

Issue 29 · November 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

OF THE
EUROPEAN BEEKEEPING ASSOCIATION

SAVA
INSURANCE
GROUP

AMONG GOOD PEOPLE

SAVA
ZAVAROVALNA
SKUPINA

V DRUŽBI DOBRIH LJUDI

SILVER SPONSOR

OF THE
EUROPEAN BEEKEEPING ASSOCIATION



BRONZE SPONSOR

OF THE
EUROPEAN BEEKEEPING ASSOCIATION





NOBODY CAN SAVE BEEKEEPING IF WE, THE BEEKEEPERS, DO NOTHING OURSELVES!

Enough waiting. The time has come to decide whether we truly want EBA or whether we have it merely so that we can say it exists.

When I took over the leadership of the European Beekeeping Association (EBA) on 22 April 2024, I believed that together we could take an important step forward for European beekeeping. Today, EBA connects beekeepers from 32 countries and represents the interests of approximately 430,000 beekeepers. Behind these numbers are people, families, traditions, countless hours of work and, above all, love for the bees.

As President of EBA, I am prepared to take the responsibility and fight for European beekeepers. But I will not pretend that everything is fine when it is not. I cannot understand how some people complain about the situation in European beekeeping while, at the same time, they cannot find even a few minutes to support our joint efforts, share EBA information or inform their members about what we are fighting for.

Today, I must ask myself: do all of us who are part of this story truly understand what we have and what we stand to lose?

Adulterated honey threatens the future of European beekeeping!

European beekeeping is facing one of the greatest challenges in its history: adulterated honey, honey whose authenticity and quality are not guaranteed. Our beekeepers are the ones who bear the consequences, as are consumers, of course. Producers of genuine honey face extremely low purchase prices, which often fail to cover all their costs and the value of their work. How can a beekeeper continue when the value of their honey is declining on the market and their work is not being fairly rewarded? How can a young person see a future in beekeeping when they have to fight for every euro in a market where authenticity and quality do not receive a fair price?

Disappointed beekeepers are right to question whether beekeeping has any future at all. The danger is that one day we will realise that we allowed genuine European honey to lose the battle against price competition and fraud.

But we must also be aware of something far more important than honey itself

If there are no beekeepers, there will not be enough honey bee colonies in the long term, as honey bees cannot survive without beekeepers. If there are fewer bees, there will be less pollination. If there is less pollination, numerous crops, biodiversity and the natural balance will be threatened. And if we neglect pollinators and, consequently, agriculture, we will also jeopardise our food security. **Do we want a hungry Europe?**

This is not just a problem for beekeepers. It is a problem for society as a whole. Protecting genuine honey, ensuring fair recognition of beekeepers' work and preserving pollinators must therefore be a shared responsibility.

EBA is fighting. But who is fighting alongside us?

At EBA, we are very much aware of this. That is why we raise awareness of the problem of adulterated honey, demand more effective controls, greater transparency and better protection for European beekeepers. We highlight the consequences of unfair practices and strive to ensure that the voice of beekeepers reaches decision-makers. Behind this work are numerous discussions, letters, meetings, initiatives and hours of voluntary work. We do this because we believe that European beekeeping needs a common, strong and independent voice.

However, today I must also speak about something that hurts me personally even more than the actual problems we face.



It hurts to be met with silence. It hurts to encounter a lack of response. It hurts to feel that some people behave as though EBA were someone else's project rather than the shared organisation of all of us.

Dear beekeepers, representatives of national organisations and EBA members, who is our work intended for if we are unwilling to share it? What is the point of information, warnings, expert articles and EBA Magazine if they remain within our own circle instead of reaching as many beekeepers, consumers, journalists and decision-makers as possible?

I often find myself wondering: do you even write about EBA on your websites, in your newsletters, on social media and through other media channels? Do you inform your members about the work of the European Beekeeping Association? Do you share EBA Magazine with them? Do you tell them what we are fighting for and why this fight matters for their future? And if you do not, why not?

I am not asking these questions because I want to accuse anyone. I am asking them because it genuinely hurts to see how much energy is invested in our joint work, while the response from those who should be our strongest supporters is sometimes so limited.

I do not expect every member to write about EBA every day. I do not expect everyone to participate in every initiative. But I do expect at least a basic level of solidarity. I expect a response. I expect us to share information, support joint campaigns and show our members that there is a European organisation standing behind their interests, ready to fight for them.

We cannot wait for others to solve our problems!

We cannot complain about low honey prices, honey adulteration and political decisions, only to remain silent when we have an opportunity to do something together. We cannot expect others to spread our message if we are unwilling to spread it ourselves.

That is why I sincerely, from the bottom of my heart, ask you: start sharing EBA information. Publish our initiatives. Promote EBA Magazine. Keep your members informed about our work. Tell them what is happening in Europe and how these decisions affect their lives.

Every post matters. Every piece of shared information matters. Every conversation with a beekeeper, politician, journalist or consumer matters. If we all take one small step, together we can make a big step forward for European beekeeping.

We do not simply need an organisation with a name, a president and representatives from different countries. We need a living European beekeeping community in which we listen to one another, support one another and stand together, especially when times are difficult.

EBA must not be just a name on paper. It must be the voice of 430,000 beekeepers, heard throughout Europe.

Waiting for someone else to solve our problems is not a strategy. It is a path to disappointment!

I have one year of my term as President of EBA remaining. I want to use this year responsibly and to the best of my ability. However, I will not hide the fact that, given everything I am experiencing, I am honestly questioning the purpose of my continued efforts if we do not all feel a shared sense of responsibility.

That is why today I am not writing only as President of EBA. I am writing as a beekeeper who cares. As a person who believes that European beekeepers deserve more. And as someone who does not want us to realise, a few years from now, that we had an opportunity to change something but failed to seize it because we did not know how to stand together, or because we were united only on paper!

This is an honest expression of disappointment and a question that we must all answer. An organisation is only as strong as its members' willingness to participate, support it and share responsibility.

European beekeeping does not need 430,000 people waiting for someone else to do something. It needs 430,000 people who understand that we must do something ourselves to secure our own future.

Boštjan Noč

President of the European
Beekeeping Association (EBA)

IMPORTANT LETTER TO THE ELISABETH WERNER

Earlier, EBA President Boštjan Noč met with Elisabeth Werner (THERE), an Austrian economist and senior European Commission official, who will serve as Director-General of the Directorate-General for Agriculture and Rural Development starting in June 2025.

EBA President Boštjan Noč has now sent her an important letter, which you can read in full in this news item.

LETTER:

Dear Elisabeth Werner,

Thank you for your letter and for the opportunity to provide more detailed comments on the operation and effectiveness of the EU Honey Platform.

As requested, please find attached the EBA's written response, setting out our main concerns, providing concrete examples, and proposing practical measures to improve the Platform's work.

Our intention is to contribute constructively to the European Commission's efforts to address the persistent challenges facing the honey sector. We believe that the Platform has an important role to play in advancing effective solutions, particularly in the areas of honey authenticity, traceability, harmonized analytical methods, and the establishment of a European Union Reference Laboratory for Honey.

At the same time, we believe that the Platform's effectiveness could be strengthened through a more focused and action-oriented approach, with clearer priorities, more time for substantive technical discussions, and greater flexibility to address critical issues raised by its members.

The EBA remains committed to constructive cooperation with the European Commission and all relevant stakeholders. We hope that our comments and recommendations will help support further progress and contribute to tangible improvements in the implementation and enforcement of EU honey legislation, to the benefit of beekeepers, consumers, and the integrity of the European honey market.

Thank you for your consideration. We look forward to the continued dialogue and to seeing the Platform's work translate into concrete progress.

Kind regards,

Boštjan Noč

President of the European
Beekeeping Association

Attached EBA document:

EBA POSITION PAPER ON THE EU HONEY PLATFORM

(on the next pages)



EBA POSITION PAPER ON THE EU HONEY PLATFORM

The Honey Platform was established to advise and support the European Commission on honey authenticity, traceability, compositional criteria, and the establishment of a European Union Reference Laboratory (EURL).

These four issues remain critical pillars in addressing the systemic challenges of the beekeeping sector. For many years, shortcomings in these areas have contributed to widespread fraudulent practices, market distortions, unfair profiteering, and consumer deception.

The European Beekeepers Association (EBA)—representing 430,584 beekeepers across 32 countries—firmly believes that addressing these four priorities is essential for the survival of the beekeeping sector. Currently, the sector faces deep uncertainty, with many producer-beekeepers questioning their professional future. Therefore, we respectfully ask you to view our comments and suggestions as a constructive contribution to the Commission's efforts to resolve these complex problems, rather than as mere criticism.

Based on our participation in the meetings of the Honey Platform thus far, we have identified several operational challenges:

A. Discussions occasionally remain focused on secondary issues.

B. The available meeting time is insufficient to fully resolve established systemic problems.

C. The Platform relies on rigid, pre-set questionnaires, while critical implementation challenges sometimes go unaddressed.

Below, we detail our perspective on the operation and effectiveness of the EU Honey Platform, complete with concrete examples and suggestions for improvement.

A. Honey Platform Discussions Remain Bogged Down in Minor Issues

1. Critical Point: Establishment of the EURL

Discussions regarding the establishment of an EURL within the Platform remain preliminary, while a disproportionate amount of agenda time is devoted to specific compositional parameters.

Discussions on individual parameters (e.g., invertase, HMF, or pollen analysis) fall at the lower level of the hierarchy of the cascade rule set out in Article 34 of the Official Controls Regulation (OCR) (EU) 2017/625. These parameters are primarily meant to establish honey compliance with standard specifications rather than address the core challenge of honey authenticity. The Honey Platform would benefit from clearly distinguishing standard quality parameters from advanced fraud and authenticity detection methods.

Furthermore, the Honey Platform currently tends to treat the EURL as a topic for "recommendation" rather than a clear administrative mandate under existing law, leading to unfortunate delays.



EBA suggestions for improvement

- To ensure harmonized, legally sound, and effective anti-fraud enforcement across all Member States, the Platform's work should explicitly align with the OCR. This includes the designation of an EURL under Article 92, the harmonization of official control methods under Articles 34 and 35, and the development of a fully workable traceability framework.
- We encourage the European Commission to initiate the formal process for designating an EURL for honey promptly and to include progress updates as a standing agenda item for the Honey Platform.
- Official methods should fully safeguard operators' legal rights to a second expert opinion ("counter-analysis") under Article 35 of the OCR.
- The Platform should ensure that draft implementing acts on methods of analysis explicitly define the legal status, uncertainty thresholds, and validation levels of test methods in accordance with OCR requirements.
- We respectfully invite the Commission to maximize the potential of the Honey Platform by treating it as the dedicated Technical Advisory Body for the swift implementation of Article 92 of the OCR.

2. Critical Point: The Union Traceability System

This vital tool against large-scale adulteration using sugar syrups and the mislabeling of origin



has not yet received the comprehensive attention it requires from the Honey Platform, remaining largely confined to general discussions. The EBA highlights several key vulnerabilities regarding imported honey traceability that merit in-depth review:

- The potential manipulation of Box I.11 of Annex II of Regulation (EU) 2019/1715 regarding the country of origin on CHED/TRACES NT documents in transit countries, frequently under the interpretation of "substantial transformation" pursuant to Article 60 of the Union Customs Code (UCC) (Regulation (EU) No 952/2013).
- The variable oversight of approved establishments, where competent authorities in exporting countries facilitate exports while maintaining limited regulatory supervision.
- Approvals relying primarily on HACCP compliance, which is inherently insufficient for detecting the addition of exogenous sugar syrups.
- Current analytical methods lack the capacity to reliably quantify the declared percentage contributions of different geographical origins.
- Border Control Post (BCP) physical and identity checks on honey remaining sporadic and optional.
- The foundational limitation that honey authenticity enforcement lacks a designated EURL and legally validated reference methods as envisioned under Articles 34–35 of the OCR.

EBA suggestions for improvement

- The Association proposes that the EU prioritize a harmonized and mandatory EU traceability framework for domestic honey. The administrative and legal components required for a comprehensive domestic traceability system are already established within EU legislation. Elements such as the beekeeper register, lot identification, commercial documentation, HACCP records, mass-balance accounting, and TRACES/CHED controls collectively form a complete traceability architecture.
- The principal challenge lies in the harmonization, digital integration, and consistent enforcement of these existing requirements across all Member States.
- A robust traceability system for domestic honey production could serve as the anchor of the EU honey market, protecting both consumers and beekeepers, while establishing a solid foundation to address the much more complex issue of imported honey traceability.
- For imported honey, the context is fundamentally different because production occurs outside the EU regulatory environment, necessitating documentary verification and international cooperation outside direct EU jurisdiction. Consequently, the EBA proposes first mapping existing vulnerabilities, followed by collaborative discussions on targeted solutions. For instance, the EBA suggests that for processed honey remaining classified under Harmonized System heading 0409, operations such as filtering, heating, and blending do not constitute substantial transformation, and the CHED country of production should remain unchanged.
- Furthermore, a robust traceability system requires legally binding EU reference methods to officially designate non-compliant honey as adulterated. Without validated reference methods, traceability risks remain a purely administrative exercise rather than a functional enforcement tool.

3. Critical Point: Addressing the Implementation Framework of the Breakfast Directive (EU) 2024/1438

The Honey Platform has yet to fully examine the practical implementation of critical amendments to honey legislation regarding consumer transparency on countries of origin and blend percentages—the first major update in 25 years.

While Amendment Directive (EU) 2024/1438 successfully introduced stricter origin-labelling obligations, it was not paired simultaneously with the technical infrastructure required to police them.

Consequently, we have a legal mandate without an accompanying harmonized analytical method, an operational EURL, or a modernized traceability framework capable of scientifically verifying percentage claims. Market enforcement currently relies heavily on documentary evidence—such as purchase invoices, customs slips, and batch records—rather than laboratory

testing, which severely limits the real-world impact of these consumer protections.

The amended text was adopted in May 2024, providing a two-year runway ahead of its application date in June 2026.

Additionally, Article 6 established an open-ended transitional period allowing stocks placed on the market or labeled before 14 June 2026 to be exhausted.

This transition period was intended to give the Commission, national competent authorities, and commercial packers adequate time to build a functional ecosystem. To date, more coordinated efforts across the Platform, authorities, and packers are needed to close these remaining gaps.

EBA suggestions for improvement

- To the European Commission: Provide validated analytical methods capable of verifying both countries of origin and the exact percentages declared in a blend. Expedite the establishment of an EURL dedicated to honey authenticity. Foster focused discussions within expert groups and the Honey Platform to establish practical enforcement guidelines.
- To Competent National Authorities: Update national guidance, support inspector training, and align local administrative procedures.
- To Packers: Adapt corporate packaging, update internal traceability software, and refine purchasing records to list countries of origin in descending order.

The EBA emphasizes that regulatory measures are most effective when supported by robust verification mechanisms. Until standardized analytical methodologies and proactive market surveillance are fully operational, the transparency promised to consumers will remain largely theoretical.

4. Critical Point: Ensuring the HARM Project Successfully Supports BCP Controls

During early meetings, the Honey Platform indicated that upcoming Joint Research Centre



(JRC) methods will empower BCPs to intercept non-compliant shipments, which suggested that the standard legal architecture of the OCR could potentially be bypassed.

While the EBA would be the first to congratulate JRC scientists and the Commission on such a breakthrough, we are mindful that establishing an EURL and subsequently developing a fully validated, harmonized method with a legally binding benchmark for honey adulteration typically requires significant time.

We therefore respectfully offer several technical observations and welcome clarification from the Honey Platform on the following points:

- Advanced or newly developed JRC methods cannot simply be deployed at borders without respecting the hierarchy prescribed in Article 34 of the OCR.
- Non-standardized or newly validated JRC analytical protocols (e.g., advanced MS, untargeted NMR, or multi-isotope profiling) naturally default to Tier 3 of the cascade rule unless formally adopted into secondary legislation or elevated to ISO/CEN standards.
- If an official control laboratory at a BCP rejects an incoming shipment based solely on a Tier 3 method when no official benchmark limit is established in EU law, that decision may rest on vulnerable legal ground, leaving it open to immediate challenge by third-country exporters and EU importers in national courts. Under Article 35 of OCR, food business operators hold an explicit right to a second expert opinion ("counter-analysis").
- If a JRC method relies on proprietary databases, statistical probability models, or unharmonized decision limits rather than a legally defined threshold in Directive 2001/110/EC, an operator's defense can readily question the method's legal certainty.
- Scientific method validation demonstrates reproducibility and accuracy, but it does not automatically confer immediate legal status as an official benchmark. Tier 3 methods lack the binding force required to withstand Article 35 legal challenges; scientific validation is distinct from legal harmonization.
- Even a single overturned administrative decision can impact confidence in a method and create an unhelpful judicial precedent.

EBA suggestions for improvement

- JRC methods derived from the HARM project should be formally integrated via implementing acts under the revised Honey Directive, supported by an established EURL under Article 92 OCR, and governed by clear, legally binding decision thresholds capable of withstanding scrutiny under Article 35 OCR.
- Methods should ideally be adopted by CEN and/or ISO and seamlessly integrated into official EU control legislation, with appropriate laboratory training and incorporation into TRACES and import workflows.

Addressing this structural gap will help ensure the EU drafts legally robust secondary acts that provide long-term certainty for all stakeholders.

5. Critical Point: Reviewing Unaddressed Legislative Loopholes

We also respectfully suggest that the Honey Platform examine several persistent legislative and operational loopholes, including:

- The importation of baker's honey sharing characteristics with filtered honey, yet lacking clear country-of-origin labeling.
- The absence of standardized legislative methods to detect the removal of HMF or the addition of industrial enzymes.
- Mislabeling practices, such as obscuring countries of origin or placing mandatory consumer information and images on the back of packaging where they are easily missed.
- Ambiguities surrounding the criterion of "mainly" concerning the botanical origin of monofloral honeys.
- The lack of standardized definitions for the physicochemical, microscopical, and organoleptic characteristics of monofloral honeys.
- The need to harmonize melissopalynology methods regarding nectarless plants, as well as over- and under-represented pollen grains.
- The complex relationship between HMF and diastase levels in naturally low-enzyme honeys.
- The absence of an official reference list recognizing naturally low-enzyme honeys.

• Vague regulatory phrasing stipulating that honey should be free from foreign matter "as far as possible" (Anne II of Honey directive).

B. The Time Available Is Insufficient to Solve Systemic Problems

Critical Points

Plenary meetings held twice a year are insufficient for diving deeply into complex technical files (e.g., authenticity testing methods, traceability protocols, labeling standards).

A significant portion of meeting time during the two physical and formal meetings is frequently consumed by administrative updates or non-contentious technical details.

Information asymmetry and the delayed sharing of working documents lead to a loss of momentum between meetings.

Discussions often focus heavily on abstract problems rather than concrete regulatory text.

EBA suggestions for improvement

• Establish Dedicated Technical Working Groups (TWGs): Request the creation of small-scale TWGs focusing on specific pillars (e.g., Adulteration & Testing Methods, Traceability & Digital Passports, Market Transparency). These groups could meet virtually every 4 to 6 weeks between plenaries to draft technical position papers, leaving the twice-yearly plenary strictly for final reviews, consensus building, and formal voting.

• Implement a Formal Written Consultation Process: Adopt a structured written consultation process with fixed deadlines (e.g., 20 working days) for commenting on draft implementing acts, delegated acts, or background documents prior to meetings. This would reserve plenary time exclusively for resolving high-level political or technical deadlocks that require face-to-face negotiation.

• Set Up a Collaborative Digital Workspace: Urge the Commission to establish a dedicated digital platform featuring active thematic discussion threads. This would allow stakeholders



to continuously share laboratory evidence, data, and draft revisions, avoiding the need to restart conversations every six months.

• Require Concrete Text Submissions: Introduce a procedural rule requiring any stakeholder bringing an issue or position to the floor to submit a concrete draft proposal or amendment text at least 3 weeks prior to the meeting. This will shift discussions from broad, inconclusive debates to targeted editorial work.

• Define Clear Workplans Tied to Legislative Deadlines: Ask the Secretariat to publish a roadmap with clear milestones aligned with the Commission's legal deadlines for implementing and delegated acts. This will establish accountable stop-gap dates for stakeholder inputs, preventing endless debates and encouraging compromise as deadlines approach.

C. Discussions Are Restricted to Pre-Formulated Questions

Critical Point

While the preparation of specific questions in advance is useful for structuring the Platform's work, the current approach may inadvertently limit members' opportunities to raise other critical issues essential to the quality, authenticity, and integrity of honey.

Examples

• Across the first four meetings, a substantial amount of time was spent debating whether invertase should be added to quality criteria alongside HMF and diastase. This debate largely overlooked the reality that adulterators frequently strip out high HMF concentrations and artificially supplement enzymes.

• The questions formulated regarding authenticity controls created the impression that the Platform views honey fraud exclusively as an analytical detection problem, which is not the case. The EBA maintains that necessary analytical methods and digital tools already exist (such as those developed under the EU Hive projects of 2017 and 2023). The core challenge lies not in scientific limitations, but in legal enforceability, as outlined in Part A of our document.

• Similarly, questions raised by the Platform regarding recommendations for creating an EU Reference Laboratory (EURL) were largely unnecessary, as the relevant provisions are already addressed in Articles 34, 35, 92, 93, 94, and related sections of the Official Controls Regulation (OCR).

