

OP-150 [Bee Health]**BeeGuards - an EU project for resilient beekeeping**

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Background

Climate change is impacting beekeeping in many ways, Varroa is still causing colony losses, alien species are getting closer, honey bees are seen as competitors to other pollinators. On the other hand, scientific and technological advances could provide beekeeping with more efficient tools to make beekeeping more resilient.

Problem description

Warmer winters cause longer brood cycles, which mean higher chance for Varroa to reproduce and increased risk in case of arrival of the exotic mite *Tropilaelaps*. Thirty years after the spread of Varroa out of Asia, we do not really have strong evidence that calendar based treatments contribute to the reduction of colony losses, particularly when environmental conditions and colony development are excluded from the equation. The “Give Varroa a Chance” approach, based on threshold infestation level, can support natural selection towards varroa-resistant honey bees. But data is needed to validate the approach and to better understand the involved biological mechanisms and environmental factors. Furthermore, habitat fragmentation and reduced floral resources have highlighted potential competition between pollinators and raised the issue of optimal colony densities and tools for assessments.

Methodology

BeeGuards (EU Horizon Europe, grant 101082073; www.beeguards.eu) is a diverse consortium composed of 27 partners from 16 countries of different backgrounds (beekeeping associations, companies, research institutes, universities) bringing together expertise across multiple fields. BeeGuards aims to strengthen beekeeping resilience by providing sustainable management practices, novel breeding strategies and digital and forecasting tools that allow the sector to adapt to a changing environment.

Results and conclusion

In the field, BeeGuards is performing a comparative study in 11 countries in Europe and beyond, applying innovative threshold-based management practices and using hives equipped with digital sensors. BeeGuards is performing complementary immunological, behavioural, pathological, hologenomic and ecological studies that will serve to elucidate how management, climate and environment act on honey bees and other pollinators. Insights on preliminary results will be provided.

Practical implications for beekeepers

Beekeepers, farmers and citizens can participate via an online encyclopedia (www.WikiBeedia.eu) and by citizen-science and carbon footprint studies to ensure that research findings are directly translated into useful and good practices for end users.



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COPENHAGEN



BEE-GUARDS – an EU project for resilient beekeeping

Cecilia Costa,  **crea**, Italy
Consiglio per la ricerca in agricoltura
e l'analisi dell'economia agraria



EU Commission call based on
input from stakeholders & science



Resilient beekeeping

Call: HORIZON-CL6-2022-BIODIV-02-two-stage
(Biodiversity and ecosystem services)

Topic: HORIZON-CL6-2022-BIODIV-02-03-two-stage

Type of action: HORIZON-RIA

**Type of Model Grant Agreement: HORIZON Action Grant
Budget-Based**

2

**Preserve
biodiversity**

**Farm to
fork**



The roots of BEE-GUARDS



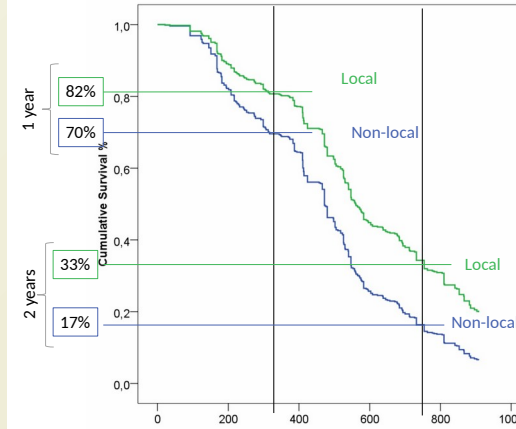
COLOSS (www.coLOSS.org)

3

- Research Network for Sustainable Bee Breeding → LOCAL BEES

- Varroa control → BROOD INTERRUPTION

- Colony losses monitoring → BEST PRACTICES

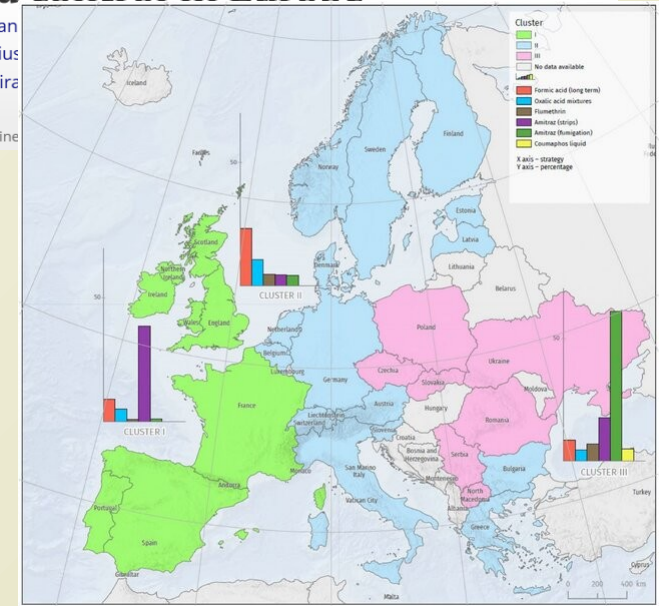


Bee management

Summer brood interruption as integrated management strategy for effective Varroa control in Europe

Ralph Büchler , Aleksandar Uzunov, Marin Kovačić , Jan Leonidas Charistos, Giovanni Formato , Egoitz Galarza, Dariusz Nebojša Nedić , Zlatko Puškadija, Jorge Rivera-Gomis , Mirjana Jerzy Wilde & Antonio Nanetti ...show less

Pages 764-773 | Received 27 Feb 2020, Accepted 24 Jun 2020, Published online





The roots of BEE-GUARDS



- SMARTBEES (www.smartbees-fp7.eu/)
- initiated breeding programs (conservation via utilization)
 - genomic selection (SNPs associated to Varroa resistance)

4

Performance testing protocol *A guide for European honey bee breeders*

Released: April, 2015. Version 1.0



Received: 7 November 2019 | Revised: 19 April 2020 | Accepted: 20 April 2020

DOI: 10.1002/ece3.6357

ORIGINAL RESEARCH

Ecology and Evolution
WILEY

Tool for genomic selection and breeding to evolutionary adaptation: Development of a 100K single nucleotide polymorphism array for the honey bee

Julia C. Jones^{1,2} | Zhipei G. Du¹ | Richard Bernstein¹ | Monique Meyer¹ |
Andreas Hoppe¹ | Elmar Schilling³ | Martin Ableitner³ | Katrin Juling³ | Regina Dick³ |
Anja S. Strauss¹ | Kaspar Bienefeld¹

