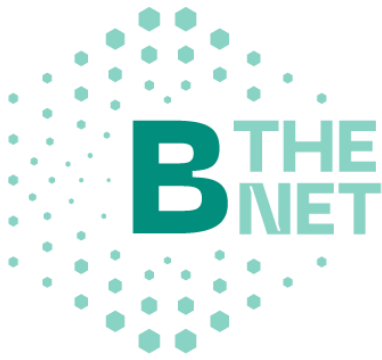




D3.5

Report on the practical validation of practices on-field M16

Project Title

B-THENET (BEST PRACTICES AND INNOVATIONS FOR A SUSTAINABLE BEEKEEPING)

Contract No.

101059812

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Thematic Priority

Innovative governance, environmental observations, and digital solutions in support of the Green Deal

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1 September 2022

Duration

48 months



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del Lazio e della Toscana *M. Aleandri*



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Abstract	Deliverable 3.5 presents the final results of the validation of the Best Beekeeping Practices co-created by beekeepers, advisors, researchers, and other experts participating in the project B-THENET. In 2023, 22 Good Beekeeping Practices and Biosecurity Measures under the themes of “apiary set-up and management/maintenance” (13 practices) and “varroosis” (9 practices) were developed by the 13 National B-THENET Centres of the project. The 13 National B-THENET Centres developed the 22 practices in their national languages (13 EU languages in total), yielding 280 practices tailored to the respective national beekeeping realities. The 280 practices were made available online in the Exchange Platform of the project, where European beekeepers and advisors could actively participate to their description and definition. Between September and December 2023, beekeepers and advisors were invited by National B-THENET Centres to participate to Exchange events, where each individual practice was assessed, refined, and integrated with the aim of reflecting their national beekeeping reality. During Exchange events, beekeepers and advisors were also asked to upvote (i.e. agree)

	or downvote (i.e. disagree) the practice on the Exchange Platform, using a thumb up/thumb down feature. Practices were considered validated only after the three following criteria were met: • Each best beekeeping practice developed at national level, received at least 10 votes (thumbs) by platform's users. • The platform community of EU beekeepers and advisors provided $\geq 75\%$ of positive votes (thumbs up and down were used to express positive or negative votes in the platform). • The National B-THENET Centre provided the WP3 leader with the confirmation of which Best Beekeeping Practices were ready to be moved from the Exchange to the Repository Platform of the project, as they were validated (on-line/on-field) by active exchange with beekeepers and advisors within National B-THENET Centres. 130 practices out of the 280 published in the Exchange Platform were validated according to the set of three criteria and could be therefore considered "Best Beekeeping Practices" (BBPs). The list of validated practices (see ANNEX) is provided in the current deliverable in English, and it reports the inputs of each of the 13 National B-THENET Centres. From January 2024, the fully developed BBPs will be freely accessible in 13 languages in the Repository Platform of the project B-THENET (https://www.bthenet.eu/repository-platform/), and they will be used as certified training material for EU beekeepers and advisors.
Keywords	EU beekeeping, Thematic Network, Validation, Good Beekeeping Practices, Biosecurity Measures in Beekeeping, Best Beekeeping Practices, Repository Platform

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The information and views set out in this report are those of the author(s) and do not necessarily reflect the official opinion of the European Union. Neither the European Union institutions and bodies nor any person acting on their behalf.

Table of Abbreviations and Acronyms

Abbreviation	Meaning
TN	Thematic Network
GBPs	Good Beekeeping Practices
BMBs	Biosecurity Measures in Beekeeping
BBPs	Best Beekeeping Practices

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1 Executive Summary

Deliverable 3.5 presents the results of the final validation of the Good Beekeeping Practices (GBPs) and Biosecurity Measures in Beekeeping (BMBs) developed by the multiple actors of the project B-THENET (GA N. 101059812).

In 2023, the National B-THENET Centres established in 13 EU countries, developed 22 GBPs and BMBs under the themes of “varroosis” and “apiary set-up and management/maintenance”. GBPs and BMBs were made available in 13 EU national languages on the Exchange Platform of the project (280 practices in total), where beekeepers and advisors could actively participate to their description and definition at the national level.