EBA suggestions for improvement

The EBA suggests making discussions within the Honey Platform more open and inclusive, ensuring that pre-formulated questions serve as a starting point rather than an exhaustive boundary. Members should have the opportunity to introduce additional issues, explain their relevance, and propose subjects for further consideration. To facilitate this, we recommend:

• Introduce an Open Agenda Item: Reserve time at each meeting for participants to raise issues outside the scope of pre-formulated questions.

• Allow Advance Submission of Additional Questions: Provide all representatives the opportunity to propose topics prior to each meeting, supported by a transparent selection process.

• Include a Participant-Led Discussion Session: Dedicate a portion of each meeting to topics proposed directly by participants, rather than relying exclusively on an agenda determined by organizers.

• Ensure Agenda Flexibility: Treat pre-formulated questions as guiding points rather than an exhaustive list, allowing emerging or overlooked issues to be addressed during meetings.

• Enhance Transparency and Follow-Up: Record additional issues raised, clarify which ones will be addressed, and provide constructive feedback when a topic cannot be immediately accommodated.

For a practical and balanced compromise, we propose a simple three-step procedure:

1. Raise: Any member may submit an additional issue.

2. Assess: The Chair determines whether it can be addressed immediately or scheduled for a future meeting.

3. Follow-Up: The issue and the decision taken are formally recorded in the meeting minutes.

This approach preserves the benefits of a structured agenda while ensuring that the collective expertise and experience of all Platform members can contribute more fully to its objectives.

Ultimately, the EBA believes that a more flexible and participatory format will help the Honey Platform identify relevant challenges more comprehensively and develop stronger, more evidence-based recommendations to improve honey quality, authenticity, traceability, and consumer protection.

Dr. Nik Lupše
Head of the Scientific Committees
European Beekeeping Association

Dr. Andreas Thrasyvoulou
Emeritus Professor
Aristotle University of Thessaloniki
Member of the EBA Scientific Committee on Safety and Quality of Bee Products

Boštjan Noč
President of the European
Beekeeping Association





THE CASCADE RULE OF OFFICIAL CONTROL REGULATION IS THE KEY FACTOR FOR DETECTING HONEY FRAUD PROBLEMS

The hierarchy of cascade tiers

The "cascade rule" laid down in Article 34 of the Official Controls Regulation (EU) 2017/625 (OCR) is essentially a legally binding priority list. It tells official laboratories exactly which analytical, testing, or diagnostic methods they must use when analyzing food, feed, or animal samples during official inspections.

Because European food law is vast, the EU doesn't always have a single, harmonized testing method for every single substance, contaminant, or pathogen. The cascade rule ensures that if a preferred top-tier method isn't available, laboratories know exactly which fallback option to legally use next. This eliminates guesswork and

creates a level playing field across the EU internal market.

Article 34(1) and 34(2) establish a strict top-down hierarchy. A laboratory can only move to a lower tier if no method exists in the tier above it.

Tier 1: Union Legislation (The Gold Standard). If specific EU rules already specify how to test for a certain substance, the laboratory must use that method.

Tier 2: Internationally Recognized Standards. If there is no specific method mandated in Union law, the laboratory must use methods recommended by internationally accepted standardization bodies such as:

- European Committee for Standardization (CEN) standards.
- International Organization for Standardization (ISO) standards.
- International peer-reviewed guidelines or protocols that are scientifically validated.

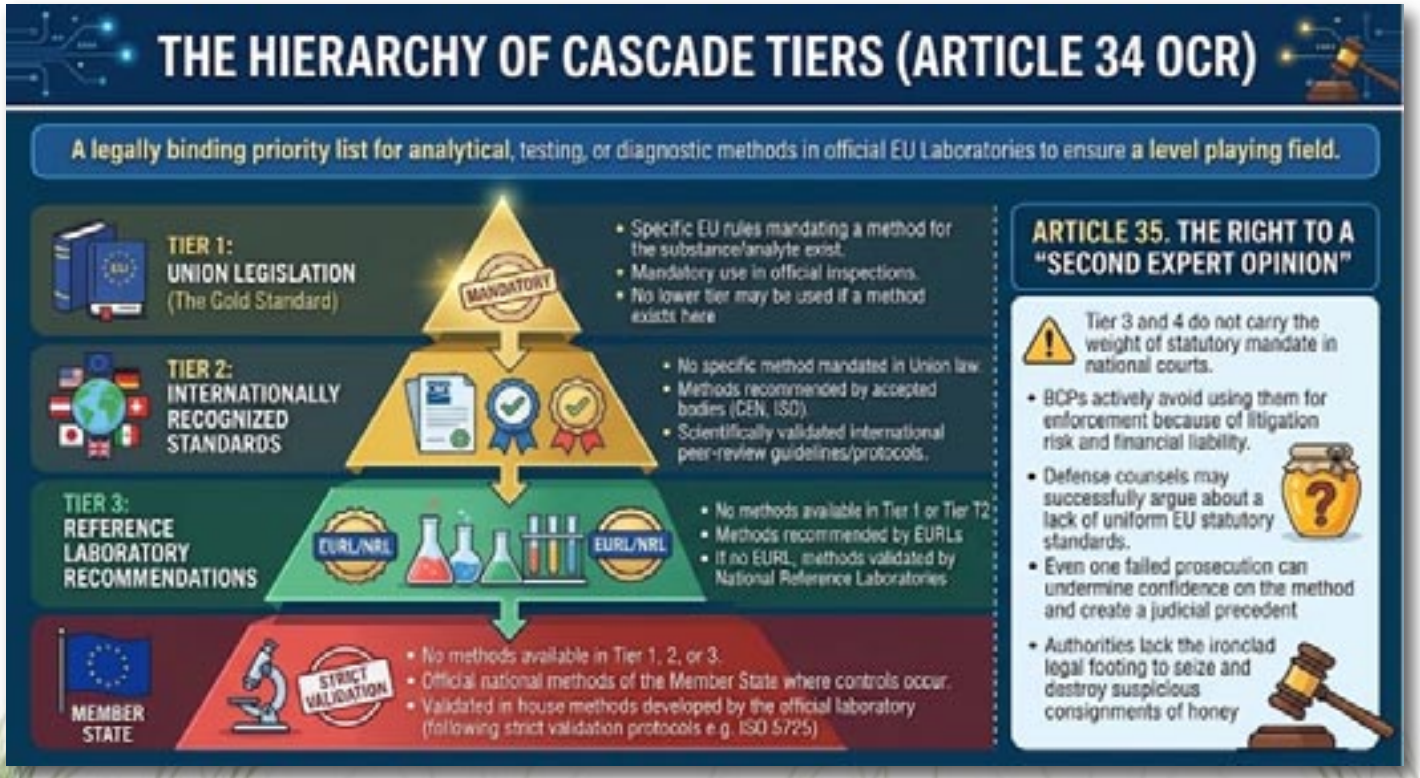
Tier 3: Reference Laboratory Recommendations. If neither Tier 1 nor Tier 2 offers an available method, the laboratory must turn to the methods recommended by European Union Reference Laboratories (EURLs). In the absence of an EURL recommendation, methods validated by National Reference Laboratories (NRLs).

Tier 4: National Rules and Validated In-House Methods. This is the bottom of the cascade. If absolutely nothing exists in the tiers above, the laboratory can look to:

- The official national methods of the Member State where the control is taking place.
- In-house validated methods developed by the official laboratory itself, provided they are validated according to strict international scientific protocols (like ISO 5725 for inter-laboratory validation).

Figure 1 summarizes the relevant information of articles 34 and 35 of cascade rule.

Figure 1.
Regulation (EU) 2017/625 establishes a four-tier hierarchy of methods for verifying authenticity (Article 34). Levels 1 and 2 offer limited grounds for challenging analytical findings. Level 3 requires EU and National Reference Laboratories for honey and harmonized methods; findings may be subject to a second expert opinion under Article 35 and challenged through applicable legal procedures. Level 4 methods assess compliance with EU parameters but cannot, on their own, establish adulteration. Today, most European countries rely exclusively on Level 4 methods



Article 35. Defending "Second Expert Opinions"

Under the OCR, food business operators have the right to a "second expert opinion" if an official sample comes back non-compliant. If an official laboratory fails to follow Article 34 cascade and relies on a lesser, unvalidated national method when an ISO standard was readily available, the food business operator can easily contest the legal validity of the test result according to article 35.

When laboratories are forced to use Tier 4 methods supported by proprietary or national databases (like NMR libraries), a court challenge by an importer is always a risk under the "Second Expert Opinion" rule.

Preventing Fragmented Enforcement

Without the cascade, a country might use a highly sensitive but unharmonized national testing method to declare an imported food item "adulterated" or "illegal," while the rest of the EU countries deem it perfectly safe. The cascade ensures scientific uniformity—everyone uses the highest standard method available.



Honey adulteration has evolved rapidly. Fraudsters move from cheap corn syrup to sophisticated, tailored syrups made from rice, wheat, and sugar beet. The official harmonized EU legislation (Tier 1) and standard international protocols (Tier 2) cannot keep up and are lagging behind. Furthermore, there hasn't been a dedicated, permanent European Union Reference Laboratory (EURL) specifically for honey authenticity.

Under these conditions, the official control laboratories drop down to a combination of Tier 3 (acting technical authorities) and Tier 4 (validated in-house/national methods and databases), operating under what the industry calls the "**State-of-the-Art**" (SOTA) approach. SOTA includes the most advanced, highest-performing techniques and protocols developed and recommended by the Joint Research Centre (JRC).

How this operates in practice versus how it reads on paper

While Article 34 allows the use of methods "recommended" by international bodies or EURLs, these do not carry the weight of statutory mandate in national courts. If a competent authority seizes millions of Euros worth of honey based on a recommended profiling method rather than a legally binding reference method, defense counsels will successfully argue a lack of uniform EU statutory standards. When the JRC ran the "From the Hives" operation, they used advanced screening methods like EA/LC-IRMS and LC-HRMS to look for marker molecules of exogenous syrups and alien enzymes.

But under EU law, a screening method that flags a sample as "suspicious" is not legally binding proof of non-compliance that can automatically withstand a high-stakes court challenge. Because there is no Tier 1 (harmonized legislation) or Tier 2 (ISO standard) definition for these specific marker tests in honey, a court will view a "suspicious" flag as an opinion, not an absolute legal fact.

Border Control strategy

A border enforcement strategy cannot run enforcement on "suspicion." To withstand judicial scrutiny, a laboratory result must be able to state, as a matter of law, that a sample is adulterated. This absolute clarity requires a EURL to issue standardized, legally binding definitions of what constitutes a compliant matrix. There is no EURL for honey, although legal requirements were set by Reg. 2017/625.

As a result, many of those shipments clear the BCPs and enter the internal market because authorities lack the ironclad legal footing to seize and destroy millions of euros worth of private property.

This is the uncomfortable truth that everyone in the European honey industry knows but regulatory often glosses over.



Bridging the gap between science and border enforcement

As scientists, we fully support the technical validation work being executed by the JRC under the HarmHoney project. However, without a formal legal bridge, the advanced multi-factorial methods e.g., advanced NMR databases, HRMS profiling, developed by HarmHoney cannot be used by competent authorities to reject honey at BCPs. Relying on these non-binding methods guarantees that Member States will face immediate, successful court challenges from major industrial importers. A single lost prosecution will create a devastating judicial precedent, paralyze all future enforcement actions and render the new percentage-labeling laws impossible to police.

Competent Authorities Avoid Advanced Testing

BCPs actively avoid using advanced methods like NMR for enforcement because of litigation risk and financial liability.

Consider the scenario that a Competent Authority blocks a 20-ton container of honey based on an in-house NMR database match (Tier 4), the importing company will immediately invoke Article 35. They will argue that the honey is 100% authentic and the "anomalous" NMR reading is simply due to a rare, local botanical variety or specific climate conditions in the country of origin.

If the Competent Authority loses that court battle, the Member State's government is legally liable to pay massive damages to the importer for ruined stock, port storage fees and lost business. Facing restricted budgets and aggressive corporate lawyers, most Competent Authorities choose the path of least resistance.

The Reality: Testing for Compliance, Not Authenticity

Because of the fear of litigation, national authorities stick strictly to the old, basic parameters of the Honey Directive 2001/110/EC.

Instead of checking if the honey is authentic, they test to see if it is compliant with simple chemical baselines. They run cheap, classical analyses that are legally uncontestable such as moisture content, fructose and glucose levels, sucrose content, electrical conductivity, HMF & diastase activity etc.

The Fraudster's Advantage

Fraudulent exporters in third countries know this exact plan of action. They deliberately manufacture designer sugar syrups from rice, beet, or

wheat specifically tailored to pass these classical tests perfectly. The syrup's moisture is adjusted, the fructose/glucose ratio is mimicked, the excess HMF is removed, and diastase is added if needed.

When the honey arrives at the BCP, the inspector runs the classical analysis. It passes perfectly. The inspector suspects it might be adulterated, but without a harmonized Tier 1 method to prove it, their hands are tied. They stamp the paperwork, and the honey enters the EU as authentic.

In practice, the lack of harmonized EU methods creates a shield of legal uncertainty that fraudsters exploit. Until the EU explicitly legalizes specific advanced profiling methods as standard enforcement tools, national authorities will continue to test for basic quality metrics rather than true authenticity to protect themselves from being sued by importers.



Andreas Thrasyvoulou

Emeritus Professor Aristotle University
Thessaloniki, Greece

The Reality: Testing for Compliance, Not Authenticity





QUESTIONS FROM MEMBERS OF THE HELLENIC PARLIAMENT TO THE REPRESENTATIVES OF EEEM AND EBA PROF. ANDREAS THRASYVOULOU

Question:
What are the capabilities of honey pollen analysis, and how useful is it for honey control?

Pollen analysis is a mandatory method for determining the botanical and geographical origin of honey under Directive 2024/1438.

The implementation of pollen analysis requires the harmonisation of national control laboratories around a common system for the examination, identification and counting of pollen grains, in order to ensure the accurate and consistent presentation of final results by Greek control laboratories. This harmonisation was achieved following years of effort and cooperation among scientists from the Laboratory of Apiculture of the Aristotle University of Thessaloniki (AUTh), the Mediterranean Agronomic Institute of Chania (MAICh), the General Chemical State Laboratory, the Honey Analysis Laboratory/Directorate of Agricultural Economy of the Dodecanese, the EEEM, and the Melissopalynology Scientific Group of the International Honey Commission.

The relevant report was submitted to the Ministry of Rural Development and Food on 12 January 2022. No action was taken by the Ministry on this matter.

Pollen analysis provides reliable results regarding the botanical origin of unifloral honeys

and can be used to verify geographical indications appearing on labels. It is particularly useful and effective for verifying PDO and PGI honeys and for supporting pollen analysis as a distinguishing characteristic in applications for their recognition. It can also distinguish Greek unifloral honey from imported unifloral honey originating from another country, for example honey from Türkiye, Mexico or China.

Adulterers involved in the relabelling of imported honey as Greek honey may remove pollen grains from inexpensive imported honey and then blend it with a small quantity of Greek honey, thereby giving the product a Greek pollen profile that pollen analysis alone is unable to detect. However, establishing a minimum pollen-grain count for Greek honeys, together with organoleptic examination, assessment of different physicochemical characteristics, and the combination of administrative checks of commercial documents (invoices, bills of lading, etc.) with a proper honey balance and a beekeeper registry, would provide the basis for an effective traceability system and clearer answers and solutions.

Relevant proposals have been submitted repeatedly to the Ministry by scientists and representatives of the beekeeping sector, without any substantive outcome.

Pollen analysis is also unable to provide reliable results for blends of imported honey which, from June 2026, will be required to indicate the countries of origin and their respective percentages. Traders often list blends from numerous countries on the label, thereby, in effect, "obscuring the picture". In such cases, the only effective solution would be a reliable traceability system, which does not currently exist in Greece.

Question: Honey adulteration is widespread. Are there methods for detecting it, and if so, why are they not being applied?

The science of honey adulteration detection has advanced significantly. Private and public research centers have developed advanced methods for detecting adulteration, including EA/LC-IRM, HPAEC-PAD, LC-HRMS, 3H-NMR and DNA-based techniques, using highly sophisticated and extremely expensive scientific instrumentation.

These methods are effective in detecting adulteration and, in essence, they are constantly evolving alongside another field of science: the science of adulteration itself. Driven by the pursuit of easy profits, scientists—particularly in China—are continually developing honey-mimicking syrups designed to "outsmart" the sophisticated analytical methods used by European control laboratories. According to the 2023 European report From the Hive, scientists from accredited European honey control laboratories have collaborated with adulteration specialists in developing honey syrups capable of evading European controls.

A second problem is that the results obtained through reliable adulteration-detection methods



do not have legal force and therefore cannot be used effectively to combat adulteration. This is because these methods have not been formally established by the EU and have neither been internationally recognized nor validated through CEN/ISO standards.

Furthermore, no European Reference Laboratory, National Reference Laboratory or Official Honey Control Laboratory has been designated, as provided under Regulation (EU) 2017/625, to validate methods that can be used for the official control of honey authenticity.

As a result of this legislative gap, laboratories use in-house validated methods which are limited to determining whether honey complies with the applicable legal requirements of the Honey Directive—such as electrical conductivity, the sum of glucose and fructose, diastase activity, HMF and other parameters—rather than determining honey adulteration and authenticity.

In conclusion, reliable methods for detecting and controlling honey adulteration do exist. However, their results currently lack the legal force required to effectively combat adulteration because of gaps in European legislation.

Question:
Does the sector agree with the proposed framework of sanctions for the implementation of honey traceability legislation?

The proposed sanctions framework appears particularly strict towards producers, with fines ranging from €200 to €10,000, as well as the possibility of losing eligibility to participate in national or EU support measures and compensation schemes administered by ELGA.

By contrast, the proposed framework does not set out with the same clarity and degree of strictness a comprehensive system of sanctions for traders, importers and distributors who may place adulterated or falsely labelled Greek honey on the market.

The effectiveness of a traceability system requires balanced treatment of all links in the supply chain. It is not reasonable for a small-scale producer to face immediate and stringent administrative measures for a registration omission while equally clear and deterrent sanctions are not provided for those further along the supply chain who market products with false origin claims or questionable authenticity.

For professional traders and importers, a proportionate but genuinely deterrent system of sanctions should be established.

Depending on the seriousness of the infringement, this could include substantial administrative fines, suspension or withdrawal of trading licenses, criminal liability, and publication of infringements, where permitted under the applicable legal framework and data-protection rules.

In analogy with the provisions concerning beekeepers, where fines are linked to the number of hives owned, a proportionate fine should also be provided for trading businesses, based, for example, on the quantity of honey involved in the infringement or on the company's annual turnover.

Consumer protection and fair competition require sanctions to apply throughout the entire supply chain, rather than selectively at the production end alone.

Question:
Does the current bill improve the previous situation with regard to honey traceability and control?

The initiative of the Ministry of Rural Development and Food—although delayed—to establish a traceability system for both domestic honey and imported honey originating from EU Member States and third countries is a positive development.

Clearly, the creation of an effective traceability system is a necessary prerequisite for protecting producers and consumers and ensuring fair competition in the market.

From this perspective, the bill represents an improvement over the complete absence of such a system to date.



THE 15TH NATIONAL CONFERENCE ON THE SAFETY AND QUALITY OF BEE PRODUCTS: FIFTEEN YEARS LATER

Fifteen Years of Continuity and Professional Dialogue

The 15th National Conference on the Safety and Quality of Bee Products was held in Kastav, a town rich in history and renowned cultural heritage, located near Rijeka, Croatia. This jubilee edition of the scientific and professional gathering provided an important opportunity to reflect on the conference's fifteen-year development. Since its first edition in 2011, the conference has grown into one of the most important national forums. It brings together experts, scientists, beekeepers, representatives of government institutions, and other stakeholders interested in the safety, quality, and market value of bee products.

Over the past fifteen years, the conference has followed numerous changes that have shaped Croatian and European beekeeping. Special attention has been devoted to challenges related to honey bee colony health, climate change, and increasingly demanding market requirements.

Furthermore, considerable attention has been paid to ensuring high standards of safety and authenticity of bee products. During this period, the conference became an important venue for the exchange of the latest scientific findings and practical experiences.

A Meeting Place for Science, Expertise, and Practice

The fifteenth conference once again brought together a wide range of participants from different fields. Lectures and professional presentations covered topics related to the quality of honey, pollen, propolis, and other bee products, laboratory testing methods, traceability systems, the regulatory framework, and modern approaches to preserving bee health.

Particular emphasis was placed on the need to connect scientific research with the practical needs of the beekeeping sector. Numerous examples demonstrated how research results can be successfully applied to improve production, quality control, and consumer confidence. During the discussions, it was repeatedly emphasized that the safety and quality of bee products are not only regulatory requirements but also key prerequisites for the sustainability of beekeeping production.

Challenges of Contemporary Beekeeping Production

Conference participants also addressed the modern challenges facing beekeeping today. Among these, climate change occupies a prominent position, increasingly affecting the availability of bee forage as well as the development of beekeeping technologies upon which honey yields depend.

At the same time, expanding global trade requires effective systems for verifying product authenticity and preventing potential market fraud.

Growing consumer expectations further highlight the need for production transparency and verifiable product quality.

Consequently, a significant part of this year's program was devoted to modern analytical methods used to confirm the origin and quality of honey and to detect possible deviations from declared product characteristics.



