Issue 28 · October 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

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Romania
Malta
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Hungary
Ukraine
Montenegro
Lithuania
Bosnia and Hercegovina
Sweden
Croatia
Czech Republic
Poland
United Kingdom
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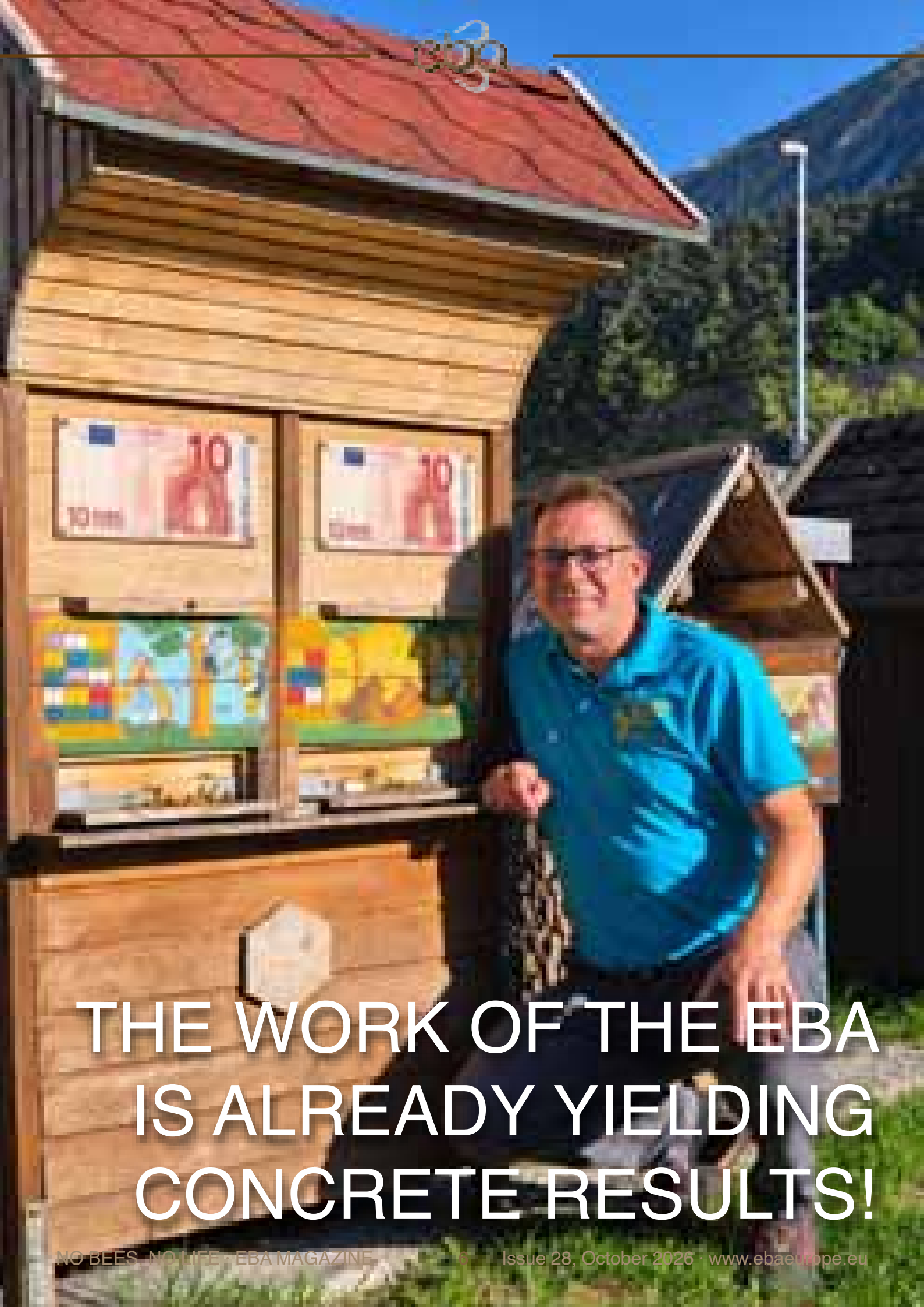


THE WORK OF THE EBA IS ALREADY YIELDING CONCRETE RESULTS!

From an idea, to a European decision, to implementation in practice

In 2025, European Commissioner for Agriculture and Food Christophe Hansen visited Slovenia on the occasion of World Bee Day. During his visit, he also met with representatives of the leadership of the European Beekeeping Association (EBA).

We presented one of the key initiatives of European beekeepers: the introduction of annual financial support for beekeepers based on the number of bee colonies, meaning support for every beehive.

We explained why European beekeeping deserves such direct support and why European legislation should allow this type of measure. Commissioner Hansen expressed his willingness to work towards a solution and to adapt the legislation to make such support possible.

In December 2025, the European Union adopted changes enabling this type of support.

Slovenia has now taken an important step further. By deciding to introduce annual support for beekeepers based on the number of bee colonies from 2028 onwards, Slovenia will demonstrate that such a measure can also be implemented in practice.

This is a great example of how an initiative from European beekeepers, dialogue with European decision-makers and concrete national implementation can together bring about meaningful change for beekeeping.

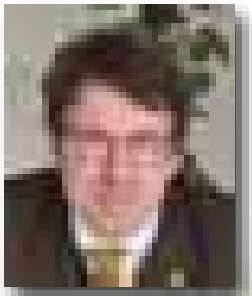
A historic day for Slovenian beekeeping – support per hive starting no later than 2028!

A meeting took place today at the Ministry of Agriculture between Minister Janez Cigler Kralj and his team and the President of the Slovenian Beekeepers' Association, Boštjan Noč, and his team.

Today can be described as a historic day, as Minister Janez Cigler Kralj gave assurances that, for the first time in Slovenia's history, a system of support per hive will be established, with payments commencing in 2028. The Minister and his team are examining the possibility of providing support as early as 2027, though he cannot yet make a firm promise to that effect. The per-hive support will be available to all beekeepers who have their bee colonies registered in the apiary register—covering approximately 200,000 colonies. The amount involved is around 10 euros per bee colony.

Boštjan Noč, President of the Slovenian Beekeepers' Association (ČZS), commented:

Today's meeting demonstrated that we are capable of taking effective action in this country! The Minister and his team showed the will and determination to resolve these matters. His very clear and unequivocal commitment that per-hive subsidies will be paid out for the first time in 2028 marks a historic turning point for beekeeping. We have hoped for, desired, and expected this for 20 years.



Now, that commitment has finally been made!

WHAT'S ALL THE BUZZ ABOUT INVERTASE?

Beekeepers would like to differentiate the quality of their own honey from honey that has been heated and/or imported and transported over long distances. One possibility is to use the so-called invertase activity as a quality parameter. Its introduction is also currently being discussed at EU level on the so-called Honey Platform.

Honey is regarded as a natural product in Europe. Consumers therefore expect the honey they buy to be as natural as possible. They are not even aware that a bigger part of honeys found in supermarkets have been pasteurised.

In order to protect honey as a natural product, the EU Honey Directive states that honey "must not […] have been heated in such a way that the natural enzymes have been either destroyed or significantly inactivated." To verify this, the introduction of invertase activity as a quality parameter was already called for by honey experts during the discussion on the first EU Honey Directive.

However, this was blocked by the imported honey trade. Instead, only the diastase activity and the HMF value were introduced as quality parameters. However, the diastase enzyme is relatively heat-resistant and the HMF value only forms slowly when exposed to heat or during storage. A lot has to happen to a honey to exceed the limits of the EU Honey Directive.

The new Honey Directive: A new chance to introduce also invertase activity

Now the demand from the beekeeping community to introduce invertase activity as a quality parameter is back on the table. According to the new Honey Directive the EU commission is empowered to adopt delegated acts to make sure that honey has not been heated or treated in such a way that the natural enzymes have been either destroyed or significantly deactivated. For this, the Commission has to take the invertase activity into account. The Directive states that the aim is to ensure fair commercial practices and as well protecting consumer interests.

The introduction of the invertase activity should help to protect domestic, carefully handled honey from products that do not respect honey as a natural product. However, the beekeeping sector in many member states lacks experience with invertase activity as a quality parameter, as it is not measured by their national laboratories. This might be the reason why some misinterpretations about this quality parameter are circulating. As a result, there is a certain fear of its official introduction.

Good experience in Germany

In Germany, we have introduced invertase activity several decades ago as a quality parameter for honey sold under the German Beekeepers' Association brand in order to emphasise the good quality of local honey (see box). The major organic associations have also set corresponding invertase limits for their honeys. We have good experience with this quality parameter. The limit can well be observed by local beekeepers and makes the difference to poor import honey obviously.

Invertase activity is also anchored in the so-called German Leitsätze für Honig. This is a collection of guidelines for the production, quality, presentation and labelling of honey. According to these recommendations the honey can be specially labelled, for example as "premium" or

Label of the German Beekeepers Association (Deutscher Imkerbund, D.I.B.)

Water content: maximum 18 % (exception for heather honey (Calluna): max. 21.4 %)

Invertase value: at least 64 U/kg (exception for naturally low-enzyme honeys: 40 U/kg, but then HMF value max. 5 mg/kg)

Diastase value: not applicable

HMF value: max. 15 mg/kg

"selection" if the invertase value is above certain thresholds (see box).

We would like to answer a few questions here to share more information about invertase activity.

What exactly are invertase and diastase?

Invertase and diastase are both enzymes that are secreted from the hypopharynx glands of the bees during the conversion of nectar/honeydew into honey. Invertase breaks down the sucrose (household sugar) in the nectar/honeydew into glucose and fructose. Diastase, on the other hand, breaks down starch into maltose and glucose. The activity of invertase decreases significantly faster than that of diastase when the honey is heated (>40°C).

The invertase activity can be regarded as an indicator for numerous other heat sensitive honey constituents – both of plant origin and also those produced by bees. A standardised, reliable method of analysis exists. It is therefore very suitable as a measure of ripeness and the natural character of honey

Would the inclusion of an additional parameter make it more difficult to test and market pure, unprocessed honey?

On the contrary. Measuring invertase activity does not make testing more complicated. First of all, you don't need to test for diastase activity anymore, and if the honey has satisfying, typical invertase activity, you don't even need to test for HMF.

As mentioned above, diastase is not very sensitive to heat and HMF builds up very slowly. A test for diastase or HMF cannot detect short-term, strong heating, for example.

To ensure that honey is "pure and unprocessed" you need other parameters such as invertase activity.

Without such a parameter you cannot distinguish between low quality and fresh honey. Especially as the harmonised analysis methods for determining diastase activity at low enzyme levels are very imprecise.

Is there a lack of knowledge about the invertase activity of different monofloral honeys?

The invertase activity of the main European honeys is well known and defined (see e.g. Oddo et al. 2004).

Nevertheless, it would be good to extend the existing data with data from the different Member States and also from non-EU countries, to prove that bees worldwide produce ripe honey of high quality, with a respective invertase activity.

Therefore, we believe that an international data collection campaign would be very helpful.

However, the samples would also have to be precisely defined, e.g. variety, age and location of the sampling.

Does the invertase activity vary significantly between different types of honey, with the botanical origin playing a minor role?

Invertase activity varies from one type of honey to another, but there is a clear correlation between enzyme activity and botanical origin. This is also known for diastase activity and the variation is within certain limits.

This is already reflected in the previous Honey Directive, which includes a lower threshold for honeys with naturally low diastase activity.

Is the invertase activity affected by numerous factors, including climatic conditions, nectar secretion rates, bee colony health, bee age, season, beekeeping practices, and other known and unknown variables?

As mentioned above, botanical origin – e.g. sugar spectrum of nectar - is the main influence.

There are other factors, but some of them do not really play a big role in practice.

If the colony is not healthy, you will not get much honey from it.

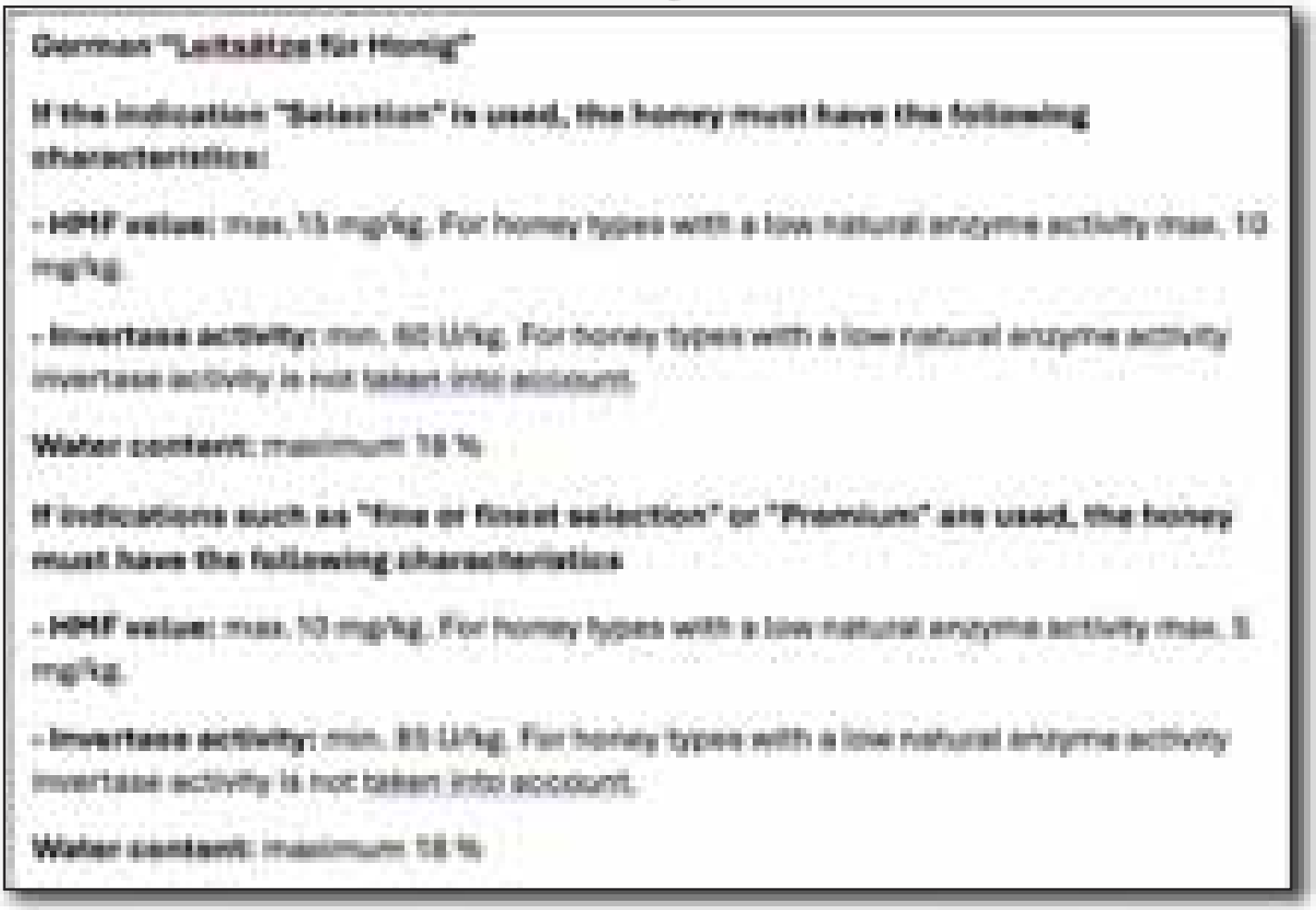
The handling of the honey by the beekeepers as well as the transport and storage of the honey in conditions that are not recommended have a far greater influence.

Does the invertase activity decline rapidly with prolonged storage and can this limit the shelf life of unprocessed honey to just a few months?

Invertase activity is quite stable when honey is stored in cool (<18°C) and dark conditions (see e.g. Radtke & Lichtenberg-Kraag 2018).

This is the general recommendation for honey storage. If honey is stored too warm, invertase activity will decrease.

That's why proper storage is one of the beekeeper's tasks in order to sell "fresh" and natural honey.



