Issue 24 · June 2026

NO BEES LIFE

EBA MAGAZINE

32 COUNTRIES

FROM WHICH EBA HAS MEMBERS

(65 beekeeping organizations)

In order of confirmation of the Statute of EBA

430.584 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*
Portugal
Spain
Slovakia
Austria
Albania
Iceland
Estonia

GENERAL SPONSOR

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EUROPEAN BEEKEEPING ASSOCIATION

SAVA
INSURANCE
GROUP

AMONG GOOD PEOPLE

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ZAVAROVALNA
SKUPINA

V DRUŽBI DOBRIH LJUDI

SILVER SPONSOR

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CLEAR ORIGIN. CLEAR CHOICE.

FROM 14 JUNE 2026, EVERY JAR OF HONEY IN THE EU MUST BE LABELED WITH THE EXACT COUNTRY OF ORIGIN.

A GREAT VICTORY FOR BEEKEEPERS AND PROTECTION OF CONSUMERS!

THE ORIGIN OF HONEY BLENDS WILL FINALLY BE CLEARLY LABELED!

The Rules on the Quality and Labeling of Honey will come into force on 14 June 2026. The key change, which transposes Directive (EU) 2024/1438, relates to the more precise labeling of the origin of honey blends. Instead of the current wording "blend of EU and non-EU honeys," the packer will be required to state all countries of origin of the honey blend in the main field of vision of the product, along with their respective percentages in descending order. Honey placed on the market or labelled in the old manner before 14 June 2026 may continue to be marketed until stocks are exhausted. With this change, consumers will be able to make a more informed decision on whether to buy a honey blend from two, three, five, or more countries, or prefer to choose local.

Of course, this does not entirely solve the issue; it is merely a step in the right direction, which nevertheless brings numerous challenges, especially regarding the verification of the information stated on the packaging. Therefore, raising consumer awareness about the importance of local honey remains extremely important.

Beekeepers and conscious consumers must also contribute to verifying the accuracy of the origin declarations of honey blends in shops. Therefore, the European Beekeeping Association will collect anonymous reports of violations of the new legislation. We call upon everyone to visit grocery stores after 14 June 2026, and check the accuracy of the origin labeling. We have published a form (QR code) on the EBA's website through which you can submit a report. We will gather these reports and forward them to competent national institutions for monitoring the adequacy of food labeling.

Boštjan Noč

President of the European Beekeeping Association
and President of the Slovenian Beekeepers' Association

THE CONSUMER IS KING!

Back in the distant year of 2018, the Slovenian Beekeepers' Association embarked on a mission that seemed unrealistic to many at the time. To me, it represented a great challenge in the lines of 'The impossible is possible!' A long and thorny path began with a clear message: THE CONSUMER IS KING and has the right to know where the honey they buy comes from.

We presented this initiative to the public at the Agra fair on August 26, 2018, and a joint declaration in support of the Slovenian Beekeepers' Association was signed by the beekeeping associations of Bosnia and Herzegovina, Montenegro, Croatia, Macedonia, Republika Srpska, and Serbia. On the same day, we co-signed the same initiative with the company Medex d.o.o. At this point, I would like to thank all the co-signatories for believing in the initiative back then and supporting the visionary idea of Slovenian beekeepers.

Dr. Andreja Kandolf Borovšak, who professionally managed this project at the Slovenian Beekeepers' Association, and I were often ridiculed at the time. We heard day in and day out that we would never succeed and that we had set too big a goal. Trade lobbies and 'counterfeiters' would never allow it, we were told. This was not only said in Slovenia. Even at the Apimondia World Beekeeping Congress in 2019 in Montreal, Canada, many European beekeepers publicly doubted the success of our Slovenian initiative, even though deep down they wished that we would succeed one day.

Our idea was backed with full energy by the State of Slovenia. The proposal for the European Union was prepared by the Ministry of Agriculture, Forestry and Food. In this initiative, we did not divide ourselves into left and right, into ours and yours. It was started by Minister Aleksandra Pivec, continued by Minister Jože Podgoršek, followed by Minister Irena Šinko, and concluded by Minister Mateja Čalušić. Bravo, ministerial team of Slovenia!

In 2020, Slovenia and Portugal presented the initiative for labeling the exact origin of honey at the meeting of the EU Agriculture and Fisheries Council. The European Parliament then approved the political agreement on greater transparency in labeling the origin of honey blends on April 10, 2024.

The process from the idea to formal confirmation took six years, and a full eight years until its realization in practice. Unfortunately, that is how the slow, very slow European political 'mills' grind. However, the lesson is clear: once you start with a noble and important idea, if there is unity, will, and energy, and if perseverance and a professional foundation are present, the result will come one day.

June 14, 2026, is a historic day for consumer protection across Europe.

Consumers will finally know from which country the honey in each individual jar or other packaging comes from. They will be able to decide for themselves whether to buy honey from the local environment, from a beekeeper they know and trust, or honey from countries where production, hygiene, and phytopharmaceutical standards differ from European ones, as many things are still allowed there, even though

they have been banned in Europe for decades. They will also be able to avoid products from environments where honey counterfeiting has long been a known problem and where the 'business' of honey counterfeiting is booming. A great day for consumers and beekeepers all over Europe!

As President, I am extremely proud that the Slovenian initiative has become a European reality. We have proven once again that united, we can achieve even the seemingly impossible. It is not all about numbers and the size of a country; what matters is the right idea, the right people, political wisdom, expertise, unity, and perseverance, which are rewarded in the end.

The declaration of World Bee Day in 2017 was one of Slovenia's greatest diplomatic successes. For me personally, for beekeepers in Slovenia and Europe, and for all honey consumers, this victory—also over powerful trade lobbies—is an even greater success.

THANK YOU, UNITED SLOVENIA! We have proven that a small country with a big vision can change Europe.

Boštjan Noč

President of the European Beekeeping Association
and President of the Slovenian Beekeepers' Association

WITH GREAT HOPE FOR A BETTER FUTURE!

NO BEES LIFE

BUY LOCAL HONEY

European Beekeeping Association

EBA'S FIGHT AGAINST HONEY FRAUD RAISES CONCERNS AS TRANSPARENCY AND ACCOUNTABILITY INCREASE

The reaction of traders and packers to the speech of EBA representative Lupše Nik in the European Parliament, is a significant recognition of the efforts made by the EBA Scientific Committee on the Safety and Quality of Beekeeping Products to tackle honey fraud.

For many years, importers of degraded honey relied on broad generalizations about honey fraud, contributing to a context in which accountability has remained diffuse. References have frequently been made to alleged weaknesses in control systems or analytical methods, without clearly identifying or substantiating the specific deficiencies. This lack of precision has persisted over time and has facilitated the importation of honey of varying quality and quantity, often in the absence of sufficiently robust controls.

Moreover, even in cases where official controls have identified non-compliant (adulterated) products, economic operators have relied on legal ambiguities, to classify these products as “suspicious”, and justify their continued circulation within the market. The first coordinated control plan of EU classified 14% of the 2,264 honey samples found to be adulterated as “suspicious” and sold as authentic in 2015-17. The EU coordinated action «From the Hive" found 46% of 320 honey shipments to Europe did not comply with the requirements in 2021-22. Again, these shipments of degraded honey were classified as “suspicious”, passed through porters and distributed as authentic on the European market.

To date, 10 years after, there is still a lack of clarity on the definition of “suspicious,” as well as the justification for the continued import of honey into the European Union without adequate verification measures.

Within this context, EBA has played a critical role in systematically identifying and clearly articulating the underlying causes of the issue, including:

- The absence of mandatory physical controls at EU borders for honey consignments;
- The inability to legally classify non-compliant honey as adulterated due to the lack of formally recognized and enforceable analytical methods, despite the absence of scientific uncertainty;
- The delayed establishment of the European Union Reference Laboratory (EURL), which remains the only body competent to provide legally binding methods, notwithstanding the legal framework established nine years ago under Regulation (EU) 2017/625;
- The limitations of the current EU traceability system, which remain insufficiently developed and presents systemic vulnerabilities that hinder the provision of reliable and transparent information regarding imported honey.

By clearly identifying the root causes of honey fraud, EBA has helped shift the discussion from vague concern to concrete accountability. This clarity removes the space for uncertainty that has too often been used to justify inaction or to exploit legal grey areas. It also creates the necessary foundation for implementing targeted, enforceable, and effective corrective measures.

It is therefore not surprising that those who benefit from the current lack of robust border control and verification systems are now greatly concerned. Greater transparency and accountability inevitably challenge practices that rely on opacity.

In this context, EBA's position remains firm. As its President, Boštjan Noč, has emphasized, the organization will not remain silent. On the contrary, it will continue to act decisively, strengthening its efforts to protect beekeepers, safeguard bee populations, and ensure that consumers are not misled.

So far, the beekeeping sector has been quite inert, particularly with appropriate EU narrative. Only with the appearance of EBA's strong voice (technically backed by science) has it started to be heard. We say started, since it is obvious that there is more time needed for full hearing to be acknowledged.

Andreas Thrasyvoulou

Professor of emeritus at the Aristotle University Thessaloniki Greece

BEES LIFE

FOURTH MEETING OF THE HONEY PLATFORM

The fourth meeting of the Honey Platform took place on May 5, 2026. EBA was represented by Dr Nik Lupše, Head of the EBA Scientific Committees, and Prof Dr Andreas Thrasyvoulou, member of the Scientific Committee on the Safety and Quality of Bee Products.

As usual, the Honey Platform sent participants specific questions a few days before the meeting and invited speakers to address the topic under discussion. This meeting focused on the important issue of honey traceability. As is well known, the current honey traceability system has significant weaknesses and is considered one of the main factors contributing to the serious problem of honey fraud.

In addition, the Honey Platform once again raised the issue of the quality criteria used to determine honey overheating, with particular emphasis on the acceptance of the enzyme diastase as an additional criterion.

Below are the answers provided by EBA to the questions.

Q1. In practice, how is honey currently traced along the supply chain from the harvesting producer, or importer, to the final consumer, and what information is recorded at each stage of the chain?

- **Beekeepers' Registry**: A mandatory registry linking each producer to their number of colonies, hive locations, and estimated production capacity. This registry verifies the identity of the producer, the geographic origin of the honey, and the scale of the operation.
- **Mass Balance System**: A critical control mechanism ensuring the quantity of honey marketed aligns with the registered production capacity. The intersection of the Beekeepers' Registry and the Mass Balance system is vital for combating food fraud, as it confirms that the volume sold is consistent with what the hives are physically capable of producing.
- **Mass Balance Verification**: Used to determine if exporting countries have the actual capacity to produce the volumes they claim to export.
- **TRACES NT**. A digital customs notification platform. It provides EU authorities with data on the shipper, the origin, and the official certification. While TRACES NT is an essential entry control and traceability tool, it records data provided by the exporting country without inherently verifying its authenticity.
- **CHED**: A mandatory document for all honey consignments at EU borders. It confirms that the honey originates from approved establishments, complies with EU residue limits and microbiological criteria, and is fit for human consumption.
- **Residue Monitoring Plan**: Each honey batch must be supported by laboratory analysis reports from an exporting country that maintains an EU-approved Residue Monitoring Plan.
- **Approved Establishments**: Under current EU rules, the "Competent Authority" of the

exporting country is responsible for maintaining the list of approved facilities. Authorities must verify that the facility ID on the drum matches the TRACES database.

- **Percentage Origin Declaration (Directive 2024/1438)**: Commercial documentation (such as invoices and batch sheets) must now list every country of origin and its exact percentage within a blend.
- **Bill of Lading**: This is required to prove that honey in transit through non-approved countries maintained its "sealed" status and was not compromised.
- **HACCP Certificate**: While not always mandatory at the border, most EU buyers are legally required to verify the processing facility's HACCP plan as part of their "Due Diligence" obligations.

Q2. What are the main practical or technical challenges in implementing a Unionwide traceability system that would reliably identify the harvesting origin of honey?

Challenges in implementing & Recommendations for Policy & Enforcement

- The Commission should transition from advisory platforms to the immediate establishment of a EURL under Article 92 & 94 of Regulation 2017/625.

An EURL is the only body capable of providing a "Binding Reference Method" and an enforceable traceability system.

- The EU should develop a publicly owned Nuclear Magnetic Resonance (NMR) database. This ensures that the "binding method" for testing authenticity is not dependent on proprietary software from private companies, which currently acts as a significant barrier.
- To prevent consumers from unknowingly purchasing "expensive sugar," the EU should centralize a database of authentic honey fingerprints and implement a blockchain-style digital passport for every drum. This would prevent "honey laundering" in Free Trade Zones (FTZs).
- To combat "lost traceability," a harmonized system should assign unique identification codes at the first point of entry. This digital trail must follow the mass balance even if the honey is blended multiple times.
- A TRACES entry should be considered legally incomplete without a physical or digital (PDF) copy of the signed certificate.
- To detail the percentage breakdown needed by Honey Directive (EU) 2024/1438, traders must have commercial documentation (invoices/batch sheets) that explicitly lists every

country of origin and its exact percentage in the blend

- BCPs or national authorities should demand the full chain of invoices and health certificates leading back to the original harvest, effectively bypassing fraudulent documentation generated in Free Trade Zones.

Detailed Analysis of traceability vulnerabilities

- In Free Trade Zones, blending and filtering are used as a "substantial transformation" which permits the changes of TRACES/CHED. The country of origin is reset.
- Advanced methods like NMR can find adulterated honey, but without an EURL, they cannot prove it to a judge.
- The traceability system cannot be applied to a non-compliant product that is considered suspect due to the lack of enforceability of the method.
- Systems like TRACES NT and CHED track movement but not authenticity; they act as "administrative mailboxes" rather than lie detectors.
- Once cleared, large "lots" are split, relabeled, and distributed, causing the traceability flag to disappear.
- The new requirement to list exact percentages on labels is essentially impossible to police without a binding reference method from an EURL.

Q3. What additional costs would such an enhanced traceability system entail?

Funding and Infrastructure of the EURL

The EURL is the cornerstone of a functional traceability system. It may function as a single laboratory, a consortium, or be hosted by the Joint Research Centre (JRC). These would ideally be national institutes that already possess the infrastructure and staff required by Article 93 of Regulation 2017/625.

Financial Framework:

- Once designated, the EURL receives a grant from the EU budget to cover mandated tasks, governed by Regulation (EU) 2021/690.

• Under Article 79 of Regulation 2017/625, Member States may collect fees from operators to cover official controls, indirectly supporting the national laboratory networks linked to the EURLs.

• In many instances, the host laboratory or Member State covers overhead and infrastructure, while EU grants fund "EU-added value" activities.

• The Commission issues annual "Financing Decisions" to allocate specific budgets to each EURL based on their approved work plans.

Composition criteria to ensure that honey has not been heated or treated in such a way that the natural enzymes have been either destroyed or significantly deactivated, taking into account the invertase index

At the 2nd meeting of the Honey Platform, the European Beekeeping Association (EBA) stated that the current use of HMF content and diastase activity as indicators for detecting honey overheating must be revised and supplemented with additional provisions.

To ensure that honey quality standards reflect scientific evidence and modern fraud detecting techniques, the EBA recommends:

• amending current HMF and diastase criteria to account for honeys with naturally low enzymatic activity;

• providing an official EU-wide list of monofloral honeys with documented low diastase levels.

• clarifying the legal interpretation of the phrase “after processing and blending” to protect producers from post-processing degradation penalties;

• legislating detection methods for enzyme adulteration and HMF removal;

• considering invertase as an alternative quality parameter only after thorough standardization and validation through a structured pilot phase.

The adoption of invertase as the exclusive criterion for determining overheating in honey should only be accepted under the following conditions:

• Sufficient time should be granted to member states to analyze a large number of monofloral honeys to determine natural variability and identify those with naturally low enzyme activity .

• Honeys that are naturally low in enzymes should be recognized as exceptions to the thresholds, without being linked to other honey parameters.

• Enzyme activity should be measured immediately after processing and blending. Honey packers should not be held responsible for enzymatic changes that occur during storage.

• A method of analysis capable of distinguishing between bee-derived and added industrial invertase should be legislated.

EBA Scientific Committee on the Safety and Quality of Bee Products

HONEY PLATFORM MEETING CONCLUDES WITH POLICY DEADLOCK; EBA REQUESTS HARMONIZED DOMESTIC TRACEABILITY AND URGENT REFORM TO ADDRESS MARKET INTEGRITY

BRUSSELS, 6th May 2026 – The latest meeting of the Honey Platform concluded today characterized by extensive discussions but a critical absence of actionable outcomes. While the session allowed for an exchange of perspectives, the European Beekeeping Association (EBA) notes that differing stakeholder interests and a persistent lack of understanding regarding the fundamental depth of the current market crisis continue to stall progress.