Debate on the Fight Against Adulterated Honey

One of the most memorable moments of the conference was an open discussion between the President of the Croatian Beekeeping Association (HPS) and the President of the European Beekeeping Association (EBA), dedicated to the problem of adulterated honey and the effectiveness of measures being implemented at both national and European levels. The discussion attracted considerable interest among participants as it addressed issues that have increasingly burdened the beekeeping sector across Europe in recent years.

At the centre of the debate was the assessment of the results achieved so far in combating non-authentic bee products on the market. The President of the Croatian Beekeeping Association pointed out that beekeepers had been expecting more concrete and visible results in protecting the honey market and expressed dissatisfaction with the pace of change at the European level. In response, the President of the EBA emphasized that European beekeeping organizations, despite continuously drawing attention to the problem, cannot independently implement regulatory measures without stronger support from national associations, Member States, and European Union institutions.

Although some moments of the discussion were marked by visible disagreements and mutual criticism regarding responsibility for the results achieved to date, the dialogue remained professional and evidence-based. The exchange of views revealed differing perspectives on the organization of European beekeeping and the representation of beekeepers' interests. Nonetheless, they simultaneously confirm a shared commitment to the fundamental goals of consumer protection, fair market competition, and ensure a sustainable future for European honey production.

For many participants, this discussion represented one of the most engaging segments of the conference because. Without the usual diplomatic reservations, it opened important questions concerning responsibility, effectiveness, and the future priorities of beekeeping organizations at a time when adulterated honey is increasingly threatening the competitiveness of domestic producers.



Looking Back: Fifteen Years Later

The jubilee nature of the conference provided an opportunity to review its developmental path. From its earliest gatherings, which were primarily focused on national issues and needs, the conference gradually expanded both its scope and







influence. Over the years, numerous research findings have been presented, new professional partnerships established, and discussions encouraged that have contributed to a better understanding of bee product safety and quality.

Particularly noteworthy is the fact that the conference has maintained continuity and a high-quality professional program throughout its existence. This consistency has enabled the creation of a recognizable national platform for communication among the scientific community, beekeepers, laboratories, inspection services, and policymakers.

Many participants noted that, over the past fifteen years, the conference has become a kind of chronicle of the development of Croatian beekeeping. Topics that once focused mainly on the basic quality parameters of honey and bee health protection have expanded to include issues of production sustainability, climate change, product authenticity, international markets, and the position of beekeepers within European policies. In this way, the conference has successfully followed the development of the profession and become an important forum for discussing the sector's most pressing issues.

The Significance of Kastav as Host

Holding the jubilee conference in Kastav further contributed to its ceremonial character. A town that has for centuries connected diverse cultural and economic influences proved to be a fitting venue for a scientific and professional gathering whose primary purpose is to connect people, ideas, and experiences. In a pleasant atmosphere, participants had the opportunity not only to follow the official program but also to continue discussions through informal interactions. This is, indeed, an invaluable component of every successful scientific and professional meeting.

Conclusion

The 15th National Conference on the Safety and Quality of Bee Products once again confirmed its important role in the development of the Croatian beekeeping sector. Fifteen editions of the conference testify to continuous effort and demonstrate that open dialogue, knowledge exchange, and cooperation between science and practice are essential for addressing the challenges faced by the entire sector.

At the same time, the conference provided an opportunity both to reflect on past achievements and to consider future directions for development. In an era marked by climate change, market challenges, and growing demands for food quality, its role is more important than ever. The jubilee edition therefore represented not only a celebration of fifteen years of tradition but also a confirmation that the safety, quality, and authenticity of bee products will remain among the key priorities of Croatian and European beekeeping in the years ahead.

LAMORIX®

Luxury anti-age cream with
bee venom and **Q10**



www.lamorix.com

BeeConn

beeconn.si

@beeconn.si

BeeConn is growing its global sales network

1:1 partner experience
Be part of a successful company
Premium beekeeping technologies

Are you ready?

Strip's d.o.o., Kandrše 7, 1252 Vače, Slovenia T: +386 3 56 70 770 I E: info@beeconn.net I W: www.beeconn.net



STRATEGY FOR TACKLING CLIMATE CHANGE

Purpose of the strategy

The Serbian Federation of Beekeeping Organisations' Strategy for Tackling Climate Change is our first attempt to make Serbian beekeeping more resilient to the climatic changes that now pose such a serious threat to it. Hardly a season passes without losses caused by extremes of weather that would once have been unexpected. As this strategy will show, extreme events have occurred throughout history, sometimes on a far greater scale than those we experience today. Never, however, have they been so persistent and frequent, making beekeeping one of the economic sectors most severely affected by extreme weather. At the same time, building resilience in beekeeping is more complicated than in almost any other branch of agriculture, so preparing this strategy has been anything but straightforward. We hope that new opportunities

will emerge in the years ahead and that future generations of beekeepers, specialists and scientists will bring fresh ideas to its further development.

Terminology

Languages with a more limited vocabulary, offering only one term for the phenomenon we are examining and seeking to address, have an easier task. In everyday Serbian, we have at least two: 'climatic changes' and 'changes in the weather'. Although these are entirely different technical concepts, the two expressions have become almost interchangeable in ordinary speech, despite being anything but synonymous.

What we are experiencing—average temperatures rising above their usual levels; sudden, abrupt and extreme weather events; storms of an intensity almost unknown in places where they now occur; more frequent morning frosts at times when we would not normally expect them; and spells of cold or tropical nights that sometimes persist for a substantial part of the year—is, strictly speaking, a change in weather rather than climate. Formally, the climate itself has not yet changed; rather, unusual phenomena are occurring at unusual times and with extreme intensity within our existing climatic zone.

We have therefore decided, for good reason, to yield to everyday usage and call this document a Strategy for Tackling Climate Change. We were concerned that using the technically correct term might divert attention in the wrong direction and prevent the strategy from receiving the recognition and attention it deserves within the beekeeping community. Indeed, it now contains essential knowledge for every beekeeper wishing, within the limits of our all-too-fragile human capabilities, to mitigate at least some of the devastating consequences of changes in the weather, hereafter referred to as 'climate change'. If these weather changes become more frequent, they may, of course, eventually bring about a definitive change in our climatic zone.

Introduction

SPOS was the first national beekeeping federation in the world to recognise the need for such a strategy and begin work on it. Slovenia overtook us: although its federation started later, it completed its strategy sooner, simply because it has greater human resources than SPOS. Its federation has worked painstakingly to build those resources over decades, whereas we are still addressing questions of our own survival and long-term security—issues that Slovenia largely resolved long ago.

Like agriculture as a whole, beekeeping takes place 'under the open sky', as the Serbian saying so aptly puts it. It is therefore exposed to climate change and directly dependent on it. Much of our success certainly depends on a young queen and the strong colony she supports, timely control of varroa and swarming, and, of course, choosing the right forage and the right location. All of this counts for little, however, if the weather during the honey flow is unsuitable: too cold, too hot, rainy, windy, excessively dry, and so on. In one respect, beekeeping is less vulnerable than other agricultural activities: colonies can be moved to more favourable locations or higher elevations, where nectar-producing plants flower later. Orchards, vineyards and maize fields cannot be moved. Once extreme weather damages them, there is no remedy: the season is lost.

The origins of climate change

As many as 90% of meteorologists today consider unusual and/or extreme weather to be the result of human interference with nature since the Industrial Revolution, particularly the increasing release of carbon dioxide, a 'greenhouse gas' blamed for climate change. Growing attention is also being paid to methane, said to be an even more potent greenhouse gas, which is literally pouring into the atmosphere in enormous quantities as climate change thaws the permafrost. Scientists have calculated that atmospheric carbon dioxide could be brought back to pre-industrial levels simply by planting forests over an area equivalent to that of the United States—a perfectly feasible undertaking, since the land is available. Yet forests continue to be felled ruthlessly for the profits of billionaires who, at the same time, sell us the promise of green energy, from which they also make handsome profits, although storing that energy requires more mining and

further pollution of the planet. It would not surprise us if the private development of the space industry were driven precisely by the idea of obtaining the necessary minerals in space, on the Moon or Mars. Planting a forest the size of the United States would produce results within, at most, some twenty years. As we can see, however, no one seems interested: there is no profit in it for investors, while the public is dispirited and disengaged, lulled into believing that governments will sort it out—even though we know they will not. The less charitable might say that we would never have reached this point had we not already cut down forests covering an area far larger than the United States.

Some twenty years ago, the media reported that an area of Amazon rainforest the size of a football pitch was being cleared every day, and that deforestation had accelerated in recent years. Meanwhile, hardly anyone is planting new trees, yet we claim to be living in the advanced twenty-first century. Everything suggests that we are actually moving backwards, even as we shamelessly sign climate protocols—some of the largest polluters are too arrogant even to sign them—on paper made, of course, from trees.

However, 10% of meteorologists believe that carbon dioxide does have an effect, but that it is minor compared with natural factors. Historical evidence certainly lends support to this view: much more extreme climatic changes have occurred in the relatively recent past, literally destroying entire civilisations. A great drought across the wider Mediterranean devastated almost every civilisation of the time that lacked an irrigation system largely independent of drought. Only Egypt had such a system, because the Nile's water comes from distant mountains outside the country. Around 1180–1170 BC, one such dry period began and lasted for several hundred years, destroying numerous civilisations and prompting incursions by the so-called Sea Peoples. They sailed in their galleys in search of places where food could be grown and they could survive. Ancient Egypt and the eastern Mediterranean coast naturally bore the brunt of these attacks. In one decisive battle, Pharaoh Ramesses III defeated the Sea Peoples; his final victory was recorded in stone reliefs, in which their differing dress reveals the presence of several distinct peoples. Hunger has always driven migration. There were no lorries, trains or supermarkets then that could obtain food from anywhere in the world at any time, as they can today.

The discoveries of our own scientist, Milutin Milanković, who demonstrated the cyclical nature of climatic change and the periodicity of ice ages, also support the view held by these 10% of meteorologists. This is a vast subject and beyond our scope here, but his findings are universally accepted, and none of the evidence supporting them has been disproved to this day. The changing tilt of the Earth's axis relative to its orbit around the Sun undoubtedly plays a part, alongside any number of other factors that we, as non-specialists, do not fully understand. So too does the continual movement of the Earth's magnetic poles, perhaps several dozen kilometres or more each year. Occasionally, the poles reverse completely, with magnetic north moving south and vice versa. We know precisely when the most recent such reversal occurred. Known as the Laschamp excursion, it took place around 41,000–42,000 years ago. During this event, the north magnetic pole moved into the southern hemisphere before returning north.

Scientists studied ancient kauri trees found in wetlands in northern New Zealand that were alive during the Laschamp excursion. By analysing their growth rings, researchers measured the rise in atmospheric radiocarbon that occurred as the Earth's magnetic field weakened. Earlier studies had focused on the period when the poles were reversed, during which the magnetic field was 28% stronger than it is today. This new research, however, found that the greatest changes occurred during the transition itself, known as the Adams Event, when the magnetic field fell to just 0–6% of its present strength. Cosmic radiation consequently increased dramatically because the magnetic field could no longer provide adequate protection. Although this happened so recently in geological terms, it was, of course, not preserved in humanity's historical memory.

The researchers showed that the Adams Event brought major environmental changes, including the expansion of North American ice sheets and shifts in wind patterns and tropical storm systems. In other words, it caused dramatic climatic changes across the planet. Austra-



lia, for example, became much drier. The event could explain the extinction of Australia's former megafauna and the disappearance of Neanderthals in Europe. While humans probably sheltered in caves and other protected places, wore primitive clothing and found other ways to 'outwit' the stronger solar radiation, Neanderthals apparently failed to do so and died out. It may also explain the sudden increase in cave art. As cosmic radiation intensified, humans probably sought refuge in caves and other shelters, spending longer there and producing more cave paintings.

The study warns that a similar shift in the magnetic field today would have devastating consequences. Cosmic radiation could destroy electricity grids and satellite systems while triggering rapid climate change. The scientists conclude that what happened 42,000 years ago was terrifying and could happen again. The magnetic field remained weak for only a few hundred years, but the effects on climate, the environment and life lasted for thousands of years.

This alone shows how vulnerable and fragile our civilisation is in the face of natural forces. Humanity has grown complacent, cushioned by a standard of living that is undoubtedly the best in history, despite all the hardships we face. We give almost no thought to how we might cope if natural events beyond our control were to recur. Money is spent on wars rather than preparing for an event of this kind, which could happen at any time. Let us be honest: we pay scarcely any attention even to events we can influence, let alone those we cannot. Yet we should have responses ready, because we do not know when they might recur.

We have learnt nothing even from the Middle Ages, remarkably close to us in historical terms. They are remembered as a dark period in the development of civilisation, and climate change was precisely what made them so. The extremely dry conditions of the medieval period left people preoccupied with producing and finding food, of which there was too little. In such circumstances, there is neither time nor money for science or art. Those pursuits require abundance, such as once existed in the valleys of the Tigris, Euphrates and Nile, where the foundations of modern science were laid. The same was true, at various times, of major trading centres, where plentiful supplies



allowed gifted people to pursue science rather than devote themselves entirely to tending crops. Today, the Euphrates is almost on the verge of drying up.

In nearby Slovenia, taxes in Bled were paid in wine during the Middle Ages. Today, no one would think of planting vineyards there, which vividly illustrates the climate that prevailed only a few hundred years ago. Rice was grown in Niš and Aleksinac in medieval times—something that seems extraordinary today, but is nevertheless true. One of the greatest droughts on record occurred in 1863. Little is known about it today, but life was far from easy for our ancestors.

Then, in 1921—ONLY 105 years ago—an extreme drought struck a vast area of Europe and Asia, causing appalling famine in some regions. In our part of the world, according to records from Bosnia and Herzegovina, the first rain did not fall until October. That alone gives some idea of the hunger people endured. Russia was also severely affected. In some Russian regions, even the birds had fallen silent, and not a single animal was to be seen: literally anything that could be caught and eaten had been consumed. In some villages, people even ate the thatch from their roofs—at least those who had not set off in search of somewhere else to live, a move that generally failed because the drought affected such a vast area.

The sociologist Pitirim Sorokin, who visited villages in Saratov and Samara provinces in the winter of 1921, wrote:

Houses stood abandoned, roofless, with broken windows and no doors. The thatched roofs had long since been stripped off and eaten. There were, of course, no animals in the village: no cows, horses, sheep, goats, dogs or cats, not even crows. Everything had been eaten. A deathly silence hung over the snow-covered streets.

People sold off or abandoned everything they owned and fled wherever their feet would carry them, without any plan. Cannibalism spread rapidly in some regions, and photographs documenting it survive to this day. Passers-by were poisoned and killed in the streets; families ate their own small children. Such horrors, only 105 years ago—and the vast majority of us have never even heard of them. Perhaps human lives

are simply too short for a serious collective memory to develop. Perhaps that is why we keep fighting wars, repeating the same mistakes and committing every conceivable folly.

Russia's new communist authorities confiscated food from those who had it and distributed it to the starving. History remembers them as villains for doing so, whereas it was, in fact, an attempt to save people and keep them alive. There were no media comparable to today's, through which people could see what was happening elsewhere in the country.

Finally, let us explain that what we observe during a period of climate change is a slowing in the transition between weather patterns: when drought arrives, it lasts too long; when a rainy spell sets in, that too lasts too long. This is caused by excessive warming at the North Pole, which reduces the temperature difference between the upper atmosphere above the pole and that above our latitudes. As a result, a given type of weather persists, on average, for longer than it used to. We can therefore expect both droughts and floods to become more likely in future.

Extraordinary events that affect the climate

Throughout history, a number of extraordinary events have affected both climate and life on Earth, particularly volcanic eruptions. In 1815, Mount Tambora in Indonesia erupted, with worldwide consequences. The following year, 1816, became known as the 'year without a summer': enormous quantities of volcanic dust rose into the stratosphere, spread across almost the entire planet and blocked much of the sunlight from reaching the Earth.

Some scientists believe Tambora's eruption was five to ten times more powerful than that of Krakatoa in 1883, which blew apart an entire Indonesian island, destroying 70% of its mass. Krakatoa's eruption was 13,000 times more powerful than the atomic bomb dropped on Hiroshima, making Tambora's between 65,000 and 130,000 times more powerful. The consequences included rain, mainly in the northern hemisphere, or drought, depending on the region, together with crop failures and a seemingly endless winter. Alongside the climatic effects came disease, including cholera, political instability in many countries and more than 10 million deaths. It was the greatest volcanic event in modern history, rated seven on the eight-point Volcanic Explosivity Index. Global temperatures fell by around 3°C in 1816.

The greatest consequence was a change in wind patterns. Tambora also released large quantities of sulphates. Together, these sulphates and the altered winds disrupted South Asian monsoons for three consecutive years. India's annual monsoons slowed, triggering a bewildering chain of effects, the most serious of which was a cholera epidemic in Bengal. The disease spread rapidly across Asia, and by the end of the century the whole world had felt its effects. An entirely new form of cholera even emerged under these conditions.

Europe's food stocks were already low after the Napoleonic Wars. Rain destroyed much of the harvest, forcing imports from America. Tambora's devastating effects on Ireland are well documented: eight weeks of uninterrupted rain destroyed the potato crop, on which people depended for survival, along with other crops. Famine followed, and typhus then spread among the starving, weakened population between 1816 and 1819, claiming around 100,000 lives on its own.

The Krakatoa explosion of 1883 also had major global consequences. It generated several tsunamis, with waves up to 46 metres high, wiping out 163 villages, devastating around 1,000 and immediately killing 36,417 people. The precision of that figure reflects the efforts of the Dutch authorities, who administered the territory at the time. The strongest tsunami even rocked ships off the coast of South Africa. A year later, bodies were still washing ashore on the African coast.

Smaller eruptions and explosions preceded the main blast. Sailors aboard ships 20 kilometres away reported falling ash and pieces of hot pumice up to 10 cm across. The explosion of the main one of the volcano's three cones was heard in Perth, Australia, 3,110 km away, and on Rodrigues Island near Mauritius, 4,800 km away. There, people thought a nearby ship was firing its cannon, which gives some idea of the force of the explosion. Sailors around 64 km from the volcano



suffered ruptured eardrums. A sound level of 310 decibels was measured at a distance of 160 km.

Barographs around the world recorded the pressure wave. Some registered as many as seven passages over the following four days, meaning that the wave travelled four times from the volcano to its antipodal point and three times back: it circled the planet three and a half times. The energy released was four times that of the largest atomic bomb ever detonated, the Soviet Tsar Bomba.

The volcano emitted 20 million tonnes of sulphur dioxide, increasing sulphuric acid concentrations in cirrus clouds—clouds formed when water vapour freezes into ice crystals—and causing them to reflect more sunlight.

The following year, average temperatures in the northern hemisphere fell by 1.2°C. The climate did not return to normal until 1888, when virtually all the sulphur had finally fallen to the ground as acid rain. The resulting spectacular red sunsets were painted by artists unaware of their cause; blue and green moons were also observed. Southern California recorded exceptional rainfall the following year, while the usual El Niño failed to materialise.

The disaster also involved a pyroclastic surge: a fast-moving cloud of gases, dust, ash and rock at around 1,000°C, sweeping down from the volcano. It crossed the bay to the mainland, reaching as far as 40 km from the volcano and scorching everything in its path. A similar surge burned the inhabitants of Pompeii and Herculaneum on 24 August AD 79.

The year 536 also left a profound mark on history. What followed may well have inspired the conspiracy theory that the period between 614 and 911 was invented and never actually happened, since the development of civilisation did indeed undergo a kind of standstill. Writing in 536, the Byzantine historian Procopius, who served as military adviser to Belisarius, one of the Eastern Roman Empire's most distinguished generals, described a sun that shone without brightness, like the moon, throughout the year. From that point onwards came wars, plague and all manner of other diseases.

Michael the Syrian, a chronicler of the Eastern Roman Empire, wrote something similar: the sun had been darkened for 18 months, giving light for only three hours in the morning, and even that light was neither like day nor night.

Other sources from across the Mediterranean describe a cloud or veil of dust that darkened the Earth for a year.

From today's perspective, all of this plainly points to a massive volcanic eruption that probably deposited ash worldwide. Widespread famine accompanied the darkness. Its effects on agriculture in 536 and the years that followed were disastrous. Without sunlight, crops failed to grow; average global temperatures fell by between 1.6°C and 2.5°C; and civilisations around the world struggled to produce enough food to survive.

Crop failures were recorded from Ireland across continental Europe to Asia and China immediately after the eruption of 536. The event also ushered in lower temperatures that lasted for decades.

Plague swept through the Eastern Roman Empire. In Constantinople—modern Istanbul, formerly also known as Stamboul and, in Serbian, Carigrad—5,000 people died on the first day, 10,000 on the second, 15,000 on the third and 18,000 on the fourth.

These were the figures reported by officials whom the emperor had stationed at the city gates to count the dead. They counted up to 300,000 and then stopped.

The plague spread to Egypt, where one city was completely wiped out. What became known as the Plague of Justinian claimed millions of lives in the Eastern Roman Empire from 536 to the middle of the eighth century.

Around 536, unusual events also began to occur in China. The Nan Shi, a sixth-century chronicle, reports a yellow, ash-like substance falling from the sky. Its precise composition remains uncertain, but accounts describe dirt or dust that could be 'gathered in handfuls'. It appeared three times in the late 530s.

