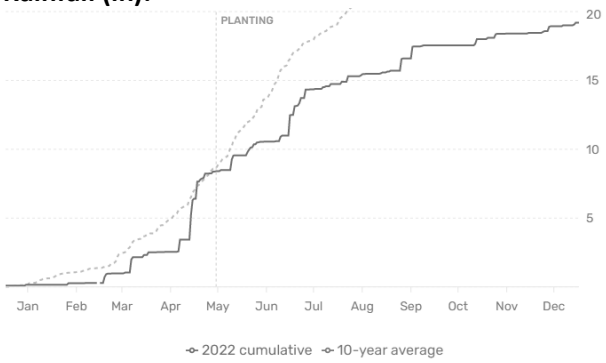
Impact of Redstar™ Starguard Inhibitor with In-season UAN/ATS Application

Study ID: 0433141202201
County: Platte
Soil Type: Alcester silty clay loam 2-6% slopes; Geary silty clay loam 7-11% slopes, eroded
Planting Date: 5/14/22
Harvest Date: 10/13/22
Seeding Rate: 33,000
Row Spacing (in): 30
Hybrid: DEKALB®
Reps: 4
Previous Crop: Soybean
Tillage: No-till
Herbicides: ***Pre:*** 8 oz/ac dicamba, 2 qt/ac Degree Xtra®, and 2 oz/ac Balance® Flexx applied as burndown on 5/20/22 ***Post:*** 32 oz/ac Roundup®, 3 oz/ac Laudis®, and 1.5 pt/ac Warrant® on 6/17/22
Seed Treatment: Standard

Foliar Fungicides: 8 oz/ac Delaro® Complete applied aerially on 8/1/22
Irrigation: Pivot, Total: 13"
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)	NO_3-N	Texture	Slope (%)
North	0-6	50	37	12	2.8	13.8	6.3	25	292	1859	280	7.7	Loam	7 to 11
	6-12	42	43	14	2.4	13	6.1	14	120	1709	277	12	Loam	
South	0-6	36	48	16	3.1	15.9	6.1	37	283	2053	228	7.9	Loam	2 to 6
	6-12	36	46	18	2.8	21.5	5.8	12	138	2542	543	8.3	Loam	

Introduction: Starguard is a nitrogen stabilizer and nitrification inhibitor. It is a mix of dicyandiamide (DCD) and N-(n-butyl) thiophosphoric triamide (NBPT). It is 20% by weight NBPT and 20% by weight DCD. The goal of this study was to evaluate the site-specific effect of inhibitors on corn yield, profit, nitrogen efficiency, available soil nitrate and ammonium, and nitrate-nitrogen (NO_3-N) concentration in soil water. A total of 150 lb N/ac and 12 lb S/ac were applied as 32% UAN and ammonium thiosulfate (ATS) blend on May 20, 2022 in-season with and without Redstar™ Starguard nitrogen inhibitor. Additional N applications through fertigation included 37 lb N/ac and 9 lb S/ac as a 32% UAN and ATS blend on July 13, 2022, and 60 lb N/ac and 8.7 lb S/ac as a 32% UAN and ATS blend on July 18, 2022. A total of 247 lb N/ac was applied over the growing season.

Water samples from lysimeters were taken for nitrate-N on 11 dates, starting June 7, 2022. Lysimeters were installed at 4 feet depth in two contrasting zones. Soil samples were collected at 0-12" depth, with seven cores collected for each sample, equally spaced diagonally across the row with three feet length between cores.

Results:

	Nitrogen Efficiency (lb N/bu grain)	Yield (bu/ac)†	Partial Profit‡ ($/ac)
Check	0.88 A*	268 A	1,759 A
Inhibitor	0.83 A	282 A	1,847 A
P-Value	0.409	0.414	0.448

*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 and $7.65/ac for the inhibitor.