Above all, the EBA emphasizes that the current frequency of engagement is insufficient; more than two online meetings per year are required to effectively address the pace of the crisis. Furthermore, technical debates continue to circle without resolution; specifically, a debate regarding invertase was once again revisited, with stakeholders presenting differing opinions that failed to yield any concrete conclusions or unified technical standards.

Critically, the EBA highlights with concern that honey adulteration was not discussed at all during the proceedings. The EBA asserts that without established mechanisms to test for the authenticity of honey and robust border controls, both consumers and beekeepers remain entirely unprotected against fraud.

The EBA expresses its appreciation to Copa-Cogeca for their presentation on traceability. Their input demonstrates a clear alignment with the EBA Scientific Committee's technical overview of the systemic threats to honey market integrity, highlighting a shared concern among primary producers.

To move beyond administrative theory and toward functional enforcement, the EBA outlines a two-tier strategy focused on immediate domestic stabilization and rigorous international oversight.

Domestic Level: Establishing the Market Anchor

The EBA maintains that the European Union must prioritize the implementation of a harmonized and mandatory traceability framework for do-

mestic honey. A robust domestic system is the essential prerequisite for addressing the complexities of the global market.

Immediate Application: Traceability systems for domestic honey are already operational in several Member States and are ready for immediate, EU-wide harmonization.

Foundation for Integrity: By fully accounting for EU production, authorities establish a "market anchor." This allows for the identification of inconsistencies in import volumes and provides the data necessary to detect potential fraud with greater efficacy.

Protection of Stakeholders: A unified domestic framework serves to protect both consumers and beekeepers by ensuring the internal market is transparent and verifiable.

International Level: Securing the Border with "Legal Weapons"

For imported honey, the EBA proposes the following mandatory measures to ensure that traceability becomes a functional enforcement tool rather than a bureaucratic exercise:

Financial Traceability: Mandatory submission of a full chain of invoices back to the original harvest point at Border Control Posts (BCPs) to eliminate the lack of transparency currently prevalent in Free Trade Zones.

Enhanced Oversight: A significant increase in customs supervision within Free Trade Zones to prevent illicit blending operations.

Certification Integrity: A prohibition on third-country authorities issuing new TRACES or health certificates based on processing. Filtering, blending, and repackaging do not constitute a "substantial transformation," and the original origin must remain the sole legal reference.

EURL Designation: The immediate adoption of delegated acts to designate an EU Reference Laboratory (EURL) under the Official Control Regulation.

Public Analytical Databases: The development of a publicly owned NMR database to ensure that binding testing methods remain independent of private software and proprietary interests.

Conclusion: Without these proposed specific legislative tools, political will to act on the existing legislation and a focus on authenticity testing, traceability will remain a purely administrative exercise. The EBA calls for a decisive shift toward a system that offers genuine protection for the long-term viability of the European beekeeping sector and the protection of the consumer. We would like to point out that traceability to the country of origin is not enough on its own without evidence that what was harvested in that country was actually honey, and not processed sugar syrup.

Dr Nik Lupše
Head of EBA Scientific Committees


Honey Platform

WORLD BEE DAY
20 MAY 2026

Press Statement Čebelarska zveza Slovenije and European Beekeeping Association

President Boštjan Noč stated on the occasion of World Bee Day:

"20 May is a day of pride for beekeepers all around the world. Today, I can proudly say that the world celebrates World Bee Day with great respect and recognition.

In 2017, the United Nations General Assembly unanimously proclaimed 20 May as World Bee Day, following the initiative of the Beekeepers' Association of Slovenia, supported by the Republic of Slovenia and unanimously endorsed by all countries of the world. This represented a historic recognition of the importance of bees, beekeepers and pollinators for the future of humanity.

World Bee Day has exceeded all our expectations. Today, there is hardly a country in the world where people do not speak publicly about the importance of bees and pollinators on 20 May. As the initiator of this day, I could never have imagined that it would achieve such global recognition and respect. Among the many international awareness days, World Bee Day has become one of the most widely recognized and warmly embraced worldwide.

On this occasion, however, I must clearly warn the public: in the modern world, bees can no longer survive without the help of beekeepers. Climate change, pesticides, intensive agriculture and bee diseases are seriously threatening their existence.

Therefore, I sincerely thank all Slovenian and all other beekeepers around the world who care for bees every day, preserve them and thereby protect one of the key foundations of global food security. More than one-third of the world's food production depends directly on pollination. Beekeepers are among the key guardians of the world's food future.

It is therefore encouraging news that, at the beginning of this year, Europe finally started allowing direct payments per hive as compensation for the pollination services provided by bees.

Another major problem facing modern beekeeping is fake honey, which is destroying honest beekeepers and misleading consumers. According to the European Commission, as much as 47 percent of honey on the European market is adulterated — honey that bees have never even seen.

This is not only an economic problem for beekeepers, but also a serious warning for consumers. People consume honey and bee products to strengthen their health, while fake honey may also pose risks to human health.

Unfortunately, Europe still lacks sufficiently effective laboratory analyses, adequate laboratories and, above all, legislation that would permanently remove such products from the market.

Therefore, the greatest guarantee of quality for consumers is simple: buy local honey directly from beekeepers. In stores, choose honey originating from your own country or at least from Europe.

European politics is very well aware of this problem, yet concrete solutions are still missing. It must be said openly: the trade lobbies behind fake honey are currently stronger than the voice of beekeepers.

The only real solution is for beekeepers and consumers to join forces and send a clear message through their choices: we will not buy fake honey.

On the occasion of World Bee Day, I wish all beekeepers a joyful celebration, great pride and, above all, many healthy bees!”

PRESIDENT’S AWARD IS BEING INTRODUCED

The EBA is introducing the President’s Award in order to recognize deserving individuals or organizations. The President’s Award is a document granted by the EBA President at their own discretion.

CANCELLATION OF PARTICIPATION AND STRONG PROTEST AGAINST THE CENSORSHIP OF A KEY TOPIC AT THE 3RD INTERNATIONAL FORUM IN MARIBOR

To whom it may concern:

On behalf of the European Beekeeping Association (EBA), we express our strongest protest against the decision made by the organizers, led by the FAO (Food and Agriculture Organization of the United Nations), to remove the scheduled case study “EU Honey Platform (Honey Adulteration)” from the agenda just one week before the forum in Maribor, held on the occasion of World Bee Day. This presentation was to be delivered on May 21st by the Head of the EBA Scientific Committees. As a sign of protest, the President of the SBA (Slovenian Beekeepers’ Association) and EBA, Boštjan Noč, will not attend the forum.

The excuse that this is due to “time constraints” is an insult to the entire beekeeping sector. We are facing the greatest existential crisis in history, driven by systemic crime involving the mass adulteration of honey. The work of the Honey Platform to date has been completely ineffective. Due to the stagnation of the action plan and a blatant lack of political will, European beekeeping is collapsing, agriculture is losing its pollination services, and consumers are knowingly left exposed to health-threatening counterfeits.

As stated in our attached press release, issued immediately following the last meeting of the Honey Platform, and also addressed in much detail during the address to the EU Parliament on April 22, 2026, at the conference on honey market integrity, all mechanisms have failed.

Press release relating to Honey platform:
https://ebaeurope.eu/honey-platform-meeting-concludes-with-policy-deadlock-eba-requests-harmonized-domestic-traceability-and-urgent-reform-to-address-market-integrity/

Press release relating to the EU Parliament conference on the integrity of the market:
https://ebaeurope.eu/european-beekeeping-association-warns-of-systemic-failure-in-honey-market-integrity-at-european-parliament-summit/

https://ebaeurope.eu/recording-of-the-conference-eu-honey-market-integrity-the-importance-of-trade-importance-and-fraud-risks/

Denying a dedicated, standalone slot to this critical issue and replacing it with a mere moderated panel discussion among multiple speakers sends a devastating signal to the public. Without a direct and sharp analysis of this systemic threat, the forum on World Bee Day loses its credibility and becomes just another event that "must" be carried out purely on paper.

Regardless of these decisions, the European Beekeeping Association, together with its scientific committees, will relentlessly continue its fight against counterfeits. We will continue to intensively and directly inform beekeepers, consumers, and the wider public about the

inefficiency of official bodies and the threat facing our industry.

Sincerely,

Boštjan Noč
President of the European Beekeeping Association (EBA)

Dr. Nik Lupše
Head of the EBA Scientific Committees

EBA ANSWERED FEEDM

Yours sincerely,

President Boštjan Noč – President of the European Beekeeping Association

Dr. Nik Lupše – Head of EBA Scientific Committees

Scientific Committee for Safety and Quality of Bee Products members:
Prof Dr Andreas Thrasyvolou
Dr Juraj Majtan
Prof Dr Dražen Lušić

F.E.E.D.M.

Dear Ms Yoncheva,

Please find attached our formal response to the concerns raised by F.E.E.D.M. regarding the statements made by the EBA representative.

Our submission sets out, in a structured and evidence-based manner, the factual and regulatory context underpinning those statements. It draws on the findings of the EU Coordinated Action “From the Hive,” relevant analytical data, and current limitations within the EU enforcement framework. It also clarifies our position on the legislative gap that continues to hinder effective action against honey adulteration.

We trust that this response adequately addresses the issues raised. We remain available to provide any further clarifications or supporting information, should this be required.

Subject: Fraud is actively exploiting the lack of legally enforceable recognition of existing methods of analysis

Dear Ms Yoncheva,

Dr Nik Lupše, head of scientific committees, in his intervention, did not rely on general or unsubstantiated claims, but on documented evidence drawn from the EU Coordinated Research Action “From the Hive” (2023). This report clearly establishes that 70 out of 123 honey exporters (56.9%) exported to the EU honey adulterated with exogenous sugars (Fig. 3, Annex A). It further confirms that 63 out of 96 importers (65.6%) introduced such adulterated honey into the EU market and marketed it as authentic (Fig. 4, Annex B).

The samples analyzed within this EU initiative were collected by Border Control Posts (BCPs) and examined by the Joint Research Centre (JRC) in Geel using state-of-the-art analytical methods, including EA/LC-IRMS, HPAEC-PAD, LC-HRMS, and H-NMR. These methods unequivocally demonstrated non-compliance with EU legal requirements.

Nevertheless, these products were ultimately classified as “suspicious” rather than “adulterated” solely because the analytical methods used have not yet been formally validated for legal enforcement purposes. This classification does not reflect any scientific uncertainty, but rather a regulatory deficiency. The legislative framework is demonstrably lagging behind both the sophistication of adulteration practices and the capabilities of modern analytical science.

The situation can be summarized as follows:

Science establishes that the product behaves as adulterated; the law refrains from formally recognizing it as such; and fraudulent operators systematically exploit this discrepancy.

Accordingly, the core issue is not a lack of detection, but a lack of legally enforceable recognition of that detection. This constitutes the principal regulatory bottleneck in addressing honey fraud within the EU.

This gap is not theoretical; it is actively and systematically exploited. Products identified as non-compliant through advanced analytical techniques remain in circulation because the absence of legally recognized methods allows operators to challenge enforcement actions, delay proceedings, and ultimately avoid sanctions or product withdrawals.

As explicitly stated by the EBA representative: “We are caught in a cycle where fraudsters use advanced syrups and falsified origins to bypass controls, while authorities wait for validated methods admissible in court.”

In this context, it is particularly concerning that F.E.E.D.M. invokes arguments regarding legal enforceability that mirror those of operators engaged in fraudulent practices. Such positioning risks reinforcing the very regulatory gap that facilitates the continued entry and distribution of adulterated honey within the EU market.

While we do not suggest that F.E.E.D.M. endorses fraudulent activity, it is untenable to imply that the market operates without systemic irregularities. Honey fraud within the EU is well-documented, organized, and persistent. It manifests through distorted pricing structures, consumer deception via misleading labeling, and significant disruption of fair market conditions.

Furthermore, the EBA representative presented substantiated data on production, consumption, export volumes, and trade balances in countries benefiting from preferential trade agreements with the EU, including Vietnam, Ukraine, and Argentina. These data indicate clear inconsistencies, with export volumes exceeding domestic production capacities, thereby confirming the role of certain countries as re-export or blending hubs. This evidence is supported by recent EU honey market analyses.

On this basis, the protest submitted by F.E.E.D.M. must be rejected as unfounded, overly general, and not supported by the available evidence. The EBA intervention was comprehensive, rigorously documented, and

grounded in EU-wide research involving 16 Member States, as well as in established legislative and trade data.

Moreover, the detailed evidence requested by F.E.E.D.M.—including specific consignments, operators, analytical methodologies, competent authorities, and verifiable results—is, to a significant extent, already accessible through its own members who have been included participated in the “From the Hive” coordinated action. Additional data may also be obtained from the JRC upon formal request.

EBA will continue to advocate decisively for the adoption of harmonized and validated analytical methods that are legally admissible for enforcement purposes.

Only through such measures can “suspicious” findings be formally recognized as “non-compliant” or “adulterated,” thereby closing the current enforcement gap and eliminating opportunities for its exploitation.

At the same time, it is imperative to establish full transparency and traceability across the honey supply chain, including the systematic disclosure of exporters, importers, consignment volumes, and batch identification.

The persistence of honey fraud in the EU is not due to insufficient scientific capability, but to regulatory inertia. Unless the EU aligns legal frameworks with existing analytical capacities, fraudulent practices will continue to evade effective enforcement, to the detriment of producers, consumers, and the integrity of the internal market.

Thank you for your commitment to European agriculture and we look forward to hearing from you!

Respectfully,

President Boštjan Noč – President of the European Beekeeping Association

Dr. Nik Lupše – Head of EBA Scientific Committees

Scientific Committee for Safety and Quality of Bee Products members:
Prof Dr Andreas Thrasyvolou
Dr Juraj Majtan
Prof Dr Dražen Lušić

ANSWER TO EBA
FROM DG SANTE

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR HEALTH AND FOOD SAFETY

Directorate G Crisis preparedness in food, animals and plants
Unit G2 - Animal Health
Head of Unit

Brussels
SANTE/G2/LK/tcn (2026)4884942

Subject: Measures to prevent the introduction of *Tropilaelaps* into the EU

Dear Mr Lupše,

Thank you for your e-mail of 31 March 2026 with the letter of the European Beekeeping Association (EBA) on *Tropilaelaps*, to two of our functional mailboxes (our reference: Ares(2026)4363994). In that letter EBA summarises its understanding of the situation and suggests several measures.

In that context, I would like to inform you that in the Commission we have taken several steps starting already late last year, when Apimondia and the EU Reference Laboratory for bee health informed us about the unclear but worrying situation. Indeed, we share your concerns, and within this context we discussed the issue with the competent authorities of the Member States at the meeting on 15 December 2025 of the Animal Health and Welfare Section of the relevant Standing Committee on Plants, Animals, Food and Feed (PAFF). The information is publicly available online:

- Presentation, point A.02: https://food.ec.europa.eu/document/download/e8c1b4ae-32b8-4a80-8f3d-aad884a8796c_en?filename=reg-com_ahw_20251215_pres-26.pdf

- Summary report, point A.02: https://food.ec.europa.eu/document/download/92105a63-5aa4-4908-8097-c7b7180cbcf3_en?filename=reg-com_ahw_20251215_sum.pdf

You might wish to note that current EU rules developed in a framework of Regulation (EU) 2016/429 ('Animal Health Law') and applicable as of 21 April 2021 are considered proportionate and fit for use, conforming to international standards of World Organisation for Animal Health (WOAH) and to science (slide 13 of the presentation referred to above). The delegates of the Member States at PAFF agreed with that.

Also EU rules for the entry of honeybee queens contain an additional specific element, as they already require additional obligations for handling consignments after the entry into the Union, unlike for other commodities. Those obligations are laid down in Articles 71 and 72 of Commission Delegated Regulation (EU) 2020/692 (slide 7 of the referred presentation).

Full compliance with those obligations requires close collaboration between importers, beekeepers, official laboratories and competent authorities and they can ensure the safety of the queens before they are introduced into EU colonies, by detecting and mitigating possible infestations with small hive beetle and *Tropilealaps*. That is even regardless of other risk-mitigating measures (certification, pre-export inspections, situation in the third country and of apiary of origin, etc.). To note, in this context, the Commission is not aware of any major shortcomings in relation to the entry into the Union of consignments of honeybee queens from listed third countries. We hope that you can echo this message to your members.

In addition, we have initiated other

- Asking for official information from the competent authorities of certain third countries with a view to taking appropriate follow-up action, if needed.
- Initiating the organisation of a comprehensive WOAH workshop with financial support from the European Union, to be held in the Caucasus region soon, with the expected participation of experts from the region, including from all EU Member States.
- Asking the EU Reference Laboratory for bee health to cover the topic and discuss best practices of handling consignments after the entry into the Union, on the agenda of its next annual meeting with the National Reference Laboratories.

