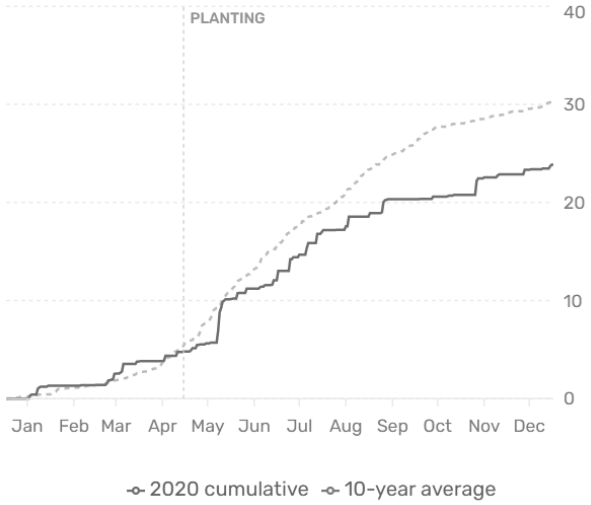
Impact of Inhibitors with UAN Application

Study ID: 1067185202001
County: York
Soil Type: Hastings silt loam
Planting Date: 4/29/20
Harvest Date: 10/20/20
Seeding Rate: 32,500
Row Spacing (in): 36
Hybrid: DEKALB® DKC7027
Reps: 6
Previous Crop: Corn
Tillage: Ridge-Till
Herbicides: ***Post:*** 84 oz/ac Stalwart® 3W on 5/11/20
Seed Treatment: None
Foliar Insecticides: None
Foliar Fungicides: None

Irrigation: Pivot, Total: 6"
Rainfall (in):



Introduction: The goal of this study was to evaluate various products applied with UAN to increase nitrogen availability and decrease nitrogen loss to the environment. Three different products were evaluated as well as an untreated check.

Check: 44 gal/ac UAN applied in a band on April 1, 2020

ATS: 44 gal/ac UAN with 4.4 gal/ac ATS (ATS contributed 12.7 lb/ac S and 5.8 lb/ac N). ATS has been shown to be a nitrification and urease inhibitor (Goos, 1985).

Biovante™: 44 gal/ac UAN with 21 oz/ac BioRed™ and 0.8 oz/gal Assist™. BioRed™ is a microbial product that claims to improve carbon cycling, nitrogen cycling, and mineralization. It also claims to hold, convert, stabilize, and increase nitrogen in soil. Assist™ is fulvic and humic acid derived from mushroom compost said to help catalyze enzyme reactions and naturally extend the life of nitrogen due to higher amounts of caboxyl groups in fulvic acid.

Instinct® II: 44 gal/ac UAN with 37 oz/ac, Instinct® II, is a nitrapyrin inhibitor by Corteva Agriscience™ with known efficacy in inhibiting nitrification.

Soil samples were taken for ammonium-N and nitrate-N. The first set of samples was taken on May 12, 2020, to a 1' depth. A second set of soil samples was taken on June 8, 2020, to 1', 2', and 3' sample depths. Samples were collected half from the fertilizer band and half from outside of the streamed band. Ear leaf tissue samples were collected at V14 on July 13, 2020, and analyzed for N%. Stand count, stalk quality, yield, and net return were evaluated. A wind storm on July 9 resulted in 37% green snap.

Results:

	- May 12 Soil Sample -			---------- June 11 Soil Sample ----------								
	1'			1'			2'			3'		
	NH_4-N	NO_3-N	Total	NH_4-N	NO_3-N	Total	NH_4-N	NO_3-N	Total	NH_4-N	NO_3-N	Total
	----------lb/ac----------											
Check	176.4 A*	147.3 A	323.7 A	86.4 A	187.3 A	273.7 A	14.4 A	139.0 A	153.4 A	18 A	69.7 AB	87.7 AB
ATS	150.0 A	174.3 A	324.3 A	133.2 A	237.7 A	370.9 A	10.8 A	146.7 A	157.5 A	21.6 A	86.3 AB	107.9 AB
Biovante™	120.0 A	164.3 A	284.3 A	67.2 A	198.0 A	265.2 A	28.8 A	146.0 A	174.8 A	28.8 A	92.7 A	121.5 A
Instinct® II	96.0 A	165.7 A	261.7 A	82.8 A	202.7 A	285.5 A	15.6 A	138.0 A	153.6 A	14.4 A	62 B	76.4 B
P-Value	0.272	0.694	0.661	0.629	0.727	0.582	0.232	0.980	0.881	0.185	0.07	0.075

*Values with the same letter are not significantly different at a 90% confidence level.

