



Report Training

Deliverable D7.5

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B-GOOD
Giving Beekeeping Guidance by cOMputatiOnal-assisted Decision making



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Grant agreement No. 817622

EU Horizon 2020 Research and Innovation action

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 Duration: 48 months
 Project coordinator: Prof. Dirk de Graaf
 Ghent University
www.b-good-project.eu

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Preface

B-GOOD is a multi-disciplinary project aiming at providing practical scientific solutions to the diverse problems beekeepers may face. More specifically, the project aims at designing innovative technologies that will facilitate the care and management of bee hives, *i.e.*, keeping honey bee colonies in a safe and healthy environment and implementing sustainable beekeeping business strategies. In this context, frequent interactions between the project consortium members and different stakeholders of the beekeeping sector are essential for the communication, dissemination, and exploitation of B-GOOD results.

This report describes two training events that took place in early spring 2022 to promote the exploitation of B-GOOD results. First, a training event involving beekeepers collaborating with B-GOOD to test the project's technologies was organised. The second event was a three-days B-GOOD European course, called "*Introduction to honey bee research and modern beekeeping*", involving early-career researchers and stakeholders of the beekeeping sectors.

Summary

Ensuring good communication and exploitation of results is crucial to maximise the impact of research projects. This report provides details of the two training events that took place within the B-GOOD project.

The first training event was designed for beekeepers collaborating with B-GOOD WP1 members for the testing of new technologies being developed within the project within the third Tier of field work. It was conducted in March 2022 and brought together 46 beekeepers from 12 countries across Europe. An overview of the project was first presented to them, followed by a practical introduction to B-GOOD technologies (*i.e.*, BEEP app and bases), as well as virtual hands-on training tutorials to learn how to set up and use some of these technologies.

The second training event was aimed at early-career researchers in the field of honey bee health. This training event was attended by 20 participants from 12 European countries. During this three-day-long course, the participants followed diverse lectures on general honey bee biology, health, and beekeeping. On the third day, the B-GOOD project and technologies was presented to them in greater detail.

Altogether, these two events have greatly enforced exploitation pathways of B-GOOD's results in both short and long term, by ensuring the effective and successful dissemination of the project's outputs.

1. Introduction

1.1. Aims of the training events

B-GOOD stands for ‘*Giving Beekeeping Guidance by cOmputatiOnal-assisted Decision making*’. This project aims at promoting sustainable and healthy beekeeping in Europe by following a scientific multidisciplinary approach to develop and test innovative technologies supporting beekeepers in their management practices.

As training events enable knowledge exchange between B-GOOD experts and different stakeholders responsible for the maintenance and development of sustainability in beekeeping. Notably, these training events are key components of the Communication and Dissemination Strategy (Deliverable 7.2) and Exploitation plan (Deliverable 7.3) of B-GOOD.

B-GOOD WP7 members have organised two training events for (i) the direct training of beekeepers, who are testing some of the technologies (i.e., BEEP bases) developed within the project, and (ii) the education of young and early-career researchers who will compose the next generation of scientists that will foster sustainability research and development of beekeeping. Overall, these training events engaged important stakeholders involved in the project and ensured a broader exploitation of the project’s results.

Considering such orientations, the specific objectives of the B-GOOD training event for beekeepers involved in the project (i) (e.g., beekeepers collaborating with WP1 members) were to:

- **Introduce the project:** to fulfil the continuous need for spreading awareness about the existence of the project to a large number of stakeholders.
- **Interact with beekeepers involved in the project:** as a core part of the project is to develop relevant and practical tools for beekeepers, interacting with them is primordial to understand how B-GOOD may best respond to their demands and needs.
- **Obtain specific feedback on the technologies developed:** as some technologies are already available to end-users (e.g., BEEP), active feedback from the field represents ideal ways to continuously improve the different tools and enhance their practicability.
- **Ensure that beekeepers operating in the field studies of the project received the proper training:** as B-GOOD involves beekeepers in a diverse set of ways (e.g., field work for WP1).

In parallel, for the training of young and early-career researchers (ii), the specific objectives were to:

- **Introduce the project:** to fulfil the continuous need for spreading awareness about the existence of the project to a large number of stakeholders.
- **Reflect on the sustainability and future of beekeeping:** as the central framework of the project is to develop ecologically and economically efficient tools to tackle bee health issues, discussions on how to achieve these objectives are essential.
- **Educate young scientists and early-career researchers:** as scientists are among the major operators that will ensure the promotion of sustainability and health within the beekeeping sector, it is pivotal to ensure that such operators receive updated training on the status of honey bee research.

1.2. Structure of the document

In this deliverable report, the two training events that took place in March and April 2022 are described subsequently:

- The next section describes the training event that was held for beekeepers collaborating in WP1.
- The following section provides information about the European training course designed for young scientists in the honey bee health field.

2. Beekeepers training

2.1. Description of the event

The online training event for B-GOOD beekeepers took place in the evening of Thursday 24th of March 2022 via the Zoom platform (Annex 1).

Given continued restrictions caused by the Covid-19 pandemic, this training event took place as a single online event to ensure the participation of, and interaction between, all attendees. This online format proved to be fruitful, as it allowed grouping 46 beekeepers from 12 European countries in a single event, thereby fostering interactions between them and the consortium members of B-GOOD.