German "Leitsätze für Honig"

If the indication "Selection" is used, the honey must have the following characteristics:

- HMF value: max. 15 mg/kg. For honey types with a low natural enzyme activity max. 10 mg/kg.

- Invertase activity: min. 60 U/kg. For honey types with a low natural enzyme activity invertase activity is not taken into account.

Water content: maximum 18 %

If indications such as "fine or finest selection" or "Premium" are used, the honey must have the following characteristics

- HMF value: max. 10 mg/kg. For honey types with a low natural enzyme activity max. 8 mg/kg.

- Invertase activity: min. 80 U/kg. For honey types with a low natural enzyme activity invertase activity is not taken into account.

Water content: maximum 18 %

Can industrial invertase be added to the honey by fraudsters to artificially increase the invertase activity?

Yes, but a test can also distinguish between the natural and industrial versions of invertase. This problem is also known with diastase. Unfortunately, there are substances that artificially increase diastase activity or lower HMF levels. There are methods to detect both types of fraud.

Can industrial invertase that is used in bee feed be found in honey and then become a problem for beekeepers?

If your honey is found to have higher levels of industrial invertase from bee feed, then you have other problems because in this case your honey is highly contaminated with syrup. It will also not pass an authenticity test.

What is the invertase activity of German honey?

As mentioned above, the invertase activity depends on the botanical origin, but the average value of several thousand tested honeys is >150 μm/kg. This includes honeys with naturally low enzyme activity, such as Robinia honey, as well as honeys with very high values, such as honeydew honeys. The honeys tested were from the same year the honey was harvested and had already been filled into jars by the beekeepers to sell them to the customers.

Summary

In conclusion, we support the introduction of invertase activity as a quality parameter to promote the marketing of fresh and carefully handled

honey. Invertase activity is an appropriate parameter. And for honeys with a naturally low invertase activity, correspondingly lower minimum values should apply, as is already the case for diastase activity.

There are different possibilities:

1. **Definition of an invertase/diastase ratio**: More data is needed to be sure that there really is a strong correlation between the two. So far in the German data we see a greater variability in this correlation.

2. **The definition of a minimum value as it is done for diastase**: Those who do not sell "fresh" honey will be against it. The question remains as to the level of the minimum values for honeys with high and low natural enzyme activity. It would be good to collect data from different countries. One point should be clear: if the value is set too low (as is already the case for diastase), it will make no sense. The values should be able to distinguish between carefully treated honey and other "honeys".

3. **Labelling of heat damaged honey**: "Honey" with unnaturally low enzyme activity due to heat or storage damage could be clearly labelled. This could be the case with some imported honeys, for example.

4. **Special labelling**: A legal definition of certain thresholds could be introduced for special labelling of honey, e.g. "premium honey" (see the German guidelines). However, first of all, this will not remove from the shelves "honey" that does not respect honey as a natural product. Furthermore, it is very important that we do not introduce terms such as "raw honey" or "virgin honey", as this would be counterproductive. Honey is by definition a raw product. The introduction of this term will only cause problems if some beekeepers use this term and others do not, as customers will be confused. We have already seen this in some cases in Germany, although the use of the term "raw honey" is not allowed.

Dr. Sebastian Spiewok
Deutscher Imkerbund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GREECE'S 'E-HONEY' PLAN PUTS HONEY TRACEABILITY UNDER THE SPOTLIGHT

Honey traceability is becoming an increasingly important issue across Europe, as consumers, beekeepers and regulators seek greater transparency over where honey comes from and what is inside the jar.

Greece is now moving to establish a national digital system designed to track honey through the supply chain. The Ministry of Rural Development and Food has submitted legislation for public consultation that would create the "e-honey" digital platform, covering honey produced in Greece as well as honey originating in other EU Member States and third countries and subsequently imported into or distributed in Greece.

The initiative has been welcomed by the Hellenic Scientific Society of Beekeeping and Sericulture (EEEM), which represents scientists specializing in beekeeping and sericulture and has been involved in proposals, training and information activities for the sector. But the Society argues that the effectiveness of the new system will depend on whether traceability extends beyond paperwork and covers the entire chain—from production and importation to trading, blending, testing and the final consumer.

From the hive to the shelf

At the heart of the proposal is a simple principle: honey should be traceable throughout its journey.

The proposed platform would be linked to Greece's National Beekeeping Register (NBR) and other public-sector databases. According to EEEM, the existing register already contains information that could provide the foundation for monitoring domestic production, including the number and movements of bee colonies, apiary locations and quantities of honey produced and distributed.

The Society says this integration could create a meaningful traceability system for Greek-produced honey but argues that the register serve so far only administrative, statistical or tax purposes.

One proposal is to connect beekeeping registration information to product labelling through a QR code or barcode, allowing consumers to obtain reliable information about a honey's origin. EEEM points to systems already operating in countries including Italy, France and Slovenia as examples of how traceability can also contribute to consumer confidence and product value.

For the honey sector, digital traceability should become not simply a regulatory obligation, but a practical tool for demonstrating origin and strengthening confidence in authentic regional products.

The missing link: traders and importers

EEEM argues that Greece's current system proposal is strong at the production end of the chain but weak at the commercial and import stages.

The Society proposes the creation of a National Register of Honey Traders–Importers, capable of recording purchases, sales, stocks, product movements and inspections, while linking imported consignments to the relevant CHED-P documentation.

This is particularly significant for imported honey. Under the proposed approach, the digital trail should not end when a consignment clears the import process. Instead, the relevant batch should remain digitally connected to subsequent commercial transactions after it reaches the importer's warehouse.

EEEM also highlights the need to monitor blends of honey by country of origin, including the respective percentage contribution of each origin, within the applicable EU framework.

For consumers, that distinction matters. A traceability system that records only the initial import quantity may show how much honey entered a market without necessarily showing what happened to it afterwards—or how it was incorporated into products sold to consumers.

A system that does not overburden beekeepers

The draft legislation would require beekeepers and other actors handling honey to enter specified information into the digital platform. Failure to comply, or the submission of false, incomplete or misleading information, could result in

administrative fines ranging from €200 to €10,000, depending on factors including the number of beehives and whether the offender is a professional or non-professional farmer or a legal entity. Repeating offences could result in doubled fines and loss of access to certain national or EU support and compensation measures.

EEEM argues that the sanctions need to be considered in the context of the entire supply chain.

The Society's concern is that enforcement could fall disproportionately on producers while comparable mechanisms for traders, importers and distributors are not defined with the same clarity. In its view, a functioning traceability system requires responsibilities and sanctions to follow the product through every stage of the chain.

The Society also calls for the system to be practical for beekeepers. Current national requirements involve production declarations twice a year, which EEEM says do not provide real-time monitoring. It proposes a simpler and more frequent updating mechanism, together with a transition period focused on information, training and support before penalties are imposed for procedural failures.

Digital traceability cannot prove what is inside the jar

Perhaps the most important issue raised by EEEM-S goes beyond the digital platform itself.

A database can trace a declaration. It cannot, by itself, prove the authenticity of the product being declared.

The Society argues that digital records can show who declared a quantity of honey, who bought it, who sold it and which commercial documents accompanied the transaction. They cannot establish, on their own, whether the contents of a particular container correspond to those declarations.

That requires laboratory controls.

EEEM therefore calls for stronger institutional and laboratory safeguards, including a National Reference Laboratory and appropriate National

Control Laboratories, referring to the framework provided by Regulation (EU) 2017/625.

Without reliable and accredited analytical methods and the necessary laboratory infrastructure, the Society warns, an electronic traceability system could become what it describes as a "blind" system: capable of tracking invoices and declarations, but unable to verify the identity and authenticity of the honey itself.

A Greek system with European implications

The debate is not confined to Greece.

Honey moves across European borders, and questions of origin, blending, authenticity and traceability inevitably extend beyond national markets. The draft legislation itself refers to honey produced in other EU Member States and in third countries, while EEEM-S argues that the Greek system should be designed to operate in compatibility with the wider EU framework rather than as an isolated national database.

The Society specifically points to EU rules and instruments relating to food traceability, labelling, official controls and honey-origin requirements, including Regulations 178/2002, 931/2011 and 2023/2652, and Directives 2011/91 and 2024/1438.

This European dimension is crucial.

If digital traceability is to follow honey across borders, national systems will need to communicate effectively with the European regulatory and control infrastructure.

What happens next?

A further issue is that the draft bill leaves important elements of the "e-

honey" system to future ministerial or joint ministerial decisions.

According to EEEM key questions—including the precise scope of the platform, registration procedures, inspections, responsibilities of competent authorities and implementation of sanctions—remain to be determined. Society argues that the legislation should establish the basic principles and minimum requirements of the system, leaving subsequent regulatory decisions primarily to deal with technical and procedural details.

The Society ultimately supports the creation of "e-honey", but says its success will depend on whether it becomes more than an electronic accounting system.

Its proposed model is broader:

traceability from hive to shelf, from importation to consumer, combined with controls on traders and importers, monitoring of blends, digital links between imported batches and commercial documentation, and laboratory verification of authenticity.

For Greece, the proposed system could therefore become an important test of how digital traceability can be applied to one of Europe's most closely scrutinized food products.

The central challenge is straightforward: knowing where honey has been is not necessarily the same as knowing what honey is.

For "e-honey" to deliver on its promise, both questions will need credible answers.

Andreas Thrasyvoulou

Emeritus Professor, Aristotle University of Thessaloniki

Secretary General of EEEM-S and EBA representative in established Working Group of Greek Ministry of Rural Development and Food

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WINTER FOOD STORES
AND THEIR UTILISATION

The quantity, quality and distribution of winter food stores have a major influence on a colony's ability to overwinter successfully. Both scientific research and practical experience have conclusively shown that honey reserves should be natural, plentiful and properly distributed, with adequate stores of bee bread on at least two or three combs.

By the beginning of November, honey stores should under no circumstances fall below an absolute minimum of 20 kg. A considerably safer target is 25–30 kg. With reserves of this size, there should normally be no need to consider stimulative feeding in spring. Farrar (1966) recommended a minimum of 27 kg of honey for the entire wintering period in the southern United States and 40 kg in the northern regions.

In practice, a beekeeper can never determine the amount of honey in a colony with complete accuracy; it can only be estimated. In an average winter, even the comb containing the least honey should have a honey band at least 12 cm deep. In some years, even this may prove insufficient, which is why beekeepers who provide more generous honey reserves can face the winter with considerably greater peace of mind.

The argument that a deep honey band restricts the bees is not convincing. Modern beekeeping is largely based on multi-storey hives, and an additional box containing empty comb can

always be placed beneath the box containing the honey stores. Part of the winter cluster can then occupy this empty comb.

The recommendation to provide substantial food reserves deserves further explanation. K. G. Ribakhuk of Petrograd found that the importance of honey extends beyond its obvious role as food. Honey is also an excellent thermal reservoir: it absorbs heat from the surrounding air during the day and releases it during cold nights. Large stores therefore help to stabilise the thermal environment of the brood nest and contribute to maintaining the colony's strength and vitality.

If the difference between daytime and nighttime outdoor temperatures is 14 °C, ranging from –1 °C to +13 °C, the presence of 20 kg of winter stores can reduce the corresponding fluctuation within the hive to about 7 °C, from +3 °C to +10 °C. Research has demonstrated a clear advantage in maintaining honey reserves of 30–35 kg compared with the previously recommended 20–25 kg.

Genetic factors have also been shown to exert a considerable influence on the foraging activity of workers and on how economically they use stored food, consequently affecting the amount of honey and bee bread accumulated for winter (Cale & Rothenbuhler, 1975; Kulincevic, 1974; Milne, 1977; Free, 1980).

A great deal has been written about food consumption during winter. Particularly interesting are the conclusions of Dr Gerhard Liebig, who, after many years of research and measurement, found that despite considerable effort he was unable to identify any rule governing winter food consumption that applied consistently to all colonies.

Food consumption simply varies too widely. It could not be reliably related to colony strength or location, nor to the quality of the food stores or the bees themselves. No single rule could therefore be established on which beekeepers might safely rely. Even colonies similar in strength and other readily observable characteristics did not consume comparable quantities of food.

Liebig cites the example of some of the strongest colonies, which preliminary assumptions suggested should consume approximately the same amount of food. In fact, their consumption ranged from 6.5 to 12 kg — a difference so large that it cannot readily be explained by what we currently know about honey-bee biology. He also attempted to determine the influence of environmental and climatic conditions, again without obtaining a clear relationship. His practical

recommendation to beekeepers was therefore simple: never draw general conclusions from measurements made on a single colony.

P. Lavi (1954) reached a similar conclusion regarding other parameters. He found empirically that during winter the temperature of colonies comparable in strength and food reserves could differ by as much as 9 °C. The strongest colonies with the largest food reserves were not necessarily the "warmest".

Dr Gerhard Liebig measured winter honey consumption between 1989 and 1993 in 100 colonies distributed among 15 apiaries at elevations ranging from 290 to 800 metres above sea level. The Institute of Apiculture at Hohenheim itself lies at an elevation of 407 metres.

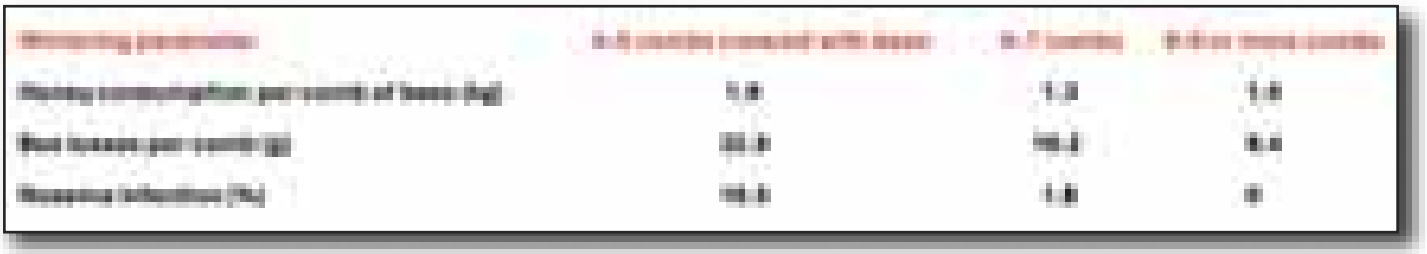
Average honey consumption between September and February ranged from 8 to 13 kg, with

an overall mean of approximately 10 kg. During this period, consumption did not differ significantly between warmer and colder locations. Differences became apparent only in March and April. In years when February was warmer than average, honey consumption during that month increased, almost certainly because of increased brood rearing.

During winter, bees consume only as much food as they require, and strong colonies use considerably less food per individual bee than weak colonies. Albert (1975), in measurements conducted over 145 days, found that a colony containing 1 kg of bees consumed an average of 50 g of honey per kilogram of bees per day. A colony containing 2 kg of bees consumed 30.5 g, while strong colonies containing more than 3 kg of bees consumed only 25 g of honey per kilogram of bees per day.

Overall, colonies consume approximately 10 kg of food by the beginning of March. At that point brood rearing expands rapidly, and food consumption rises accordingly.

According to M. V. Zherebkin (1979), the amount of food consumed during winter depends significantly on colony strength. The relationship is illustrated clearly in the following table:



It is useful to know that food consumption is lowest at an outdoor temperature of approximately 6 °C. According to G. D. Bilash, N. I. Krivtsov and V. I. Lebedev, the optimum outdoor temperature for overwintering strong colonies of Central Russian bees is 4.4 °C, compared with 5.5 °C for medium-strength colonies and 7.7 °C for weak colonies.

At temperatures above 7.7 °C, the winter cluster begins to loosen and the bees increase their food consumption.

Betts (1943) likewise found that bees use their honey reserves most efficiently at outdoor temperatures between 6 and 8 °C. As temperatures fall further, consumption increases, although not nearly as dramatically as might be expected — an observation first made by Gilbert (1932).

Low food consumption is directly associated with reduced metabolic activity resulting from the absence of brood (Corkins & Gilbert, 1932; C. R. Ribbands, 1964).

Once a colony forms its winter cluster, heat loss is reduced ninefold, while its food requirement is 20–25 times lower than would be expected from measurements made on an individual bee. Metabolic activity and energy ex-


BEES
LIFE

penditure are 250–300 times lower than during the active season.

