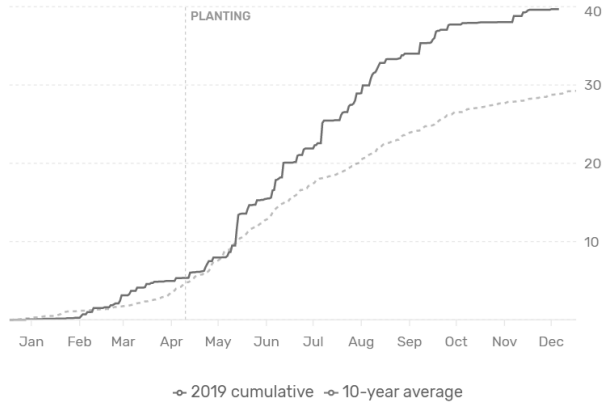
Impact of N-Serve® with Anhydrous Ammonia Application

Study ID: 0718185201901
County: York
Soil Type: Hastings silt loam, 0-1% slopes; Uly-Hobbs silt loams, 11-30% slopes
Planting Date: 4/24/19
Harvest Date: 10/22/19
Seeding Rate: 32,000
Row Spacing (in): 30
Variety: Pioneer® P1563AM™
Reps: 7
Previous Crop: Soybean
Tillage: No-Till
Herbicides: ***Pre:*** 2 qt/ac Medal® II ATZ and 5 oz/ac Explorer™ on 4/23/19
Seed Treatment: None
Foliar Insecticides: 6.4 oz/ac Tundra® EC on 8/4/19
Foliar Fungicides: 8 oz/ac Delaro® on 8/4/19

Fertilizer: 180 lb/ac N as spring applied anhydrous ammonia on 4/10/19; 5 gal/ac 10-34-0 in-furrow 4/23/19
Irrigation: Pivot, Total: 1"
Rainfall (in):



Introduction: N-Serve® by Corteva Agriscience™, is a product with known efficacy for inhibiting nitrification (product information is provided at right). The chemical compound nitrapyrin in N-Serve® temporarily inhibits populations of the bacteria that convert ammonium to nitrite (*Nitrosomonas*) and nitrite to nitrate (*Nitrobacter*). These compounds protect against both denitrification and leaching by retaining fertilizer N in the ammonium form. Ammonium (NH_4^+) is a positively charged ion (cation) that can be held on negatively charged exchange sites in soils (such as in clays and organic matter); in comparison, nitrate (NO_3^-), which is negatively charged, can be converted to nitrous oxide (N_2O) or nitrogen gas (N_2) in waterlogged conditions, or can leach below the root zone with rain in well drained soils. You can learn more about nitrogen inhibitors at https://cropwatch.unl.edu/2019/nitrogen-inhibitors-improved-fertilizer-use-efficiency.

CORTEVA™ agriscience

N-Serve® 24
Optinyte™ technology
NITROGEN STABILIZER

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Use to delay nitrification of ammoniacal and urea nitrogen fertilizer compositions in the soil by controlling the nitrification process.

Active Ingredients:
nitrapyrin: 2-chloro-6-(trichloromethyl) pyridine..... 22.2%
Other Ingredients..... 77.8%
Total..... 100.0%

Contains petroleum distillates
Contains 2 lb of active ingredients per gallon.

Product information from: https://s3-us-west-1.amazonaws.com/agrian-cg-fs1-production/pdfs/N-Serve_24_Label1d.pdf

The purpose of this study was to evaluate the impact of N-Serve® applied with anhydrous ammonia on crop yield and soil ammonium and nitrate. Anhydrous ammonia was applied at a rate of 180 lb N/ac on April 10, 2019 on ridge-tilled ground following a previous crop of soybeans. The study compared 180 lb N/ac with no inhibitor versus 180 lb N/ac with 1 qt/ac N-Serve® (recommended rate). Soil samples were taken on June 17 in V6-V7 corn. Corn was planted 5” off the anhydrous band and soil samples were collected 2" from the anhydrous band at 1', 2', and 3' depths in both the N-Serve® treatment and check in three replications of the study. Soil samples were analyzed for ammonium-N and nitrate-N.