As good part of the testing of the technologies developed by the project is carried out by beekeepers collaborating with B-GOOD, the training school was prepared for these stakeholders. Indeed, their training will increase the success of the collaboration and maximize the outcomes of the project, with direct benefits to other work packages of B-GOOD (e.g., WP1).

All beekeepers who were chosen to be part of the Tier 3 list produced by WP1 (see Task 1.2 and **Deliverable 1.7**) were given the opportunity to attend this event. The participants received an email invitation where an agenda was included as well (see Annex 2). 40 out of 46 beekeepers attended the online event, showing an important interest and demand for interactions

Before the event, the participating beekeepers received the BEEP base together with the relative protocols (see **Deliverable D1.7**) so that installation and setup of these devices could be guided directly by the B-GOOD speakers during the training. Moreover, in order to prepare and provide the most suitable training for the participants, beekeepers were asked to fill in an [online survey](#) before the event for assessing the level of familiarity with the tools to be tested and tailor the course according to their needs. In total, 46 participants from 12 different countries attended the online event. Their level of experience in beekeeping ranged from 2 to 40 years.

The online event was chaired by members of WP7 (UBERN) while the main project coordinator and other B-GOOD members of WP1 (WR) and WP6 (BEEP) participated as speakers or moderators. In the first part of the event, participants were introduced to the project with a presentation given by the main project coordinator (see Annex 3). This gave the beekeepers the opportunity to understand how their contribution was fitting into the broad scope of B-GOOD. In the second part, beekeepers received hands-on training through direct instructions and tutorials and learnt how to setup and use the B-GOOD base and app that are to be tested (Annex 4). After each session, the participants had the possibility to give feedback and ask questions to the speakers and directly interact with project partners attending the event. Notably, with the help of WP7 members the beekeepers had the opportunity after the event to organize a parallel channel of communication where knowledge and feedback can be exchanged between them.

To foster knowledge transfer and ease the access to the information delivered, after the event beekeepers received the video recordings of the training, links to online video resources (e.g., B-GOOD YouTube channel) as well as pdfs of the presentations to use as guides and training books alongside with the protocols and workplan developed by WP1 members.

In collaboration with members of WP8 (AU), an evaluation survey is also planned to be sent to the participants to gather feedback on the training contents and structure.

3. European B-GOOD course

3.1. Description of the event

The 3-days B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping” was held via Zoom and took place between Monday 11th and Wednesday 13th April 2022 (Annex 5).

The 3-day European Bee Course was targeted towards young scientists and early-career researchers, as this teaching format easily permits the transfer of theoretical knowledge, which suits better the needs of this target group. Moreover, this was a multiday course more suited to students and scientists as they were able to dedicate more time to education than other stakeholders.

For the recruitment of participants, a dedicated web page was designed and hosted on the B-GOOD website. An invitation reporting the link to this page was disseminated within the B-GOOD consortium and the COLOSS association (www.coloss.org) (see Figure 1 and Annex 6). Pensoft online tools were used to manage the registrations of interested participants. A total of 207 applications were collected, reflecting the high demand for such training in the honey bee research community. As planned by the DoA, the event was limited to 20 participants so to ensure interaction and a more complete knowledge exchange. As such, members of the B-GOOD consortium (UBERN) selected the participants based on their career stage and motivation in applying to the course. These candidates were Master students, PhD or post docs affiliated with European universities and research institutes. Among these participants, 12 different countries were represented.



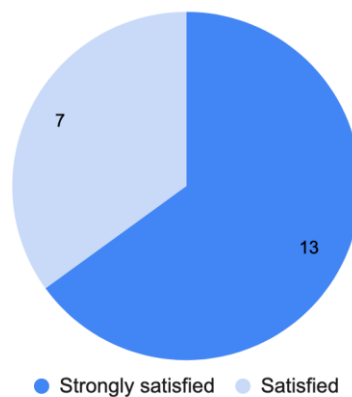
Figure 1: The B-GOOD Online Honey Bee Course Announcement used during the communication campaign and disseminated through the B-GOOD and COLOSS networks.

As detailed in the agenda (see Annex 5), the morning sessions of the first two days were focused on honey bee biology and evolution as well as on the main stressors affecting honey bee health (Annex 7). In the afternoon sessions, participants received practical guides and

virtual training on how to manage honey bee colonies in different seasons and under different professional scenarios (e.g., honey production, royal jelly production and queen rearing; Annex 7). On the last day, a detailed introduction to the B-GOOD project provided the students with a clear example of how honey bee research is applied in multiple fields (Annex 8). This last intervention enabled B-GOOD members to increase their connection with the research community and spread awareness over the present and future opportunities made available by the European Commission in fostering the growth of honey bee science.

After completion of the course, the students received the pdfs of the lectures for consultation, a list of the most important scientific publications mentioned throughout the event and were asked to fill in an [online survey](#) for course evaluation. All participants filled in the survey. Notably, no negative reports were collected regarding the level of satisfaction. 13 of the participants reported a strong satisfaction with the content and structure of the course and seven reported a general satisfaction (see Figure 2). The general level of satisfaction regarding the knowledge provided was also high, as 17 participants reported to be strongly satisfied with the presentations and the teaching materials received. Personal comments were also added by the participants, most of which included praises for the efforts made by the organizers and presenters in communicating in a format that was easy to follow and understand.

