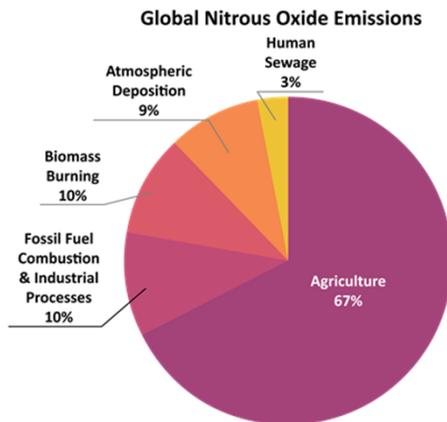
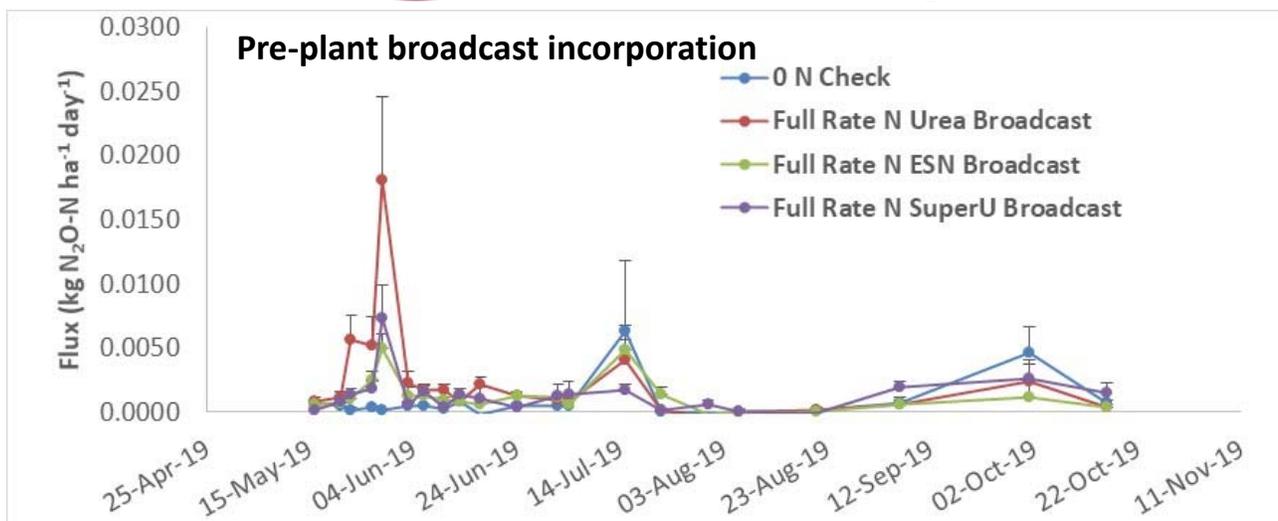


