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Rainfall changes alter plant communities in Chihuahuan Desert grasslands

Timothy Ohlert

University of New Mexico, tohlert@unm.edu

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Rainfall changes alter plant communities in Chihuahuan Desert grasslands

Timothy Ohlert, Dr. Scott Collins

University of New Mexico - Department of Biology

Variations in New Mexico's climate have been detected over the past century and are expected to continue into the future. Some of these climatic changes result in more frequent instances of extreme drought events and alterations of monsoon seasonality, with monsoons being pushed later into the fall. Such changes could make our Chihuahuan Desert plant communities less productive, shift the abundance of the plant species, or have other destabilizing impacts.

Our experiment manipulated precipitation in two desert grassland communities at the Sevilleta National Wildlife Refuge near Socorro, NM. Some plots were subjected to an extreme drought event, receiving only 33% of annual precipitation for five years, and others were subjected to a change in the timing of monsoon precipitation, delaying rainfall to September and October.

We found that not only did plant production decrease but plant community assembly also changed in response to these treatments. The greatest production loss was in the extreme drought manipulation which also experienced a change in species diversity, an immediate diversity decrease that eventually recovered to levels above its initial condition. Plant diversity in the delayed monsoon treatments initially increased and eventually settled to near ambient levels, probably due to an initial propagation of bet-hedging species that had been accumulating in the seed bank. In both grasslands, the two treatments caused the dominate grasses to become subordinate which likely drove the lowered productivity and greater evenness of the plant abundances within communities of both treatments.