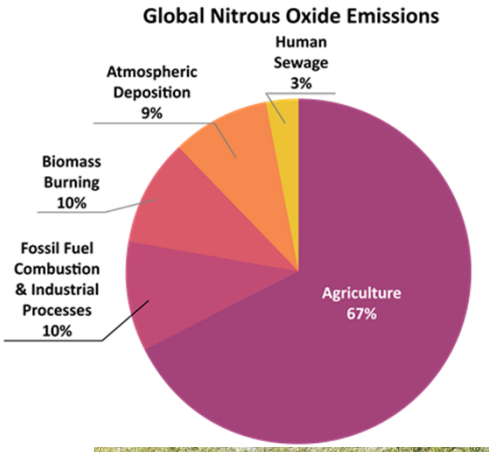
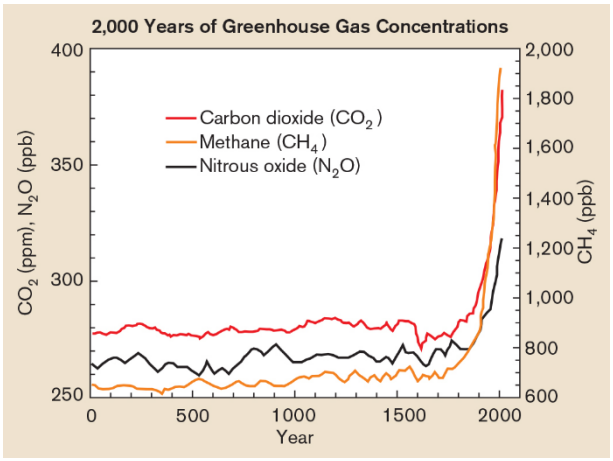
Station 4: Nitrous Oxide – It's a Gas
2020 MSSS Drop-in Tour — 4R Canola N Management





Increasing GHG in atmosphere

N_2O gas sampling

auto-evacuating system (CLICK HERE)

- 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 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 N_2O.
- The 4R Nutrient Stewardship provides a sustainable solution for maintaining/increasing productivity while reducing N_2O emissions.
- The project tested the "4R" combinations of integrated best management practices by answering three questions:
    1) Can SuperU broadcast or ESN/Urea blend shallow banded applications reduce N_2O emissions, compared to urea shallow banded?
    2) Can new inhibitor products (DMPSA and eNtrench) reduce emissions when urea is deep banded?
    3) Can urease and nitrification inhibitor products (AgroT and AgroT plus) reduce emissions for in-season UAN application?

