



# EPILOBEE

A pan European surveillance program on honeybee  
colony losses

On behalf of the Consortium

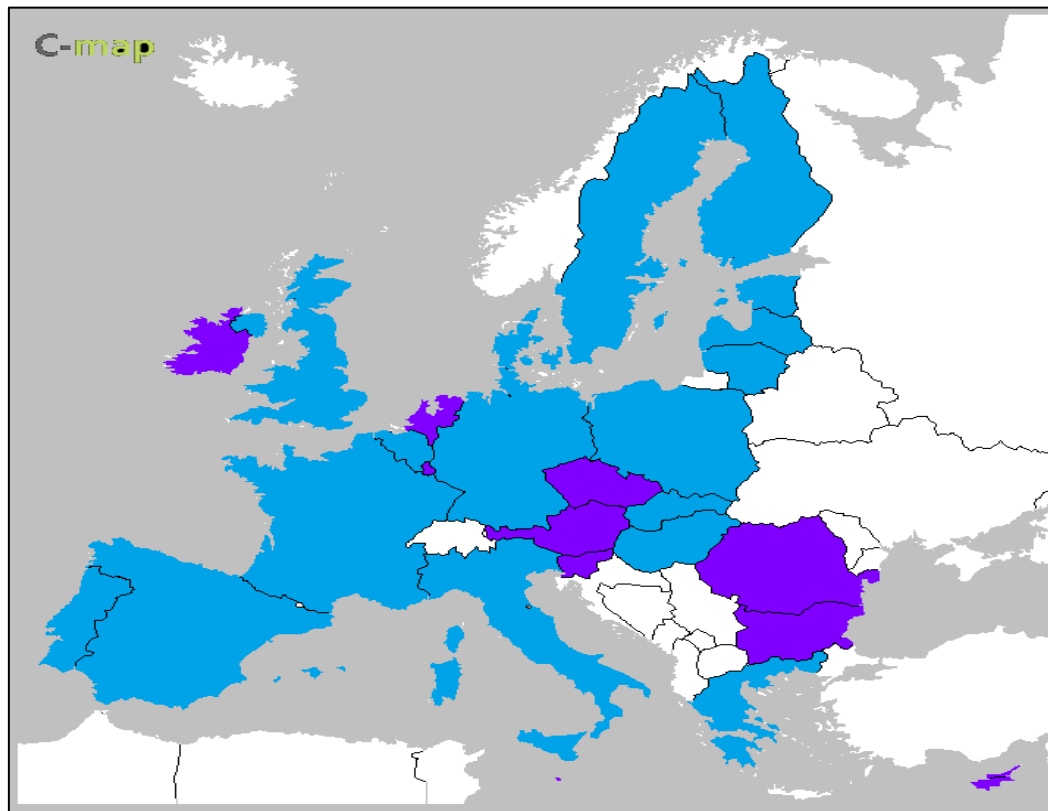
M.-P. Chauzat – M. Laurent – P. Hendriks – M. Ribière-Chabert

PAFF committee – Brussels – 2014

# EPILOBEE consortium

17 member states

162 authors



Belgium	6
Denmark	2
Estonia	3
Finland	3
France	22
Germany	11
Greece	27
Hungary	9
Italy	17
Latvia	8
Lithuania	2
Poland	5
Portugal	4
Slovakia	10
Spain	22
Sweden	2
UK	7

17 member states taking part to EPILOBEE

EU Commission and the Member States financed the project

EU Reference Laboratory for honeybee health

- coordinates the study
- collects the data
- statistically analyse the data
- publishes the data with the Member States

EFSA provides funds for man power for statistical analysis

# Objectives of the surveillance : EPILOBEE

## Estimate the overwintering colony mortality rate



Assess *Varroa destructor* infestation (apiaries and colonies)



Estimate *clinical* prevalence of the principal honeybee diseases

- ▶ American foulbrood
- ▶ European foulbrood
- ▶ Varroosis
- ▶ Nosemosis
- ▶ CBPV



Ensure early detection of *Aethina tumida* and *Tropilaelaps* mites

**Spring 2011** : guide lines edited

**Winter 2011-2012** : application by the Member States



**Spring 2012** : Harmonization of case definitions, development of the database; Trainings on homogenization of colony observations

