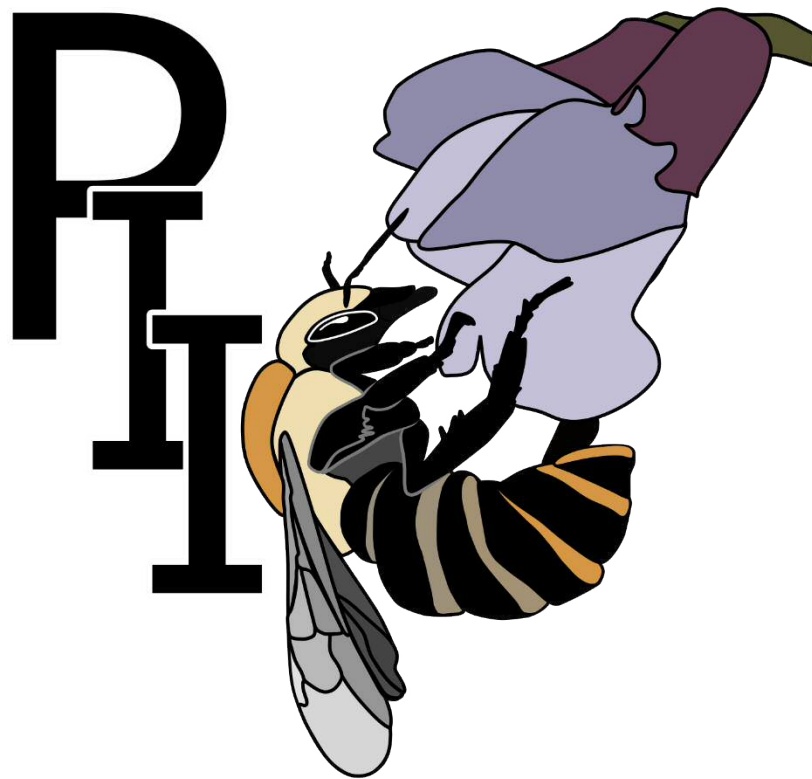


Dear Reader,

Here, we have collected several possible positions in our group, from projects to master thesis. For more information, please do not hesitate to contact the person responsible. Please note that we cannot consider AI-generated emails or applications.

Yours sincerely,

The Team of Plant-Insect-Interactions



Plant-Insect-Interactions

Sommersemester 2025

Bee Plant Pollution

Micro plastics in flower resources

Background:

Anthropogenic particles like tire wear, soot and brake dusts are constantly released in the air, and therefore can sediment on various surfaces like plants and flowers. As pollinators primarily depend on the floral resources, a pollution of these resources has possibly detrimental effects. First hazard experiments concluded that plastic particles have negative effects on health and cognition of bees. However, there is little information on the exposure of bees as the possible pollution sources e.g. nectar and pollen have not been investigated.



Methodological approach:

Nectar and Bees are collected in the closer area of Freising together with environmental data. The samples are to be processed and analysed with a fluorescent method. The results of the flower resources will be put in a landscape context, compared with a flower morphology as well as possibly in context of pollution found in bees.



Research question:

What is the extend of micro plastic pollution found in nectar on various road edges close to Freising. What factors (e. g. distance to road, flower morphology) influence the pollution

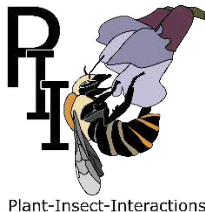
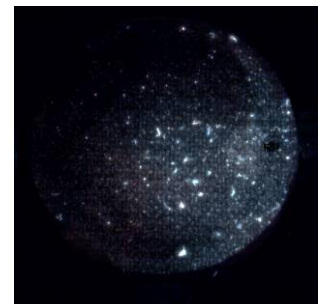


Time frame:

Starting between February-May, duration adjusted on the degree between 6 weeks up to 6 months.

Requirements:

Very clean and independent working in Lab is required. Basics of R would be good. Use of Fiji and prior work on research microscopes are a plus.



Contact:

Plant Insect Interactions, TUM:
Kenneth Kuba (Kenneth.kuba@tum.de)

Summersemester 2025

Bee Plant Pollution

Behavior changes due to plastic contamination

Background:

Anthropogenic particles like tire wear, soot and brake dusts are constantly released in the air, and therefore can sediment on various surfaces like plants and flowers. As pollinators pick e.g. micro plastics up during feeding, they can not only accumulate in the guts but also breach into the haemolymph and ultimately reach the brain and affect cognition. We want to test if chronic plastic exposed bees can still learn similarly as bees that are not exposed.



