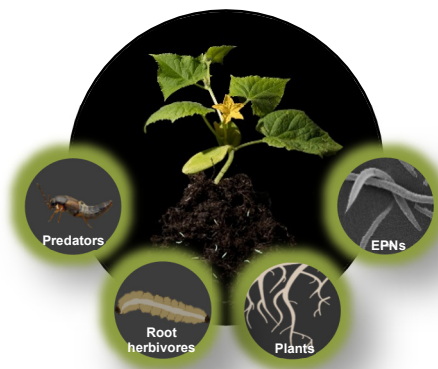


-Internship/Thesis Project Opportunities-

Applying Chemical and Molecular Ecology Knowledge to Develop Sustainable Agricultural Practices

Current agricultural practices include the use of highly toxic pesticides to combat herbivorous insect pests. Due to the enormous damage they cause to ourselves and to our environment, alternative pest control strategies are urgently needed. In this context, the use of natural enemies such as entomopathogenic nematodes or predators is envisioned as a promising strategy. Unfortunately, the use of these organisms not always results in satisfactory results, and many herbivorous pests are still out of control. A way to boost the efficacy of natural enemies and thereby develop agricultural practices that are environmentally friendly and compatible with sustainable and organic farming systems is to understand how plants, insects, and their natural enemies interact, which is the key research focus of the Experimental Biology Research Group (Head: Dr. Ricardo Machado). This is why we are specifically interested in discovering the genes and metabolites that are used by living organisms to interact between them and with their environment. To this end, we use several molecular, chemical, and bioinformatics approaches including experimental evolution, genotyping by new generation sequencing, transient and stable genome editing, animal ethology, and analytical chemistry using plants, root herbivores, entomopathogenic nematodes and their symbiotic bacterial partners, and insect predators as part of our model system of study.



We are currently accepting applications of bachelor and master students to conduct internships and/or thesis projects. Specific projects will be discussed with interested students individually to match their own scientific interest and background.

Interested students can contact Dr. Ricardo Machado (ricardo.machado@unine.ch; Head of the Experimental Biology Research Group) directly.

If you want to know more about our research, you can visit the following links:

- Institute of Biology: <https://www.unine.ch/biologie/en/home/laboratoires-et-groupes-de-reche/experimental-biology.html>
- Swiss Plant Science Web: <https://swissplantsciencweb.unibas.ch/en/machado/>
- Google scholars: <https://scholar.google.com/citations?user=cX75BIAAAAJ&hl=en&oi=sra>

Or read some of our key publications:

- Machado RAR, Thönen L, Arce CCM, Theepan V, Prada F, Wüthrich D, Robert CAM, Vogiatzaki E, Shi YM, Schaeren OP, Notter M, Bruggmann R, Hapfelmeier S, Bode HB, Erb M. 2020. Engineering bacterial symbionts of nematodes improves their biocontrol potential to counter the western corn rootworm. *Nature Biotechnology* 38: 600–608. <https://www.nature.com/articles/s41587-020-0419-1>
- Zhang X, Van Doan C, Arce CCM, Hu L, Gruenig S, Parisod CG, Hibbard BE, Hervé M, Robert CAM, Machado RAR, Erb M. 2019. Plant defense resistance in natural enemies of a specialist insect herbivore. *PNAS* 116(46):23174-23181. <https://www.pnas.org/content/116/46/23174.short>
- Arce CCM, Theepan V, Schimmel BCJ, Erb M*, Machado RAR. 2020. Plant-derived CO₂ mediates long-distance host location and quality assessment by a root herbivore. *BioRxiv*. <https://doi.org/10.1101/2020.03.12.988691>.
- Machado RAR, Theepan V, Robert CAM, Züst T, Hu L, Su Q, Schimmel BCJ, Erb M. 2020. Complex plant metabolomes guide fitness-relevant foraging decisions of a specialist herbivore. *BioRxiv*. <https://doi.org/10.1101/2020.07.13.200618>.