



## **Database on bees exposure to stressors**

### **Deliverable D2.1**

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*Anses*

**PoshBee**

**Pan-european assessment, monitoring, and mitigation  
of stressors on the health of bees**



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## Table of contents

Preface .....	4
1. The database.....	4
1.1. The first on-line interface.....	4
1.2. The second on-line interface .....	5
2. The database content .....	5
3. Data access .....	5
4. Benefits and use of the database .....	5
5. Acknowledgements.....	6

## Preface

A site network for assessing exposure of bees to chemical, nutritional, and pathogen stressors was implemented across eight European countries, across Europe's main biogeographic zones. This was the objective of WP1, one of the 12 PoshBee project work packages. Three species of commercially produced 'sentinel' bees (*Apis mellifera*, *Bombus terrestris*, *Osmia bicornis*) were deployed within two mass-flowering crops, apples and oilseed rape. In each country, 16 sites located in both of these crop types were selected along an intensity gradient, using the proportion of arable land in the landscape as a proxy. A full suite of measurements was performed in the field to encapsulate the variation in habitat quality, the abundance of flowering plants, the diversity of chemical pollutants present on the bees themselves, in bee products and in their food resources, and the frequency and co-occurrence of colony pests and pathogens, that bees encountered under typical field conditions (PoshBee [deliverable D1.6 Database of field records](#)).

The aim of the study was to gain a holistic picture of the multiple environmental and biotic stressors encountered by bees occurring in representative agricultural landscapes in each of the participating countries.

In WP1, characterisation of the sites and surrounding fields (PoshBee deliverable [D1.2 Report on landscape context of field sites](#)), crop management practices, floral and wild bee abundance, hive strength/colony performance, and observation of clinical signs and of presence of pests were measured.

In WP2, one of the 12 PoshBee project work packages, the objective is to measure chemical exposure, pathogens and aspects of nutrition in honey bees, bumble bees and solitary bees deployed in the site network. All samples collected in the field and intended for laboratory analysis were sent to WP2 partners. These data (from information on samples to analytical results) will be recorded in a database. Cleaned data will initially be available to WP1 and WP2 partners only, via the PoshBee members website.

An on-line centralised interface populated by WP1 and WP2 data will be made available by June 2023 to all PoshBee consortium members and Policy makers as identified through the PoshBee stakeholder mapping process (PoshBee deliverable [D10.1 Report on the knowledge exchange and impact strategy for PoshBee](#)).

## 1. The database

Two on-line interfaces are planned. The first interface available by October 2020 is intended for the recording of WP2 data. The second interface available by June 2023 will be populated with WP1 and WP2 data.

### 1.1. The first on-line interface

The first on-line interface is intended for WP2 partners to record their data on samples and laboratory analyses. Each WP2 partner will record its own data. Editing and consistency controls will be undertaken on each dataset downloaded to the interface enabling the collection of a clean set of data for further analyses. Automatic reports will be generated once a week during the recording to manage the quality of the data entered in the database, i.e., to identify if data are missing, percentage of samples recorded, percentage of analyses recorded, etc..

## 1.2. The second on-line interface

By June 2023, an on-line centralised interface will be developed in order to store the WP1 and WP2 data. There will be the possibility to extract data in the form of cleaned Excel files. Queries will be possible to consult and extract data of interest.

## 2. The database content

The first on-line interface gathers all the information on samples collected across the sites in Europe (WP1) (country, crop, site, management intensity on site, species, type of samples, quantity and quality of samples, date of sampling) along with the related laboratory results and the parameters of the methods employed for analysis (deliverable D1.6 Database of field records).

The laboratory results are diverse: pathogen detection and quantification, pesticide residues detection and quantification in different matrices, metals detection and quantification in different matrices, nutritional content, palynological analysis, fat body percentage, and wing asymmetry. For metals, pesticide residues and pathogen analyses, parameters of the methods are recorded in the database (Limit of Detection, Limit of Quantification, Uncertainty, Trueness, Precision, Sensitivity, Specificity, Threshold).

The second on-line interface will gather all these cleaned data. In addition, it will gather field data collected in the site network (WP1). Information on the sites (country, crop, site, species, and management intensity for each site) along with crop management practices, floral and wild bee abundance, hive strength, *B. terrestris* colony performance, *O. bicornis* performance and observation of clinical signs and of presence of pests were collected in the field. Cleaned Excel files containing WP1 data will be uploaded on the interface.

## 3. Data access

Following the recording of WP2 data, cleaned data will be extracted in Excel files. These files will be put on the PoshBee members website for access by WP1 and WP2 partners.

By June 2023, the second on-line interface containing WP1 and WP2 data will be accessible to all PoshBee consortium members and relevant Policy makers as identified through the PoshBee stakeholder mapping process (deliverable D10.1 Report on the knowledge exchange and impact strategy for PoshBee).

There will be the possibility to extract WP1 and/or WP2 data in Excel files or carry out queries directly on the interface. Queries will enable any visitor to consult data on-line and extract data of interest.

Data extraction and on-line consultation will be done on WP1 and WP2 data separately since the datasets are not directly compatible. However all the files have the same code (country/crop/site) to enable further cross-analysis to be performed on the extracted files (using statistical software).

## 4. Benefits and use of the database

For the two on-line interfaces, data will be extracted in Excel files, which is the most suitable form to perform analyses.

The first on-line interface was designed with consideration for how the WP2 partners record laboratory results and all the necessary information needed to report the results (list of

analytes/amino acids/sterols/element/pollen searched or the unit to be used or parameters to be measured). This eases recording of data and prevents, to the highest possible degree, any errors. Automatic error controls have been developed in the online interface. This ensures both consistency and security of data for further analyses.

Information on parameters of the methods employed for the search of pesticide residues are recorded in the database. This ensures that uniformity can be achieved across the laboratories.

The cleaned Excel files will enable the WP1 and WP2 partners to analyse data, make comparison and links and collaborate among themselves for publication.

The second on-line interface will enable people to navigate through the data with queries. Extraction of data of interest will be possible and will enable any visitor to perform statistical analysis of the data with dedicated statistical software tools.

## **5. Acknowledgements**

This database will be populated by different datasets, for which data were collected, sent and analysed by several partners: beekeepers, beekeepers associations, scientists, laboratories. We wish to thank all of them for their involvement in this site network and the resulting data that come out of it.