Results:

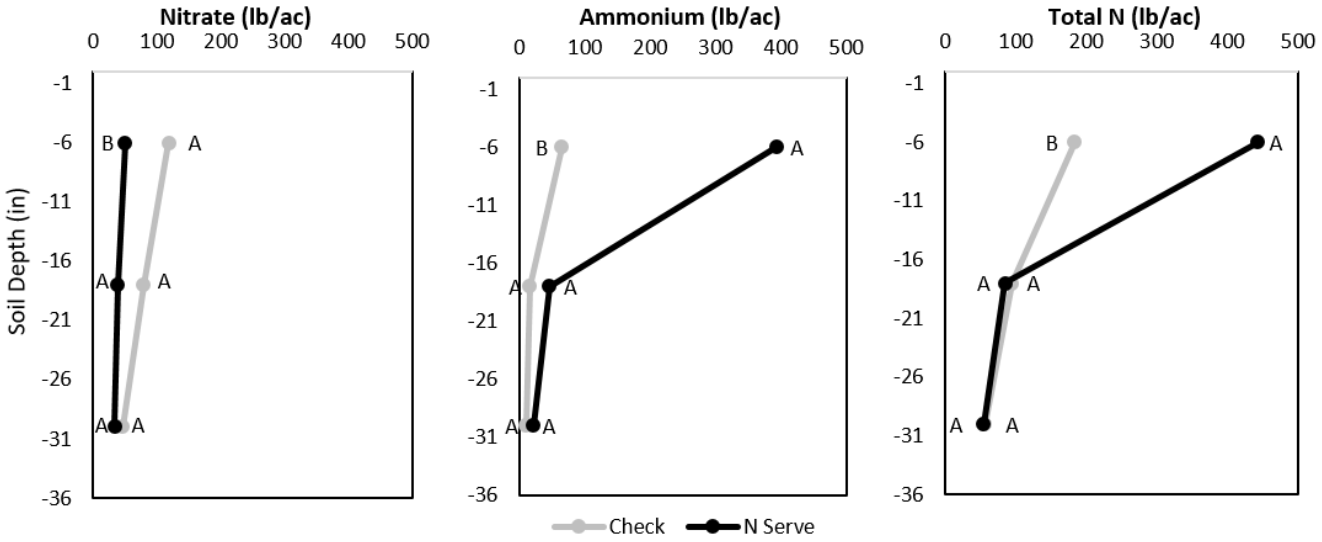

Figure 1. Soil ammonium-N and nitrate-N for check (180 lb N/ac anhydrous ammonia with no inhibitor) and N-Serve (180 lb N/ac anhydrous ammonia with 1 qt/ac N-Serve inhibitor) treatments on June 17 at 1', 2', and 3' depths. Within a sampling depth, points with the same letter are not statistically different at the alpha=0.1 level.

	Stand Count (plants/ac)	Stalk Rot (%)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	32,500 A*	13.21 A	17.9 A	250 A	957.74 A
N-Serve®	31,750 A	7.14 A	18.0 A	251 A	949.65 B
P-Value	0.182	0.190	0.436	0.370	0.036

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre adjusted to 15.5% moisture.
‡Marginal net return based on $3.83/bu corn and $11/ac ($47.95/gal) for N-Serve.

Summary:

- Soil samples in the top foot showed greater ammonium concentration where N-Serve® was used and lower nitrate concentration (Figure 1). This indicates that N-Serve® was slowing the conversion of ammonium to nitrate at the time of soil sampling (9 weeks after application). Deeper sampling depths did not show differences between the treatments.
- There were no differences in stand counts, stalk rot, grain moisture, or yield. Marginal net return was significantly lower for the N-Serve® treatment as additional product cost were not offset by an increase in yield.
- Agronomic benefits for a nitrification inhibitor may not be realized every year as rainfall dictates whether nitrogen will be leached, volatilized, or denitrified. This study will be conducted again in 2020.

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