Station 7: Nitrous Oxide – It's a Gas

4R Nutrient Stewardship Self-Guided Tour



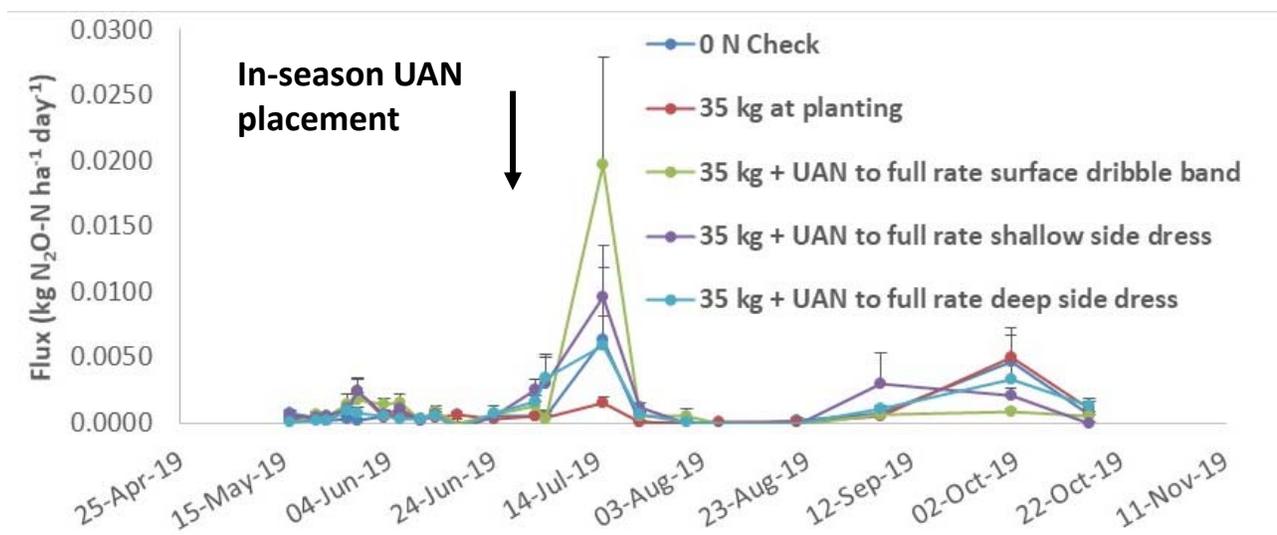
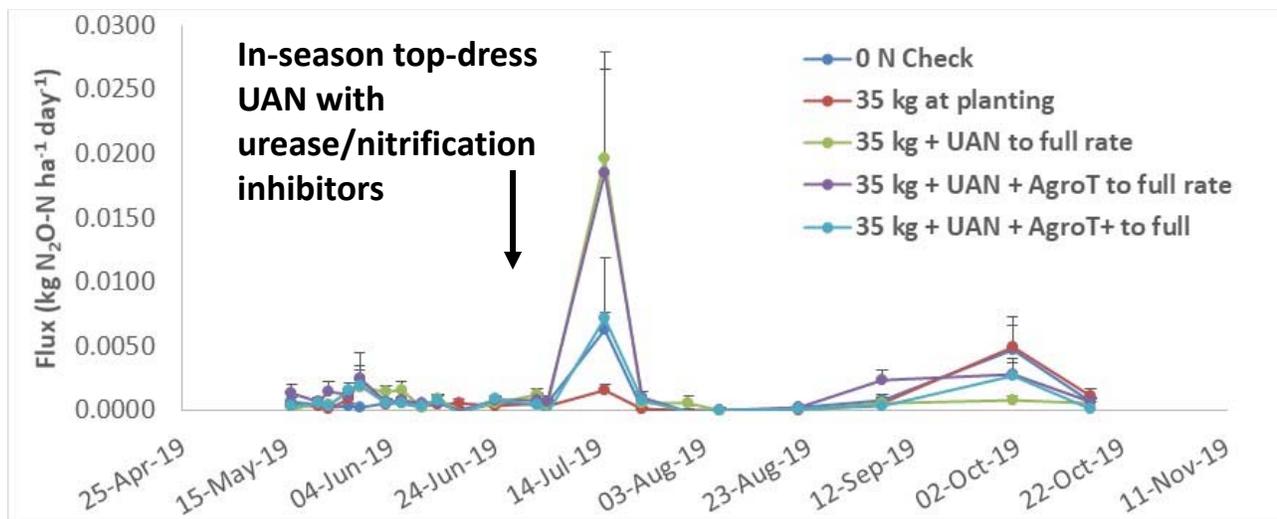
Static-vented chambers (white) for monitoring N_2O flux



- ✦ Nitrous oxide (N_2O) is a gas that traps heat in the atmosphere and also destroys ozone in the upper atmosphere.
- ✦ N_2O is released from soil during the cycling of nitrogen. Addition of fertilizers, livestock manures, and crop residues can lead to emissions. Emissions occur when nitrogen is nitrified to nitrate and when nitrate is denitrified.
- ✦ Agriculture is the dominant source of emissions, accounting for nearly 70% of emissions of the gas in Manitoba and globally.
- ✦ Emissions are an environmental more than agronomic issue. Only a few lbs/ac of N are lost as the gas.
- ✦ The 4R Nutrient Stewardship provides a sustainable solution for maintaining/increasing productivity while reducing N_2O emissions.
- ✦ The project tested combinations of integrated best management practices considering “4R” components in three groups of 1) Pre-plant broadcast incorporation of urea-based sources; 2) In-season top-dress UAN with urease/nitrification inhibitors; 3) In-season UAN placement through surface dribble or side-dress at varying depths.
- ✦ Preliminary results confirm the advantage in using enhanced efficiency fertilizer products (ESN and SuperU) in reducing N_2O emissions, compared to conventional urea when pre-plant broadcast-applied at the recommended rate (figure above) .

Station 7: N₂O flux

4R Nutrient Stewardship Self-Guided Tour



- ✦ The pattern of emission over the year differs between single N addition Pre- or At-plant (figure on previous page) and split application with in-season UAN top- or side-dressed (figures above). A peak in emissions near after planting is not apparent with split application; because of low N addition near planting.
- ✦ Instead, the majority of N₂O emissions happened after in-season application.
- ✦ Compared to UAN alone, AgroTain Plus but not AgroTain resulted in lower N₂O flux peaks, confirming the benefit of nitrification inhibitor but not urease inhibitor in mitigation of N₂O emissions from corn fields in MB.
- ✦ For the in-season UAN placement, surface dribble resulted in the highest N₂O flux rate. Side-dress significantly reduced N₂O flux with the effectiveness being more evident with deep application.
- ✦ These results suggest an advanced 4R management of using enhanced efficiency fertilizer, especially those with nitrification inhibitors, and deep side-dressing in-season UAN can effectively reduce N₂O emissions for corn production.