Are you satisfied with the content and structure of the course?



Are you satisfied with the presentations and the teaching material provided at the end of the course?

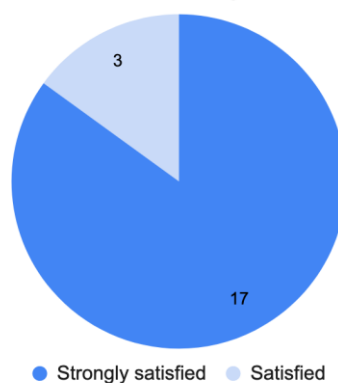


Figure 2: Overview of the answers collected with the evaluation survey of the B-GOOD Online Honey Bee Course

4. Conclusions

With the online training school for beekeepers directly collaborating with B-GOOD, these participants were able to gain specific knowledge about the use and evaluation of the BEEP base and app developed by the project. In this manner they also familiarized themselves with digital technologies that are now more and more prominent within the beekeeping sector, as their use fosters a more sustainable practice.

With the 3-days B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”, early-career scientists had the possibility of gaining up to date knowledge on multiple topics related to honey bee research. Moreover, as this course covered a broad range of topics, both theoretical and applied, the participants had the opportunity to widen their perspective on honey bee science. This aspect will help them professionally as they will be able to identify better opportunities on how to improve sustainability in beekeeping. Moreover, as the event was concluded with the use of the B-GOOD project as an empirical example of research application, their awareness of present and future research opportunities supported by the European research commission has been expanded.

For both, the training event and the three-day online course, further knowledge dissemination has been ensured as all training materials is available to participants. These two events expanded the reach of communication of the B-GOOD project, as beekeepers and early-career scientists from multiple backgrounds and countries, previously unfamiliar with the project, participated. The fruitful feedback collected during and after the training sessions will also guide the B-GOOD members to a better understanding about how the technologies developed and the results obtained by the project can be exploited. Moreover, these training events increased the level of key stakeholder’s involvement within the project, while consolidating and fostering collaboration among B-GOOD partners who worked together to organize the events and develop training materials.

In conclusion, B-GOOD trainings events represented a significant opportunity for beekeepers and scientists to acquire more knowledge while also enabling the expansion of B-GOOD communication and promoting the exploitation of the project’s achievements. Overall, the degree of exploitation and dissemination that these training events enabled for the B-GOOD project will be more understandable at the end of the project and will thus be evaluated in the following tasks (e.g., D7.7).

5. Acknowledgements

The authors would like to thank the B-GOOD consortium members for a very fruitful collaboration, the different participants of the trainings for their active participation and interactions, and the people involved in the internal reviewing process of this document for their helpful advices.

6. References

Ülgezen, Z.N., Valkenburg, D.J., Schaafsma, F., van den Bosch, T. & van Dooremalen, C. (2022). Protocols No.3. Deliverable D1.7 EU Horizon 2020 B-GOOD Project, Grant agreement No. 817622.

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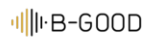
Beaurepaire, A., Neumann, P., de Smet, L., Verbeke, W., Korcheva, A., Metodiev, T., van Dooremalen, C., Williams, J.H., Schoonman, M. (2021). Exploitation Plan. Deliverable D7.3 EU Horizon 2020 B-GOOD Project, Grant agreement No. 817622.

7. Annexes

Overview of the annexes:

- 7.1. Annex 1: Agenda of the B-GOOD Tier 3 beekeepers training school
- 7.2. Annex 2: Screenshot of the email invitation for the B-GOOD Tier 3 beekeepers training school
- 7.3. Annex 3: Screenshots from the presentations by Prof. Dirk De Graaf during the B-GOOD Tier 3 beekeepers training school
- 7.4. Annex 4: Screenshots from the presentations by Marten Schoonman and Zeynep Ülgezen during the B-GOOD Tier 3 beekeepers training school
- 7.5. Annex 5: Agenda 3-days B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”
- 7.6. Annex 6: Screenshots of the html form used for the recruitment of participants for the 3-days B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”
- 7.7. Annex 7: Screenshots of the lectures held during the first two days of the B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”
- 7.8. Annex 8: Screenshots of the lectures held during the last day of the B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”

7.1. Annex 1: Agenda of the B-GOOD Tier 3 beekeepers training school



Tier 3 Training School

Thursday 24th March from 18:00 CET to 21:00 CET

Chair: Dr. Arrigo Moro (UBERN)

Presenters: Prof. Dr. Dirk De Graaf (UGENT), Marten Schoonman (BEEP), Zeynep Ülgezen (WR)

18:00 – 18:15 Welcome, introduction of the speakers and agenda – Dr. Arrigo Moro (UBERN)

18:15 – 19:00 Introduction of the aims, structure, and results of the B-GOOD project – Prof. Dr. Dirk De Graaf (UGENT)

19:00 – 19:15 Q&A – Moderated by Dr. Arrigo Moro (UBERN)

19:15 – 19:30 Break

19:30 – 19:50 Introduction to BEEP system and guide to its functionalities – Marten Schoonman (BEEP)

19:50 – 20:20 Tier 3 protocol Training – Zeynep Ülgezen (WR)

20:20 – 20:50 Q&A – Moderated by Dr. Arrigo Moro (UBERN)

20:50 – 21:00 Closing

7.2. Annex 2: Screenshot of the email invitation for the B-GOOD Tier 3 beekeepers training school

Dear beekeeper,

B-GOOD is happy to invite you to its training online course on **Thursday 24th of March from 18:00 to 20:30 CET**. For participating, please find the Zoom link at the end of this message.

