



# **EU reference laboratory for honeybee health activities**

**M-P Chauzat, M Laurent, M-P Rivière**





## National reference laboratory network

**27 Member States of the European Union**

### Third countries

- African reference lab for pollinators (Kenya)
- Bosnia Herzegovina
- Canada
- Norway
- Kosovo
- Switzerland
- Turkey
- UK



# Analytical capacities of the NRLs

24 parasitic and infectious agents

## Bacteria

*Paenibacillus larvae* (American foulbrood)  
*Melissococcus plutonius* (European foulbrood)

## Mites

*Tropilaelaps* spp.  
*Varroa destructor*  
*Acarapis woodi*

## Amoeba

*Malpighamoeba mellifica*

## Insects

*Vespa velutina*  
*Braula coeca*

## Viruses

**ABPV** Acute bee paralysis virus  
**BQCV** Black queen cell virus  
**CBPV** Chronic bee paralysis virus  
**DWV** Deformed wing virus  
**IAPV** Israeli acute paralysis virus  
**KBV** Kashmir bee virus  
**SBV** Sacbrood virus  
**AIHV** Apis iridescent virus  
**FV** Filamentous virus  
**SBPV** Slow bee paralysis virus  
**VDV** Varroa destructor virus

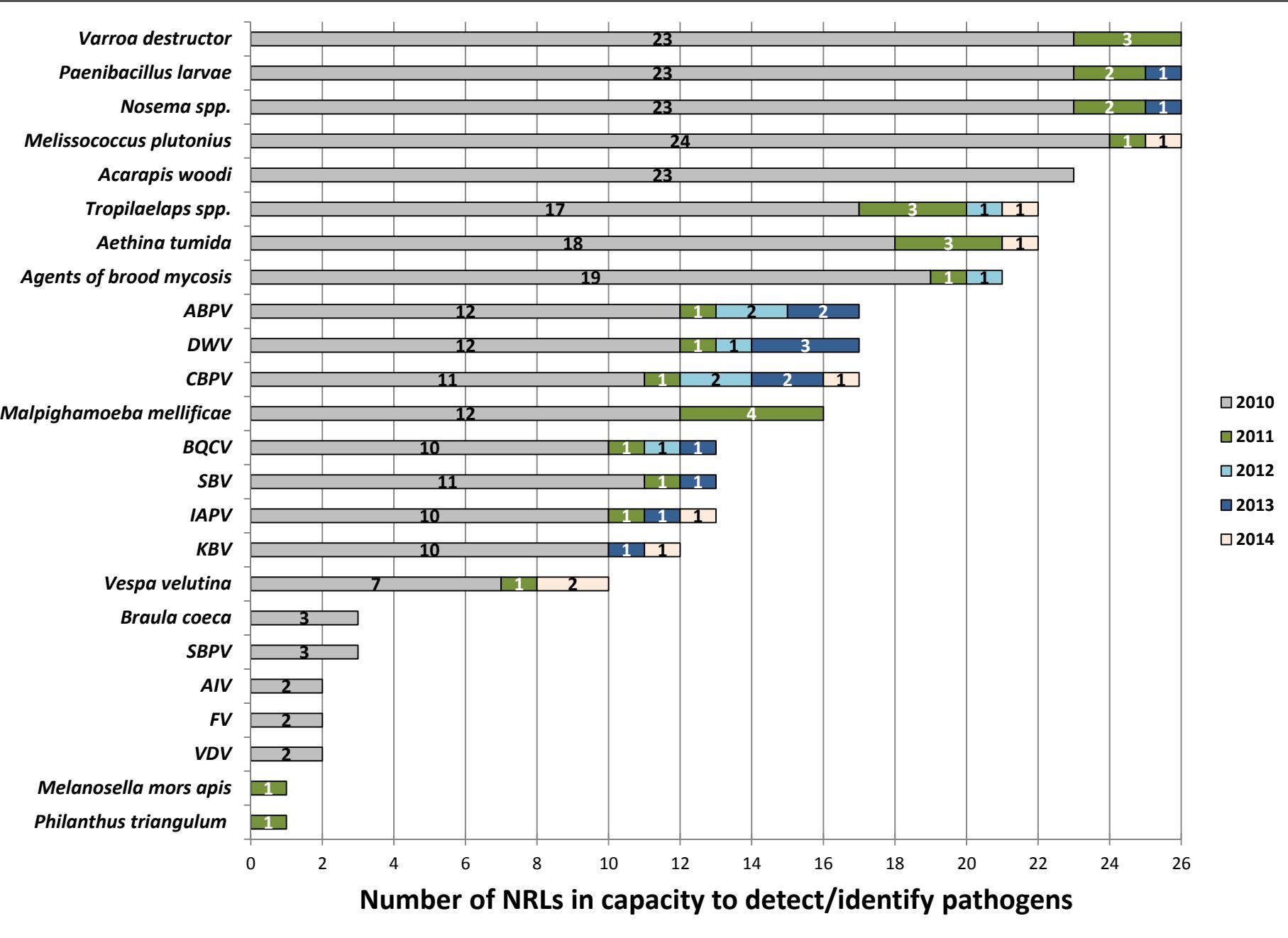
## Coleopteran

*Aethina tumida*  
(Small hive beetle)

