BRC Science Highlight
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Intra- and Inter-Annual Variability of Nitrification in the Rhizosphere of Field-Grown Bioenergy Sorghum

Background/objective

Biological nitrification inhibition (BNI) and plant-microbe competition for ammonium by sorghum might increase bioenergy feedstock production sustainability by reducing nitrate and nitrous oxide production. However, the influence of variable environmental, field, and plant growth conditions on BNI are not currently understood. Researchers report on the results of a two-year sorghum field trial that helps to address this knowledge gap.

Approach

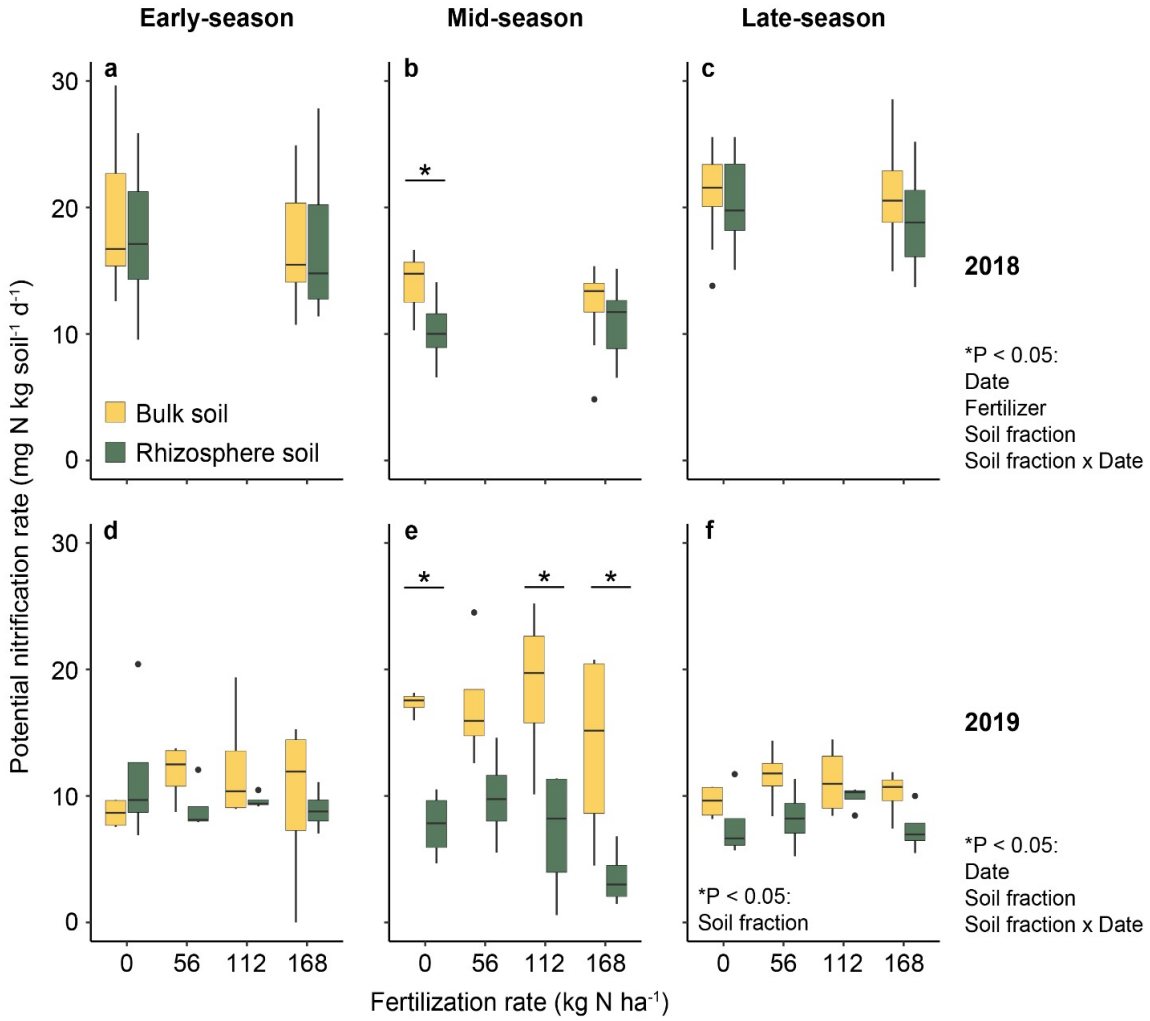
- Grew four energy sorghum phenotypes for two seasons under four fertilization rates at the Illinois Energy Farm in Urbana, Ill.
- Measured rhizosphere and microbial community dynamics at early-, mid- and late-season each year.

Results

- Across two growing seasons, sorghum rhizosphere nitrification was suppressed 20-58% during peak growth at mid-season.
- Plant phenology exerted substantial control over rhizosphere soil nitrification, with most suppression occurring when plants grew fastest during mid-season.
- Intra- and inter-annual variation in soil moisture and N availability also affected nitrification potential and suppression in rhizosphere soils.

Significance

This work suggests that plant phenology and environmental conditions should be considered when devising strategies to improve sorghum N sustainability.



Nitrification potential data from bulk and rhizosphere soils.

Burnham et al. 2022. **"Intra- and Inter-Annual Variability of Nitrification in the Rhizosphere of Field-Grown Bioenergy Sorghum."**
GCB Bioenergy. DOI:10.1111/gcbb.12917

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