

Various Fertilizer Sources and Cultivation Practices for Mitigation of Greenhouse Gas Emissions



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Objectives:

1. Evaluate the impact of turfgrass species, cultivation practice, and fertilizer source on the emissions of greenhouse gases from cool-season turfgrass.
2. Evaluate the impact of turfgrass species, cultivation practice, and fertilizer source on the year end mineralizable nitrogen from cool-season turfgrass.
3. Evaluate the impact of turfgrass species, cultivation practice, and fertilizer source on overall turfgrass quality.

An ongoing field study evaluating fertilizer source (Urea, Encapsulated Polyon, and Milorganite), turfgrass (Creeping bentgrass and Kentucky bluegrass), and site location (wet and dry locations in the topography) on greenhouse gas (CO_2 , CH_4 , N_2O) emissions and turfgrass quality was initiated on June 5, 2013 in Grand Forks, ND at the Lincoln Golf Course. Sampling occurred weekly throughout the summer. The final sampling date was October 26, 2013. At each sampling date gas samples were taken using a vented closed gas chamber that was placed over the plots for 40 minutes following the USDA ARS GRACEnet methods. Samples were taken from the same location throughout the summer as the anchors for the gas chambers were tamped into the ground flush with the soil surface at the beginning of the season (see picture below). To ensure a good seal, the tops of the gas chambers were also tapped in after they were placed over the anchors (see below). Gas samples were taken at 0, 20, and 40 minutes post closure of the chamber (see pictures below). This method allows gas concentrations to build up inside of the chamber, and a flux rate of the gases from the surface to be calculated based on the change in concentration over time. In addition, at each sampling date, we collected air temperature, soil temperature, soil moisture, turf grass quality and canopy greenness data. The turfgrass quality was assessed using the NDVI value as a measure of relative greenness



Greenhouse gas sample chambers were tamped into the ground flush with the soil surface. Gas samples were taken a 0, 20, and 40 minutes after the chambers were closed.

Summary

- Field Site was initiated June 5, 2013
- Weekly samples were taken June 5, 2013–October 26, 2013
- Variables measured on each sampling date: Flux of CO₂, CH₄, N₂O, soil temperature, soil moisture, air temperature, turfgrass quality, and canopy greenness.
- Preliminary results indicate some site location effects for CO₂ and N₂O, and a treatment effect for flux of CH₄.