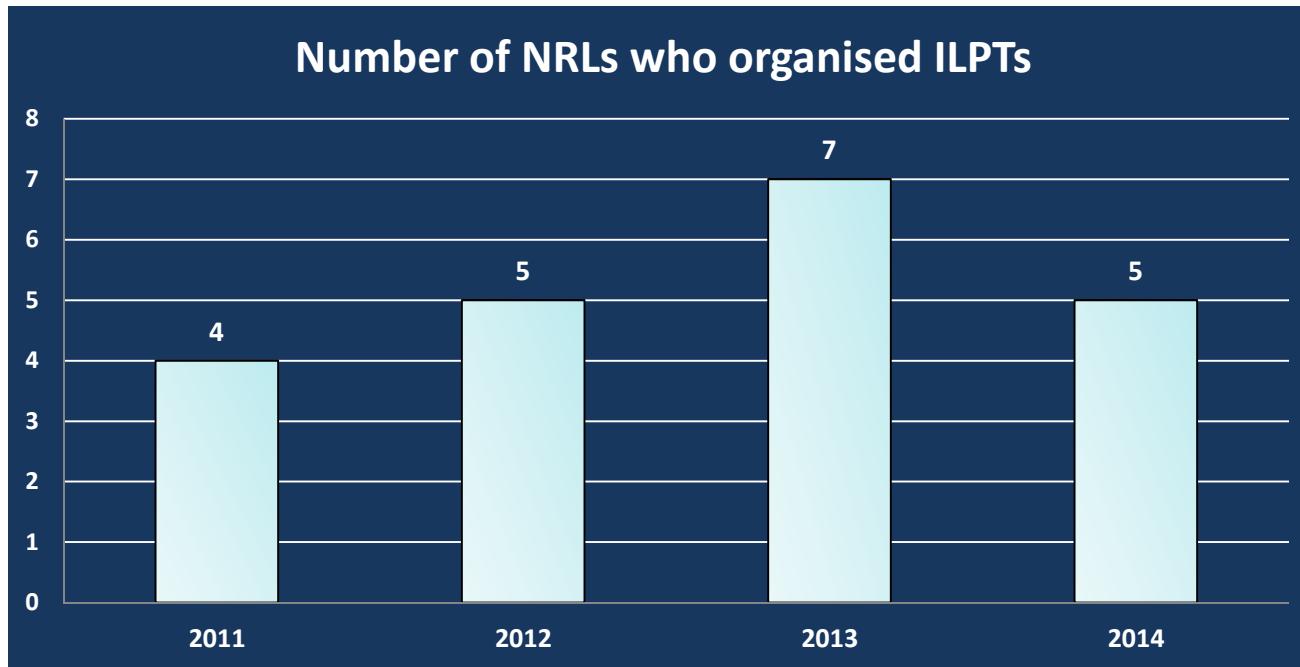
## Fungi

*Nosema apis*  
*Nosema ceranae*  
*Ascospaera apis*  
*Aspergillus flavius*

# Analytical capacities at European level



# Organisation of ILPTs from 2011 to 2014



2011	2012	2013	2014
<i>P. larvae</i>	<i>P. larvae</i>	<i>P. larvae</i>	<i>P. larvae</i>
<i>M. plutonius</i>	<i>M. plutonius</i>	<i>M. plutonius</i>	<i>M. plutonius</i>
<i>V. destructor</i>	<i>V. destructor</i>	<i>V. destructor</i>	<i>V. destructor</i>
<i>Nosema</i> spp.	<i>Philantus triangulum</i>	<i>Nosema</i> spp. Viruses	<i>A. tumida</i>