The following year, Chinese chronicles recorded snow during the summer months. The chronicles of the Southern Dynasties described midsummer frost and snow in August, destroying crops in Qingzhou and other provinces. The result was a severe famine lasting around two years and causing the loss of an estimated 70–80% of the population.

Reports of frost and snow also emerged from Mesopotamia in the summer of 536. The winter was described as 'so severe that birds perished in the great quantities of snow'.

During the sixth century, settlements in eastern and central Sweden declined so sharply that villages and many towns were abandoned. The reason remains unclear, but the shortage of sunlight in 536 and the resulting scarcity of food undoubtedly influenced the Scandinavians' actions.

Subsequent eruptions only made matters worse: three eruptions in Iceland in 540 and 547 contributed to the general darkness of the period and brought about the so-called Late Antique Little Ice Age. This cooled the planet for at least a decade, if not longer. Crop failures and famine followed, leaving populations weakened and vulnerable to disease.

Tropical volcanic ash found in ice layers in both the north and south has led some scientists to identify an eruption in El Salvador in 535 or 536 as the trigger for this little ice age. Near San Salvador lies the Ilopango volcano, now a crater lake, which also erupted at that time. Its eruption coincided with the Maya 'Hiatus', a period of population decline and reduced building activity. Others believed that an eruption in North America during the 530s produced the enormous cloud that darkened the skies over northern and western Europe.

Even if Ilopango's eruption, or that of another volcano, was not large enough to blanket the western hemisphere in ash, these events contributed to the overall 'darkness' of the mid-sixth century.

The eruption of 536 occurred just as the former Roman Empire was at its most vulnerable in both east and west.

By the sixth century, the empire's centre had shifted east to Constantinople. Under Emperor Justinian, the Eastern Roman Empire sought to restore the glory and grandeur of ancient Rome.

When plague broke out in 541, the Eastern Roman Empire lost between 35% and 55% of its population. This weakened its economy and brought social upheaval, military setbacks and administrative decline. It never fully recovered from the crop failures, disease and wider conflicts triggered by events after 536.

In the west, the empire had long since fragmented into separate states ruled by Germanic kings. Angles, Saxons, Franks, Ostrogoths, Visi-

goths, Vandals and others continued to fight over people and territory, exploiting the absence of central leadership and economic stability.

Peru's Moche civilisation once dominated the western coast of South America, contributing to the region's cultural and economic heritage. The Moche were accomplished fishers and had mastered irrigation for crops including beans and maize. In the mid-sixth century, however, an El Niño cycle warmed the water so much that fish populations could not survive. Massive floods and heavy rain destroyed irrigation networks, making it impossible to grow enough food. Famine and climatic chaos, combined with ineffective leadership, meant that the Moche never regained their former strength.

The terrible conditions described by contemporaries in 536 attracted renewed attention in 2018. Harvard historian Michael McCormick was part of an interdisciplinary team of 12 scientists who combined their research to establish whether 536 really was the worst year in history. They also sought answers about metal use, coin production and changes in seventh-century monetary systems. Their investigation included analysis of a glacier in the Swiss Alps to determine what caused the 18-month period of darkness in the mid-sixth century.

Using unprecedented analytical technology, the team found fragments from an Icelandic volcano in samples from Swiss glacial ice. 'Coincidentally', the samples dated to precisely 536. This definitively confirmed a volcanic event that sent ash through the atmosphere over northern Europe and around the world, triggering a global crisis.

The new ice-core evidence presented in the 2018 study and other research built on findings made by dendrochronologists in the 1990s. Dendrochronology uses tree rings to determine the age of wood.

According to a professor involved in the 2018 study, scientists first examined rings from Icelandic trees and saw that something significant had happened in the mid-sixth century. Tree growth had slowed, indicating unusually low temperatures. The ice-core evidence made those findings more precise and helped identify the catastrophic event behind the enormous changes of 536.

Further research shows that tree growth slowed worldwide. Tree-ring records from both North America and Europe indicate that conditions became considerably colder for at least 15 years after the eruption. Between 536 and 545, global temperatures reached their lowest level in 2,000 years.

Some researchers also identified when conditions began to improve for humanity. The ice samples show lead appearing in the atmosphere around 640, indicating that people had begun producing silver for monetary exchange. To specialists, the introduction of silver meant a growing demand for money, suggesting better economic prospects. In some places, improvement came a century after the eruption, although certain regions did not introduce silver into their economies until the 660s. In other words, it took more than a century for the eruption's consequences to subside.

Taken together, these events show just how vulnerable our civilisation and planet are. We are, in fact, living through one of the best periods in the Earth's recent history, which is precisely why civilisation has developed so far. Yet even a relatively small but dangerous natural event could literally destroy us overnight, and we still cannot predict such events, let alone overcome their consequences.

Ivan Brndušić, who keeps bees in both New Zealand and Serbia and uses sensors to measure conditions inside hives in both countries, recorded a simultaneous rise in air pressure at both locations when the submarine volcano Hunga Tonga–Hunga Ha'apai erupted on 15 January 2022. It is astonishing that a relatively small volcano can affect air pressure across the world.



In 1859, a major explosion on the Sun produced a geomagnetic storm that reached the Earth and allowed telegraph systems to operate even when disconnected from their batteries. Analysis of ice samples has established that electromagnetic storms of this magnitude occur every 500 years, although strong but considerably less powerful geomagnetic storms occur much more frequently—as in 1921, 1960, 1972 and 1989—and the weakest occur almost continuously.

Imagine such an event today, in a world filled with electronic devices and advanced technology. It is said that the entire planet would be without electricity for at least three months. Whether civilisation would ever recover is another question, given what we are like and how irrationally we would behave during those months. At the very least, widespread hunger and infectious disease would follow, with catastrophic consequences, particularly in large cities. Yet globalisation has brought 'civilisation' to every village too, making our households unable to sustain themselves, although less than a century ago we were entirely self-sufficient.

That world has gone. The SPOS president's grandmother, Bosiljka, born as recently as 1929, used to tell him that when she was a child, their household produced literally everything it needed, from food to clothing and footwear. Salt was the only thing they had to go to town to buy. That was only about 80–85 years ago. Imagine the collapse if a natural cataclysm like those described above were to strike today.

Clearly, we know very, very little. Our lives are also too short to observe some phenomena properly, while wars throughout history have destroyed many records.

We are left marvelling at the world around us, even though it is, in fact, so logical and interconnected.

The effects of climate change on beekeeping

The principal effects of climate change on beekeeping are late frosts, unusually cold or hot weather during spring build-up and honey flows, frequent storms with hail and heavy rain, and excessively warm winters. Nor must we overlook the effects on the biology of bee diseases and parasites, or on bee nutrition.

Late frosts

In practice, beekeeping has virtually no defence against late frosts, as we still lack the technology to prevent them effectively. Fruit blossom and acacia flows are particularly vulnerable: damage can be so severe that some fruit blossom flows, or the acacia flow, fail altogether. We cannot prevent acacia flowers from being frost-damaged, although fruit growers can protect modern orchards to some extent. What we certainly can and must do is develop an effective system for monitoring and surveying forage areas, identifying places that have escaped the frost. Years in which no such places exist are rare. Once we find them, we move the colonies at the right time and hope for weather favourable to nectar secretion.

Finding such sites is, of course, no easy task. Acacia woodland throughout the wider area being considered for migration must be monitored before the growing season begins, at several different elevations.

Many beekeepers do not understand why this monitoring must start before visible growth appears. The reason is that acacia buds are extremely sensitive. Frost damage can occur very early, as soon as the buds begin to develop, when most beekeepers would not even think of visiting acacia woodland. Even very small buds can be damaged, and identifying the damage is not straightforward. A few days after a low-temperature event, cut a bud open with a razor blade and look for brown or black tissue, the colour depending on how long after the frost it is examined.

When frost strikes this early, replacement buds begin to develop. Even if there are no further frosts, moving colonies to that site is inadvisable: flowers developing from replacement buds generally produce insufficient nectar. Only very rarely do they deliver the desired yield. The author has kept bees since 1992 and has seen only one such year.

Later frost damage presents a different, more readily understandable picture, making it much easier to draw conclusions. Start by following the forecast for every potentially suitable site. No forecast is accurate enough in every respect; all



have shortcomings. Nevertheless, choose services offering more days of individual forecasts, even though these are constantly revised, as one would expect. By monitoring them continually, you can assess the direction of change over the coming ten days with Yr, or 14 days with meteoblue, whose full 14-day forecast requires a modest additional payment.

Once you know where and when frost has occurred, make a note of it and visit the site when you can to assess the actual situation. Inspect both hollows and higher ground to establish whether conditions differ and how. Even without such detailed surveys, later frost damage can be assessed more easily, at least in part, during visits closer to the start of the acacia flow. For those assessments to be sound, however, you must visit several elevations on the same day, covering a vertical range of up to 500 metres or more.

Acacia naturally flowers later at higher elevations and earlier lower down. Its entire growth cycle is delayed or advanced according to elevation and aspect—whether the slope faces south or north. Simply compare the stages of growth, and the picture becomes clear. If growth becomes progressively less advanced as you climb, it is very likely that none of the sites visited suffered frost damage during the later stages of growth. This does not rule out early frost damage at all those sites. That could only have been identified by visiting during early growth, when branches still appeared ‘bare’ but the buds were already developing.

If, however, acacia at a higher elevation is more advanced than that lower down, this is neither normal nor to be expected. It means that an early or late frost damaged the lower site. Growth from replacement, or lateral, buds takes much longer, so development is delayed and may catch up with, or even lag behind, that at higher elevations.

Ideally, all these methods should be used, as together they offer the only reliable route to accurate information.

This is not cheap: for an average Serbian apiary, fuel for these visits alone can cost as much as 120,000 dinars, or around €1,000. At retail prices, that is equivalent to roughly 1.0–1.5 kg of honey per hive. It therefore makes sense to organise visits with one to four like-minded fellow beekeepers.

Consider a specific example. In spring 2025, acacia flowers suffered at least two major frost events. The observations below relate mainly to the central part of central Serbia, but broadly similar conditions occurred elsewhere, with differences primarily in timing, as well as other factors. Some areas suffered far less damage than others, although these were relatively rare.

Reports even from more experienced beekeepers revealed considerable confusion, simply because they had not followed acacia development and frost damage closely enough in late winter and early spring.

The first frost caused the greatest damage. Wherever it struck, it completely destroyed the developing flowers and leaves. Beekeepers who were not monitoring events therefore kept saying that the acacia 'had not started yet', even though the warm end to winter had prompted a very early start in 2025.

A second frost followed after a time. This was closer to ground level, although its effects varied between sites. In many places it destroyed acacia growth up to four metres above ground, including areas spared by the first frost because of local microclimatic conditions. Less experienced beekeepers should know that, when conditions are right, acacia can still provide an excellent flow even if only the treetops survive. Such sites deserve careful attention, with binoculars used for a clearer view. Their yields can be entirely normal if all the conditions fall into place.

This is especially true of acacia woodland, where the flowers at the top produce the most nectar anyway because they receive the most sunlight. Flowers deep within the dark woodland are almost useless. Hence the reputation of solitary acacias, often standing on field boundaries, as the best nectar producers: a single tree can yield five kilograms of honey or more. Their flowers receive ample sunlight on every side, which explains their exceptional performance.

Broadly speaking, acacia was completely destroyed below 330–350 metres above sea level, apart from a few isolated pockets. Above that lay a zone extending to around 450–480 metres where most acacia remained undamaged. Another zone of severe frost damage followed, but with many more pockets that had escaped. Choosing the right site there could therefore still be expected to add some acacia honey to the supers.

Throughout this period, individual misconceptions persisted. We received reports of 'exceptionally abundant blossom' near Negotin, at a site where the flower clusters were, at one point, around 2.5 cm long. Those beekeepers had not realised that acacia at higher elevations than Negotin—for example, at 200 metres above sea level—had already begun opening several days earlier at the few sites that had escaped frost. The 2.5 cm clusters in Negotin were clearly on trees damaged much earlier and represented a second flowering.

Does that second flowering produce nectar? As already noted, experience is generally disappointing. Most commonly, it yields very little. Sometimes it produces exceptionally well, but usually for only one day, rarely two or three. A sustained good flow has occurred only once in the past thirty years or so. Relying on such an outcome is therefore a highly uncertain gamble.

Unusually cold or hot weather during spring build-up and honey flows

After the frost season, the next challenge is unusually cold or hot weather during spring build-up, particularly during the spring flows from fruit blossom, oilseed rape and, above all, acacia. Sudden, unseasonable cold and warm spells are becoming more frequent in spring, with heatwaves increasingly common during fruit blossom flows and cold, rainy spells during the acacia flow.

In cold years, interventions in the brood nest during spring build-up require extreme caution. We should intervene only when we are sure that the available bees can cover the brood affected by our 'experiments' without undue effort. Otherwise, we open the door to chalkbrood and other diseases, while slowing and/or compromising colony development. Ideally, leave the brood nest alone and concentrate almost exclusively on swarm control. This preserves the quality of the bees and enables much better use of the coming flows: well-reared bees are the foundation of success on any flow.

Rain and cold during the acacia flow have been familiar for decades, but never with the duration and intensity seen over the past ten years or so. Night-time temperatures can fall to just 3–6°C, followed by cloudy, sunless days, with such conditions lasting one or two weeks or longer. Acacia produces very little nectar in these circumstances, and the bees have only a very brief window in which to gather even that small amount. Collecting every available drop requires real mastery.

There is a fine beekeeping saying for abundant flows: 'When honey rains down, put your buckets where it will fall.' The same principle applies to poor flows, when honey arrives as 'dewdrops' rather than 'rain', but the resources available are now dramatically reduced. Let us therefore explain how precious acacia nectar is secreted under these conditions.

Most acacia nectar is secreted at night, as well as during the day when the sun shines. When nights are cold, with single-figure temperatures rather than the optimum 12–23°C, very little nectar forms. As soon as daylight arrives and temperatures permit flight, bees pour out of the hives to collect it. The apiary becomes very noisy, but unfortunately only briefly: nectar is scarce, and this intense activity may last only half an hour to an hour at most. Then the apiary quietens down because the nectar has gone. The bees must wait for sunshine to stimulate fresh secretion.

Activity may resume at around 11.00, noon, 13.00, 14.00, 15.00 or even 17.00, depending mainly on the weather. The poor, rainy season of 2014 remains memorable: days were desperately dark and damp, night-time temperatures fell to just 6°C, and on some days bees did not fly until 17.00 or 17.30. Yet when the sun finally appeared in the afternoon, hive scales showed that they could still bring in around 4 kg of nectar, despite actively flying for less than two hours, generally about an hour and a half. This nectar naturally contained a great deal of water, so hive weight fell substantially overnight as the water was removed.

Under these conditions, it is particularly important to get our bees flying as early as possible in the morning so that they can collect the meagre nectar secreted overnight. In such years, hive entrances must face east or south-east, allowing the first rays of sunlight to reach them. These colonies will be the first to fly and, over the next half-hour or so, collect the available nectar. Meanwhile, bees in hives facing west or north will still be inside, unaware that by the time they emerge, they will find acacia flowers emptied of nectar. Fresh nectar will usually not be available for another three to six hours.

Alongside the correct entrance orientation, choose naturally warm micro-sites. These can be identified by comparing the progress of vegetation with that at nearby potential sites serving the same acacia woodland. They are easiest to find during very early spring field visits, when you can physically feel how much warmer they are than their surroundings.

In 2017, after acacia at his permanent apiary had been frost-damaged, the author moved his colonies to a completely different site more than 100 km away. The hives stood on widely spaced pallets in four staggered rows to help the bees orientate. Sparse vegetation shaded the first two rows from the morning sun, while the other two were unshaded. By the end of the acacia flow, the first two rows had produced an average of one Farrar shallow super of honey per colony; the other two produced two supers—exactly twice as much.

Unless you experience this yourself, you may never appreciate the need to position hives properly. In good years, everything seems easy, pleasant and inconsequential. In bad years, as this example shows, every detail matters, and we are literally wrestling each drop of nectar from nature.

Although I am not an advocate of insulating hives, it may produce benefits during spring flows in such cold years. The nature and scale of those benefits should be investigated carefully.

More frequent storms with hail and heavy rain

Climate change has brought more frequent storms involving hail, heavy rain, strong winds and sudden temperature changes.

All of these severely damage bee forage. To reduce losses as far as possible, first choose



sites with substantial shelterbelts on the sides exposed to prevailing winds. This helps prevent the initial damage. If a storm also brings heavy hail, the best course is to move the colonies on the very next night. From the following day, acacia nectar secretion drops dramatically: the trees have numerous wounds to heal, and nectar production becomes a secondary 'task'.

Excessively warm winters

Until about thirty years ago, we could still speak of normal winters, with plenty of snow, the cold we needed and an appropriate duration. Now there is very little snow, low temperatures have almost disappeared, and winters are shorter and more like autumn. Influxes of warm air begin as early as late December or January, stimulating growth that then becomes more vulnerable to the late frosts discussed above.

The lack of snow is a particular problem. Only slowly melting snow can provide sufficient moisture deep in the soil, which has a major influence on plants' nectar secretion. Rain cannot replace snow without soil cultivation—and not entirely even then. Acacia and lime woodland is not, and cannot be, cultivated; most rainwater ends up in rivers. There are no short-term solutions to these problems, but we must recognise them and take them into account when planning colony movements.

Changes in the biology of bee diseases and parasites

Climate change has brought not only milder winters but also later winter onset and an earlier return of spring temperatures. Queens therefore continue laying late into autumn and resume earlier in spring, giving varroa a full two additional months in which to reproduce.

The problem becomes particularly acute in autumn. Even if we treat at the standard post-flow times in July and August—which we must continue to do—there is still more than enough time before brood rearing ends for varroa to reproduce during the extended autumn and to invade our apiaries from those of irresponsible beekeepers. German researchers established years ago that as many as 1,000 mites can enter a hive in late

summer and autumn even after timely, successful treatment in August. This reinvasion has catastrophic consequences for the colony. Our varroa control strategy must therefore change, with much closer attention paid to mite levels.

The situation with nosemosis is similar. Around 2000, a different causative organism, Nosema ceranae, arrived in our region and replaced the previous species, Nosema apis. Climate change was responsible for this shift: the new organism is more sensitive to cold and would never have spread here without warming. It also develops and causes damage throughout the season, even during hot summers. If we still had the colder winters of the past, the infectious pressure from nosemosis would be lower. Spores die after 24 hours at –20°C, so the infectivity of spores on comb outside the winter cluster would be considerably reduced.

Another dangerous bee parasite is now approaching, again aided by climate change and the dramatic shortening—or, in some regions, complete disappearance—of the broodless period. This is tropilaelaps (Tropilaelaps clareae), which appears to be even more dangerous than varroa. Initial reports suggest that only formic acid is effective against it, so we shall have to learn to use it. The Asian hornet (Vespa velutina) and small hive beetle (Aethina tumida) are also on our doorstep. Their initial introduction was accidental, but climate change is enabling their spread.

We therefore need to familiarise ourselves with all these threats in good time, so that we are ready when they arrive.

Changes in bee nutrition

Climate change is profoundly altering bee nutrition through its complex effects on vegetation, accompanied by shortages of nectar and pollen.

The greatest impact is on pollen, and it began a long time ago. Pollen supplies fatty acids, essential amino acids, proteins and other nutrients needed to rear healthy bees and develop their vital glands. An increasingly dry climate reduces both pollen quality and quantity, weakening bees' immune systems, increasing their susceptibility to disease and shortening their lives.

An analysis of historical pollen samples in the United States showed that pollen protein content has been declining since 1850, when atmospheric carbon dioxide began to increase as a result of the Industrial Revolution. The most marked changes were observed in 1960, when carbon dioxide levels began rising dramatically. When plants are exposed to high atmospheric carbon dioxide levels—in a polytunnel, for example, but now outdoors as well—they produce more starch and sugar and less protein. Thus, even when pollen appears plentiful, protein may still be in short supply.

We should therefore consider providing suitable pollen substitutes supported by scientific research and, where necessary, adapting the legislation accordingly.

Research on bumblebees has shown that they build smaller nests under temperature stress and when high-quality food is scarce, but that supplying highly nutritious food mitigates heat stress.

