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Precipitation Variability and Nitrogen Deposition Alter Root Distribution in a Tallgrass Prairie

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ABSTRACT

Climate change and increases in nitrogen deposition impact ecosystems globally. Projected atmospheric warming allows rain to fall in larger events with longer dry periods in between, increasing rainfall variability in many regions. Concurrently, the combustion of fossil fuels and the heavy use of nitrogen fertilizers continue to increase the availability of nitrogen globally. However, not much is known about how these global change factors, increased rainfall variability and nitrogen deposition, interact with each other to affect ecosystem functions, particularly belowground where root production contributes to soil carbon pools- an important component in regulating climate. In order to study these factors, we used partial rainout shelters and a nitrogen fertilizer in a tallgrass prairie dominated by *Schizachyrium scoparium*, a C4 grass, and *Solidago canadensis*, a rhizomatous C3 forb. We simulated increased rainfall variability by equalizing cumulative rainfall across sheltered and unsheltered plots every 30 days. Slow-release urea was applied after the first watering event to experimentally increase nitrogen availability. Root density was determined by taking two 70cm soil cores from each plot. We found increased precipitation variability shifted belowground biomass to shallower depths, while increasing nitrogen availability shifted belowground biomass deeper. To get more conclusive results, we are continuing to run this experiment with another set of soil cores in order to confirm the effects of increased rainfall variability and nitrogen levels on belowground biomass.

KEYWORDS

Climate change, precipitation variability, nitrogen deposition, root growth

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