

# MEASURING N<sub>2</sub>O EMISSIONS FROM DRYLAND SORGHUM PRODUCTION USING GAS CHAMBER AND EDDY COVARIANCE FLUX METHODS

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## ABSTRACT

Nitrous oxide (N<sub>2</sub>O) emissions are not well quantified in the dryland production systems of the Great Plains. Lack of field-based data has led to the use of questionable assumptions in various life-cycle analyses when dryland grain production is a feedstock. A field-scale trial of 81 acres was established within a 160 acre production field of dryland grain sorghum in northwest Kansas in 2021. Grain sorghum was no-till seeded into wheat stubble. Grower practices for nitrogen management were utilized, with UAN streamed on the soil surface immediately following planting. Nitrous oxide fluxes were measured using two methods, one of which provided values at discrete times and the other providing a continuous dataset. To obtain the continuous measurement, an eddy covariance system, consisting of a closed-path gas analyzer and sonic anemometer were used to derive field-scale half-hourly N<sub>2</sub>O fluxes. In addition to the continuous monitoring instrumentation, soil gas chambers were installed at 8 locations in a perimeter around the eddy covariance instrumentation at an average distance of 252 ft. At a sampling event, chambers were sealed and a gas sample was extracted from the chamber headspace at 0, 20, 40, and 60 minutes post seal. Samples were collected at 24, 48, and 72 hours after N application and generally weekly thereafter. Gas sampling campaigns were conducted in the mid-morning hours. This presentation will present initial findings of this project as well as a comparison of estimates of N<sub>2</sub>O flux from the discrete and continuous measurement approaches.