Impacts of Small Rainfall Events in a Desert Grassland

Rainfall events in the northern Chihuahuan Desert are often small (<5 mm). However, these small events may significantly impact microbial activity and nutrient cycling even though they are insufficient to significantly increase plant water availability.

In a study published in Ecohydrology in 2015, researchers at the University of New Mexico experimentally manipulated small rainfall events in a mixed *Bouteloua eriopoda* and *Bouteloua gracilis* desert grassland (Figure 1). They removed all events <3.8 mm from treatment plots during a dry monsoon (2012) and then added a similar magnitude of small rainfall events in 3.8-mm increments to the same treatment plots during a subsequent wet monsoon (2013). Plant productivity, soil moisture, organic carbon, nitrogen supply, and extracellular enzyme activity for phosphate mobilization were monitored in both years. Soil nitrogen supply to PRS® probes during the monsoon period was determined by installing one cation and one anion probe in each experimental plot (20 total pairs) at the interface of vegetation and bare soil.

Figure 1. Desert grassland at the Long Term Ecological Research site at Sevilleta, New Mexico, USA. Photograph courtesy of Doug Moore.

Consistent with their hypothesis, aboveground productivity was unaffected by the removal of small events in 2012 while soil moisture, organic carbon, nitrogen supply and extracellular enzyme activity were all lower when small rainfall events were removed. In 2013, treatment plots had lower aboveground productivity, soil moisture and soil N supply than ambient plots. The researchers attribute legacy effects from the removal of small events in 2012 may have limited the ability of these plots to respond to higher, supplemented rainfall in 2013.

The authors concluded that a reduction in the frequency or effectiveness of small precipitation events due to a warming climate may intensify some deleterious effects of dry monsoons, and inhibit grassland recovery in subsequent years with higher rainfall.

Adapted from Petrie, M.D., S.L. Collins, and M.E. Litvak. 2015. The Ecological Role of Small Rainfall Events in a Desert Grassland. Ecohydrology 8:1614–1622. View the full article at http://onlinelibrary.wiley.com/doi/10.1002/eco.1614/full.