Please note also that the competent authorities of the Member States themselves may initiate even more actions (slides 12-15 of the referred presentation) in collaboration with beekeepers. That is both for improved compliance with current rules and to consider legislative and non-legislative actions on their territory.

I hope you find the above information useful and may be able to contribute to many of those, by way of efforts from your membership in the given EU Member State.

Yours sincerely,

Francisco Reviriego Gordejo

CC (in ARES): B. Logar, L. Kuster, Z. Ilevicius, M. Klemm.

Electronically signed on 04/05/2026 09:26 (UTC+02) in accordance with Article 11 of Commission Decision (EU) 2021/2121

HONEY DNA ANALYSIS TEST RECEIVES ISO 17025 ACCREDITATION

Celvia CC announces accreditation of innovative MDA test for honey authenticity verification

Celvia CC is pleased to announce that its MDA (Honey Metagenomic DNA Analysis) test has received ISO 17025 accreditation from the Estonian Accreditation Centre (EAK), marking a significant milestone in honey quality assurance and authenticity verification.

What does this mean?

ISO 17025 is the international standard for testing and calibration laboratories, ensuring the

EESTI AKREDITEERIMISKESKUS
ESTONIAN ACCREDITATION CENTRE

AKREDITEERIMISTUNNISTUS
ACCREDITATION CERTIFICATE

MTÜ Eesti Standardimis- ja Akrediteerimiskeskus
kinnitab käesolevaga, et
NPA Estonian Centre for Standardisation and Accreditation hereby confirms that

Celvia CC AS
Teaduspargi tn 13, Tartu
Registrikood / registry code 11673707

vastab EVS-EN ISO/IEC 17025:2017 nõuetele kui katselabor
conforms to the requirements of EVS-EN ISO/IEC 17025:2017 as testing laboratory

geneetika valdkonnas
in the field of genetics

Akrediteerimisulatus on esitatud tunnistuse lisas
The scope of accreditation is specified in the annex

Tunnistuse number: **L317**
Number of certificate

Akrediteering kehtib perioodil: **01.04.2026 – 31.03.2031**
Accreditation validity period

Tallinn, 01.04.2026

Paavo Ruzitš
Katsetamise, kalibreerimise ja mõõtmise üksuse akrediteerimisjuht
EAK juhataja ülesannetes/ Head of Testing, Calibration and Measurement Unit
in the role of Head of EAK

Tunnistus on välja antud seoses esma akrediteerimisega
This certificate was issued due to initial accreditation

Tunnistuse kehtivust ja akrediteerimisulatust saab kontrollida EAK veebilehelt eak.ee
Validity of this certificate and accreditation scope can be checked from the EAK web site eak.ee

EAK on ühinenud Euroopa Akrediteerimiskoostöö organisatsiooni (EA) Mitmepoolse Lepinguga selle valdkonna akrediteerimiseks
EAK is a signatory of the European co-operation for Accreditation (EA) Multilateral Agreement for accreditation in this field

highest level of technical competence and reliable results. This accreditation provides confidence that MDA test results meet rigorous international quality standards and are recognized across borders.

How the MDA test works

The MDA test uses metagenomic DNA analysis to examine the complete genetic fingerprint of honey samples. By sequencing 1-20 million DNA fragments from a 100g honey sample, the test analyzes DNA from plants, bacteria, fungi, insects, and other organisms that bees encounter during honey production. The test can identify over 5,000 plant species and over 100 000 species in total.

Unlike traditional methods that rely solely on pollen microscopy or chemical markers, the MDA test creates a comprehensive DNA profile that reflects the honey's biological composition. Using machine learning methods, this DNA profile is compared against a database of authentic honey samples to detect deviations that may indicate manipulation or adulteration.

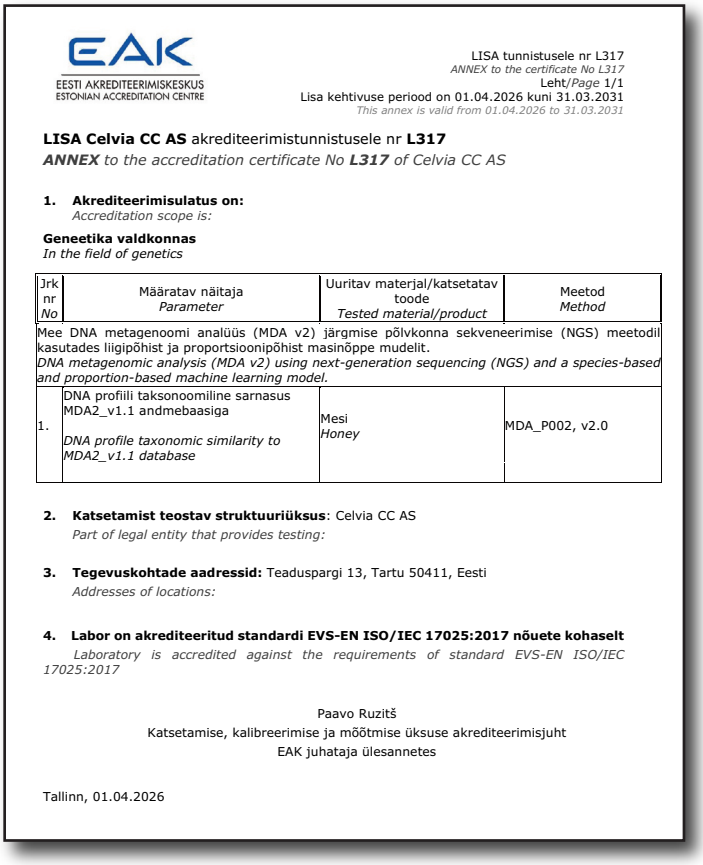
A clear answer: authentic or not

The MDA test provides a straightforward result: an authenticity decision. The test does not make specific claims about how honey may have been adulterated, nor does it provide official determinations of geographical origin. However, clients have the option of receiveing interactive charts showing the complete plant and organism composition detected in their sample, along with information about bee pathogens and parasites.

Each honey has a unique DNA composition that cannot be artificially imitated. The comprehensive DNA profile makes the test a powerful tool for verifying honey quality throughout the supply chain.

The accredited MDA test provides honest producers with a science-backed verification method and gives buyers confidence in the honey they purchase.

More information about our test is available https://mda-test.com/en/



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ESTONIAN ACCREDITATION CENTRE

LISA tunnistusele nr L317
ANNEX to the certificate No L317
Leht/*Page* 1/1
Lisa kehtivuse periood on 01.04.2026 kuni 31.03.2031
This annex is valid from 01.04.2026 to 31.03.2031

LISA Celvia CC AS akrediteerimistunnistusele nr **L317**
***ANNEX** to the accreditation certificate No **L317** of Celvia CC AS*

1. Akrediteerimisulatus on:
Accreditation scope is:

Geneetika valdkonnas
In the field of genetics

Jrk nr *No*	Määratav näitaja *Parameter*	Uuritav materjal/katsetatav toode *Tested material/product*	Meetod *Method*
Mee DNA metagenoomi analüüs (MDA v2) järgmise põlvkonna sekveneerimise (NGS) meetodil kasutades liigipõhist ja proportsioonipõhist masinõppe mudelit. *DNA metagenomic analysis (MDA v2) using next-generation sequencing (NGS) and a species-based and proportion-based machine learning model.*			
1.	DNA profiili taksonoomiline sarnasus MDA2_v1.1 andmebaasiga *DNA profile taxonomic similarity to MDA2_v1.1 database*	Mesi *Honey*	MDA_P002, v2.0

2. Katsetamist teostav struktuuriüksus: Celvia CC AS
Part of legal entity that provides testing:

3. Tegevuskohtade aadressid: Teaduspargi 13, Tartu 50411, Eesti
Addresses of locations:

4. Labor on akrediteeritud standardi EVS-EN ISO/IEC 17025:2017 nõuete kohaselt
Laboratory is accredited against the requirements of standard EVS-EN ISO/IEC 17025:2017

Paavo Ruzitš
Katsetamise, kalibreerimise ja mõõtmise üksuse akrediteerimisjuht
EAK juhataja ülesannetes

Tallinn, 01.04.2026

Anita Lipu MSc

Researcher of Food Genomics

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REPRODUCTIVE CAPACITY OF VARROA DESTRUCTOR IN FOUR DIFFERENT HONEY BEE SUBSPECIES

Abstract

Varroa tolerance as a consequence of host immunity may contribute substantially to reduce worldwide colony declines. Therefore, special breeding programs were established and varroa surviving populations investigated to understand mechanisms behind this adaptation. The aim of this study was to investigate the reproductive capacity in the three most common subspecies of the European honey bee (Carnica, Mellifera, Ligustica) and the F2 generation of a varroa surviving population, to identify if managed host populations possibly have adapted over time already. Both, singly infested drone and worker brood were assessed to determine fertility and fecundity of varroa foundresses in their respective group. We found neither parameter to be significantly different within the four subspecies, demonstrating that no adaptations have occurred in terms of the reproductive success of Varroa destructor. In all groups mother mites reproduce equally successful and are potentially able to cause detrimental damage to their host when not being treated sufficiently. The data further suggests that a population once varroa tolerant does not necessarily inherit this trait to following generations after the F1, which could be of particular interest when selecting populations for resistance breeding. Reasons and consequences are discussed.

1. Introduction

Varroosis is known to be the most serious threat for European honey bees across the globe (Rosenkranz et al., 2010). A key for the mite's success lies in their ability to perfectly adapt to host conditions, including the reproduction in worker brood. Even though reproductive capacity of V. destructor seems equally high in both, drone and worker brood, a distinctive amount of mites fail to reproduce even though they are not infertile (de Ruijter, 1987). The conditions however, under which mite foundresses remain "temporary sterile" cannot yet be explained (Garrido and Rosenkranz, 2003) but is discussed to be a host-specific tolerance trait against the mite (Rosenkranz and Engels, 1994). Host stages in which mites are able to reproduce vary between drone and worker brood and reproduction is only possible within a narrow time frame, indicating a particularly sensitive process (Frey et al., 2013).

Interestingly, Xie et al. (2016) revealed that mother mites are able to choose nurse bees over foragers and newly emerged bees as their opti-

mal host in the phoretic phase, not only enabling them to quickly infest new brood cells (Donzé et al., 1998), but also providing the best possible nutritional conditions to produce a larger amount of progeny. Subsequently, the varroa population per colony can increase up to ten times in only one short beekeeping season (Sokół et al., 2019) which overall demonstrates a high degree of adaptation.

Reports from surviving populations have increased over the last decade, suggesting a rapid host adaptation more or less simultaneously (Oddie et al., 2018). Besides a specific varroa mite targeted hygienic behavior (VSH = varroa sensitive hygiene) (Panziera et al., 2017), reduced mite reproduction is considered to be one key advantage for colony survival by means of natural selection (Locke et al., 2012). Almost exclusively, such traits have been investigated and documented for resistant honey bee populations (Locke, 2016a) but have probably been neglected for more common subspecies. To date, investigations on the mites' reproductive success have focused on exotic bee subspecies such as A.m. syriaca (Alattal and Rosenkranz, 2006) or the Africanized honey bee (Garrido et al., 2003). Little or nothing is known about the adaptation potential of subspecies which are native to most parts of Europe.

To close this knowledge gap and ascertain both, fertility and fecundity as a consequence of the reproductive capacity of V. destructor, we have compared the three most common subspecies of the European honey bee, i.e. Apis mellifera carnica (branch-M, western Europe), A. m. mellifera (branch-M, northern Europe) and A. m. ligustica (branch-C, southeastern Europe) representing at least two different evolutionary branches, corresponding to distinct geographic areas in Europe to cover a wide range of adaptation potential (Bouga et al., 2011). In addition, the F2 generation of a varroa surviving population descending from the "Bond Project" on Gotland (Fries et al., 2006) was evaluated, to identify if managed host populations possibly have adapted over time already despite systematic control measures.

2. Materials & methods

2.1. Bee colonies and subspecies

A total of 22 honey bee colonies (A. mellifera L.) were investigated during summer season from May to August. We focused on subspecies originating in Europe such as the Carniolan bee A. m. carnica (n = 5, originated from our local Hohenheim breeding line), the European dark bee A. m. mellifera (n = 7, originated from a purebreeder in Freiburg, Germany), the Italian bee A. m. ligustica (n = 5, originated from a pure-breeder in Alsace, France) and a F2 generation of mite surviving bees from the "Bond Project" descending from the Swedish island of Gotland "Gotland/F2" (n = 5). To provide a sufficient amount of drone pupa, one to two drone-frames were

placed at the edge of the brood nest of each colony. All experimental hives were either successfully overwintered from the past season (Carnica, Go/F2, Mellifera) or freshly created by re-queening established colonies (Ligustica). They were kept and maintained without varroa treatment in the current season at our local apiary near the Apicultural State Institute in Stuttgart, Germany.

2.2. Mite reproduction

The reproductive capacity of the foundress mite is specified as success to generate at least one viable daughter before the host pupa hatches (fertility). In contrast, mother mites that lay no or only a single egg, have no males or are delayed in egg-laying respective to host-development will fail to produce viable offspring for the following mite generations. Further, the number of progeny per mite (fecundity) serves as measure for a possible host adaptation representing a reduced reproductive capacity in terms of an increased survivability of the colony. To increase comparability of our results, all experiments were performed according to the methods described in Locke and Fries (2011).

In brief, worker and drone pupae in stage Pd and older, but before eclosion, were examined (see Fig. 1). At least 30 cells per colony were carefully investigated where possible and mite infestation was documented. Only cells with a single foundress were considered, cell content and mites attached to the pupa were accurately removed and subsequently observed under a stereomicroscope (Zeiss Stemi, 2000-CS). Varroa mites were able to naturally infest drone and worker brood in all colonies, no additional mites were inserted.

2.3. Data evaluation

Mite reproduction and fecundity data were first tested for variance homogeneity and normal distribution with Levene's and Shapiro-Wilk test and verified for both datasets, respectively. A generalized linear model was applied to both sets followed by a comparison of the least-squares means and a P value adjustment (Tukey method i.e. Tukey's HSD test). For all tests RStudio (R Core Team, 2018) and significance level of a = 0.05 was used.

3. Results

Different parameters of varroa mite reproduction in four different honey bee subspecies are presented in Table 1. A total of n = 3104 drone and n = 2526 worker brood cells were evaluated, including empty and multiply infested cells. We did not find significant differences for the overall reproductive capacity (fertility) in the four groups. Neither in worker brood (df = 10: F = 2.26; P = 0.144) nor in drone brood (df = 15: F = 2.51; P = 0.098). A similar outcome was observed for the average number of offspring per foundress (fecundity). Both, progeny found in worker brood (df = 10: F = 2.84; P = 0.092) and in drone brood (df = 10: F = 2.32; P = 0.873) were at the same level.

Due to an increased infestation rate which resulted in a high ratio of multiply infested cells in the drone brood of all four subspecies, it was not possible to evaluate drone pupa in stage Pd and older as previously described. To compare fecundity regardless these circumstances, we had to consider earlier developmental stages beginning already at Pw (Fig. 1) providing a sufficient amount of singly infested cells. This is why the average number of offspring is relatively low when compared to worker brood.

For the number of cells in Ligustica drone brood it needs to be mentioned that due to the late re-queening of experimental colonies (mid July) it was not possible to obtain a sufficient amount of singly infested cells. Hence, we only used 10 cells per colony on average, this should be considered when interpreting the results.