In my view, these facts may hold part of the explanation for the remarkable longevity of winter bees. Such a substantial reduction in metabolism, combined with the absence of brood rearing, dramatically reduces physiological exhaustion. Moreover, winter bees are reared under particularly favourable conditions and accumulate larger internal reserves, a subject discussed elsewhere in this book.

A. M. Ryamova (1978) clearly indicated that, in addition to the factors already mentioned, the longevity of winter bees is influenced by a particular pattern of larval nutrition that induces changes at an early stage of development. These changes give winter bees measurable physical advantages over summer bees.

It should also be noted that in some solitary insects, winter generations develop at lower temperatures and subsequently exhibit greater resistance to winter conditions. Although direct comparisons between solitary and social insects such as honey bees must be made with caution, N. G. Bilash (1980) investigated whether a comparable phenomenon might occur in bees.

Based on 2,800 measurements collected over three years from Central Russian and Caucasian honey bees, he found that during August — when the greatest proportion of winter bees is reared — colonies reduce the temperature in the brood area by between 0.4 and 1.0 °C. The more winter-hardy the bee race, the greater this reduction tended to be. There is no direct evidence that this decrease in brood temperature actually improves winter hardiness or extends the lifespan of the bees, although the author of the study strongly supported this hypothesis.

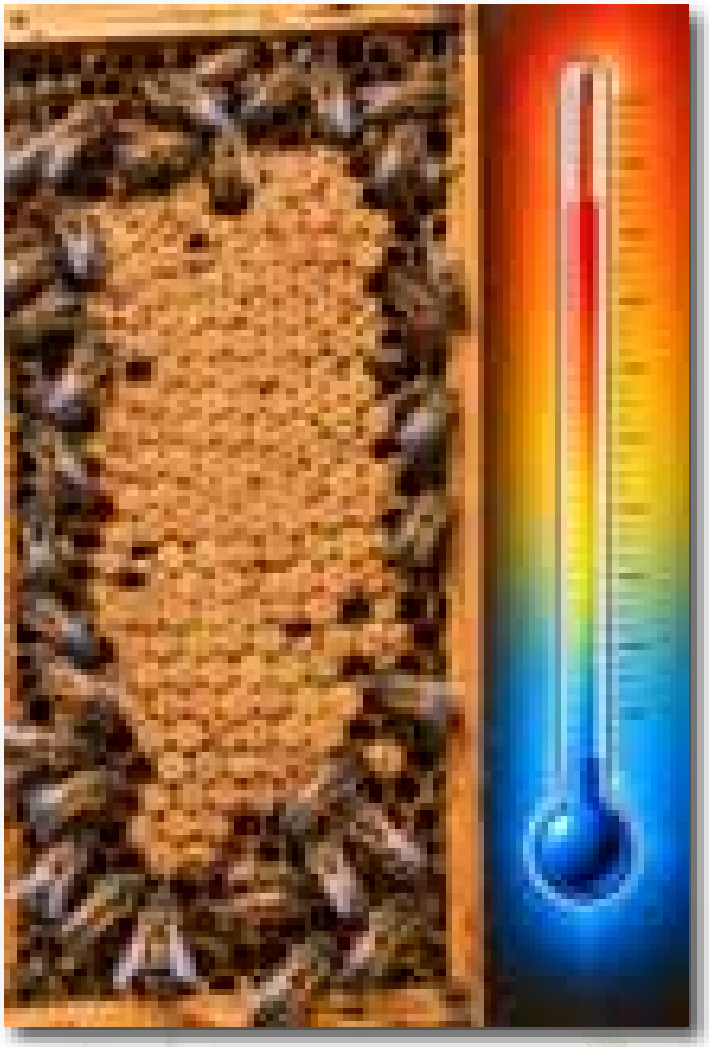
Brood temperature and Varroa

The physiological reduction in brood temperature during the period when winter bees are being reared has acquired a new significance since the arrival of Varroa.

Research has suggested that selecting honey-bee strains in which worker development is shortened by one day — from 21 to 20 days — could substantially, perhaps even dramatically, reduce the damage caused by Varroa. The reason is that the mite reaches sexual maturity towards the end of the bee's development. The shorter the developmental period of the host, the fewer fertile female mites can complete their development and subsequently reproduce. Conversely, the longer brood development lasts, the greater the number of fertile female mites that can emerge, increasing the damage to the colony.

Because the physiological reduction in brood temperature during August and September prolongs brood development by at least several hours, it may directly increase the number of fertile female Varroa mites that successfully emerge.

A similar situation may occur in apiaries where screened bottom boards are left open throughout the entire season — a practice that, in my view, is undesirable for several reasons. The temperature of brood situated close to the



screen may remain somewhat lower, potentially favouring greater Varroa reproduction. During cold nights, even very strong colonies may be unable to maintain brood temperature within the strictly optimal range under such conditions.

Something similar may occur during particularly cool months in otherwise average years. This may be one of the reasons why Varroa infestation is often greater in cooler years and lower in warmer ones. In practical terms, screened bottom boards should therefore be kept closed during summer and open during winter. This subject will be discussed in greater detail in a subsequent article.

The winter cluster and comb

Approximately 75% of the winter cluster occupies comb containing empty cells, while the remainder covers comb containing honey and pollen. Empty comb is thought to provide particularly effective thermal insulation. If circumstances force bees to form their cluster entirely on honey-filled comb, heat loss may be three times greater than normal.

There is a widespread misconception among beekeepers that bees prefer to rear brood in old comb. This idea is not consistent with the behaviour of bees under natural conditions: colonies tend to store honey in older comb previously used for brood rearing while constructing fresh comb for brood.

Observations by a number of practitioners and researchers (Betts, 1934; John Free, 1994) likewise indicate that bees prefer relatively young comb for brood rearing.

When bees overwinter on dark, old comb, crystallisation of the stored food has been reported to be 45% greater; 58% more colonies emerge from winter showing signs of dysentery; and colony mortality is 12% higher than among colonies overwintering on light-coloured comb.

Unfortunately, traditional beekeeping methods often work against the bees' natural tendency to store honey in comb previously used for brood and to extend the brood nest onto newer, lighter comb. Bees first fill the dark comb intended by the beekeeper for brood rearing with nectar. This progressively reduces the space available to the queen for egg laying and may become an important factor in the development of the swarming impulse, particularly in spring.

Furthermore, beekeepers who retain old comb in the brood nest may face greater Varroa infestation. It has been demonstrated that brood cells in old comb are more than four times as likely to be infested by Varroa as cells in light-coloured comb (Giancarlo A. Piccirillo & David De Jong, 2004).

It is precisely because of the broodless period and the associated reduction in metabolism that bees conserve their protein reserves, enabling them to begin rearing substantial quantities of brood rapidly the following spring (Khalifman, 1953; O. P. Sharma & Rajesh Garg, 1984).

A bee that becomes separated from the winter cluster is unlikely to survive. It rapidly chills and loses the ability to fly, entering a state of cold-induced paralysis commonly known as chill coma. The minimum body temperature at which a honey bee can take flight is approximately 27 °C. During flight, body temperature is around 38 °C, while temperatures as high as 47 °C have been recorded (Heinrich, 1980).

The activity of the flight muscles ceases completely when the bee's body temperature falls to 10 °C. If such a bee is brought into a warm room, its body temperature will rise by approximately 1.5 °C per minute.

Hive design and wintering

V. N. Zhukov (1985) reported research into the overwintering of honey-bee colonies. He concluded that bees overwinter relatively poorly in the conventional Dadant–Blatt (DB) hive because the cluster assumes a flattened shape, with insufficient space to form its more natural configuration.

By contrast, he found that colonies overwintered very successfully in eight-frame Langstroth–Root (LR) hives with 20 cm of space between the frames and the bottom board — effectively a deep floor created by an empty shallow box.

Colonies in these hives consumed 36.9% less food than those in DB hives. The quantity of faecal matter in the hindgut of individual bees was only 25.2 mg, compared with as much as 46.8 mg in bees kept in standard DB hives. During the following season, the eight-frame LR colonies also produced 56.8% more honey than colonies kept in DB hives.

The quality of winter stores

Although relatively little attention is sometimes paid to the quality of winter food reserves, they affect not only overwintering itself but also the colony's subsequent spring development. The conclusion is that floral honey accompanied by adequate quantities of bee bread provides the best conditions for successful overwintering and normal colony development.

It is worth considering here the long-established belief that so-called "forest honey" is unsuitable for overwintering bees. Practical experience is divided. Most beekeepers maintain that bees develop dysentery because forest honey leaves large quantities of indigestible material in the hindgut. A smaller group, however, report that their colonies have overwintered extremely well and developed normally in spring while feeding exclusively on dark forest honey.

The outcome undoubtedly also depends on the severity of the winter and the length of the period during which bees are unable to make cleansing flights.

G. F. Taranov emphasised that winter honey stores containing honeydew do indeed produce more indigestible residues. In two experiments, the quantity of undigested material produced from honey containing honeydew was 34.2–35.9% greater than that produced from floral honey. Taranov nevertheless considered this increase relatively small and insufficient in itself to explain the occurrence of dysentery during winter.

An important distinction must, however, be made between honey produced from honeydew of animal origin — principally the excretions of plant-sucking insects such as aphids — and honey produced from sugary secretions released directly by plants.

Unlike nectar, honeydew does not contain the same range of phytoncides and other antimicrobial substances capable of suppressing microbial growth. Microorganisms can therefore multiply in honeydew while it is still present on the leaves, altering its composition and producing substances potentially harmful to bees. By evening, honeydew that was initially light in colour may already have become dark.

Other substances harmful to bees may originate from the aphids themselves. Products resulting from the breakdown of their proteins can damage cells of the rectal glands in the bee's hindgut and interfere with water reabsorption,

thereby contributing to dysentery. In other words, the diarrhoeal condition is attributed to intoxication by degradation products rather than simply to the physical accumulation of indigestible material.

G. F. Taranov reported that a bee fed exclusively on oak honeydew may have its lifespan reduced by as much as 76%. During winter, colonies tend to develop dysentery only when honeydew constitutes the predominant component of their stored honey.

This helps to explain why beekeepers report such widely differing experiences with so-called forest honey during winter. In practice, it can sometimes be extremely difficult to determine whether a particular forest honey originates primarily from plant secretions or from honeydew produced by sap-feeding insects.

Following the severe colony losses in the former West Germany during the winter of 1962/1963, Steche identified the fact that large numbers of colonies had overwintered on pine honeydew as one of the factors associated with the subsequent severe outbreak of Nosema disease in spring.

MD Rodoljub Živadinović

Epidemiology specialist, apitherapist

President of the Serbian Federation of Beekeeping Organization's

EBA Vice-President for promotion and international cooperation

apikult@gmail.com

DIUTINUS BEES:

PHYSIOLOGICAL DIFFERENCES, LONGEVITY AND AGEING

This article examines the importance of diutinus bees to colony survival and the performance of an apiary throughout the year. It considers the physiological differences between long-lived and short-lived workers and explores how ageing in honey bees is regulated.

After the drones have been expelled, the colony—now consisting of the queen and worker bees—begins preparing for winter. The workers undergo physiological changes, while the colony enters winter with stores of honey and bee bread. The bees themselves accumulate protein reserves, principally in the fat body, hypopharyngeal glands and haemolymph. They become long-lived workers equipped to withstand the demands of winter.

Researchers commonly use the term *diutinus bees* for these long-lived workers. The Latin word *diutinus* means “lasting a long time”. Because seasonal conditions usually favour their development before winter, they are often called “winter bees”. Yet the conditions that produce long-lived workers can also arise in summer, as the studies discussed below demonstrate.

Although diutinus workers can live for many months, that longevity is ultimately spent in the service of colony growth, generational replacement and reproduction. When and why do these bees develop? How long do they live? What happens within their bodies to make such longevity possible?

Physiological differences

Workers that enter winter in the diutinus state differ physiologically from nurse bees and foragers produced in spring and summer. In temperate climates, they form the worker population that sustains the colony through winter. Their protein reserves are concentrated mainly in the fat body and haemolymph, although reserves also accumulate elsewhere in the body. Under favourable wintering conditions, diutinus workers age very slowly while their protein reserves decline gradually (Maurizio, 1954).

As early as 1921, Adrienne Koehler identified substantial physiological differences between summer and winter bees. Bees entering winter contained stores of fat and protein-rich globules that had not previously been observed in summer bees. The fat body consists largely of thin layers of cells distributed throughout the body and along the abdominal wall, where they form loosely ar-

ranged lobes of extensively tracheated tissue (Figure 1).

Figure 1. Photograph: Dr S. Ramsay.

Fat-body cells, or adipocytes, synthesise many of the proteins and circulating metabolites found in the haemolymph. They also produce antimicrobial peptides involved in the insect's humoral immune response. Humoral defence includes both the production of antimicrobial peptides and melanisation, an important response to injury and infection. Melanins are pigments deposited at sites of tissue damage or infection. Phenoloxidase, a key enzyme in melanin synthesis, contributes to the individual bee's immune defence. In insects, this soluble protein occurs in the haemolymph and in several types of haemocyte (Castillo et al., 2006; Williams, 2007).

The fat body also stores glycogen and triglycerides needed for development and reproduction (Arrese and Soulages, 2010). Fat-body reserves tend to decline as bees age, while younger bees have a greater capacity to synthesise antimicrobial peptides (Brown et al., 2003; Wilson-Rich et al., 2008).

The fat body and the accumulation of protein reserves

Koehler (1921) observed protein reserves accumulating in the fat bodies of bees that appeared in September and disappeared by March. Himmer (1930) subsequently reported that bees used these reserves to rear brood in spring and that their fat bodies diminished after brood rearing. These observations prompted further investigation.

Kratky (1931) found that the hypopharyngeal glands of most winter bees were as fully developed as those of spring and summer nurse bees. Ewenius (1937) confirmed this finding. He marked newly emerged workers on 31 August and 23 October and dissected them during winter. Despite a difference of seven and a half weeks in their ages, he found no difference in hypopharyngeal-gland development between the two groups.

In 1939, Ruth Lotmar, who had studied and later worked with Karl von Frisch, examined the development of the hypopharyngeal glands and fat body over two successive winters. She recorded an increase in nitrogen content in the abdomen, including the gut, and in the head of winter bees.

Her findings indicated that protein reserves rose in autumn as bees consumed substantially more pollen.

Pollen consumption was greatest in September, somewhat lower in October and very low in November and December. It increased again in January and February, reached a peak in March, and then fell sharply to the usual spring level associated with brood production.

Lotmar (1939) found that the hypopharyngeal glands enlarged first, followed by development of the fat body. The proportions of bees with well-developed glands and fat bodies became similar only during winter; they diverged again when brood rearing resumed. In September, 20% of bees had a developed fat body and 58% had well-developed hypopharyngeal glands. In October, the respective figures were 56% and 84%. From November to January, approximately 75% had a developed fat body and 77–78% had well-developed hypopharyngeal glands.

In February, 60% of bees had a developed fat body and more than 80% had well-developed hypopharyngeal glands. By March, the figures had fallen to 15% and 50%, respectively. In April, no bees in the sample were recorded as having a developed fat body, although 50% still had well-developed hypopharyngeal glands.

