



HAL
open science

Wild bee larval food composition in five European cities

Joan Casanelles-abella, Alexander Keller, Stefanie Müller, Cristiana Aleixo, Marta Alós-orti, François Chiron, Lauri Laanisto, Łukasz Myczko, Pedro Pinho, Roeland Samson, et al.

► **To cite this version:**

Joan Casanelles-abella, Alexander Keller, Stefanie Müller, Cristiana Aleixo, Marta Alós-orti, et al.. Wild bee larval food composition in five European cities. *Ecology*, 2022, 103 (9), pp.e3740. 10.1002/ecy.3740 . hal-03875514

HAL Id: hal-03875514












<https://hal.science/hal-03875514v1>

Submitted on 28 Nov 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Wild bee larval food composition in five European cities

Joan Casanelles-Abella^{1,2}  | Alexander Keller³  | Stefanie Müller^{1,4}  |
 Cristiana Aleixo⁵  | Marta Alós-Orti⁶  | François Chiron⁷  |
 Lauri Laanisto⁶  | Łukasz Myczko⁸  | Pedro Pinho⁵  | Roeland Samson⁹  |
 Piotr Tryjanowski⁸  | Anskje Van Mensel⁹  | Lucía Villarroya-Villalba¹  |
 Loïc Pellissier^{2,10}  | Marco Moretti¹ 

¹Biodiversity and Conservation Biology, Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland

²ETH Zurich, Institute of Terrestrial Ecosystems, Zurich, Switzerland

³Organismic and Cellular Interactions, Biocenter, Faculty of Biology, Ludwig-Maximilians-Universität München, Martinsried, Germany

⁴Department of Evolutionary Biology and Environmental Studies, University of Zurich, Zurich, Switzerland

⁵Centre for Ecology, Evolution and Environmental Changes (cE3c), Faculdade de Ciências, Universidade de Lisboa, Lisbon, Portugal

⁶Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Tartu, Estonia

⁷Université Paris-Saclay, CNRS, AgroParisTech, Ecologie Systématique Evolution, Orsay, France

⁸Department of Zoology, Poznan University of Life Sciences, Poznań, Poland

⁹Laboratory of Environmental and Urban Ecology, Department of Bioscience Engineering, University of Antwerp, Antwerp, Belgium

¹⁰Land Change Science, Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland

Correspondence

Joan Casanelles-Abella

Email: joan.casanelles@wsl.ch

Funding information

Bundesamt für Umwelt, Grant/Award Number: 16.0101.PJ / S284-0366; Ernst Göhner Stiftung, Grant/Award Number: 2019-2917/1.1.; Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Grant/Award Numbers: 2020.03415. CEECIND, SFRH/BD/141822/2018; H2020 Environment, Grant/Award Number: H2020 BiodivERSA32015104; Narodowe Centrum Nauki, Grant/Award Number: NCN/2016/22/Z/NZ8/00004; Schweizerischer Nationalfonds zur Förderung der Wissenschaftlichen Forschung, Grant/Award Number: 31BD30_172467

Handling Editor: William K. Michener

Abstract

Urbanization poses threats and opportunities for the biodiversity of wild bees. At the same time, cities can harbor diverse wild bee assemblages, partly due to the unique plant assemblages that provide resources. While bee dietary preferences have been investigated in various studies, bee dietary studies have been conducted mostly in nonurban ecosystems and data based on plant visitation observations or palynological techniques. This data set describes the larval food preferences of four wild bee species (i.e., *Chelostoma florissomne*, *Hylaeus communis*, *Osmia bicornis*, and *O. cornuta*) common in urban areas in five different European cities (i.e., Antwerp, Belgium; Paris, France; Poznan, Poland; Tartu, Estonia; and Zurich, Switzerland). In addition, the data set describes the larval food preferences of individuals from three wild bee genera (i.e., *Chelostoma* sp., *Hylaeus* sp., and *Osmia* sp.) that could not be identified to the species level. These data were obtained from a Europe-level study aimed at understanding the effects of urbanization on biodiversity across different cities and cityscapes and a Swiss project aimed at understanding the effects of urban ecosystems in wild bee feeding behavior. Wild bees were sampled using

Open access funding provided by ETH-Bereich Forschungsanstalten.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2022 The Authors. *Ecology* published by Wiley Periodicals LLC on behalf of The Ecological Society of America.

standardized trap nests at 80 sites (32 in Zurich and 12 in each of the remaining cities), selected following a double gradient of available habitat at local and landscape scales. Larval pollen was obtained from the bee nests and identified using DNA metabarcoding. The data provide the plant composition at the species or genus level preferred by each bee. These unique data can be used for a wide array of research questions, including urban ecology (e.g., diversity of food sources along urban gradients), bee ecology (characterization of bee feeding preferences), or comparative studies on the urban evolution of behavioral traits between urban and nonurban sites. In addition, the data can be used to inform urban planning and conservation strategies, particularly concerning flower resources (e.g., importance of exotic species and, thus, management activities). This data set can be freely used for non-commercial purposes, and this data paper should be cited if the data is used; we request that collaboration with the data set contact person to be considered if this data set represents an important part of the data analyzed in a study.

KEYWORDS

cavity-nesting bees, *Chelostoma florissomne*, DNA metabarcoding, Europe, *Hylaeus communis*, *Osmia bicornis*, *Osmia cornuta*, plant–pollinator interactions, trap nest, urban ecology, urbanization

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Metadata and data are available in the Supporting Information and data are also openly accessible on the ENVIDAT repository at <https://doi.org/10.16904/envidat.249>. Raw sequencing data are provided in the National Center for Biotechnology Information (NCBI) Sequence Read Archive (SRA) under Project Accession No. PRJNA790728 at <https://www.ncbi.nlm.nih.gov/bioproject/790728>.

ORCID

Joan Casanelles-Abella  <https://orcid.org/0000-0003-1924-9298>

Alexander Keller  <https://orcid.org/0000-0001-5716-3634>

Cristiana Aleixo  <https://orcid.org/0000-0002-3293-476X>

Marta Alós-Orti  <https://orcid.org/0000-0002-5722-6583>

François Chiron  <https://orcid.org/0000-0003-1958-7115>

Lauri Laanisto  <https://orcid.org/0000-0003-2215-7298>

Pedro Pinho  <https://orcid.org/0000-0001-5571-9619>

Piotr Tryjanowski  <https://orcid.org/0000-0002-8358-0797>

Loïc Pellissier  <https://orcid.org/0000-0002-2289-8259>

Marco Moretti  <https://orcid.org/0000-0002-5845-3198>

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

How to cite this article: Casanelles-Abella, Joan, Alexander Keller, Stefanie Müller, Cristiana Aleixo, Marta Alós-Orti, François Chiron, Lauri Laanisto, et al. 2022. “Wild Bee Larval Food Composition in Five European Cities.” *Ecology* 103(9): e3740. <https://doi.org/10.1002/ecy.3740>