In this course you will receive a detailed overview of the B-GOOD project and understand how your valuable contribution will fit into the broad scope of this international project.

You will also receive direct instructions on how to install and make the best use of the BEEP bases and app. Furthermore, you will also learn how to setup your hives for the collection of research data and how to carry on your inspections following the B-GOOD scientific protocol.

Lastly, we suggest you to submit your feedbacks and first impressions on the BEEP system through this quick survey [B-GOOD Tier 3 pre-course evaluation](#). This will help us better understand how we can assist you with this course in solving any problem you might have encountered in setting up the bases.

Would you please also confirm if you received the 3 BEEP bases and the box with the sample material? Thank you.

-
We look very much forward to your participation.

Kindest regards,

On behalf of the B-GOOD consortium,

Famke Schaafsma- ter Burg

-

Topic: B-GOOD Tier 3 Beekeepers Training Course
Time: Mar 24, 2022 06:00 PM Zurich

Join Zoom Meeting

<https://unibe-ch.zoom.us/j/67228154895?pwd=RUFMempYL2tPUG5UL3k3MFVGYTfwQT09>

7.3. Annex 3: Screenshots from the presentations by Prof. Dirk De Graaf during the B-GOOD Tier 3 beekeepers training school

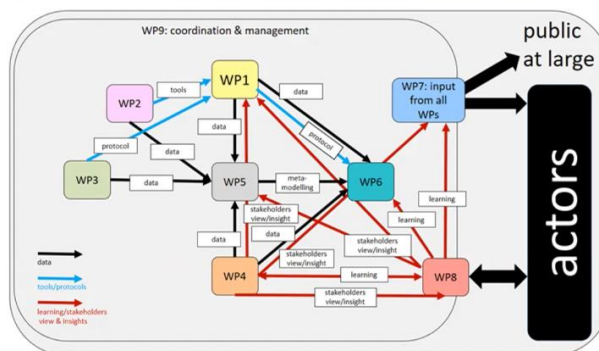
Brief introduction



- B-GOOD: Giving Beekeeping Guidance by computational-assisted Decision making
- Horizon2020-funded project
- 17 partners coming from 13 countries
- Multi-disciplinary
- Started June 1th, 2019
- Now at month 36/48

- Brief introduction
- B-GOOD structure
- Progress and achievements
 - WP1
 - WP2
 - WP3
 - WP4
 - WP5
 - WP6
 - WP7
 - WP8

B-GOOD structure: work packages



WP1: beekeeping and health indicators
 WP2: beekeeping and innovation
 WP3: ecology and environmental drivers
 WP4: socio-economic drivers
 WP5: data analysis and decision making

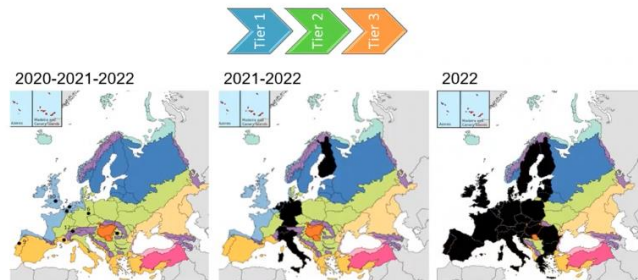
WP6: operationalization and application
 WP7: communication and exploitation
 WP8: multi-actor co-development
 WP9: coordination and management
 WP10: ethics requirements

- Brief introduction
- B-GOOD structure
- Progress and achievements
 - WP1
 - WP2
 - WP3
 - WP4
 - WP5
 - WP6
 - WP7
 - WP8

P&A WP1 Beekeeping and Health Indicators



- Harmonization and optimization
 - ✓ Protocols ready to use
- Data collection: 3-tiered approach



- Brief introduction
- B-GOOD structure
- Progress and achievements
 - WP1
 - WP2
 - WP3
 - WP4
 - WP5
 - WP6
 - WP7
 - WP8

P&A WP1 Beekeeping and Health Indicators



- TIER 1 & 2
 - ✓ Set-up of BEEP bases
 - ✓ Field measurements
 - ✓ Entry of data into BEEP



- BEEP base: automated health monitoring (°T, weight, sound)
- BEEP app: to log beekeepers actions and experimental measurements

- Brief introduction
- B-GOOD structure
- Progress and achievements
 - WP1
 - WP2
 - WP3
 - WP4
 - WP5
 - WP6
 - WP7
 - WP8

7.4. Annex 4: Screenshots from the presentations by Marten Schoonman and Zeynep Ülgezen during the B-GOOD Tier 3 beekeepers training school

Apiary/hives

BEEP webapp:

- Create your account
- Enter data and see BEEP base data
- To use: <https://app.bEEP.nl>
- Can use on any device

