

The [ECOSPHERE research group](#) aims to study aquatic and valley ecosystems that are continuously challenged by natural and anthropogenic stressors. The research focuses on acquiring fundamental and applied knowledge at different levels of structural and functional organisation in order to underpin environmental management decisions.

**MASTER THESIS SUBJECT**  
**2024-2025**

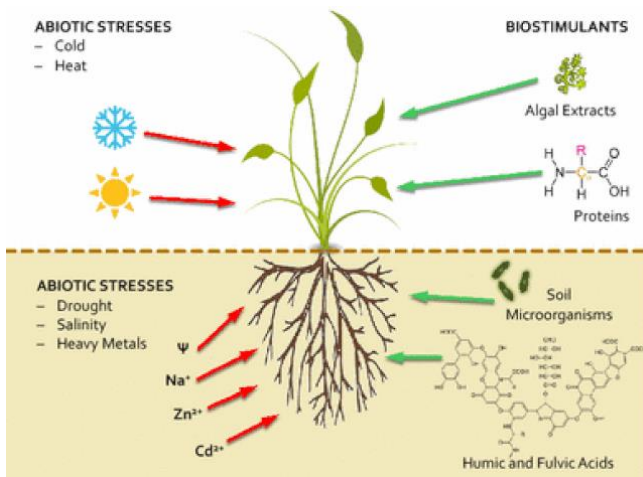
**Microalgal biostimulants in agriculture: A source of soil nutrients and conditioning, impact on soil contaminants with focus on mobility and bioavailability**

Research group: ECOSPHERE

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**Microalgae can accumulate different metals, nitrogenous wastes, and other hydrophilic or hydrophobic organic compounds**

- This topic mostly contains  literature study,  lab work,  field work,  experimental work,  GIS,  numerical modelling,  other: .....
- Possession of driver's license B is  needed,  recommended,  not needed
- Possession of certificates needed:  FELASA C,  other: .....



## Summary

The growing global population and rising consumption are significantly increasing the demand for agricultural food production. Concurrently, heightened environmental awareness has led to concerns about agricultural practices and their effects on ecosystem functions and biodiversity. To evaluate the environmental impact and risks associated with using microalgae or their components as biostimulants, it is crucial to consider their relevance in real-world conditions. While the application of microalgal biomass or extracts as biostimulants offers various benefits, it may also raise concerns, e.g. related to the culture conditions and effects on the receiving soil and water systems. Microalgae are known to bioaccumulate various pollutants, such as metals, hydrophilic or hydrophobic organic compounds (e.g., pesticides, polyaromatic hydrocarbons, polyhalogenated hydrocarbons). Moreover, algae can elevate nitrogen waste products (e.g., ammonia, nitrite, nitrate), which become toxic at elevated concentrations and may significantly degrade soil and surface water quality. The addition of microalgae to soil may also affect the mobility, bioavailability, and transformation of both nutrients and contaminants already present.

The primary tasks in this project will include:

- 1) Perform microcosm experiments to study the effects of the biostimulants on plant growth and nutrient and contaminant mobility and bioavailability.
- 2) Assessing the impact on nutrient and contaminant mobility and bioavailability by measuring their concentrations in soil pore water using rhizon samplers.
- 3) Utilizing ICP-MS for metal analysis and various configurations of LC and GC-MS for detecting organic compounds.

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