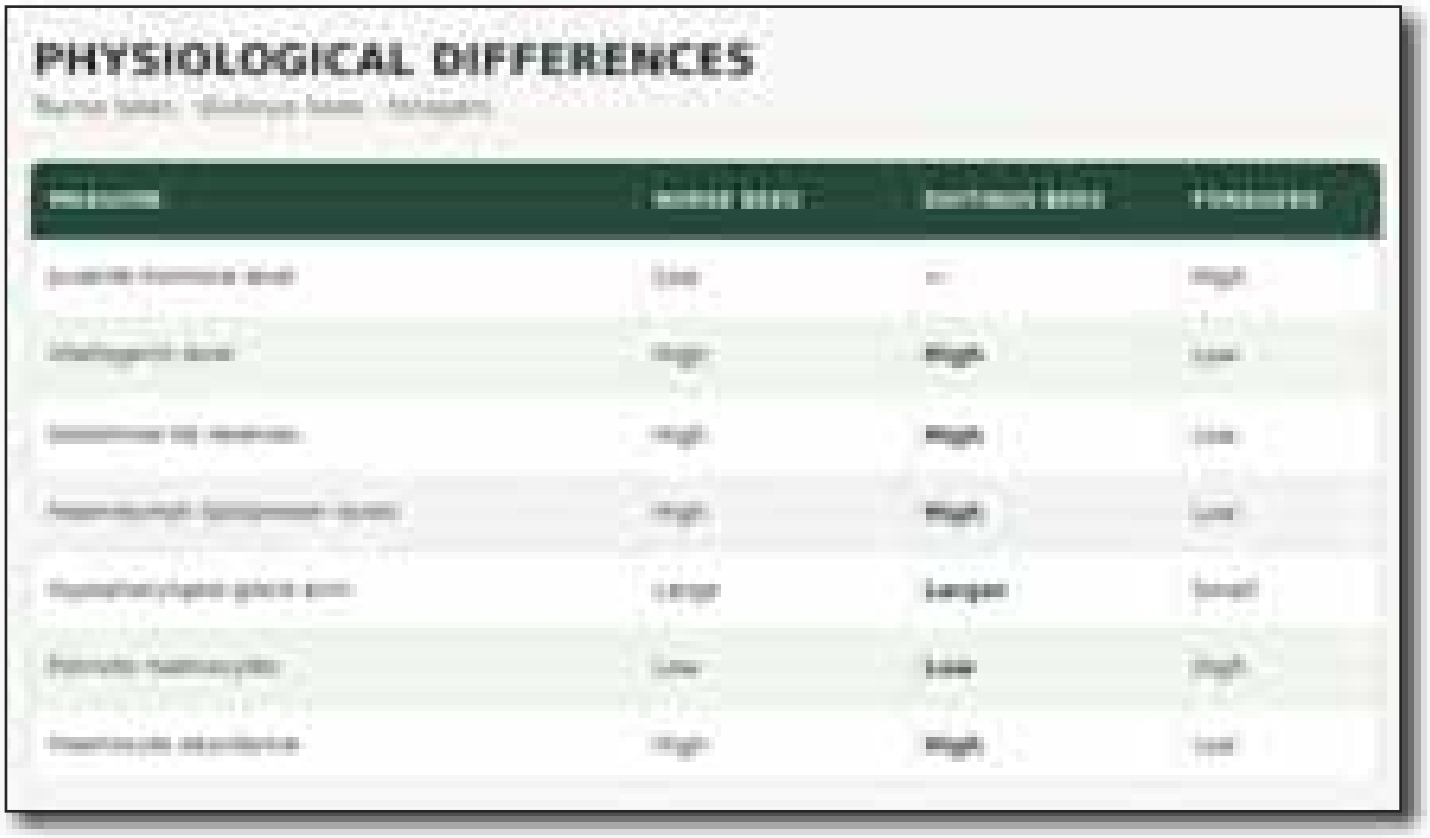


Table 1.
Physiological differences among nurse bees, diutinus bees and foragers (Goe M. Graham, 2015).

"Super-nurse" bees

Diutinus bees might be described as a kind of "super-nurse" bee. They share several physiological characteristics with young spring and summer nurses: low juvenile hormone levels, large hypopharyngeal glands—slightly more developed in diutinus bees—high concentrations of lipids and proteins in the haemolymph, and a well-developed fat body (Fluri et al., 1977, 1982; Koehler, 1921; Maurizio, 1954; Shehata et al., 1981; Table 1).

Compared with nurse bees and diutinus winter bees, foragers have a higher proportion of pyknotic haemocytes—immune cells undergoing nuclear pyknosis and cell death—which may impair immune function (Amdam et al., 2004; Rutz et al., 1974; Wille and Rutz, 1975). Summer and diutinus bees differ in other respects as well. One notable finding is that winter bees have greater antimicrobial activity in their haemolymph than summer bees, potentially helping them resist infection during winter (Dostálková et al., 2021). By contrast, carbohydrate and lipid concentrations in haemolymph appear relatively stable across the year, with no substantial changes associated with seasonal development (Kunert and Crailsheim, 1988).

Ptaszyńska et al. (2018) reported higher concentrations of several elements in summer bees: aluminium, copper, phosphorus and vanadium; calcium, potassium and magnesium; chromium, selenium and zinc; and the toxic elements arsenic and mercury.

Winter diutinus bees, by contrast, had higher concentrations of iron, manganese, nickel and cadmium. *Nosema* infection had a greater effect on elemental composition in winter diutinus bees than in summer bees. The authors suggested that infection-related reductions in iron, manganese, nickel and sodium might contribute to increased mortality during wintering (Ptaszyńska et al., 2018).

Lipofuscin

Pigments found in cells and tissues have long been investigated as possible markers of ageing. Light microscopy revealed such pigments in many organs and in cultured cells. Electron microscopy, histochemistry and biochemical methods have since helped researchers investigate their origins, accumulation and possible physiological significance.

These pigments are commonly referred to as ageing pigment, ceroid or lipofuscin. Numerous studies have associated cellular lipofuscin accumulation with physiological ageing. Its concentration varies among tissues and organs and is influenced by internal regulation as well as environmental conditions, including diet, physical activity, stress and hygiene. In honey bees, summer and winter workers differ in the extent of lipofuscin accumulation (Figure 2).

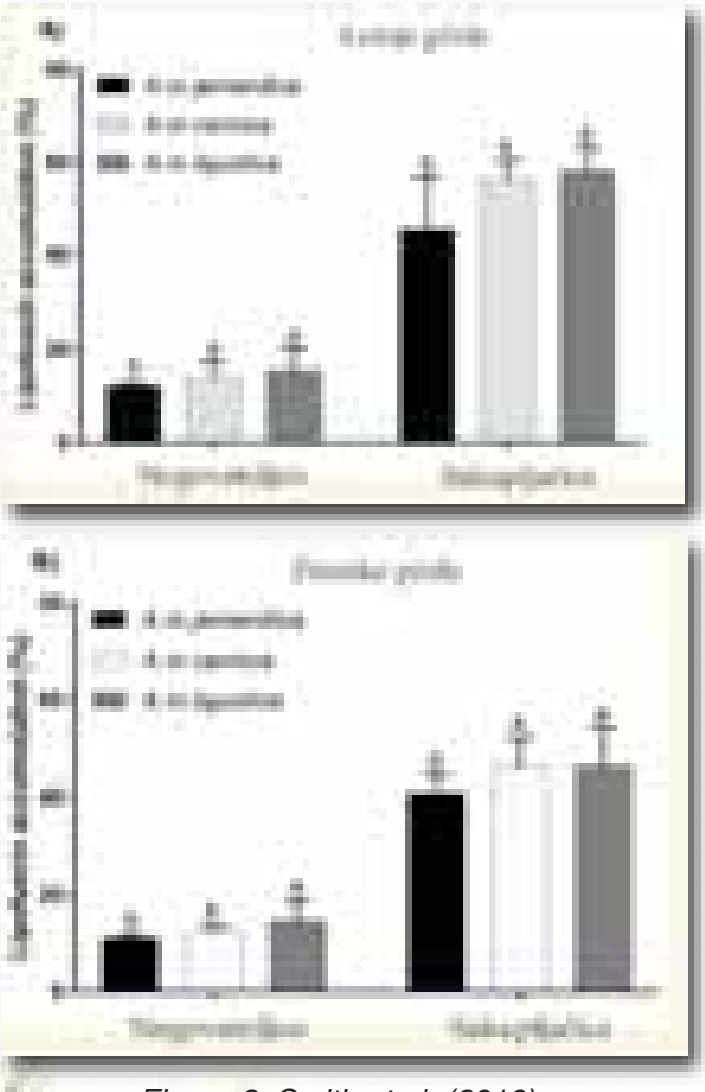


Figure 2. Smith et al. (2019).

Protein oxidation by free radicals and/or peroxidase may play an important part in lipofuscin accumulation (Kato, Maruyama, Naoi, Hashizume and Ozawa, 1998).

Gut flora: the microbiota or gut microbiome

Another distinction among diutinus bees, nurses and foragers concerns the composition of their gut microbiota and the bacterial load within the gut. The adult worker gut is dominated by nine bacterial phylotypes, found mainly in the hindgut.

Five core groups—*Snodgrassella alvi*, *Gilliamella apicola*, the Firm-4 and Firm-5 lactobacilli, and *Bifidobacterium*—occur in adult workers across the world. Other groups, including *Bartonella apis*, *Apibacter adventoris*, *Frischella perrara* and Acetobacteraceae, are common but may be absent from some bees (Raymann and Moran, 2018).

Forager guts. Kešnerová et al. (2019).

Smaller populations of bacteria, often acquired from the environment, may occur in the foregut and midgut (Martinson, Moy and Moran, 2012).

Nurse-bee guts. Kešnerová et al. (2019).

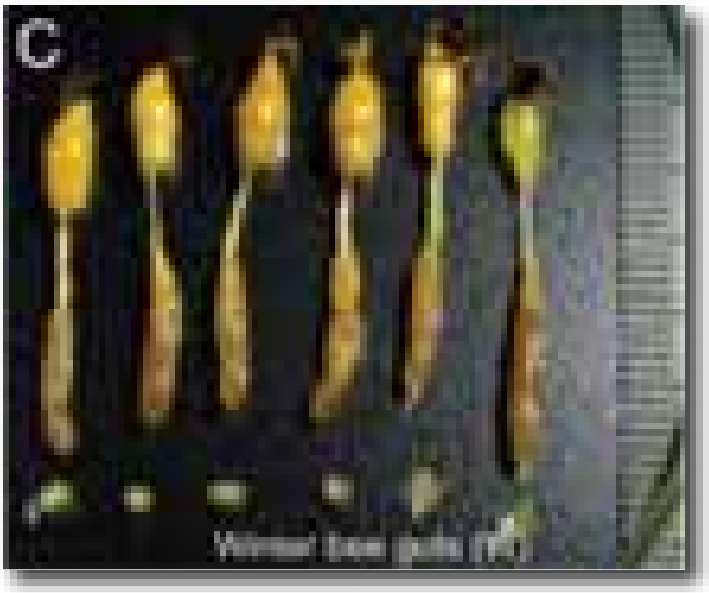


Figure 3. Winter-bee guts. Kešnerová et al. (2019).

These differences may partly reflect diet. Foragers feed predominantly on nectar and honey, whereas nurses and diutinus winter bees consume more pollen (Anderson et al., 2014). The fresh weight of the hindgut in foragers is approximately half that of spring and summer nurses or diutinus winter bees. Diutinus bees also carry a greater gut microbial load than foragers, with particularly high levels of *Bartonella* and *Commensalibacter* (Kešnerová et al., 2019; Figure 3). Antibiotics and exposure to agrochemicals can disrupt the gut microbiota and may increase bee mortality (Raymann, Shaffer and Moran, 2017). This matters to beekeepers because studies have found that substances including chlorothalonil, thiacloprid, imidacloprid, glyphosate and coumaphos can alter aspects of gut-microbiota structure or function. Such disruption may increase susceptibility to infection and adversely affect bee health (Anderson et al., 2016; Motta et al., 2020; Bommuraj, Chen et al., 2021; Flores et al., 2021; DeGrandi-Hoffman et al., 2021; Tarpy et al., 2021; Miotelo et al., 2021; Alberoni et al., 2021). Protecting the workers that will overwinter from contamination is therefore particularly important.

The expression “winter bees” can suggest that these workers are produced only in winter or can arise only in preparation for it. In fact, they are generally reared in late summer and autumn. Like other workers, they acquire their distinctive physiology in response to particular conditions. “Late-summer and autumn bees” would describe when they are produced; “winter bees” describes the season they survive. Their lives may extend from late summer into early spring, and sometimes longer.

Workers can also enter the diutinus state in spring or summer. If such bees were moved to a region experiencing winter, they might likewise be capable of enduring winter conditions. Their long-lived physiology is therefore more informative than the season in which they developed.

Factors leading to the diutinus state

Among the most important factors associated with the development of diutinus workers are a sustained reduction in brood, potentially to complete broodlessness, and the accompanying decline in brood pheromone or larval signals. Reduced foraging activity and changes in juvenile hormone titre also contribute (Smedal et al., 2009; Fluri et al., 1982; Maurizio, 1950). Brood emits a mixture of fatty-acid esters, among which methyl oleate and ethyl oleate are prominent (Figure 4).

Figure 4. Open brood.

Trouiller et al. (1992) reported the following proportions of compounds associated with four- and five-day-old larvae: methyl palmitate 5%, ethyl palmitate 7.5%, methyl stearate 8.5%, ethyl stearate 11%, methyl oleate 18%, ethyl oleate 21%, methyl linoleate 6% and ethyl linoleate 2%. The source text also gives “methyl” at 10.5%, without identifying the compound, and ethyl linolenate at 10%.

When the amount of open brood declines, exposure to these larval signals falls. Vitellogenin production can then increase, contributing to the physiological state associated with long-lived workers, a developed fat body and enlarged hypopharyngeal glands (Figure 5).

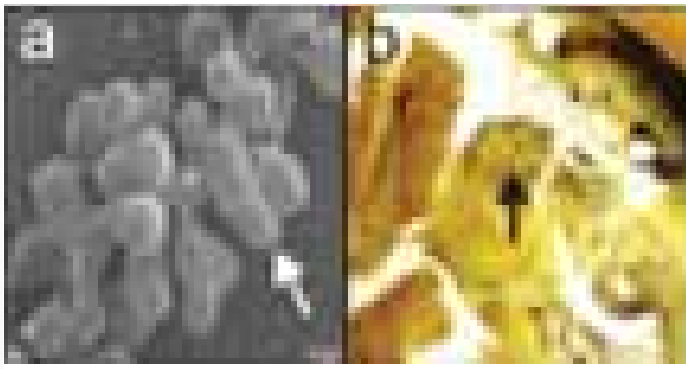


Figure 5. Hypopharyngeal gland (a) and fat body (b). Graham Kingham, 2021.

These processes matter whether the change occurs before winter or during spring or summer. Foraging is generally more intense in the warmer seasons, but the ability to produce long-lived workers is not confined to autumn.

The familiar explanation that summer bees die young simply because brood rearing wears them out, while autumn bees are spared because they rear less brood, is incomplete. Work in the hive may affect lifespan, including through oxidative stress, but changes in physiology and the transition from in-hive duties to foraging are also central. Reduced brood rearing in late summer and autumn matters in part because it is associated with increased vitellogenin production.

In a normally developing summer colony, workers commonly progress from in-hive tasks to foraging. Nurse bees may begin foraging as early as four to seven days after emergence (Amdam

and Omholt, 2002), before they have spent much time rearing brood. The transition is associated with a marked decline in vitellogenin and an increase in juvenile hormone titre (Figure 6). Once bees become foragers, the pace of ageing increases.

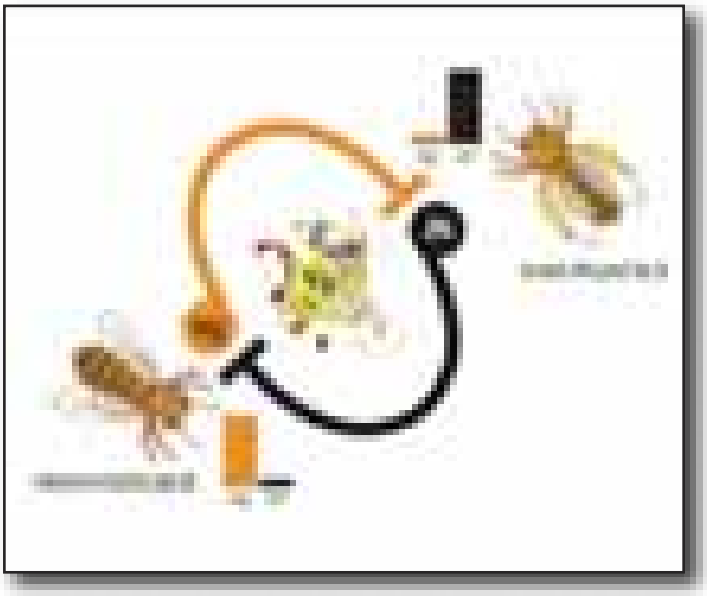


Figure 6.
The transition from nurse bee to forager.

