyles, sustainable self-sufficiency, and boutique culinary delights.

For more information and registration for potential exhibitors: irena.skorja@ce-sejem.si
Visit the website: https://ce-sejem.si/en/fairs/march-fairs/for-exhibitors/
The Celje Fair team invites you to the most diverse and enriching spring fairs!

TO THE EBA WITHOUT MEMBERSHIP FEE

At the meeting of the EBA Executive Board, on the proposal of the EBA President Mr. Boštjan Noč, an important decision was made regarding membership in the EBA in the upcoming period: "**Membership in the EBA is free for the duration of the mandate of the EBA President Mr. Boštjan Noč**."

Decision of the EBA Executive Board is another confirmation that the EBA continues to work only in the interest of bees, beekeepers and consumers in Europe.



SPONSORSHIP REQUEST

AND METHOD OF ADVERTISING IN THE MAGAZINE

On behalf of the European Beekeeping Association (EBA),I am writing to seek your support in the form of sponsorship to help ensure the smooth and effective operation of our Association.

The EBA is dedicated to promoting and supporting beekeeping across Europe. The Association was founded out of necessity, as bees and beekeepers are essential for our ecosystem and society. Without beekeepers there are no bees, and whithout bees there is no pollination, leading to a lack of food on planet Earth.

EBA works for bees, beekeepers and consumers.

Our mission is to:

1. Fight against counterfeit honey that flooded the European market;
2. Introduction of incentives per beehive as agro-ecological programme;
3. Fight against the improper use of chemicals that are harmful to bees;

In return for your generous support, we offer various sponsorship benefits. We believe that this partnership would be mutually beneficial and would significantly contribute to the advancement of the european beekeeping sector.

ADVERTISING IN THE MAGAZINE:

1. Through sponsorship packages;
2. It is possible to pay for an ad only for 1/4 page (100 euros), for a larger area by agreement. The entire page cannot be obtained, it belongs only to the General Sponsor.

IT CONTINUES →

EBA sponsorship packages

GOLD sponsor - 5.000 euros:
Advertisement on the EBA website
Presentation at all EBA events, logo on all EBA correspondence
12 advertisements in the EBA monthly e-magazine in A4 page size

SILVER sponsor - 3.000 euros:
Advertisement on the EBA website
Presentation at all EBA events, logo on all EBA correspondence
12 advertisements in the EBA monthly e-magazine in half A4 page size

BRONZE sponsor - 2.000 euros:
Advertisement on the EBA website
12 advertisements in the EBA monthly e-magazine in the size of 1/4 A4 page

EBA SUPPORTER - 1.000 euros:
Advertisement on the EBA website
12 advertisements in the EBA monthly e-magazine in the size of 1/8 A4 page

These are basic packages, but we are open to different forms of cooperation, which we agree on individually. We would be delighted to discuss this opportunity further and explore how we can align our goals with your organization's values.

Thank you for considering our request. We look forward to the possibility of working together.

Yours sincerely,

Boštjan Noč
President of the European Beekeeping Association

CONTENT

EBA informative and professional monthly magazine “NO BEES, NO LIFE”

January 2025.
Issued since July 2024.
Publisher: **European Beekeeping Association** (EBA)
Head office: Brdo pri Lukovici 8, 1225 Lukovica, SLOVENIJA
eba@ebaeurope.eu
www.ebaeurope.eu

The editor reserves the right to publish a larger advertisement than the size specified by the sponsorship package, if it improves the design of the magazine.

Advertising in the magazine: 1. Through sponsorship packages; 2. It is possible to pay for an ad only for 1/4 page (100 euros), for a larger area by agreement. The entire page cannot be obtained, it belongs only to the General Sponsor.

The total number of pages in the magazine is not fixed.

There are no fees for published texts and photos.

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