

Institute of Botany

**Topic:** Pollinator-plant-pathogen interaction

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**Background information:**

European pollinators are a group of taxonomically diverse insects with substantial sociocultural, biological and economic values for humankind that are undergoing major declines or colony losses. Wild and managed pollinators provide crucial pollination functions that safeguard wild plants, thereby contributing to maintenance of vital biodiversity and ecosystem functions in terrestrial ecosystems. Moreover, they provide pollination services securing yields of crops supplying essential nutrients and dietary diversity to humans. However, pollinators face multiple threats, including land-use change, conventional intensive agriculture, invasive alien species, and pests and pathogens. In 2016, the IPBES stated in its global assessment of pollinators, pollination and food production that: *“many drivers that directly impact the health, diversity and abundance of pollinators, from the gene to the biome scales, can combine in their effects and thereby increase the overall pressure on pollinators”*. Unfortunately, this potential interaction of multiple pressures on pollinators remains largely untested in field situations and is mostly based on laboratory evidence.

**The main question to be addressed in the project:**

How modifications to the availability and quality of floral resources driven by land-use and alien plant species govern the plant-pollinator-virus community structure and the eco-epidemiological dynamics of viruses interacting with pollinator individuals, colonies, species and communities?

**Information on the methods/description of work:**

Twelve landscape units (**LU**) distributed in Kraków and the surrounding Uplands will serve for investigation. In each LU, a stratified insect-flower visitation at regular intervals will be conducted during two field seasons. Species composition and abundance of flowering plants, pollinators (domestic honey bees, wild bees, hoverflies, butterflies and moths) and pollinator visitation frequency to flower species will be quantified. Plant community composition and nutritional quality of floral resources will be quantified. Next samples of both pollinators and floral resources will be tested for the presence of DWV virus and possible other pollinator pathogens present in the environment. Based on pollinator-plant-pathogen presence a unique dataset to address virus transmission paths across wild and domestic pollinators at the community level in real-world ecosystems will be generated.

**Additional information :**

The student should have former experience in working with and recognizing to higher taxonomic levels pollinators such bees or syrphid flies.

**Place/name of potential foreign collaborator:**

- 1) Adam Vanbergen, INRAE, Dijon, France;
- 2) Matthias Albrecht, Agroscope, Zürich, Switzerland;
- 3) Peter Neumann, Vetsuisse Faculty, University of Bern, Switzerland
- 4) Robert Paxton, Institute for Biology, MLU Halle-Wittenberg, Germany;
- 5) Oliver Schweiger, UFZ, Leipzig, Germany;

## References:

- 1) Kovács-Hostyánszki A., et al. (2016): Drivers of change of pollinators, pollination networks and pollination, In: The assessment report of the IPBES on pollinators, pollination and food production. S.G. Potts, V. L. Imperatriz-Fonseca, and H. T. Ngo, (eds). Secretariat of the IPBES, Bonn, Germany. 552 pages.
- 2) González-Varo J-P., et al. (2013) Combined effects of global change pressures on animal-mediated pollination TREE 28( 9): 524-530
- 3) Vanbergen J.A. et al. (2013) Threats to an ecosystem service: pressures on pollinators. *Frontiers in Ecology and the Environment* 11(5): 251-259