4. Discussion

Here, we studied the reproductive capacity of three commonly managed honey bee subspecies and the F2 generation of a varroa surviving population originated from the "Bond Project" (Fries et al., 2006). When compared to former data, the fertility of varroa foundresses in worker brood did not change significantly during the past three decades and has levelled off between 80 and 90 % (Thrybom and Fries 1991; Corrêa-Marques et

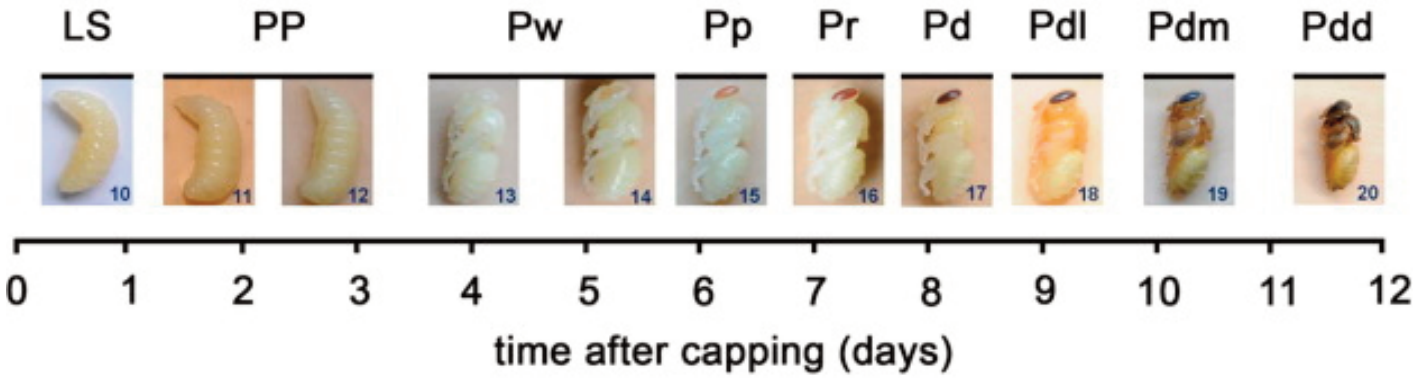

Fig. 1. Classification of pupal stages respective to ontogenetic worker development (after Rembold et al., 1980, graphically modified after Wang et al., 2015). Abbreviations: LS = 5th larval instar after sealing; PP = prepupa; P = pupa (w = white eyes; p = pink eyes; r = red eyes; d = dark brown eyes; dl = dark brown eyes, light pigmented thorax; dm = dark brown eyes, medium colored thorax; dd = dark brown eyes, dark thorax)

al., 2003; Garrido et al., 2003; Alattal and Rosenkranz, 2006; Locke et al., 2012; Alattal et al., 2017). This trend is corroborated by our data and most likely similar for drone brood.

Drone frames that we have investigated here were highly infested already in early summer, not least because some colonies remained untreated in the former season at our experimental apiary but also because the mite's preference to infest drone cells is approximately eight times higher when compared to worker brood (Fuchs, 1990; Santillán-Galicia et al., 2002). In addition, the time frame which is attractive to enter cells for infestation is approximately twice as long in drone brood (Calderone et al., 2002), being one reason for this preference. Under these circumstances it was not surprising that we found many multiply infested drone cells and it became a challenge to locate cells containing only one foundress for our evaluation. Ligustica queens arrived after summer solstice very late in the season and besides that, a very high mite infestation in drones was the reason that we were not able to collect a sufficient amount of singly infested cells.

Moreover, our data confirms that there is no large selection pressure favoring reduced mite reproduction in both, drones and workers, at least not under intensively managed conditions. For the three common subspecies this is not remarkable as host adaptations are most often reported as a means of natural selection (Seeley, 2007; Locke et al., 2012; Oddie et al., 2017). For the F2 generation of the surviving population from Gotland however, we had expected a different outcome. The Gotland bees have developed an apparent reduced mite reproductive success trait that is either inheritable from paternal, maternal or both sides in the F1 generation (Locke, 2016b). Our results provide evidence that this trait seems to fade out by further generational change, once more making the colonies susceptible to Varroosis.

Although we did not find significant differences in the fertility and fecundity of varroa females between surviving F2 and common honey bee subspecies, we are still convinced that the varroa reproductive capacity represents a crucial and probably the only parameter for the future selection of varroa resistance on the individual level. One reason is that we confirmed that about 85% of the "temporary sterile mites" were again fertile if re-introduced into freshly sealed brood cells (Weller, 2008). Hence, the occurrence of "temporary sterile mites" seems to be rather a trait of the host than a trait of the parasite and, therefore, offers possibilities for selection.

5. Conclusion

Frequent reports have shown that apart from the most common managed honey bee subspecies there are populations demonstrating increased mite susceptibility and great variance in mite reproductive capacity (de Guzman et al.,

	Carnica	Mellifera	Ligustica	Gotland/F2	
Drones					
Total No. of cells (n)	68	179	51[b]	141	
Mean fertility (±SE)	79% (±8.4)	83% (±5.5)	59% (±7.3)	79% (±6.5)	ns
Mean fecundity (±SE)a	2.7 (±0.5)	2.7 (±0.3)	2.2 (±0.6)	2.6 (±0.2)	ns
Workers					
Total No. of cells (n)	90	91	120	120	
Mean fertility (±SE)	82% (±6.1)	% (±6.1)	% (±5.2)	78% (±5.2)	ns
Mean fecundity (±SE)	3.3 (±0.3)	3.4 (±0.3)	4.1 (±0.4)	3.3 (±0.2)	ns

ns: not significant (P > 0.05).
[a] Earlier developmental stages beginning already at Pw had to be considered for the drone brood.
[b] Not representative, due to the low amount of singly infested cells (10 cells per colony on average) ns: not significant (P > 0.05).

Table 1
Comparison of the reproductive capacity (mean fertility and fecundity ± standard error) of mother mites produced in singly infested drone and worker brood cells] Table 1 Comparison of the reproductive capacity (mean fertility and fecundity ± standard error) of mother mites produced in singly infested drone and worker brood cells]

2008; Locke, 2016a; Nganso et al., 2018). This reflects an encouraging potential to establish varroa resistance in European A. mellifera populations (Büchler et al., 2010). However, resistance mechanisms are complex which is why further research is necessary to understand host-adaptation and mite reproduction in greater detail.

Acknowledgements

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Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

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Brunswick, Germany. Peer review under responsibility of King Saud University. 2019 Production and hosting by Elsevier B.V. on behalf of King Saud University

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BEWARE OF THE DANAANS EVEN WHEN THEY BEAR GIFTS

This ancient tribe was so unpredictable that the Greeks earned this saying because of them. They never knew from where they would draw the sword and attack. In beekeeping, bees that mistake their hive and enter a foreign one can be called by this name. You will probably say that such bees do not exist, but they very much do. And when you hear how many there are, you will be astonished. And they bring with them varroa, nosema, even foulbrood…The problem, once again, originates from humans. While bees lived alone in nature, this was very rare — only 1-5% of bees would fly into foreign tree hollows. Because the trees were far apart from each other, and bees simply did not have the evolutionary need to develop extreme precision in returning to their own hive. But humans brought the “trees” (hives) closer together, so that today two colonies are often separated by only a 2 cm wooden wall. This fact alone has increased the number of bees drifting into foreign hives, but that is not all. Varroa appeared, and in 2004 it was established that when varroa lowers the protein level in a bee’s body below a certain threshold, the bee loses its orientation ability. It flies into the first hive it finds, or even the first apiary.Here are two examples so you can understand the scale of the problem. A long time ago, on an island in the Adriatic Sea,

an apiary was located at one end of the island and the forage at the other, so all the bees flew in the same direction because there was no other pasture. During the night, they moved the apiary toward the pasture in the direction of the bees' flight, exactly 800 m closer, but they chose a similar location and arranged the hives in exactly the same way. The next day, almost no bee returned to its place! In the morning they flew out, and when they returned home, they simply spotted their apiary on their flight path.Here is an easy way to prove this strange phenomenon to yourself. This spring, place two hives 2 meters apart from each other. Immediately reduce one to the size of a brood chamber, and on the other stack 3-4-5 honey supers. Return in two weeks and move all the supers from one hive to the other. What do you think will happen? Now all the bees will enter the hive that has suddenly "grown," and none will go into the one that has "shrunk." This best confirms what chaos we create in the apiary when we remove honey and return the extracted supers. But the main problem is that we mix bees between hives!Science clearly states that in our apiaries, 13% to 42% of the bees in the hives (always more at the ends of the rows) are not offspring of that hive's queen! There are certain differences between summer and winter. In summer, the percentage at the ends of the rows is 22% ± 3%, and in the middle of the row 42% ± 6%. In autumn, it is 13% ± 1% at the ends of the rows, and 39% ± 4% in the middle of the row.Such mixing of bees significantly affects the work of the colony. Bees somewhat do not tolerate each other, and this disrupts their work. It is true that we create swarms from multiple colonies, but those bees are not genetically compatible and are agitated when forced to live together in the same hive. We can hardly notice this with the naked eye, but there are wonderful studies on bee overwintering. They combined two, three, or more colonies into one and monitored the overwintering parameters. The more colonies that were joined, the worse the overwintering parameters were (greater amount of feces in the intestines, higher food consumption, poorer results on the following year's forage…), which best shows how much bees from different queens do not tolerate each other.What can be done to reduce these effects? First of all, terrain with as many landmarks as possible, hives as far apart from each other as possible (do not place all the bees next to each other on a one-hectare plot, but arrange them in groups that you will space far apart, and within the groups keep hives distant from neighboring ones). Even when migrating on pallets, separate them from each other as much as possible, with entrances turned toward slightly

different directions. It would be ideal if hives on pallets were painted in colors that bees can distinguish. The basic colors bees distinguish are ultraviolet (which our eyes do not see), blue, and green. From these combinations they can also distinguish yellow, blue-green, light green (dark green looks black to them), white, and combinations of ultraviolet and yellow that we also cannot see — but they see patterns on flowers that we do not. They do not see red, so poppy petals appear black to them.Every help given to bees in

this regard is important and useful for the beekeeper. There will be fewer bee diseases, first and foremost (the highest probability of finding American foulbrood is precisely in hives located next to the first discovered hive with foulbrood). Bees prefer to drift into darker hives, so that should also be kept in mind. On pallets, have an odd number of hives, which reduces drifting. Various shapes can be placed on hives or drawn on them. It has been established that bees cannot distinguish between a full circle and a square with a diameter of 5 cm. But they distinguish very well between a full line and a circle. Many arrange pallets around the apiary in various ways, even placing them over the flight paths of some hives. Bees have about 60 times weaker visual resolution than us, so they do not notice some fine details. Therefore, shapes are not crucial to them, but the orientation of their edges is (vertical / horizontal / diagonal). They also distinguish radial symmetry well (rays toward the center). That is why they distinguish a circle from a square, diamond, and triangle, but it is important that their center of mass is not in the same place. They distinguish a right-angled triangle from an inverted one. They distinguish a T shape from an inverted T. They distinguish parallel from crossed lines.A huge problem regarding bee drifting that almost no one is aware of is the selection of the starter colony from which young queens will be reared. Imagine if it is at the end of the row? It will be the best, but not thanks to its own genetics. Such colonies must be very far apart from each other before you can compare them. The only case where foragers from outside will not influence the result is when performing a hygienic behavior test, because foragers do not participate in that task.

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HOW TO INCREASE YIELD THROUGH WISER APIARY PLACEMENT

We are witnessing that most beekeepers do not pay enough attention to the distance from neighboring apiaries, considering it an insignificant factor. That this is a catastrophic mistake is proven by numerous facts, and we will address this in a separate article in the upcoming issues of the magazine. For now, we will cover only one extremely important factor that you probably wouldn't even think about if you weren't already familiar with it.It concerns the fact that a bee changes the electrical charge of the flower it lands on for nectar. When the next bee soon arrives at that same flower, it recognizes by the flower's electrical charge that it has been recently visited, so it does not land on it and does not waste time, "knowing" that new nectar could not yet have been produced. This dramatically increases the efficiency of forage utilization. However, if the terrain is overloaded with bees — that is, with nearby apiaries — the bee flies futilely from flower to flower; almost every one has already been visited, and it loses a great deal of time until it finds an unvisited flower. On intensively foraged pastures, this sometimes means that a bee spends several times more time flying to fill its honey stomach than it would actually spend collecting nectar.In other words, if there are many hives in one location, the flowers become overloaded (no matter how many there are), and your bees will collect **LESS HONEY** in the same amount of time than they would if fewer colonies were present at that location. That is why it is not only good to stay away from other apiaries, but your own apiary should also be arranged in mutually distant groups of 20–35 hives, depending on the type and expected intensity of

the forage. The optimal distance between such apiaries is 2–2.5 km (the optimal bee flight range is up to 800–900 m, and the same distance from another apiary ensures that at least 80% of the bees on the apiaries do not “overlap” the forage they are visiting). Even a distance of just 200 m can make a dramatic difference.This has long been known to science, although not directly, because as early as 1975 Erickson wrote about his research on electricity in bees, without explicitly stating the above conclusion. However, it was clear to all of us who read it that this connection must exist, because with bees — as in all of nature — nothing is accidental, or perhaps some natural coincidence has been successfully used for a useful purpose.However, direct scientific conclusions came from the University of Bristol, which in 2013 conducted research in collaboration with scientists from Queen Mary University of London. The research was led by Daniel Robert, and the paper was published in the journal *Science*. While a bee is flying, it becomes positively charged due to intense friction with the air (it flaps its wings up to 230 times per second). The flower it lands on is usually negatively charged relative to the surrounding air. By landing, the bee changes its charge. The next bee senses this through the tiny hairs on its body and, since the flower is “empty,” does not even land on it. After some time, new nectar is produced and the flower becomes negatively charged again within about 100 seconds. In those 100 seconds, up to 10 bees may make futile attempts to visit the flower in areas with high bee density — resulting in a loss of both time and energy, and most of all, a loss in yield. If nature had not “invented” this electrification, the losses would have been even greater.Additionally, differences in electrical potential help bees collect pollen more easily, because it literally “jumps” onto them.Think about everything mentioned above when choosing the location and method of placing your apiaries on the upcoming foraging sites.

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Article

Emergent and Known Honey Bee Pathogens through Passive Surveillance in the Republic of Kosovo*

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Abstract: In recent years, honey bee colony losses in the Republic of Kosovo remained largely unknown. From 2019 to 2021, 81 apiaries with different disease suspicions were investigated in the framework of honey bee disease passive surveillance. Fifty-nine of the eighty-one apiaries were tested for *Vairimorpha ceranae*, *Vairimorpha apis*, trypanosomatids *Lotmaria passim*, and *Crithidia mellificae*. All samples were positive for *V. ceranae* (100%) whereas *L. passim* was found with a lower frequency (11.9%). *V. apis* and *C. mellificae* were not found. Thirteen of the eighty-one apiaries were tested for seven viruses (ABPV, CBPV, DWV, BQCV, SBV, IAPV, KBV) and five of them were found (ABPV, CBPV, DWV, BQCV, SBV). The most frequently detected viruses in honey bees and *Varroa* mites were DWV (100%) followed by BQCV, ABPV, SBV, and CBPV (92.3%, 69.2%, 30.8%, and 7.7%, respectively). *Varroa* mite samples had different degrees of co-infection by viruses. Nine of the eighty-one apiaries consisted of brood combs with larvae, eight of them were AFB positive, ERIC I genotype, and one EFB positive. This paper represents the first molecular investigation (PCR) and detection of the honey bee viruses ABPV, CBPV, DWV, BQCV, and SBV as well as *V. ceranae*, *L. passim*, and *M. plutonius* in the Republic of Kosovo.

Keywords: honey bee; *Vairimorpha* spp.; trypanosomatids; *Varroa destructor*; viruses; passive surveillance

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1. Introduction

Honey bee health has recently become a major topic due to the important role that bees play in pollination and food production [1]. In the last ten years, some regions of the world have suffered from a significant reduction in honey bee colonies [2]. It is believed that the reduction in honey bee populations is caused by a number of different biotic and abiotic factors, in particular pests, genetic factors, bee management, including beekeeping practices and breeding, climatic changes, malnutrition, agricultural practices, and the use of pesticides [2]. From emergent bee pathogens, the microsporidian species *Vairimorpha* (formerly *Nosema*) *apis* and *Vairimorpha* (formerly *Nosema*) *ceranae* [3] have been identified in European honey bees, *Apis mellifera*. *V. ceranae* is the most common gut pathogen in adult honey bees [4] and its infection could induce a degeneration of gut epithelial cells [5], a significant reduction in honey production [6], and a reduction in bee lifespan [7–10].

Two trypanosomatids *Lotmaria passim* and *Crithidia mellificae* (Kinetoplastea: Trypanosomatidae) are capable of colonizing the digestive tract of honey bees [11,12]. Both

pathogens are considered to alter bee physiology, behaviour, immune responses, and litespan [13–16].

Several bee viruses, like acute bee paralysis virus (ABPV), black queen cell virus (BQCV), chronic bee paralysis virus (CBPV), deformed wing virus (DWV), Kashmir bee virus (KBV), Sacbrood virus (SBV), and Israeli acute paralysis virus (IAPV) have been documented to be transmitted and activated by *Varroa* mites in field conditions [17–27]. ABPV, BQCV, KBV, and IAPV belong to the *Dicistroviridae* family [28] while DWV and SBV are classified in the *Iflaviridae* family [28]. CBPV has not yet been classified into any taxa [29].

