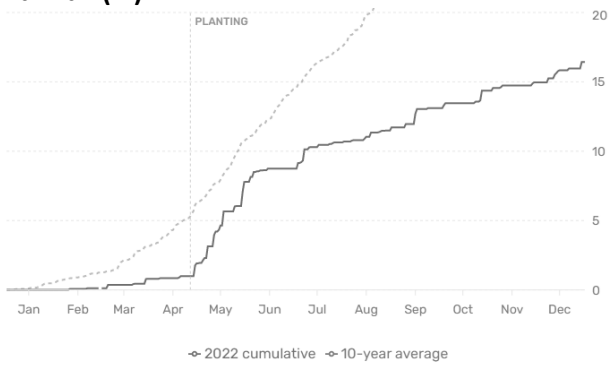
Impact of CENTURO® Inhibitor with In-season UAN Application

Study ID: 1256139202202
County: Pierce
Soil Type: Boelus loamy fine sand 2-6% slopes; Bazile soils 1-6% slopes; Hord silt loam 0-2% slopes, rarely flooded; Loretto loam 2-6% slopes
Planting Date: 4/26/22
Harvest Date: 10/17-10/18/22
Seeding Rate: 34,000 (irrigated) & 24,000 (dryland)
Row Spacing (in): 30
Hybrid: Pioneer® P1185Q™
Reps: 8
Previous Crop: Corn
Tillage: Disked 4/1/22 and field finish 4/25/22
Herbicides: ***Pre:*** 1.5 qt/ac Keystone® Lite on 4/28/22 ***Post:*** 4 oz/ac Realm® Q, 8 oz/ac atrazine, and 25 oz/ac Roundup PowerMAX® 3 on 6/8/22

Seed Treatment: Qrome®
Foliar Fungicides: 6.8 oz/ac Aproach® Prima and 4 oz/ac Sniper® applied through pivot on 7/15/22
Irrigation: Pivot, Total: 15"
Rainfall (in):



Soil Tests (0-6" and 6-12"), May 11, 2022:

Location	Depth (in)	Sand (%)	Silt (%)	Clay (%)	OM (%)	CEC	pH	P (ppm)	K (ppm)	Ca (ppm)	Mg (ppm)	NO3-N	Texture
West	0-6	74	19	7	1.5	9.4	6.1	22	120	1296	161	9.6	Sandy loam
	6-12	60	30	10	1.6	11.2	6.3	7	41	1601	224	8.5	Sandy loam
Middle	0-6	86	8	6	1.7	7	5.8	158	231	867	96	7.2	Loamy sand
	6-12	82	12	6	1.1	8.8	5.5	116	135	1046	115	6.8	Loamy sand
East	0-6	82	12	6	1.5	8.2	5.7	43	128	1054	114	9.5	Loamy sand
	6-12	82	11	7	1.2	10.1	5.4	17	55	1201	130	7.6	Loamy sand

Introduction: CENTURO™, by Koch Agronomic Services LLC, has known efficacy for inhibiting nitrification. The active ingredient in CENTURO is the chemical compound pronitridine. This product 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.

The goal of this study was to evaluate the site-specific effect of inhibitors on yield, available soil nitrate and ammonium, and nitrate-nitrogen (NO_3-N) concentration in soil water. The whole field received N fertilizer from: variable rate MAP applied in the spring (20 lb N/ac) and 35 lb N/ac as 32% UAN on April 26 at planting. The inhibitor treatments were applied on June 2 with UAN and thiosulfate, which resulted in 96 lb N/ac being applied. The June 2nd sidedress application was made with strips that contained CENTURO™ and strips with no inhibitor. Following the sidedress application, the field received five fertigation events: 17 lb N/ac as 32% UAN and thiosulfate blend on June 15, June 29, and July 6; and 18 lb N/ac as 32% UAN on July 15 and July 25. The total N application over the growing season was 238 lb N/ac.

Crop yield, soil nitrate, soil ammonium, and NO3-N concentration in soil water were measured. Water samples from lysimeters were taken for nitrate-N on eight dates, starting from June 21, 2022. Lysimeters were installed at 4 feet depth in three contrasting zones. Soil samples were collected at 1 foot along the band and across the band (6 cores for each in the band and out of band with 5 inches from each core).

Results:

	Yield (bu/ac)†	lb N/bu grain	Partial Profit‡ ($/ac)
Check	261 A	0.91 A*	1,580 A
Centuro™	260 A	0.92 A	1,563 B
P-Value	0.347	0.354	0.048

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $6.57/bu corn, $0.56/lb N fertilizer, and $10.50/acre for Centuro®.

