May 23, 2024 – SYMPOSIUM

Solutions to monitor plants, pollinators and their interactions in a changing world

Organizers: Emmanuelle PORCHER
and Gabrielle MARTIN

COLLÈGE DE FRANCE
— 1530 —

CHAIRE BIODIVERSITÉ & ÉCOSYSTÈMES

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Solutions to monitor plants, pollinators and their interactions in a changing world

Amphithéâtre Maurice Halbwachs

Plant-pollinator interactions, which play a central role in the functioning of all ecosystems, including in farmland, are likely to be greatly altered by global change, but these changes remain poorly understood because they are often studied in isolation, either for plants or for pollinators, and with relatively little international coordination, except for certain groups (butterflies) or ecosystems (forests). This lack of knowledge can be a major obstacle to the conservation of plants and their pollinators. The symposium will bring together representatives of the main European structured schemes for the monitoring of plants, pollinators and their interactions. It will be an opportunity to share existing results, identify challenges to analyse available data further, and discuss prospects for improving, developing and extending such monitoring on a European scale, e.g. using automatic identification methods using sound or image analysis.

Organizers:

Emmanuelle Porcher & Gabrielle Martin

Speakers:

Helge Bruelheide, iDiv, Germany
Nicolas Deguines, SPIPoll, France
Bodil Ehlers & Christian Daamgard, Novana, Denmark
Jérôme Frei & Tobias Roth, Biodiversity Monitoring Switzerland, Switzerland
Pieter de Frenne, forestREplot, Belgium
Maria-Begoña Garcia, Adopta una planta, Spain
Ute Jandt, EuropaBON & sPlot, Germany
Alexis Joly & Pierre Bonnet, Pl@ntNet, France
Gabrielle Martin, Vigie-flore, France
Denis Michez, EU pollinator monitoring schemes, Belgium
Oliver Pescott, National Plant Monitoring Scheme, United Kingdom
Don Waller, American datasets from forestREplot, USA

09h00

Introduction

Emmanuelle Porcher, Centre d'Ecologie et des Sciences de la Conservation, Muséum national d'Histoire naturelle, Paris, France

09h15

The National Plant Monitoring Scheme, a new direction for UK plant recording?

Oliver L. Pescott, UK Centre for Ecology & Hydrology, Wallingford, UK

Volunteer-based plant monitoring in the UK has focused historically on distribution mapping, with less emphasis on the collection of data on plant communities and habitats. To address this gap, the 'National Plant Monitoring Scheme' (NPMS) was launched, emphasizing volunteer flexibility and rigorous sampling. Developed over nine years, NPMS aims to match standards set by bird and butterfly monitoring programs. Comparisons with professional surveys help identify biases, guiding future adjustments. Understanding NPMS strengths and limitations informs development, builds trust in results, sustains volunteer interest, and offers insights for international initiatives.

09h45

Tracking plant population dynamics with a citizen science network

María Begoña García, *Pyrenean Institute of Ecology (CSIC), Spain*

Long-term monitoring is vital for predicting population declines, especially among priority species. The 'Adopt a plant' program, initiated in 2013 in northeastern Spain, engages volunteers and rangers to monitor plant populations across diverse landscapes. Led by scientists, participants use rigorous methods to estimate population sizes and track disturbances, providing valuable data on nearly 300 populations over time. Surprisingly, the dominant trend observed is stability, particularly among priority species. This information is critical for assessing the conservation status of threatened and EU-designated plants. Collecting such large-scale data refines conservation priorities and enhances understanding of flora vulnerability.

10h15: coffee break

Biodiversity Monitoring in Switzerland: Current State and insights into Plant-Pollinator Interactions

Jérôme Frei and Tobias Roth, *Federal Office for the Environment / Hintermann & Weber AG*

Switzerland's biodiversity is monitored through diverse programs, collectively offering valuable insights into biodiversity trends. The Swiss Biodiversity Monitoring (BDM) focuses on common species outside protected areas like vascular plants and butterflies. Since the early 2000s, BDM has noted increased species diversity due to climate change and agricultural measures. However, this has led to more uniform species communities, indicating biotic homogenization that may affect plant-pollinator interactions. Wind-pollinated species thrived, while those crucial for specialized pollinators lagged. Identifying gaps in monitoring systems and strategies to address them is crucial for future conservation efforts.

Structured monitoring of wild flora in France demonstrates 15 years of plant community changes related to climate change and pollinator loss

Gabrielle Martin, *Centre de Recherche sur la Biodiversité et l'Environnement, Université Toulouse 3 Paul Sabatier, Toulouse, France*

Long-term biodiversity monitoring using standardized methods provides valuable data for comparing and detecting changes over time. France's Vigie-flore, initiated in 2009, engages amateur and professional botanists to monitor plant communities across various habitats. This scheme has revealed nationwide shifts in plant communities due to climate change, alongside a decline in common insect-pollinated species. These findings highlight rapid changes in wild flora and their conservation implications on a national scale. The discussion will focus on the implications and future perspectives of this monitoring progra..

NOVANA - monitoring Danish terrestrial habitats

Bodil Ehlers and Christian Damgaard, *Department of Ecoscience, Aarhus University, Denmark*

The Danish monitoring program NOVANA has recorded the community composition of higher plants and selected soil chemical variable in terrestrial habitats since 2004. The monitoring program was developed as a response to the EU habitat directive and covers 32 open habitats (dunes, heathlands, grasslands, bogs) and 10 forest habitat types in two bioregions (Atlantic and Continental). The data consists of a total of 2722 sites, 26606 plots, and 70481 plots*year combinations. Selected results will be presented.

