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# Precipitation pattern affects nitrogen acquisition by *Stipa grandis* and microorganisms in a temperate steppe

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Growing evidence shows that the precipitation have already become more extreme and will be common in future climate regimes. Extreme precipitation pattern has been suggested to be an important factor to affect grassland ecosystems and could intensely influence productivity and species composition. The extreme precipitation may affect the ecosystem by changing N acquisition of plant and microbes. However, it still remains unclear how they respond to such altered extreme precipitation in nitrogen (N) acquisition over chemical and spatial scales.

The simulation of extreme precipitation pattern (the same amount of precipitation but with different frequencies) was performed during a growing season (July, August), and a short-term $^{15}N$ tracer experiment was conducted after precipitation simulation in a temperate steppe in Inner Mongolia to unravel plant–microbial acquisition of N for different N forms over soil depths.

*Stipa grandis* (dominant species in our study land) acquired more N with increasing frequency of extreme precipitation, while the amount of microbial N uptake showed little changes. Soil microbes outcompeted for N than *Stipa grandis*. The preference for N forms in *Stipa grandis* and microbes were different in low frequency of extreme precipitation, while they showed similar preference in high frequency of extreme precipitation. It indicates that the chemical niche between plant and microbes was overlapped and could compete intensively for chemical N niche in high frequency of extreme precipitation in the system.

These findings help us to understand the changes in N acquisition by plant and microbes, which provides a physical explanation for altered ecosystem function and composition resulted from extreme precipitation in a temperate steppe in Inner Mongolia.