Methodological approach:

Bumblebees colonies are exposed for several weeks to micro plastic contaminated pollen. Individuals of three different treatments are tested using a new developed maze system in which both a stimulus and a reward are presented. This new setup allows tests under safe conditions and is easy to learn.

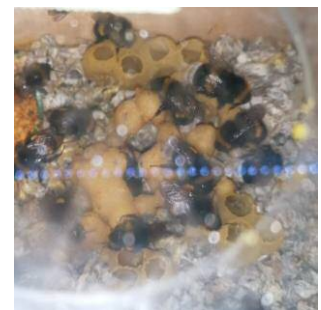


Research question:

Are chronic exposed bumblebees negatively affected in their learning capabilities.

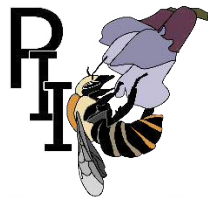
Time frame:

Starting between ideally February-March, duration adjusted on the degree between 6 weeks up to 3 months.



Requirements:

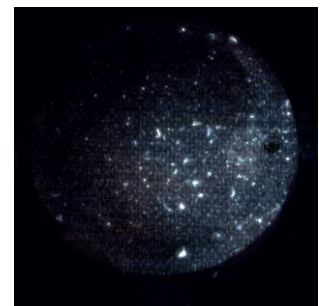
Independent lab working with living bumblebees is required. Basics of R would be good.



Plant-Insect-Interactions

Contact:

Plant Insect Interactions, TUM:
Kenneth Kuba (Kenneth.kuba@tum.de)



Summersemester 2025

Bee Plant Pollution

Developmental influence of micro plastic on wild bees

Background:

Anthropogenic particles like tire wear, soot and brake dusts are constantly released in the air, and therefore can sediment on various surfaces like plants and flowers. Pollinators not only pick them up when feeding for themselves, but also collect possibly polluted flower resources for their offspring. Via this also micro plastic can be fed to wild bee larvae. We want to investigate how micro plastic affects development of two wild bee model organisms



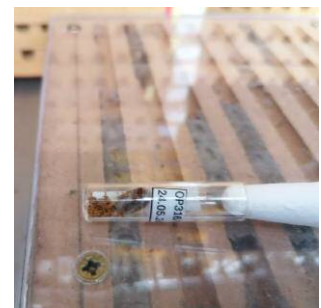
Methodological approach:

Bumblebees colonies are exposed for several weeks to micro plastic contaminated pollen. During this time bumblebees rear larvae with the contaminated resources. Similarly, we exchanged the pollen of red mason larvae with plastic polluted pollen. After the bees have hatched we want to measure the body size and several key body features to assess if and how the development of the two model organisms was affected. We will put this in perspective to the fed amount of pollen.



Research question:

Are body size, symmetry and other key indicators of adult bees affected by the amount of micro plastic fed to bee larvae.

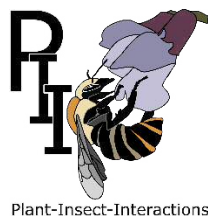


Time frame:

Starting between ideally February-April, duration adjusted on the degree between 6 weeks up to 3 months.

Requirements:

Independent working in the Lab is required. Basics of R would be good.



Contact:

Plant Insect Interactions, TUM:
Kenneth Kuba (Kenneth.kuba@tum.de)

Summer Semester 2025

CityBees:

Floral resources in urban gardens

Research focus:

To what extent are floral resources of different plant species affected by urbanization?

Background:

In the CityBees project we study the interactions between wild bees and flowers in cities. Although the availability of floral resources can support bees in cities, plants themselves are also affected by urbanization. We are looking for a student who wants to study how floral resources interact with urbanization.