**Autumn 2012** : Colony visit 1

**Spring 2013** : Colony visit 2. Estimation of 1<sup>st</sup> winter mortality rate

**Summer 2013** : Colony visit 3. Estimation of 1<sup>st</sup> summer mortality rate

**Autumn 2013** : Colony visit 1

**Spring 2014** : Colony visit 2. Estimation of 2<sup>nd</sup> winter mortality rate

**Summer 2014** : Colony visit 3. Estimation of 2<sup>nd</sup> summer mortality rate

- The decision was voted in May 2012

Between autumn 2012 and summer 2013

17 member states

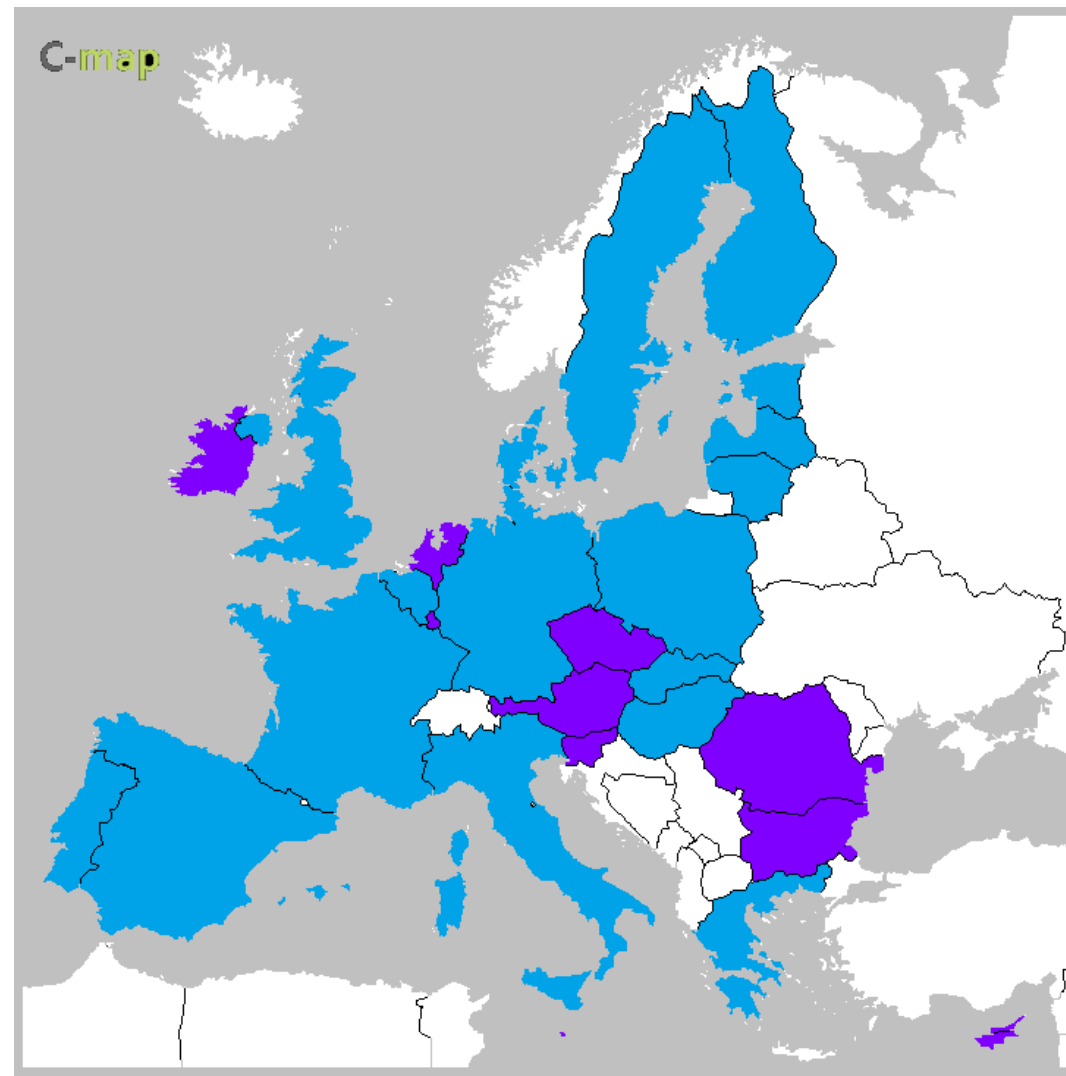
31 832 colonies

3 284 apiaries fully visited 3 times

1 354 bee inspectors

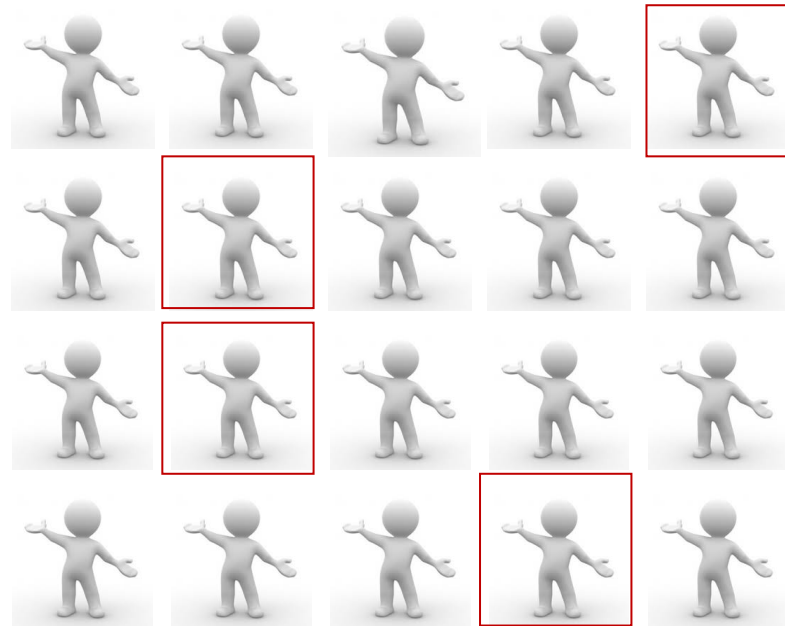
Over all 8 572 visits of apiaries

Data from March 2014



# Within each country

## Random sampling in a list of beekeepers

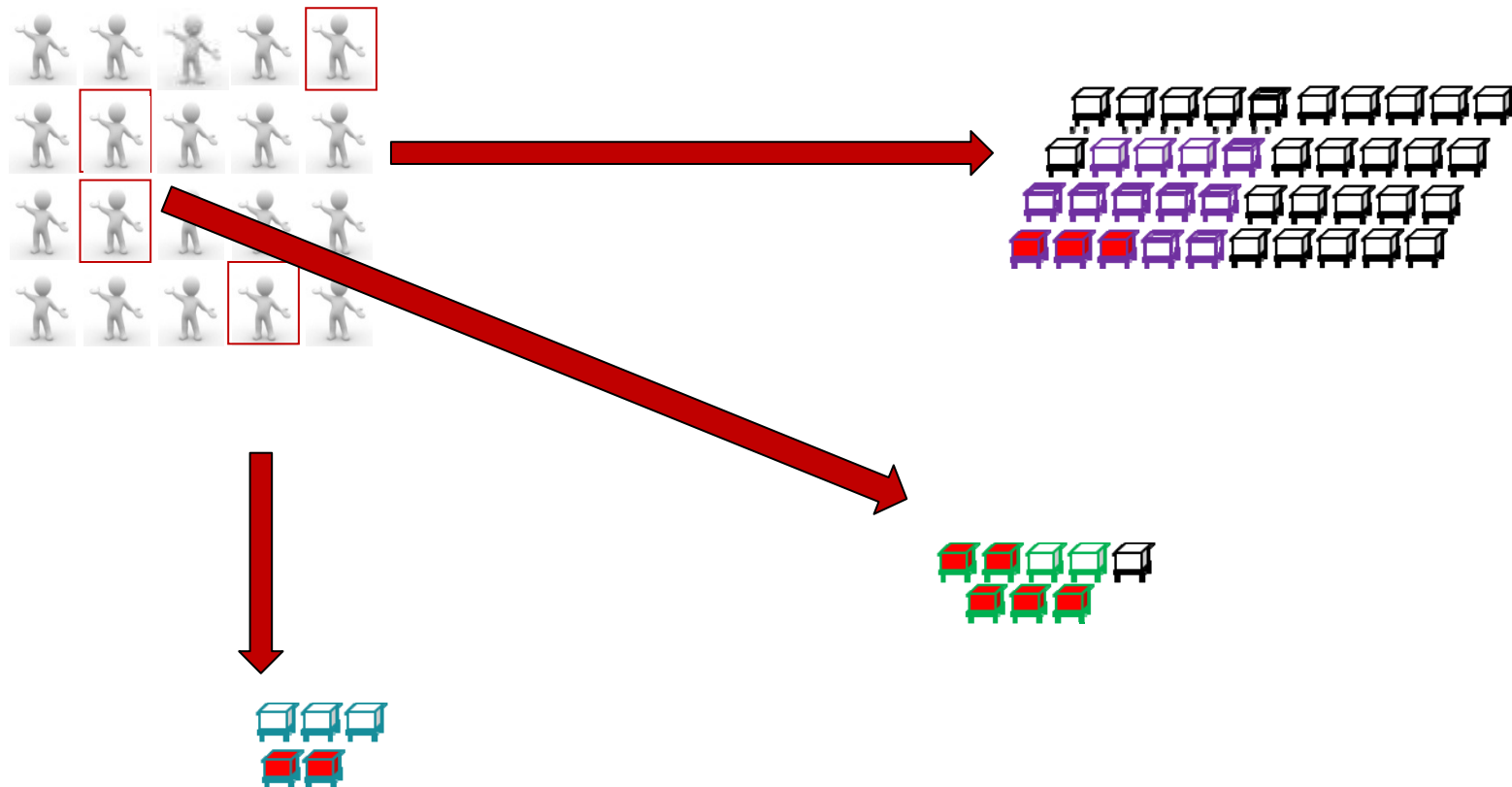


# Within a each country

Random sampling in each apiary

2 epidemiological units:

