

Master's thesis proposal - Year 2024-2025 - Biomonitoring of the agricultural landscape using solitary bee hotels

This master's thesis takes place at the Brussels School of Bioengineering, in the ULB AgroecologyLab, under the supervision of Professor Nicolas J. Vereecken, as part of a collaborative project with the Gembloux Faculty of Agronomy.

Summary of the research:



The industrialisation of Western agriculture since the Second World War has led to a sharp increase in the use of pesticides, synthetic fertilisers and mechanisation on large-scale monocultures. This transition to industrial agriculture has had deleterious effects on (agro)ecosystems and their ability to provide ecosystem services. Agroecology aims to provide a response to these problems, reconciling agricultural production with social and environmental sustainability. There is therefore growing interest in biodiversity-rich agriculture that would restore ecological functions such as pollination and the natural regulation of pests and weeds. The aim of this project is to study the potential of different farms, located along an agroecological gradient, to mobilise greater functional agro-biodiversity than 'conventional' agriculture. More specifically, the project is studying the communities of different organisms (Carabid beetles, Earthworms, Soil micro-organisms and Pollinators) as well as certain bio-aggressors in four types of farming system (Conventional, Soil Conservation, Organic and Soil Conservation Organic) and describing how they perform their ecological functions (regulation of pests and weeds, soil

structure and life, pollination ES...).

The current tender is part of this project and aims to use biomonitoring, with the help of bee hotels (*Osmia cornuta* and *Osmia bicornis*), to study the presence of pesticide residues in the agroecosystem and the floral composition of the pollen collected by these two wild bee species. The study sites are agricultural fields of winter cereals. The hotels will be placed at the edge of the field.

Research themes (to be defined jointly with the student according to his/her needs and affinities - fieldwork period in February to set up the hotels, in May to remove them, in June to collect the pollen):

- Quantitative study of active substances found in pollen, pollen origin (diversity of floral composition visited), landscape study around agricultural plots, comparison of these results between different agricultural practices, etc.

Note: expenses incurred for the research (e.g. travel to sites) will be reimbursed. The working language may be French or English. A driving licence and access to a vehicle are strongly recommended.

For further information or questions, please contact: Nicolas.leclercq@uliege.be and Nicolas.Vereecken@ulb.be