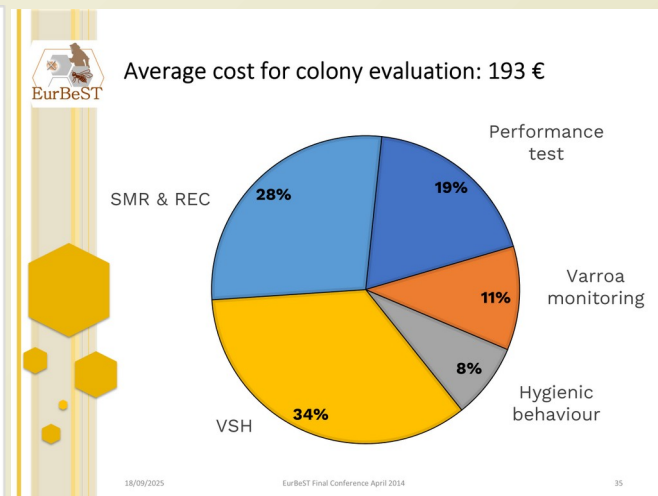
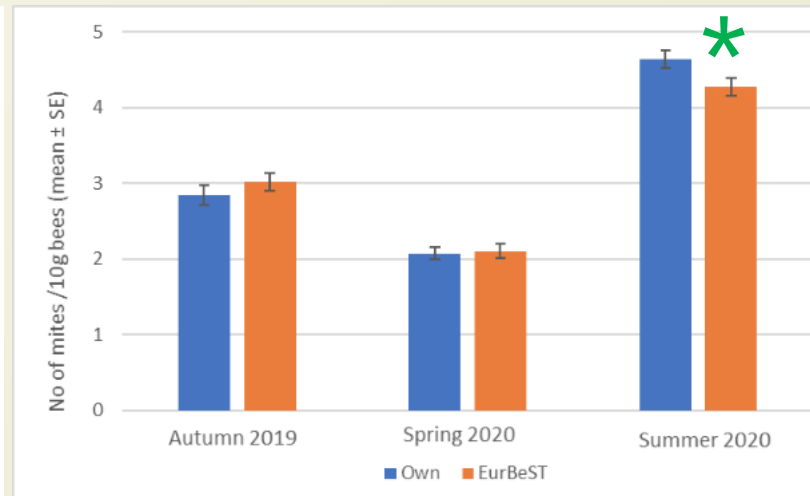
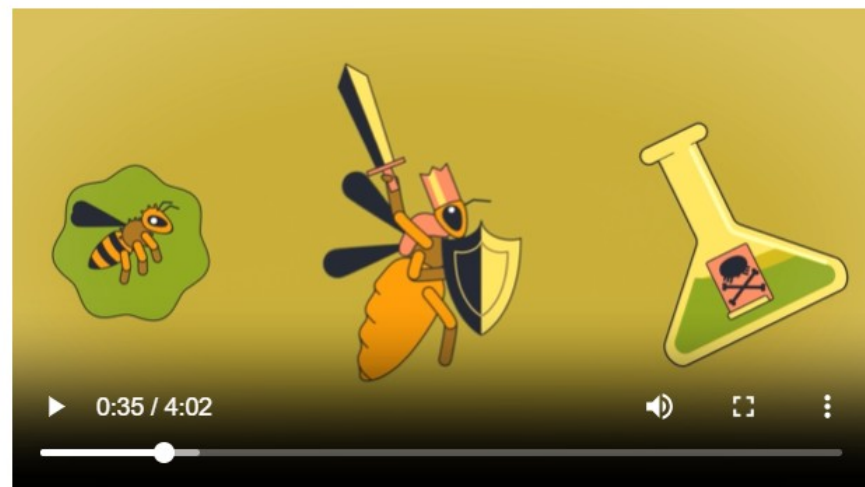
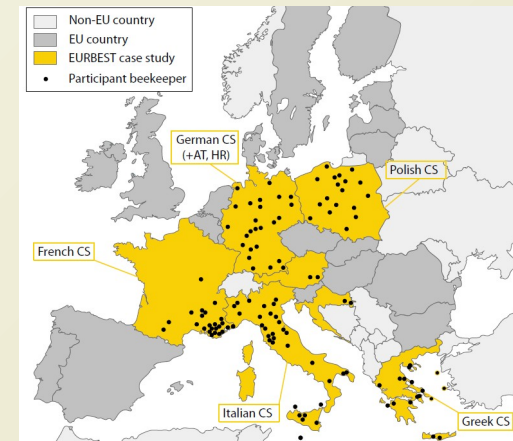


The roots of BEE-GUARDS

□ EurBeST (www.eurbest.eu)

- selection for Varroa resistance and apicultural traits can be successful but requires concerted efforts

5





The roots of BEE-GUARDS

□ BEECONSEL (www.beeconsel.eu)

- Improved mating control to support conservation

6





Resilient beekeeping and breeding to safeguard natural genetic resources and pollination services

48 months duration

10 work packages

14 milestones

45 deliverables

1097 person months

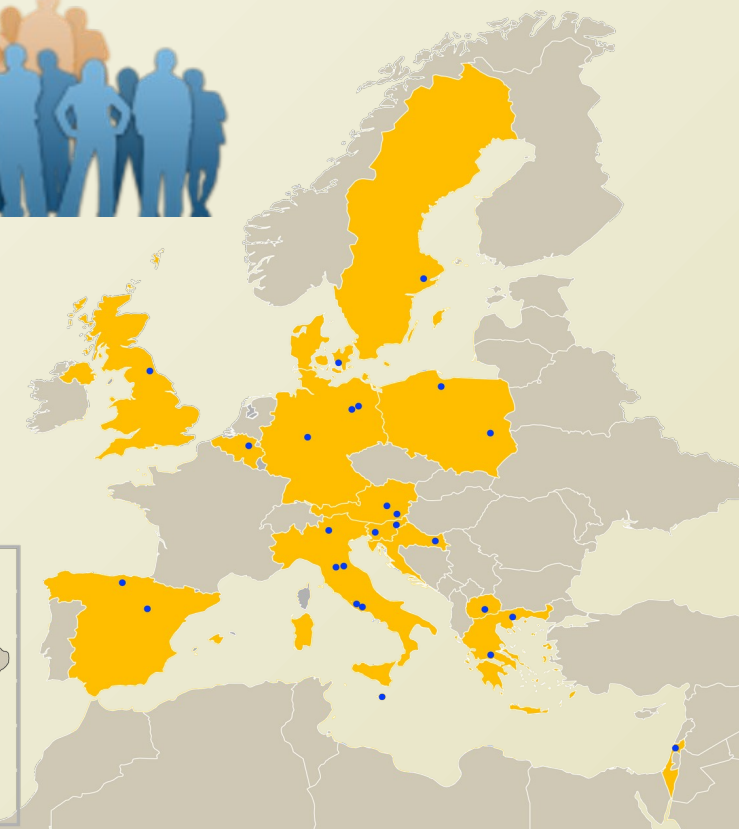
6 Mio € Budget

27 partners from 16 countries



BeeGuards' multiactor and interdisciplinary approach

- Beekeeper Association and Federations
- Research and Extension Institutes
- Research Institutes
- SMEs
- Universities





How to make beekeeping more resilient?

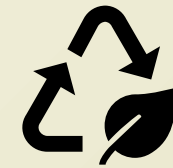
□ Adapting management



□ Understanding mechanisms



□ Mitigating the environmental impact





What do we focus on?

