



Assessing the impact of beekeeping on wild pollinators within the BEE-GUARDS project

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INTRODUCTION

Beekeeping is often regarded as sustainable agricultural activity, yet concerns have emerged regarding its potential impact on wild pollinators. Within the BEE-GUARDS project, a dedicated Work Package (WP8) addresses knowledge gaps concerning interactions among managed and wild pollinators. By analysing **plant-pollinator-pathogen networks** across multiple countries, it aims to disentangle the **ecological effects of managed honey bees on wild pollinator communities**.



WP8 OBJECTIVES

- Assess the **impact of beekeeping** on wild pollinators at the agricultural landscape scale.
- Provide **methodological guidelines** for studying pollinator competition.
- Identify **optimal honey bee colony densities** based on landscape carrying capacity.
- Investigate **pathogen spillover** between honey bees and other bees.
- Improve **knowledge and awareness** among beekeepers and the public on the ecological role of pollinators.

Task 8.1 – Assessing competition between managed honey bees and wild pollinators



A field study is conducted in multiple European countries and Argentina, comparing areas with **high and low honey bee colony densities**.

Plant-pollinator-pathogen networks are established to evaluate pollinator diversity and abundance, floral resource availability, and potential competition. **Pathogen screening** is performed in selected sites to assess transmission between managed and wild pollinators.



Task 8.2 – Historical competition analysis

Hive **density data** from several European countries are combined with global **diversity records** to model trends in pollinators, providing insights into how **long-term** honey bee colony densities may have influenced wild pollinator diversity over time.



Task 8.3 – Pathogen transmission experiments

Lab studies assess **pathogen spillover** between honey bees and other bees. Survival, behaviour, and colony fitness are monitored in model species (*Bombus terrestris*, *Osmia* spp.) exposed to common and emerging pathogens, providing evidence of cross-species infection risks.

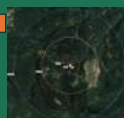


Task 8.5 – Citizen science initiative



An **easy and quick survey** enables **beekeepers and citizens** to record plant-pollinator interactions. Data collected across many sites expands the scope of field surveys and fosters public engagement towards **pollinator conservation**.

Task 8.4 – Case study on bumblebee colonies under high honey bee density



Experimental bumblebee colonies are placed at **varying distances** from a **high-density** honey bee mating station. Colony growth, fitness, and pathogens are monitored to evaluate the effect of honey bee density.

CONCLUSION

BEE-GUARDS investigates how managed honey bees influence wild pollinator populations through competition and pathogen transmission. By combining field studies, historical analyses, laboratory experiments, and citizen science, it generates a **comprehensive picture of plant-pollinator-pathogen dynamics**. The findings will support **sustainable beekeeping practices** that safeguard **biodiversity** and promote coexistence between managed and wild pollinators.



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Citizen Science

Survey

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PP-556 [Pollination and Bee Flora]
Assessing the impact of beekeeping on wild pollinators within the BeeGuards project

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Concerns have grown over the potential negative impacts of beekeeping on wild pollinators. While large numbers of honey bee colonies can create local-scale effects, current evidence doesn't indicate they are a major factor in wild pollinator decline. The actual occurrence and extent of competition for floral resources and pathogen spillover across different environments and honey bee colony densities remain unclear. Furthermore, the absence of standardised methodologies and long-term studies limits understanding of the broader ecological effects of beekeeping on wild pollinators. Addressing these gaps is especially critical in the light of recent measures implemented in several countries, where the introduction of honey bee colonies into certain protected areas has been prohibited to safeguard wild pollinator communities. BeeGuards (www.beeguards.eu), structured into 10 work packages (WPs), aims to equip the beekeeping sector with sustainable management practices and innovative strategies to adapt to climate changes while minimizing unintended consequences on the environment. WP8, "Analysis of Plant-Pollinator-Pathogen Networks to Assess the Impact of Beekeeping on Wild Pollinators", investigates the potential impacts of beekeeping activities on wild pollinator populations. It is dedicated to analysing the complex interactions within plant-pollinator-pathogen networks to assess how the presence of honey bees colonies might affect wild pollinators. WP8 is conducting a field study in multiple European countries and Argentina, comparing pollinator communities in areas with high and low honey bee colony densities. Pollinator biodiversity, abundance, and plant-pollinator interactions are monitored, and pathogen transmission between honey bees and wild pollinators is assessed. Historical data are analysed to evaluate the influence of honey bee colony presence on wild pollinator populations over time. Laboratory experiments examine the effects of pathogen infections on both honey bees and wild bees, measuring survival, behaviour, and overall health. A specific case study evaluates the impact of high honey bee colony density on bumblebee colony fitness. Finally, a citizen science initiative is implemented to engage beekeepers and the public in pollinator monitoring, to expand data collection efforts. WP8 will guide the development of sustainable practices to protect biodiversity, delivering scientific insights and practical solutions that foster coexistence between managed bees and wild pollinators.