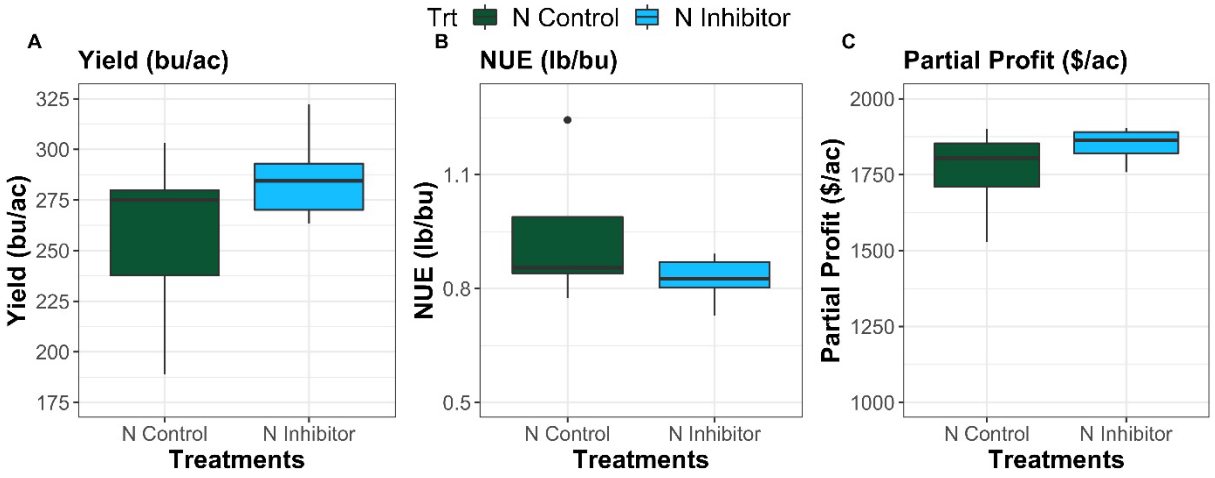


Figure 1. Box plots for grain yield (A), nitrogen use efficiency (B), and partial profit (C) by treatment. Treatments are no inhibitor control (green) and inhibitor (blue).

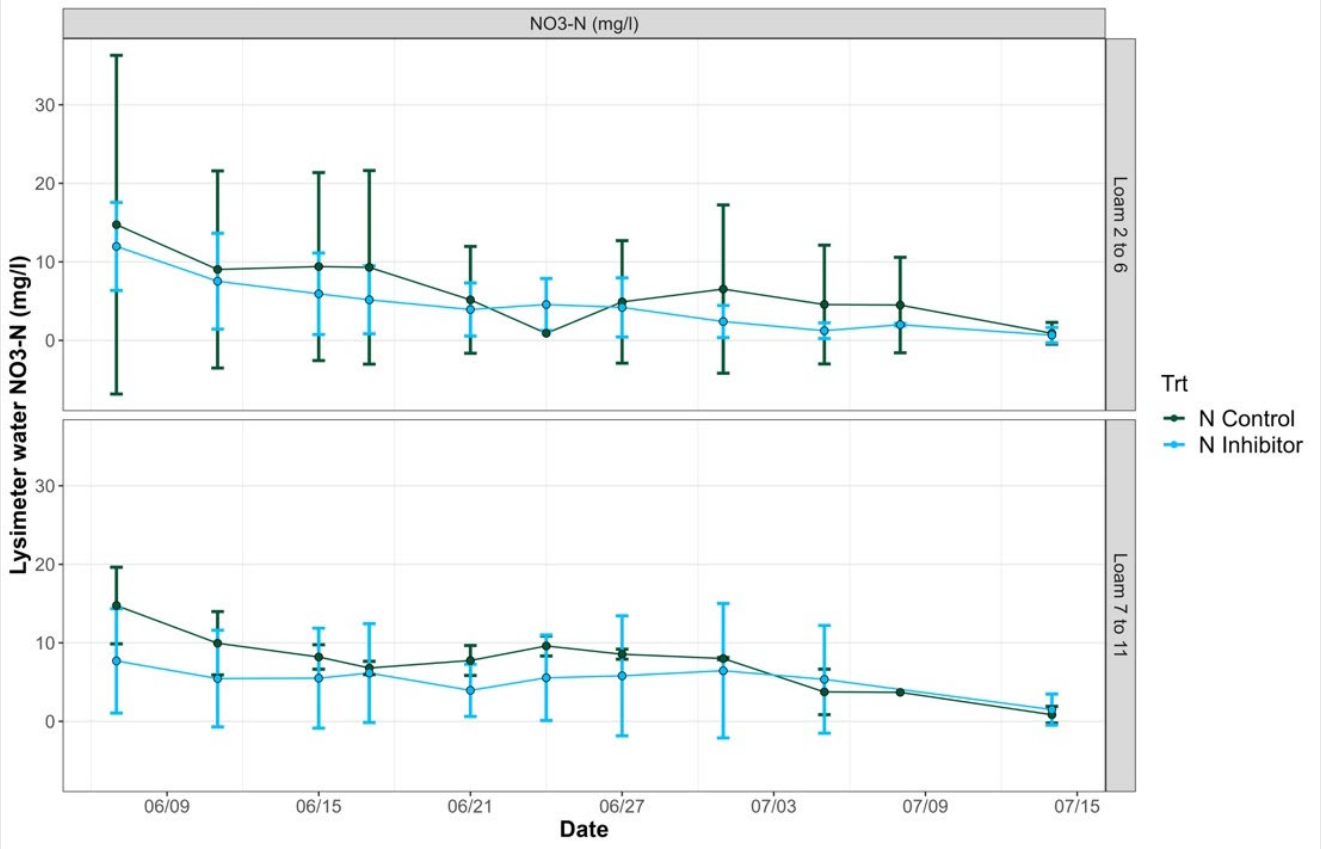


Figure 2. Lysimeter water (NO_3-N) by soil texture and sampling dates. Treatments are no inhibitor control (green) and inhibitor (blue). Points indicate the average NO_3-N concentrations with standard error bars. Lines indicate the trend of NO_3-N concentrations over time.

