Nitrous Oxide Emissions from Bermudagrass Turf Fertilized with Slow Release and Soluble Nitrogen Sources

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Nitrous oxide (N_2O) is an important greenhouse gas (GHG) and the majority of emissions in the USA are from agriculture. Most of this comes from the soil and is linked to soil management and nutrient use. Although most attention given this issue has been focused on production agriculture, an important component that is often overlooked relates to the contributions from turfgrass areas. One estimate indicates that there are about 40 to 50 million acres of urbanized land covered with turfgrasses (e.g., golf courses, lawns, parks, sport fields). Because turfgrasses often receive fertilizer N, these areas have the potential for significant contribution to overall N_2O emissions. One best management practice (BMP) that may help achieve the goal of reduced GHG emissions from turf is the use of controlled release N fertilizers. The objective of this work is to quantify N_2O emissions from bermudagrass turf fertilized with a conventional soluble N fertilizer (urea), a slow-release polymer coated N fertilizer, and an organic (manure) source of N.

Emissions of N_2O increased after application of each of the N fertilizer sources in 2007. Emissions from urea, however, were sometimes higher than either of the slow-release sources. In general, N_2O emissions returned to pre-fertilization levels among treatments after 7 to 10 days. Cumulative emissions of N_2O during the first year were statistically similar among N sources. However, numerically, emissions were highest from urea and lowest from the organic source. Emissions also tended to increase after irrigation or precipitation. The relationship between soil temperature and N_2O emissions was weaker than between soil moisture and emissions, although emissions were lower during winter when soils were colder. There were no significant correlations between N_2O emissions and soil ammonium and nitrate levels. The experiment was continued in the 2008 season, but the 2008 data are still being processed.

Strict interpretation of the first year data indicates that fertilizer source did not affect overall N_2O emissions from turfgrass. But, variability is high in this type of data collection and thus complicates statistical detection of differences among treatments. Additionally, emissions of N_2O from turfgrass are complex, and likely are affected partially by all factors including fertilizer type, soil moisture level, temperature, and N level. This study will not be continued beyond the 2008 season. *KS-37F*