- the apiary
- the colony of honeybees





## Weighted average with the apiary sizes

$$\hat{\theta} = \frac{\sum_{i=1}^n (M_i \cdot P_i)}{\sum_{i=1}^n M_i}$$

$m$  = number of selected colonies

$A$  = number of dead colonies inside the selected colonies

$$P_i = \frac{A_i}{m_i}$$

$M$  = total number of colonies

## Confidence interval

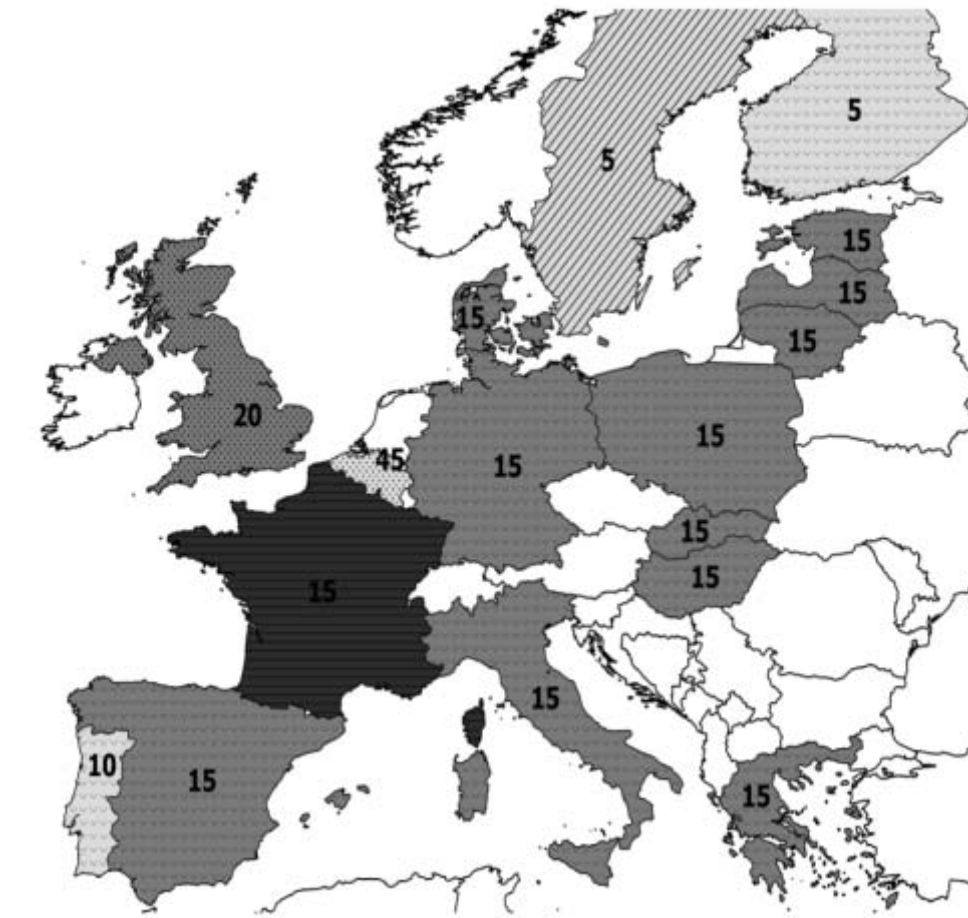
$$V(\hat{z}) = N^2 \left(1 - \frac{n}{N}\right) \frac{s_a^2}{n} + \frac{N}{n} \sum_{i=1}^n \left( M_i^2 \left(1 - \frac{m_i}{M_i}\right) \frac{s_{bi}^2}{m_i} \right)$$

so  $V(\hat{\theta}) = \frac{1}{M^2} V(\hat{z})$

$V(\hat{z})$ : variance of  $Z$  in a two degree sampling with a simple aleatory sampling at each degree

95%-CI of  $\theta$  :  $\hat{\theta} \pm 2 \times V(\hat{\theta})$

# Different national programmes



Total number of  
apiaries selected  
in each country

145 - 160  
190 - 220  
396

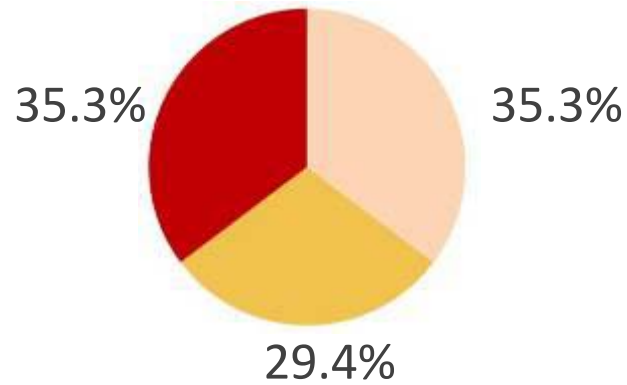
Absolute accuracy  
defined by each  
country

