

Can plants alter exudates based on soil lithology?

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Roots drastically alter the rhizosphere by weathering rocks, mobilizing nutrients, stabilizing soil particles, and manipulating the microbiome through the release of exudates. Recently, novel methods have been developed to collect exudates for identification and other applications [1]. However, these methods are typically deployed in controlled settings using glass beads without the input of various soil chemical and physical properties. We attempted to measure the rate of root exudation in different soil conditions and depths in a greenhouse setting and at the Susquehanna Shale Hills Critical Zone Observatory. Using a fully crossed factorial design we tested whether exposure to different lithology, specifically shale- and sandstone-derived soil, would affect the rate of exudation and physiological status of roots of the same tree. Preliminary results show increased available phosphorus in exudates extracted from roots exposed to sandstone-derived soils. The identity of exudates will be determined using ion chromatography, with an emphasis placed on phosphatase, and normalized against specific root length and electrolyte leakage. These results will highlight the role of biotic controls on soil solution concentration and nutrient availability as well as plant-soil interactions on mineral weathering.

[1] Phillips, Erlitz, Bier & Bernhardt (2008), *Functional Ecology* 22, 990-999.