From September 2023 to December 2023, the National B-THENET Centres conducted Exchange events, where the practices described in the Exchange Platform were refined and validated by beekeepers and advisors. To be considered officially validated as “Best Beekeeping Practices” (BBPs), each practice had to receive at least 10 votes (thumbs) in the Exchange Platform, and of those, $\geq 75\%$ needed to be positive. Moreover, the National B-THENET Centre contact points, needed to provide formal confirmation to the Work Package 3 leader that the Best Beekeeping Practice was ready to be moved to the Repository Platform of the project, being validated on-line/on-field, and by active exchange with beekeepers and advisors within National B-THENET Centres.

130 practices out of the 280 published in the Exchange Platform were validated according to the set of three criteria and could be therefore considered BBPs. A report of the fully validated Best Beekeeping Practices can be found in the **ANNEX** of the present deliverable. They 130 BBPs will be transferred to the Repository Platform of the project by the B-THENET Coordinators and become training material for beekeepers and advisors from January 2024.

2 Introduction

The project B-THENET, aims to modernise the beekeeping sector by sharing knowledge ready to be put into practice and fostering best practices exchange.

In particular, the project pursues the following objectives:

- Modernize the EU beekeeping sector by establishing a multi-actor network with complementary knowledge that connects beekeepers, researchers, advisors, and the other actors in the apiculture sector.
- Collect, categorize (“Inventory”), and select good practices for sustainable beekeeping and new research findings ready to put into practice or not sufficiently known using a bottom-up methodology.
- Create a digital knowledge platform (“Exchange”) to increase the flow of practical information and knowledge sharing within the EU.
- Create a digital knowledge platform (“Repository”) to collect, share and store knowledge on best practices, for the long term, facilitating and harmonizing the education of the EU beekeeping sector.

To select, develop and disseminate Best Beekeeping Practices in Europe, B-THENET brings together the expertise of beekeepers, researchers, advisors, and other experts in the field. The collaborative work is carried out both in person, during “exchange events” organised by the 13 National B-THENET Centres, and on the project's Exchange Platform, the first portal for the European beekeeper (<https://www.bthenet.eu/>).

In 2023, the 13 National B-THENET Centres located in Austria (UGRAZ), Belgium (UGENT), Croatia (UNIZG), Germany (UHOH), Greece (HAO), Hungary (UVMB), Italy (APIMONDIA), Poland (INHORT), Slovakia (UVLF), Slovenia (SBA), Spain (UCM), Sweden (SLU), and coordinated by Denmark (BIAVL), worked alongside their national beekeepers and advisors to fully develop 22 GBPs and BMBs under the themes of “varroosis” (9 BMBs) and “apiary set-up and management/maintenance” (13 GBPs), selected with a bottom-up, EU-wide survey (Table 1).

Table 1. Inventory of prioritised practices object of study of the project B-THENET in 2023. The list includes GBPs and BMBs selected with a bottom-up methodology involving European beekeepers and advisors.

CATEGORY: GOOD BEEKEEPING PRACTICES	
Theme: “APIARY SET-UP AND MANAGEMENT/MAINTENANCE”	
Practice container: PROPERLY PLACE HIVES IN THE APIARY	
Cluster 1: Identify a proper area to locate the apiary	
Avoiding exposure to pollutants (e.g., pesticides, heavy metals, etc.)	
Setting-up apiaries in an area accessible to vehicles (e.g., relevance of solid/dry ground)	
Avoiding areas where allergenic (e.g., <i>Ambrosia trifida</i> and <i>Artemisia vulgaris</i>) or toxic (e.g., containing pyrrolizidine alkaloids, like <i>Echium</i> spp., <i>Eupatorium</i> and <i>Senecio</i> spp. etc.) plants could be found in a significant quantity	