Tasks may include:

- Collection of nectar and pollen from six flower species in urban community gardens in Munich and Berlin.
- Extraction of pollen
- Chemical analyses of pollen nutrition
- Statistics

Time frame:

Start spring / summer 2025

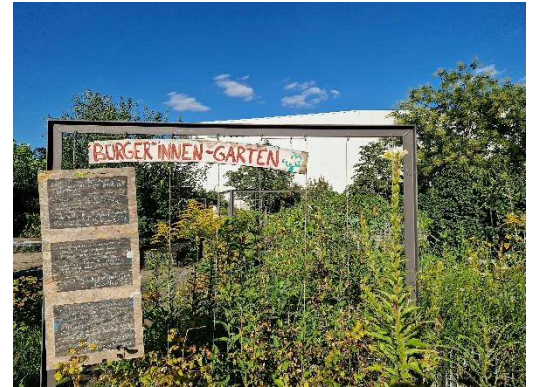
Requirements:

- Interest in plants and urbanization
- Willingness to do fieldwork and/or labwork
- Independent and reliable working attitude

Send an email if you are interested and we can meet to discuss the options. Starting dates and exact topics are flexible.

Contact:

Plant Insect Interactions, TUM:
Gaya ten Kate (gaya.ten-kate@tum.de)



More information
about the
CityBees project



Summer semester 2025

Bumblebees under stress:

The effects of pesticides on *Bombus terrestris*

Background:

Pesticides are widely used in modern-day agriculture in different forms (e.g., spray mist, liquid, solid). These substances, when used in the field, can come in contact with more than just the target species. Through wind and rain, they can be carried even further. Furthermore, as the pesticides change over time, keeping up with studying the effects (on plants, pollinators, or other target and non-target species) can be challenging. We, therefore, would like to add to the knowledge base and test the effects of 3 new systemic pesticides on the health, brood development, and feeding behavior of *Bombus terrestris*.



Methodological approach:

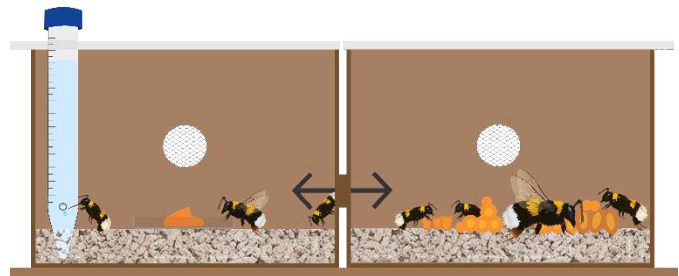
Students will conduct a feeding experiment with multiple bumblebee microcolonies. The pollen and nectar fed to the workers of *Bombus terrestris* will be treated with different pesticides, and longevity, brood development, and feeding behavior will be recorded.

Research question:

What are the effects of three different pesticides on *Bombus terrestris*?

Time frame:

This experiment can be started year-round. Important students will need to come in every day for 6 weeks, and bigger commitments (e.g., lectures, vacation) should be avoided. In the case of a master thesis, the scope of this project will be expanded to include multiple feeding experiments with different parameters.



Requirements:

Reliable, precise, and clean working in the lab, no statistical knowledge required, no prior knowledge of working with insects required.

Contact:

Plant Insect Interactions, TUM:
Carmen Nebauer (carmen.nebauer@tum.de)

Summer semester 2025

Assessing mediating factors of different food sources on pesticide-exposed bumblebees

Background:

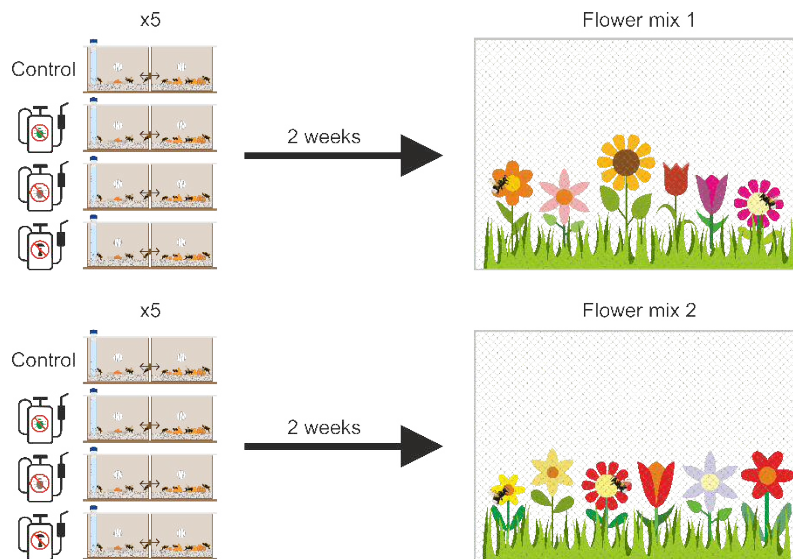
Many pesticides used in agriculture are known to affect pollinators negatively. As the use of pesticides is increasing rather than decreasing, any way to alleviate the negative effects of these substances is important. There has been some evidence to suggest that differing pollen nutrition can foster pesticide tolerance in honeybees. We, therefore, want to test this in bumblebees and, hopefully, in the future, be able to give recommendations for flower mixes.