One proposed link between declining vitellogenin and ageing involves zinc and haemocytes. A fall in vitellogenin may reduce zinc availability and affect haemocyte numbers, weakening cellular immune defence. In the presence of normal brood signals and active foraging, vitellogenin levels tend to fall as workers make the transition to foraging. Where brood or brood pheromone is absent, vitellogenin levels may remain higher, the transition may be delayed, and workers may live longer.

A range of studies has examined this relationship. Bees reared without brood or brood pheromone have been reported to retain higher vitellogenin levels into middle age, delay the onset of foraging and achieve greater longevity (Maurizio, 1950, 1954; Eischen et al., 1982; Omholt, 1988; Harbo, 1993; Smedal, Brynem, Kreibich and Amdam, 2009; Alaux et al., 2009, 2010; Döke et al., 2015).

A spell of rainy weather illustrates how colony circumstances can change together. Foraging stops; reduced incoming resources may be followed by a decline in egg laying and, subsequently, less open brood and fewer larval signals. Under such circumstances, a slower transition to foraging could help maintain the worker population until conditions improve.

When a beekeeper finds little or no open brood in late summer or autumn, conditions may favour the development of long-lived workers. In upland and mountainous areas, this process may begin earlier and continue for longer.

The effect on longevity may be particularly strong when both brood and brood pheromone are absent. Smedal et al. (2009) found the highest fat-body vitellogenin levels under these conditions and reported that workers could live for more than 200 days. Vitellogenin appears to be an important component of the regulation of longevity and immunity, although the full set of underlying mechanisms remains to be established.

Some researchers have suggested that the fatty-acid composition of cell membranes may also help explain differences in lifespan (Pamplona et al., 2002; Hulbert, 2005). Fat-body function and vitellogenin remain closely linked to the physiological changes relevant to winter survival (Figure 7).

Figure 7. Trophocytes (tr) and oenocytes (oe), two cell types found in the fat body.

Diutinus bees in spring and summer

Conditions favouring increased vitellogenin production can arise in spring and summer as well as in late summer and autumn. In a queen-

right colony with little open brood, or temporarily no brood, long-lived spring or summer workers may develop particularly substantial fat bodies and hypopharyngeal glands. Greater access to pollen at that time of year may be one reason.

Much of the discussion so far has compared late-summer and autumn “winter bees” with nurses and foragers from normally brood-rearing spring and summer colonies. These comparisons reflect the focus of much of the published research. Earlier work, however, also examined long-lived bees produced during summer.

In 1950, the Swiss researcher Anna Maurizio found that workers in brood-rearing colonies had depleted hypopharyngeal glands and poorly developed fat bodies by 27 days of age. They lived for no more than 38 days. When she caged queens in summer to create a prolonged period without brood, workers aged 144 days still had well-developed hypopharyngeal glands and fat bodies; some survived for as long as 166 days. Maurizio concluded that diutinus workers could also develop in summer when a colony remained without brood for an extended period. Subsequent research likewise associated reduced brood, particularly reduced open brood containing larvae requiring feeding, with increased worker longevity.

Cardona and colleagues (2020) revisited this question using wire cages that allowed queens to lay only a small number of eggs. They compared workers from these colonies with workers from control colonies in which queens laid normally and open brood was present. Their findings were broadly similar to Maurizio’s: workers from colonies with restricted queens survived for up to 154 days, compared with up to 56 days in the controls (Figure 8).

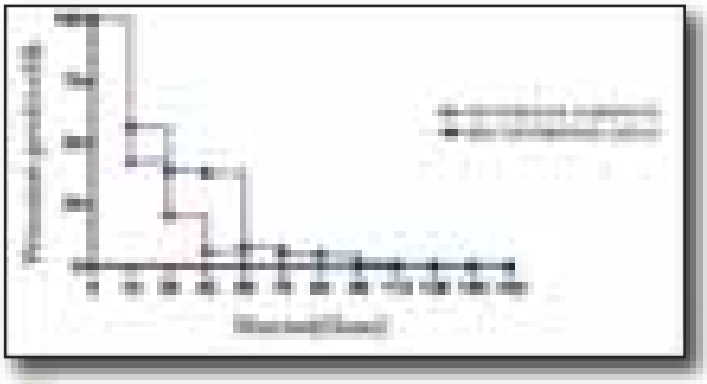


Figure 8. Cardona et al. (2020).

These findings support the use of *long-lived* or *diutinus* workers as the general term, since the physiological state need not be tied to a particular season. Where the distinction is useful, the terms *winter diutinus bees* and *summer* or *spring diutinus bees* make the timing clear.

Beekeepers naturally pay close attention to long-lived winter bees, but long-lived workers produced in spring and summer may also help a colony survive. If brood production falls during a nectar dearth, fewer young bees will emerge to replace the existing workers. Extending the lives of those already present can help bridge the gap.

Diutinus-like workers may also occur around swarming and supersedure, when the area of open brood can decrease.

Before swarming, the queen may be fed less intensively and her laying may be restricted, particularly when substantial nectar is being brought into the hive.

Halberstadt (1966) used protein electrophoresis to examine hypopharyngeal-gland proteins and found that 84–90% of bees in a natural swarm showed protein bands resembling those of diutinus winter bees.

Thus, long-lived workers can arise in spring and summer when brood is deliberately reduced by restricting the queen, as in experimental studies, or when open brood declines because of a shortage of food or another cause. An ageing queen with reduced laying capacity may create similar conditions.

Fluri et al. (1982) found higher haemolymph vitellogenin levels in broodless summer bees than in diutinus winter bees. The physiological differences between the two groups appear relatively small, although some studies report greater protein and vitellogenin reserves in broodless summer workers.

For example, the total haemolymph protein concentration of ten-day-old summer nurses rearing brood was reported as 40–50 µg/µl, of which 32–40% was vitellogenin (Rutz et al., 1976; Fluri et al., 1982).

The reported amount of vitellogenin was 250–400 µg. In broodless summer bees, total protein concentration was 80–100 µg/µl, with 500–800 µg of vitellogenin (Fluri et al., 1982). In winter bees aged 12–165 days, total protein concentration ranged from 40 to 90 µg/µl; vitellogenin

accounted for 32–40%, with reported amounts of 250–750 μg (Fluri et al., 1977, 1982).

These figures suggest that broodless summer bees can accumulate especially large protein and vitellogenin reserves. They may therefore have strong physiological potential for longevity. In spring and summer, however, greater foraging activity may accelerate ageing compared with winter diutinus bees during the period of reduced flight activity.

Seasonal influences

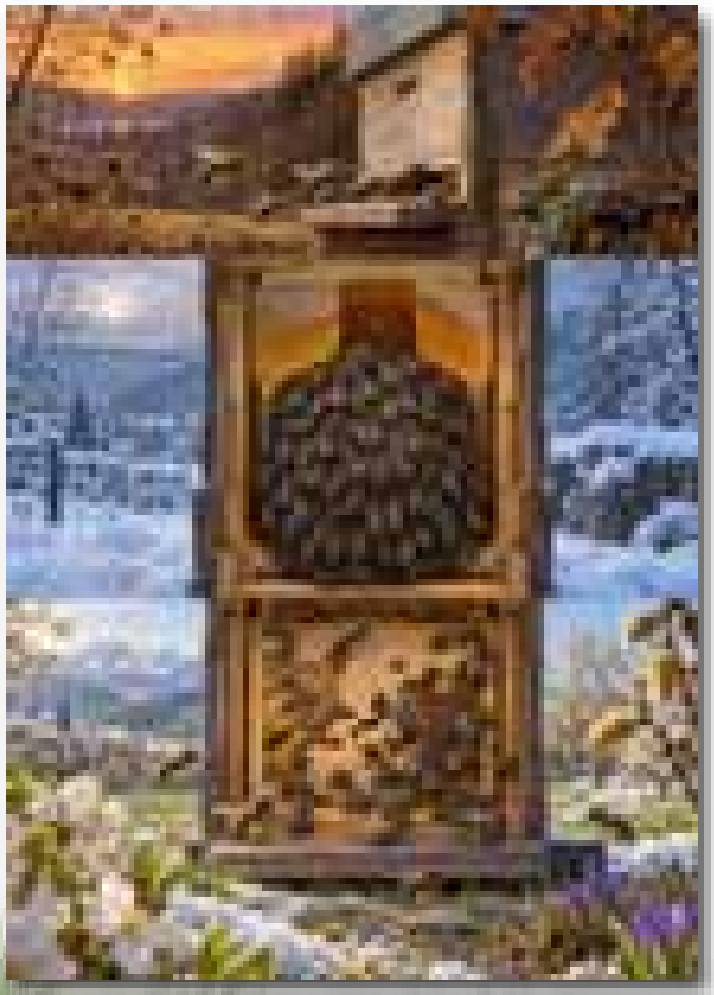
Seasonal changes in day length, temperature, pollen availability and food stores all influence worker physiology and colony behaviour as winter approaches and recedes. Together, they may reduce brood rearing and exposure to brood pheromone—the "larval signal". Foraging activity also falls, affecting juvenile hormone dynamics and the transition from in-hive work to foraging.

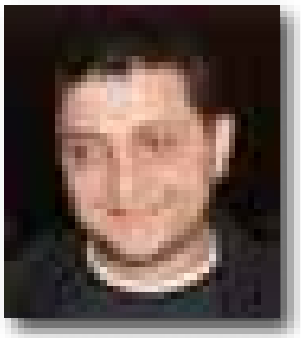
These seasonal influences can therefore favour the development of long-lived workers, particularly as larval signals decline and vitellogenin production increases. Cherednikov (1967) artificially shortened day length in late spring and summer and recorded several differences between treated and untreated colonies. In treated colonies, bees cannibalised brood and eggs; nectar and pollen collection and consumption increased; fat bodies developed more extensively; and workers showed greater resistance to cold and starvation. Bees also aggregated at ambient temperatures of 18–20°C.

Fluri and Bogdanov (1987) likewise reported increased fat-body lipid and protein levels in workers exposed to a shortened photoperiod. Shortening autumn days may contribute to reduced foraging activity, altered juvenile hormone levels and declining exposure to larval signals.

Huang and Robinson (1995) found that foragers in colonies moved into a cool room during summer showed a substantial reduction in the rate of juvenile hormone biosynthesis within eight days. Their experiment could not establish whether this was a direct effect of temperature or darkness, or an indirect consequence of changes in feeding, brood rearing and opportunities to forage.

Kefuss (1978) reported that an abrupt reduction in photoperiod of 15 minutes per day reduced brood production, whereas changes closer to the natural rate of two to three minutes per day did not have the same effect (Fluri and Bogdanov, 1987b). The development of diutinus workers is therefore best understood in the context of several interacting changes as a colony approaches winter.





Milan Jovanović

37A/16 Radoja Krstića St.
37240 Trstenik
Republic of Serbia

+381 37 713 335
+381 62 961 1513

3/114 May Street, Adelaide, South Australia
+61 451 549 929 (Viber)
www.apiarium.rs
apiaryum@outlook.com

CREAMED HONEY QUICK AND EASY

Producing creamed honey can be a challenge for many beekeepers. The finished product often turns out differently from what was intended, leading to needless disappointment. There are, however, only a few basic points to bear in mind.

Many Central European honeys crystallise sooner or later, depending on the ratio of the two main sugars in honey, glucose and fructose. Honeys with a high glucose content, including spring honeys such as oilseed rape, dandelion and fruit blossom honey, crystallise more quickly. If honey is sold in liquid form immediately after extraction, the onset of crystallisation in the customer's home can arouse suspicion that the beekeeper has added sugar. Experience shows that many consumers know little about what happens to genuine honey as it crystallises, and are often misinformed. With nobody at hand to explain the physical and chemical process clearly, they may suspect adulteration.

Rapidly crystallising honeys should therefore be offered in a creamed rather than a liquid form. In places where creamed honey is unfamiliar,

consumers will need time to get used to it. This may take several years, but in the end both customers and beekeepers will be pleased. I can confirm this from my own experience. Creamed honey was once unknown in our area. Today I sell more creamed honey than all the other varieties in my range.

Producing creamed honey can be a challenge for many beekeepers. The finished product often turns out differently from what was intended, leading to needless disappointment. There are, however, only a few basic points to bear in mind.

Broadly speaking, there are two methods of producing creamed honey.

Method 1 has been described in many beekeeping books and will be referred to here as “stirring in step with crystallisation”. What is being followed? The natural course of crystallisation during storage, so that stirring can begin at the critical moment.

Method 1

With this method, crystal formation is monitored by eye. Honey stored in liquid form after extraction begins to turn cloudy. This is precisely the point at which it should be stirred vigorously once to produce creamed honey. Once the honey has crystallised completely, it becomes very stiff, particularly when cold, and turning it into creamed honey takes considerable time and effort. If the right moment is missed, the honey must be stirred several times to produce fine crystals and the smooth texture of creamed honey. When stirring begins too late, this process has to be repeated on several occasions. A powerful electric drill can do the job well, as considerable power is needed. Doing it all by hand is, of course, extremely tiring. Some beekeepers give up when crystals that have not been broken down sufficiently cause the honey to set hard again in the jar: it can then bend a spoon or knife when you try to use it.

Method 2

The second method, “corrective stirring”, also known as the Rapido method, is a relatively new approach that differs fundamentally from Method 1.

The amount of liquid honey remaining in the batch determines how crystallisation proceeds and when it is complete. Despite the beekeeper’s efforts, crystallisation continues, and the honey may still set hard. Automatic stirrers fitted with timers can be programmed to stir at set intervals for set periods, making an optimum result virtually certain. This is difficult to achieve when stirring by hand.

The Rapido method largely removes this uncertainty. Follow the procedure below in the same way each time to obtain a consistent result. It is the quickest way to produce the creamed honey that consumers increasingly want. The Rapido tool also greatly reduces the work and time involved. An estimated 30,000 beekeepers already use this method. Although the special stirring tool was invented some years ago, the method has gained wider acceptance only in the past decade. A little basic knowledge is still needed to make it work properly.

How to do it successfully

Extract the blossom honey and transfer it to storage containers. Leave it in storage until it has crystallised completely. The lower the temperature, the sooner crystallisation will be complete. Honey placed straight into cold storage after extraction will also retain air introduced during extraction. The freshly extracted honey must therefore first be allowed to settle so that foam and small particles rise to the surface. After about 12 hours, it can be skimmed and put into jars. To speed up crystallisation, you can seed the newly extracted liquid honey with honey that already has a fine crystal structure. Add about 200 g of creamed honey to a 40 kg bucket and mix it in with the Rapido at a

low speed. Then put the honey into cold storage. That is all there is to it. If you have not followed this approach to making creamed honey, try the following method.

When you need creamed honey for sale, take a bucket of fully crystallised honey out of storage and warm it to brood-nest temperature (33–35°C). This takes two days in a warming cabinet or water bath for a 40 kg bucket, or one day for a 14 kg bucket. At the end of this period the honey must still look completely crystallised, with no liquid areas; unfortunately, incorrect advice on this point can be found online. It is now soft enough to work easily, without much effort. The surface and the contents of the bucket are warm and soft, but no part of the honey should be liquid.

The crystals in honey warmed in this way can be broken up quickly and easily with the Rapido. The shear forces that break down larger crystals become effective when the tool is run at high speed (500–800 rpm). Pass the Rapido through the honey three times, moving from the top to the bottom of the container. Honey flows through the stirring disc, whose design resembles a ship's propeller, while projections on the underside of the tool break up the crystals. The whole operation takes just two to three minutes, with the drill doing the work. Only one stirring session is needed. Do not run the disc at high speed at the surface of the honey, or a great deal of air will be incorporated.

The honey now consists entirely of broken-down crystals and contains no liquid component. The problem of further crystallisation described under Method 1 therefore cannot arise. The desired result is achieved reliably, provided the procedure is followed exactly.