ABPV and IAPV cause trembling, inability to fly, rapidly progressing paralysis, and death of honey bees [30–32], whereas KBV in natural infections commonly persists within apparently healthy broods and adults [33–35]. CBPV causes massive worker bee losses, mostly in strong colonies, and its infection appears in two groups of clinical signs: one including inability to fly, clustering, trembling, and crawling; the other consisting of black hairless individuals with shortened abdomens [36]. BQCV and SBV are the most widely distributed of all honey bee viruses. BQCV does not cause visible symptoms in infected adult bees but it could lead queen larvae and pupae to death by turning their cells black. Two-day-old larvae appear to be most vulnerable to SBV infection and, once they are fed with contaminated larval food, they fail to pupate [37,38], acquiring a sac-like appearance. DWV causes deformed wings in honey bees and induces colony weakening and mortality. Typical disease symptoms of DWV infection include shrunken, crumpled wings, decreased body size, and discoloration in adult bees. Three genetic variants of DWV were discovered and identified as types A, B, and C, but DWV-A and -B are the most widespread variants [39,40].

Two bacterial pathogens affecting honey bee larvae but not adult bees are *Paenibacillus larvae*, the causative agent of American Foulbrood (AFB), and *Melissococcus plutonius*, responsible for European Foulbrood (EFB) [41]. The clinical symptoms of AFB are darkened, sunken, and perforated cell caps containing diseased larvae, a characteristic unpleasant odour, and sticky larval remains when drawn out with a matchstick. Instead, EFB usually affects young larvae that die while still coiled before they are capped. The younger larvae affected cover the bottom of the cell and are almost transparent, with a visible trachea and midgut; the latter, full of bacteria, appears as a yellow spot. Dead, flaccid discoloured larvae in uncapped cells show colour changes from pearly white to yellow to yellowish brown [42]. AFB and EFB are both widely distributed and potentially lethal to infected colonies [41–44].

According to the data from the Beekeepers' Association in the Republic of Kosovo, the beekeeping industry consists of around 135,750 honey bee colonies and 6453 beekeepers [45], with mild fluctuations over the years. In the last two years, there have been frequent reports from beekeepers about *Varroa destructor* mite infestation and increased requests for investigation due to colony losses supposedly caused by some honey bee pathogens, such as viruses, fungi, or other parasites, often positively correlated with *Varroa* infestation. Due to the lack of information about the presence of viral disease, we aimed to determine the presence and distribution of known and emergent honey bee pathogens such as ABPV, KBV, IAPV, DWV, BQCV, CBPV, SBV, *V. apis*, *V. ceranae*, *L. passim*, and *C. mellificae* in apiaries of the Republic of Kosovo based on reporting from beekeepers and veterinarians.

2. Materials and Methods

2.1. Sample Collection

From 2019 to 2021, based on complaints of beekeepers concerning weakened colonies, the presence of *Varroa* mites, honey bees with deformed wings, sac brood, and sticky larvae, sampling was performed on 89 apiaries suspected of disease by beekeepers and veterinarians and adult bee specimens, brood combs with larvae and pupae, as well as *Varroa* mites, were collected and sent to the Kosovo Food and Veterinary Agency, Veterinary Laboratory for analyses (Table 1, Figure S1).

Table 1. Municipalities involved in the passive surveillance, number of sampled apiaries per group, pathogens investigated, and results of laboratory investigations.

Municipality		Group 1			Group 2										Group 3		
		Vairimorpha spp. and Trypanosomatids			Honey Bee Viruses										American and European Foulbrood		
		N. of Sampled Apiaries	N. of Apiaries with Positive Results		N. of Sampled Apiaries	N. of Apiaries with Positive Results (Honey Bee Samples at Different Stages of Development)					N. of Sampled Apiaries	N. of Apiaries with Positive Results (*Varroa* Mite Samples)				N. of Sampled Apiaries	N. of Apiaries with Positive Results	
			Vairimorpha ceranae	*Lotmaria passim*		ABPV	CBPV	DWV	BQCV	SBV		ABPV	CBPV	DWV	BQCV		AFB	EFB
1	Suharekë	3	3	0	2	2	0	2	2	0	2	2	0	2	2	1		nt
2	Shtime	2	2	0		0	0		1	0	1	1	1	1		1		nt
3	Prishtinë	4	4	1	ns						ns					ns		
4	Deçan	14	14	3	ns						ns					1	nt	1
5	Kamenicë	4	4	0	1	1	0	1	1	1	ns					1	1	nt
6	Podujevë	3	3	0	ns						ns					ns		
7	Vushtri	4	4	0	ns						ns					ns		
8	Drenas		1	0	2	1	0	2	2	0	1	0	0	1		1		nt
9	Ferizaj	1	1	0	ns						ns					ns		
10	Prizren	1	1	0	2	0	0	2	1	0	2	1	0	2	0	ns		
11	Mitrovicë	2	2	0	ns						ns					ns		
12	Novobërdë	2	2	0	ns						ns					ns		
13	Hani i Elezit	1	1	0	ns						ns					ns		
14	Malishevë	3	3	2	ns						ns					1	1	nt
15	Gjilan	3	3	0		1	0		1	1	1	1	0	1		ns		
16	Lipjan	3	3	0		1			1	0	1	1	0	1		ns		
17	Graqanicë		1	0	ns						ns					ns		
18	Skenderaj	2	2	0	1	1	0	1	1	0	ns					ns		
19	Viti	2	2	1	ns						ns					2	2	nt
20	Fushë Kosovë		1	0	ns						ns					ns		
21	Obiliq		1	0	ns						ns					ns		
22	Pejë	1	1	0	ns						ns					ns		
23	Gjakovë	ns			1	1	0	1	1	1	ns					ns		
24	Junik	ns				1	0		1	1	ns					ns		
25	Istog	ns			ns						ns					1		nt
Total apiaries sampled per group		**59**			**13**						**8**					**9**		
Total pathogens detected per group			**59**	**7**		**9**	**1**	**13**	**12**	**4**		**6**	**1**	**8**	**6**		**8**	**1**
% of infections			**100**	**11.9**		**69.2**	**7.7**	**100**	**92.3**	**30.8**		**75**	**12.5**	**100**	**75**			
% of infection in honey bees and *Varroa* together						**84.6**	**15.4**	**100**	**92.3**	**30.8**								

nt = not tested. ns= not sampled.

Group 1: fifty-nine apiary samples taken from 22 municipalities (Table 1). For each apiary, a pool of 30 adult worker honey bees collected from 3 different colonies was prepared to be tested for *Vairimorpha* spp. since suspicion of infection was raised based on a weak colony condition. Sampling was carried out upon the request of beekeepers for suspected cases of weak colonies during the spring, summer, and autumn periods. For each of the three colonies of the apiary, 30–60 bees were taken randomly from the flight board and inside of the hive, and, once pooled, the samples were sent by the beekeepers to the laboratory for *Vairimorpha* spp., *L. passim*, and *C. mellificae* detection. All the samples were stored at −20 °C until analysis.

Group 2: thirteen apiary samples (adult and/or larvae and/or pupae and/or *Varroa*) taken from 10 municipalities (Table 1). Sampling was carried out after suspicion of viral infections due to the presence of *Varroa*, lack of body hair on the thorax, deformed wings, and sac brood in weak or lost bee colonies. Each colony sample consisted of a full frame with different stages of bee development (adult and/or larvae and/or pupae and/or *Varroa*). Each apiary sample consisted of a pool of frames from 3 to 6 colonies belonging to the same apiary. In the laboratory, samples were collected from the honey bee combs with disposable forceps, placed in 10 mL plastic vials, and stored at −80 °C until analysis.

Group 3: nine apiary samples taken from 8 municipalities (Table 1) of which eight were analysed for AFB and only one for EFB. For each apiary, the sample consisted of a pool of several brood combs (10 × 10 cm with larvae) with suspicion of AFB or EFB infection.

2.2. Clinical Inspection of Samples

Thirty honey bee abdomens from Group 1 specimens were homogenized and prepared on the same day for *Vairimorpha* spp. spore detection by light microscopy at 400× magnification.

Adult bees, larvae, and pupae as well as *Varroa* mites collected from Group 2 were examined for the presence of sac-brood-like larvae, bees with deformed wings, or *Varroa* mites.

Samples from Group 3, consisting of brood combs, were clinically examined for symptoms of AFB and EFB, and then eight suspected larvae were tested for AFB and only one for EFB with rapid immunochromatography and microscopy.

2.3. Vairimorpha spp. Spore Detection and Vairimorpha apis/Vairimorpha ceranae Species Identification

The abdomens of 30 honey bees were separated and macerated in about 2.5 mL of distilled water using a mortar and pestle and successively 27.5 mL of distilled water was added to a final volume of 1 mL per bee. A drop of this suspension was examined under a light microscope at 400× magnification to evaluate the presence of *Vairimorpha* spp. spores. *Vairimorpha* spp.-positive samples were analysed for *V. apis* and *V. ceranae* species identification after DNA extraction from 1 mL homogenate using the QIAamp® DNA Mini Kit (Qiagen, Hilden, Germany) according to the manufacturer's instructions, with a lysozyme pre-incubation step. The yield and purity (260/280 and 260/230 nm absorbance ratios) of DNA were determined using the Nanodrop™ OneC (Thermo Fisher Scientific, Waltham, MA, USA) spectrophotometer. DNA was stored at −20 °C until use. Negative controls (negative process control—NPC: water for molecular biology applications instead of the sample) were included in each extraction session.

For *V. apis* and *V. ceranae* identification, two different sets of primers described by Martín-Hernández et al. [46] were used and PCR analysis was carried out as previously described by Bordin et al. [47]. Negative (negative template control—NTC: water for molecular biology applications instead of the DNA template) and positive (positive template control—PTC: DNA from *V. apis*- or *V. ceranae*-positive samples) controls were included in each PCR.

2.4. Lotmaria passim and Crithidia mellificae Detection

For *L. passim* and *C. mellificae* detection, two pairs of primers described by Bartolomé et al. [48] were used and PCR analysis was carried out as previously described by Bordin et al. [47]. Negative (NTC: water for molecular biology applications instead of the DNA template) and positive (PTC: DNA from *L. passim*- or *C. mellificae*-positive samples) controls were included in each PCR.

2.5. Honey Bee Viruses

Thirteen honey bee (adult and/or larvae and/or pupae) and eight *Varroa* mite samples were analysed for seven honey bee viruses relevant with respect to colony health status: ABPV, CBPV, DWV, SBV, BQCV, KBV, and IAPV.

For each sample, a pool of five specimens per development stage (adult, larvae, or pupae) or a pool of up to ten specimens of *Varroa* mites was homogenized by Tissue Lyser II (Qiagen, Hilden, Germany) (2 cycles, 1 min each, at 30 Hz) in the presence of a 5 mm stainless steel bead. Total RNA extraction was performed using the NucleoSpin RNA kit (Macherey Nagel GmbH & Co. KG, Dueren, Germany) according to the manufacturer's instructions. The yield and purity of RNA (260/280 and 260/230 nm absorbance ratios) were assessed with a Nanodrop™ OneC spectrophotometer. RNA was stored at −80 °C until use. Negative controls (NPC: buffer RA1 from the extraction kit instead of the homogenized sample) were included in each extraction session.

To detect viral RNA, real-time RT-PCR (rRT-PCR), or end-point RT-PCR were performed as described by Bordin et al. [47]. To detect the presence of DWV the molecular protocol described by Martinello et al. [49] was used. Negative (NTC: water for molecular biology applications instead of the RNA template) and positive (PTC: viral RNA from positive sample) controls were included in each PCR.

2.6. Paenibacillus larvae (AFB) Detection by Field Tests, Isolation, and PCR

A first visual inspection of brood combs was carried out to search for symptoms of AFB: irregular and patchy brood pattern, unpleasant odour, perforated and sunken cell caps, dark-coloured larvae, ropy larvae, and stickiness. Larvae with AFB symptoms were then analysed with the AFB lateral flow test—Diagnostic Test Kit (Vita Europe, London, UK) according to the manufacturer instructions (https://www.vita-europe.com/beehealth/products/afbdiagnostic-test-kit/) (accessed on 20 January 2024). The samples were stored at −20 °C for further analyses.

The presence of *P. larvae* in the eight samples of suspected larvae was also determined by the culture method and PCR.

The isolation of *P. larvae* and the following colony identification (catalase test and Gram staining) was performed on Columbia sheep-blood agar (CSA), supplemented with nalidixic acid and pipemidic acid, according to the WOAH Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, chapter 3.2.2 (2023) [50].

To assess the presence of *P. larvae* by the PCR method, DNA extraction was performed from a larvae homogenate using the QIAamp® DNA Mini Kit (Qiagen, Hilden, Germany) according to the manufacturer's instructions, with a lysozyme pre-incubation step. The yield and purity (260/280 and 260/230 nm absorbance ratios) of DNA were determined using a Nanodrop™ OneC spectrophotometer. DNA was stored at −20 °C until use. Negative controls (NPC: water for molecular biology applications instead of the sample) were included in each extraction session.

For *P. larvae* detection, the primers described by Dobbelaere et al. [51], targeting a 1096 bp region of the 16S rRNA gene, were used. PCR was carried out on a Veriti™ 96-Well Thermal Cycler (Applied Biosystems™, Waltham, MA, USA), using the AmpliTaq™ Gold kit (Applied Biosystems™, Waltham, MA, USA). In a final volume of 50 µL, 200 ng of DNA was amplified using a final concentration of 2 mM $MgCl_2$, 1 µM for each primer, 0.2 mM of dNTPs, and 1 U AmpliTaq Gold DNA polymerase. The thermal cycling profile consisted of an initial activation step at 95 °C for 10 min followed by 35 cycles at 93 °C for 60 s, 55 °C

for 30 s, 72 °C for 60 s, and a final elongation step at 72 °C for 5 min. Negative (NTC: water for molecular biology applications instead of the DNA template) and positive (PTC: *P. larvae* DNA) controls were included in each run of PCR. The presence and the size of amplification products (1096 bp) were evaluated by electrophoresis in 7% acrylamide gel after silver staining or capillary electrophoresis on a LabChip® GX Touch HT Nucleic Acid Analyzer (Perkin Elmer, Waltham, MA, USA).

2.7 Genotyping of Paenibacillus larvae Isolates

For *P. larvae* genotyping, DNA was extracted from catalase-negative and Gram-positive colonies using the QIAamp® DNA Mini Kit (Qiagen, Hilden, Germany) according to the manufacturer's protocol for Gram-positive bacteria, and the DNA was eluted in a final volume of 120 µL. The yield and purity of DNA were determined using the Nanodrop™ OneC spectrophotometer and the nucleic acid was stored at −20 °C until use. ERIC-typing PCR was performed using the primers published by Genersch et al. [52]. The PCR was carried out on a Veriti™ 96-Well Thermal Cycler (Applied Biosystems™, Waltham, MA, USA) in a final volume of 50 µL using the AmpliTaq™ Gold kit and containing a final concentration of 2.5 mM $MgCl_2$, 800 µM of dNTP mix, 1 µM of each primer, 2.5 U AmpliTaq Gold DNA polymerase, and 50–100 ng of DNA. The thermal cycling amplification profile consisted of an activation step at 95 °C for 10 min, followed by 50 cycles at 94 °C for 1 min, 53 °C for 1 min, 72 °C for 2.5 min, and a final elongation step at 72 °C for 10 min. Negative (NTC: water for molecular biology applications instead of the DNA template) and positive (PTC: *P. larvae* DNA) controls for ERIC I, II, and IV genotypes were included in each PCR. After amplification, about 16 µL of the PCR reaction was electrophoresed in a 1.7% SeaKem® Gold Agarose gel (Lonza Rockland, Inc., Rockland, ME, USA) and the PCR products were visualized after ethidium bromide staining on a UV trans-illuminator.

2.8. Melissococcus plutonius Detection by Field Tests and PCR

Brood combs were examined for EFB signs such as dead, flaccid discoloured larvae in uncapped cells or changes in their colour (from pearly white to yellow, yellowish to brown), and the presence of dry and dark brown scales that can easily be removed from the cells.

Larvae with EFB symptoms were tested with the EFB lateral flow test—Diagnostic Test Kit (Vita Europe, London, UK) according to the manufacturer's instructions (https://www.vita-europe.com/beehealth/products/efb-diagnostic-test-kit/) (accessed on 20 January 2024). After analysis, all samples were stored at −20 °C until further examination.

A pool of larvae was analysed to detect the presence of *M. plutonius* by the PCR method, using the primers described by Govan et al. [53], targeting an 832 bp region of the 16S rRNA gene. DNA extraction was performed using the QIAamp® DNA Mini Kit (Qiagen, Hilden, Germany) according to the manufacturer's instructions (protocol for bacteria—isolation of genomic DNA from Gram-positive bacteria). The yield and purity of DNA were determined using the Nanodrop™ OneC spectrophotometer and the nucleic acid was stored at −20 °C until use. Negative controls (NPC: water for molecular biology applications instead of the sample) were included in the extraction session.

