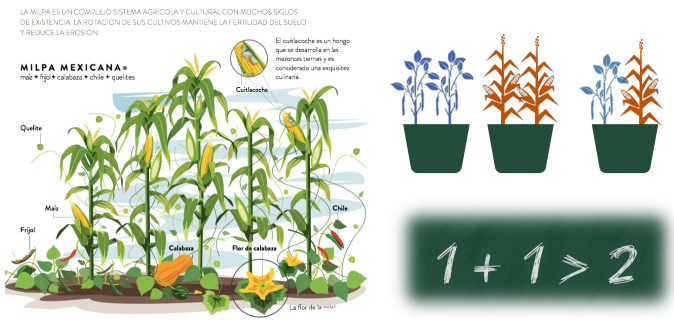
Université de Neuchâtel
Institut de biologie

Master thesis opportunity



Effects of Companion Plants in Agroecosystems: Does 1 + 1 > 2?

Background: Intercropping, where farmers grow multiple crops together, offers a compelling alternative to monoculture. This practice enhances soil fertility, supports pollinator services, naturally controls pests, and boosts resilience to environmental stressors. Drawing inspiration from nature, intercropping pairs complementary crops as companions, creating synergistic effects that embody both ancient wisdom and modern sustainability.
But what drives these benefits? Are the chemical profiles of intercropped species simply the sum of their individual traits, or does intercropping fundamentally alter their chemistry? To uncover the secrets of companion planting, this project will test whether plant chemical profiles—such as volatile emissions, plant nutrients and metabolome—change in the presence or absence of companion plants. By exploring these interactions, we aim to shed light on the mechanisms that give polyculture its ecological and agricultural importance.

Aims: This project will use controlled experiments to compare the chemical traits of plants grown in monoculture and polyculture setups. By characterizing changes in volatile emissions, flower traits, and nutrient profiles, we seek to understand how companion plants influence each other's chemistry and contribute to the advantages of intercropping.

Requested skills: The project will primarily involve greenhouse work, with the potential for fieldwork in Mexico if desired. We are seeking a highly motivated student with strong interest in chemical ecology, phytochemical analyses, and statistical analysis.

Keywords: Sustainable agriculture, chemical ecology, companion crops, polyculture.

Place of work: UniNe, Institute of Biology. Optional: Mexican field site.

References:

Benrey, B., Bustos-Segura, C., & Grof-Tisza, P. (2024). The mesoamerican milpa system: Traditional practices, sustainability, biodiversity, and pest control. *Biological Control*, 105637.

Patel, M. K., Pandey, S., Kumar, M., Haque, M. I., Pal, S., & Yadav, N. S. (2021). Plants metabolome study: Emerging tools and techniques. *Plants*, *10*(11), 2409.

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