- Mostly ILPTs organised at the national level

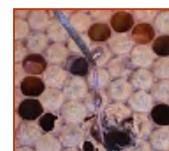
# EPILOBEE

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## First active harmonised surveillance program

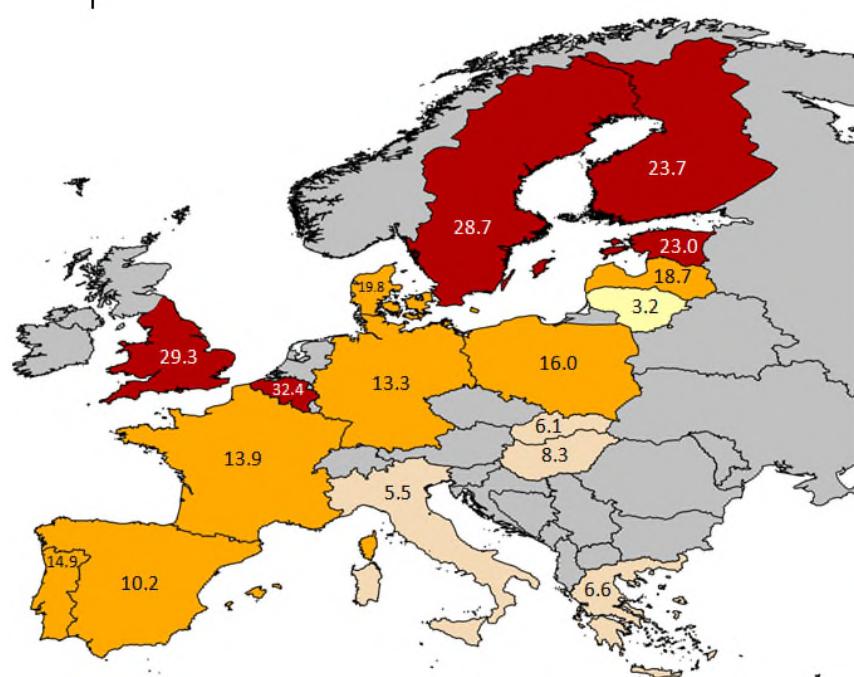


- Estimate the overwintering and seasonal colony mortality rates
- Estimate the *clinical* prevalence of the principal honeybee diseases
  - American foulbrood
  - European foulbrood
  - Varroosis
  - Nosemosis
  - Chronic paralysis