3.5  
5  
8  
9

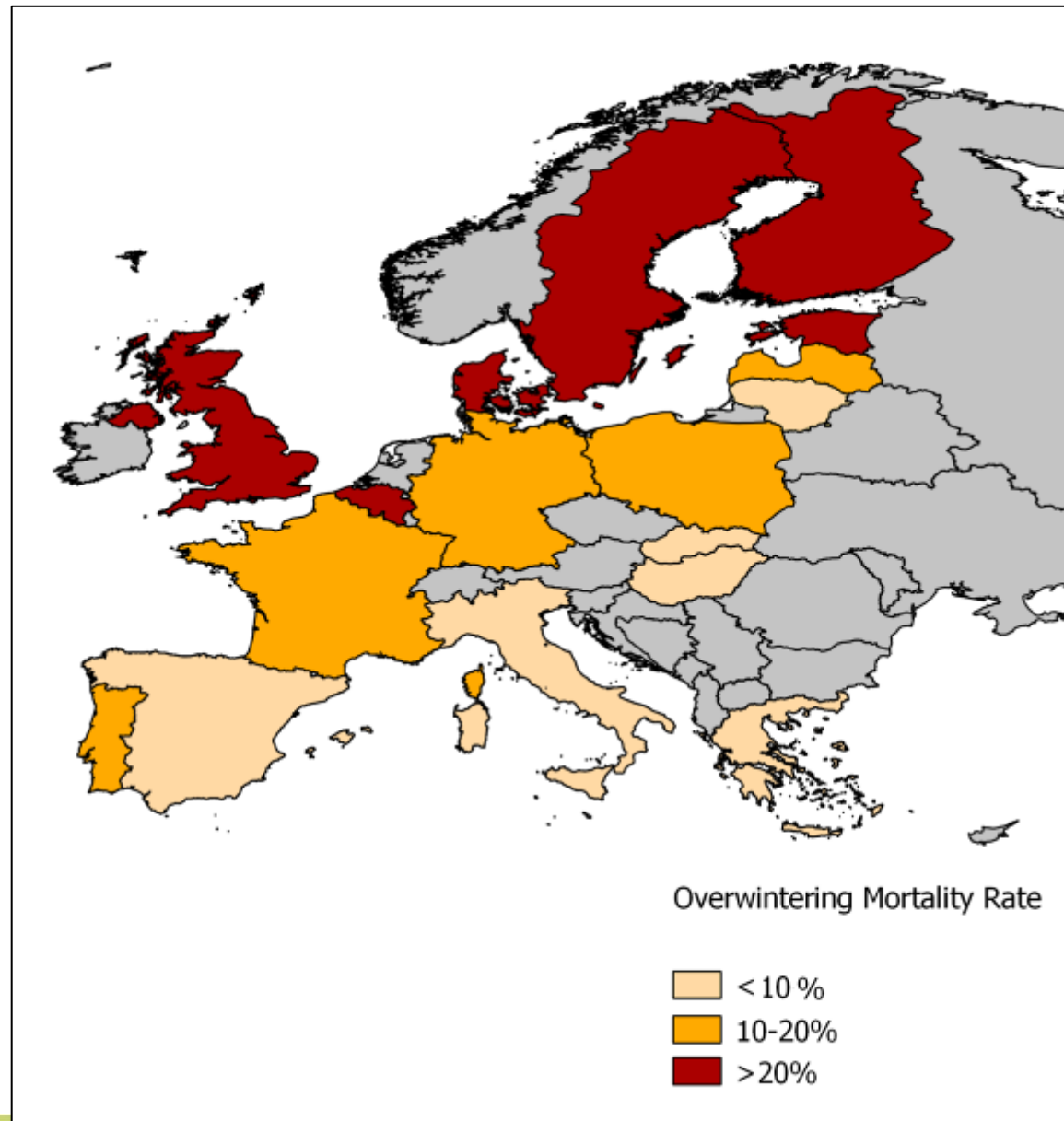
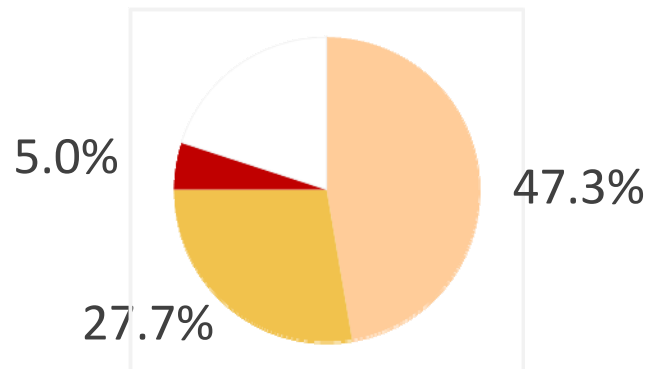
In bold: expected  
prevalence

