INFLUENCE OF SLURRY ACIDIFICATION ON SOIL NUTRIENT DYNAMICS AND GREENHOUSE GAS EMISSIONS

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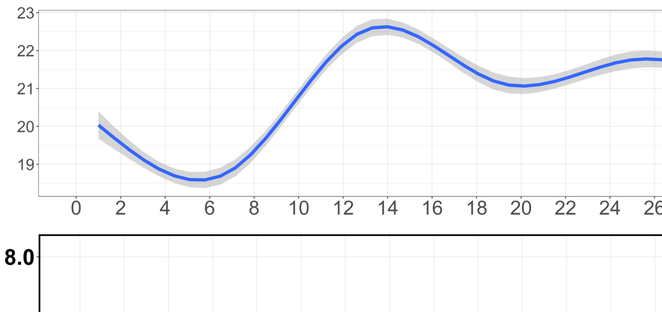
Background & Objectives

Acidification of livestock **slurry** with sulphuric acid (H_2SO_4) is widely used in Europe to reduce NH_3 emissions and enhance the fertilizer value of slurry. However, the fate of the sulfate (SO_4^{2-}) and impact of acidification on soil carbon (C), nitrogen (N), and phosphorus (P) cycling remains poorly understood. This study aimed to disentangle the effects of cattle slurry, H^+ and SO_4^{2-} addition on soil nutrient cycling.

Greenhouse gas (GHG) emissions (CO_2, CH_4, N_2O) and soil nutrient dynamics (NO_3^-, NH_4^+, PO_4^{3-}, DOC, DON, pH; measured using soil extracts and Rhizon® samplers) were monitored over a 2-month period after treatment application. **The key aim was to assess the interactions between H^+ and SO_4^{2-} on soil nutrient dynamics (S, N, P, and C) and GHG in soil receiving H_2SO_4-acidified slurry.**

Experimental design

The study included six treatments, where slurry acidification with sulfuric acid was compared with separate addition of K_2SO_4, acidification with HCl, and mineral addition of H_2SO_4 and K_2SO_4 excluding the organic factor of the slurry. Photographs of the experimental set-up are shown below.



Results

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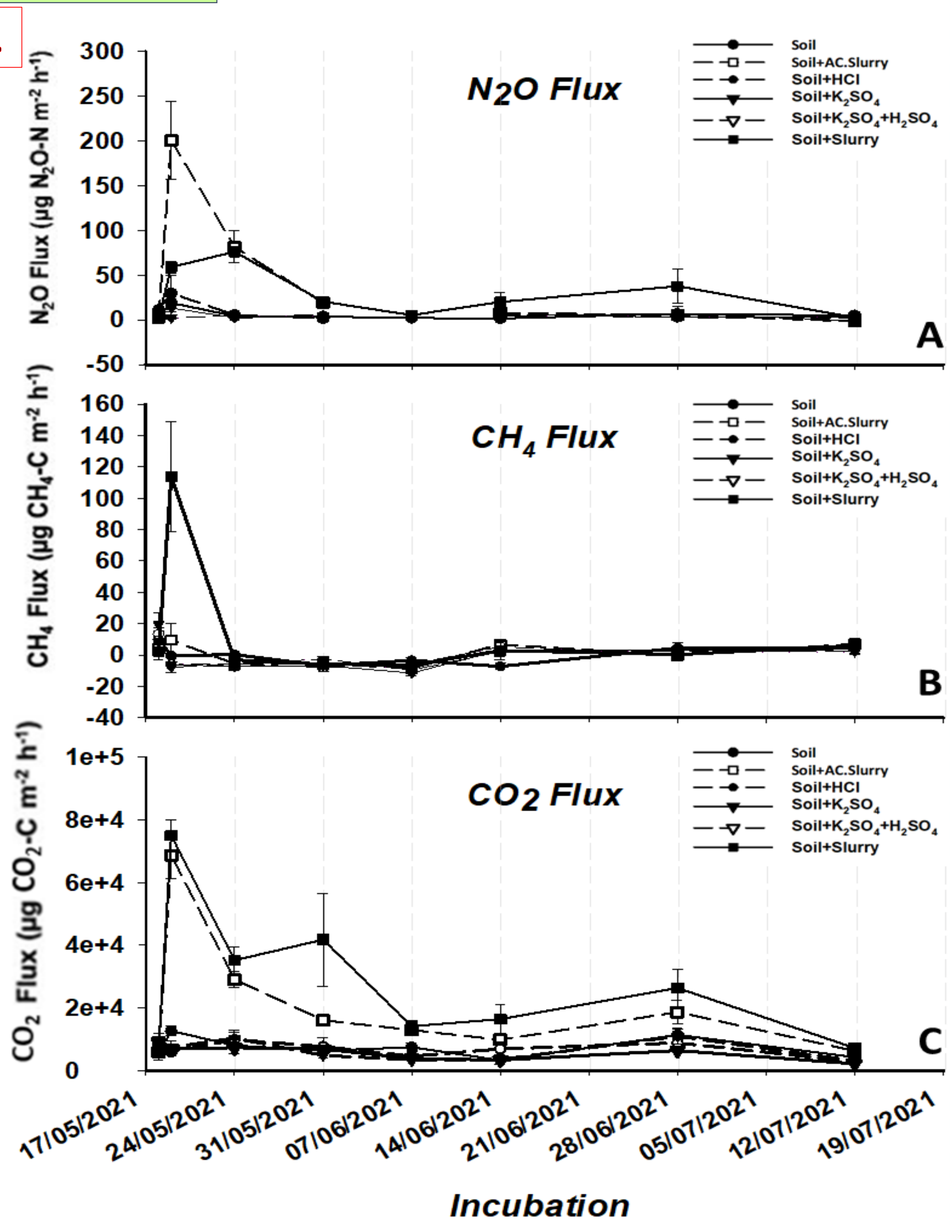