Long-term changes in forest plant communities have affected species' abundances and pollinator resources

Donald M. Waller, *American datasets from forestREplot, Madison, USA*

In Wisconsin, USA, re-surveys of 293 forest sites since the 1950s show conspicuous declines in native species abundance (mean: 41%) and increases in non-natives. Animal-pollinated wildflowers declined, while abiotically-pollinated graminoids and ferns rose. Native species that rely on specialized pollinators declined more while non-native species with biotic pollination increased more. Smaller, fragmented southern forests experienced greater declines, reflecting an extinction debt, as did smaller grasslands. Larger, continuous northern forests retained more diversity but shifted in composition, reflecting deer impacts. These shifts in diversity and composition have altered pollinator resources in temperate forests.

forestREplot: A database of forest herb layer resurvey plots

Pieter de Frenne, *Forest & Nature Lab, Ghent University, Ghent, Belgium*

Resurveys of historical vegetation plots track changes in community composition and diversity, crucial for understanding global-change impacts, especially in slow-changing ecosystems like temperate forest herb layers. These layers hold significant plant diversity and are sensitive to factors like past land use, atmospheric deposition, and management. forestREplot, a database spanning global temperate zones, contains 5,524 plots and 14,185 relevés. The latest version (3.0) integrates World Flora Online taxonomy, featuring numerous datasets with multiple resurveys, enabling analysis of herb layer dynamics in response to nitrogen deposition and climate change.

Plant Biodiversity Trends and Monitoring in Germany

Ute Jandt, *Martin Luther University Halle-Wittenberg, Institute of Biology / Geobotany and Botanical Garden, Halle (Saale), Germany*

Helge Bruelheide, *German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Leipzig, Germany*

In Germany, biodiversity has significantly transformed due to environmental change and high human impact, yet monitoring efforts have only covered recent decades with limited data and integration. The "sMon" project aims to analyze German species data from various sources to track biodiversity trends, revealing losses in plant species frequency by 70%. Native species

like heaths and grasslands have declined, while non-native species and heavily impacted habitats increased. Fine-scale plant community analysis shows stable richness but turnover in species composition. A new project, "MOTIVATE," will utilize longitudinal vegetation data to enhance biodiversity monitoring with expertise from various fields.

15h15: coffee break

15h45
European policy background for pollinator monitoring

Andreas Gumbert, *European Commission- DG Environment, Brussels, Belgium*

In the framework of the European Green Deal, the European Commission adopted political strategies that are of relevance for the monitoring of pollinators. The EU Biodiversity Strategy for 2030 establishes an objective to reverse the decline of pollinators by 2030. The EU Pollinator Initiative was revised in 2023, and it provides an action framework for (i) improving knowledge on pollinators (including monitoring), (ii) tackling the drivers of their decline, and (iii) for mobilising society and engage in strategic planning. The methodology for an EU-wide pollinator monitoring scheme is being developed, supported by a range of activities to enhance the taxonomic capacity on pollinators. The Commission aims at setting up an integrated monitoring framework, linking information about the status and trends of pollinator populations with drivers of their decline, in particular land use and habitat quality, as well as pesticide pressure. The Commission supports several monitoring initiatives in this regard (LUCAS, EMBAL, Insignia).

16h00
European initiatives for pollinator monitoring

Denis Michez, *Laboratory of Zoology, University of Mons, Mons, Belgium*

Wild bee species in Europe are declining, prompting action plans from countries and the European Commission. To evaluate these plans, accurate population estimates are crucial. New initiatives include ORBIT, developing taxonomic tools for bee monitoring, and SPRING, enhancing taxonomic expertise across EU states for the EU Pollinator Monitoring Scheme (EU-PoMS). SPRING offers training at various levels, from identifying pollinator groups to species. These projects also create e-learning materials available through the 'Pollinator Academy' online portal, consolidating information on pollinator identification tools. ORBIT and SPRING, commissioned by the EU's General Directorate for Environment, aim to support effective bee population monitoring and conservation efforts.

16h30
The Spipoll project: monitoring plant-visitor interactions in France with citizen science

Nicolas Deguines, *Ecologie et Biologie des Interactions, Université de Poitiers, Poitiers, France*

Understanding threats to flower visitors – beyond bees – amid global environmental changes is crucial for ecosystem function and human well-being. The Photographic Survey of Flower Visitors (Spipoll) was launched in 2010 in France, engaging citizen scientists to document plant-visitor interactions using a standardized protocol. Volunteers photograph all organisms visiting a plant species' flowers for 20 minutes. Identifications are verified by experts and/or peer volunteers. Over 650,000 interactions across 75,000 locations have been recorded. This unique dataset informs research on flower visitors' responses to environmental gradients. The talk will highlight Spipoll's findings and scientific perspectives.

17h00
Collaborative AI for plant biodiversity monitoring: From Pl@ntNet to GeoPl@ntNet

Alexis Joly and Pierre Bonnet, *Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier, INRIA, Montpellier, France / botAnique et Modélisation de l'Architecture des Plantes et des végétations, CIRAD, Montpellier, France.*

Pl@ntNet is a participatory platform based on artificial intelligence to facilitate plant identification and the monitoring of plant biodiversity. In this presentation, we will first look at the technology behind Pl@ntNet, as well as the innovative services it offers in the fields of conservation, research and agro-ecology. We will then discuss the new biogeographical models developed by the Pl@ntNet team to overcome the problems of bias and incomplete data, and their integration into a new tool (GeoPl@ntNet) currently under development.

17h30-18h00
Closing discussions

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