Avoiding areas exposed to excessive humidity and wind
Ensuring presence of trees (or other barriers) to create protection against weather stressors (e.g., heat, wind etc.)
Maintaining appropriate distance from other apiaries (for hive production and bee health)
Having enough space for storage rooms/working tools
Keeping safe distance from houses/ villages (for human safety)
Preventing theft of hives (e.g., assess presence/build a fence around the apiary)
Cluster 2: Setting-up of the apiary
Keeping an appropriate number of hives (e.g., consider the amount of melliferous plants and sources of water available in the area where the apiary is located)
Seasonally relocating the apiary (e.g., taking into account the season, wintering close to warmer areas)
Proper positioning of the hive (e.g., providing hives with a proper stand, guaranteeing proper space between hives providing a proper orientation of the hive entrances so that sun can reach them from the early morning hours to sunset)
Avoiding obstacles for the bees (e.g., high grass/snow in front of the hive entrance)
CATEGORY: BIOSECURITY MEASURES for Varroosis Theme: “VARROOSIS” Practice container: “GUARANTEE BEST EFFICACY OF ANTI-VARROA TREATMENTS, ESPECIALLY WITH ORGANIC COMPOUNDS”
Cluster 1: How to conduct
Assessment of varroa infestation level during the beekeeping season
Identification of the best moment for varroa treatments according to the national climatic areas.
Cluster 2: Proper use of low environmental impact compounds
Use of oxalic acid (including sublimated)
Use of formic acid
Use of thymol (e.g., applying only when environmental temperature is high enough).
Use other low environmental impact compounds (if medicines are available in your country)
Cluster 3: Biotechniques
Brood removal (e.g., partial drone/worker brood removal or total brood removal/shook swarm)
Queen caging (e.g., use of cages that do not permit the queen to lay eggs or trapping comb)
Heat treatments
<i>Warnings and legal restrictions for BMBs:</i> - to treat varroa according to the national legislation (e.g., use only medicines authorized for honey bees); - to follow the label indication (also considering dispensers, sublimators, etc).

Each National B-THENET Centre developed the 22 practices reported in Table 1 in their 13 national languages, yielding a total of 280 practices. The 280 practices were made available online in the Exchange Platform of the project, in the format of user-friendly, step-by-step protocols including images, tags (e.g., climatic area, tools and supplies, production line, etc.), links to useful innovations and scientific references.

The 13 B-THENET Centres actively discussed and refined the practices in their 13 national languages with the help of their local beekeepers and advisors, with the aim of reflecting their national beekeeping reality.

The final step to define Best Beekeeping Practices, was to validate each practice described in the Exchange platform at national level. The present deliverable reports the methodology and results of the final validation of Best Beekeeping Practices achieved through the active collaboration between National B-THENET Centres and their beekeepers and advisors.

3 Methodology for the validation of practices

Validation of the 22 practices available in the Exchange Platform in 13 languages was carried out both online, through platform' tools collecting feedback and votes, and in person, through Exchange meetings organised by the 13 National B-THENET Centres.

In September 2023 online validation was performed. Platform users (beekeepers and advisors) were invited by the National B-THENET Centres to assess if each practice was described exhaustively (text and images) and if it represented the respective national approach to beekeeping. Users of the platform could interact with the practices by adding comments, asking questions, and providing tips to improve the content. Moreover, by using a thumb up/thumb down feature of the platform (Fig. 1) they could provide a negative or a positive vote to express their agreement, or disagreement with the content of the practice.

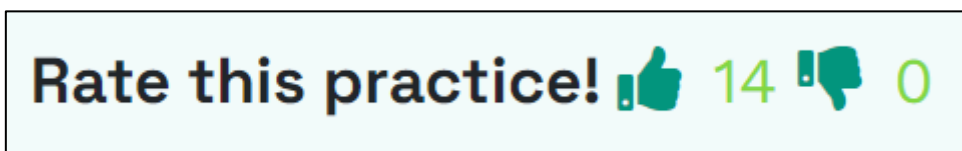


Figure 1. The rating tool of the Exchange Platform of the project B-THENET. Registered users can use it to like (thumb up) or dislike (thumb down) the content of the practices updated online.

