Ecosystem responses of grassland to drought

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Grassland, as one of the important ecosystems and an ecological barrier in China, is the green production base of animal husbandry. It plays a vital role in maintaining national ecological security, food security and even global ecological balance. However, climate change is expected to lead to more frequent extreme droughts in grassland regions. Yet, the

underlying mechanisms of ecosystem responses to drought are not well understood.

Recently, a research team from the Institute of Applied Ecology of the Chinese Academy of Sciences addressed this issue by experimentally removing 66% of growing season precipitation for four years in two grasslands of Inner Mongolia.

As expected, the researchers found that these two sites differed markedly in their aboveground net primary production (ANPP) responses to soil moisture, with greater sensitivity at the more arid site.

They used structural equation modeling to further examine the underlying community-based mechanisms for such differential ANPP responses to declining soil moisture. Surprisingly, the results indicated very little influence of species richness on ecosystem responses to drought. However, ANPP responses to drought were indirectly mediated by community functional composition (i.e. community-weighted traits and functional diversity) as well as soil nutrient availability.

Moreover, these indirect effects differed by site with stronger buffering influences observed at the site with greater ecosystem drought resistance.

Together, these results highlight the importance of understanding the unique indirect effects of drought on semi-arid plant communities and have broad impacts for improving models of ecosystem sensitivity to drought with climate change.

Relevant results were published online in the journal *Ecology* with the title "Plant traits and soil fertility mediate productivity losses under extreme drought in C3 grasslands."

More information: Wentao Luo et al, Plant traits and soil fertility

mediate productivity losses under extreme drought in C 3 grasslands, *Ecology* (2021). DOI: 10.1002/ecy.3465