The PCR was carried out as described above in a final volume of 50 µL containing a final concentration of 2.5 mM $MgCl_2$, 0.2 mM dNTP mix, 0.5 µM of each primer, 2 U AmpliTaq Gold DNA polymerase, and 50–100 ng of DNA. The thermal cycling amplification profile consisted of an activation step at 95 °C for 10 min, followed by 35 cycles at 94 °C for 30 s, 60 °C for 30 s, 72 °C for 30 s, and a final elongation step at 72 °C for 10 min. Negative (NTC: water for molecular biology applications instead of the DNA template) and positive (PTC: *M. plutonius* DNA) controls were included in each PCR. The presence and the size of the amplification product (832 bp) were evaluated by electrophoresis in 7% acrylamide gel after silver staining.

3. Results

The results from 89 investigated apiaries are shown in Table 1 and Figures 1 and 2.

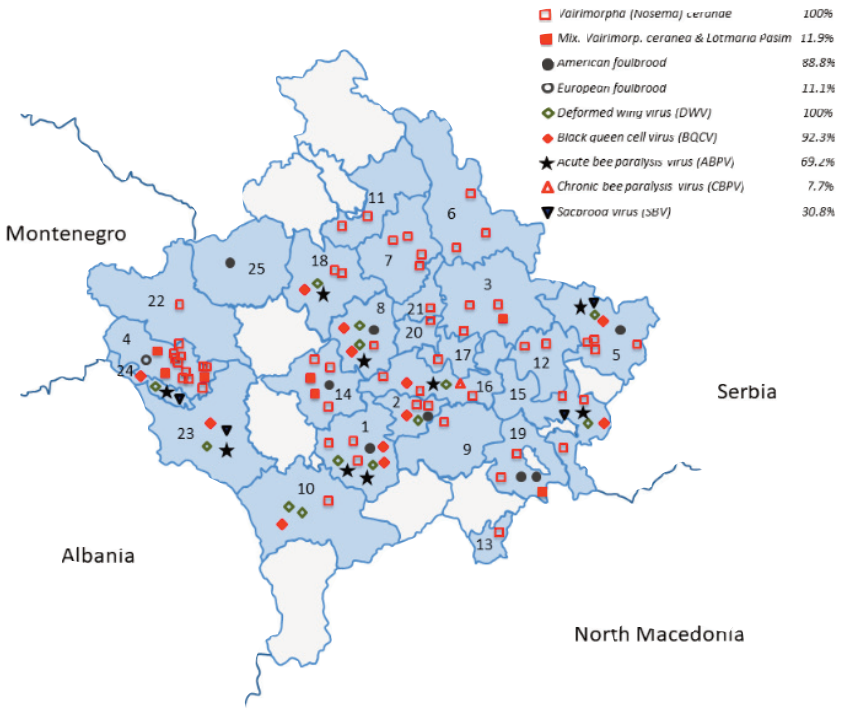

Figure 1. Distribution of detected pathogens by municipality in the Republic of Kosovo. The numbers correspond to the 25 involved municipalities (1—Suharekë; 2—Shtime; 3—Prishtinë; 4—Deçan; 5—Kamenice; 6—Podujevë; 7—Vushtrri; 8—Drenas; 9—Ferizaj; 10—Prizren; 11—Mitrovicë; 12—Novoberdë; 13—Hani i Elezit; 14—Malishevë; 15—Gjilan; 16—Lipjan; 17—Graqanicë; 18—Skenderaj; 19—Viti; 20—Fushë Kosovë; 21—Obiliq; 22—Pejë; 23—Gjakovë; 24—Junik; 25—Istog). Each symbol indicates the presence of a different pathogen individually or in combination. Their percentage of detection is also indicated.

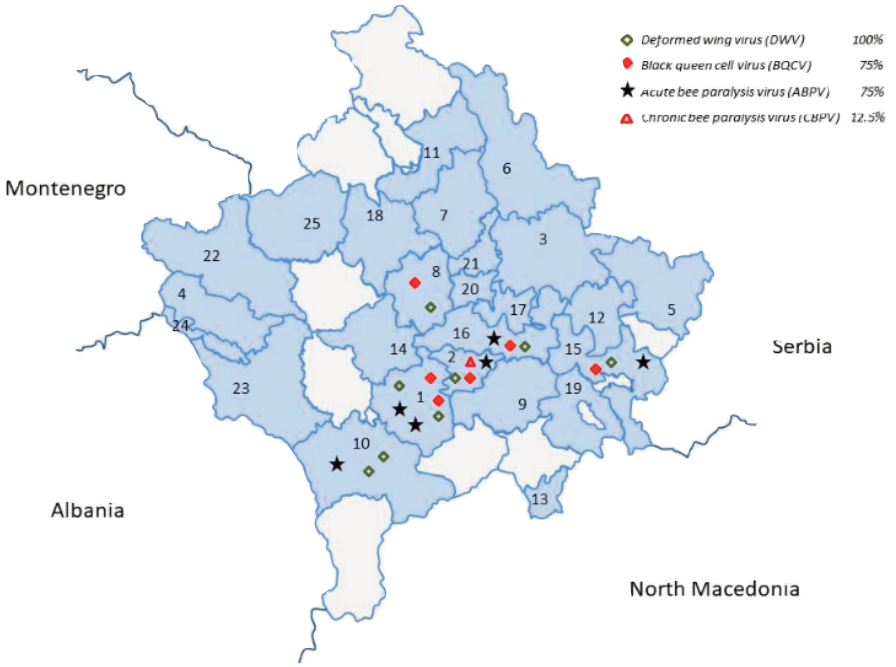

Figure 2. Distribution of detected honey bee viruses in *Varroa* mites by municipality in the Republic of Kosovo. The numbers correspond to the 25 involved municipalities. Each symbol indicates the presence of a different virus detected in *Varroa* specimens. Their percentage of detection is also indicated.

3.1. Group 1—Vairimorpha spp. and Trypanosomatids L. passim and C. mellificae

Of 59 investigated apiaries from 22 municipalities, *V. ceranae* infections were found in all apiaries (100%), whereas all were negative for *V. apis*. The trypanosomatid *L. passim* was detected in seven apiaries (11.9%) from four municipalities, while *C. mellificae* was never detected (Table 1, Figures 1 and 3A–C,E).

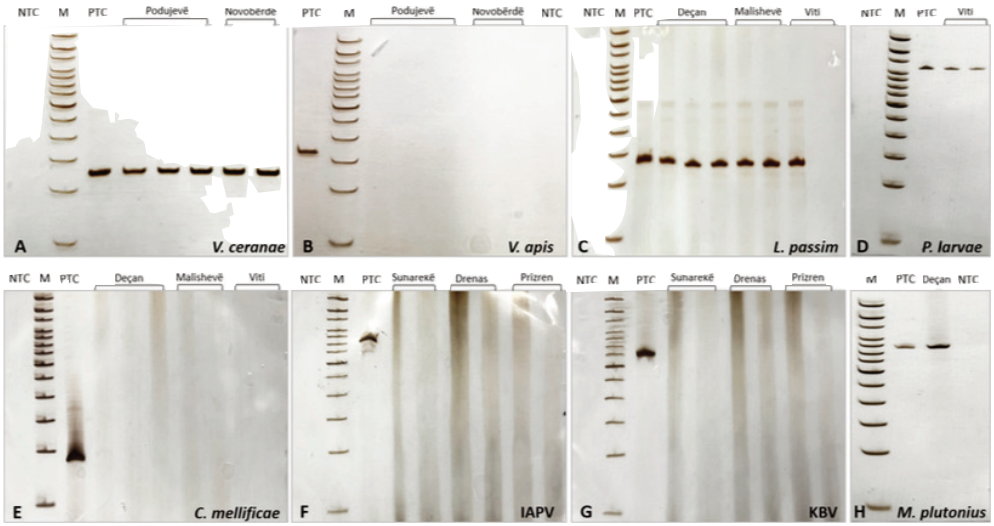

Figure 3. PCR products of eight bee pathogens after 7% acrylamide gel electrophoresis and silver nitrate staining. In this figure, PCR products from some of the analysed apiaries are shown: Suharekë, Drenas, Prizren, Podujevë, Novobërdë, Deçan, Malishevë, Viti. Eight bee pathogens were amplified by PCR: (**A**) *V. ceranae* (218 bp); (**B**) *V. apis* (321 bp); (**C**) *L. passim* (254 bp); (**D**) *P. larvae* (1096 bp); (**E**) *C. mellificae* (177 bp); (**F**) IAPV (767 bp); (**G**) KBV (659 bp); (**H**) *M. plutonius* (832 bp). M: 100 bp DNA Ladder (Invitrogen™); PTC: pathogen positive control; NTC: no template control.

3.2. Group 2—Honey Bee Viruses (ABPV, CBPV, DWV, SBV, BQCV, KBV, and IAPV)

The following honey bee viruses were detected in samples (adults/larvae/pupae) from the 13 apiaries in the 10 municipalities: DWV in all thirteen apiaries (100%), BQCV in twelve apiaries (92.3%), ABPV in nine apiaries (69.2%), SBV in four apiaries (30.8%), and CBPV in one apiary only (7.7%). IAPV and KBV were not detected in any apiary (Figure 3F,G). Viruses were found in all the developmental stages of honey bees and in particular, adults specimens tested positive for DWV, BQCV, ABPV, CBPV, and SBV; pupae for DWV, BQCV, ABPV, and SBV; and larvae for DWV, BQCV, and ABPV (Table 1 and Figure 1).

In the eight *Varroa* samples derived from eight apiaries from six municipalities, four out of seven viruses (ABPV, CBPV, DWV, BQCV) and different co-infections were detected. In particular, only the sample from one municipality (Shtime) was found to be co-infected with all four viruses, and four *Varroa* mite samples from three municipalities (Gjilan, Lipjan, Suharekë) tested positive for three viruses (ABPV, DWV, BQCV), whereas two samples from Prizren and one sample from Drenas tested positive for ABPV and DWV, and for DWV and BQCV, respectively (Table 1 and Figure 2).

3.3. Group 3—Paenibacillus larvae and Melissococcus plutonius Detection

In the third group, all 8 larvae samples from the brood comb (1, Suharekë; 1, Kamenicë; 1, Drenas; 1, Malishevë; 1, Shtime; 2, Viti; 1, Istog) investigated for the presence of the causative agent of AFB tested positive for *P. larvae* on an AFB lateral flow test—Diagnostic Test Kit (Vita Europe, London, UK), PCR, and the culture method (Table 1, Figures 1 and 3D). All *P. larvae* isolates were identified as the ERIC I genotype. The only sample from the Deçan municipality analysed for *M. plutonius* presence was positive for

EFB on a lateral flow test—Diagnostic Test Kit (Vita Europe, London, UK) and PCR (Table 1, Figures 1 and 3H).

4. Discussion

In the last decade, a reduction in honey bee colonies has been frequently reported around the world [2,54]. Among the causes for mortality and global threat for honey bee colonies are several pathogens and parasites [55].

Our study was based on passive surveillance on weak honey bee colonies aiming to determine the occurrence and distribution of known and emergent honey bee pathogens in the Republic of Kosovo. An investigation based on passive surveillance was already carried out by Hulaj et al. [45] focusing on AFB.

In all the 59 apiaries tested for *Vairimorpha* spp., a high percentage of infection (100%) with *V. ceranae* was found, while no samples tested positive for *V. apis*. These data confirm what has already been reported in Italy [47,56] and in the neighbouring countries to the Republic of Kosovo, such as Serbia, Croatia, Bosnia–Herzegovina, Montenegro, North Macedonia, and Bulgaria, where *V. ceranae* dominates in microsporidia infections in honey bees [57–61]. Furthermore, this finding confirmed the previously reported higher diffusion of *V. ceranae* in other European countries and worldwide [62–65]. The presence of *V. ceranae* infection could reduce honey bee lifespan [7], significantly increase honey bee worker mortality, and could be one stressor responsible for elevated colony losses [66].

In the Republic of Kosovo, *L. passim* was only detected in seven of fifty-nine apiaries (11.9%) from four municipalities during the passive surveillance. In the Veneto region (northern Italy), *L. passim* was detected in almost all of the apiaries analysed with an overall positivity rate of 48.8% in 2020, while an increase was observed in 2021 with an overall value of 62.2% [47]. In Serbia, *L. passim* was detected during 2007–2015 every year. In the Republic of Kosovo, *C. mellificae* was never reported, as well as in neighbouring Serbia [67].

In our study, five honey bee viruses were found (ABPV, CBPV, DWV, BQCV, SBV) and the most frequent were DWV and BQCV with 100% and 92.3% prevalence in the 13 apiaries analysed, respectively. ABPV was detected in nine apiaries (69.2%), SBV in four apiaries (30.8%) from four municipalities, and CBPV in only one apiary (7.7%). No positivity for IAPV and KBV was observed in the investigated apiaries.

When comparing our research on honey bee viruses with other countries, we found that the same viruses (ABPV, CBPV, DWV, BQCV, and SBV) have also been detected in neighbouring Serbia, Austria, Greece, and other countries [68–71], whereas KBV was also detected in France [20]. The presence of DWV is often associated with *V. destructor* infestation, and the role of this mite in viral transmission has already been experimentally demonstrated [72]. It is known that DWV, vectored by the *Varroa* mite, adversely affects humoral and cellular immune responses and promotes the reproduction of this parasitic mite [27].

Both BQCV and SBV are not known to be transmitted by *V. destructor* [73]. However, a significantly higher prevalence of BQCV and SBV in colonies infested with *V. destructor* mites has been detected, hypothesizing the role of *V. destructor* in their transmission [74]. In our study, considering not only honey bee but also *Varroa* mite samples, the virus frequency was increased for ABPV (from 69.2% to 84.6%) and CBPV (from 7.7% to 15.4%).

Furthermore, larvae collected from the brood comb tested for AFB were positive for the *P. larvae* ERIC I genotype in eight out of nine apiaries. This finding is in line with the results of the passive survey carried out during 2007–2019 that revealed a wide diffusion of AFB of the ERIC I and II genotypes in the country [45], thus suggesting the necessity of applying active disease surveillance strategies. The single positivity detected for EFB suggests that the disease is present in the country but further investigations are needed to understand its true distribution and possible impact on honey bee colonies.

5. Conclusions

Although there have been clinical cases of suspected emergent honey bee diseases in the Republic of Kosovo, they have never been investigated; this paper represents the first molecular detection of honey bee viruses (ABPV, CBPV, DWV, BQCV, SBV), the microsporidian *V. ceranae*, the trypanosomatid *L. passim*, and the bacterium *M. plutonius*. Furthermore, we also confirmed the presence of *P. larvae* in the apiaries of the Republic of Kosovo.

We hope that the results presented herein could open the path to further investigations in order to consolidate and update the knowledge on the health status of honey bee colonies in the Republic of Kosovo.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/app14030987/s1, Figure S1: Map with the involved municipalities and the type of beehive matrices that have been sampled.

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**This designation is without prejudice to positions on status, and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo declaration of independence*

CZECH BEEKEEPING CLUBS: "PHOTO-FRAMES" AN EXCELLENT EDUCATIONAL AID

What is a photo frame?

It's an ordinary hive frame which has a photograph of a real comb from the hive attached to it instead of a wax foundation.

What is their advantage?

They are a great teaching aid for several reasons. First of all, it is much more ethical showcasing realistic photos rather than having to open up a hive every time you want to show someone what it looks like inside it. There is less stress for the bees and you can take your time without having to worry about their health.

Secondly, since there are no live bees present, it is safe to use these frames to educate allergic people, the general public and small children, who might be scared of getting stung.

Lastly, they can be arranged in any arbitrary way in order to simulate certain situations, which may occur in a bee colony.

Where can I get them?

We have made a step-by-step tutorial and published it on the website of the International Center for Young Beekeepers (ICYB). You can find all the photographs there as well. You can use the link:

https://www.icyb.cz/blog/2026/06/02/tutorial-how-to-make-a-photo-frame/ .

How can I join this project?

You can help by either taking photos, promoting the project or just trying it for yourself and giving us feedback so we can perfect our tutorials. We appreciate everyone who takes the meaning of educating the youth seriously and we hope together we can achieve amazing results.

Lukáš Loukota
Young Czech beekeeper, 16 years old

Tutorial

How to make a "photo-frame"

A photo-frame

Photo-frames are an amazing teaching aid used a lot by Czech beekeeping clubs. They are not really common elsewhere though. That is the

reason this project has started. We want to teach beekeeping club leaders and other educators around the world how to make them.

So, what does a photo-frame look like? It's an ordinary hive frame which has a photograph of a real comb from the hive attached to it instead of a wax foundation.

What is it actually useful for? It is a great teaching aid for several reasons. First of all, it is much more ethical showcasing realistic photos rather than having to open up a hive every time you want to show someone what it looks like inside it. There is less stress for the bees and you can take your time admiring their work without having to worry about their health.

Secondly, since there are no live bees present, it is safe to use these frames to educate allergic people, the general public and small children, who might be scared of getting stung.

