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Wind + a Spark = A Grassland Wildfire, Monitoring of a Native Grassland Burn

Grazinglands Research Laboratory, El Reno, Oklahoma May 2017

Rationale: Controlled burning in the Southern Plains is a common practice to manage non-native species, remove biomass, and help to keep rangeland clear for optimum forage growth. Prescribed burns are started, monitored, and stopped by man. An alternative to prescribed burns are wildfires that are started from lightening or some other spark that also remove vegetation from the landscape.

Burning also affects the soil nutrient cycling and has been noted to exacerbate the loss of carbon and nitrogen in the form of greenhouse gases. Monitoring of these soil nutrient elements has not been documented in perennial grassland wildfires of the Southern Plains.

On March 4, 2017, a grassland fire occurred when high winds caused an electrical fire that burned ~40 acres. Monitoring such a site in tandem with non-burned area allows researchers to better understand the effect of fire on the landscape. Assessing soil moisture, greenhouse gas flux, soil carbon and nitrogen, and soil microbial community over a designated time will describe specific changes to grassland soils which will help to better understand the impact of fire.

Knowledge of how fire, a common management practices of the Southern Plains' perennial cropping systems, alter soil nutrient cycling and greenhouse gas emissions will help to determine drivers in greenhouse gas emissions and establish sustainable management practices in the future to ensure agricultural resources.

Objective: The overall objective of this study was to monitor the effect of fire on soil C and N cycling in perennial grasslands of the Southern Plains. Additionally, we determined microbial community diversity of burned and unburned soils.

What we going to do: We evaluated burned and unburned field sites post burn in March 2017 for two weeks for changes in soil carbon and nitrogen cycling. This study was also recreated by taking burned and unburned soil samples to the laboratory. Both the field and laboratory studies were monitored under controlled temperature and moisture conditions at time zero, three, six, nine, 24, 48, 72, 96, to two weeks.

Treatments include:

1) Native Warm-Season Pasture Non-Burned
2) Native Warm-Season Pasture Burned

Soil Analysis at each time period:

Soil Water Content
Soil Inorganic Nitrogen- Ammonium and Nitrate Content
Total Nitrogen
Dissolved Organic Nitrogen
Microbial Biomass Nitrogen
Total Carbon
Dissolved Organic Carbon
Microbial Biomass Carbon
Microbial Fatty Acid Community Assessment

Greenhouse Gas Analysis at each time period:

Carbon Dioxide
Nitrous Oxide
Methane

Proposed Outcomes:

- Assess greenhouse gas flux given burning.
- Determine soil priming caused by burning.
- Determine how fire affects microbial community changes post application.

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