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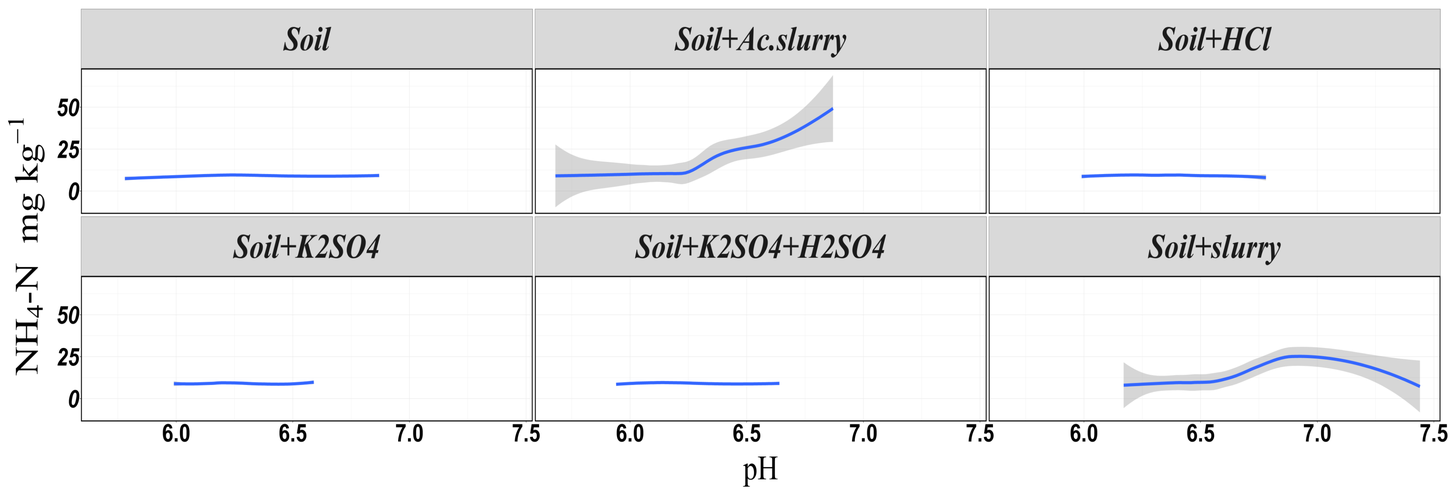

Main conclusions

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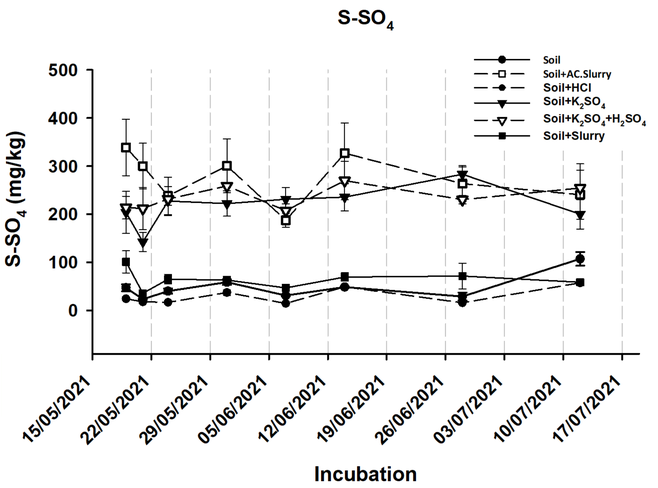
- CO_2-C, and CH_4-C fluxes in slurry decreased with the reduction in slurry pH. However,
- the effect of acidification on N_2O-N flux remains unclear (Fig.1. A,B,C).
- Acidification in the presence of organic N, increases mineralization (Fig.3.)
- Acidification of slurry slowed nitrification of the mineralized N (NH_4-N).
- Acidification of slurry in the current experiment did not affect organic P mineralization.
- More studies are needed to better understand the interactions between the SO_4^{2-} and soil nutrient dynamics and GHG emissions.



Acknowledgments

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