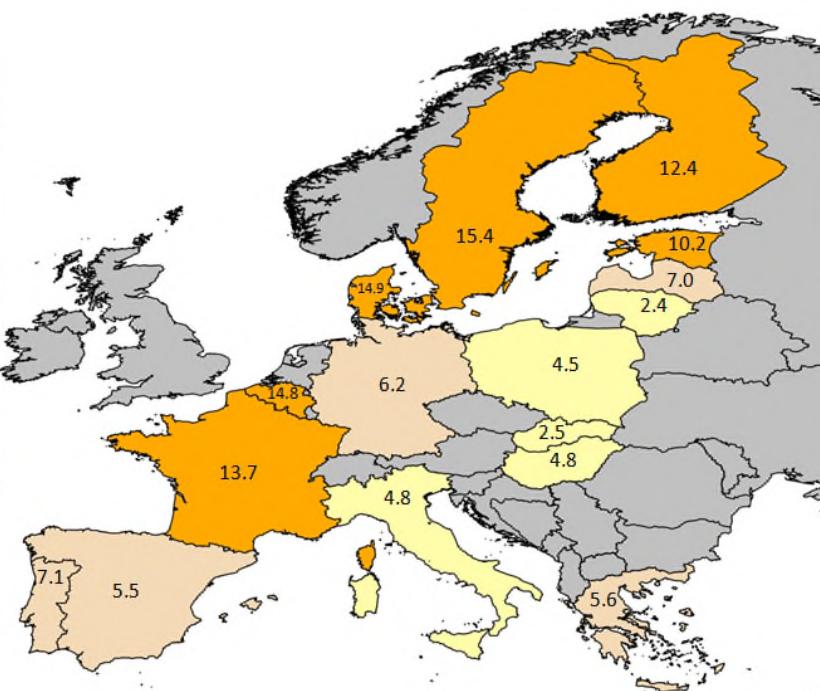


# Overwintering colony mortality

2012 – 2013

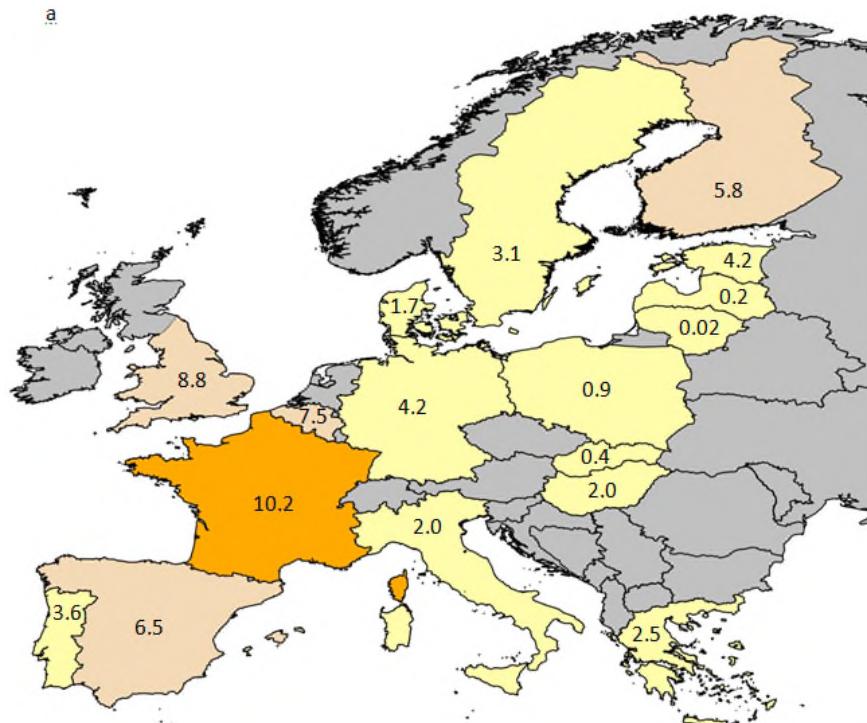


2013 – 2014

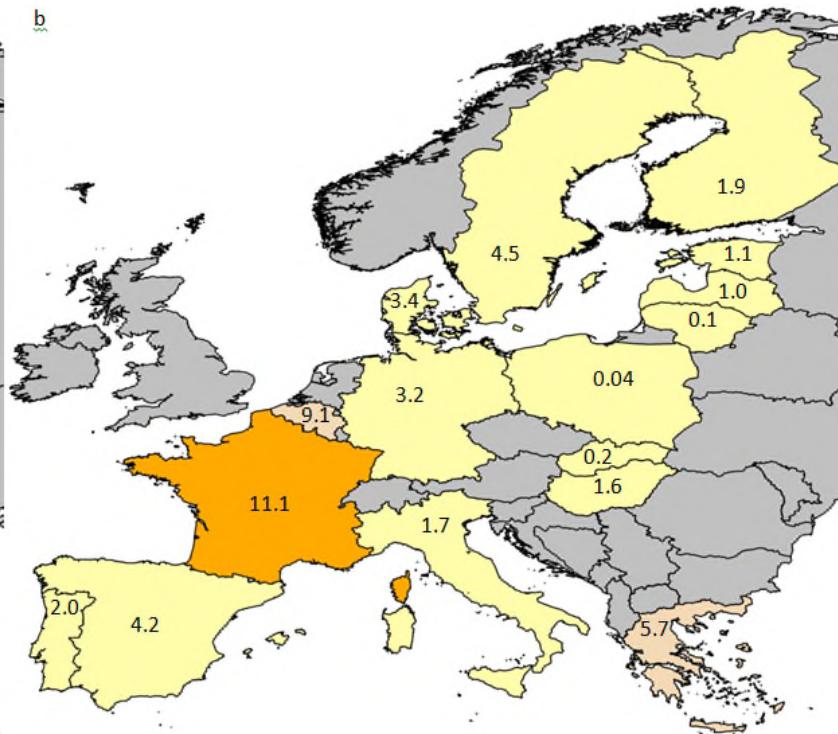


# Seasonal colony mortality

2012 – 2013



2013 – 2014