Stirring honey rapidly after it has been warmed in this way changes not only its crystal structure but also its viscosity and flow properties. If some air is accidentally incorporated during stirring, leave the honey to stand for a while so that the air can rise to the surface. Because the honey is relatively warm, filling the jars is quick and easy. There is another advantage: honey filling machines run smoothly, and their hoppers can be emptied completely.

The Rapido method

The Rapido method offers a number of advantages that make honey processing considerably easier. After extraction, the honey can simply be put into storage. With Method 1, by contrast, the onset of crystallisation has to be monitored so that stirring can begin at the right time. With the Rapido method, the warmed honey needs to be stirred only once. It reliably produces a creamy consistency from batch to batch. A YouTube video at www.biorat.de explains the whole procedure clearly.

This specially designed tool, made from certified food-grade stainless steel, is the only hand-held stirrer suitable for high-speed use in honey. Other commonly available stirrers are not suitable for such speeds. The Rapido can, of course, also be used for slow-stirring methods. It comes in two lengths, with fittings for either an electric drill or a mortar mixer (www.biorat.de). Klaus Wallner originally developed the Rapido for laboratory use, to distribute active substances com-

pletely and uniformly throughout honey. Beekeepers subsequently found that honey processed with it develops an attractive, fine, creamy texture.

Mistakes to avoid

Heating the honey above 35°C

Do not overheat the honey. If it becomes too fluid, larger crystals may escape the shear forces, pass through the tool and remain unbroken.

Processing honey that is partly liquid

Too much liquid honey between the crystals affects the final crystallisation in the jar. As a result, the honey may set hard again during storage.

Starting the Rapido at high speed at the surface

This incorporates a great deal of air, making the honey foamy. The entrained air can take several days to rise to the surface, where it forms foam.

Using an underpowered drill or mixer

For a successful result, the tool must reach at least 500 rpm.

Pulling the Rapido out of the bucket too quickly

Honey will splash across the room.

Buying Rapido imitations

Many inexpensive copies based on the original design are available. The materials used are not certified as safe for food contact, and the workmanship is often poor. Buying a copy is also unfair to the person who developed the original tool at considerable expense and tested it extensively in practice.

Dr Klaus Wallner

University of Hohenheim

State Institute of Apiculture

D-70593 Stuttgart

WallnerKlaus@web.de

A SPECIAL BEE-EQUIPPED WINDOW

Strip's d.o.o. (https://www.strips.eu/en) features a special bee-equipped window in its main office. A unique aspect of the setup at Strip's is that the hive is fitted with a sound system, allowing the sound of the bees to be heard throughout the room. As of today, a special mesh has been installed on part of the hive, enabling air from the hive to circulate into the room.

Read about the benefits here: https://medikoel.com/delci-zraka-v-panju/. https://cebelarstvo-noc.si/cebele-v-oknu-podjetja-strips-d-o-o/

Biodiversity Data Journal (2026) Volume 14, Issue 1: 177–184

Rapid Communication

First record on the invasion and establishment of the Oriental hornet *Vespa orientalis* (Linnaeus, 1771) in Slovenia

Alexandra Papachristoforou‡, Blanka Aleksiev, Eftychia Evangelopoulou‡, Aleš Bozovičar, Simon Gozar and Theofanis Giannoulis‡

‡ Laboratory of Applied Apiculture, Department of Animal Science, University of Thessaly, Gaiopolis Larisa, Thessaly, 41500, Greece
§ Slovenian Research and Innovation Agency, Metelkova ulica 6, SI-1000 Ljubljana, Slovenia
| Laboratory of Biology, Genetics and Bio-informatics, Department of Animal Science, University of Thessaly, Gaiopolis Larisa, Thessaly, 41500, Greece
¶ Beekeepers' Association of Slovenia, Dolič 8, 1000 Ljubljana, Slovenia

Corresponding author: Alexandra Papachristoforou (alexpapa@uth.gr)

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Abstract

This present study reports the invasion and nesting of the Oriental hornet, *Vespa orientalis*, in the coastal area of Slovenia. Five nests of the non-native species were observed in the urban city center of Koper, on the west Slovenian coast. Individuals' samples were sampled, and both DNA analysis and morphological characteristics confirmed that they belong to the *Vespa orientalis* species. Among the specimens females captured, four were identified as *Dolichovespula* (Vespini: genera), fourteen as workers and one as male. Following the first discovery, a further 11 nests of *Vespa orientalis* were detected in cemeteries and villages between 4 and 34 km from Koper. This signals the establishment of the species in Slovenia and the arrival of a serious threat to agriculture, biodiversity, the urban environment and public health.

Key words: Invasive, hornet species, establishment and nesting

Introduction

The Oriental hornet *Vespa orientalis* (Linnaeus, 1771), Hymenoptera, Vespidae, Vespinae) has a wide distribution area, including areas of the warmest places worldwide. It is native to parts of southern Europe, North Africa, and Southwest Asia and it is the only vespid species that can survive desert environments (Archer 1998). Recently, it has been expanding its geographic distribution through human-mediated dispersal and favorable climatic conditions (Matsuura and Yamane 1990, Archer 2012). *Vespa orientalis* is a generalist predator, preying on a wide range of insects, including significant pollinators such as honey bees and solitary bees. Its establishment in new areas poses threats to agriculture, biodiversity, and urban environments (Libby 1964, Beggs et al. 2011). This species nests readily in anthropogenic structures and can reach high population densities, thereby increasing the likelihood of human-hornet encounters and ecological disruptions (Archer 1998). Diverse workers, and even queens in the spring,

activity from honey bees to provide protein for their larvae. Hornets use a highly effective hunting strategy called "hawking", whereby they hover in front of hive entrances and search returning foragers (Arca et al. 2015; Rhodes et al. 2011). Hawking of honey bee brood may decrease or cause completely causing populations to decline. In severe cases, particularly for relatively weak colonies, sustained attack can lead to colony collapse, with some studies reporting losses of up to 30-50% (Papachristoforou et al. 2021; Cappa et al. 2022). Furthermore, scientific studies have shown that Oriental hornets can carry several common honey bee pathogens and parasites. The hornet can act as a mechanical vector, spreading pathogens between different honey bee colonies through predation such as Deformed Wing Virus (DWV) or Nosema ceranae (Zacepins et al. 2015; Power et al. 2024).

While native to European regions such as Cyprus, Greece, South Italy and Albania, during recent years its presence has been confirmed in North Italy (Bessi et al. 2019), Croatia (Čonkovac 2021), Romania (Vlachi and Rusanderea 2021), and Spain (Sánchez et al. 2019). In Slovenia, a country with well-developed apiculture and homeland of the Carniolan honey bee *Apis mellifera carnica* Pollmann, 1879, sporadically *V. orientalis* sightings have been reported close to the border with Italy since 2019. Not the establishment of this invasive species was never confirmed, possibly because of the cold and extended winters combined with the long periods of rain that characterize the Slovenian climate. However, the rise in temperatures during recent years and the proximity of the area to Trieste, where the establishment of *V. orientalis* has been confirmed (Bessi et al. 2019), has possibly enabled the colonization and establishment of the Oriental hornet in west Slovenia. This study describes the recent discovery of nests and potentially reproductive individuals in the city of Koper and its surrounding areas.

Materials and methods

Following information about the presence of *V. orientalis* specimens in the old city of Koper, field observation took place on the 6th of September 2023. Researchers walked and observed visually an area of 0.14 km² and marked the presence of individual Oriental hornets within this area. By monitoring and following the hornet flight pathways, researchers tried to discover the nests and trap specimens for identification. Nest coordinates were noted, and captured individuals were immediately placed in freezers at -20 °C for later genetic and morphological analyses. All dead hornets were weighed and then stored in falcon tubes with ethanol for later analysis. According to their body size, the female hornets were divided in two groups (1 largest and 14 small ones), and the Mann-Whitney test was used to compare the two groups. The observed significance level (p-value) of the test was compared with the Monte-Carlo simulation method utilizing 10,000 randomization cycles (Mehta and Patel 1998). Following the discovery of

Figure 1. Aerial view of Kupari, indicating the locations of the first *Vespa orientalis* nests discovered in the area and the locations where wild-caught hornets were released. Image source: Google Earth.

the first five nests, the Dubrovnik authorities issued a public media announcement providing guidelines and calling on residents to report any sightings or the possible presence of *V. orientalis* nests in their area. Researchers systematically visited each reported location to verify whether the observations were accurate for a 10-day period, between September 7 and October 16, 2025. The coordinates of the nests discovered were noted before authorities destroyed them.

For the genetic analysis, DNA was isolated from the 14 female hornets obtained in Kupari (Figure 1) using PureLink® Genomic DNA Mini Kit (Invitrogen), following the manufacturer's protocol. For the molecular identification of the species, a preliminary study was conducted to identify the mitochondrial DNA regions that could be used as markers for the analysis. A total of 36 complete mitochondrial DNAs of the genus *Vespa* deposited in NCBI (Table 1) were aligned using AliView and the polymorphic regions were also analysed for their suitability. A region mapped in the 16S rDNA gene was selected, one that has been previously reported as suitable for species identification (Saeed et al. 2014). The corresponding segment of the mitochondrial DNA was amplified, using the primers F (5'-ATAAGAC GAGAAGACCC-3') and R (5'-GATTTAGGCTTGTTATTCCC-3'). PCR mixtures (50 µL) contained 20 ng DNA, 1× Taq buffer, 2 mM MgCl$_2$, 0.2 mM of each dNTP, 50 pmoles of each primer and 1 U Taq polymerase. The cycling

Table 1. Title: An exemplary table with a header and several rows

Accession number	Species
1. MZ... (redacted)	
2. [illegible]	Vespa orientalis
3. [illegible]	
4. MZ... (redacted)	Vespa affinis
5. [illegible]	
6. [illegible]	Vespa bicolor
7. [illegible]	Vespa velutina
8. [illegible]	Vespa crabro
9. [illegible]	Vespa dybowskii
10. MZ... (redacted)	
11. [illegible]	
12. [illegible]	
13. [illegible]	
14. MZ... (redacted)	
15. [illegible]	Vespa analis
16. [illegible]	
17. [illegible]	
18. [illegible]	
19. LC744727	
20. LC744728	
21. LC744729	
22. [illegible]	
23. MZ... (redacted)	
24. [illegible]	Vespa mandibularis
25. [illegible]	
26. MZ... (redacted)	
27. [illegible]	
28. [illegible]	
29. [illegible]	
30. [illegible]	
31. [illegible]	Vespa velutina
32. [illegible]	
33. [illegible]	
34. [illegible]	
35. [illegible]	
36. [illegible]	

conditions consisted of an initial denaturation at 95 °C for 3 min followed by 35 cycles of denaturation at 95 °C for 30 s, annealing at 52 °C for 40 s and extension at 72 °C for 1 min, with a final extension at 72 °C for 10 min. PCR products were purified using QIAquick PCR Purification Kit (QIAGEN, Hilden, Germany) and sequenced bi-directionally by Cosmo. Nucleotide sequences were analysed and aligned using BioEdit (Hall 1999). The haplotypes of the analyses were aligned with the respective haplotypes of the species belonging to the genus Vespa, to produce a phylogenetic tree. For their taxonomic assignments using MEGA 11 (Tamura et al. 2021). The sequence of Apis mellifera was used as an outgroup for the analysis.

Results

On the 4th of September 2025, five nests of the oriental hornet were detected in the old city of Kopan, and over 120 observations of individuals were recorded in the area (Figure 1). All nests were found in cavities located in the thick stone walls of old buildings. The entrances of the nests were circular in the walls, at heights of between 2.5 and 3.5 meters above the

ground. Following the first discovery, a further 21 nests of *V. orientalis* were detected in nearby ruins and villages, about 8 to 30 km from Rogovo (see Supplementary material Table S1). All nests were located at heights between 2 and 4 meters above ground level, formed within the stone walls of buildings. Many of the houses and remaining structures in the area follow the traditional Istra Kamen dry-stone masonry style, consisting of double stone walls with a hollow cavity in between. This internal space provides ideal conditions for the development of *V. orientalis* nests. No nests were found at ground level or at low heights.

The morphological characteristics of the 19 queens collected in Rogovo were identical to the taxonomic characteristics of *V. orientalis* (Figure 1A). Females (n = 18) were identified by the presence of a stinger and by counting 11 segments on their antennae. The single male captured was easily identified by the 13 segments of its antennae. According to Archer (1998) *V. orientalis* can be readily recognized by the combination of abdominal color characteristics. The second, the fifth and the sixth gastral tergites (T2, T5, T6) appear entirely reddish or dark brown, while tergites three and four (T3, T4) are mainly yellow with a basal reddish-brown band that extends medially and two small lateral reddish-brown spots (Figure 2B). Furthermore, the head clypeus (Figure 2C) appears yellow (Smith-Pardo *et al.* 2020). Trueadresses were differentiated from workers according to their body weight. The two trueadresses had an average weight of 0.417 g (SEM: 27.4, min: 0.166, max: 0.671) and were significantly heavier than the fourteen workers (p < 0.001), presenting an average body weight of 0.271 g (SEM: 7.5, min: 0.219, max: 0.333).

The DNA analysis revealed three different haplotypes, S1/2/3/1.3, that were aligned with the available sequences of the genus and the phylogenetic tree (Figure 3). As shown in the tree diagram, all three haplotypes were

Figure 1

grouped in the clade of *V. orientalis*. This finding is further supported by the BLAST results, in which all three haplotypes showed maximum similarity with the mitochondrial genomes of *V. orientalis* (NC_034003.1). The DNA analysis confirmed that the *Vespa* samples collected in Kuçovë belong to the Oriental hornet species.

Discussion

The findings of the present study have confirmed the establishment of the Oriental hornet in another country where it is not native. For the moment, there is no evidence about its origin. It cannot be confirmed if hornets reemerged naturally from the area of Trieste (in Italy) or if they were

accidentally transferred to the city of Koper, possibly through shipments. Future analyses have been planned to compare hornet from the area of Trieste to identify the origin of the invasion in Primorska. Koper is Slovenia's largest port and the most commercial gate to the Mediterranean Sea and the world. Recently, world trade has been the vehicle for invasive species expansion as it has been shown by the establishment of V. orientalis in Greece (Thrivaki 2016) and the establishment of Trigo volucina in Europe (Arca et al. 2015). The number of discovered nests and the presence of reproductive individuals (foundresses and males) demonstrates that this species has the potential to expand its territory in Slovenia. Possibly, the Slovenian climate is no longer a restricting factor since the rising temperatures favors the hornets. According to official data from the Environmental Agency of Slovenia, 2019 (when we could assume that the first nest was created in the area) has been the warmest year of the past four decades, reaching a mean temperature of 11.2 °C. Even if temperatures fall to slightly lower levels in the future, V. orientalis might adapt to such conditions. It has been found that Oriental hornet queens hibernating in colder environments present a discontinuous gas exchange cycle pattern leading to a 99% lower standard metabolic rate, which might reflect an adaptation for prolonged diapause suitable for colder and prolonged winter conditions (Cohen et al. 2022).

The invasion of V. orientalis can harm native honey bees directly and indirectly by preying on them, stressing colonies, robbing hive resources, and potentially spreading pathogens. The impact of honey bee predation by invasive species of hornet can be significantly higher than that by sympatric hornets. Coevolving prey-predator relationships allow coexistence among sympatric species (i.e. native hornets and honey bees) and reduce the consequences of predation (Papachristoforou et al. 2007, 2011, Cappa et al. 2021). But with invasive species such relationships may not have the time to develop and the predation pressure on native honey bees by Vespa species might be very high (Arca et al. 2014, Cappa et al. 2021). Slovenia has a unique cultural and ecological reliance on beekeeping – approximately one in every 250 citizens is a beekeeper. Honey bees play a critical role in pollination, supporting plant reproduction and ecosystem stability. However, the high predation pressure from Oriental hornets on native Carniolan honey bees could severely impact Slovenian agriculture in the coming years if control measures are not implemented promptly. Slovenian authorities should strongly support local beekeepers and researchers in trapping the predators and finding and destroying their nests, aiming to the protection and conservation of Apis mellifera carnica.

