

Soil amendments reduce P release from
flooded soils:
Incubation studies simulating snowmelt and
summer flooding

**Chammi Attanayake, Darshani Kumaragama, Chamara Weerasekara,
W.A.U. Vitharana, Saman Dharmakeerthi, Emily Van, Doug Goltz and
Srimathie Indrarathne**



THE UNIVERSITY OF
WINNIPEG



UNIVERSITY OF PERADENIYA

EGU General
Assembly 2020



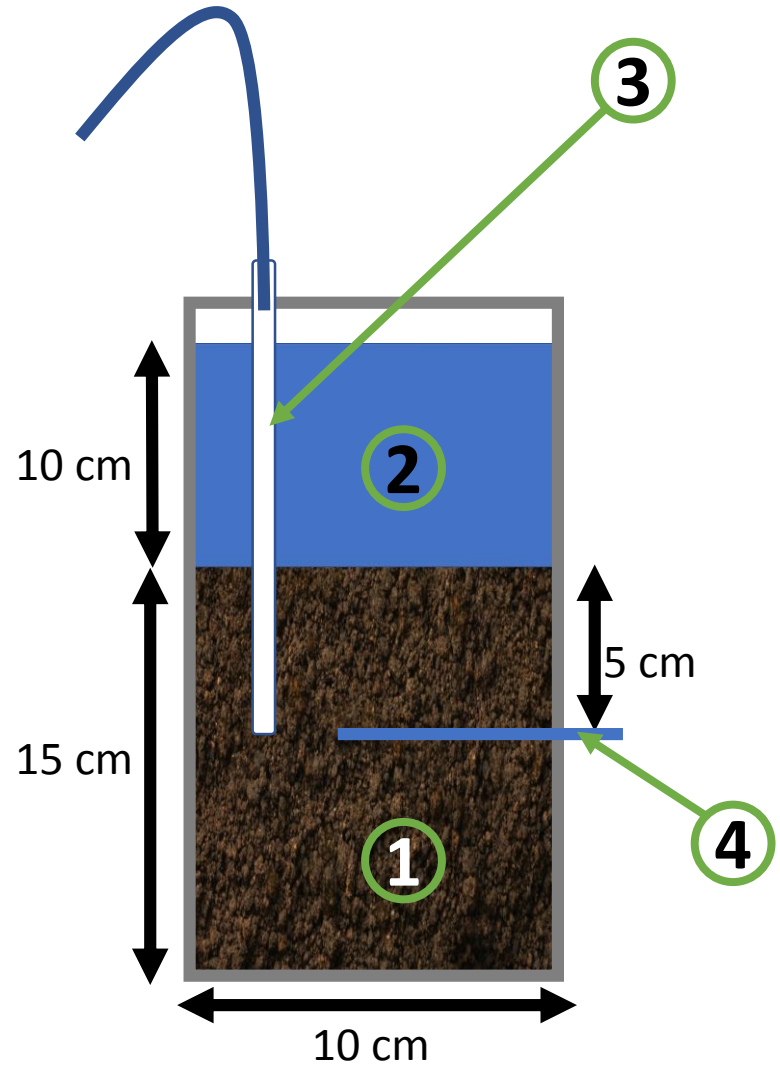
Introduction

- Prolonged flooding could enhance P release from soils due to anaerobic reduction.
- In the Canadian Prairies, flooding is common with spring snow melt and summer precipitation
- Limited knowledge on seasonal differences in flooding-induced P release from soils.

Objective

- To compare P release in flooded soils under simulated summer flooding and spring snowmelt conditions.
- To investigate the effectiveness of gypsum, magnesium sulphate, alum, ferric chloride, zeolite and manganese oxides in reducing P release from flooded soils under simulated summer and spring snowmelt flooding conditions.

Incubation study



- ① Soil
- ② DI Water
- ③ Pt Redox probe
- ④ Rhizon flex sampler

- Amendment were mixed with soil/spread on the top (5Mg/ha)
- Incubated at room temperature (22°C) and 4°C for 8-10 weeks

Incubation study

- Pore-water samples were collected at every week
- Analysis in pore-water
 - Dissolved reactive P-Molybdate reductive
 - pH
 - Cations-ICP-OES
 - Anions-IC
 - Electrical conductivity



Conclusion

- Release of soil P into soil solution and floodwater was higher at 22°C than that at 4°C.
- Gypsum, magnesium sulphate, alum, ferric chloride and manganese(IV) oxides were effective in reducing the concentrations of P in the pore- and flood-water at various capacities.
- Zeolite increased the concentration of P in pore- and flood-water.
- Degree of effectiveness of amendments depended on soil properties.

Acknowledgement

- NSERC Discovery grant
- Queen Elizabeth II Advanced Scholar Program at the University of Winnipeg
- Environment and Climate Change Canada through Lake Winnipeg Basin Program