Lower than winter mortality

# EPILOBEE data analysis

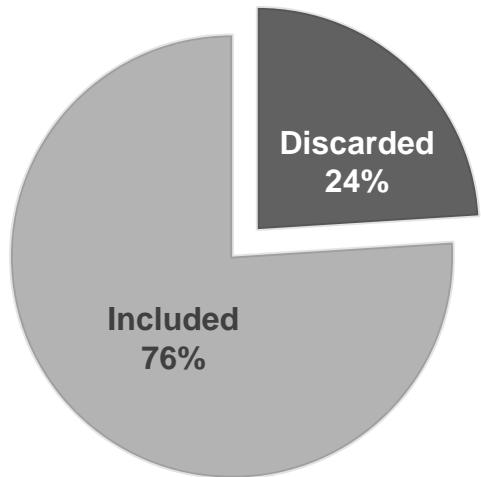
3 053 apiaries visited 3 times in 2012-2013

Logical conditions



721

2 332 apiaries



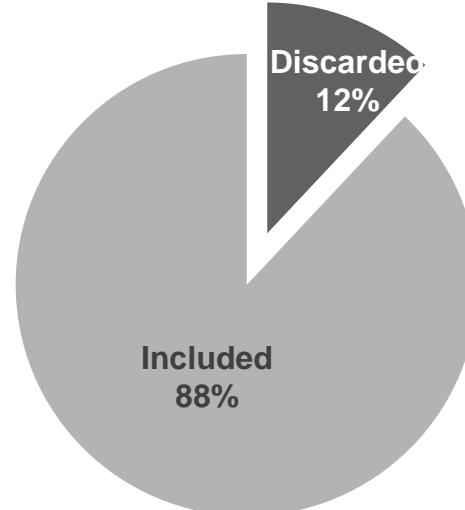
2 745 apiaries visited 3 times in 2013-2014