In addition to the risks that Oriental hornets pose to honey bees, the agricultural sector, biodiversity and human activities in the area will be also affected. Hornets are omnivorous, feeding on a variety of food resources including fruits, insects (including important pollinators) and even corpses of large animals. There are recorded incidents of hornets being

abandoned because of the arrival of the invasive yellow-legged (Asian) hornets (Laure et al. 2024). Farmers often report damage caused to orchards by various hornet species. In terms of public health, hornets can inflict multiple, painful stings on humans (Dacca et al. 2021) and there are reports of fatalities due to severe and allergic reactions (Ono 2021). Hornets may also become a vector of diseases since their stings may transmit important opportunistic pathogens in humans (Chlebicki et al. 2021).

Authors' contributions

[illegible]

Authors' ORCIDs

[illegible]

Acknowledgements

[illegible]

Funding declaration

[illegible]

References

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INVITATION TO PARTICIPATE IN THE INTERNATIONAL SYMPOSIUM APITHERAPY DAY 2027

The Beekeepers' Advisory Service, the Slovenian Beekeepers' Association, in co-operation with the Beekeepers' Association of Styrian Societies, is preparing the next International Symposium Apitherapy Day, which will take place on March 27, 2027 in Slovenia.

Everyone who works in the field of apitherapy – both in practice and in the research and educational environment – is invited to express interest in participating as lecturers at the event. We look forward to expert contributions, research, examples of good practice or innovative approaches in the field of bee products for health and well-being.

In addition to academic and professional lecturers, we also invite commercial providers and companies operating in the field of apitherapy to:

- present their products or services,
- share the results of research related to their activities,
- are included as sponsors of the event with the possibility giving presentation at the exhibition space (stand) or with a commercial lecture.

If you would like to participate, we invite you to send us:

- short description of the lecture or workshop (title and content, up to 100 words),
- short CV or company presentation
- contact details,
- possible interest in sponsorship or booth presentation.

The received applications will be reviewed by the Apitherapy Commission at the Slovenian Beekeepers' Association. If you know anyone else who might be interested, please feel free to forward this invitation or inform us.

Please express your interest by November 15, 2026, via email at: boris.potocnik@czs.si

We look forward to your suggestions, professional cooperation and joint contribution to the development of apitherapy!

On behalf of Fundacja Apikultura and Stowarzyszenie Lokalna Grupa Działania „Krzemienny Krąg", we are honoured to invite you to participate in the national Conference "**Honey Under the Spotlight – What Changes Does the Breakfast Directive Bring**", which will be held on **27 October 2026** in Ostrowiec Świętokrzyski, Poland.

The conference will focus on the implementation of the European Union Breakfast Directive and its impact on the honey market, the quality and authenticity of bee products, consumer protection, and fair competition. The event is expected to bring together approximately 300 participants, including representatives of the beekeeping sector, academia, public administration, inspection authorities, and the food industry.

Best Regards,
Ewa Pająk

PRELIMINARY CONFERENCE PROGRAMME

"Honey under the magnifying glass – what does the Breakfast Directive change?"

Venue and Date:
Kino Etiuda – Municipal Cultural Centre, Ostrowiec Świętokrzyski, Poland
27 October 2026

Scale:
300 participants

Organisers:
Fundacja Apikultura & Stowarzyszenie Lokalna Grupa Działania „Krzemienny Krąg"

1. Conference Objective

Main objective:

To increase awareness among food industry businesses, regulatory authorities and consumers of the need to prioritise authentic Polish honey in light of the implementation of the European Union Breakfast Directive, which came into force on 14 June 2026.

2. Conference Programme

Opening Session

- 09:00–10:00 -Registration and welcome coffee
- 10:00–11:00 -Official opening of the conference, welcome remarks and addresses by invited guests.

Part I – Expert Presentations

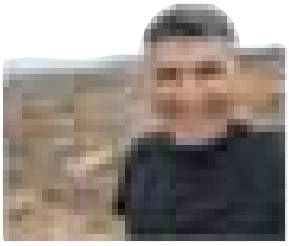
- 11:00-11:20 - Honey Adulteration Practices in the European Union
Peeter Matson and Bernhard Heuvel
- 11:20-11:40 - Honey Fraud in the EU: New Labelling, Old Problem
Prof. Dražen Lušić
- 11:40-12:00 - Presentation
Piotr Blajer and Kamil Baj
- 12:00-12:20 - The State of Beekeeping in Poland – Resources, Economics and Development Potential
Piotr Semkiw, National Institute of Horticultural Research (INHORT)
- 12:20-12:40 - The Breakfast Directive – Responsibilities of Businesses and the Official Control System
Dorota Bocheńska, Chief Inspector of IJHARS

Lunch Break – 12:40-13:40

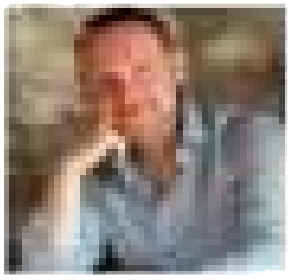
Part II – Presentations and Panel Discussions

- 13:40-14:00 - Honey Origin and Its Value to Consumers
Ewa Waś and Dariusz Teper, HoneyLab
- 14:00-15:20 - Panel Discussion: Fair Rules of the Game – When EU Legislation Meets Market Reality
- 15:20-16:40 - Panel Discussion: Polish Honey as the First Choice – How to Convince Consumers

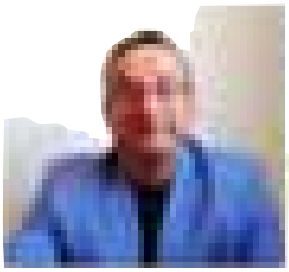
Closing of the Conference – 16:40-17:00



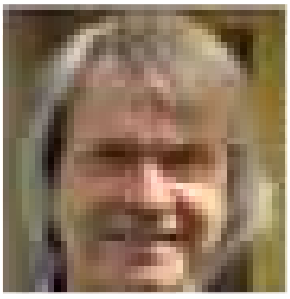
Prof. Miguel Vilas-Boas, PhD (Portugal) – Professor and Dean of the School of Agriculture at the Polytechnic Institute of Bragança, Vice-Chair of the Apimondia Commission for Technology and Quality, and Head of the Propolis Working Group of the International Honey Commission. During the conference, he will present an international perspective on the changes introduced by the Breakfast Directive and explain their significance for increasing market transparency and protecting authentic honey.



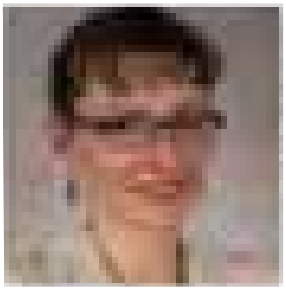
Prof. Drahen Lašić, PhD (Croatia) – Researcher at the University of Rijeka and Coordinator of the International Honey Commission, specializing in honey quality and authenticity analysis. His extensive experience in developing and implementing honey testing methods will demonstrate how science supports the effective detection of honey adulteration and strengthens consumer confidence in honey origin labeling.



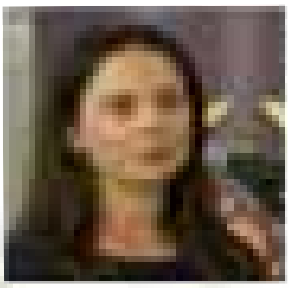
Assoc. Prof. Róbert Chlebo, PhD, Eng. (Slovakia) – Professor at the Slovak University of Agriculture in Nitra and Chair of the Apimondia European Commission. For many years, he has actively contributed to the development of European beekeeping and the promotion of high-quality standards for bee products. During the conference, he will discuss the impact of new regulations on the future of the honey market and the importance of international cooperation in protecting honest producers.



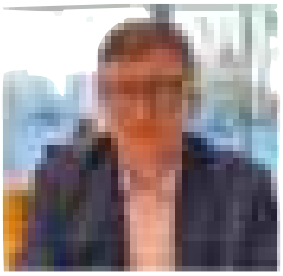
Eng. Etienne Bruneau (Belgium) – Expert at CARI and UCLouvain, former Chair of the Apimondia Commission for Technology and Quality, and long-serving Chair of the COPA-COGECA Honey Working Group. He has been actively involved in initiatives supporting the quality of bee products and the development of European beekeeping. His expertise will illustrate how the new regulations can reduce unfair competition and enhance transparency in the honey market.



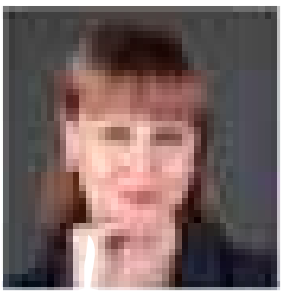
Prof. Aneta Strachecka, PhD, DSc (Poland) – Professor at the University of Life Sciences in Lublin and specialist in honey bee and pollinator health. Her research demonstrates that high-quality honey begins with healthy bee colonies. During the conference, she will highlight the importance of bee protection as the foundation for the production of authentic Polish honey.



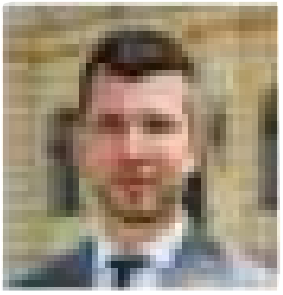
dr Ewa Wiś (Poland) – Co-owner of HoneyLab Topór & Wiś and member of the International Honey Commission. For many years, she has specialized in detecting adulteration of bee products and is recognized as one of Poland's most experienced experts in honey and beeswax authenticity testing. Her presentation will demonstrate how modern laboratory methods support the implementation of new regulations and consumer protection.



dr Dariusz Teper (Poland) – Expert at HoneyLab Teper & Wiś, specializing in pollen analysis and the determination of honey's botanical origin. His expertise will explain how honey origin is verified and why reliable product identification is essential for the effective implementation of the Breakfast Directive.

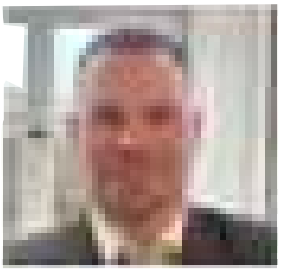


Prof. Paulina Niedźwiedzicka-Rystwej, PhD, DSc (Poland) – Director of the Centre for Experimental Immunology and Immunobiology of Infectious and Cancer Diseases at the University of Szczecin. Her research focuses on the biological properties of bee products and their effects on human health. She will explain why authentic honey is a valuable food product whose quality deserves effective protection.

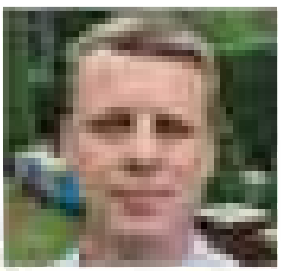


Prof. Michał Białągowski, PhD, DSc, Eng. (Poland) – Professor at the Cracow University of Economics and specialist in food quality and authenticity. For many years, he has conducted research on food safety and methods for verifying food origin. During the conference, he will discuss the significance of the new regulations for the honey market and their role in protecting both honest producers and consumers.

Peeter Matsen (Estonia) – Professional beekeeper and co-founder of Nordmel, a company specializing in premium-quality honey from Estonia's natural environments. Representing the practical side of European beekeeping, he will demonstrate how transparent origin labeling and high product quality contribute to consumer trust and producers' competitiveness.



Bernhard Heuvel (Germany) – Professional beekeeper, founder of the Global Honey Integrity Center (GHIC), and former President of the European Professional Beekeepers Association. For many years, he has been actively engaged in combating honey fraud and increasing transparency in the European honey market. His experience aligns perfectly with the conference theme, highlighting why the implementation of the Breakfast Directive is an important step toward protecting authentic honey and supporting honest European and Polish beekeepers.

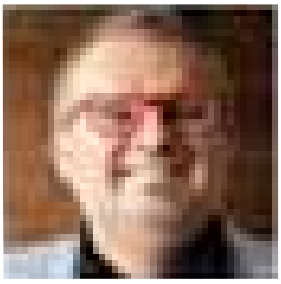


dr Piotr Semków (Poland) – Researcher at the National Institute of Horticultural Research, affiliated with the Apiculture Division in Puławy. He specializes in beekeeping, the economics of beekeeping production, and market analysis of bee products. He is the author of numerous studies and publications on the Polish beekeeping sector, including analyses of the state of beekeeping and the honey market in Poland.

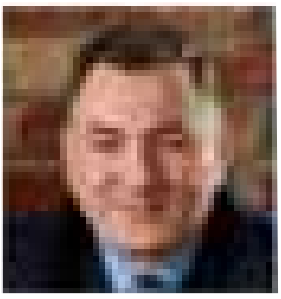
Piotr Bieja (Poland) – Beekeeper and founder of the Królewskie Miody (Royal Honey) brand. An experienced apiarist and owner of the Królewskie Miody Apiary, he combines traditional beekeeping craftsmanship with a modern approach to quality, education, and bee protection. Creator of highly regarded bee products, nature enthusiast, and advocate of ethical and responsible beekeeping.

Michał Lipiński (Poland) – Director of the "Nowe Poland" (Towar Polski) Competition. For over two decades, he has supported Polish entrepreneurs and promoted the development of strong and trustworthy Polish brands. As Director of the prestigious "Towar Polski" program, he is actively involved in recognizing outstanding Polish products, services, and innovative solutions. He is an expert in quality communication, brand reputation management, and the use of quality marks in business development.

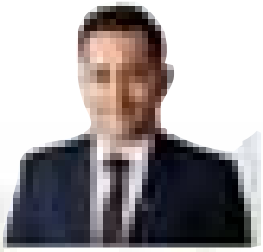
Kamil Bej (Poland) – Experienced beekeeper and co-founder of Pszczelarium, one of the first initiatives in Poland to promote urban beekeeping. For years, he has combined his passion for bees with environmental education, creating pollinator-friendly spaces and raising awareness of the crucial role bees play in urban ecosystems. As a practitioner and advocate of beekeeping, he shares knowledge on pollinator protection, responsible apiary management, and fostering a conscious relationship between people and nature.



Jarosław Kulin (Poland) – President of the "Kraeiniony Kraj" Local Action Group Association, actively engaged in local development, regional promotion, tourism, social entrepreneurship, and community-support initiatives. For many years, he has promoted cooperation between local governments, social organizations, and entrepreneurs, contributing to the sustainable development and visibility of the region.



Sylwester Mrozek (Poland) – Manager of the Commercial Formats and Concepts Development Department at Carrefour Poland. He is involved in the development of modern retail solutions and in strengthening cooperation with local producers and suppliers. He is responsible for projects related to new sales concepts, customer experience development, and initiatives promoting local products.



Marcin Ossolin – The Director General of the Agricultural Advisory Centre in Brwinów, he has extensive experience in public administration, local government, and the development of agriculture and rural areas. In his work, he focuses on strengthening the agricultural advisory system, facilitating the transfer of knowledge into practice, and supporting local communities. He places particular emphasis on food security, sustainable rural development, and cooperation among institutions working to support farmers.


FIRST BEEKEEPING FAIR
OF THE SOUTHWESTERN BALKANS
"TROMEĐA"
ZLATIBOR
Sports Hall
OCTOBER 17, 2026
ORGANIZERS:
SERBIAN FEDERATION OF BEEKEEPING ORGANIZATIONS
MUNICIPALITY OF ČAJETINA
CO-ORGANIZERS:
BEEKEEPERS' ASSOCIATION OF THE REPUBLIKA SRPSKA
FEDERATION OF BEEKEEPERS OF BOSNIA AND HERZEGOVINA
BEEKEEPERS' ASSOCIATION OF MONTENEGRO
ONE REGION – ONE BEEKEEPING FAMILY!

THE SERBIAN FEDERATION OF BEEKEEPING ORGANISATIONS (SPOS)

THE MUNICIPALITY OF ČAJETINA

in co-organisation with

THE FEDERATION OF BEEKEEPERS' ASSOCIATIONS OF THE REPUBLIC OF SRPSKA

THE FEDERATION OF BEEKEEPERS OF BOSNIA AND HERZEGOVINA

THE FEDERATION OF BEEKEEPING ORGANISATIONS OF MONTENEGRO

with the support of

THE "ZLATIBOR" BEEKEEPERS' ASSOCIATION

are organising the

FIRST SOUTH-WESTERN BALKANS BEEKEEPING FAIR "TROMEĐA / THREE-BORDER REGION"

Zlatibor, 17 October 2026

Sports Hall, Zlatibor Tourist and Recreation Complex
(in the very centre of Zlatibor, just 100 metres from the lake)

Opening hours: 9:00 a.m.–7:00 p.m.

