



Fall Nitrification Inhibition of Anhydrous Ammonia in Manitoba

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INTRODUCTION

- Fall application of anhydrous ammonia (AA) (82-0-0) is common in MB but prone to losses by the time of next growing season
- Farmers apply higher fall nitrogen (N) rates than spring to compensate these N losses
- Applied N (AA) is converted by soil pH to ammonium (NH₄⁺) which is transformed to nitrate (NO₃⁻)
- N loss is directly proportional to NO₃⁻ conc. within the soil

OBJECTIVES

- Do nitrification inhibitors (NIs) with fall-applied AA can slow down the conversion of NH₄⁺ to NO₃⁻ (nitrification)
- Nitrification inhibitors may prevent N losses and cut the higher fall N rates requirements

FIELD SETUP

- A trial was setup on a commercial field at Silverwinds Farms using a RCBD with five treatments and four replicate blocks
- Nitrogen (82-0-0) was applied on September 30, 2020, at a reduced rate of 110 lb N ac⁻¹ with Centuro® (@ 21 L metric tonne⁻¹ N), N-Serve® (@ 0.95 L ac⁻¹), and without any NIs (NH₃ 110N). While the treatments without N addition (Control) and with full N rate 140 lb N ac⁻¹ (NH₃ 140N) were included
- Soil (0-12" on band rows) was sampled during late fall (Nov 7, 2020), early spring (April, 27) and late spring (May 12) for the year 2021
- Soil samples were extracted for NH₄⁺ and NO₃⁻ conc.
- Results reported in mg kg⁻¹ dry soil

RESULTS

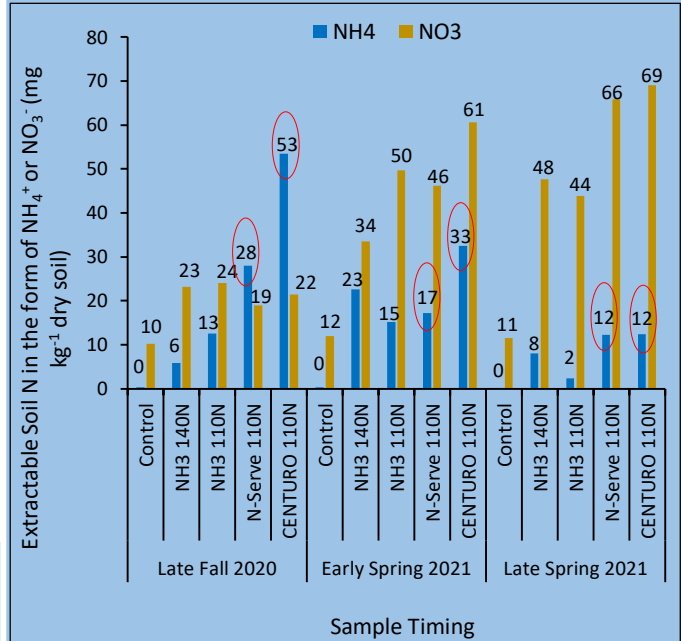


Fig. 1 Use of nitrification inhibitors N-Serve and CENTURO showing more NH₄⁺ persistence (red oval values) and inhibiting NH₄⁺ conversion to NO₃⁻ from late fall to late spring compared to the treatments without nitrification inhibitors

REFERENCES

Singh, G., and Nelson, K. A. (2019). Pronitridine and nitrpyrin with anhydrous ammonia for corn. *J. Agric. Sci.*, 11, 13-24. Tenuta et al. 2016. Lower nitrous oxide emissions from anhydrous ammonia application prior to soil freezing in late fall than spring pre-plant application. *J. Environ. Qual.* 45 (4): 1133-43.z

RESULTS CONTINUED

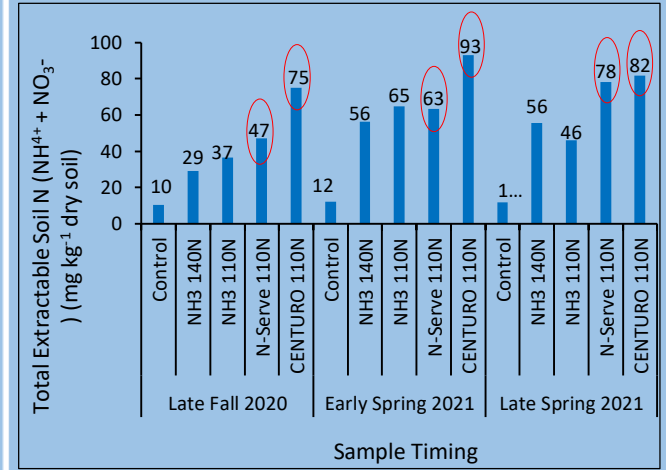


Fig. 2 Use of nitrification inhibitors N-Serve and CENTURO showing more persistence of total extractable soil N (NH₄⁺ + NO₃⁻) (red oval values) from late fall to late spring compared to the treatments without nitrification inhibitors

CONCLUSIONS

- Use of nitrification inhibitors overall allowed greater NH₄⁺ persistence
- Nitrification inhibitors allowed more inorganic N persistence
- CENTURO tended to show better inhibition than N-Serve

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