The Memory of Swiss Rice Paddies - Soil Seed Banks, Aquatic Dormancy Stages and Weed Potential

Starting date: Autumn 2026 or Spring 2027
Duration: 6-12 months
Working Place: Agroscope, Zurich-Reckenholz
Language: D / E / F
Agroscope research group: Agricultural Landscape and Biodiversity
Evaluating professor or university: e.g. Prof. Dr. Achim Walter

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Paddy rice cultivation is an emerging agricultural system in Switzerland. Since the first pilot trials conducted by Agroscope in 2017, paddy rice fields have expanded and now represent novel temporary wetland habitats within agricultural landscapes.
During the flooded growing season, paddy fields can support a wide range of wetland-associated organisms, including plants, dragonflies, amphibians and aquatic invertebrates. However, little is known about the biodiversity hidden belowground.
Soils may contain persistent seed banks of wetland plants as well as dormant stages of aquatic organisms capable of surviving dry winter conditions. These hidden biological reservoirs can be considered the ecological “memory” of paddy fields and may strongly influence future biodiversity and weed dynamics.
Within a nationwide research project, Agroscope will investigate the soil seed banks and aquatic dormant stages of Swiss paddy rice fields for the first time.

Objectives

The thesis aims to investigate the biological potential stored in paddy soils and its implications for:

- biodiversity conservation,
- wetland plant restoration,
- survival of aquatic organisms between flooding periods,
- future weed pressure in rice cultivation,
- sustainable crop rotation and management strategies.

A particular focus will be placed on linking the vegetation observed in 2026 to the future vegetation emerging from the soil seed bank after experimental re-flooding in 2027.

Potential Research Questions

- Which plant species are present in the soil seed banks of Swiss paddy fields?
- How does seed bank composition vary among sites?

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- Which rare or conservation-priority wetland species persist in the soil?
- Can dormant aquatic organisms survive winter conditions and reappear after re-flooding?
- How closely does the soil seed bank reflect the standing vegetation?
- Which environmental and management factors determine the biodiversity and weed potential of paddy fields?

The precise focus can be adapted to the student's interests, ranging from plant ecology and wetland biodiversity to agroecology and weed science.

Tasks

Students will be integrated into a national research project and contribute to:

Field Work

- Soil sampling in Swiss paddy rice fields
- Collection of site and management information

Experimental Work

- Establishment and maintenance of seed bank emergence experiments
- Monitoring of germination and vegetation development
- Plant identification and community assessment
- Monitoring of aquatic organisms emerging after re-flooding

Data Analysis

- Analysis of soil seed bank composition
- Comparison between standing vegetation and emerging vegetation
- Statistical analysis using ecological datasets
- Optional GIS and biodiversity modelling approaches

Candidate Profile

Applicants should be enrolled in:

- Environmental Sciences
- Agricultural Sciences
- Biology
- Ecology
- Geography
- Natural Resource Sciences
- or related disciplines

Desired qualifications:

- Interest in biodiversity and ecology
- Motivation for field and laboratory work
- Basic statistical skills (R preferred)
- Ability to work independently
- Interest in plant and macroverterates identification is an advantage

What We Offer

- Participation in a unique nationwide biodiversity research project
- Supervision by researchers at Agroscope
- Combination of field work, greenhouse experiments and ecological data analysis
- Collaboration with biodiversity experts and species specialists
- Opportunity to contribute to scientific publications
- Research with direct relevance to agriculture, conservation and environmental policy