FREE ADMISSION FOR ALL VISITORS

Free parking for exhibitors is available in the car parks in front of and behind the Sports Hall.

Free parking for visitors is available in the grounds behind and alongside the Sports Hall, with capacity for more than 300 buses and cars.

FREE EXHIBITION STANDS

Completely free exhibition stands will be provided to the **first 40 exhibitors to register**.

UP TO 20% DISCOUNT FOR BEEKEEPING EQUIPMENT EXHIBITORS

AN ADDITIONAL 66% DISCOUNT FOR SPOS MEMBERS EXHIBITING HONEY

A GENEROUS BUFFET LUNCH FOR ONLY RSD 900

A generous lunch will be available for just **RSD 900 per person** to all guests who register in advance by email at **spos.kancelarija@gmail.com**.

Lunch will be served from **12:00 noon to 4:00 p.m.** as a buffet and will include:

beef noodle soup, roast pork, chicken drumsticks and thighs, potato stew, rice with vegetables, roasted potatoes, seasonal salads, bread and dessert.

To register, simply provide the **beekeeper's full name and telephone number** – no other information is required.

Lunch will be served in the restaurant on the **first floor above the Sports Hall**.

On the third floor, you will also find the **"Trg Sport Kafe" restaurant**, where you can enjoy drinks or a meal at regular prices while overlooking the entire fair from the café terrace.

ACCOMMODATION

For accommodation, please contact the **Zlatibor Tourist and Recreation Complex (TRK Zlatibor)**:
Tel.: 060 48 48 140
Email: recepcija@trkzlatibor.rs

Once their reasonably priced accommodation is fully booked, they will assist visitors in finding accommodation at similar rates in nearby properties.

The price of a bed in a shared room, including breakfast, is just **RSD 3,900 per person**, plus **RSD 140 tourist tax** and **RSD 20 insurance**.
A single room with breakfast costs **RSD 4,800**, plus **RSD 140 tourist tax** and **RSD 20 insurance**.

Lunch can be added for **RSD 900 per person**.

Book as early as possible, as availability is limited.

FREE ENTRY TO THE SPECTACULAR STOPIĆA CAVE

Enjoy a **100% discount – completely FREE admission** to the spectacular **Stopića Cave (HERE)!**

50% OFF A RIDE ON THE ZLATIBOR GOLD GONDOLA

Enjoy a **50% discount on the gondola ride!**

Regular ticket price: **RSD 2,000**
Special price for fair visitors: **only RSD 1,000**
Discount vouchers can be collected from the **SPOS stand at the fair**.

PROGRAMME

10:30 a.m. – OFFICIAL OPENING

The fair will be officially opened by:

- **Spec. Dr Med. Rodoljub Živadinović**, President of SPOS
- **Darko Marković**, President of the Federation of Beekeepers' Associations of the Republic of Srpska
- **Rehad Deljo**, President of the Federation of Beekeepers of the Federation of Bosnia and Herzegovina
- **Radule Miljanić**, President of the Federation of Beekeeping Organisations of Montenegro
- **Milan Stamatović**, President of the Municipality of Čajetina
- **Prof. Dr Dragan Glamočić**, Minister of Agriculture, Forestry and Water Management of the Republic of Serbia

11:00 a.m. – PROFESSIONAL LECTURE PROGRAMME

11:00 a.m.–12:30 p.m.

Dr Zlatko Tomljanović, DVM, PhD**
Sveta Nedelja, Croatia

*Dr Zlatko Tomljanović is an internationally recognised beekeeping expert whose principal fields of interest include **bee health, beekeeping technology and the development of climate-change adaptation strategies for beekeeping**.*

*He heads the **Beekeeping Advisory Department** within the Directorate for Professional Support to Agricultural Development at the Croatian Ministry of Agriculture, Forestry and Fisheries, and also leads its **Climate and Environment Working Group**.*

*He is the national coordinator of the pan-European **Climate Farm Demo (CFD)** project.*

*Together with his family, he runs a family farm with **250 honey bee colonies**.*

*He is the co-author of two books, *Causes, Prevention and Control of Swarming* and *Good Veterinary Practice in the Apiary*.*

*Dr Tomljanović has delivered **more than 1,000 lectures, workshops and professional seminars** at both national and international level. He has also worked as a technical adviser to large commercial beekeeping operations in the **United States and Australia**.*

"BEEKEEPING CHECKMATE: A RELIABLE TECHNIQUE FOR CONTROLLING THE SWARMING IMPULSE, IMPROVING THE RELIABILITY OF GOOD HONEY YIELDS, AND TURNING A NATURAL INSTINCT INTO BEEKEEPING SUCCESS"

12:30–1:30 p.m.

Dr Zorica Plavšić, MD, PhD**
Belgrade, Serbia

*President of **ApiMed Serbia – the First International Association of Healthcare Professionals Practising Apitherapy**

Dr Zorica Plavšić is a specialist in pneumophthisiology and holds a doctorate in medical sciences, as well as master's degrees in **allergy and clinical immunology** and **public health**. She has undertaken further professional training in the United States.

At the **Belgrade City Institute for Lung Diseases and Tuberculosis**, she served as Head of the Department of Allergology and Clinical Immunology.

She has been involved in apitherapy since 2009 and, in 2022, founded and became President of **ApiMed Serbia**, the First International Association of Healthcare Professionals Practising Apitherapy in Serbia.

The Association provides education in apitherapy through its own original programmes, including an **Apitherapy Course** and a seminar on the **Preparation, Construction and Use of Apitherapy Rooms**, which has so far been held six times.

A specialist team within the Association has also developed an educational programme introducing preschool and primary-school children to **bees and bee products**.

The Association's project, ***"Introducing Children to Bees and Bee Products as Functional Foods"**, has received support from the Serbian Ministry of Education for implementation in educational institutions.

Dr Plavšić is a member of the **European Beekeeping Association (EBA) Scientific Committee for Apitherapy**.

She is the author or co-author of **more than 90 scientific and professional papers**. She is also the publisher and one of the authors of the books *Authorised Lectures on Apitherapy* and *Manual for the Preparation, Construction and Use of Apitherapy Rooms*.

In cooperation with SPOS, ApiMed Serbia maintains the **Register of Apitherapy Room Owners in Serbia** and supervises their operation.*

"CHANGE THE RULES OF THE GAME: APITHERAPY ROOMS AS AN EXCELLENT OPPORTUNITY TO INCREASE BEEKEEPING PRODUCTIVITY IN TOURIST DESTINATIONS"

1:30–2:30 p.m.

Spec. Dr Med. Rodoljub Živadinović
Žitkovac, Serbia
President of SPOS
Vice-President of the European Beekeeping Association (EBA)
Editor-in-Chief of the EBA beekeeping magazine **NO BEES, NO LIFE**

*Dr Rodoljub Živadinović is a **specialist in epidemiology and a certified apitherapist**. He has been a beekeeper since **1992**.*

*He has written **more than 100 articles on beekeeping** for numerous Serbian and international journals and magazines and is the author of several beekeeping books and manuals.*

*He is the author of SPOS's **Strategy for Combating the Effects of Climate Change**, **Guidelines for Preserving Honey Authenticity**, and the specialist marketing manual **All About Honey – Medoteka**.*

*He conceived and organised all three SPOS beekeeping fairs – in **Belgrade, Vranje and Zlatibor**.*

*He previously served as editor of the beekeeping magazines **Pčelar** and **Matica**.*

"OUTSMARTING CLIMATE CHANGE: INCREASING PRODUCTIVITY AND REDUCING COSTS THROUGH THE PROPER APPLICATION OF EFFECTIVE BEEKEEPING"

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

We are delighted to invite you to the events we proudly support and sponsor: Mead Madness Cup 2027, Honey Madness Cup 2027, and the European Mead Makers Conference.

Kraków, Poland

18–20 February 2027

This is a unique gathering of mead makers, beekeepers, producers, and honey enthusiasts from around the world. The programme includes international competitions, a conference, tastings, and opportunities to meet industry professionals.

Mead Madness Cup – an international mead competition for both professional and home producers.

Honey Madness Cup – a competition dedicated to the quality of honey.

European Mead Makers Conference – knowledge, experience, and the opportunity to connect with mead makers from around the world.

Registration is now open!

Mead Madness Cup: https://meadmadness-cup.com
Honey Madness Cup: https://honeymad-nesscup.com
European Mead Makers Conference: https://emmconference.com
We look forward to welcoming you to Kraków and hope to see you at these events, which we are proud to support and sponsor!


CONGRÈS EUROPÉEN
DE L'APICULTURE
Parc des Expositions d'Agen
1er au 4 octobre 2026
PROGRAMME DES CONFÉRENCES

VENDREDI 2 OCTOBRE 2026

[illegible]

[illegible] | **Table ronde marché du miel français et mondial et lutte contre l'adultération**
[illegible]

[illegible] | **Biologie de l'abeille : Les abeilles ont elles le besoin des mieller ?**
[illegible]

[illegible] | **Des fleurs aux décideurs : structurer l'action pour la biodiversité**
[illegible]

[illegible] | **Les différents modèles de ruches utilisés en Afrique, ruches type Kenyane**
[illegible]

[illegible] | **La ruche basse consommation**
[illegible]

[illegible] | **Table ronde l'agriculture et la Communauté européenne : nouvelle PAC, mesures de soutien**
[illegible]

[illegible] | **La création de ruchers apicoles pour les femmes illettrées**
[illegible]

[illegible] | **Maîtrise des mortalités hivernales : méthodes et résultats**
[illegible]

[illegible] | **Ombre, naturisme et hygiène : Leur rôle au service de la ruche**
[illegible]

[illegible] | **Traitement Varroa en Suisse**
[illegible]

[illegible] | **Et si des bénévoles pouvaient lutter en chromatie contre Asiat aux abeilles ?**
[illegible]

[illegible] | **La résistance comportementale de Varroa destructor aux acaricides**
[illegible]

SAMEDI 3 OCTOBRE 2026

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://chefstables.gr/1st-honey-sensory-analysis-education-in-greece/
Video: https://www.youtube.com/watch?v=uH6kcbbly7w&t
Article by a graduate in the Gastronomos magazine: https://shorturl.at/eb5Le

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 Stavlas**, 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.

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**.

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 1995, 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 1998.

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 25/09/2026.

Bank Account Details:
Piraeus Bank
IBAN: GR53 0171 5890 0065 5916 4158 685/Account Number: 6559/16 41 58 685
Account Holder: CHEF STORIES LP /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

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/3cxxGHwdBNbTfjLA
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 6942880954

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,

Sylvie - Ioanna Kaumeraki & Nana Zygouri

ΕΚΠΑΙΔΕΥΣΗ στην ΟΡΓΑΝΟΛΗΠΤΙΚΗ ΑΝΑΛΥΣΗ ΜΕΛΙΟΥ

INSTRUCTOR's CVs

Gian Luigi Marcazzan

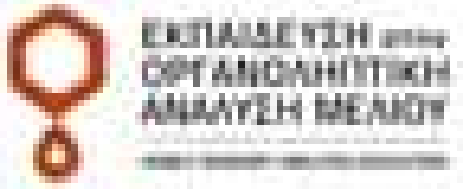
Gian Luigi Marcazzan is a researcher and technical manager for honey quality control by chemical and sensory analysis at the Council for Agricultural Research and Economics (CREA) in Bologna, Italy for 28 years. He is the leader of the Honey Sensory group within the International Honey Commission, the 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 15 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 WG288 (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 Apidiology, Raffaele has more than 15 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 "AsSensori", sensory analyses as an R&D tool for businesses. Raffaele also has written for national beekeeping magazines in Italy such as L'apicoltore/Mieli&Dintorni, 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 2018, 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.



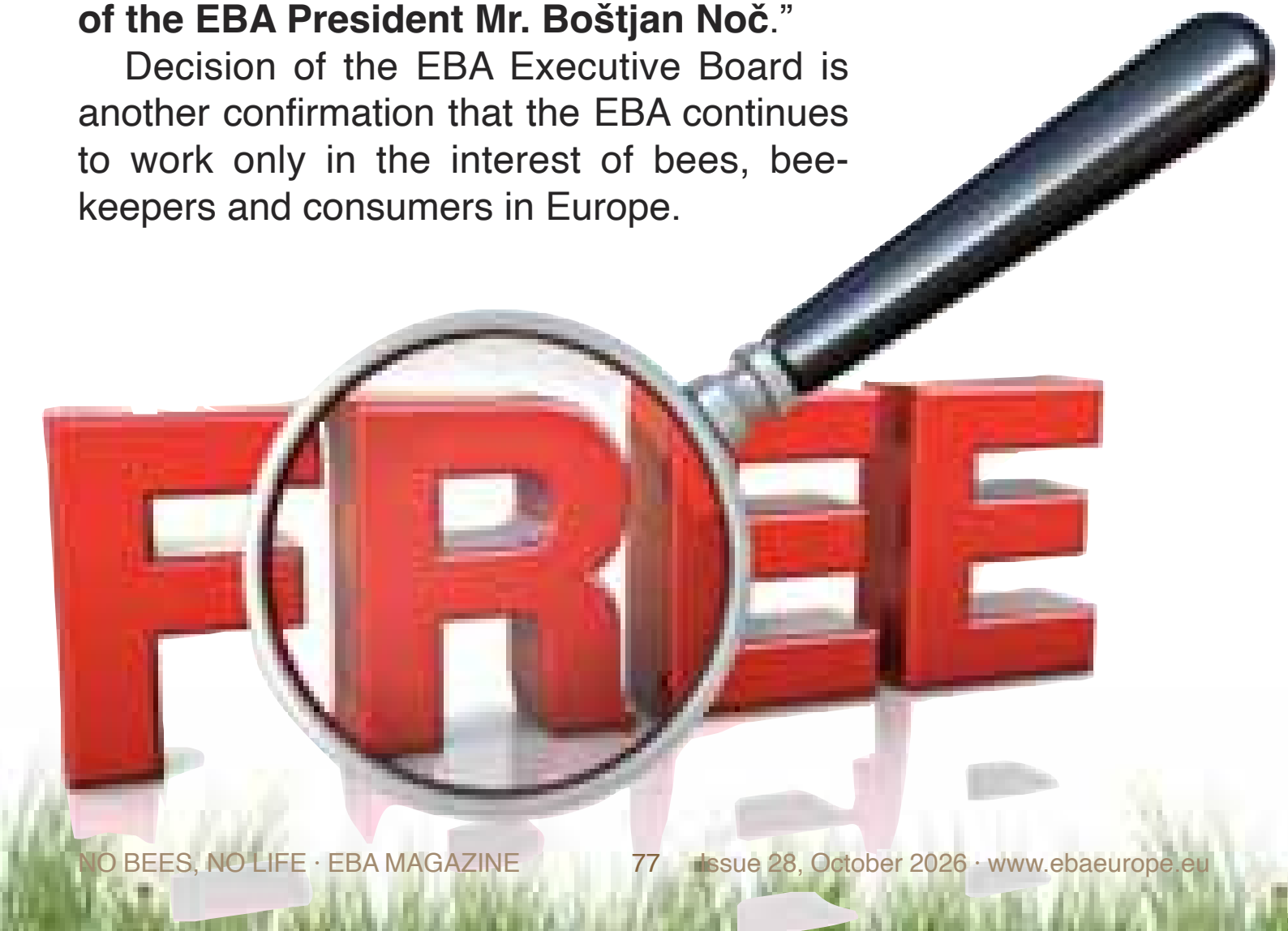
Nana Zygoura

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

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

NO BEES LIFE

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Head office: Brdo pri Lukovici 8, 1225 Lukovica, Slovenija
eba@ebaeurope.eu
www.ebaeurope.eu

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)