9



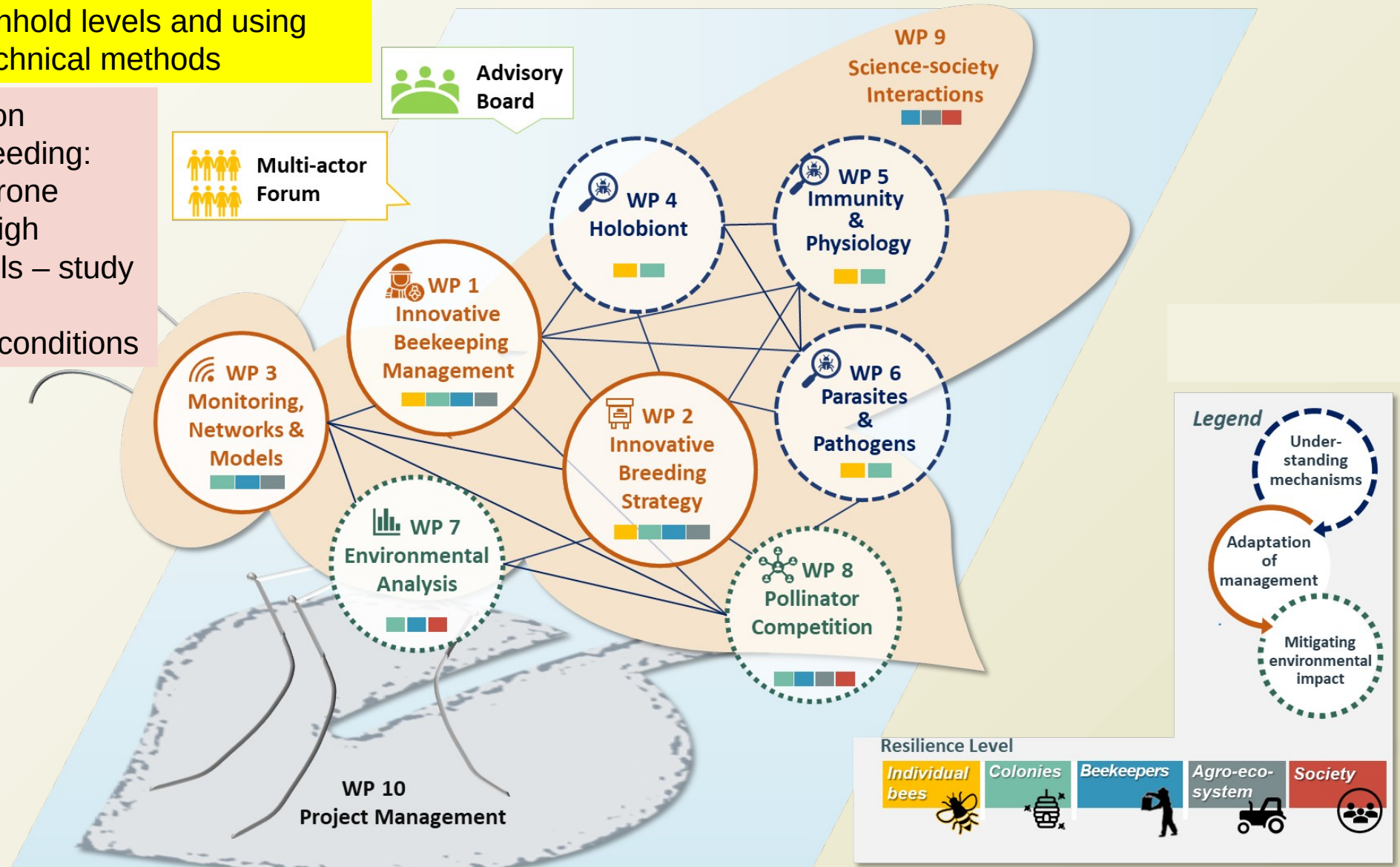


Large field study to evaluate Innovative management: Varroa treatments based on threshold levels and using biotechnical methods

Natural selection elements in breeding: mating using drone colonies with high infestation levels – study in different environmental conditions

10

Resilience via adapted management





Beekeeping

- Summer brood interruption
- Threshold-based winter treatments
- Higher infestation during reproductive season
- Natural selection via drones

11

Breeding

- Mating stations with high infestation (drone fitness)
- Genetic markers? New resilience traits?
- Resistance traits support low impact management and vice versa
- Cryorepositories





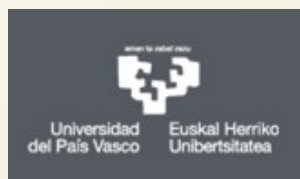
Italian National
Research Council



CENTRUM
PSZCZELARSKIE
WILDE



Universidad Zaragoza



L-Università
ta' Malta



BEE SOURCES
BEEKEEPING CONSULTANCY

BEE-GUARDS apiaries

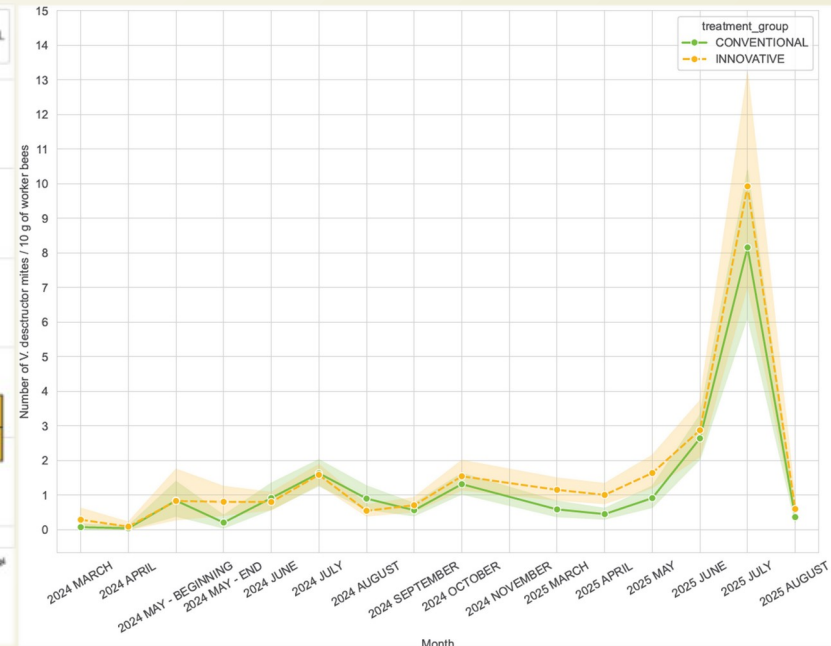
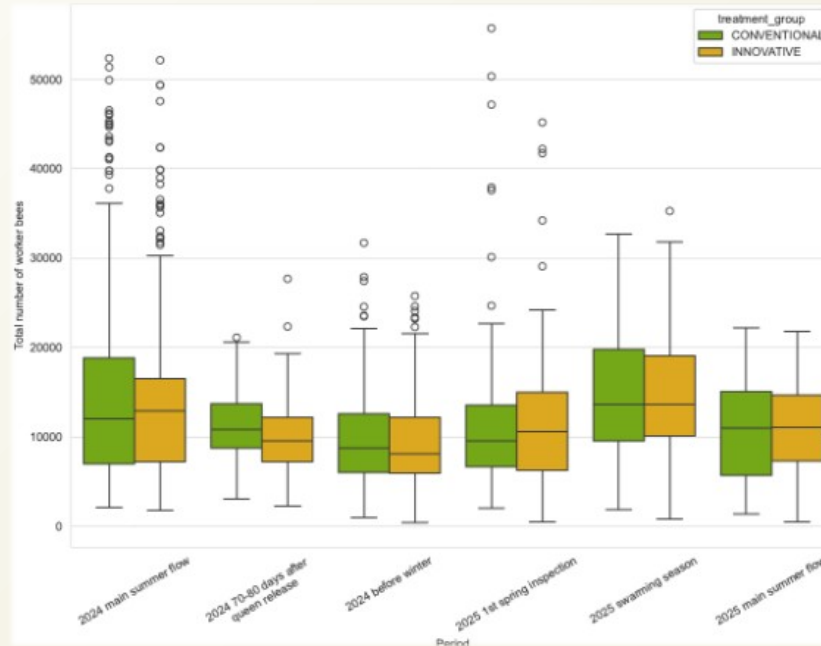
- Management 12 countries, 21 apiaries, ~ 500 colonies
- Breeding 4 countries, 6 apiaries, ~ 200 colonies





