Evaluating the Bioavailability of Residual Phosphorus in Organic, Calcareous, and Acid Soils

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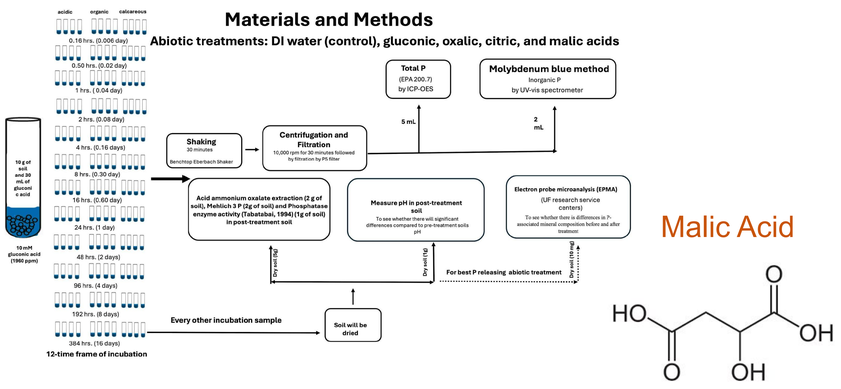
Introduction

Within agriculture, there is a question about the environmental hazards of over-fertilizer applications. The wrong amount of application can cause both poor crop yields and fertilizer runoff, the latter of which leads to massive ecosystem disruption to the water bodies this fertilizer eventually reaches in the form of eutrophication.

This research studies the availability of residual Phosphorus (P) in soil samples to understand the relationship between P already present in soils but inaccessible to plants and newly applied P from fertilizers.

Methods

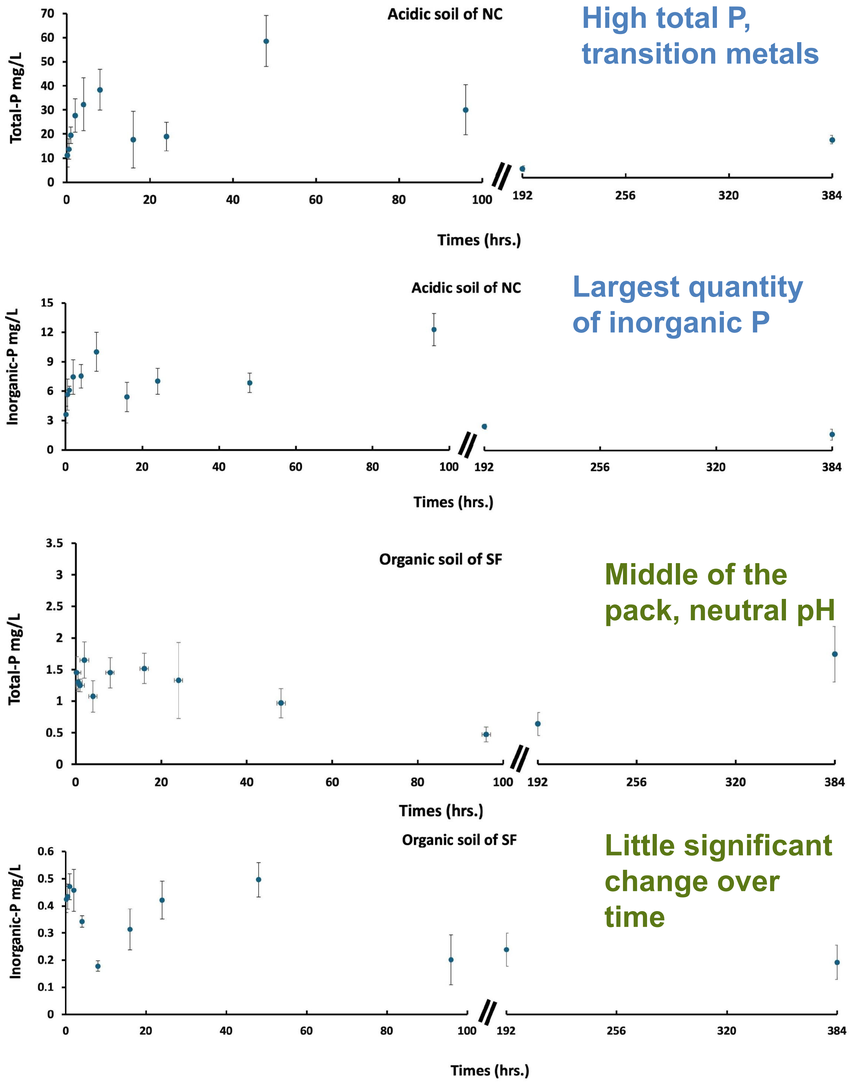
The soils are tested for P bioavailability by introducing various acids and shaking before filtrating. Enzymes, pH analysis, electron probe microanalysis, total P ICP-OES, and UV-vis spectrometry with Molybdenum methods are all used in subsequent stages to help simulate the variety of ways P interacts with soils.

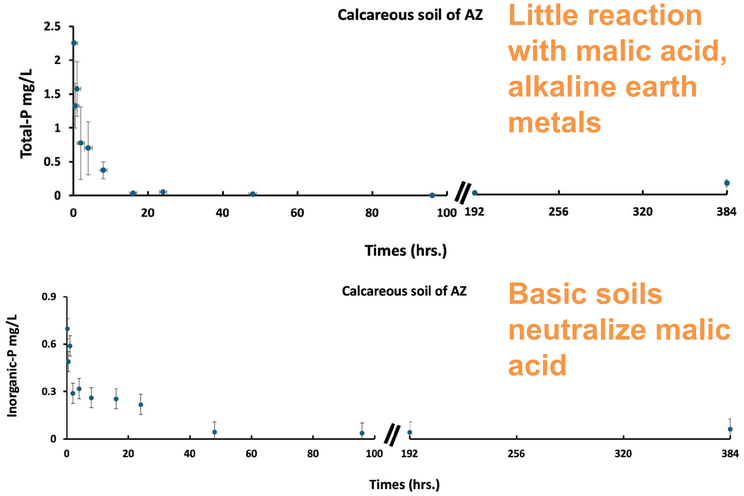


Malic Acid

Results

Results should reveal that the residual P in soils can be made more bioavailable through the methods used in this research. This would help scientists to develop interventions to utilize the "legacy-P" from soils that would otherwise not have been bioavailable. Eutrophication can also be minimized by unlocking residual phosphorus to minimize fertilizer use.





Discussion

Finding a solution to releasing legacy-P from soils is at the core of this research. Increasing our P use efficiency will protect the environment and save growers $$$$ through reduced fertilizer application. This study only uses malic acid; in the future, we will test with gluconic, citric, and oxalic acids. We will also be testing with commercial bioproducts to test biotic P-release mechanisms.

Acknowledgements

- **Department of Soil, Water, and Ecosystems Sciences, UF EREC**

References

Doydora et al. 2020. *Soil Systems*.

This material is based upon work supported by the National Science Foundation CBET-2019435.