Paddy Rice Cultivation as GHG Mitigation Option in Organic Soils – RiceClim Project

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Background

Drained organic soils are significant sources of greenhouse gases (GHGs). Rewetting these soils improves the GHG balance, but it is often associated with the abandonment of agriculture. In Switzerland, paddy rice has been successfully cultivated since 2017 and has become an economically viable local niche product. The RiceClim project, running from May 2025 to April 2029, aims to evaluate the potential for mitigating GHG emissions through paddy rice cultivation.

Overall Aims

- Practical recommendations to reduce the GHG balance of paddy rice cultivation on organic soils
- Process understanding

Field (ha)

Does paddy rice have a lower climatic impact than drained cropland?

Which taxonomic and functional differences exist between microbial communities in paddy rice and adjacent drained cropland soils?

- Annual budget of CO_2, CH_4 , N_2O,
- 16S (archaea and bacteria), mcrA, pmoA,
- soil properties

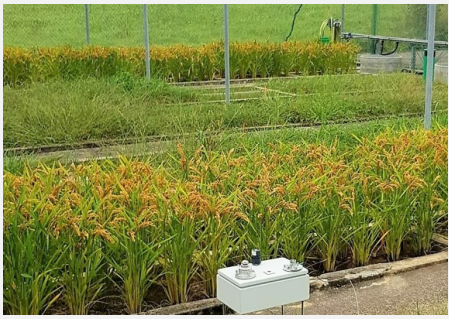
Mesocosm facility (m^2): Residue management

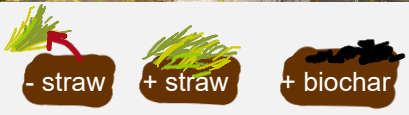
Can the addition of biochar and the removal of straw improve the GHG balance?

How are CH_4 emissions related to microbial communities and functional markers?

What are the contributions of straw and old peat to CH_4 and CO_2 fluxes?

Can biochar reduce the amount of co-metabolized peat and recent carbon?





- Annual budget of CH_4 + N_2O
- 16S, mcrA, pmoA
- SO_4^{2-}, NO_3^-, DOC, Fe^{3+}

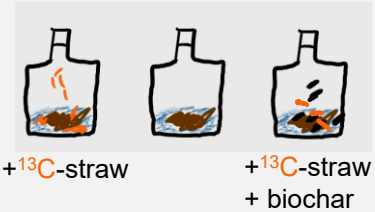
- Fluxes of $^{13}CH_4$, $^{13}CO_2$, $^{14}CH_4$, $^{14}CO_2$

Incubation (cm^2)

Can biochar effectively reduce CH_4 emissions in different soils?

Is a high soil organic carbon (SOC) level associated with increased CH_4 emissions?

How do electron acceptors affect the microbial communities and CH_4 emissions?



Four soils with different SOC contents (3-22%) will be incubated for four months.

- Fluxes of $^{13}CH_4$, $^{13}CO_2$
- 16S, mcrA, pmoA
- SO_4^{2-}, NO_3^-, DOC, Fe^{3+}

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