Logical conditions



319

2 426 apiaries



4 758 apiaries in the analysis

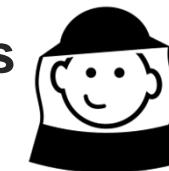
Year  
Countries

Random effect

# EPILOBEE : risk factors



Typology of beekeepers



Education of beekeepers



Beekeeping practices



Previous winter mortality



Prophylaxis



# Publications

**EXTERNAL SCIENTIFIC REPORT**

ANS

APPROVED: 29 March 2016

**Statistical analysis on the EPILOBEE explanatory variables related to honey mortality in EU during a 2 year surveillance period**

French Agency for Food, Environmental and Occupational Safety (ANSES)

Antoine JACQUES, Marion LAURENT, Magali RIBIÈRE-CHABERT, Isabelle BOUJEDDAD, Stéphanie BOUGEARD, Pascal HENDRIKX and Marie-Pierre CHAUZAT

**Abstract**

Seventeen Member States of the European Union were brought together to active epidemiological surveillance program on honeybee colony mortality in representative beekeeper populations of randomly selected apiaries and colonies. Visits were performed to estimate the mortality of bee colonies over the winter period. Beekeeping practices and clinical signs of the main honeybee diseases were assessed by questionnaire. Winter and seasonal mortalities widely varied according to the country when comparing both years. The highest winter mortality was recorded in Lithuania (31.73%) and the lowest in Lithuania (2.16%) in 2013-2014. In the multivariate models combining both years, the country was studied as a random effect. Clustering of observations, the highest winter mortality rate (14.04%) was found in the United Kingdom. Beekeepers were mostly hobbyists, including hobbyist beekeepers over 65 years of age with small size apiaries including queens and a small experience in beekeeping. The lowest winter mortality was affected to a cluster with professional beekeepers between 30 and 45 years old, managing large apiaries. The management promoted the increase of the live beekeepers had attended a beekeeping training during the past three years and had a qualification in beekeeping, were members of a beekeeping organization or experience in beekeeping superior to five years. These apiaries did not have a queen. Variables with a statistically significant effect on honeybee colony mortality in winter season were colonies clinically affected by the varroosis, the absence of bees in the past three years of the beekeeper's activity, the non-use of an apiary participation to a cooperative veterinary treatment. Being a pilot project, EPILOBEE will lead to the formulation of recommendations for future epidemiological surveillance.

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**Key words:** honeybee health, colony mortality, honeybee diseases, epidemiology

**Question number:** EFSA-Q-2014-00882

**Correspondence:** sc.secretariat@efsa.europa.eu

Euroreference 2 - March 2017

EUROPEAN UNION

The first pan-European epidemiological study reveals honey bee colony losses (2013-2014) in winter colony losses and seasonal colony losses

Marion LAURENT<sup>1</sup>, Pascal HENDRIKX<sup>2</sup>, Magali RIBIÈRE-CHABERT<sup>3</sup>, Mathilde SAUSSAC<sup>4</sup>, Stéphanie BOUGEARD<sup>5</sup>, Giles E. BUDGE<sup>6,7</sup>, Pascal HENDRIKX<sup>1</sup>, Marie-Pierre CHAUZAT<sup>1,2\*</sup>

**Check for updates**

**OPEN ACCESS**

**Citation:** Jacques A, Laurent M, EPILOBEE Consortium, Ribière-Chabert M, Saussac M, Bougeard S, et al. (2017) A pan-European epidemiological study reveals honey bee colony survival depends on beekeeper education and disease control. PLoS ONE 12(3): e0172591. doi:10.1371/journal.pone.0172591

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**Data Availability Statement:** The data belong to each Member State and the European Commission. They are available upon request to the Member State. Each Member State has a list of people who worked in EPILOBEE. The request for data should be addressed to them. The authors of this study may be contacted at [epilobee@anses.fr](mailto:epilobee@anses.fr).

**Funding:** The funders of EPILOBEE were the European Commission, the Member States and the EU Reference Laboratory. The statistical analysis was performed by the University of Newcastle upon Tyne, Newcastle upon Tyne, Tyne and Wear, United Kingdom.