Lastly, they can be arranged in any arbitrary way in order to simulate certain situations, which may occur in a bee colony.

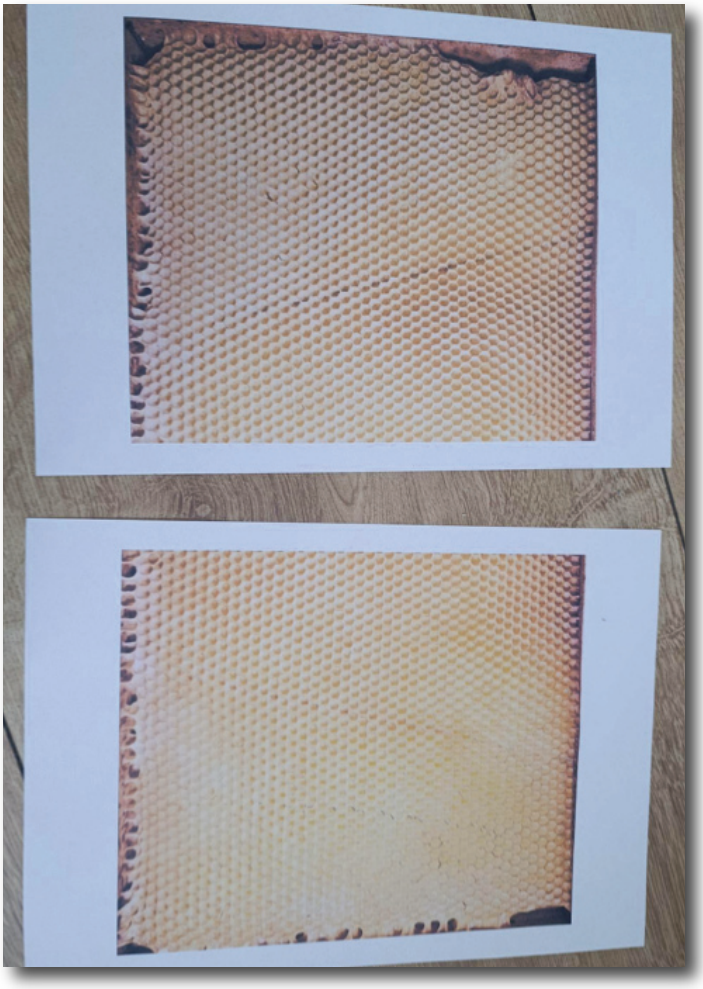
Tutorial

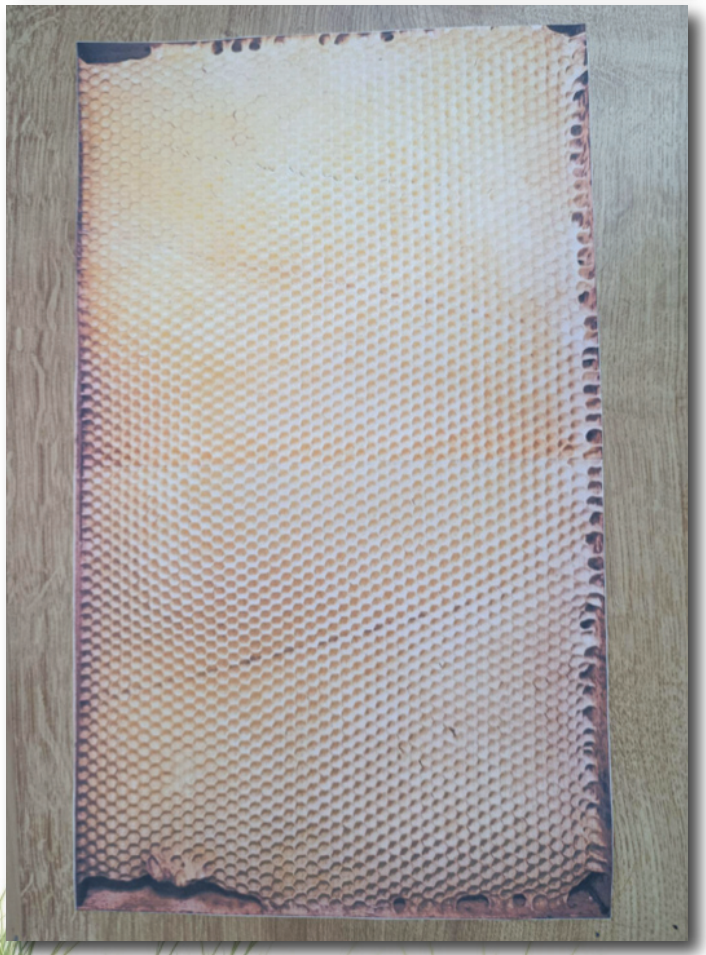
Before you start, note that all current photographs are of the Adamec (39x24 cm) frames, if you use any other size of frame, the cells won't be to scale.

1. We start by assembling the wooden (or plastic) frame. You can also buy pre-assembled ones, but they are usually more expensive.

2. Afterwards you can add plastic or metallic spacers if you usually use them in your hives, otherwise skip this step.

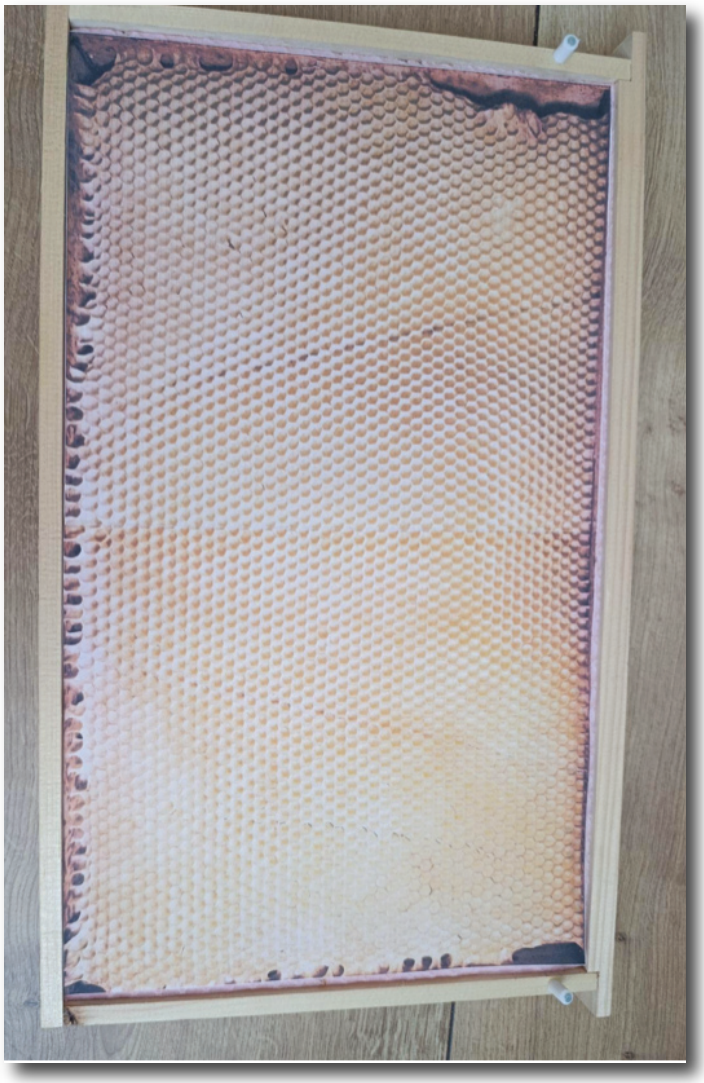
3. Then cut a polystyrene or XPS desk which is slightly larger than the inner hole of your frame.





4. When you are done, print out the photograph of your chosen frame. You can either print it on A3 paper as one piece or use the A4 version and print it in two parts and glue them together.

5. After that, you can glue the photographs onto your polystyrene desk. Then cut off the excess paper and leave about a 2mm border.



6. Finally you can insert the desk with the photograph into the frame. You can also add some more nails or screws to hold it in place, if it falls out too easily.

Photographs

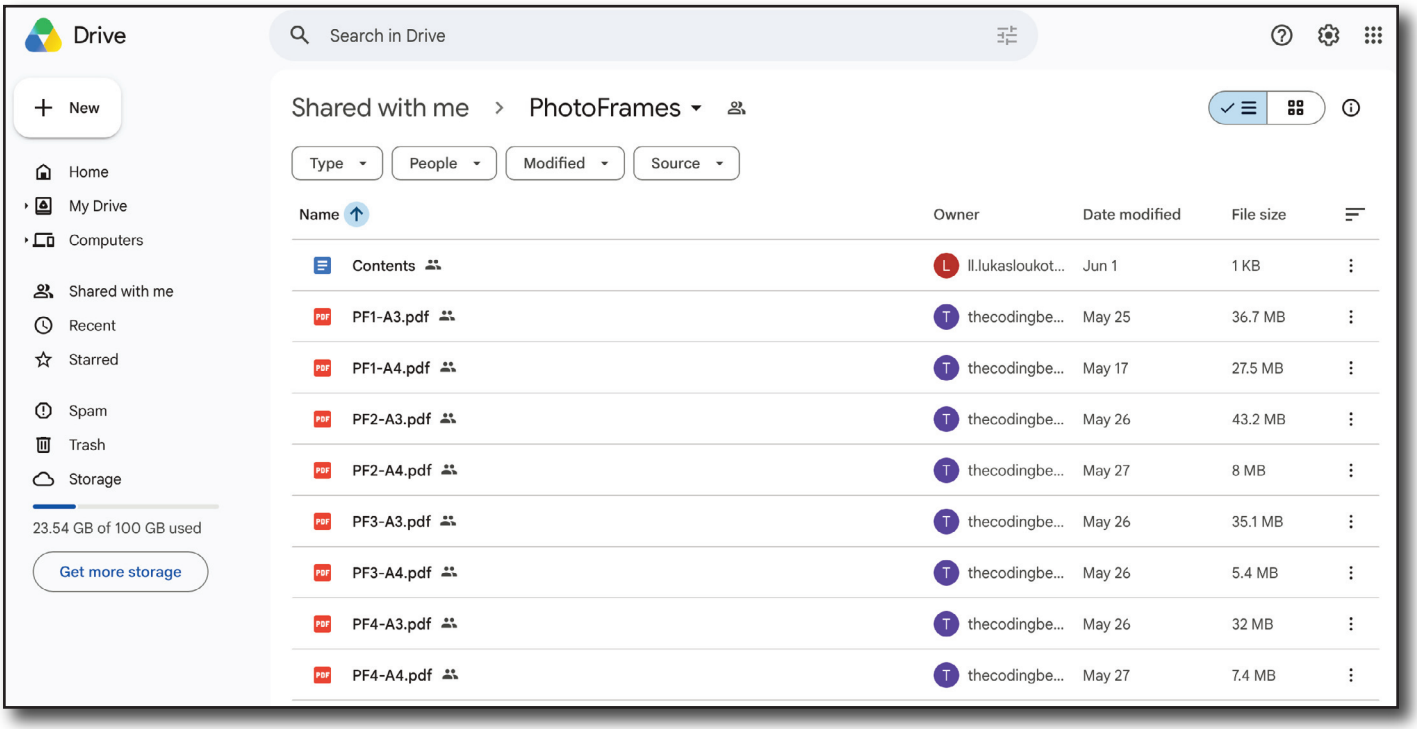
All photographs in both versions are available in this google drive folder:

https://drive.google.com/drive/folders/1rAiTommCpBnUvY_lAETZH5rmWgp2L2e

Contents

To help you better incorporate photo-frames into your teaching, there is a short description of each one's content in the provided folder.

Currently we don't have many photographs, but we are planning on expanding our gallery with many more frames, especially those with different diseases and other unusual phenomena.



INFORMATION ON THE CELEBRATION OF WORLD BEE DAY IN MADRID, 20 MAY 2026

The Embassy of the Republic of Slovenia in Madrid marked World Bee Day on Wednesday, 20 May, by organizing an event entitled “The World is Our Hive: Bees Without Borders” (El mundo es nuestra colmena: abejas sin fronteras). The full-day event was organized in cooperation with the Royal Botanical Garden of Madrid.

Dr. Paola Vecino (El Rincón de la Abeja) made a significant contribution to the event from a content perspective, assisting with its professional design and advising on the involvement of Spanish institutions and beekeepers.

On this occasion, two panel discussions featuring international and local experts were held in the Botanical Garden’s conference hall (one in English and one in Spanish). In the area of the garden known as Glorieta de los Plátanos, presentations of projects, traditions, and products related to bees and other pollinators were organized in cooperation with various embassies, institutions, associations, and companies.

The panel discussions were opened with welcome remarks by H.E. Mr. Tadej Rupel, Ambassador of the Republic of Slovenia to Spain; Dr. Ricarda Riina Olivares, Deputy Director of the Royal Botanical Garden – CSIC; and Mr. Rafael García González, Deputy Regional Minister for Environment, Agriculture and Territorial Planning of the Community of Madrid. Video greetings were also delivered by Mr. Boštjan Noč, President of the Slovenian Beekeepers’ Association and the European Beekeeping Association, and Prof. Dr. Peter Kozmus, Acting President of Apimondia.

The first panel focused on plants, pollinators and agriculture, as well as conservation policies and current challenges facing bees from an international perspective. The discussion was moderated by Dr. Paola Vecino and featured Prof. Pablo Vargas (Royal Botanical Garden – CSIC), Dr. Zlatko Tomjanović (Ministry of Agriculture, Forestry and Fisheries of the Republic of Croa-

tia), Mr. Miguel Ángel Fernández (LG Spain), Dr. Celeste Azpiazu (IMIDRA – Madrid Institute for Rural, Agricultural and Food Research and Development), and Dr. Noa Simón Delso (BeeLife European Beekeeping Coordination), who joined via video link.

The second panel brought together local experts and focused primarily on the impact of climate change on bees, threats and predators affecting bee populations, and the relationship between beekeeping and agriculture. Once again moderated by Dr. Paola Vecino, the participants included Clara Beatriz Vignolo Pena (Royal Botanical Garden – CSIC), Salvador Andrés Catalina (Asociación A.S.A.F.), Eva Miquel del Amo (Fundación Amigos de las Abejas), Juan Antonio Plaza Nicolás (Madrid Regional Beekeepers' Association APISCAM), and Prof. Rafael Alcalá Herrera (Technical University of Madrid).

The discussions were attended by ambassadors and other embassy representatives, local government officials, and invited guests. Admission was also free for all other invitees and visitors to the Royal Botanical Garden – CSIC.

From 10:00 a.m. to 3:00 p.m., parallel to the panel discussions, visitors could explore exhibition stands featuring demonstrations of beekeeping practices, beehive management, and various projects related to bees. A selection of honey and honey-based products was also on display and available for tasting.

Exhibitors included, in addition to the Embassy of Slovenia, the embassies of Andorra, Belgium, Croatia and Lithuania, the Royal Botanical Garden – CSIC, Asociación Abeja Silvestre, the Madrid Regional Beekeepers' Association APISCAM, the Madrid Fire Brigade, El Rincón de la Abeja, Fundación Amigos de las Abejas, IMIDRA, LG Spain, and Cantueso Natural Seeds.

The exhibition area was also visited by students from the Madrid secondary school IES Dámaso Alonso. They responded enthusiastically to the Embassy's invitation, particularly as one of the classes is currently participating in a project focused on pollinators.

Following the panel discussions, attendees moved to the exhibition area, where they had the opportunity to engage directly with experts and learn more about the projects presented earlier. Guided tours of the Royal Botanical Garden (in Spanish and English) focusing on pollinator observation were organized simultaneously, along with presentations by the Madrid Fire Brigade on its activities related to bees.

At the Slovenian Embassy's stand, visitors were introduced to Slovenian beekeeping traditions and a selection of typical products, including honey, honey biscuits, and honey candies. The display also highlighted the tradition of painted beehive panels (panjske končnice), gingerbread hearts (lect hearts), and various promotional materials related to bees.

Among the honey-based products presented were donations from Medex, as well as honey produced in the apiary of the Ministry of Foreign and European Affairs of the Republic of Slovenia and by three Slovenian beekeeping associations: the Ljubljana Moste-Polje Beekeepers' Association, the Litija Beekeepers' Association, and the Urban Beekeeper Association. The company Krka Farmacéutica, S.L. also contributed towards covering organizational costs.

The Embassy shared several posts about the event on social media, available on Instagram (@sloinesp) and X (@SLOinESP).