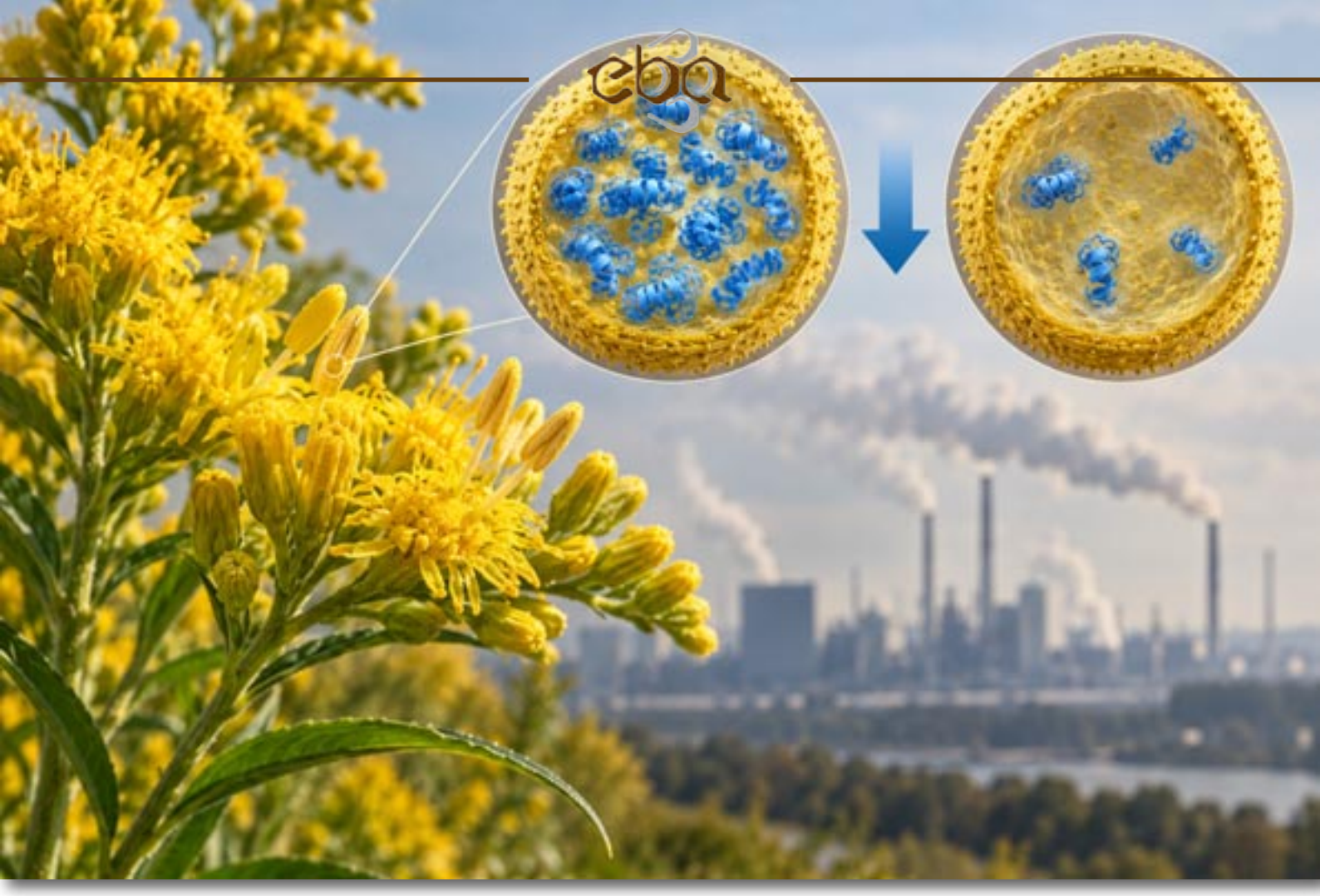
In an experiment in Iowa, USA, bees exposed to high temperatures and drought preferred relatively drought-resistant plants. It is therefore reasonable to expect these plants to become the main food sources in areas growing increasingly dry. We already see this during the growing season in Serbia, where bees visit creeping thistle, other thistles and similar plants in large numbers.

Serious consideration should be given to planting white sweet clover wherever possible. Its honey-producing potential is almost equal to acacia's, and it continues secreting nectar even at 40°C. It can yield up to 500 kg of honey per hectare and up to 100 kg of pollen.

This does not make it an outstanding pollen plant, but its contribution is far from negligible. It is a biennial, establishing itself in the first year and flowering and producing nectar in the second.

The Institute for Forage Crops in Kruševac has developed an annual sweet clover, as has also been done in the United States. Its nectar and pollen yields remain to be seen.

High temperatures directly affect the amount of pollen plants produce, which is why Serbia now experiences pollen shortages during increasingly hot, dry summers. In borage (Borago



officinalis), also known in Serbian as borač or 'cucumber herb', for example, pollen mass has been observed to fall by 50% under high temperatures.

Global warming affects bees more adversely than cooling.

The phenomenon is known as entropic stress. In honey bee colonies, this is a complex form of chronic ecophysiological strain caused by climate change.

Rising temperatures, more frequent extreme weather events and disrupted plant phenology progressively disorganise biological processes within the hive and disrupt synchronisation between bees and their external environment—by as much as 90%. As a result, a large proportion of energy is no longer available for useful biological functions: some must be diverted into compensatory mechanisms intended to counteract the negative effects, although these never succeed completely.

This stress manifests itself in increased energy expenditure and metabolic demand, reduced adaptive efficiency, and greater colony vulnerability to parasites, pathogens and nutritional deficiencies.

Adapting beekeeping to climate change to make better use of forage

At first sight, overcoming the effects of climate change to make better use of bee forage seems an impossible task. Often, no solution is apparent: we cannot irrigate woodland and other uncultivated vegetation, protect it from frost and other hazards, or control climatic factors. Yet that is far from the whole truth. There are always options, with varying degrees of success depending on the season.

Rearing bees properly

Rearing bees well has never mattered more. Every 'minute' of a flow now counts, and at that moment we need a colony in peak condition, made up of bees reared to the highest standard. Poor-quality artificial feeds—sugar, maize and other syrups, and pollen substitutes—should be kept to a minimum and provided only when necessary.

This strategy will not cover these matters in detail. Information is plentiful in all the better books and, particularly in recent years, in Srpski pčelar. We shall simply set out the main objectives and explain why they must be pursued without compromise.

Bee quality comes first. A well-reared bee flies at lower temperatures, accesses nectar more effectively because of its longer proboscis, and brings in more honey because it is stronger and has a larger honey crop. Its glands are better developed, enabling it to process incoming nectar more efficiently, and so on. To produce such bees, we must do everything possible to provide the best and most natural diet during their development and avoid exhausting them with unnecessary work, while keeping them regularly occupied with tasks that discourage swarming.

It is also beneficial to overwinter colonies at somewhat higher elevations, moving them down when the early forage that supports spring build-up becomes available. German research indicates that colonies overwintered in the mountains conserve more energy, develop faster in spring and produce more honey over the year. Above all, lower temperatures reduce pointless flights when no forage is available. Such flights consume enormous amounts of energy, almost as though the bees were actually foraging: energy use in flight shows virtually no statistically significant difference between a bee with an empty crop and one with a full crop—14.1 mg versus 14.5 mg of honey per hour of flight.

During colony development, avoid practices that disrupt the natural age structure. The only acceptable intervention of this kind is to stimulate queen laying at the time when eggs must be laid for the bees that will receive nectar during the next flow. When bees are well reared and the natural age structure is maintained, even smaller colonies can produce respectable quantities of honey in a short time. This is the goal of modern beekeeping that helps counter the effects of climate change.

Climate change has brought more frequent droughts. Growing human demand for water has led to many springs being tapped for water supplies; many others dry up in summer, as do entire watercourses. Media reports suggest that even the once-mighty Euphrates is close to drying up completely, and similar reports about Italy's River Po have circulated for years. In such circumstances, bees may have no water within five or six kilometres of the apiary, making hygienic water stations necessary. However, if only one beekeeper provides one, bees from a wide area will gather there, creating ideal conditions for disease transmission. Water stations should be shaded, as standing water exposed to direct sunlight can reach astonishing temperatures.

As nature provides less nectar, fewer colonies should be kept at any one site—ideally 20–30, depending on the forage—with the next apiary at least 1.5 km away, preferably 2 km. Some 60–90% of bees forage within 1,000 metres of their hive, a further 10–20% range up to 1,500 metres, and only 5–10% travel beyond 2 km. Forage within a 1,000-metre radius therefore has the greatest influence on yield. This covers just over 314 hectares, more than enough for a substantial flow. The greater the distance between apiaries, the better.

The optimum distance from hive to forage is up to 800 metres for acacia, 1,000 metres for sunflower, 1,200 metres for lime and 700–1,200 metres for meadow forage. If bees must fly uphill, these optimum distances fall by about a third. If the wind blows from the forage towards the apiary, their range falls by 40–60%.

Never place an apiary within 1,500 metres of a lakeshore: water produces no nectar. Position it in the centre of the forage, with at least one kilometre of suitable vegetation in every direction. Do not leave colonies on the woodland edge, as some do, thereby depriving them of half their potential forage area. Beekeeper Jovica Petrović provided a striking example a few years ago with two apiaries on an acacia flow just 200 metres apart. One yielded around 20 kg per hive; the other yielded nothing. For the bees at the second site, those extra 200 metres were apparently too far to find the flow.

When laying out an apiary, pay particular attention to preventing drifting between hives. Drifting is an effective means of spreading varroa and other diseases, and it also interferes with productive foraging. Detailed Russian research found that colonies formed by uniting two or three colonies overwintered less successfully than equally strong colonies descended from a single queen.



Colonies containing offspring of several queens were more restless, consumed more food and accumulated more faeces in their intestines. Everything suggested that the bees did not 'get on' particularly well.

Research has also shown that substantial numbers of bees can enter colonies through natural drifting in summer, potentially creating the same intolerance and poorer performance. Pfeiffer and Crailsheim (1998) reported that, in natural habitats, 1–5% of bees were not offspring of the resident queen, compared with 13–43% in 'modern' apiaries. In summer, the figures were 22 ± 3% at row ends and 42 ± 6% in the middle; in autumn, 13 ± 1% at row ends and 39 ± 4% in the middle.

Other research found that more bees drifted from inner hives to those at row ends than in the opposite direction (Jay, 1965). The old saying 'Beware of Greeks bearing gifts' therefore applies to bees as well.

Several methods can reduce drifting. Place hives or pallets at least 1.5–2 metres apart: the greater the spacing, the less drifting occurs. Choose sites with plenty of landmarks, such as shrubs and small trees, or provide shapes that bees are known to recognise. Circles, triangles and squares are particularly useful, as are rectangles, crosses, stars, pentagons and hexagons, in different sizes and in colours bees distinguish most readily: blue, green, yellow and violet. Old pallets, cheaply obtained or even free, are also often used, with their boards painted in different colours.

Preventing drifting is especially important when selecting breeder queens for queen rearing. Unless the hives are sufficiently far apart, drifting will give a wholly misleading picture of the yields and disease status of each colony under assessment.

The crucial role of SMS hive scales in making the most of a flow

SMS hive scales have already revolutionised the way we use honey flows. In an era of climate change, they acquire additional important roles. These rely on capabilities the scales already possess, but which have now become crucial. Inter-

net-connected scales are also being developed, using satellite connectivity to provide coverage everywhere, including places with no mobile signal.

Their use will be almost identical, but they will be particularly valuable because they can cover areas currently without reception—areas increasingly attractive to beekeepers as the climate changes.

The need for SMS scales is growing. First, we need a hive on a scale at as many sites as possible. At least a third of these scales should be at previously untested sites, encouraging the search for better locations. A site can only be judged good after performing well in both good and poor years: one good year may mean very little.

Second, SMS scales are more important than ever in determining precisely when colonies should be moved. With increasingly variable weather, this is critical.

Arrive just one day late to a flow that brings in, say, 8 kg of nectar that day, and rain may begin the following day and ruin the flow. A delay of a single day then costs both bees and beekeeper those 8 kg of nectar.

A beekeeper should have a scale at the current apiary and at every potential destination. The timing of a move is relatively easy to establish. At the current site, daily intake naturally rises to a certain level, usually around the middle of the flow, and then begins to fall. At the potential next site, intake begins rising at that point.

The right time to move is the evening of the day when the declining intake at the current site is approximately equal to the rising intake at the next site.

On the following day, intake at the old site will be lower—by, say, 2.5 kg during an acacia flow—while intake at the new site will be 2.5 kg higher than the day before. If we fail to move that evening, the next day's total opportunity loss will be 5 kg per hive: the difference in intake between the two sites.

Modern beekeeping therefore has no room for guesswork. We must treat every good day for honey intake as though it were the last. Thinking this way reduces the scope for mistakes, because every mistake here is expensive, particularly a delay in moving colonies.

Monitoring the weather forecast

SMS scales are an enormous help, but they must be used alongside good weather forecasts. Ten-day forecasts, such as Yr, and 14-day forecasts, such as meteoblue, are now commonly used. They are naturally not precise enough at longer ranges, but are updated daily and become more accurate as the date approaches. They should be checked every day so that significant changes are spotted early enough to plan accordingly.

The website www.freemeteo.rs is also particularly useful. Alongside forecasts, it provides historical data for the location of interest. You can discover which years recorded the highest and lowest temperatures on a given date since records began, and what those temperatures were, as well as maximum rainfall and highest and lowest wind speeds. It also offers historical overviews by day and month.

For temperature, favour sites where the forecast difference between daytime and night-time temperatures is as small as possible. The plant's optimum daytime temperature for nectar secretion should also last for as much of the day as possible. Modern forecasts provide hourly values for all parameters, making such sites easy to identify.

Do not look only at temperature. Relative humidity forecasts are essential for good nectar secretion, as are wind forecasts: strong winds dry out nectar, make it physically harder for bees to collect it and reduce departures from the hive.

Relative humidity has an enormous effect on honey yields. Dry air dries out nectar and reduces its volume. Rainfall, however, affects humidity only in the short term, not over longer periods. Humidity primarily depends on the air mass present, which may be moist or dry. Its forecast is therefore extremely important. Never move colonies to a site where humidity is expected to fall below 40%; ideally, it should be above 60%.

The lower the humidity, the more foraging shifts to the morning. Humidity is generally highest around 05.00. Later in the day, intake recorded by the scale falls and often becomes negative. Atmospheric humidity has a clear effect



on nectar secretion, although a much smaller one than soil moisture. Below 40% humidity, nectar dries faster than it is produced. At humidity levels of up to 45%, yields are reduced by 20–60%. Lime, sunflower and clover close their flowers when humidity is low.

Humidity also influences flower temperature. When humidity is low, stronger evaporation cools the flower. When it is high, insufficient cooling can cause overheating, again reducing nectar secretion. The optimum relative humidity is therefore considered to be 45–65%. Dry wind is disastrous: plants lose water, water flow to the flowers decreases and less nectar is produced. Under these conditions, relative humidity is usually a disastrously low 25–35%.

The optimum humidity for nectar secretion is 45–60% for acacia, 50–65% for lime, 40–55% for sunflower and 55–75% for oilseed rape.

Forecasts also give daily wind speeds for the coming ten or 14 days, allowing windy sites to be avoided. As a broad guide, effects on scale readings become apparent above 5 m/s, and flows decline markedly above 10 m/s, although other climatic factors also play a part. As the old beekeeping saying goes, ‘The wind blows the honey out of the hives.’

In stronger winds, plants lose moisture faster through leaves and flowers. They protect themselves by closing their stomata, reducing water flow to the flowers and secreting less nectar. Strong winds also dry nectar within the flower.

Even if secretion remains normal, there may be nothing left for the bees. This is particularly apparent during acacia flows.

Most plants have a narrow optimum temperature range for nectar secretion: approximately 22–28°C for acacia, 20–28°C for lime,

24–32°C for sunflower and 16–22°C for oilseed rape. Secretion is much poorer below 17°C or above 29°C for acacia, below 17°C or above 30°C for lime, below 20°C or above 34°C for sunflower, and below 12°C or above 26°C for oilseed rape. Indeed, as soon as air temperature leaves the optimum range, yields fall by 30–60%. Cherry plum, also known locally as džanarika or piskavac, is a plant that secretes nectar even at 4°C, when bees do not leave the hive.

Wind cools flowers, taking them outside their optimum range and reducing nectar production. Above 25 km/h, bee flight decreases; at 35–40 km/h, substantial flight activity virtually ceases. Some bees remain inside in strong winds. Those foraging expend much more energy in flight, making nectar collection less productive.

Acacia is the most wind-sensitive. Even a moderate but persistent wind over two or three days can destroy the flow despite optimum temperatures. It performs best below 10 km/h. At 20 km/h, yields fall by as much as 30–50%; at 30 km/h, by up to 80%. Above 30 km/h, they may fall to zero.

Lime is moderately sensitive because its flowers are deeper, but after three or four days of wind the nectar supply declines.

Winds up to 15 km/h have almost no effect.

At 25 km/h, yields fall by around 30%; at 35 km/h, by 60–80%. Above 35 km/h, they may fall to zero.

Sunflower nectar also lies deeper within the flower, but winds across open plains dry the soil more readily and thus reduce secretion. In already dry years, wind can be a major reason for poor sunflower yields.

Sunflower withstands winds up to 20 km/h reasonably well. At 30 km/h, however, yields fall by 20–40% if the soil is moist and by 50–70% if drought has dried it out. At 40 km/h, yields fall by 70–90%; above that, they may reach zero. In wet years, sunflower can tolerate winds up to 35 km/h quite well.

Oilseed rape is sensitive to wind in terms of nectar production. Wind cools the flowers and reduces secretion, but there is also a mechanical effect: shaking the flowers accelerates water loss. Winds up to 10 km/h are not a problem. At 20 km/h, yields fall by 20–40%; at 30 km/h, by 60–80%. Above 30 km/h, they may fall to zero.

In general, a persistent moderate wind of 20–30 km/h is worse for nectar production than a single storm gust.

Some protection can be achieved by placing apiaries in sheltered positions beside woodland or in hollows, with hives aligned east–west to counter southerly and north-westerly winds. Together, these measures can increase yields by 10–40%.

Shelterbelts are extremely useful. Deciduous trees 20–30 metres from the apiary reduce wind speeds by 30–70%. The whole forage area cannot, of course, be protected this way, but such terrain should be considered where available: choosing the site alone can substantially improve yields.

The UV index also deserves attention: the lower it is, the greater the chance of higher intake on the scale. The index measures the intensity of ultraviolet radiation from the Sun. At 8–10, for example, human skin can be damaged within 15–25 minutes, and such conditions are naturally unwelcome for plants too. At extreme values above 11, effects are much greater, and plants may dramatically reduce nectar secretion.

Plants are much less sensitive to UV than humans, and moderate exposure can be beneficial: it strengthens pigmentation and fruit colour, increases antioxidant content and promotes resistance to pathogens. At an index of 8–11 or above, however, photosynthesis may be inhibited, plant-cell DNA damaged, and leaves—particularly young leaves—affected by spotting and necrosis. Under strong sunlight, plants suffer primarily from high temperatures rather than UV itself: leaf temperatures above 40°C already cause damage. Extreme UV merely accelerates the process. Plants growing in calcium-rich soil are more resistant because calcium strengthens cell walls and reduces damage.

Acacia has high UV tolerance. An index up to 10 does not trouble it and can even enhance photosynthesis. Its leaves have a substantial waxy coating that provides natural UV protection. Non-extreme UV also increases nectar secretion. Air temperatures above 45°C, however, are highly detrimental: flowers wilt faster and nectar dries out.

Lime has moderate UV tolerance and is somewhat more sensitive than acacia. The great-

est damage occurs when extreme UV combines with drought and high temperatures, reducing nectar quantity. Moderate UV, at an index of 6–8, improves nectar production.

Sunflower has high UV tolerance. Even an index above 11 poses no problem if the soil contains sufficient moisture. Problems arise when extremely high UV coincides with dry soil: photosynthesis declines, flowering is shortened and nectar secretion may stop altogether.

Oilseed rape has the lowest UV tolerance. Nevertheless, in Serbia, the UV index is never high enough to cause serious damage on its own. The main problems affecting rape flows are overheating flowers, April drought, high night-time temperatures and wind stress. UV harms rape only when extreme exposure coincides with drought, causing flowers to deteriorate rapidly and secrete less nectar.

Check recent rainfall at potential destinations too. Two or three rainy days in the preceding seven days indicate optimum soil moisture. With only zero or one rainy day over that period, nectar production may be reduced by as much as 40–80%.

In every case, monitor all four forecast factors: temperature, relative humidity, wind and UV radiation. Two rules apply. The first is 'two out of four': if two factors are poor, yields will be low. If three out of four are poor, there is usually no yield at all. If only one is poor, bees will bring in a reasonable amount of nectar. If all four are optimal, memorable days lie ahead.

High temperatures combined with low humidity and the resulting shortage of pollen also reduce brood rearing. For example, colonies in AŽ hives had only one frame of brood on 27 July 2007. This compromises subsequent flows, because poorly fed brood develops into bees of insufficient quality. Night-time temperatures around 30°C—tropical nights—are also becoming more frequent. They make colony transport harder because bees are more difficult to confine, while increasing the risk of suffocation and comb collapse in transit.

With high summer temperatures, hive paint colours require greater care. Black or other dark colours can make hive walls as much as 20–30°C hotter than those of light-coloured hives. Choose paints with a high Light Reflectance Value, or LRV. This ranges from 0 to 100 and expresses the percentage of light reflected. White has an LRV of 80–95; pale yellow or pale green, 60–75; mid-grey, 40–50; dark blue or dark green, 10–30; and black, 0–5. Choose an LRV of at least 60, preferably 75.

How beekeepers can shorten the extended growing season

Climate change brings earlier springs, progressively shorter forage periods and longer autumns. In some years, the growing season is already up to two months longer than usual. This extra time brings no new flows; on the contrary, existing flows are becoming shorter as summers grow hotter. Bees therefore needlessly consume stores intended for winter. Varroa also reproduces for longer and causes more damage, forcing beekeepers to rethink control. The old treatment regime is no longer sufficient: both the timing and, where necessary, the number of treatments must change.

At present, there is only one way for a beekeeper to shorten the effective growing season by as much as a month, perhaps more. What appears miraculous is actually very simple once the idea occurs to you: move colonies to high elevations, say above 1,300 metres, immediately after the main flows end.