**Introduction**

Honey bees are highly effective pollinators with an annual global contribution to crop productivity of € 147 million [1]. Recent decades have seen heightened concern about honey bee colony mortality across the United States [2, 3], Asia [4] and Europe [5]. Whilst the global number of managed colonies has risen by about 45% over the last 60 years [6, 7], the seemingly unpredictable loss of honey bee colonies exacerbates the shortage of pollinators leading to concerns that

**PLOS ONE**

RESEARCH ARTICLE

A pan-European epidemiological study reveals honey bee colony survival depends on beekeeper education and disease control

Antoine Jacques<sup>1,2</sup>, Marion Laurent<sup>2</sup>, EPILOBEE Consortium<sup>3</sup>, Magali Ribière-Chabert<sup>2</sup>, Mathilde Saussac<sup>4</sup>, Stéphanie Bougeard<sup>5</sup>, Giles E. Budge<sup>6,7</sup>, Pascal Hendrikx<sup>1</sup>, Marie-Pierre Chauzat<sup>1,2\*</sup>

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\* The complete membership of the EPILOBEE Consortium is provided in the Acknowledgments.  
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**Abstract**

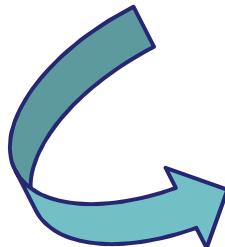
Reports of honey bee population decline has spurred many national efforts to understand the extent of the problem and to identify causative or associated factors. However, our collective understanding of the factors has been hampered by a lack of joined up trans-national effort. Moreover, the impacts of beekeeper knowledge and beekeeping management practices have often been overlooked, despite honey bees being a managed pollinator. Here, we established a standardised active monitoring network for 5 798 apiaries over two consecutive years to quantify honey bee colony mortality across 17 European countries. Our data demonstrate that overwinter losses ranged between 2% and 32%, and that high summer losses were likely to follow high winter losses. Multivariate Poisson regression models revealed that hobbyist beekeepers with small apiaries and little experience in beekeeping had double the winter mortality rate when compared to professional beekeepers. Furthermore, honey bees kept by professional beekeepers never showed signs of disease, unlike apiaries from hobbyist beekeepers that had symptoms of bacterial infection and heavy Varroa infestation. Our data highlight beekeeper background and apicultural practices as major drivers of honey bee colony losses. The benefits of conducting trans-national monitoring schemes and improving beekeeper training are discussed.

PLOS ONE | DOI:10.1371/journal.pone.0172591 March 9, 2017

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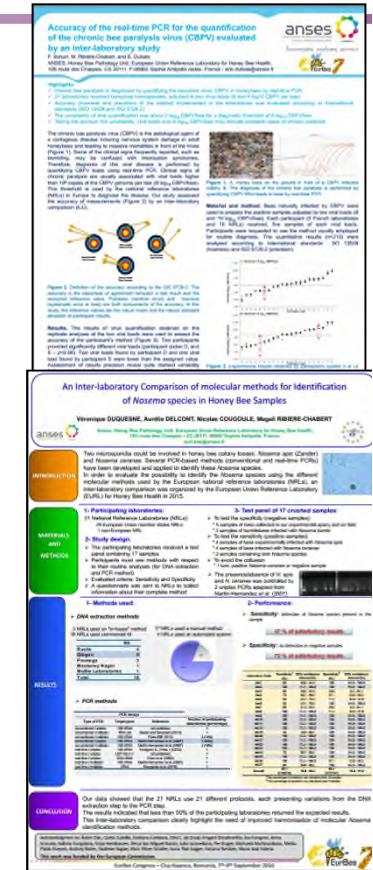
# Conclusions

- Sets of European data available at the EURL
- In different areas
- Discussions on availability and ownership
- Various ways for dissemination of knowledge



**Good network dynamism**

**Harmonisation of analytical capacities for reliable diagnosis  
of honeybee diseases**





Thank you for your attention!

