Biogeochemical Responses to Fire Seasonality and Frequency in a Temperate Mixed-Grass Savanna: Storage and Dynamics of Soil Carbon and Nitrogen. (S07-boutton120448-Poster)

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Abstract:

Fire is used to manage vegetation in many ecosystems, but frequent or seasonal fires could alter soil organic C (SOC) and total N stores, with consequences for both ecosystem soil fertility and global biogeochemical cycles. We quantified effects of repeated, seasonal fires on SOC and total N in a clay-loam, mixed-grass/mesquite savanna. Unburned controls and 4 fire treatments differing in frequency and season of occurrence (summer vs. winter) were evaluated. Three winter fires in 5 years had no effect on SOC or total N. However, SOC (0-10 cm) increased from 1110 g C/m2 in controls to 1280-1550 g C/m2 in treatments that included summer fire, implying sequestration of 30-90 g C/m2/yr during the 5 yr study. Soil total N (0-10 cm) increased from 100 g N/m2 in controls to 125-140 g N/m2 in summer fire treatments, indicating accumulation of 5-8 g N/m2/yr. Lower soil d13C and d15N values in summer fire treatments suggest increases in SOC and total N may be related to shifts in the functional composition of the plant community. Fire and its season of occurrence can significantly alter ecosystem processes and the biogeochemistry of C and N in this mesquite savanna.

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