Between September and December 2023, National B-THENET Centres organised Exchange meetings, with the aim of providing final validation of the practices through physical exchange with beekeepers and advisors. During interactive sessions, beekeepers and advisors could work in groups to actively revise and improve the practices in the Exchange Platform, and were asked to vote (thumbs up, or thumbs down) using the platform feature if they agreed or not with the improved content.

At the end of December 2023, the practices were considered validated if:

1. Each best beekeeping practice developed at national level received at least 10 votes (thumbs) by platform's users.
2. The platform community of EU beekeepers and advisors provided $\geq 75\%$ of positive votes (thumbs up and down were used to express positive or negative votes in the platform).
3. The National B-THENET Centres provided formal confirmation of which Best Beekeeping Practices were ready to be moved to the Repository Platform, as validated (on-line/on-field) by active exchange with beekeepers and advisors within National B-THENET Centres.

Each National B-THENET Centre contact point verified if the single practices developed at national level met the three validation criteria, and reported on a designated table the ones that were validated (see **ANNEX**).

4 Results of the validation of practices

The list of Best Beekeeping Practices validated in 2023 by the multiple actors of the project B-THENET is available in the **ANNEX**. The table presents the titles of the 22 GBPs and BMBs in English (yielding 280 individual practices developed in 13 national languages by the 13 National B-THENET Centres), and the list of 13 countries where validation of each single practice was conducted under the coordination of National B-THENET Centres. A total of 130 practices out of the 280 published in the Exchange Platform was validated according to the established set of three criteria. The 130 validated practices can now be considered Best Beekeeping Practices (BBPs). From January 2024, the fully developed BBPs will be freely accessible in 13 languages in the Repository Platform of the project B-THENET (<https://www.bthenet.eu/repository-platform/>). They will reflect the national approaches to beekeeping of the countries that participated in their development, highlighting the differences driven by climatic and environmental conditions, different bee genetics, beekeeping equipment, and diseases. This will provide national beekeepers and advisors with verified knowledge tailored to their local conditions and co-created with their active contribution.

The practices that did not receive validation will be further implemented and refined through Exchange meetings, with the objective to achieve approval of the national communities of beekeepers and advisors. It should be noted that not all the practices developed in 2023 may be validated as BBPs across all countries involved in the project. For example, in Sweden and Italy beekeepers and advisors downvoted specific practices as they considered them not feasible, economically sustainable, or simply because they did not adopt the described technique. Their position further underlines the differences affecting beekeeping across European countries. Moreover, it highlights the importance of evaluating each practice with national beekeepers and advisors, to ensure that the project outputs can truly reflect the country-specific needs.

5 Conclusions

The present deliverable reports the results of the final validation of practices developed with a Multi-Actor Approach within the project B-THENET. By the end of December 2023, 130 out of the 280 practices published in the Exchange Platform have been validated as Best Beekeeping Practices and will be moved to the Repository Platform. The validated BBPs will become training material for beekeepers and advisors that will yield certification at the National and International B-THENET Centre level. Moreover, BBPs will be available online in 13 languages (currently they are also being translated in French by the Belgian partner who conducted the exchange in Flemish) as step-by-step protocols including images, tags (e.g., climatic area, tools and supplies, production line, etc.), links to useful innovations and scientific references. Future plans involve harmonisation of BBPs in English language, in a manual that will highlight differences and similarities in the adoption of each BBP across counties involved in the project. Practices that did not pass validation by the end of December 2023 will be further refined and implemented through active exchange between National B-THENET Centres, beekeepers, and advisors. Over the course of the following months, they will be reassessed, and those meeting the criteria will be validated as BBPs and published in the Repository Platform.