# Honeybee colony winter mortality

### Proportion of countries



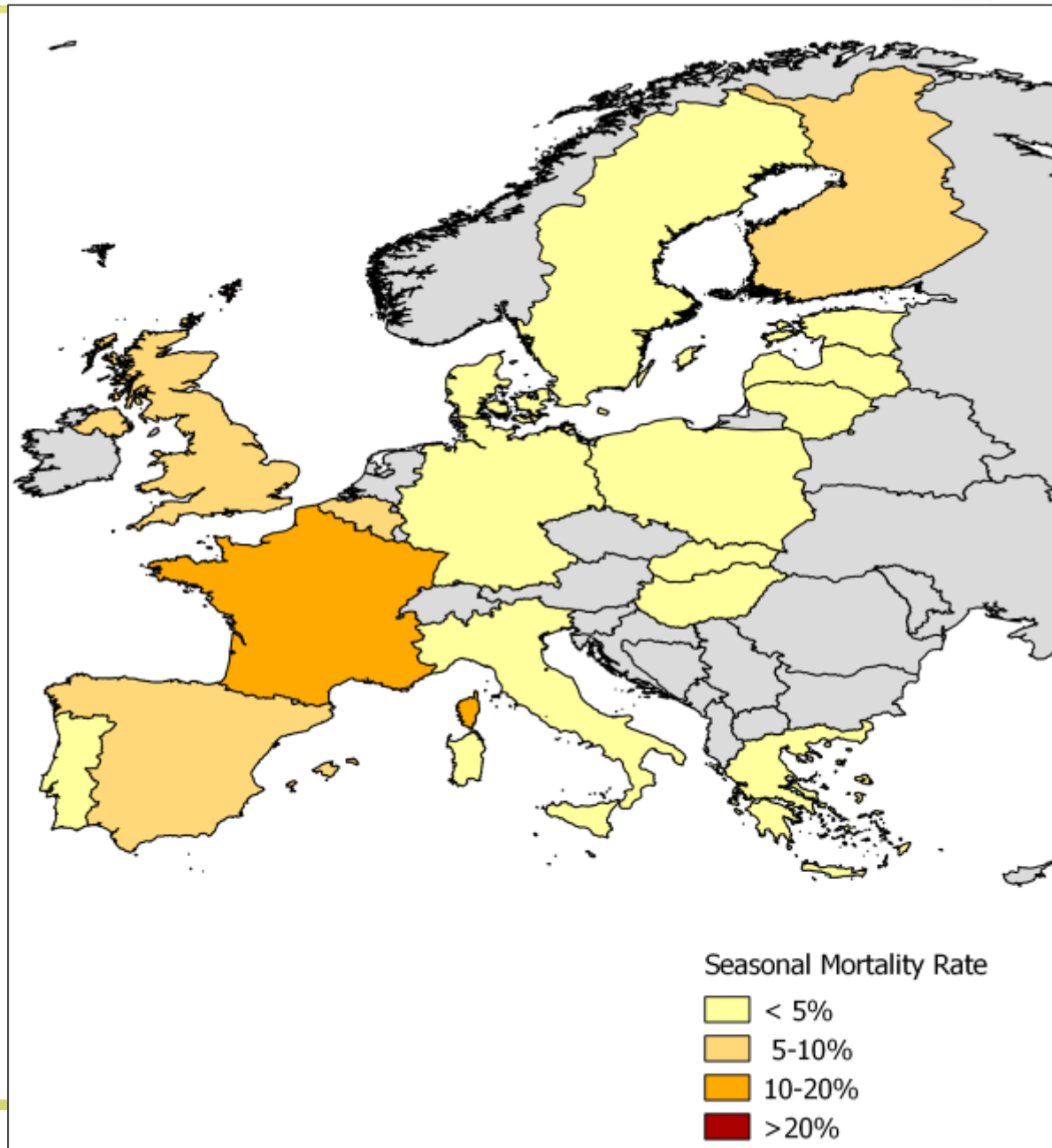
### Proportion of colonies



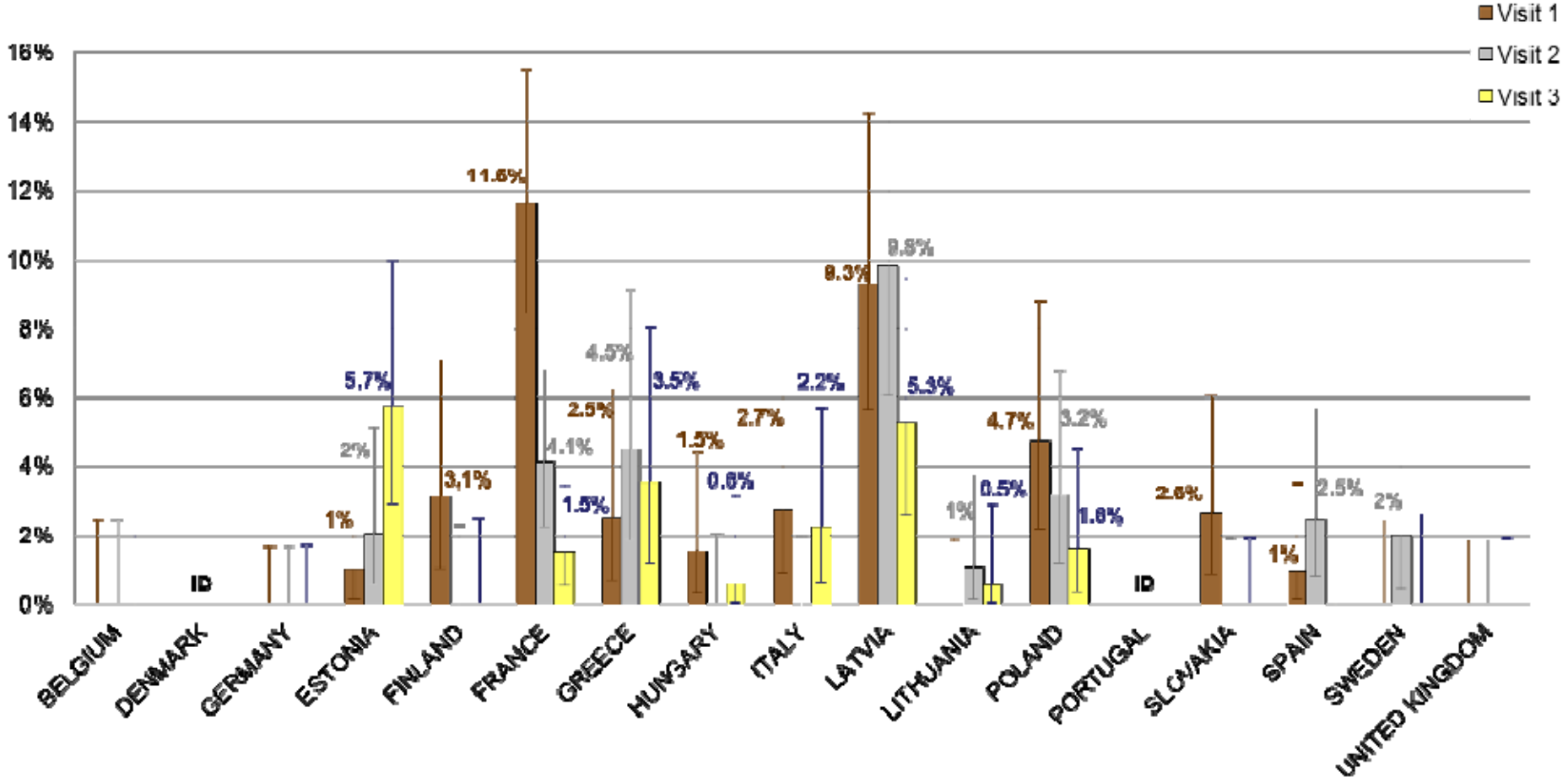