This can provide pollen still available at altitude when valley vegetation has been scorched by the sun. The cooler high-altitude climate also prompts bees to prepare for winter earlier. Where no late flows are available, this is an ideal way to shorten the season. With pollen available, long-lived winter bees can develop to the highest possible standard. The earlier end to the growing season allows them to enter winter in full vigour, without the wear caused by unnecessarily rearing excessive amounts of brood.

Improving bee forage

Planting nectar-producing vegetation appears to be one of the simplest solutions and deserves intensive effort. Yet there still seems to be neither the willingness nor the funding to make it happen.



When planting spring-flowering species, choose those with more cold-resistant flowers. The apple cultivar Melrose, for example, can withstand very low temperatures, down to –4°C, at the pink-bud stage.

Establishing woodland with summer-flowering nectar trees—Japanese pagoda tree, bee-bee tree, lime, sweet chestnut and others—would certainly be an effective solution.

Japanese pagoda tree and bee-bee tree produce abundant nectar even at exceptionally high air temperatures.

Beekeepers generally cannot afford to plant such trees.

Over the years, SPOS has repeatedly tried to persuade the state to undertake this kind of afforestation, but neither the willingness nor the money has been forthcoming.

Our greatest success came when Agriculture Minister Branislav Nedimović, following discussions with SPOS, invited all beekeepers interested in tree planting to come forward, with the cost of saplings to be covered.

Believe it or not, not a single person responded.

Conclusion

Alongside all the measures described above, greater state support is essential to counter the effects of climate change on beekeeping. Society needs beekeeping more than beekeepers themselves do, as demonstrated by the large numbers abandoning the activity because of low honey prices. Those prices are driven by unfair competition: adulterated products account for 80% of the honey on retail shelves in Serbia and worldwide. Despite all our efforts, the state has so far shown no sign of beginning to address this major problem.

Bees have a negligible negative environmental impact, yet make an enormous contribution to biodiversity conservation. The value of that benefit is more than thirty times the value of the bee products obtained. A life cycle assessment, or LCA—an assessment of a product's negative environmental impact from production to its 'disappearance', meaning consumption—conducted in Slovenia found that producing one kilogram of honey generates 1.08 kg of carbon dioxide. This excludes colony transport, as 90% of Slovenian

beekeepers do not move their bees. For comparison, a car with a EURO 4 engine emits 160–165 g of carbon dioxide per kilometre; the figures are around 145–150 g for EURO 5 and 125–135 g for EURO 6. One kilogram of carbon dioxide occupies approximately 0.5 cubic metres.

By contrast, producing one kilogram of beef generates as much as 60 kg of carbon dioxide; one kilogram of chocolate, 19 kg; and one kilogram of cane sugar, 3 kg. An American LCA put the figure for one kilogram of honey at 0.67–0.92 kg of carbon dioxide. In Italy, estimates ranged from 0.44 to 3.18 kg, depending on the year and the management system. Another Italian study found 1.4–2.2 kg for migratory beekeeping and 0.38–0.48 kg for stationary beekeeping. The figure used in the EU is 0.75 kg, probably the closest estimate for Serbia: CarbonCloud product report.

This is another reason to value honey as a food of the future. Together with the overriding benefits of pollination, it places bees among humanity's highest priorities.

The bee has not been declared the most important living creature on the planet without good reason. All that remains is for decision-makers to understand this too.

To make that happen, we beekeepers must present the case for beekeeping wherever and whenever we can, using sound arguments. Beekeepers have become the bees' only guardians: without us, varroa alone would wipe them out in less than a year and a half, quite apart from the other threats to their health and survival. These are the reasons why beekeepers must be supported, so that they can respond more effectively to climate change and, in doing so, safeguard food production in Serbia.

Author of the Strategy

Dr Rodoljub Živadinović, Specialist Physician
President of the Serbian Federation of Beekeeping Organisations (SPOS)
EBA Vice President for promotion and international cooperation
Member of the Executive Board of the EBA

Contributors

Srđan Stanojević
Commercial organic beekeeper

Goran Tomić
Commercial beekeeper

Vlastimir Spasić, Engineer
Editor-in-Chief, Srpski pčelar (The Serbian Beekeeper)





PESTICIDES THAT DO NOT KILL BEES IMMEDIATELY

WHAT HAPPENS WHEN PESTICIDES ACT TOGETHER?

When a beekeeper finds no dead bees in front of the hive after a crop has been sprayed, that is good news. It does not, however, prove that the treatment has had no effect on the colony.

A bee may survive exposure to a plant protection product yet learn less effectively, live for a shorter time or become more susceptible to the next substance it encounters.

These are known as *sublethal effects*: the dose tested does not cause immediate death, but it may alter functions essential to the bee and the colony.

Pesticide synergy occurs when two substances acting together produce a toxic effect greater than would be expected from adding their individual effects.

We first heard a deeply alarming account of this problem, whose full scale is difficult even to envisage, let alone quantify, at the 2015 Apimondia Congress in Daejeon, South Korea.

We learnt that when two pesticides enter a hive—chlorothalonil from agricultural treatments and coumaphos from Varroa treatment—doses that have little effect individually can act together to produce mortality in four-day-old larvae five

times greater than the sum of the effects of the same doses applied separately.

The researchers also tested chlorothalonil with fluvalinate. In four-day-old larvae, the combined toxicity was seven times greater than the sum of the effects of the two substances applied separately.

Those findings caused considerable concern in the beekeeping community. Under existing legal frameworks, poisoning of this kind is exceptionally difficult to establish, let alone use as the basis for compensation.

Chlorothalonil was an active ingredient in products such as Dakoflo 720 SC and Bravo 720 SC, which were also used on apples and sour cherries. The experimental findings must **not** be described as results obtained with Dakoflo or Bravo.

They illustrate why assessments of immediate mortality need to be accompanied by studies of longer-term outcomes in bees.

A major analysis published in 2022 also showed how much evidence is missing. For many of the pesticides examined, research on sublethal effects remains insufficient, while evidence on their combined effects is even scarcer.

It is regrettable that research in this area remains limited, even as new pesticides continue to appear and older ones have yet to be studied adequately.

In the field, a bee does not encounter just one active ingredient. It may pick up residues from a treatment applied to an orchard or crop while visiting flowers, bring contaminated nectar or pollen back to the hive, and then encounter a Varroa treatment within the colony. The presence of two substances does not, by itself, demonstrate synergy. To use that term, we must show that their combined effect exceeds what would be expected from their individual effects.

A fungicide can affect a colony without leaving dead bees at the hive entrance

Fungicides offer a good example of why immediate mortality is an inadequate measure on its own.



In a US study, honey bee colonies were fed pollen containing Pristine, a fungicide formulated with boscalid and pyraclostrobin. Under the conditions tested, consumption was associated with shorter worker lifespan and smaller colony populations.

The effect increased with dose and was also observed at the lowest concentration tested.

A separate study using the same product found poorer performance in an olfactory associative learning test, in which bees learnt to associate an odour with a reward.

These are findings for a particular product under particular experimental conditions. They do not mean that every fungicide produces the same effects. This issue is relevant to beekeepers in Serbia. Boscalid and pyraclostrobin are also the active ingredients in Signum, a product listed by the Serbian Plant Protection Directorate.

The manufacturer recommends its use against brown rot blossom blight in stone fruit



during flowering, including in plums, and describes it on its website as safe for bees.

Signum and the Pristine formulation used in the studies do not, however, contain the two active ingredients in the same proportions.

Results obtained with Pristine must therefore **not** be presented as though Signum had been tested.

They show why longer-term outcomes in bees should be examined alongside immediate mortality.

Consider a flowering plum orchard, the bees visiting its blossom and an apiary nearby. Applying a fungicide at that time creates a genuine possibility of bee exposure.

Whether exposure actually occurs, and at what level, depends on the treatment and the residues the bees collect. Without measuring those residues and testing the relevant doses, we cannot claim that a particular application weakened a colony.

When one substance amplifies the effect of another

Synergy has been demonstrated experimentally for certain combinations.

In 2019, Tosi and Nieh investigated flupyradifurone and the fungicide propiconazole. In their study, the combination increased mortality and behavioural disturbances, including poor coordination, hyperactivity and lethargy.

The authors also found differences in susceptibility: foragers were more sensitive than in-hive bees, and the effects varied with the season.

Flupyradifurone is the active ingredient in Sivanto Prime, which appears on the Serbian list of plant protection products. That does not establish that bees in Serbian apiaries have been exposed to Sivanto Prime and propiconazole at the same time.

A particularly interesting 2024 study examined larvae of the Carniolan honey bee, *Apis mellifera carnica*.

The researchers tested acetamiprid alone, a fungicide mixture containing boscalid and dimoxystrobin, and the two treatments together in larval food.

At the lower concentrations tested, the individual treatments did not produce the same adverse outcome as the combination. The authors reported a synergistic adverse effect on the survival of adult bees that developed from the exposed larvae.

According to the Serbian Plant Protection Directorate's list, products containing acetamiprid include Mospilan 20 SG and Tonus.



These trade names are given to help beekeepers recognise the active ingredient. The study did **not** test a mixture of Mospilan and Signum.

Moreover, Signum contains **pyraclostrobin**, whereas the study tested **dimoxystrobin**.

Another experiment shows why the precise combination matters.

In a study of larvae, chlorantraniliprole alone did not increase mortality relative to the control, but it did so when combined with propiconazole or iprodione.

Chlorantraniliprole combined with propiconazole was also highly toxic to adult workers in a contact-exposure test.

At the same time, not every combination examined in that study produced an enhanced effect.

Chlorantraniliprole is found in products on the Serbian list, including Coragen 20 SC. The findings described above came from experiments involving products used in Californian almond orchards; they do not establish the same degree of risk in Serbian orchards.

What if a Varroa treatment is involved as well?

A beekeeper may reasonably ask whether a bee that has visited sprayed flowers could also be exposed to a substance used against Varroa.

That is certainly possible, but its significance depends on the exact combination, dose and timing of exposure. Tau-fluvalinate provides a useful example for identifying an active ingredient in products used in different settings.

It is present in the insecticide Mavrik. Among its listed uses, the manufacturer includes oilseed rape at the beginning of flowering, with a warning not to apply it while bees are flying.

The same active ingredient was present in Varotom, a veterinary medicinal product used against Varroa when it was registered. Over the past decades, a number of registered and unregistered products containing this active ingredient have also been available.

The official Varotom instructions specified when and how it should be used and stated that

it should not be applied during a nectar flow or while honey supers were on the hive.

The use of the same active ingredient in a field crop and in an apiary is therefore a reason to investigate exposure pathways carefully.

It does not prove that a bee received both doses simultaneously when the products were used according to their instructions. Nor can simultaneous exposure be ruled out; if it occurred, it could have increased the bee's overall exposure to the pesticide.

A 2019 analysis of laboratory studies found that combinations of sterol-biosynthesis-inhibiting fungicides with insecticides or acaricides were frequent among the reported synergistic effects.

One possible explanation is interference with enzymes involved in breaking down certain substances in the bee's body.

The authors stressed, however, that assessing risk in a working apiary also requires evidence of how often these substances actually occur together and at what concentrations.

The example of "a fungicide applied to plum trees and Varroa strips in the hive" therefore needs to be read precisely. It is a question that warrants investigation.

Without an appropriate experiment, there is no basis for claiming that synergy between Signum and Varotom has been demonstrated.



Herbicides may have indirect effects too

Glyphosate—found in products such as Roundup Flash and Glifol K, among others listed in Serbia—is an example of an effect that cannot be reduced to the question, "How many bees died immediately?"

In a 2018 experiment, Motta and colleagues showed that glyphosate exposure altered the composition of the honey bee gut microbiota.

Under experimental conditions, exposed bees were more susceptible to the bacterial infection tested.

This does not show that every herbicide application near an apiary causes disease in a colony.

It shows that a risk assessment concerned only with immediate mortality may miss another biological pathway through which exposure can affect bees.

Synergy is not the rule for every mixture

Scientific findings require care on this point.

A 2019 analysis of laboratory data found a substantial proportion of synergistic outcomes among the combinations for which data suitable for its model were available.

A different analysis, published in 2022, concluded that the acute toxicity of most mixtures it examined in adult bees was approximately additive, with relatively few large departures from that expectation.

These results cannot be converted into a simple percentage giving the likelihood of synergy in any particular apiary. The studies used dif-



ferent datasets and different criteria for assessing departures from additivity.

The narrower, more reliable conclusion matters most: synergy occurs with certain combinations, but it must not be assumed simply because two substances are present.

For a beekeeper, the useful questions are: Which active ingredient was present? In which product? On which crop? At what stage of flowering? And how did the timing relate to treatment of the hive?

For a researcher, there is another question: What dose was actually measured in the pollen, nectar, bee and hive?

Only then can laboratory evidence of possible synergy be connected to conditions in the field.

Conclusion

The absence of dead bees in front of a hive does not rule out sublethal effects.

In research studies, certain fungicides have affected bee longevity, colony population or learning. Synergy has also been demonstrated for specific combinations of fungicides and insecticides.

Responsible bee protection therefore requires adherence to each product's instructions, careful planning of treatments around flowering, and research into actual, simultaneous exposure in our apiaries.

MD Rodoljub Živadinović

Epidemiology specialist, apitherapist
apikult@gmail.com

President of the Serbian Federation of Beekeeping Organization's

EBA Vice-President
for promotion and international cooperation



References

1. Tosi, S., et al. (2022). "Lethal, sublethal, and combined effects of pesticides on bees: A meta-analysis and new risk assessment tools." *Science of the Total Environment*, 844, 156857. DOI: 10.1016/j.scitotenv.2022.156857.

2. Carnesecchi, E., et al. (2019). "Investigating combined toxicity of binary mixtures in bees." *Environment International*, 133, 105256. DOI: 10.1016/j.envint.2019.105256.

3. Tosi, S., and Nieh, J. C. (2019). "Lethal and sublethal synergistic effects of a new systemic pesticide, flupyradifurone, on honeybees." *Proceedings of the Royal Society B*, 286, 20190433. DOI: 10.1098/rspb.2019.0433.

4. Fisher, A., et al. (2021). "Colony field test reveals dramatically higher toxicity of a widely-used mito-toxic fungicide on honey bees." *Environmental Pollution*, 269, 115964. DOI: 10.1016/j.envpol.2020.115964.

5. "A common fungicide, Pristine®, impairs olfactory associative learning performance in honey bees" (2021). *Environmental Pollution*. DOI: 10.1016/j.envpol.2021.117720.

6. "The neonicotinoid acetamiprid reduces larval and adult survival in honeybees and interacts with a fungicide mixture" (2024). *Environmental Pollution*. DOI: 10.1016/j.envpol.2024.124643.

7. "Combined Toxicity of Insecticides and Fungicides Applied to California Almond Orchards to Honey Bee Larvae and Adults" (2019). A study of larvae and adult bees exposed to individual products and their combinations.

8. Motta, E. V. S., et al. (2018). "Glyphosate perturbs the gut microbiota of honey bees." *PNAS*, 115, 10305–10310. DOI: 10.1073/pnas.1803880115.

9. Zhu, W., Schmehl, D. R., Mullin, C. A., and Frazier, J. L. "Four Common Pesticides, Their Mixtures and a Formulation Solvent in the Hive Environment Have High Oral Toxicity to Honey Bee Larvae." (2014) *PLOS ONE*. DOI: 10.1371/journal.pone.0077547.



TROPILAELAPS MERCEDESAE IS AN EMERGING EMERGENCY FOR EUROPEAN APICULTURE

Tropilaelaps mercedesae hosts and distribution

Tropilaelaps mercedesae is one of the four species that have been described: T. clareae, T. koenigerum, T. mercedesae and T. thaï.

Originally, each species parasitized the giant honey bees Apis dorsata and Apis laboriosa but only T. mercedesae and T. clareae have spilled over to A. mellifera and in rare observations to A. cerana (Delfinado-Baker & Baker, 1982). It was believed that these mites are restricted to tropical and sub-tropical zones that overlap with their native host range. However, recent introductions of T. mercedesae into temperate climatic conditions clearly indicates an ability of the mite to adapt to variable climatic conditions and reproduce effectively on Apis mellifera brood (Esmaeily et al, 2026; Tokash et al, 2026; Williams et al, 2026).

In Asia, A. mellifera has been recorded to be host for T. mercedesae in Nepal, Myanmar, South Korea, Papua New Guinea, India, China, Thailand, Indonesia, Vietnam, Philippines, Pakistan, Uzbekistan. In Europe, first reports came from Russia (Brandorf et al, 2024; Joharchi and Stolbova 2024) and Georgia (Janashia et al, 2024). The most recent detection was in Türkiye (WOAH- WAHIS Event 7792 report, 2026) while there are suspicions for Tajikistan, Iran and Azerbaijan. (Fig. 1).

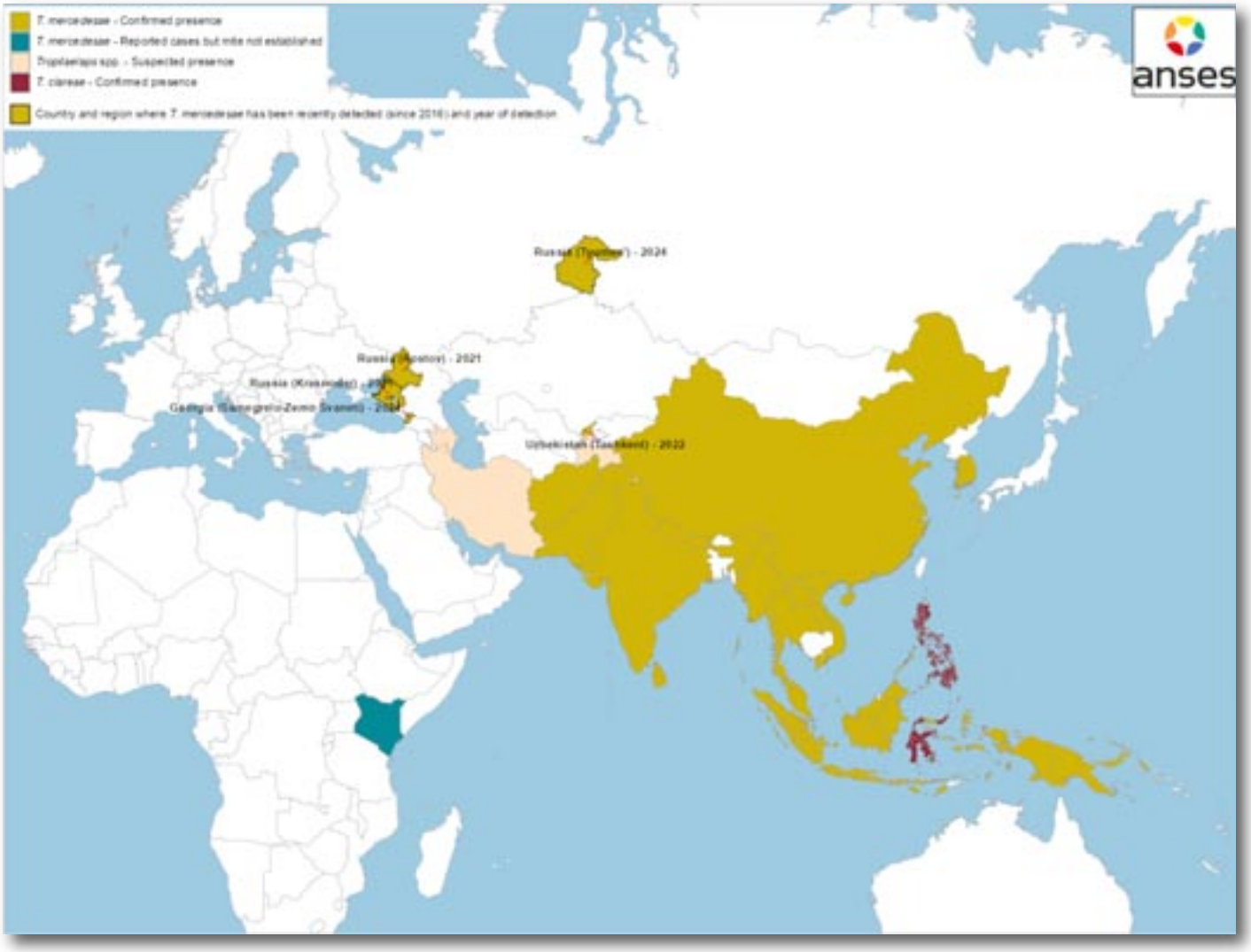


Figure 1. Spread of Tropilaelaps mercedesae till March 2025 (from ANSES)

Similarities and differences between T. mercedesae and Varroa destructor

Tropilaelpas mite has similarities as well as differences with Varroa mite (Gill et al, 2024a; Esmaeily et al, 2026; Williams et, 2026); it is smaller and lighter in colour and vertically elongated compared to Varroa (Fig.2). They both parasitise honey bee brood, and transmit viruses, however, Tropilaelaps mite spend very little time on adult bees, is moving fast along the edges of the open cells, it starts to reproduce very quickly inside the capped cells, with almost one egg every 24 hours. Furthermore, Tropilaelaps mites do not need to mate in order to be fertile, and they can mate even outside of the brood cells. This fast reproduction and the cryptic behaviour inside the capped brood is what makes the Tropilaelaps a more serious and damaging mite compared to Varroa. Considering the severity of the parasitism and the fast spread, Tropilaelaps mite is obviously an emerging emergency for Apiculture in Europe.