6 ANNEX

Category: GOOD BEEKEEPING PRACTICES
Theme: “APIARY SET-UP AND MANAGEMENT/MAINTENANCE”
Practice container: “PROPERLY PLACE HIVES IN THE APIARY”

		AT	BE	DE	DK	EL	ES	HR	HU	IT	PL	SE	SI	SK
1	Avoiding exposure to pollutants (e.g., pesticides, heavy metals, etc.)	X	X	/	/	/	X	X	/	/	X	X	X	/
2	Setting-up apiaries in an area accessible to vehicles (e.g., relevance of solid/dry ground)	X	X	/	X	/	X	X	/	/	X	/	X	/
3	Avoiding areas where allergenic (e.g., <i>Ambrosia trifida</i> and <i>Artemisia vulgaris</i>) or toxic (e.g., containing pyrrolizidine alkaloids, like <i>Echium</i> spp., <i>Eupatorium</i> and <i>Senecio</i> spp. etc.) plants could be found in a significant quantity	/	/	/	X	/	X	X	/	/	/	X	X	/
4	Avoiding areas exposed to excessive humidity and wind	X	X	/	X	/	X	X	/	/	X	X	X	/
5	Ensuring presence of trees (or other barriers) to create protection against weather stressors (e.g., heat, wind etc.)	X	X	/	/	/	X	X	/	/	X	X	X	/
6	Maintaining appropriate distance from other apiaries (for hive production and bee health)	X	X	/	X	/	X	X	/	/	X	X	X	/
7	Having enough space for storage rooms/working tools	X	X	/	X	/	X	X	/	/	X	X	X	/
8	Keeping safe distance from houses/ villages (for human safety)	X	X	/	/	/	X	X	/	/	X	X	X	/
9	Preventing theft of hives (e.g., assess presence/build a fence around the apiary)	X	X	/	X	/	X	X	/	/	X	/	X	/
10	Keeping an appropriate number of hives (e.g., consider the amount of melliferous plants and sources of water available in the area where the apiary is located)	X	X	/	/	/	X	X	/	/	X	X	X	/
11	Seasonally relocating the apiary (e.g., taking into account the season, wintering close to warmer areas)	X	/	/	/	/	X	X	/	/	X	/	X	/
12	Proper positioning of the hive (e.g., providing hives with a proper stand, guaranteeing proper space between hives providing a proper orientation of the hive entrances so that sun can reach them from the early morning hours to sunset)	X	X	/	X	/	X	X	/	/	X	X	X	X
13	Avoiding obstacles for the bees (e.g., high grass/snow in front of the hive entrance)	X	X	/	/	/	X	X	/	/	X	X	X	/

Category: BIOSECURITY MEASURES

Theme: "VARROOSIS"

Practice container: "GUARANTEE BEST EFFICACY OF ANTI-VARROA TREATMENTS, ESPECIALLY WITH ORGANIC COMPOUNDS"

		AT	BE	DE	DK	EL	ES	HR	HU	IT	PL	SE	SI	SK
1	Assessment of varroa infestation level during the beekeeping season	X	X	/	X	/	X	X	/	X	X	X	/	/
2	Identification of the best moment for varroa treatments according to the national climatic areas.	X	X	/	X	/	X	X	/	X	X	X	/	/
3	Use of oxalic acid (including sublimated)	X	X	/	X	/	X	X	/	/	X	X	X	/
4	Use of formic acid	X	/	/	X	/	X	X	/	/	X	X	X	/
5	Use of thymol (e.g., applying only when environmental temperature is high enough).	/	/	/	X	/	X	X	/	/	X	/	/	/
6	Use other low environmental impact compounds (if medicines are available in your country)	X	/	/	/	/	X	/	/	/	/	/	/	/
7	Brood removal (e.g., partial drone/worker brood removal or total brood removal/shook swarm)	X	/	/	X	/	X	X	/	/	X	X	X	/
8	Queen caging (e.g., use of cages that do not permit the queen to lay eggs or trapping comb)	X	X	/	/	/	X	X	/	/	X	/	/	/
9	Heat treatments	X	/	/	/	/	X	/	/	/	/	/	/	/

X - It is **not** registered and for use in apiary-allowed veterinary medicine (EU level)

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