# Honeybee colony seasonal mortality

Lower than overwintering mortality

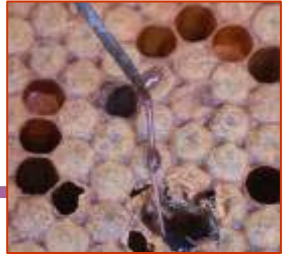
Maximum : 13.6%



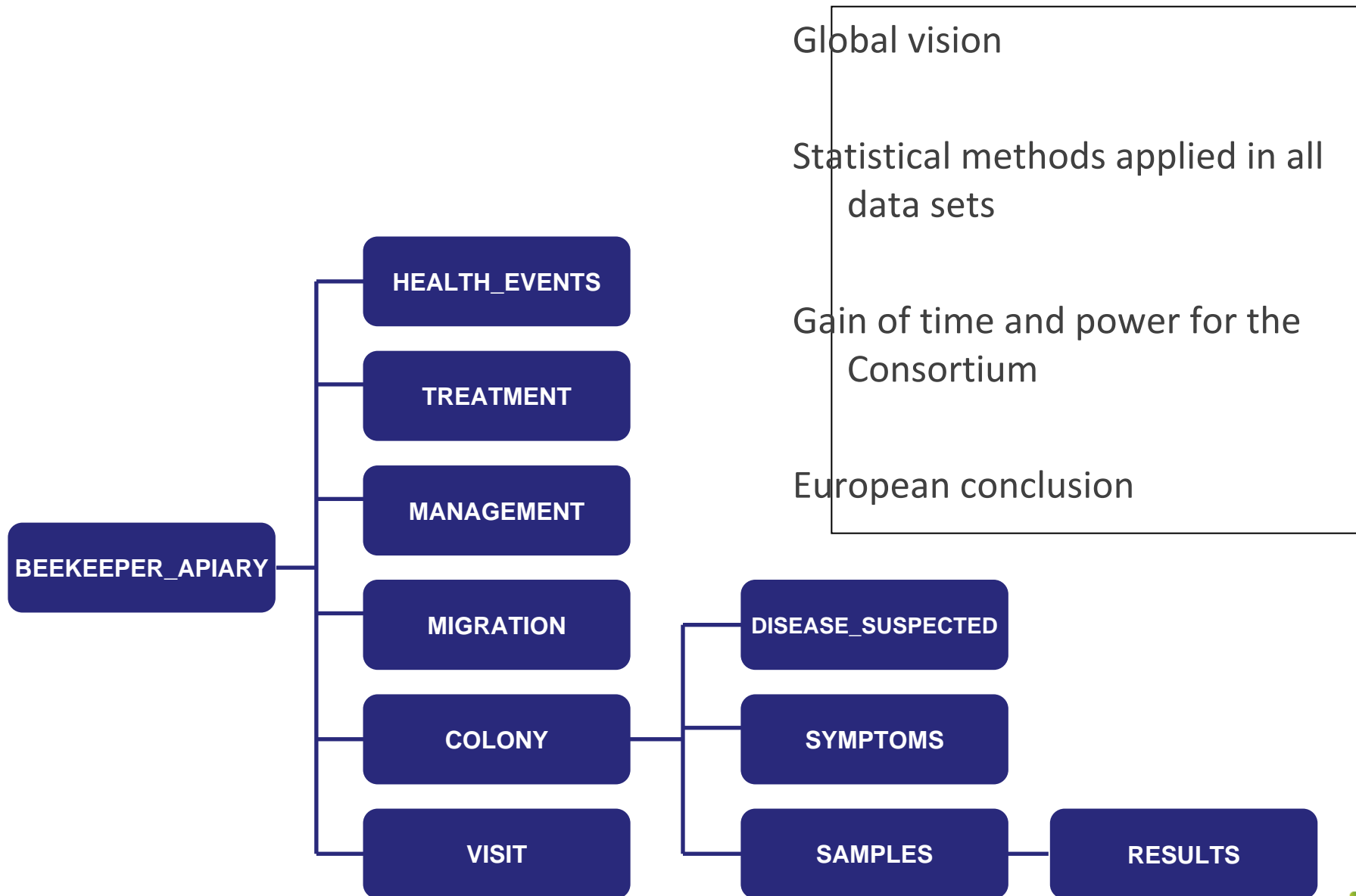
# Disease prevalence – American foulbrood