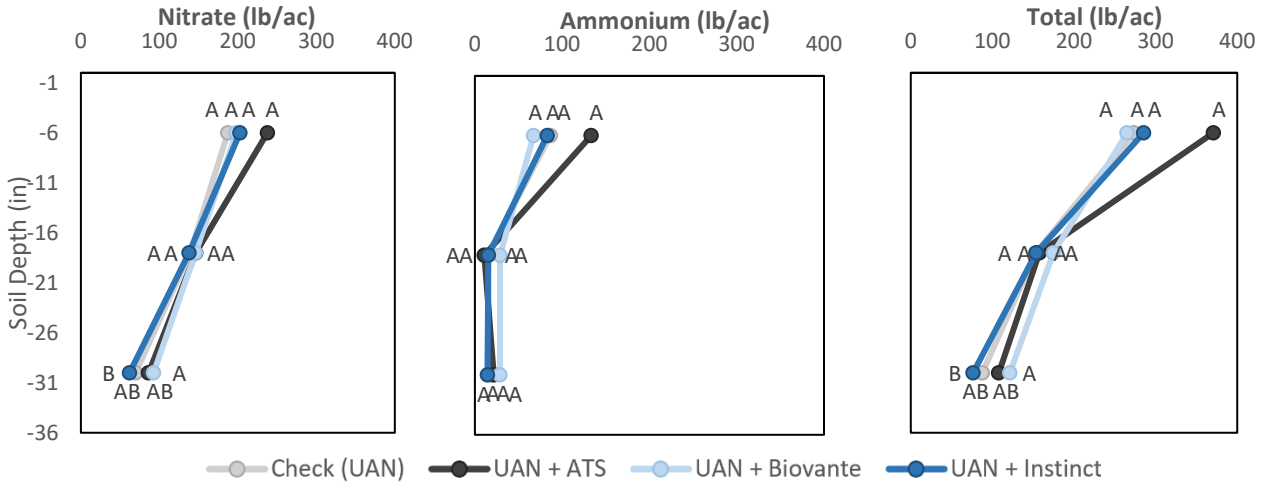


Figure 1. June 8 soil samples at 1', 2', and 3' depths for ammonium (lb/ac), nitrate (lb/ac), and total N (lb/ac) for the check and inhibitor products.

	Stand Count (plants/ac)	Stalk Rot (%)	Green snap (%)	V14 Foliar N (%)†	Moisture (%)	Yield (bu/ac)††	Marginal Net Return‡ ($/ac)
Check	28,875 A*	2.50 A	15 A	2.99	18.2 A	209 B	734.76 AB
ATS	25,500 A	0.00 A	23 A	3.21	18.3 A	215 A	745.62 A
Biovante™	26,125 A	0.00 A	21 A	2.97	18.2 A	212 AB	725.64 B
Instinct® II	28,750 A	0.63 A	16 A	3.13	18.2 A	212 AB	730.65 AB
P-Value	0.105	0.524	0.448	N/A	0.635	0.104	0.064

*Values with the same letter are not significantly different at a 90% confidence level.
†Samples were submitted to Midwest Laboratories. Midwest Laboratories' normal level for %N in tissue sample is 3.4; therefore, all the samples were considered low or sufficient-low. Ward Laboratories' sufficiency level is 2.71; therefore, by Ward Laboratories' standard, all foliar N tissue samples are sufficient.
††Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.51/bu corn, $7.86/ac for ATS, $17.31/ac for Biovante™ BioRed™ and Assist™, and $12.30/ac for Instinct® II.

Summary:

- The use of the ATS, Biovante™, and Instinct® II did not impact soil nitrate or ammonium at the 1' and 2' depths. At the 3' depth, Biovante™ had higher nitrate concentrations than the Instinct® II treatment; however, neither Instinct® II nor Biovante™ had a statistically different nitrate concentration than the check.
- There were no differences in stand count, stalk rot, or green snap between the treatments evaluated.
- Yield was higher for the ATS treatment than for the check. Biovante™ and Instinct® II did not result in any yield differences compared to the check.
- Net return was higher for the ATS treatment than for the Biovante™ treatment.

Goos, R. J. 1985. Identification of Ammonium Thiosulfate as a Nitrification and Urease Inhibitor. Soil Science Society of America Journal 49:232-235

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