Innovative VS Conventional: bee population and varroa infestation

13



SEPTEMBER 24th - 25th, 2025

BEEKEEPING TECHNOLOGY AND QUALITY

PP-212 Comparing colony performance under standard and innovative varroa management concepts in a European experiment
Martin Gabel

SEPTEMBER 26th - 27th, 2025

BEE BIOLOGY

PP-429 Creation of honey bee germplasm repositories across Europe to enhance the protection of honey bee genetic resources
Jesús Yániz

SEPTEMBER 27th, 2025 - Saturday

HALL A2
11:00 - 13:00

SYMPOSIUM / BEE BIOLOGY
Breeding, selection and conservation
Moderators: Gennaro Di Prisco & Rui Goncalves

12:30 - 12:45

Status Report on Bee-Guards Innovative Breeding Strategies
Raffaele Dall'Olio - Italy

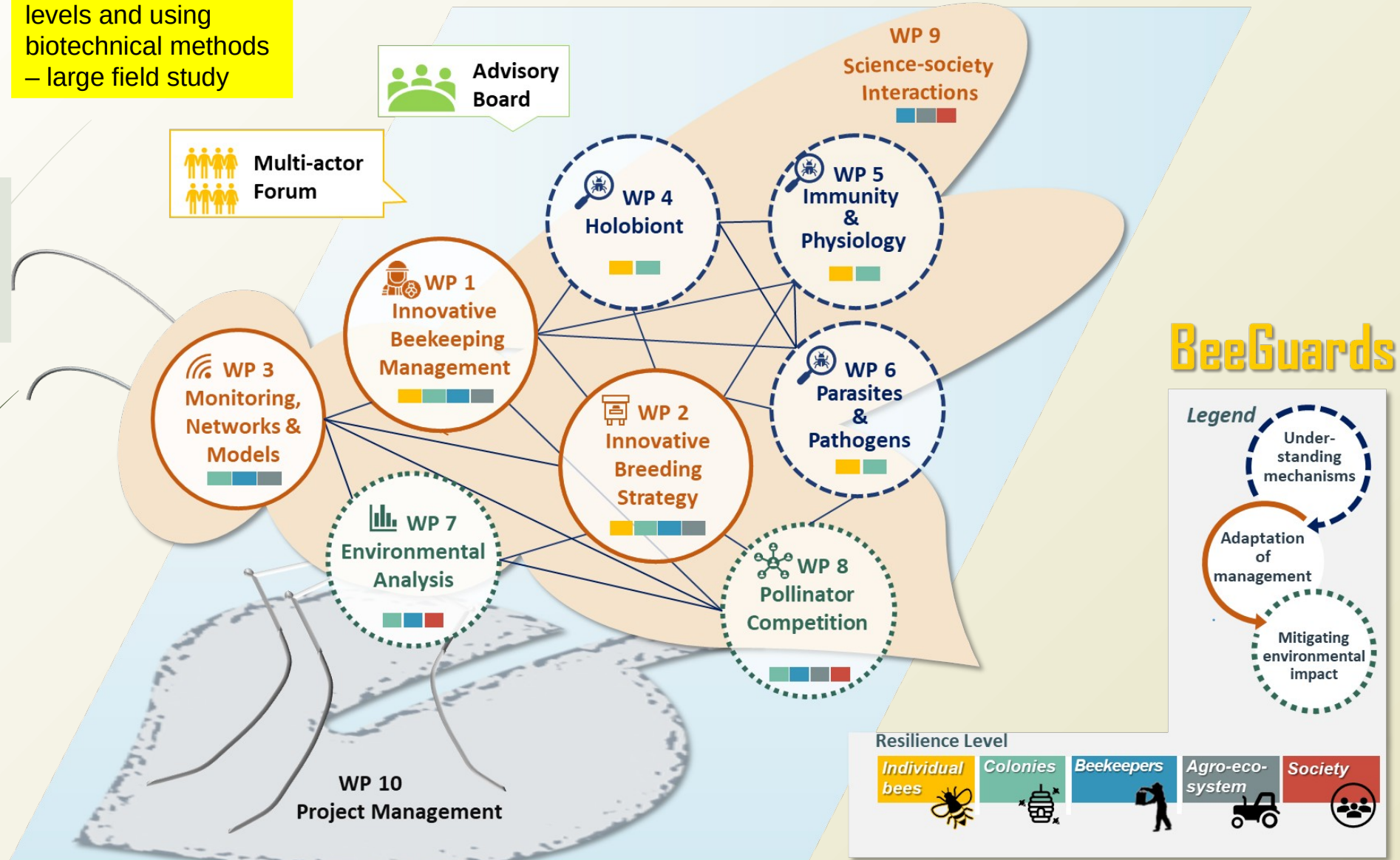
Resilience via adapted management

Natural selection elements in breeding: high drone infestation in mating stations—study in different env. conditions

Varroa treatment based on threshold levels and using biotechnical methods – large field study

Digital hives for continuous monitoring of colony development

14



Digital tools: Internet of Apiaries



- IoT sensors to monitor presence of brood in the colonies (resilience trait?)
- Develop model-derived decision support tools based on data from the pan-European Digital Apiary Network
- centralized data management platform to enable big science and Artificial Intelligence applications

