

Article title	Climate-Smart Fertilizers: Pioneering Tools to Address an Overlooked Yet Disruptive Problem
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Abstract	<p>Nitrogen (N) fertilizers are essential for enhancing crop productivity. However, both production and soil application responses related to N fertilizers can lead to significant greenhouse gas (GHG) emissions. Conventional production methods use fossil fuels and emit 4 lbs of CO₂ per lb of N. Once applied, reactions in the soil can produce nitrous oxide (N₂O) that constitutes up to 6% of US GHG emissions. N₂O emissions are lower in absolute mass than CO₂, but their warming effect is 300 times greater over a century. Agriculture is responsible for 75% of global N₂O emissions, primarily due to N fertilizer use.</p> <p>Nitricity Inc. is committed to providing innovative solutions for reducing these environmental concerns. In 2022, Nitricity partnered with the International Fertilizer Development Center (IFDC) to implement a containerized production system and produce N fertilizer using air, water, and renewable energy (hydroelectric power) on-site in Muscle Shoals, AL. The fertilizer was used for experiments with two objectives: quantifying N₂O emissions from different fertilizer sources and assessing the effectiveness of continuous monitoring using the Picarro G2508 Gas Concentration Analyzer. Two soil types were fertilized with the equivalent of 200 kg N/ha from either Urea or Calcium Nitrate (CN) produced with Nitricity's technology and two different calcium sources. The results demonstrated that CN significantly reduced soil N₂O emissions compared to urea, regardless of the calcium source. The study also highlighted the efficacy of the Picarro G2508 Analyzer in reducing labor costs and continuously monitoring N₂O emissions.</p> <p>These findings emphasize the success of Nitricity's novel, electrified production and the need to explore alternative management practices to mitigate the environmental impact of N fertilizers. By embracing innovation and utilizing available tools, the industry can make substantial contributions to reducing GHG emissions and creating a more sustainable future.</p>
Publication date	2023-11-01
Citations	Celli, T., Smith, K., Fugice, J., Schwalbe, J., McEnaney, J., & Pinkowski, N. (2023) Climate-Smart Fertilizers: Pioneering Tools to Address an Overlooked Yet Disruptive Problem [Abstract]. ASA, CSSA, SSSA International Annual Meeting, St. Louis, MO. https://scisoc.confex.com/scisoc/2023am/meetingapp.cgi/Paper/149101
Article link	https://scisoc.confex.com/scisoc/2023am/meetingapp.cgi/Paper/149101