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Flexible C, N and P allocation in maize plants and soil microbial biomass under recurrent and long-term drought

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One of the negative effects of the global warming is increasing aridity worldwide. Alterations in plant and microbial C, N and P in response to drought events can differ considerably in magnitude and direction. Therefore, synchronization between C, N and P in plants, dissolved forms and microbial biomass in soil is of great interest.
Our objective was to evaluate C:N:P stoichiometry relations in plants and soil as affected by moderate water shortage and severe drought with subsequent rewetting. We tested the sensitivity of stoichiometry ratios in plants, dissolved compounds and soil microbial biomass in greenhouse experiment with maize. Three treatments were used: i) control with constant soil moisture (CTL); ii) soil with constantly low wetness of 25% WHC (DRY) and iii) soil exposed to drying-rewetting events (DRW).
N dynamics was the most sensitive to water stress in maize plants and soil, while P dynamics was almost unaffected by drought and rewetting. As a result, C:N and N:P ratios were also sensitive to water treatment indicating that C, N and P cycles were decoupled by the water stresses.
High C:N ratios in CTL and low C:N ratios in DRY and DRW treatments indicate stoichiometric flexibility in plants and soil microbes. N allocation was found to respond to N shortage in CTL and increased salt concentrations in soil solution in DRY and DRW treatments.
C:N:P stoichiometry in soil microbes was found flexible during active plant growth, while that at the end of growth season turned to almost homeostatic ratio.
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