15

BeeNet

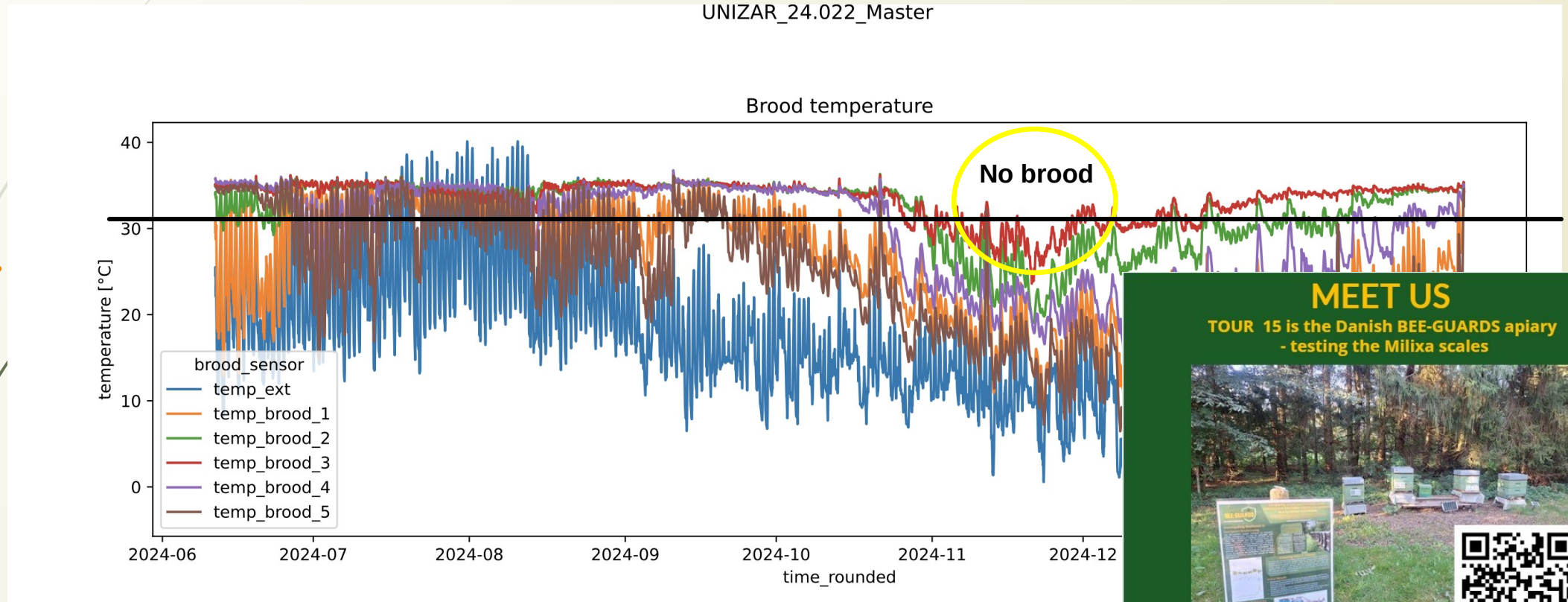


Monitoraggio ambientale con le api



Monitoring brood presence over winter

16



MEET US

TOUR 15 is the Danish BEE-GUARDS apiary
- testing the Milixa scales



Follow the scale and beecounter on
<https://beeguards.eu/scale-denmark/>

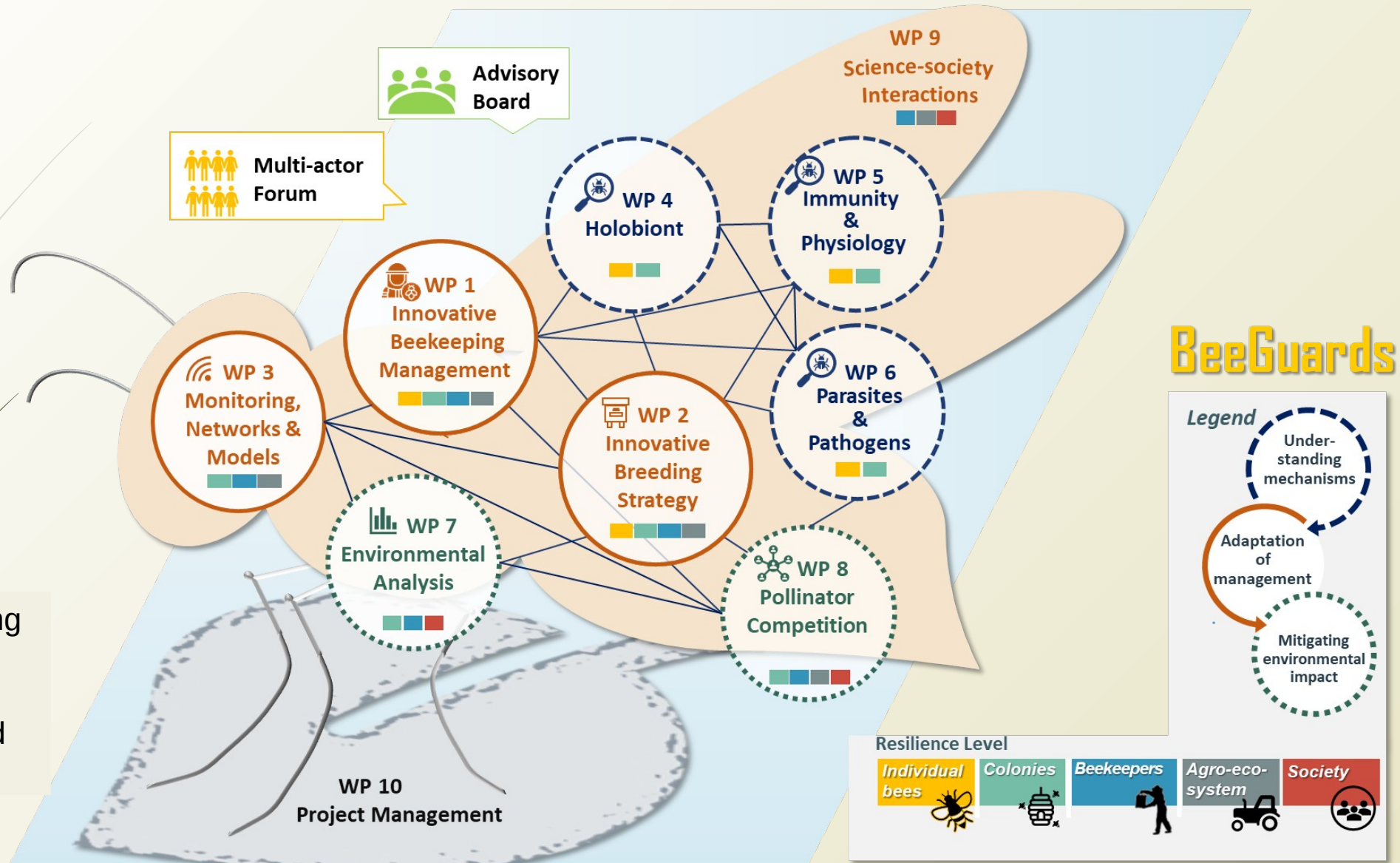


Resilience via understanding mechanisms



Effects of innovative management and landscape on the honey bee holobiont and on immunity and physiology

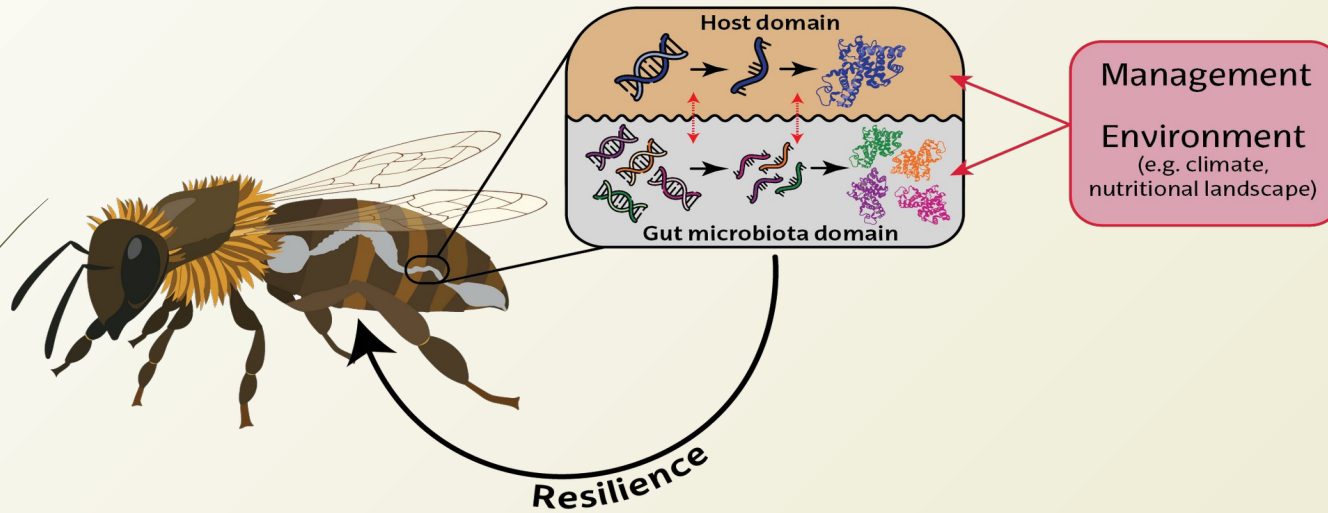
Understanding climate as a driver of parasites and pathogens