Methodological approach:

Bumblebee colonies will be exposed to pesticides and then released into flight cages on two different flower fields sown in Dürnast. There, flower visitation and bumblebee behavior will be recorded. Some pollen will also be collected from returning bees and later analyzed in the lab.

Research question:

Can different flower mixtures help mitigate the negative effects of pesticide exposure in *Bombus terrestris*?

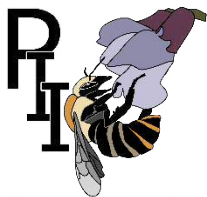


Time frame:

The project will take place in May and June with the analysis happening afterwards. Depending on the course (Internship, Bachelor- or Master thesis) the chemical analysis of the pollen can be added to expand the scope. **We are looking for several students for this project.**

Requirements:

Self-sufficient, reliable, precise, and clean working in the field and lab, no statistical knowledge required, no prior knowledge of working with insects required



Contact:

Plant Insect Interactions, TUM:
Carmen Nebauer (carmen.nebauer@tum.de)

We are looking for a motivated student to help us during fieldwork within the RestPoll project.

Background: Restoring pollinator habitats across European agricultural landscapes

Pollinators are declining worldwide, due to climate change, habitat loss and fragmentation and intensification of agriculture. RestPoll aims to substantially and permanently restore more wild pollinator habitats and enhance the connectivity of habitats in Europe, by strengthening society-wide capability to reverse wild pollinator decline and stabilize pollination services and their societal benefits.

Agroforestry systems provide a promising approach to integrating trees and shrubs into agricultural landscapes, creating diverse habitats that support pollinators by offering forage, nesting sites, and shelter. These systems can enhance habitat connectivity, reduce landscape fragmentation, and contribute to more sustainable and resilient ecosystems.



Your task:

- Fieldwork in Germany on Agroforestry sites, where we will collect pollinator and botanical data
- Taxonomy on wild bees and hoverflies

Requirements:

- Interest in pollinators and insect identification
- Interest in botany
- Ability to meet the physical demands of fieldwork in June 2025
- Driver's license

Starting date: Beginning of June 2025

Extent/working hrs: 20 hrs/week in June/July 2025

Contact: Paula Prucker (paula.prucker@tum.de), Marielle Schleifer (marielle.schleifer@tum.de)

We are looking for two motivated Master's students interested in conducting their Master's thesis with us as part of the RestPoll project.

Background: Restoring pollinator habitats across European agricultural landscapes

Pollinators are declining worldwide, due to climate change, habitat loss and fragmentation and intensification of agriculture. RestPoll aims to substantially and permanently restore more wild pollinator habitats and enhance the connectivity of habitats in Europe, by strengthening society-wide capability to reverse wild pollinator decline and stabilize pollination services and their societal benefits.

Agroforestry systems provide a promising approach to integrating trees and shrubs into agricultural landscapes, creating diverse habitats that support pollinators by offering forage, nesting sites, and shelter. These systems can enhance habitat connectivity, reduce landscape fragmentation, and contribute to more sustainable and resilient ecosystems.



Research questions:

- (1) Which effect do agroforestry systems have on pollinating insects?
- (2) How does the landscape context influence these effects?

Methodological approach:

- Fieldwork in Germany on Agroforestry sites, where we will collect pollinator and botanical data (1 + 2).
- Taxonomy on wild bees and hoverflies (1 + 2).
- Comparative analysis of 2024 and 2025 findings (1).
- GIS-based landscape analysis (2).

Requirements:

- Interest in pollinators and insect identification
- Ability to meet the physical demands of fieldwork from April to August 2025 (3 rounds)
- Basic knowledge of statistical analysis in R (preferred)

Starting date: Mid of March/Beginning of April 2025

Contact: Paula Prucker (paula.prucker@tum.de), Marielle Schleifer (marielle.schleifer@tum.de)

Sommersemester 2025

Diversity of Plants and Insects on different flowering field types

Background:

Flowering fields are a popular scheme for ecological reassessment of agricultural land. Many studies report about their ecological use compared to other agricultural structures. However, little is known about the comparison between different arrangement methods. The project BlüDiv is comparing different arrangement methods (e.g. fallow, commercial seed mixture) of flowering fields with focus on the optimization of plant and insect diversity.