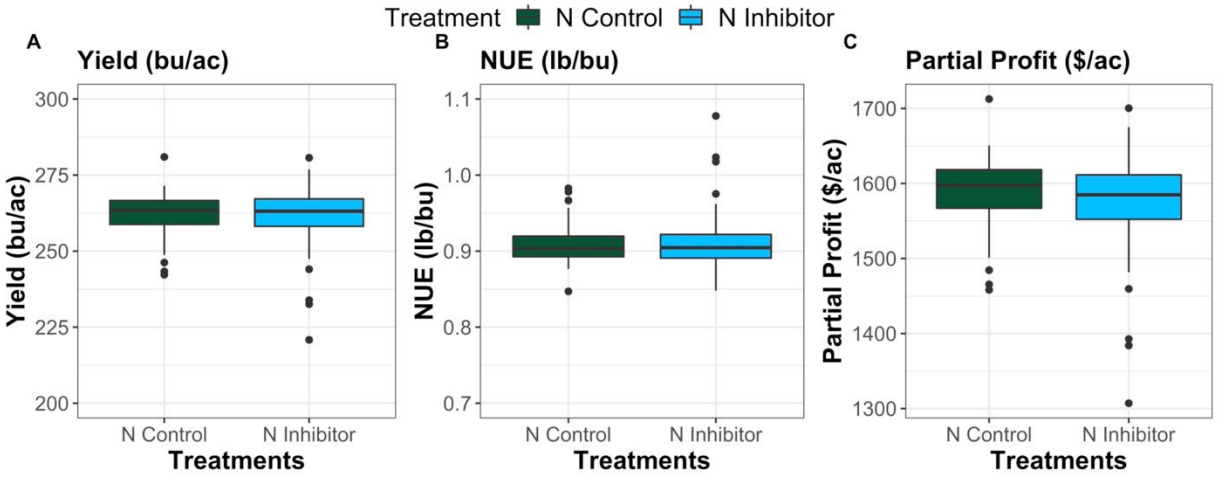


Figure 1. Box plots for grain yield (A), nitrogen use efficiency (B), and partial profit (C) by treatment. Treatments are no inhibitor control (green) and Centuro® nitrification inhibitor (blue).

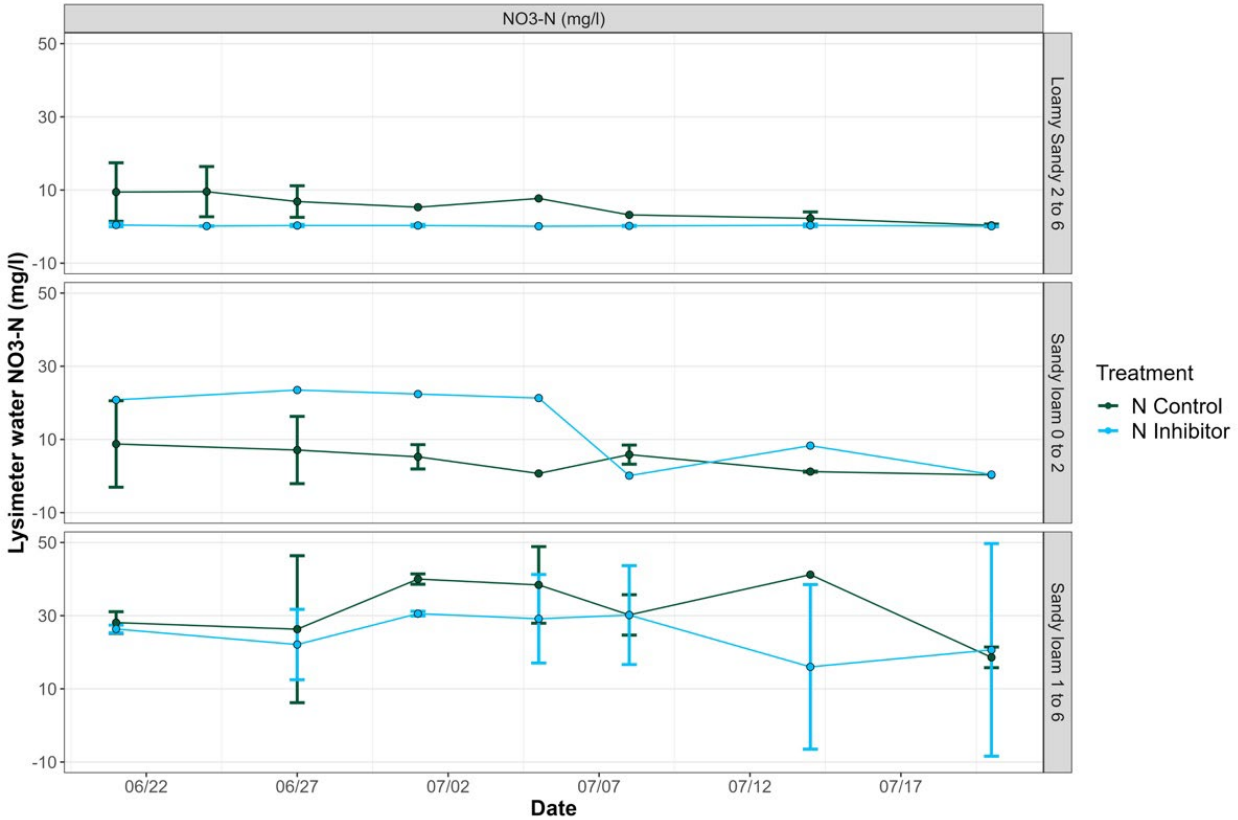


Figure 2. Lysimeter water (NO_3-N) by soil texture and sampling dates. Treatments are no inhibitor control (green) and Centuro® nitrification inhibitor (blue). Points indicate the average NO_3-N concentrations with standard error bars. Lines indicate the trend of NO_3-N concentrations over time.