BEEP lijnstand



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BEEP

2022-03-24 19:13:04

Your own checklist

New inspection

Select colony or collaboration group: **Select all hives**

Date of inspection: **Select checklist:**

Bee colony ☐ **Disorder** ☐ **Food** ☐ **Production** ☐ **Weather** ☐ **Overall** ☐

TOTAL IMPRESSION

Bees added ☐ **Bees removed** ☐ **Bees lost** ☐

Bees colony

- ☐ Queen
- ☐ Presence
- ☐ Cells
- ☐ Introduction
- ☐ Space
- ☐ Splitting colony
- ☐ Population
- ☐ Size
- ☐ Removal
- ☐ Bees added
- ☐ Drones
- ☐ Uniting colonies
- ☐ Loss
- ☐ Activity

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BEEP

2022-03-24 19:13:41

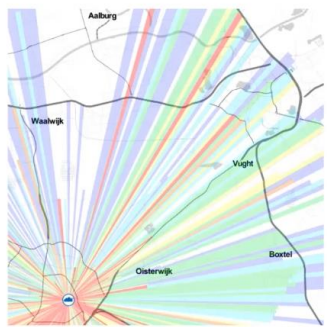
LoRa: sending sensor data wirelessly to the BEEP server

Background

- Long Range Wide Area Network
- Open source (The Things Network)
- Free to use
- Low bandwidth, low energy use and low radiation

Practical

- Requires gateway in the area
- Advised: DLOS8 Outdoor LoRaWAN Gateway

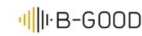


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BEEP

2022-03-24 19:19:09

Tier 3 workplan

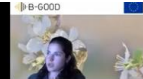


		Months											
Experimental observation	Timing	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Presence of queen & brood	1 x month *												
Sampling for lab analyses	3 x year *												
Overall impression	1 x week **												
Colony Health	1 x week **												
Colony mortality	1 x month *												
BEEP app inspection sheets to be used		9	9	9	9, 10	9	9	9, 10	9	9	9, 10	9, 10	9, 10

* The months may vary between institutes, dates are only provided as an outline, and to represent activities that can be combined. Participants should make 'local' decisions on timing of data collection, depending on colony status, phenological state and climate of country. See workplan section on experimental observations for more details. Preferably every time the hive is being opened.

** Preferably every time the hive is being opened, if the hives are not often opened then at least once a week.

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2022-03-24 19:48:06

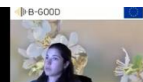
Sampling bees for lab analyses



- 3* a year
 - Spring: when bees start to (mass) forage
 - Summer: the expected moment of peak colony size
 - Autumn: before it gets too cold to sample ($< 10^{\circ}\text{C}$)
- Sample codes generated via BEEP app



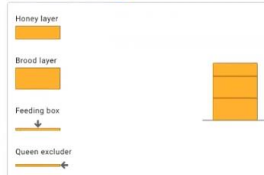
This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817622.



2022-03-24 19:43:32

Create new hive

drag layers to configure hive

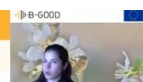


brood box and frame dimensions

Brood box width (cm)	Frame width (cm)
<input type="text" value="0.0"/>	<input type="text" value="0.0"/>
Brood box height (cm)	Frame height (cm)
<input type="text" value="0.0"/>	<input type="text" value="0.0"/>
Brood box depth (cm)	
<input type="text" value="0.0"/>	

QUEEN DETAILS

Queen name	Queen notes
<input type="text"/>	<input type="text"/>
Bee race	Queen clipped
<input type="text" value="Select Bee race"/>	<input type="checkbox"/>
Birth date	Queen fertilized
<input type="text" value="2022-03-24"/>	<input type="checkbox"/>
Age	Queen marked
<input type="text" value="0"/>	<input type="checkbox"/>



2022-03-24 20:01:37

Inspections Hive 1

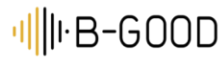
Search...

B-GOOD

Inspections	Mar 24, 2022 7:56 PM	Mar 24, 2022 7:51 PM	Mar 24, 2022 6:58 PM	Mar 16, 2022 12:00 PM	
Disorder > Absence of stressors				100	
Disorder > Laboratory test > Sample code	YKAZMUNF				
Food					
Food > Feeding > Amount (weight)	2500gr				
Food > Feeding > Type	Fondant				
Food > Sufficient nutrition				100	
Hive					
Hive > Configuration > Brood layers			2		
Hive > Configuration > Feeding box			0		
Hive > Configuration > Frames per layer			10		
Hive > Configuration > Queen excluder			1		
Hive > Configuration > Supers			0		
Space					
Space > Bee colony > Suitable space				100	