The event was also covered by Diplomacy News:

https://www.diplomacynews.com/2026/05/21/varias-embajadas-con-la-eslovena-al-frente-celebran-el-dia-mundial-de-las-abejas/

https://www.diplomacynews.com/en/2026/05/21/several-embassies-with-the-slovenian-one-at-the-forefront-celebrate-world-bee-day/

The Royal Botanical Garden reported on the event on its website and social media channels:

https://rjb.csic.es/la-embajada-de-eslovenia-en-espana-y-el-real-jardin-botanico-celebran-el-dia-mundial-de-las-abejas/

The Croatian Ministry of Agriculture also published a report on the event:

https://savjetodavna.mps.hr/2026/05/28/svjetski-dan-pcela-obiljezen-u-madridu/

ΕΚΠΑΙΔΕΥΣΗ στην ΟΡΓΑΝΟΛΗΠΤΙΚΗ ΑΝΑΛΥΣΗ ΜΕΛΙΟΥ

HONEY SENSORY ANALYSIS EDUCATION

2nd Honey Sensory Analysis Education in Greece

Level 1, 2026 in Athens

We are delighted to invite you to participate in the **2nd Honey Sensory Analysis Education Level 1**, which will take place in **Athens**.

This 2nd training event follows the highly successful 1st Honey Sensory Analysis Education - Level 1, which was held in **Thessaloniki** and brought together professionals from across Greece and abroad. The strong response and great interest from professionals encourage us to continue spreading specialized knowledge in honey sensory analysis, aiming to further support the development and promotion of Greek honey.

You can find **more information** about the 1st Education - Level 1 here:
https://chefstories.gr/1st-honey-sensory-analysis-education-in-greece/
Video: https://www.youtube.com/watch?v=uM0AcbNy7mM
Article by a graduate in the Gastronomos magazine: https://shorturl.at/ebL4n

The three-level educational scheme in honey sensory analysis has its roots in Bologna, Italy, where it was developed by **Bee Sources**.

Having trained hundreds of professionals internationally, Bee Sources collaborates with **Chef Stories**, and together they implement in Greece the first two levels of the Italian three-level educational program.

Location: Athens. The exact venue will be announced soon.

Dates & time: 18 - 22 November 2026, 09:00 - 17:00.

Description: Education – Level 1

This is an **intensive five-day training program** focused on developing skills in honey sensory analysis.

Participants will have the opportunity to:
- Train in honey sensory analysis techniques and in the recognition of aromas and flavors
- Become familiar with important varieties of Italian and Greek honey, their botanical origins, and their classifications
- Understand conditions such as crystallization, natural properties, and defects of honey
- Learn about European and Greek legislation regarding honey categories, quality, labeling, and marketing
- Learn how to describe and evaluate honey quality using methodological tools of sensory analysis
- Discover ways to use honey in cooking and pastry-making
- Explore current developments in research and laboratory methods for honey analysis

Note: The training activity will be conducted in English. If you require interpretation in Greek, please indicate this in your expression of interest.

ΕΚΠΑΙΔΕΥΣΗ στην
ΟΡΓΑΝΟΛΗΠΤΙΚΗ
ΑΝΑΛΥΣΗ ΜΕΛΙΟΥ

HONEY SENSORY ANALYSIS EDUCATION

Objective of the Honey Sensory Analysis Education

The objective of the Honey Sensory Analysis Education is to create a core group of trained sensory honey analysts who will be able to recognize, describe, evaluate, and communicate the origin, characteristics, and quality of honey in a unified and systematic way.

In the long term, the aim is for these trained honey sensory analysts, through their specialized knowledge, to contribute to the enhancement of the professional value chain and to the promotion of Greek honey as a high-quality product at both national and international levels.

The **2nd Honey Sensory Analysis Education Level 1** is addressed to:

- Beekeepers
- Honey producers and processors
- Honey trade networks and distributors
- Food & Beverage managers
- Nutritionists, dietitians, chefs, and pastry chefs
- Professionals from the agri-food and tourism sectors
- Retail store professionals
- Educators and researchers in relevant fields
- Journalists, food bloggers, and agri-food communication professionals

Next Education Levels: Level 2 & Level 3

Participants who successfully complete **Level 1** will have the opportunity to continue their training with **Level 2 Advanced**, which will take place in **Thessaloniki from 19–21 February 2027**, or in any other city where it may be organized by Bee Sources.

Subsequently, successful graduates will have the opportunity to take part in the **Level 3 Exams** in Bologna, Italy. Successful completion leads to inclusion in the **Italian National Register of Experts in the Sensory Analysis of Honey.**

ΕΚΠΑΙΔΕΥΣΗ στην ΟΡΓΑΝΟΛΗΠΤΙΚΗ ΑΝΑΛΥΣΗ ΜΕΛΙΟΥ

HONEY SENSORY ANALYSIS EDUCATION

Organization & Organizers

The Honey Sensory Analysis Education in Greece, Level 1 & Level 2, is organized by Chef Stories, a company providing consulting services as well as the design, organization, and implementation of specialized, high-quality gastronomy events.

Chef Stories is today a strategic partner of numerous businesses, organizations, and institutions in the sectors of food and beverages, retail, tourism, exhibitions, conferences, and development services, contributing its experience and expertise to the design and implementation of diverse projects that highlight and promote local gastronomy and Greek agri-food products.

Members of the Chef Stories team, Sylvia Koumedaki, Chef Stories Co-founder & Gastronomy Events Specialist, and Nana Zygoura, Business Development & Marketing Consultant and Trainer, have successfully completed the Honey Sensory Analysis Courses (Levels 1 & 2) in Italy Drawing from their personal experience, they have adapted the training content to the specific context and needs of the Greek honey market.

For this 2nd Honey Sensory Analysis Education Level 1, Chef Stories is collaborating with Bee Sources, an internationally recognized consulting and training company in the beekeeping sector Since 2005, Bee Sources has specialized in the development and dissemination of honey sensory analysis techniques.

Bee Sources systematically trains professionals who form part of the Italian National Register of Experts in the Sensory Analysis of Honey (https://www.albomiele.it/), a body of experienced analysts established in 1988 and officially recognized by the Italian Ministry of Agriculture since 1999.

Participation Fee - Level 1

The participation fee for the 2nd Honey Sensory Analysis Education – Level 1 is €900, payable in two installments.
Deposit: 500 €, until 25/08/2026
Final Payment: 400 €, until 20/09/2026.

Bank Account Details:
Piraeus Bank
IBAN: GR33 0171 5590 0065 5916 4159 697Account Number· 655916 4159 697
Account Holder· CHEF STORIES L.P.SWIFT/BIC: PIRBGRAA

The participation fee includes:
Training materials and notes, honey samples for tasting and analysis, a parallel activity, welcome lunch

Not included:
Transportation to and from **Athens** and accommodation.

ΕΚΠΑΙΔΕΥΣΗ στην ΟΡΓΑΝΟΛΗΠΤΙΚΗ ΑΝΑΛΥΣΗ ΜΕΛΙΟΥ
HONEY SENSORY ANALYSIS EDUCATION

Participation Process & Expression of Interest Form

In order to ensure the smooth conduct of the training program, the number of participants is **strictly limited**.

To secure your place:

1. Complete the expression of interest form at the following link: https://forms.gle/3cxicDHsn8H3cTYLA
2. After submitting the deposit, please send the payment receipt to the email: events@chefstories.gr
3. You will then receive the detailed program, additional instructions, and the payment receipt.

Participation registrations are managed by **Tania Georgiadou**
T. +30 2310471628
M. +30 6942980958

The Honey Sensory Analysis Education is an investment in personal and professional development and a step forward in promoting Greek honey as a product of high quality.

We look forward to welcoming you!

Kind Regards,

Sylvia – Ioanna Koumedaki & Nana Zygoura

ΕΚΠΑΙΔΕΥΣΗ στην ΟΡΓΑΝΟΛΗΠΤΙΚΗ ΑΝΑΛΥΣΗ ΜΕΛΙΟΥ

HONEY SENSORY ANALYSIS EDUCATION

INSTRUCTOR's CVs

Gian Luigi Marcazzan

Gian Luigi Marcazzan is a researcher and technical manager for honey quality control by chemical and sensory analysis at the Council for Agricultural Research and Economics (CREA) in Bologna, Italy for 26 years. He is the leader of the Honey Sensory group within the International Honey Commission, the leading organization to develop methods for honey quality evaluation. He is the President of the Italian Register of Experts in the Sensory Analysis of Honey with more than 25 years of experience as a teacher and professional honey taster From 2008, Gian Luigi works as a panel leader for the international honey competition BioMiel. Gian Luigi studies the composition of royal jelly and propolis to open up the knowledge on the composition in order to characterize and control the quality He is also a beekeeper and breeds bees for the production of swarms and honey.

Raffaele Dall'Olio

Raffaele Dall'Olio is a beekeeper and animal biologist with a master's degree in honeybee pathogens diagnostic, skilled in artificial insemination of honeybee queens. He has more than 10 years of experience in honeybee research and teaching focusing on genetic conservation of honeybee breeds, detection of pathogens and viruses, improving the quality of beekeeping products. He's a member of the international research networks COLOSS (on Colony Losses) and RNSBB (about Sustainable Bee Breeding). Raffaele has commercial experience with 150 hives in Tuscany, Italy and queen-rearing experience and manuka honey in New Zealand. As an internationally sought out speaker including Apimondia and the European Conference of Apidology, Raffaele has more than 10 years' experience as a teacher and professional honey taster and as a panel leader for the Italian National Register of Professional Honey Taster and member of official Panel Test at CRA-API lab since 2005 and in several Honey Contests. In 2015, he found "AsSenso", sensory analyses as an R&D tool for businesses. Raffaele also has written for national beekeeping magazines in Italy such as L'apicoltoreitaliano, Lapis and APOidea.

Mary Nikolaou

Mary Nikolaou was born and raised in Athens. After completing her studies as an Agronomist Technologist, she trained for a year at the Institute of Agricultural Sciences and Aristotle University of Thessaloniki in beekeeping and professional apiculture, establishing her first hives. Since 2012, she has been a beekeeper and honey producer, fully committed to quality and knowledge. Driven by her interest in understanding honey, she pursued further specialization in honey sensory analysis in Italy for two years. In 2023, she passed the exam at CREA, the Italian Ministry of Agriculture research center, earning the title of Expert in Honey Sensory Analysis, held by only 300 people worldwide. She is the first Greek member of the Italian National Register of Experts in Honey Sensory Analysis. Mary views honey as not merely food, but as a carrier of knowledge, experience, and culture. She is also a certified olive oil taster and collaborates with the Olive Oil Sensory Analysis Lab at the University of Peloponnese. In this first Greek training, she will teach Greek honey varieties alongside Italian experts, presenting the rich botanical and sensory profile of local honeys.

ΕΚΠΑΙΔΕΥΣΗ στην ΟΡΓΑΝΟΛΗΠΤΙΚΗ ΑΝΑΛΥΣΗ ΜΕΛΙΟΥ

HONEY SENSORY ANALYSIS EDUCATION

Nana Zygoura

Nana Zygoura is a Business Development and Marketing Consultant & Trainer. With studies in Marketing, Communication and Culture, she has had a long professional career as a director in Marketing and Communication, Client Service and New Business departments. Today she is an independent professional and supports companies, organizations and institutions in the design and implementation of development programs for agri-food, local, innovative and youth entrepreneurship. She also collaborates with Chef Stories company and together they design, organize and implement comprehensive programs and individual specialized events to highlight and promote Greek and local gastronomy. She is a certified adult trainer, a trained honey taste analyst in Italy, a graduate of the Butchers' School and has completed Level 3 of the Wine Studies of the international organization WSET. More about Nana Zygoura, on: www.zygoura.gr

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We are looking for new EUROPEAN CHAMPIONS in honey – a prestigious title for the next two years!

OBALNO ČEBELARSKO DRUŠTVO KOPER

ČZS SLOVENIAN BEEKEEPERS' ASSOCIATION

MESTNA OBČINA KOPER COMUNE CITTÀ DI CAPODISTRIA

eba

Sample submission

- **3 jars of honey (450 g each)**, properly labelled for sale.
- Register via the online form using the QR code.
- Attach the printed confirmation and proof of payment to the sample.
- Participation fee: **€70** per sample.
- Samples can be sent by post or delivered in person to:

Čebelarska zveza Slovenije, Brdo pri Lukovici 8, 1225 Lukovica, Slovenija.

Online submission form with instructions for sample submission

Evaluation process

The honey will be evaluated by a panel of international honey experts.

- Evaluation is carried out in liquid form (crystallized honey will be properly liquefied beforehand).

A minimum of 7 samples per category is required

- If fewer samples are submitted, the commission will classify them based on electrical conductivity into: honeydew or multifloral.

All samples will be tested for **basic quality parameters** (≤ 18.6% moisture content, HMF ≤ 15 mg/kg). The top three honeys in each category will undergo additional analysis for **authenticity** and **safety**.

Submit your samples by: 14.9.2026

AWARD CEREMONY IN KOPER, SLOVENIA 5 DECEMBER 2026

European Honey Contest
Koper - Slovenia

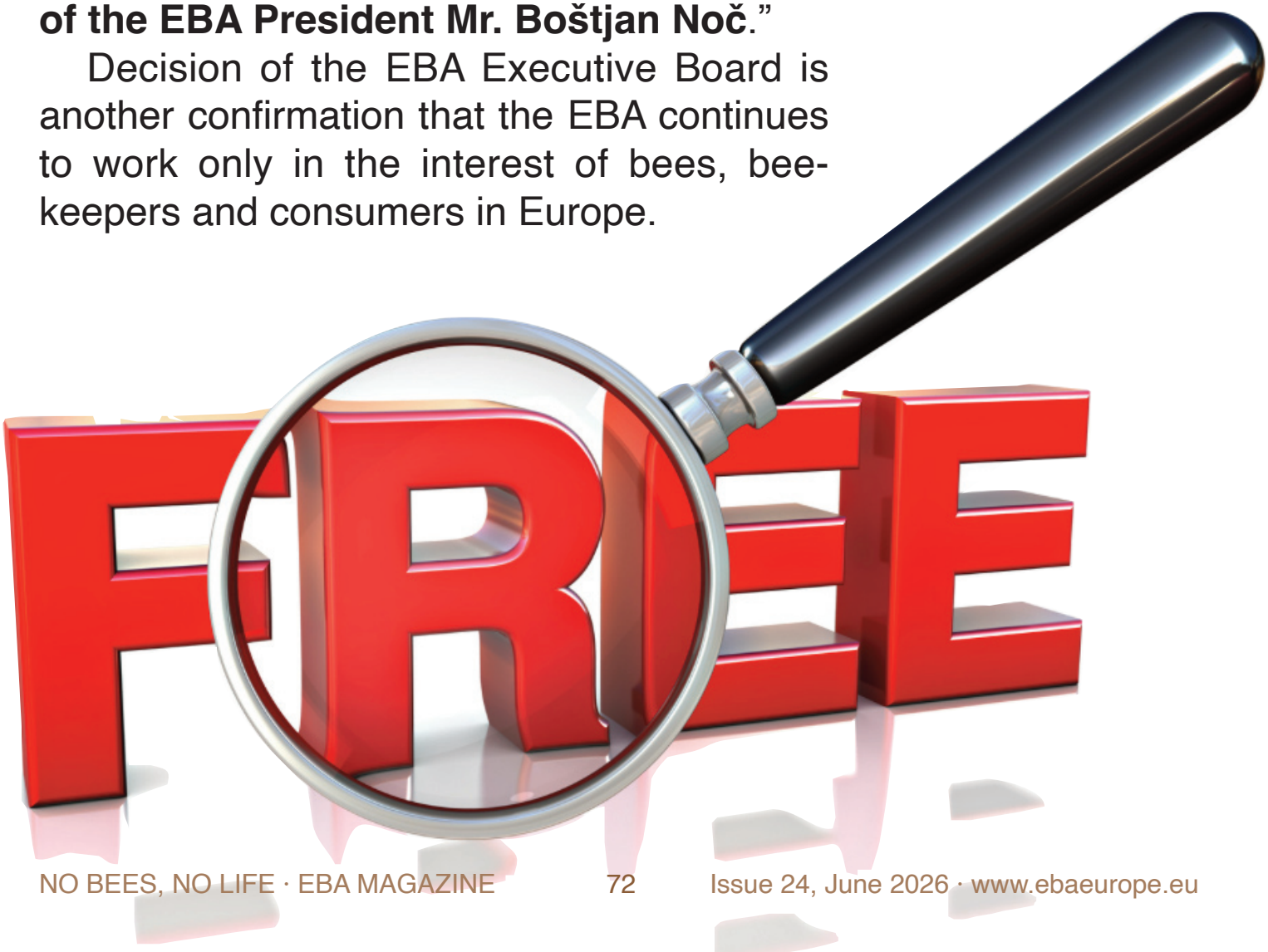
www.honey-contest.eu

Only authentic honeys with exceptional sensory characteristics typical of their variety will be awarded the top three distinctions and earn the right to promote this prestigious title.

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

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