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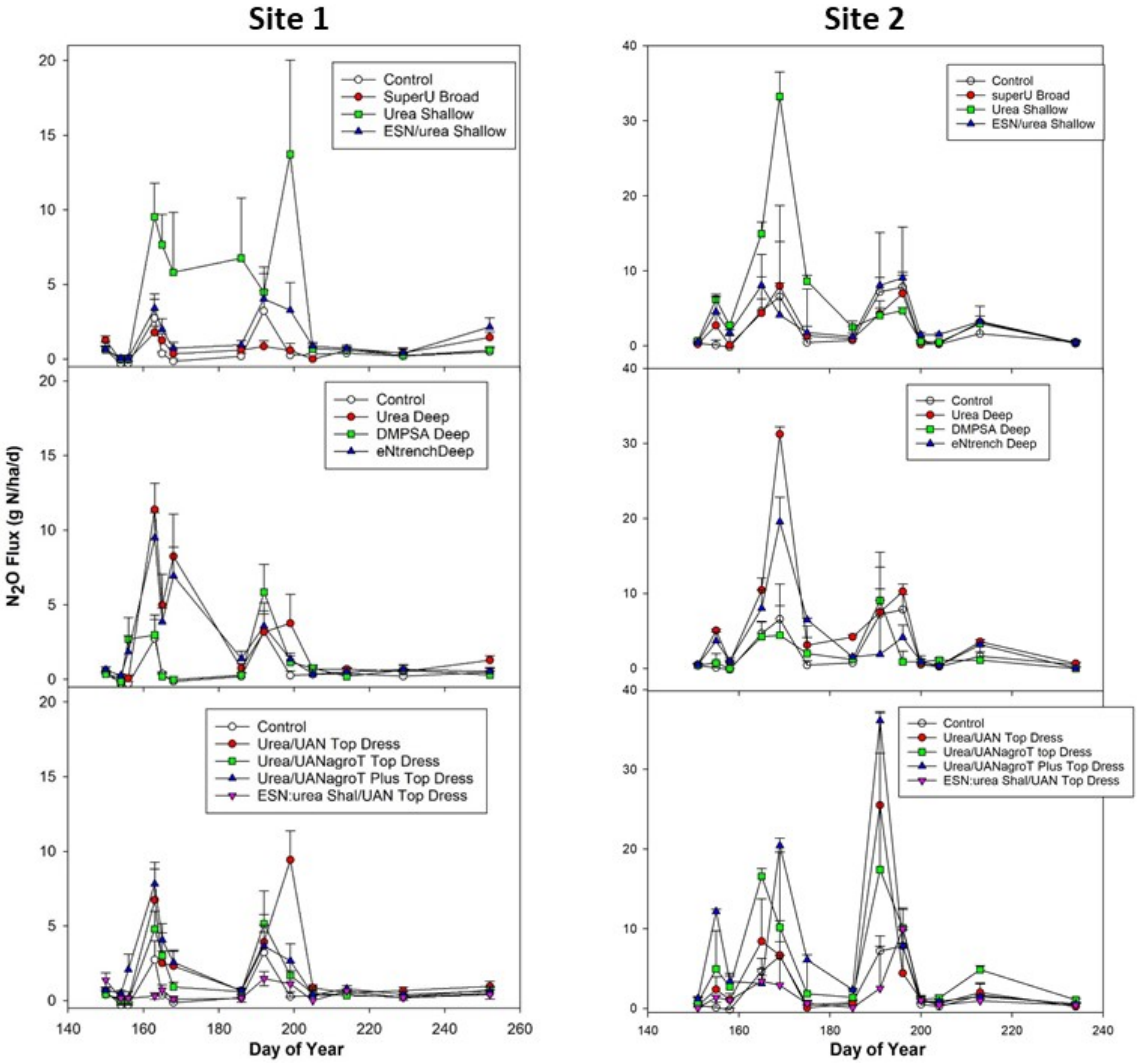
Fig.1 *N_2O flux rate as affected by selected 4R treatments at two canola sites in 2019.*



- N_2O fluxes were monitored at two sites near St. Claude in MB throughout the growing season of 2019. The selected treatments included the 0N check and among the spring 1×N treatments.
- Daily flux values are presented as three panels in the figures. The top panel has SuperU Broadcast Surface, urea shallow banded and ESN:urea shallow banded treatments. The middle panel shows the urea, DMPSA and eNtrench deep banded treatments. The bottom panel shows the split applications of UAN, UAN/AgroT or UAN/AgroT plus top dressed (streamed).
- At both sites, urea shallow banded produced the most N_2O emissions. SuperU surface broadcast and ESN:Urea blend shallow banded resulted in substantial reduction in N_2O emissions (top panels).
- When urea was deep banded, use of nitrification inhibitors DMPSA and eNtrench greatly reduced N_2O emissions, with the effectiveness being more evident for DMPSA (middle panels).
- At both sites, split application of UAN products results in an increase in emissions mid-season. At site 1, AgroT and AgroT plus products tended to reduce N_2O emissions than UAN only. At site 2, however, UAN with AgroT plus had the most N_2O emissions. Use of ESN:Urea blend with UAN top dress had the lowest N_2O flux rate (bottom panels).