2022-03-24 19:58:55

7.5. Annex 5: Agenda 3-days B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”



Introduction to honey bee research and modern beekeeping

	Monday 11th April 2022	Tuesday 12th April 2022	Wednesday 13th April 2022
9.00 - 9.40 CEST	Opening	Colony losses and general honey bee pathology Dr. Lars Straub	Honey bee research Dr. Alexis Beaufrepaire
9.40 - 9.50 CEST	Break	Break	Break
9.50 - 10.30 CEST	The honey bee colony superorganism Dr. Lars Straub	Honey bees and pesticides Dr. Lars Straub	The B-GOOD Project - Aims, Structure and Results 1 Prof. Dirk De Graff
10.30 - 11.00 CEST	Break	Break	Break
11.00 - 11.40 CEST	Evolution and distribution of the honey bee Dr. Alexis Beaufrepaire	Honey bee pests and pathogens 1 Dr. Amigo Moro	The B-GOOD Project - Aims, Structure and Results 2 Prof. Dirk De Graff
11.40 - 11.50 CEST	Break	Break	Break
11.50 - 12.30 CEST	Introduction to beekeeping Dr. Amigo Moro	Honey bee pests and pathogens 2 Dr. Amigo Moro	Closing remarks
12.30 - 13.30 CEST	Lunch Break	Lunch Break	
13.30 - 14.15 CEST	Beekeeping 1 - Honey and other bee products Dr. Amigo Moro	Beekeeping 3 - Managing honey bee diseases 1 Dr. Amigo Moro	
14.15 - 14.30 CEST	Break	Break	
14.30 - 15.15 CEST	Beekeeping 2 - Queens and royal jelly production Dr. Raffaele Dall'Olio	Beekeeping 4 - Managing honey bee diseases 2 Dr. Amigo Moro	

7.6. Annex 6: Screenshots of the webpage used for the recruitment of participants for the 3-days B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”

View in browser



B-GOOD

B-GOOD Online Honey Bee Course


Introduction to honey bee research and modern beekeeping

Successful bee research and practice requires a sound understanding of the biology of these creatures, coupled with a general knowledge of factors threatening their health worldwide.

We invite you to explore these topics with the help of researchers from the Horizon 2020 [B-GOOD project](#).

11-13 April 2022

[Register here](#)




©Ugoine Godeau

This course will:

- Cover different aspects of honey bee's fundamental biology, such as their ecology and evolution;
- Give a virtual overview of various beekeeping practices to introduce students to the work with honey bees in the field;
- Provide a strong emphasis on the main stressors affecting these organisms, together with the latest developments in the research and practice that aims at better understanding how to mitigate such issues.

Ultimately, the B-GOOD Online Honey Bee Course “**Introduction to honey bee research and modern beekeeping**” will provide you with a solid foundation in honey bee science and will enable you to understand how to conduct research projects in this field.








If you are a student in the biology and ecology fields or a young scientist, or a veterinarian operating in the beekeeping sector, this course will perfectly suit your interests and field of work. It is free of charge and will be available for only 20 participants. If you would like to register, [please fill in this registration form](#) before Friday 25th March 2022.

For any questions regarding the online course, please contact Dr. Arrigo Moro at arrigo.moro@vetsuisse.unibe.ch.

With our kindest regards,
The B-GOOD team

We look very much forward to your participation!

If you are interested to find out more about B-GOOD and honey bee health, check out our website and social media channels.

B-GOOD Project

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817622.

7.7. Annex 7: Screenshots of the lectures held during the first two days of the B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”

The faces and names of participants were concealed in respect of privacy.

Evolution of (honey) bees

A. The « bees »

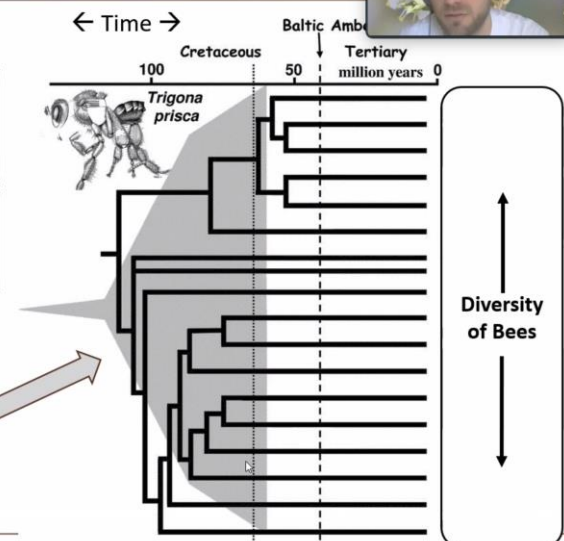
Angiosperm evolution:

Late Cretaceous period (~130 MY):

Oldest bee fossil records found in Myanmar (*Melittosphex burmensis*):