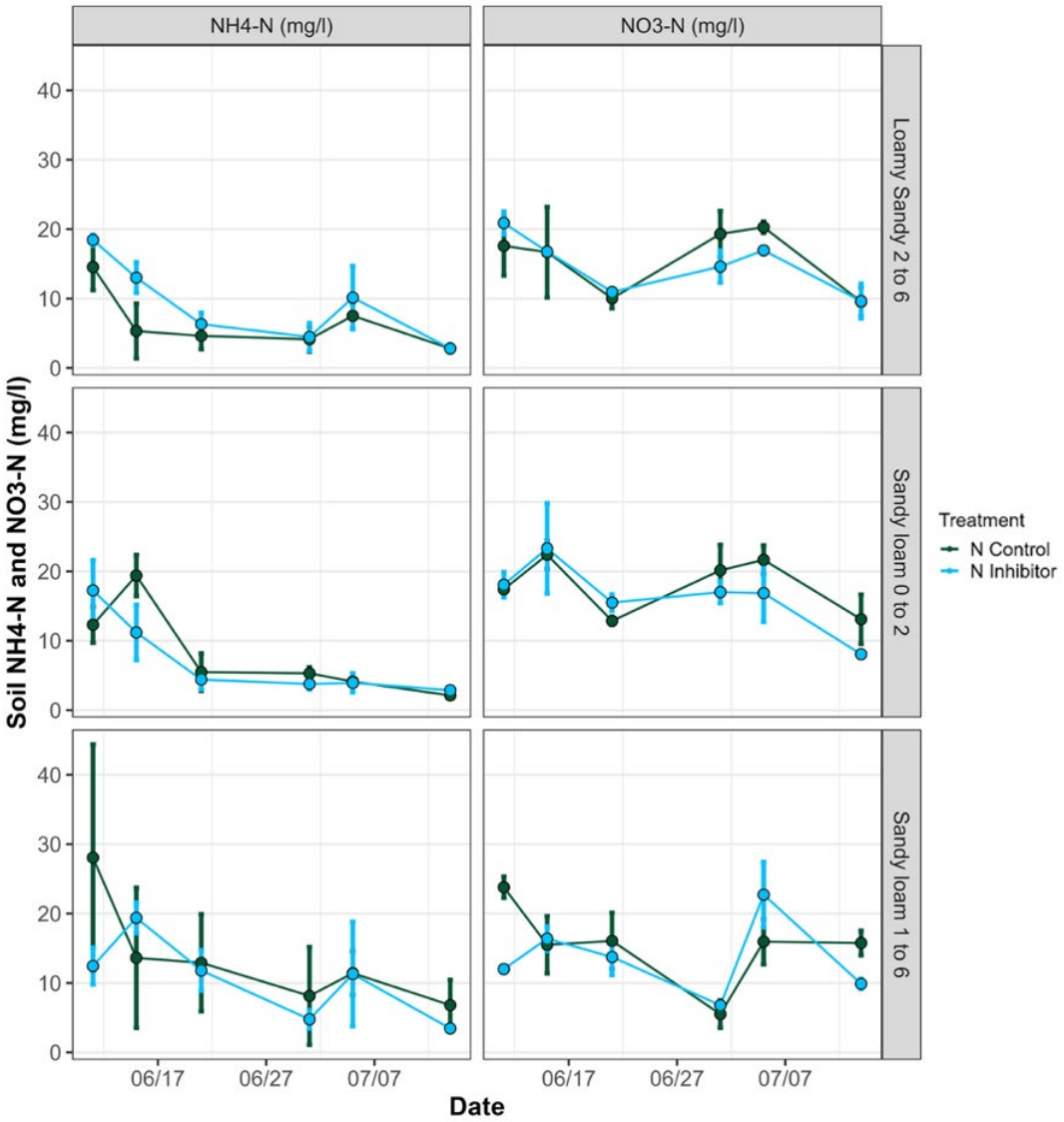


Figure 3. Soil nitrate-nitrogen (NO_3-N) and ammonium nitrogen (NH_4-N) by soil texture and sampling dates. Treatments are no inhibitor control (green) and Centuro® nitrification inhibitor (blue). Points indicate the average soil NO_3-N and NH_4 concentrations with standard error bars and the lines indicate the trend of soil NO_3-N and NH_4-N concentrations over time.

Summary:

- On a whole-field basis, the use of the inhibitor did not improve yield or nitrogen use efficiency (Figure 1). Further analysis will examine the response of N inhibitor in contrasting zones.
- Net return was $16/ac lower for the inhibitor treatment due to the increased input costs for the inhibitor product.
- There was no treatment effect on soil lysimeter water nitrate collected at 4 feet depth (Figure 2). Lower than normal precipitation at the site may have reduced the likelihood of nitrate leaching.
- Soil nitrate and ammonium concentration were not statistically different between treatments (Figure 3).

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