

LAND USE EFFECTS ON GREENHOUSE GAS PRODUCTION IN MISSOURI RIVER FLOODPLAIN SOILS

Benjamin D. Moore

Peter P. Motavalli, Thesis Advisor

ABSTRACT

Soil-based greenhouse gases (GHG) are produced primarily through plant and microbial processes and are affected by soil properties. The lower Missouri River Floodplain (MRF) region encompasses different land use systems including agriculture, agroforestry and riparian forest. The goal of this study was to investigate the influences of lower MRF land use on the variations of soil GHG emissions.

For the laboratory incubation study intact soil surface cores were obtained from sites within the MRF near New Franklin, Missouri and incubated to determine the GHG flux rate. Cores were subjected to multiple soil water regime treatments. Lower MRF land uses and water regime had effects on CO₂ and N₂O cumulative emissions. Flooded (FLD) CH₄ efflux rates were significantly higher than under the OPT and FLX soil moisture regimes. Fertilized agriculture and agroforestry soils emitted the most N₂O among the land use and N treatments.

The in situ study component was comprised of three spatially intensive samplings through the 2011. Limited significant relationships were found between soil properties and GHG emissions. Interpolations of GHG flux rates allowed for the investigation of GHG spatial variation across each lower MRF land use.