BeeGuards

Study of the holobiont to unravel management and environment-driven changes in colony resilience

18



Universidad
del País Vasco

Euskal Herriko
Unibertsitatea



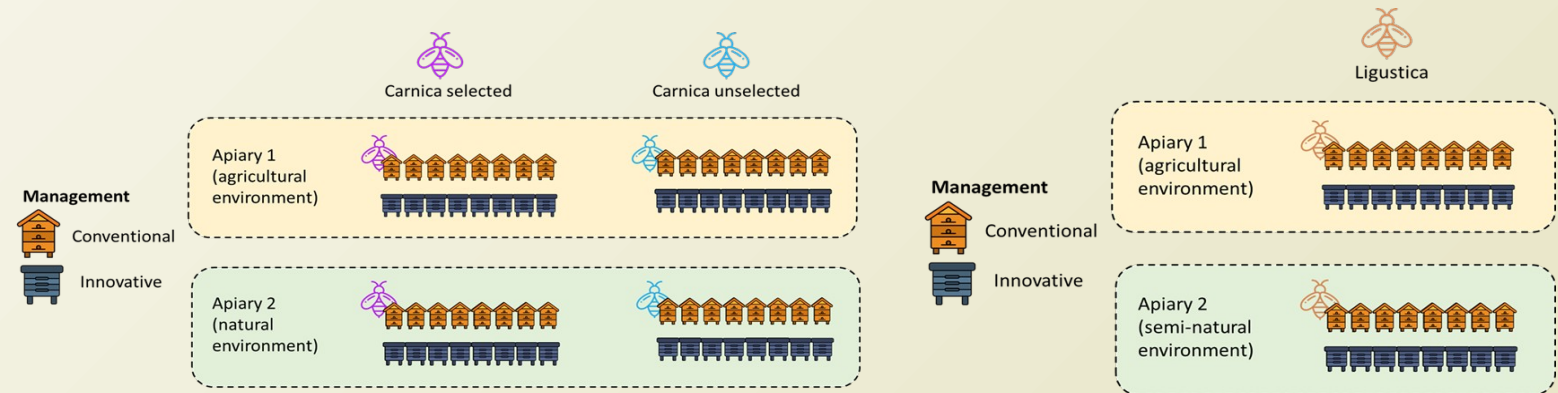
- identify the microbiome+genome combinations that are selected in the innovative management
- provide molecular evidence on how these microbiome+genome combinations contribute to a more resilient honey bee



Study of the holobiont to unravel management and environment-driven changes in colony resilience



- integrated honey bee gut metagenome catalogue (MAG) (iBeeMC)
- Identify microbial profiles linked to resilience under different management conditions, landscapes and in different honey bee genotypes



SEPTEMBER 24th, 2025 – Wednesday

AUDITORIUM 15 SYMPOSIUM / BEE BIOLOGY

10:15 – 10:30 Generating a comprehensive metagenome-assembled genome (MAG) catalogue of the honey bee gut
Jorge Langa - Spain

Investigating immuno-physiological and behavioral mechanisms of adaption to abiotic stressors



- Nutritional value of the landscape and intensity of land use
- Colony management (innovative vs conventional)
- Temperature/humidity



Italian National
Research Council



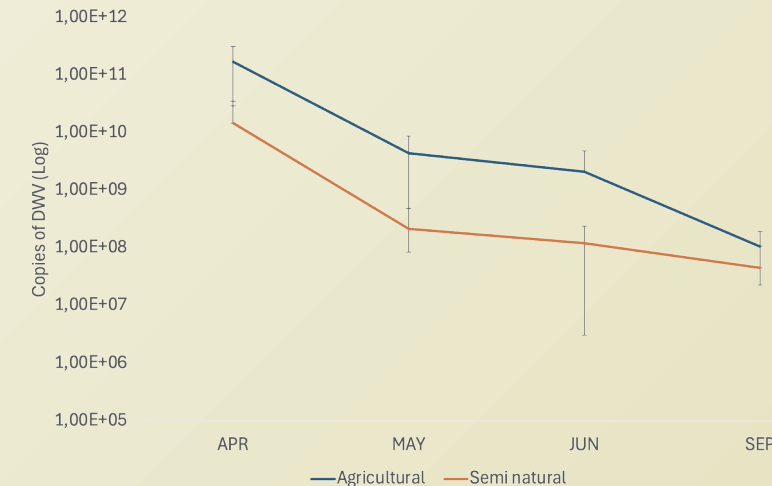
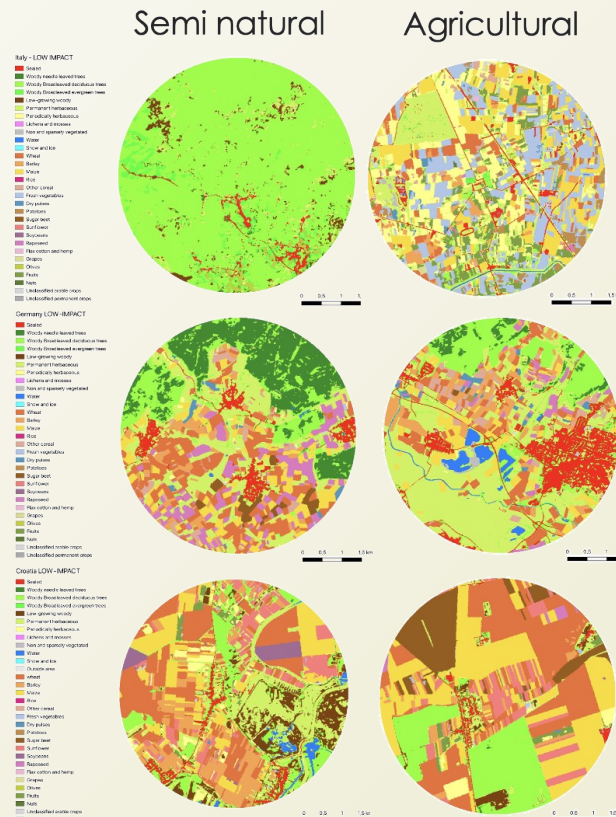
Case Study Apiaries



Italy

Germany

Croatia



SEPTEMBER 26th - 27th, 2025

BEE BIOLOGY

PP-419 Nutritional landscape as a driver for honey bee immunity
Roberta Santopietro

Understanding climate as a driver of parasites & pathogens and mitigating their impact



21

- Better understanding how climate influences the emergence of biotic threats
- Develop management tools to help beekeepers cope with these emerging threats

Tropilaelaps Maltese  Tropilaelaps – Maltese version Download Now!	Tropilaelaps Dutch  Tropilaelaps – Dutch version Download Now!	Tropilaelaps Greek  Tropilaelaps – Greek version Download Now!
Tropilaelaps Portugal  Tropilaelaps – Portuguese version	Tropilaelaps France  Tropilaelaps – France version	Tropilaelaps Italy  Tropilaelaps – Italian version