Methodological approach:

Insects and plants are collected via different methods. Insect sampling will be done with pitfall traps, malaise traps and sweep netting (netting preferably wild bees or hover flies). For plants, biomass is collected and species are identified in the field on a subplot of the whole plot.



Research question:

(How much) Do the arrangement methods differ in their diversity of plants or arthropods (focus can be laid on a specific group)?

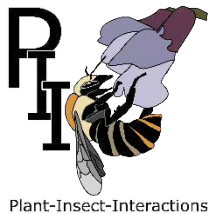
Time frame:

Field work between May-August, duration adjusted on the degree between 6 weeks up to 6 months.



Requirements:

Basics of R would be good. Drivers license is a plus.



Contact:

Restoration Ecology, TUM,
Plant Insect Interactions, TUM:
Franziska Mück (Franziska.mueck@tum.de)



Sommersemester 2025

Land use effects on invertebrate diversity and food webs

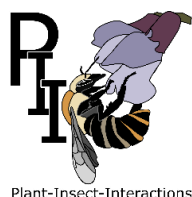
Background: Biodiversity is shaped by organismal differences in the consumption, utilization and allocation of nutrients as well as the environment they are immersed in. In this project we aim to determine the impact of grazing and mowing in the diversity of organisms in grasslands and forests, focusing on invertebrates, largely insects and spiders. Many of these groups have never been addressed before and their status is not known, which makes it an exciting project to work on.

Methodological approach: The laboratory work consists on sorting samples of pitfall traps, window traps, swipe netting and targeted collection were collected in Spring-Summer 2024, by their taxonomy using microscope and taxonomical keys. After entering the count of each organism into an excel file we will be doing statistical analyses with R Software, in order to understand species distribution and abundances in a landscape context (landscape heterogeneity, land use, urbanization).

Research question: What is the effect of land use on the diversity and composition of invertebrate communities? Other related questions of your interest would be considered, as this large dataset will be valuable for addressing multiple questions on ecosystem services and landscape ecology.

Time frame: Starting now! The samples are there and they are waiting for you.

Requirements: Musts: Motivation and responsibility. Willingness to work in the lab with sometimes dirty samples. Attention to detail. Love for nature and insects. **Advantageous:** Basics of R Software. Background in ecology. **We provide:** This is an unpaid thesis for TUM/LMU students. We provide training in different areas (e.g., taxonomical identification, statistics, communication), team work, a great working environment and possibility to be part of publications.



Contact with a CV, motivation letter and, if you have, references:

Plant Insect Interactions, TUM:
Dr. Alejandra Parreno (alejandra.parreno@tum.de)

Sommersemester 2025

Effect of warmer temperatures during overwintering on the physiology of wild bees

Background: Climate change affects insects, special when leading to warmer winters and earlier springs. Little is known however on the mechanisms of those effects, including those on the physiology of organisms. Wild bees are already threatened by a number of global change drivers and changes on their overwintering patterns could be detrimental to their development and success in spring.



Methodological approach: We want to look for differences in fat consumption between wild bees of different species that have overwintered in a gradient of temperatures. We do that with chemical essays and statistical analyses. The bees are already there after an experiment with different temperatures last year, so the thesis would be based on lab work (e.g., GC-MS) and analytical work.



Research question: What is the effect warmer overwintering temperatures on the physiology of wild bees? Other related questions of your interest would be considered, as this large dataset will be valuable for addressing multiple questions on ecosystem services and landscape ecology.



Time frame: Starting now! The samples are there and they are waiting for you.

Requirements: Musts: Motivation and responsibility. Willingness to work in the lab with chemicals and following protocols. Attention to detail. **Advantageous:** Basics of R Software. Background in chemistry. **We provide:** This is an unpaid thesis for TUM/LMU students. We provide training in different areas (e.g., chemical lab, statistics), team work, a great working environment and possibility to be part of publications.



Contact with a CV, motivation letter and, if you have, references:

Plant Insect Interactions, TUM:
Dr. Alejandra Parreno (alejandra.parreno@tum.de)