Furthermore, a big difference between Tropilaelaps and Varroa lays on their ability to survive on adult bees, and in colonies without brood. It is well known that Varroa mites can survive on adult bees for long periods (due to their feeding behaviour), but we are not sure for how long Tropilaelaps mites can survive. There are different opinions till now (from 4-5 days till 2 weeks), and



Figure 2. Ventral and dorsal view of Tropilaelaps and Varroa mites (Photo: F. Hatjina)

the scientists working with Tropilaelaps are trying to determine exactly how it feeds on adult bees, or if it is possible to feed also on dead bees, dead brood or any other host. For sure, Tropilaelaps can survive for longer periods, than one week, and short winter breaks is not our 'natural solution' for the fight against it.

Detection methods for T. mercedesae

As already pointed out, Tropilaelaps mites do not stay on adult bees for long therefore, when brood is present, the methods used to detect Varroa mites and even estimate the infestation level, such as alcohol wash and powdered sugar shake, are not the most effective ones (Tokach et al, 2026). Other methods tested, were proven to be more efficient:

a) such as the sticky bottom board: placing a white sticky board or mesh floor insert is one of the most sensitive ways to catch falling mites, although it is laborious and requires patience and good vision.

b) the worker brood cell uncapping (using forceps or wax strips): manually uncapping worker brood cells or using the rapid brood de-

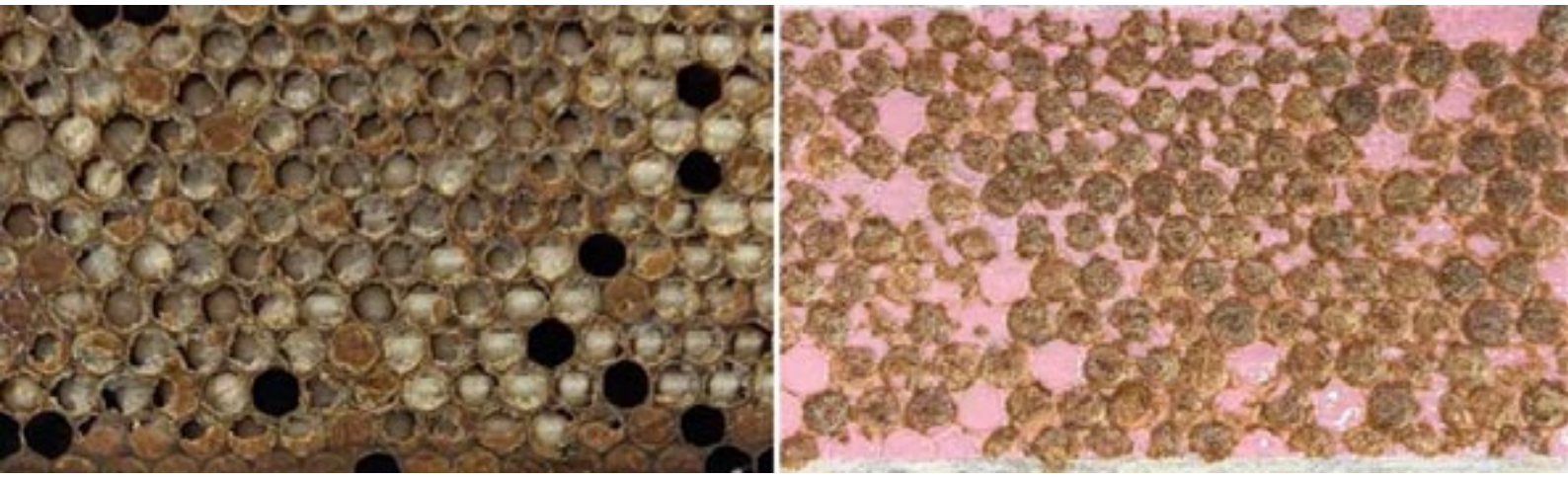


Figure 3. Application of wax strip to uncap the sealed brood (Photo: L. Charistos)

capping method (such as applying depilation wax strips to sealed brood) allows beekeepers to directly observe fast-moving mites emeging out of opened cells within the first 5 to 10 seconds (Uzunov et al, 2025) (Fig. 3).

c) the Brood Frame Bump Test: Banging a frame of open larvae over a collection tray or surface can dislodge mites, though it is less sensitive than sticky traps or decapping.

d) the Swabs (DNA) method: Swabbing hive surfaces or debris provides a highly sensitive molecular detection approach without needing to visually spot the mites, however, more expensive and requires a laboratory testing.

T. mercedesae and damages to honey bees

The damages that T. mercedesae causes to honey bees are associated with reduced weight and longevity. However, it can also transmit viruses (as DWV) (Dainat et al., 2009; Forsgren et al., 2009).

A common symptom is irregular brood patterns and the death of immature honey bees (Chantawannakul et al, 2018; Gao et al, 2021).

As in most of the cases, both, Varroa mites and Tropilaelaps mites are found together, the damages are probably higher, although the level of co-existence or competition of the two mites is unknown (Fig. 4).

Treatment methods against T. mercedesae

One could think that both mites, especially when they co-exist can be treated effectively at the same time.

Wrong and correct. Wrong, because to be effective against Tropilaelaps one needs to find them only on adult bees, therefore, a brood break is essential.

There is no way that you can treat them while there is brood in the colony.

Therefore, all our long treatments against Varroa during brood-right periods are ineffective against Tropilaelaps.

Wrong also because synthetic acaricides are not effective against Tropilaelaps, as they might be against Varroa (without mentioning resistance of Varroa to synthetic acaricides).

Correct, because Varroa treatments during brood-less periods could be also used to treat Tropilaelaps.

The most effective strategy shown till now combines a cultural brood break with the use of an organic acid like formic acid (Gill et al, 2024b; Tokash et al, 2024; Sankovitz et al, 2025).

Our latest developed strategy against Varroa in Europe, inducing a summer brood break and use of an organic acid (Buchler et al, 2020), is going to be proven also helpful for treatment of Tropilaelaps.



Figure 4. Two Tropilaelaps mites on an alive honey bee (Photo F. Hatjina)

Our future in Europe

In the European Union, which is free from this exotic parasite, the parasite is regulated by The World Organisation for Animal Health (WOAH) and in accordance with the Animal Health Law (EU Regulation 2016/429). According to WOAH, the presence of the mite must be communicated to WOAH and be notified. The most possible route of T. mercedesae introduction is the trade of honey bee queen or bee packages from an infected to a non-infected area. However, the trade of other honey bee products cannot be ruled out. Similarly, migratory beekeeping is regarded as one of the main routs of introduction. Just recently, WOAH published a Technical Statement as a recommendation for delegates (veterinary services) of the European region.

Apimondia Federation and its Bee health Commission, realising the importance and the risk of T. mercedesae spread, organised an informative webinar, already in March 2025, with the intention to spread the knowledge among scientists and beekeepers. Later, in November 2025, the Apimondia Working Group on Good Veterinary Practices in Apiculture published an alerting letter, and distributed it among its members, focusing on regulations and surveillance recommendations, also sent to WOAH. In August 2026, BEE-GUARDS project and Apimondia organised a 2 days training workshop in Kazakhstan, hosted by the Kazakh Research Institute of Animal Husbandry and Feed Production titled 'hands-on workshop on Tropilaelaps mite surveillance and control'. Recently, a workshop on "The Tropilaelaps Mite on Its Way to Europe" was organised by the Julius Maximilians-Univer-

sität Würzburg and Ss. Cyril and Methodius University in Skopje, where Apimondia Bee health Commission was also represented, and a PRESS RELEASE was published, along with a short communication aiming to be sent to local authorities in European Countries. Just recently Apimondia after consultation with WOAH also published an Urgent Call for Coordinated actins among authorities and beekeepers, which will be followed by a very specific Action Plan for surveillance.

The aim of all the above actions was:

★ To alert the beekeepers and competent authorities for the risk of introduction of T. mercedesae.

★ To raise awareness of the severity and the possible measures needed to be taken.

★ To highlight and urge the need of borders control or the trade of bee queens, bee packages and bee products.

★ To inform the relevant veterinary services and facilitate the implementation of regulations

★ To initiate active and passive surveillance programs, where they do not yet exist.

Apimondia and its Bee Health Commission has started working on a coordinated surveillance program, with beekeepers acting as Citizen Scientist, especially in Easter European Countries, aiming at a) educating beekeepers on detection methods and b) coordinate active monitoring, for early detections, which will be published soon.

For spreading knowledge among beekeepers and veterinarian, Apimondia's Bee Health Commission just published an open access Bee World article "Faster than Varroa: Tropilaelaps mercedesae as an Emerging Emergency for Global Apiculture", (Hatjina 2026) where several online educative sources are listed.

Dr. Fani Hatjina

Bee Health Scientific Commission of Apimondia

Department of Apiculture-Institute of Animal Science, ELGO DIMITRA, Greece

beehealth@apimondia.org



References

Brandorf, A., Ivoilova, M. M., Yañez, O., Neumann, P., & Soroker, V. (2024). First report of established mite populations, Tropilaelaps mercedesae, in Europe. Journal of Apicultural Research, 64(3), 842–844. https://doi.org/10.1080/00218839.2024.2343976

Büchler, R., Uzunov, A., Kovacic, M., Prešern, J., Pietropaoli, M., Hatjina, F., Pavlov, B., Charistos, L., Formato, G., Galarza, E., et al. (2020). Summer Brood Interruption as Integrated Management Strategy for Effective Varroa Control in Europe. J. Apic. Res. 59, 764–773. doi: 10.1080/00218839.2020.1793278 .

Chantawannakul, P., Ramsey, S., Khongphinitbunjong, K., & Phokasem, P. (2018). Tropilaelaps mite: an emerging threat to European honey bee. Current opinion in insect science, 26, 69-75.

Dainat, B., Ken, T., Berthoud, H., & Neumann, P. (2009). The ectoparasitic mite Tropilaelaps mercedesae (Acari, Laelapidae) as a vector of honeybee viruses. Insectes sociaux, 56(1), 40-43.

Delfinado-Baker, M., & Baker, E. W. (1982). Notes on honey bee mites of the genus Acarapis Hirst (Acari: Tarsonemidae). International Journal of Acarology, 8(4), 211-226.

Esmaeily, M., Kwon, S., Babaeian, E., & Jung, C. (2026). Tropilaelaps mercedesae: An emerging global threat to apiculture–A comprehensive review. Frontiers in Insect Science, 6, 1871985.

Forsgren, E., De Miranda, J. R., Isaksson, M., Wei, S., & Fries, I. (2009). Deformed wing virus associated with Tropilaelaps mercedesae infesting European honey bees (Apis mellifera). Experimental and Applied Acarology, 47(2), 87-97.

Gao, J., Ma, S., Wang, X., Yang, Y., Luo, Q., Wang, X., ... & Dai, P. (2021). Tropilaelaps mercedesae parasitism changes behavior and gene expression in honey bee workers. PLoS Pathogens, 17(7), e1009684.

Gill, M. C., Chuttong, B., Davies, P., Earl, A., Tonge, G., & Etheridge, D. (2024a). Assessment of the levels of resistance of Tropilaelaps mercedesae to a variety of synthetic miticide. bioRxiv, 2024-12.

Gill, M.C., Chuttong, B., Davies, P., Etheridge, D., Panyaraksa, L., Tomkies, V., Tonge, G., Budge, G. (2024b). Assessment of the efficacy of field and laboratory methods for the detection of Tropilaelaps spp. PLoS One: https://doi.org/10.1371/journal.pone.0301880

Hatjina, F. (2026). Faster than Varroa: Tropilaelaps mercedesae as an Emerging Emergency for Global Apiculture. Bee world, 103(1): DOI - 10.1080/0005772X.2026.2742576

Janashia, I., Uzunov, A., Chen, C., Costa, C. and Cilia, G. (2024). "First report on Tropilaelaps mercedesae presence in Georgia: The mite is heading westward!" Journal of Apicultural Science. https://doi.org/10.2478/jas-2024-0010.

Joharchi, O. and Stolbova, V.V. (2024). "The first report on the ectoparasitic genus Tropilaelaps (Acari: Mesostigmata: Laelapidae) in Russia." Persian Journal of Acarology 13 (3): 513-516. https://www.biotaxa.org/pja/article/view/85545.

Sankovitz, M., Steinhauer, N., Yemor, T., Cook, S. C., Evans, J. D., & Ramsey, S. D. (2025). Evaluation of efficacy of formic acid and thermal remediation for management of Tropilaelaps and Varroa mites in central Thailand. Journal of Apicultural Research, 64(4), 1049-1058.

Tokach, R., Seshadri, A., Rogers, S. R., Chuttong, B., Jung, C., & Williams, G. R. (2026). Global range of Tropilaelaps mercedesae. Journal of Apicultural Research, 65 (4), 623-627

Tokach, R., Aurell, D., Chuttong, B., & Williams, G. R. (2026). Sensitivity of current Tropilaelaps mercedesae monitoring methods in Apis mellifera colonies. Scientific Reports 16, 16778

Uzunov, A., Janashia, I., Chen, C., Costa, C., & Kovačić, M. (2025). Rapid brood decapping for Tropilaelaps mercedesae Detection. Bee world, 102(1), 15-20.

Williams, G. R., Aurell, D., Gill, M. C., Khongphinitbunjong, K., Tokach, R., & Traynor, K. S. (2026). Tropilaelaps mercedesae: rapid geographic expansion in a novel honey bee host. Trends in Parasitology. TREPAR 2874

PRESS RELEASE

European experts call for urgent action against *Tropilaelaps* and other invasive species challenging apiculture

Ohrid, N. Macedonia, 1 to 5 September 2026

Europe faces an increasing risk from *Tropilaelaps* mites and other alien and invasive species that threaten honey bees, pollinators, biodiversity and ecosystem resilience. The emerging challenges brought together researchers, veterinary professionals, extension specialists and beekeeper representatives from several European countries in Ohrid from 1 to 5 September, 2026.

Discussions focused on the heightened risk of *Tropilaelaps* introduction into Europe, particularly southeastern Europe, following the confirmed occurrence in Türkiye reported to the World Organisation for Animal Health on 31 August 2026. Participants also reviewed the spread and impacts of the small hive beetle (*Aethina tumida*), the yellow-legged hornet (*Vespa velutina*) and repeated introductions of the red dwarf honey bee (*Apis florea*), as well as entry pathways linked to transport, trade and bee movements.

The workshop called for stronger institutional preparedness; harmonised surveillance, diagnostics and rapid-notification systems; field sentinel colonies; species-specific contingency plans; risk-based monitoring at high-risk entry points; targeted research; and closer regional and cross-border cooperation. Participants also stressed the need to promote basic research on the biology of host-parasite interactions, strengthen veterinary and extension services, and to support practices that improve ecosystem resilience.

The central conclusion was clear: prevention, early detection, rapid reporting and coordinated, science-based action are more effective and less costly than managing an alien species after establishment. A unified European response involving authorities, scientists, beekeepers, laboratories and international organisations is urgently needed to protect apiculture, pollinators, biodiversity and ecosystem services. A *Brief Communiqué* was prepared and disseminated to relevant institutions across participating countries (attached).

The workshop "**The Tropilaelaps Mite on Its Way to Europe**" was organised by the Julius-Maximilians-Universität Würzburg and Ss. Cyril and Methodius University in Skopje, with funding from the German Academic Exchange Service (DAAD).



THE REMARKABLE POWER OF HONEY PROTEINS

Many consumers have never even heard that honey contains proteins, let alone that these proteins offer more than nutritional value: they also have beneficial biological and medicinal effects.

Alongside natural aromas, antioxidants, essential minerals and vitamins, probiotic bacteria and other constituents, honey contains proteins and peptides added by the bees themselves—compounds capable of exerting powerful biological effects in the human body.

THE ANTIBACTERIAL ACTIVITY OF HONEY PROTEINS

In laboratory experiments, honey proteins have demonstrated antibacterial activity, including against bacteria resistant to multiple antibiotics.



Two proteins have attracted particular attention: MRJP1 (major royal jelly protein 1) and MRJP2 (major royal jelly protein 2): research article.

You may well wonder how royal jelly proteins find their way into honey.

Royal jelly contains nine types of major royal jelly protein, collectively accounting for 15% of its mass, while MRJP1 accounts for approximately half of its total protein content. Bees also add this particular protein to honey, where it constitutes around 0.01–0.02% of the honey's mass.

The text's argument is that even this small amount is sufficient to produce a biological effect—a striking indication of its potential value.

ANTIOXIDANT ACTIVITY AND IMPROVED CELL SURVIVAL

The digestion of honey and its proteins reveals another intriguing property. After subjecting honey proteins to simulated digestion, re-



searchers isolated peptide fractions that reduced oxidative stress and improved the survival of exposed cells in cell cultures.

These fractions included a short peptide derived specifically from the digestion of the bee protein MRJP1: research article.

The researchers also identified another MRJP1-derived peptide, TSNTF.

FASTER WOUND HEALING AND SMOOTHER SKIN

Bee defensin-1, a peptide found in honey, has also attracted scientific interest.

In experiments, it promoted the migration of human skin cells towards a wound, helping to close the gap.

It also stimulated the secretion of matrix metalloproteinase-9, an enzyme involved in tissue remodelling during wound healing.

When applied topically, it accelerated wound closure in laboratory animals as well: research article.

Research has made particularly significant progress in the treatment of wounds infected with antibiotic-resistant bacteria, where conventional treatment options can be severely limited. Dr Peter Molan was a leading pioneer in this field.

Numerous references can be found in Honey in Modern Wound Management (Advancis Medical, HealthComm UK Limited, 2009), a textbook for healthcare professionals written by experts from four continents.

RESEARCH CONTINUES

Scientists are steadily uncovering the properties and potential applications of the proteins that bees secrete from their glands and incorporate into honey.





Honey also contains proteins of plant origin.
We eagerly await the next scientific discoveries!



MD Rodoljub Živadinović

Epidemiology specialist, apitherapist

apikult@gmail.com

President of the Serbian Federation of Beekeeping Organization's

EBA Vice-President for promotion and international cooperation



A new book

NEW APITHERAPY MANUAL: HOW TO GET STARTED WITH BEEHIVE AIR INHALATION

Apitherapy opens up new opportunities for beekeepers. One of the most interesting is beehive air inhalation, during which users breathe air directly from the hive through specialised equipment. But how can this idea become a safe and professional service?

The answers are presented in the Apitherapy Manual for Beehive Air Inhalation by Matjaž Pogačnik, a long-time beekeeper, certified NPK apitherapist and innovator.

This newly published manual guides beginners and experienced practitioners from the initial idea to an organised apitherapy practice with Medikoel equipment. It includes practical floor plans for spaces with one or more inhalation stations and is available in multiple languages, in both print and digital formats..

Hive air can be a new part of a beekeeper's offering – and the manual shows how to take the first step.

Matjaž Pogačnik, author of the new manual, helped us answer some of the questions beekeepers most often face when getting started with beehive air inhalation.

Why did you decide to write an apitherapeutic manual?

A lot of information about apitherapy can be found today, but there is much less practical knowledge on how to actually perform it.

Beekeepers often know what apitherapy is and the potential that hive air holds, but they do not know how to start. What devices do they need? How should the space be set up? How should a user be received? How long should the inhalation last? How should the equipment be cleaned? The manual was created to gather all this information in one place and offer beekeepers a clear path from the initial idea to providing apitherapeutic activities.

Who is the manual intended for?

Primarily for beekeepers who wish to upgrade their apiary with an additional activity, but

also for apitherapists who already work with clients and want to carry out their work in a more structured way.

The manual is designed to be used by beginners, while also containing enough concrete information to serve as reference material for more experienced practitioners.

What else can a beekeeper offer today besides honey?

An apiary has much more potential than we often realise. In addition to honey, propolis, and other bee products, we can also offer the experience of the bee environment and apitherapeutic services.

One of the most interesting options is hive air inhalation, where the user breathes air directly from the bee hive using special equipment.

This can be a very interesting upgrade to a beekeeping business, especially for beekeepers who want to offer visitors something different.

How does an ordinary apiary become an apitherapeutic space?

It is not necessary to start with a large-scale project.

An apitherapeutic space can be very simple, with a single inhalation point, or more developed to accommodate several users.

Above all, it is important that it is functional, pleasant and correctly designed.

The manual presents various layout options and concrete examples of floor plans, making it easier for beekeepers to visualise how they could arrange their space.

What is most important when it comes to hive air inhalation?

It is very important that inhalation does not take place at random.

