



Other Sources of Greenhouse Gases in Agricultural Soils: Nitrous Oxide and Methane

Most of the focus on greenhouse gases (GHG) is on carbon dioxide (CO₂), but methane (CH₄) and nitrous oxide (N₂O) are even more powerful GHG. The main source of these GHG in the U.S. is agriculture, including from nitrogen (N) fertilizer, flooded agriculture, such as rice production, and animal wastes.

Nitrogen Fertilizer Management. Nitrogen (N) fertilizer is necessary for the food and energy security of this country, but it can also be a major source of N₂O emissions from agricultural soils if not managed properly. As more acreage goes into corn or biomass crops for ethanol or butanol production, N management will play an ever greater role in the overall global warming potential from agriculture. Nitrous oxide emissions from improper fertilizer management can also counteract the positive GHG mitigation effects of practices used for carbon sequestration. As a result, proper N management plays a crucial role in reducing GHG levels.

However, there is a serious lack of data available on agricultural emissions of these gases. Accurate emissions factors for agricultural sources of these GHG do not exist, and there are uncertainties regarding current methods to measuring their emission levels.

As a research-based consortium focused on the sustainability of the nation's soil resource, CASMGs has the expertise, critical mass, and rapid-response capability to:

- Develop field measurements and models of N emissions from agricultural lands under different cropping systems, including renewable energy crop production;
- Determine ways to increase fertilizer N use efficiency, establish alternative management systems for N, and a protocol for N₂O emissions reductions in future C markets;
- Document the effect of different animal waste management systems on methane emissions; and
- Develop total GHG accounting for agricultural lands and markets.

CASMGs FACTS: Nitrous Oxide and Methane

- Nitrous oxide (N₂O) is 310 times more potent than CO₂ as a GHG.
- Methane (CH₄) is 21 times more potent than CO₂ as a GHG.
- Much more must be known about agricultural N₂O and CH₄ air pollutant emission inventories, measurement and monitoring methodologies, modeling, and best management or production practices before we can hope to reduce these emissions.
- Improved N management will reduce N₂O emissions, improve N efficiency, improve water quality, and improve agricultural profitability.