Data from: Associative nitrogen fixation (ANF) in switchgrass (Panicum virgatum) across a nitrogen input gradient

Roley SS, Duncan DS, Liang D, Garoutte A, Jackson RD, Tiedje JM, Robertson GP

Date Published: June 6, 2018

DOI: https://doi.org/10.5061/dryad.60bn81v

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> Roley SS, Duncan DS, Liang D, Garoutte A, Jackson RD, Tiedje JM, Robertson GP (2018) Associative nitrogen fixation (ANF) in switchgrass (Panicum virgatum) across a nitrogen input gradient. PLOS ONE 13(6): e0197320. https://doi.org/10.1371/journal.pone.0197320

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> Roley SS, Duncan DS, Liang D, Garoutte A, Jackson RD, Tiedje JM, Robertson GP (2018) Data from: Associative nitrogen fixation (ANF) in switchgrass (Panicum virgatum) across a nitrogen input gradient. Dryad Digital Repository. https://doi.org/10.5061/dryad.60bn81v

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Keywords	associative nitrogen fixation, stable isotope, switchgrass
Scientific Names	Panicum virgatum
Spatial Coverage	US Midwest, Michigan, Wisconsin

Abstract

Associative N fixation (ANF), the process by which dinitrogen gas is converted to ammonia by bacteria in casual association with plants, has not been well-studied in temperate ecosystems. We examined the ANF potential of switchgrass (Panicum virgatum L.), a North American prairie grass whose productivity is often unresponsive to N fertilizer addition, via separate short-term 15N2 incubations of rhizosphere soils and excised roots four times during the growing season. Measurements occurred along N fertilization gradients at two sites with contrasting soil fertility (Wisconsin, USA Mollisols and Michigan, USA Alfisols). In general, we found that ANF potentials declined with long-term N addition, corresponding with increased soil N availability. Although we hypothesized that ANF potential would track plant N demand through the growing season, the highest root fixation rates occurred after plants senesced, suggesting that root diazotrophs exploit carbon (C) released during senescence, as C is translocated from aboveground tissues to roots for wintertime storage. Measured ANF potentials, coupled with mass balance calculations, suggest that ANF appears to be an important source of N to unfertilized switchgrass, and, by extension, to temperate grasslands in general.

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