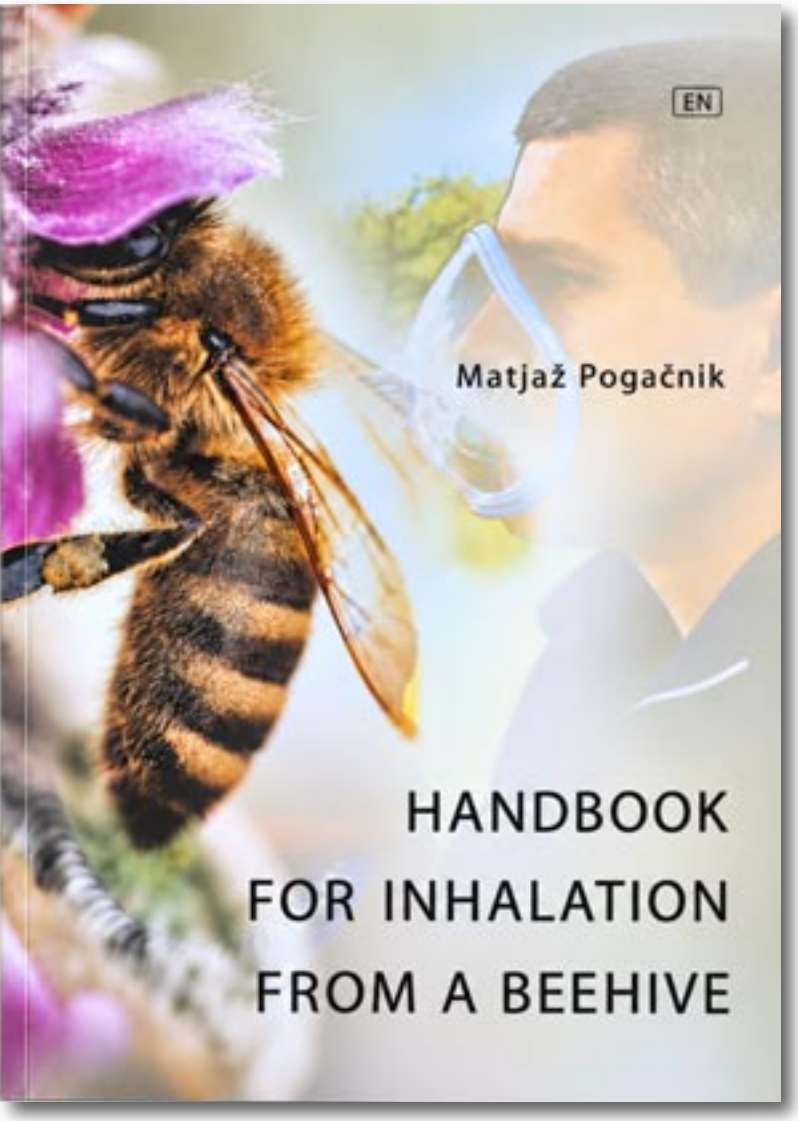
The practitioner must know how to prepare the user, how to use the equipment correctly, how long the inhalation should last and how to monitor the user's well-being.

This is precisely why the manual contains clear protocols that help establish a structured and repeatable way of working.

Which devices play a key role in this?

One of the main devices is the API AEROSOL II, designed for the controlled inhalation of air from the bee hive.





This is a device that allows the beekeeper to deliver hive air to the user in a practical way.

Another important device is the Propo Steam, which is used for propolis evaporation.

Both devices are presented in more detail in the manual, along with instructions for preparation, use and maintenance.

Why is there so much emphasis on protocols in apitherapy?

Because good apitherapy is about more than just the device. It is important to know which procedures to use, in what order, how long each inhalation should last, and how to adapt it to the purpose of the visit.

Protocols help the practitioner work with greater confidence and organisation, while providing the user with a more professional experience.

What about hygiene and safety?

This is one of the most important parts. All equipment that comes into contact with the user must be properly cleaned and disinfected. Correct storage of equipment and knowledge of contraindications are also essential.

The manual therefore also includes guidelines on safety, allergic reactions, anaphylaxis, and the basic legal and ethical aspects of practising apitherapy.

What advice would you give to a beekeeper who is considering apitherapy but doesn't know where to start?

First, they should inform themselves thoroughly and think about what they want to offer.

There is no need to do everything at once. You can start with a single inhalation point and basic equipment, and then gradually develop the activity.

Above all, it is important that you have clear knowledge, the correct procedure, and high-quality equipment. This is precisely the main purpose of the manual – to save the beekeeper a lot of guesswork and show them concrete steps.

Does the manual also complement practical training?

Yes. I also conduct a two-day certification for the use of Medikoel's apitherapeutic products.

There, participants gain hands-on experience in using the devices, performing individual procedures, and organising apitherapeutic activities. The manual and the training therefore complement each other very well.

What do you want a beekeeper to take away from the manual?

Above all, the awareness that their apiary can offer much more than just honey.

If they have the knowledge, the right equipment, and a well-defined way of working, they can develop a new apitherapeutic story from an existing apiary.

The Apitherapy Handbook for Beehive Air Inhalation is available in multiple languages, in both print and digital formats. You can order it on the Medikoel website.



FROM ŽIROVNICA TO THE WORLD: THE NOČ BOŠTJAN BEEKEEPING FOUNDATION CONNECTS PEOPLE FOR THE FUTURE OF BEES

"United for Bees" – an international initiative bringing together knowledge, research, innovation, charity and young people from around the world

In Žirovnica, the birthplace of Anton Janša, a pioneer of modern beekeeping, the Noč Boštjan Beekeeping Foundation – Foundation for Charity, Knowledge and Innovation in Beekeeping was established. Its mission is to connect people, institutions, researchers, companies and charitable organisations from Slovenia and abroad who want to contribute their knowledge, experience and efforts to the future of beekeeping.

The foundation was established by Boštjan Noč, long-serving President of the Slovenian Beekeepers' Association and President of the European Beekeeping Association since 2024.

As the initiator of World Bee Day, he has spent many years promoting international cooperation and raising awareness of the importance of bees.

Through this new foundation, he aims to strengthen these connections and create a platform where knowledge, charity, research, innovation and practical initiatives for future generations can come together.

People Matter More Than Money

The foundation's guiding principle is simple: people, their knowledge, their ideas and their willingness to cooperate matter more than money.

The foundation aims to connect organisations that see beekeeping not merely as an economic activity, but also as an important part of natural and cultural heritage, biodiversity conservation and the education of young people.

"*I want Žirovnica, a place with an exceptional beekeeping heritage, to become a starting point for connecting people from all over the world. Anton Janša is a great historical figure, and it is our responsibility to carry his legacy into the fu-*

ture. I believe we can achieve a great deal together by bringing together people who act from the heart and genuinely want to make a difference for bees," says Boštjan Noč.

An International Network Is Already Growing

The foundation is building an international network of partners, including:

- Fundacja Apikultura – Poland
- Faculty of Medicine, University of Rijeka – Croatia
- Bees for Development Ethiopia – Ethiopia
- IRNAD – Argentina
- Youth Bee Works – United States
- DAGEM, Düzce University – Türkiye
- Istituto Zooprofilattico Sperimentale del Lazio e della Toscana (IZSLT) – Italy
- The Friends of the Bees Foundation – Spain
- Save The Bees USA – United States
- Beekeepers Foundation UAE – United Arab Emirates

The foundation is actively seeking new partners in Europe and other parts of the world. It is particularly interested in foundations, research institutes, educational institutions and organisations working in bee conservation, biodiversity, scientific research, innovation and support for young people.

International Camps for Young Beekeepers

One of the foundation's key development ideas is to organise regular international camps for young beekeepers from around the world.

The camps would bring young people together to exchange knowledge and practical experience, discover different beekeeping traditions, and build new international friendships and collaborations.

They would give young beekeepers the opportunity to learn from one another, explore modern approaches to beekeeping and discuss the challenges facing future generations of beekeepers. Through initiatives like these, the foundation hopes to empower young people to



become active contributors to the future of beekeeping and to make international cooperation an important part of their education and development.

United for Bees

The foundation's work is based on the belief that challenges affecting the future of bees transcend national borders. It therefore aims to encourage cooperation between scientists, beekeepers, companies, charitable organisations and young people, creating opportunities for good ideas to develop into practical projects.

The Noč Boštjan Beekeeping Foundation welcomes everyone who wishes to contribute knowledge, experience, connections or ideas to the development of beekeeping and the protection of bees.

From Žirovnica to the world – United for Bees.

Website: https://cfnb.si
Contact: nocb@cfnb.si

Noč Boštjan

Beekeeping Foundation – Foundation for Charity, Knowledge and Innovation in Beekeeping "United for Bees"











SUPPORT

FOR THE FOUNDATION FROM THE EUROPEAN COMMISSION

The Beekeeping Foundation Noč Boštjan has received a special letter of support and encouragement from the European Commission, on behalf of Commissioner for Agriculture and Food Mr Christophe Hansen.

This letter is very important to our Foundation, as it comes directly from the European Commission and represents significant encouragement for the Foundation's mission at the European level.

In the letter, the European Commission specifically highlighted the importance of the mission of the Beekeeping Foundation Noč Boštjan – protecting bees, preserving and further developing beekeeping knowledge, and safeguarding the future of beekeeping.

It is particularly important to us that the European Commission recognised our focus on young people, cooperation, research, innovation, education and the protection of the natural environment.

The letter also states that the Beekeeping Foundation Noč Boštjan can make a valuable contribution to European objectives in the field of pollinator protection and sustainable beekeeping by connecting people and organisations, exchanging knowledge, engaging younger generations and building partnerships.

More about the Beekeeping Foundation Noč Boštjan https://cfnb.si/

Boštjan Noč

Chairman of the Management Board
and Founder of the Foundation

Ref. Ares(2026)9146939 - 28/09/2026

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR AGRICULTURE AND RURAL DEVELOPMENT

Directorate B – Sustainability
The Director

Brussels
AGRI.B.1/DS/rd D(2026) 9746719

Mr Boštjan Noč
President of the European
Beekeeping Association
nocb@cfnb.si

Commissioner Hansen has asked me to convey to you his complements on the establishment of your new foundation. We would like to acknowledge the importance of its mission to protect bees, preserve beekeeping knowledge and heritage, and support the future of beekeeping. The foundation's focus on supporting and empowering young people to engage in beekeeping and its emphasis on cooperation, research, innovation, education and the natural environment reflect a forward-looking vision for apiculture . These commitments align with the broader European objectives of strengthening pollinator protection, supporting beekeepers, and promoting sustainable farming practices.

The European Commission has consistently underlined the essential role of bees and other pollinators for biodiversity, food security and the future of agriculture in Europe, which is also reflected in EU policy support. The Common Agricultural Policy provides dedicated support for the apiculture sector and for environmentally friendly farming practices that benefit pollinators, while wider EU action seeks to reverse pollinator decline, restore habitats and reinforce the resilience of agriculture.

Looking ahead, the Commission proposed to continue its support for apiculture and environmental action in the Common Agricultural Policy for 2028-2034.

Beekeeping Foundation Noč Boštjan can make a valid contribution to these objectives by fostering knowledge exchange, engaging younger generations, and building partnerships that help ensure a sustainable future for beekeeping and rural communities in Europe.

In this spirit, Commissioner Hansen wishes the foundation every success in inspiring a new generation of beekeepers and helping to safeguard bees, beekeeping heritage and the natural environment.

Yours sincerely,

Gijs SCHILTHUIS

AND EVERYONE WAS MOVED TO TEARS



The Honey Symposium on the fringes of Global Food Week in Abu Dhabi

Between 6 and 8 October, the Honey Symposium, jointly organised by Apimondia and the Sultanate, took place in Abu Dhabi. This event forms part of Global Food Week, a major agricultural trade fair, comparable to Bio-Fach in Germany, though not quite as large. I had the honour of being one of the four selected speakers there to present apitherapy in the United Arab Emirates.

The Chair of the Apimondia Apitherapy Commission, Dr János Körmendy-Rácz, opened the session with a brief introduction to bee products. This is by no means limited to the therapeutic use of honey, but also includes propolis, bee venom, royal jelly, Apilarnil and much more.

Turkey, a country with a particularly strong research programme in apitherapy, was represented by Prof. Dr Banu Yücel. The distinguished researcher outlined the use of bee products in animal breeding. I then had the opportunity to give a presentation on drone larvae (Apilarnil) and its applications. This product is of particular interest, as we together with Westphalian University in Recklinghausen had only recently discovered significant quantities of spermidine in it.

In the practical demonstration that followed, Alina-Felicia Váradi showed us how bee products can be used in medical practice and for preventative healthcare. She describes her area of specialism as ‘Api-Nutrition’, that is, a holistic ap-



the eye, allowing it to cleanse itself. Medically, there are many applications for this type of eye wash, such as treating eye infections in motorcyclists, itchy eyes caused by allergies, or glaucoma.

Prof. Dr Hassan Al-Lawati from Oman, with whom I had attended a specialist course on bee venom therapy in China last November, then demonstrated to the audience how bee venom can be used in practice. This demonstration was of great interest to visitors from the region.

Other topics included specialised bee breeding and innovation tailored to the climatic conditions in the VAR. There was also a honey



proach to nutrition using bee products. The experienced beekeeper and engineer dripped Thai honey from stingless bees, supplied by Prof. Dr Orawan Duangphakdee (Chair of the Apimondia Regional Commission for Asia), into the eyes of volunteers from the audience. After plenty of tears, their vision cleared up again quite quickly. The tears flush bacteria and foreign bodies out of

tasting session featuring local honeys such as Al Ghaf, mangrove and Sidr honey. The event concluded with an awards ceremony honouring various honey producers and outstanding working groups. A big thank you goes to Dr Ihsan Farouk Abu Alrub (Senior Researcher at the Abu Dhabi Agriculture and Food Safety Authority), who organised this event flawlessly and with great hospitality.









A highlight for the invited speakers was an excursion to an apiary in a date palm grove. In addition to the sheer heat, the high humidity can also sometimes pose a major problem for the bees and honey production. All beekeeping tasks must be carried out in air-conditioned and dry rooms. The electricity required for this is provided free of charge.

I was personally very impressed by the openness and drive towards bee products in general, and apitherapy in particular, in this part of the world. The scale of Global Food Week – where honey was just one part of the exhibition – also demonstrated the powerful development taking place in this region.

Accompanying images: All image rights are held by me or Api-Zentrum Ruhr.


The Biggest Mead & Honey Events
for Mead Makers and Beekeepers Worldwide.
HONEY MADNESS CUP 2027
EUROPEAN MEAD MAKERS CONFERENCE
Mead Madness Cup
KRAKÓW / POLAND | 18-20.02.2027
REGISTRATION NOW OPEN


HONEY MADNESS CUP 2027
EUROPEAN MEAD MAKERS CONFERENCE
Mead Madness Cup
COMPETITION / POLL
18-20 FEBRUARY 2027
More information and registration on:
emmconference.com, meadmadnesscup.com
registration open until 22.01.2027
honeymadnesscup.com
registration open until 13.11.2026

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

chef stories
GASTRONOMY
STRATEGY & EVENT EXPERTS



BEESOURCES

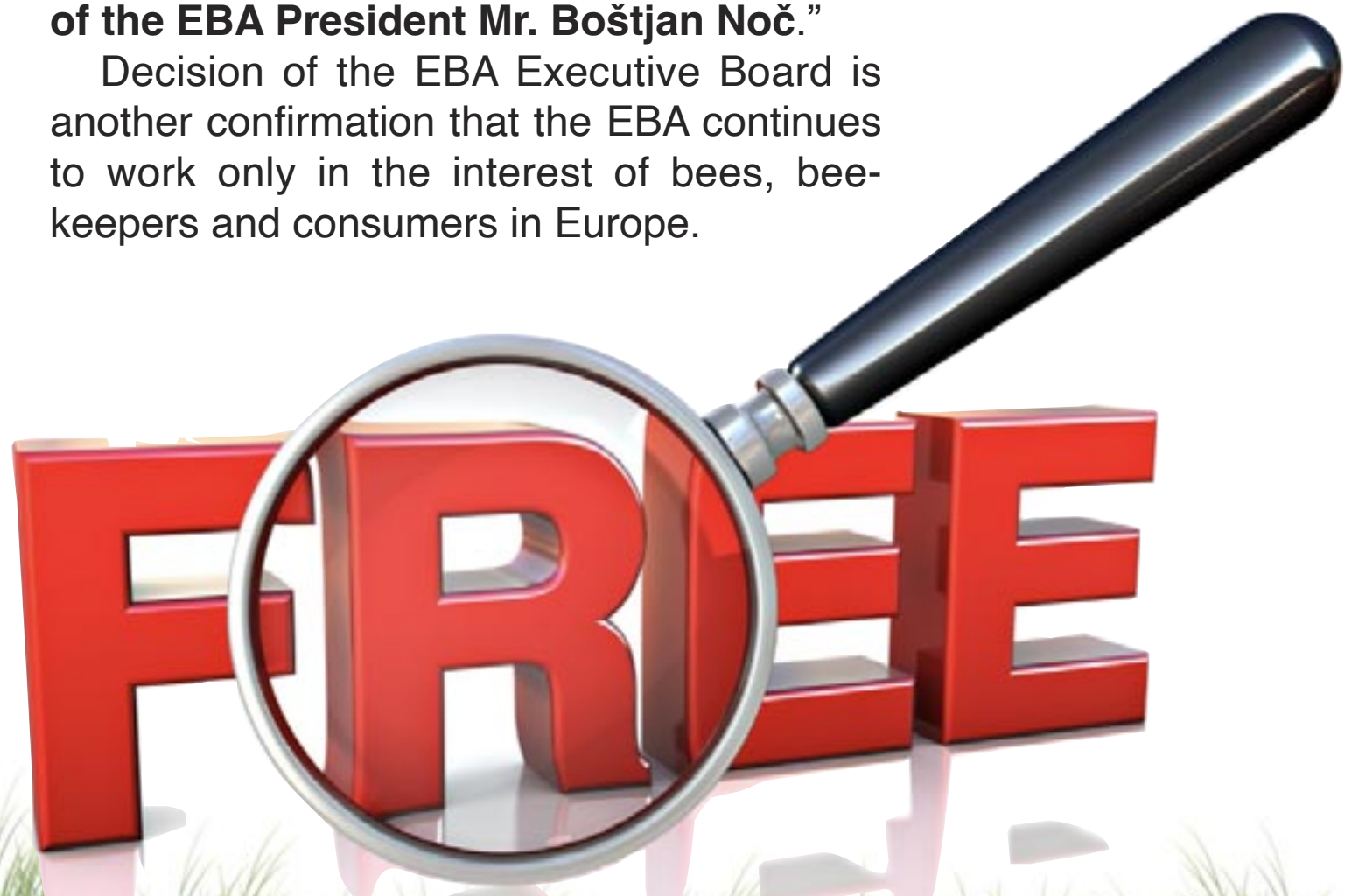
crea
Consiglio per la ricerca in agricoltura



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, bee-keepers 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



6 NOBODY CAN SAVE BEEKEEPING IF WE, THE BEEKEEPERS,
DO NOTHING OURSELVES!

9 IMPORTANT LETTER TO THE ELISABETH WERNER

10 EBA POSITION PAPER ON THE EU HONEY PLATFORM

19 THE CASCADE RULE OF OFFICIAL CONTROL REGULATION IS THE KEY FACTOR
FOR DETECTING HONEY FRAUD PROBLEMS

24 QUESTIONS FROM MEMBERS OF THE HELLENIC PARLIAMENT TO
THE REPRESENTATIVES OF EEEM AND EBA PROF. ANDREAS THRASYVOULOU

27 THE 15TH NATIONAL CONFERENCE ON THE SAFETY AND QUALITY
OF BEE PRODUCTS: FIFTEEN YEARS LATER

32 STRATEGY FOR TACKLING CLIMATE CHANGE

56 PESTICIDES THAT DO NOT KILL BEES IMMEDIATELY:
WHAT HAPPENS WHEN PESTICIDES ACT TOGETHER?

62 TROPILAELAPS MERCEDESAE IS AN EMERGING EMERGENCY
FOR EUROPEAN APICULTURE

68 PRESS RELEASE: EUROPEAN EXPERTS CALL FOR URGENT ACTION AGAINST
TROPILAELAPS AND OTHER INVASIVE SPECIES CHALLENGING APICULTURE



69 THE REMARKABLE POWER OF HONEY PROTEINS

73 NEW APITHERAPY MANUAL: HOW TO GET STARTED WITH BEEHIVE AIR INHALATION

77 FROM ŽIROVNICA TO THE WORLD: THE NOČ BOŠTJAN BEEKEEPING FOUNDATION CONNECTS PEOPLE FOR THE FUTURE OF BEES

80 SUPPORT FOR THE FOUNDATION FROM THE EUROPEAN COMMISSION

82 AND EVERYONE WAS MOVED TO TEARS

85 MEAD MADNESS CUP 2027, HONEY MADNESS CUP 2027 & EUROPEAN MEAD MAKERS CONFERENCE – YOU'RE INVITED!

86 2ND HONEY SENSORY ANALYSIS EDUCATION IN GREECE

92 TO THE EBA WITHOUT MEMBERSHIP FEE

93 SPONSORSHIP REQUEST AND METHOD OF ADVERTISING IN THE MAGAZINE

94 EBA SPONSORSHIP PACKAGES

NO BEES LIFE
EBA MAGAZINE

EBA informative and professional monthly magazine "NO BEES, NO LIFE"

November 2026.
Issued since July 2024.
Publisher: **European Beekeeping Association** (EBA)
Head office: Brdo pri Lukovici 8, 1225 Lukovica, Slovenija
eba@ebaeurope.eu
www.ebaeurope.eu

Downloading and printing texts from "NO BEES, NO LIFE" in other magazines and electronic media is allowed and free of charge, but it is mandatory to indicate the source of the text immediately below the title. Magazine sharing is preferred.

The contents of the texts and advertisements are the responsibility of the autors.

The responsibility for the correctness of the English language in the magazine lies with the authors of the texts.

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

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

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

There are no fees for published texts and photos.

Editor in chief of the electronic edition of the magazine:
MD Rodoljub Živadinović, Epidemiology Specialist, Apitherapist
apikult@gmail.com, +381 60 444 01 01 (Viber, WhatsApp, Telegram, Signal, WeChat, Daze)