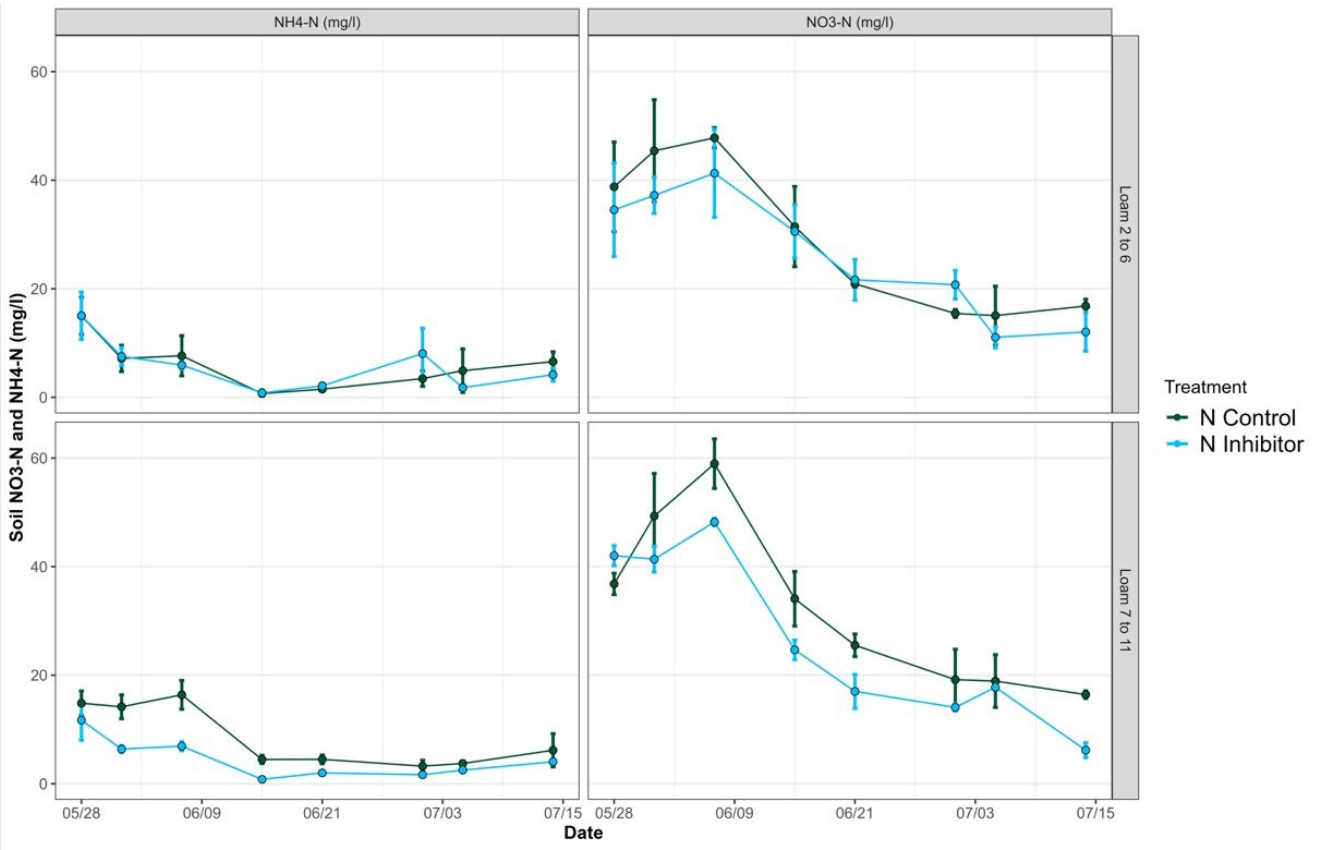


Figure 3. Soil nitrate-nitrogen (NO_3-N) and ammonium (NH4-N) by soil texture and sampling dates. Treatment are no inhibitor control (green) and inhibitor (blue). Points indicate the average soil NO3-N and NH4 concentrations with standard error bars and the lines indicate the trend of soil NO3-N and NH4 concentrations over time.

Summary:

- On a whole-field basis, the use of N inhibitor did not result in differences in yield, partial profit or nitrogen use efficiency (Figure 1). Further analysis will look at the response of N inhibitor in contrasting zones.
- There was no treatment effect on soil lysimeter water nitrate collected at 4 feet depth (Figure 2).
- No statistical differences were found between treatments for soil nitrate and ammonium concentrations (Figure 3).

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