The effects of soil drying and rewetting history on phosphorus solubilisation and growth of maize (Zea mays) under contrasting agricultural soils in China

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Abstract

This paper tested the hypothesis that agricultural soils with a recent history of drying and rewetting (DRW) can trigger P solubilisation in the rhizosphere and a subsequent growth response of maize (Zea mays). Specifically, it aimed at investigating a possible delayed effect of soil DRW stresses by studying P solubilisation in the rhizosphere, plant P acquisition and performance, and root growth, all under the previous history of series of DRW events, combined with different types of agricultural soils of varied texture and pH. The soils were collected from four different agricultural regions of China, Shandong, Chongqing, Heilongjiang and Beijing, treated with four varying cycles of DRW events prior to the experiment, to raise levels of soil biotic and abiotic activities and potential development of maize growth. A controlled small pot experiment was conducted to establish the Olsen P in the soil, maize shoot P concentrations, root morphology and other rhizosphere parameters, for the duration of 43 days after planting. The results show a positive relationship between plant biomass, plant P concentration, and Olsen P. The effect was most clearly demonstrated by growth of plants and their biological performance in the rhizosphere, as the plants responded better in the soil with a DRW background than a soil that did not have a history of DRW in the past. However, the soluble P concentration and plant growth response varied depending on soil types and P application rates, and the most positive was under
Haplic Phaeozems soil from Heilongjiang, leading to an acceptance of hypothesis.

**How to cite:** Mongol, N.: The effects of soil drying and rewetting history on phosphorus solubilisation and growth of maize (Zea mays) under contrasting agricultural soils in China, EGU General Assembly 2020, Online, 4-8 May 2020, EGU2020-19920, https://doi.org/10.5194/egusphere-egu2020-19920, 2020