➤ Origin of bees ~120 MY

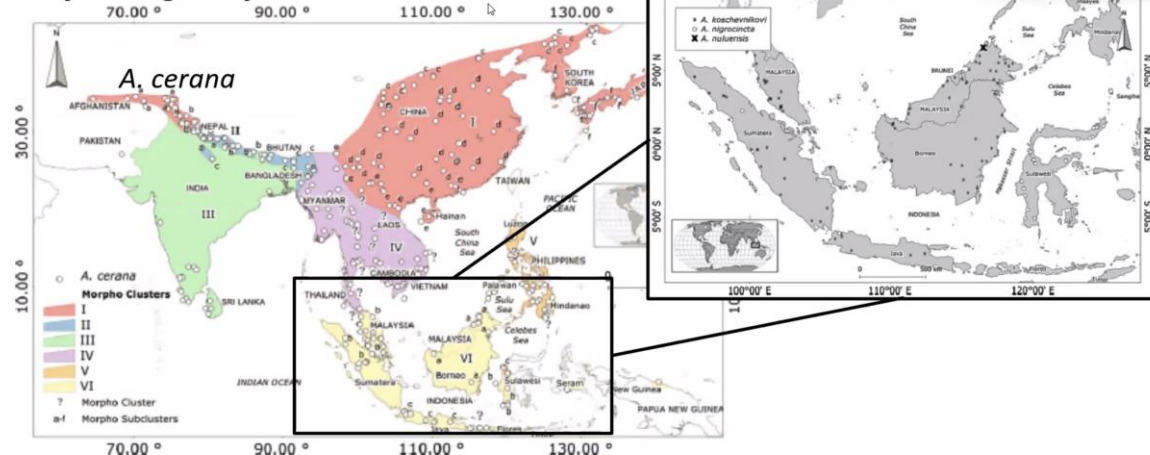
Diversity of Angiosperms



© Lunau (2004)

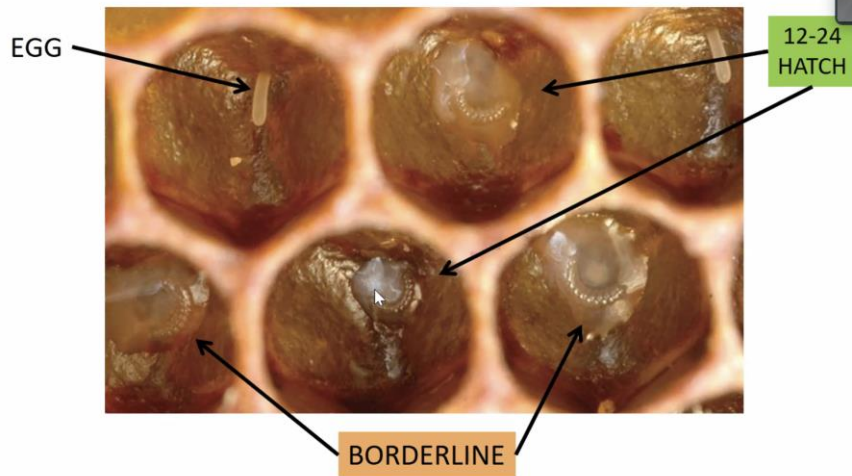
Distribution of honey bees

Cavity-nesting honey bees



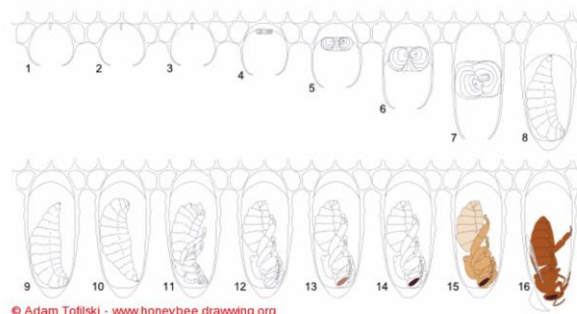
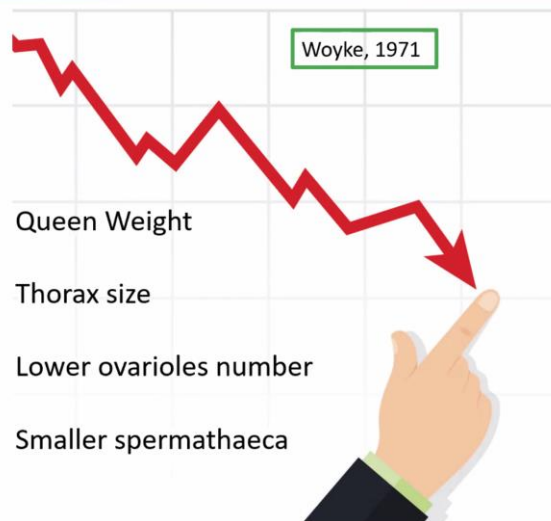
© Hepburn and Radloff (2011)

The smaller the better







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Decreasing totipotency

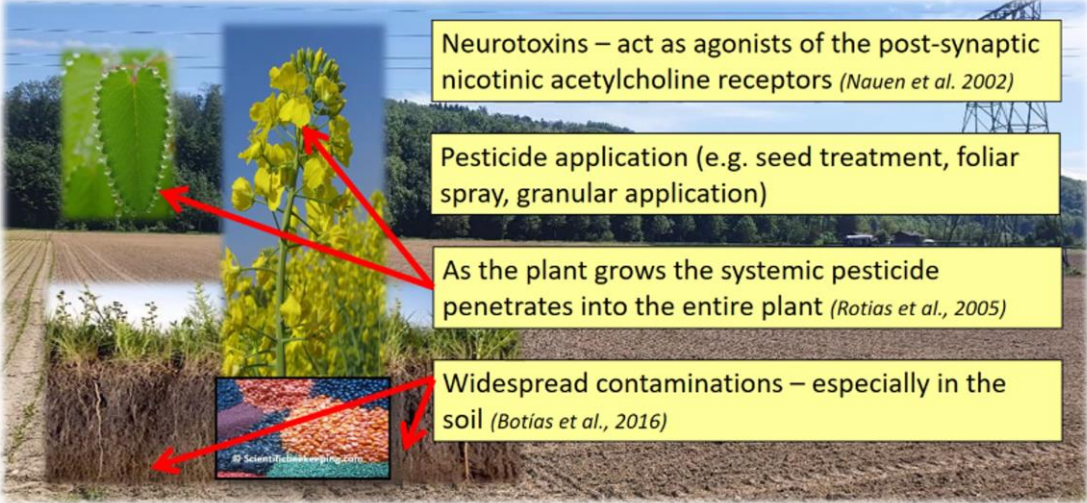


This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817622.