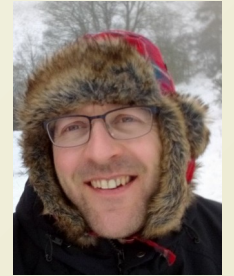
- Improve beekeeping resilience by predicting disease / parasite emergence

SEPTEMBER 24th - 25th, 2025

BEE HEALTH



Understanding the emergence of Chronic bee paralysis in England and Wales PP-137



Fri, 26 Sep, 9:45–10:00 HALL A2
Predicting the impact of Varroa under climate change: An individual based modelling approach
Hollie Pufal - United Kingdom



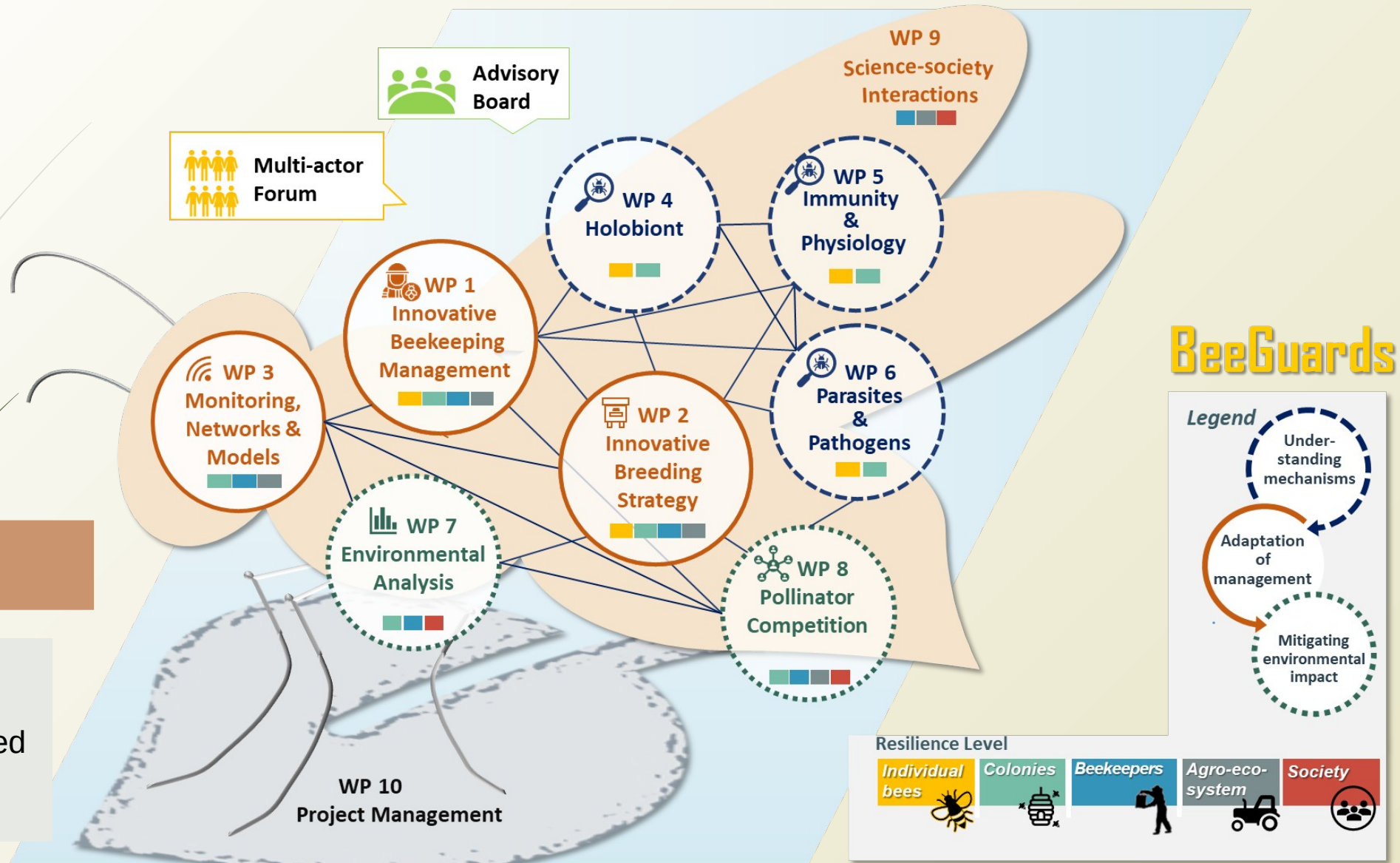
Resilience via mitigating the environmental impact



22

Carbon footprint

Study on competition between managed and unmanaged bees





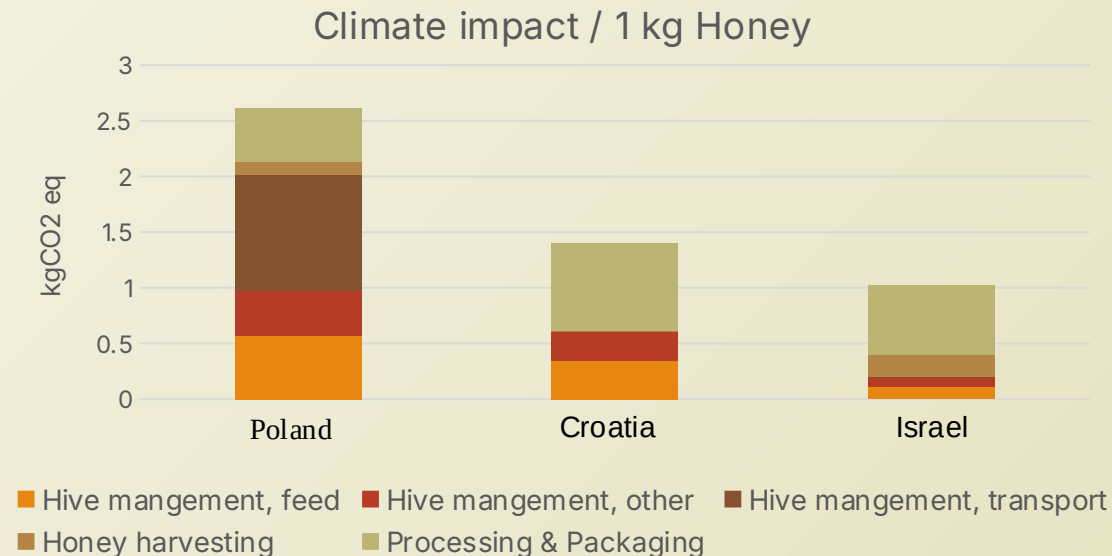
Environmental analysis of European apicultural practices



23

To assess whether, and under what conditions, breeding for resilience can **reduce the environmental impact** of European honey.

Identify **best practices** regarding environmental performance in the innovative management approaches and range the innovation's net contributions in a system perspective.