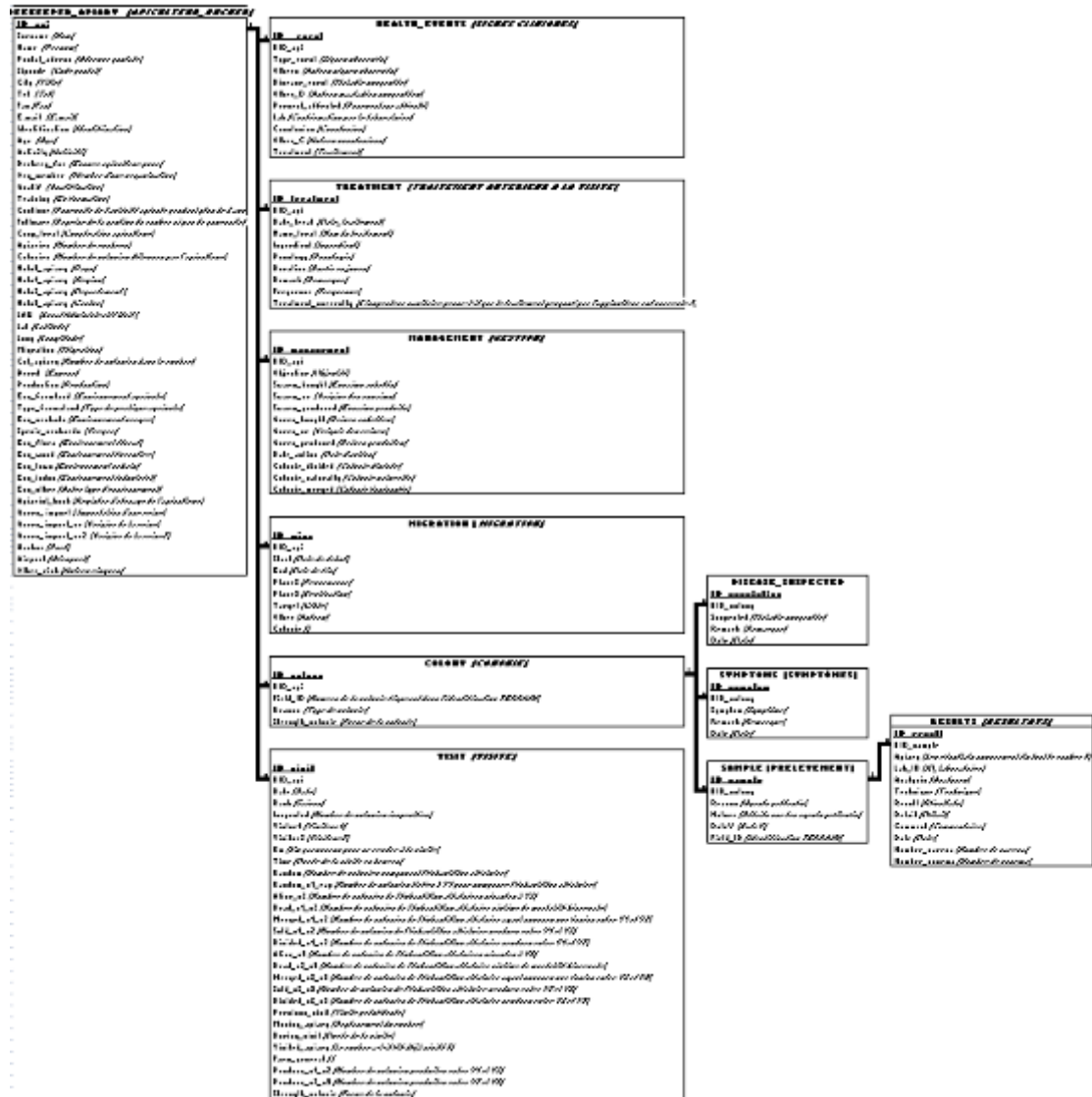
Highly variable prevalence



# Analyze the data at the European level



# Further statistical analysis



12 tables

164 columns

364 177 lines

(data from July 2014)

Variable to be included in the analysis?

Identify the major gaps in the data base

# Assessment of data quality

## Validation and correction of data

- different languages used
- use of O instead of 0
- use of , instead of .
- $10^5 = 10 \text{ E}+5 = 10\text{E}5$
- ...

Identify the major mistakes

Develop R scripts



# EPILOBEE : a unique program

First time for a European wide program on honeybee colony mortalities

Mortality rates and disease prevalence were calculated according to a standardized method in all member states

2012-2013 winter has been particularly long and cold in many areas of Europe

Results of 2013-2014 forthcoming



# EPILOBEE : a program to be completed

EFSA would help for statistical analysis through the hiring of a statistician

EFSA would have access to the data through reports

Conclusions to be produced by the LR UE

One EPILOBEE contact in each Member State

Scientific knowledge to be used by the Consortium

Publication of the results to be accredited to the EPILOBEE consortium

EFSA will get the data analysed to be included in the future project MUST B

# Acknowledgments

Endless list of people involved in EPILOBEE



Huge efforts made by the member states, field people, laboratories and beekeepers

**Thank you!**



[eurl.bee@anses.fr](mailto:eurl.bee@anses.fr)