Karolina Gvozdova




Neurotoxins – act as agonists of the post-synaptic nicotinic acetylcholine receptors (*Nauen et al. 2002*)

Pesticide application (e.g. seed treatment, foliar spray, granular application)



As the plant grows the systemic pesticide penetrates into the entire plant (*Rotias et al., 2005*)



Widespread contaminations – especially in the soil (*Botias et al., 2016*)


ScientificData.com



This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817522.







Colony losses can result from a multitude of interacting factors (*Kulhanek et al., 2017*)

Biotic risk factors – Mites, viruses, bacteria or fungi

Nutrition – lack of resources or resource diversity; **weather**



This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817522.


Neumann & Carreck, 2010; Steinhauer et al., 2018

7.8. Annex 8: Screenshots of the lectures held during the last day of the B-GOOD Online Honey Bee Course “Introduction to honey bee research and modern beekeeping”

The faces and names of participants were concealed in respect of privacy.

P&A WP2 Beekeeping and Innovation

- LFD for pesticide detection
 - ✓ Prototype of dual-LFD for screening *neonics* was validated on bee related matrices (rapeseed, sunflower, pollen, honey and bees)
 - detects 6 out of 8 known *neonics*
 - ✓ Development of LFDs for fipronil, chlorpyrifos, avermectins and pyrethroids



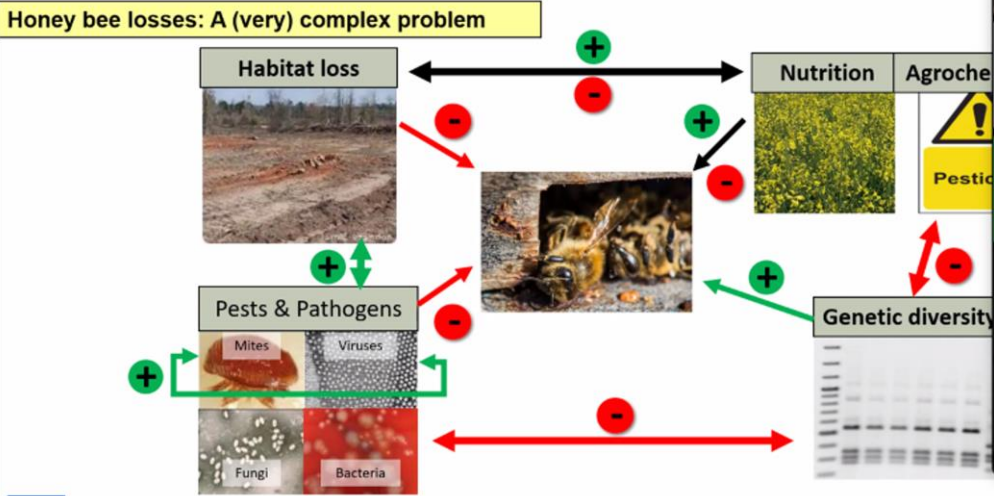
Online Honey Bee Course, April 2022

GHENT UNIVERSITY

2. Methodology of honey bee research

2.1. Organization of bee research

Honey bee losses: A (very) complex problem



Online Honey Bee Course, April 2022

GHENT UNIVERSITY



www.b-good-project.eu
[@BGOOD.H2020](https://www.facebook.com/BGOOD.H2020)



GIVING BEEKEEPING GUIDANCE BY COMPUTATIONAL-ASSISTED DECISION MAKING

EU Horizon 2020 Research and Innovation Action

INTRODUCTION OF THE AIMS, STRUCTURE RESULTS OF THE B-GOOD

Dirk de Graaf



This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817622.

Online Honey Bee Course, April 2022



Unmute
Stop Video
Security
Participants 18
Chat
Share Screen
Polls/Quizzes
Record
Live Transcript
Breakout Rooms
Reactions
More
End



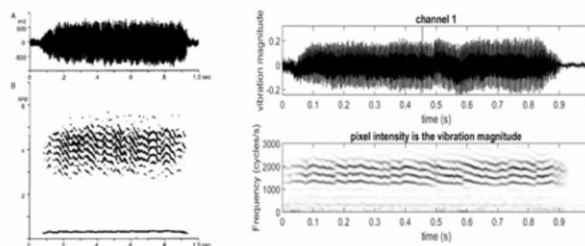





P&A WP2 Beekeeping and Innovation

■ Vibrational data recording

- ✓ Accelerometers installed in 3 MAs (UK, BE PT)
- ✓ Continuously collecting raw accelerometer signals
- ✓ Automated detection and categorization of pulsed vibrations





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Online Honey Bee Course, April 2022



Unmute
Stop Video
Security
Participants 18
Chat
Share Screen
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More
End