Analysis of plant-pollinator-pathogen networks to assess the impact of beekeeping on wild pollinators



24

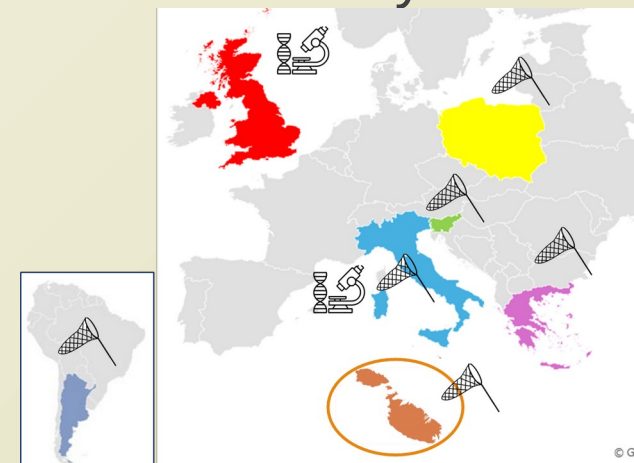
- Provide standard **methodological guidelines** that comprehensively study the **potential** competition between managed honey bees and wild pollinators.
- Identify **optimal colony densities** based on landscape carrying capacity.
- Investigate the **effects of honey bee pathogens** on other bees and **vice versa**.
- Improving knowledge and awareness** of beekeepers and wider society on the important ecological role of all pollinators.

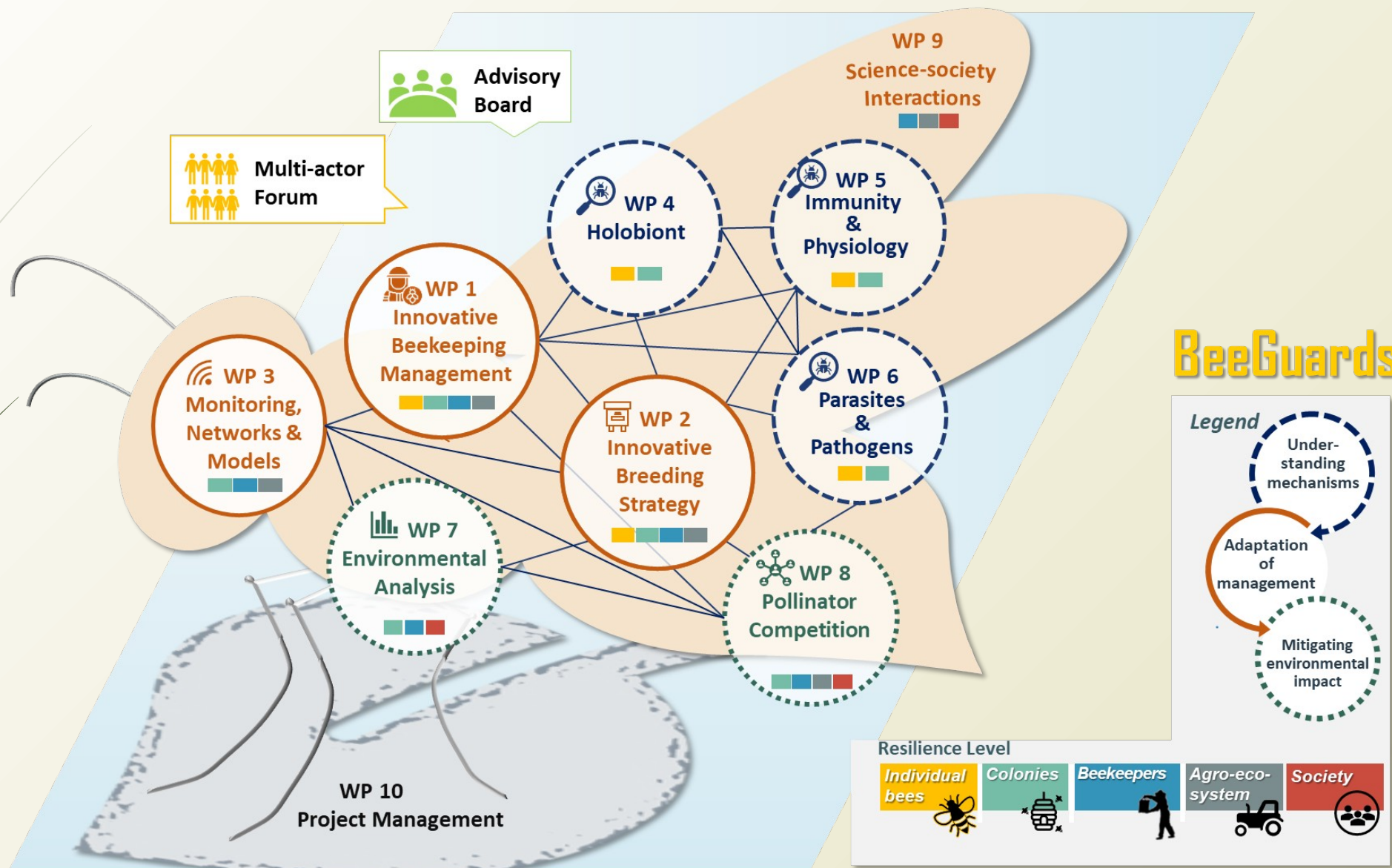


PP-556 Assessing the impact of beekeeping on wild pollinators within the BeeGuards project
Gherardo Bogo

SEPTEMBER 26th - 27th, 2025

POLLINATION AND BEE FLORA







Science – society interactions



26

- Communicate the project and disseminate its outcomes
- Plan and implement interaction with society (“Quest”, “WikiBEEdia”)
- Plan and implement participatory interactions with stakeholders and to build the Multi-actor Forum





27

Main Page

Main Page Discussion

Read View source View history Tools

Other languages: Deutsch English Gaeilge Malti Nederlands dansk eesti español français hrvatski italiano latviešu lietuvų magyar polski português română slovenčina slovenščina suomi svenska čeština Ελληνικά български 中文

Welcome to WikiBEEdia!

Thank you for visiting WikiBEEdia! This encyclopedia on honey bee and beekeeping related topics was created within the EU project [BeeGuards](#). It aims to be the world's number one encyclopedia on honey bees, beekeeping, honey bee diseases, hive management and research. It is available in many languages and beekeepers and honey bee researchers from around the globe are invited to contribute.

If you have any questions, please contact us at info@wikibeedia.eu. Some instructions for writing, editing and translating articles can be found here, if you want to contribute, please use the following page as a starting point: [Instructions](#)

Categories

WikiBEEdia is organised in different categories to make it easier to navigate. So far we divided our articles in six categories:

- Research
- Biology
- Diseases
- Hive management
- Forage
- Hive Products



Appearance hide

Text

- ☒ Small
☐ Standard
☐ Large

Width

- ☒ Standard
☐ Wide

Come and visit us at the APIMONDIA BOOTH on Thursday
25th afternoon and become a **WikiBeedian**





aim to improve beekeeping resilience by

- managing colonies with low chemical input
- breeding local bees for resistance traits
- using digital tools to monitor colony development
- offering statistical models for Decision Support Systems
- understanding the impact of management and landscape on the holobiont and on immunity
- monitoring and preventing existing and emerging parasites and predators
- analysing and mitigating the environmental impact of beekeeping



11th European Conference of Apidology

7-10 September 2026 · Bologna, Italy

**LIKE FORAGING BEES, WE SEEK NOVELTY,
WE NEED COOPERATION AND WE PROFIT
FROM DIVERSITY**

The conference is jointly organized by CREA-AA – Research Centre for Agriculture and Environment and the Alma Mater Studiorum – University of Bologna

<https://www.eurbee2026.com/>



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Acknowledgement



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Hope

That bees and science can help to
ensure peace

