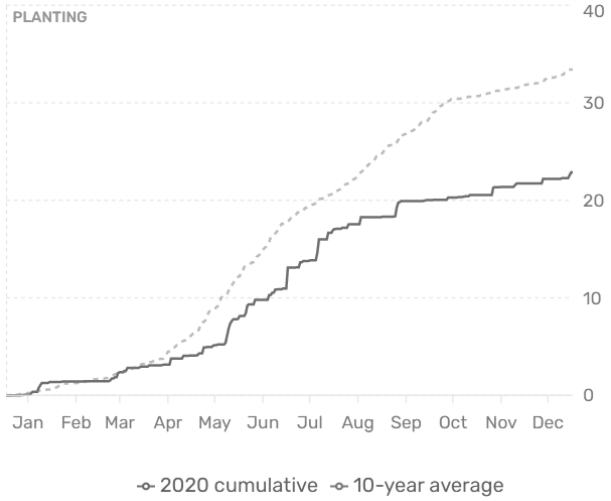
Impact of MicroSource® DCD 25 Inhibitor with Anhydrous Ammonia Application

Study ID: 1137109202001
County: Lancaster
Soil Type: Judson silt loam 2-6% slopes; Aksarben silty clay loam 6-11% slopes; Zook silty clay loam occasionally flooded; Kennebec silt loam occasionally flooded
Planting Date: 4/29/20
Harvest Date: 10/12/20
Seeding Rate: 30,000
Row Spacing (in): 20
Hybrid: CROPLAN® 5335 VT2 PRO
Reps: 4
Previous Crop: Soybean
Tillage: Turbo-Till
Fertilizer: 4 ton/ac ag lime and 140 lb/ac N as anhydrous ammonia

Irrigation: None
Rainfall (in):



Introduction: MicroSource® DCD 25 contains dicyandiamide (DCD), a product with known efficacy for inhibiting nitrification. The chemical compound DCD 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 clays and organic matter); in comparison nitrate (NO_3-), which is negatively charged, can be converted to N_2O or N_2 gases in anerobic 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.

The purposes of this study were to evaluate the impact of MicroSource® DCD 25 applied with anhydrous ammonia on crop yield and soil ammonium and nitrate. Anhydrous was applied on November 9, 2019, at a rate of 140 lb/ac N. Soil samples were taken for ammonium-N and nitrate-N. Soil samples were collected across the inter-row area at 6" intervals (0", 6", 12", 18”, and 24" from the row). The first set of samples was taken on May 12, when corn was just spiking to a 1' depth. A second set of soil samples was taken on June 3, with V4-V5 corn, to 1', 2', and 3' sample depths.

Results:

	-- May 12 Soil Sample --			---------- June 3 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	10.5 A	119.5 A	130.0 A	26.8 A	100.3 A	127.0 A	12.0 A	29.0 B	41.0 A	15.8 A	18.5 A	34.3 A
DCD	13.0 A	121.0 A	134.0 A	34.5 A	127.3 A	161.8 A	12.0 A	40.0 A	52.0 A	14.0 A	29.5 A	43.5 A
P-Value	0.801	0.894	0.849	0.347	0.14	0.164	1	0.046	0.151	0.831	0.239	0.530

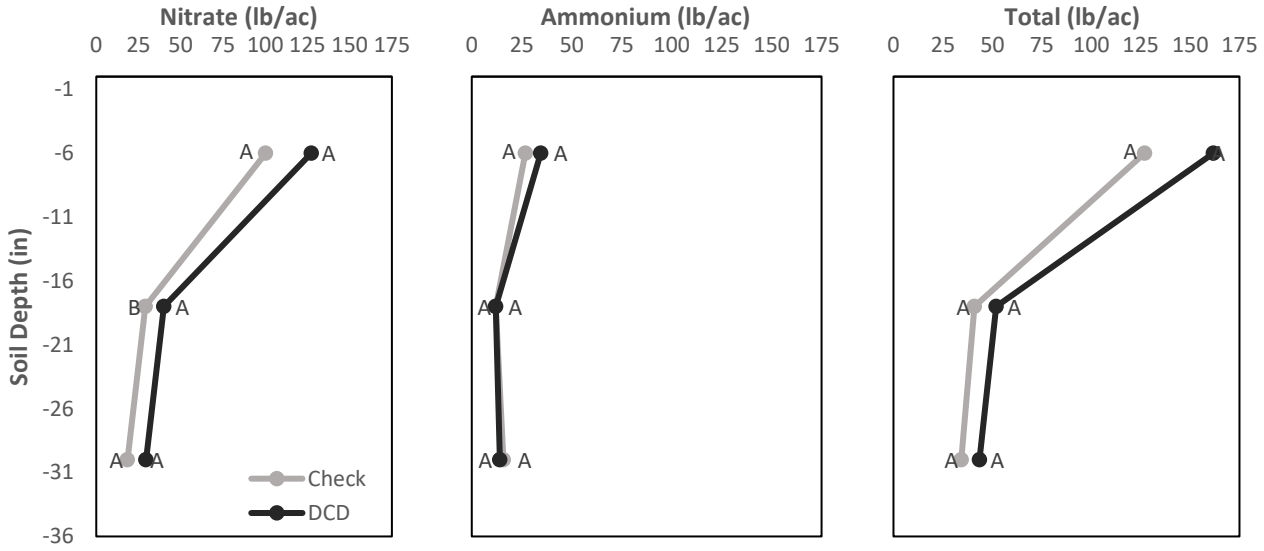


Figure 1. June 3 soil samples at 1’, 2’, and 3’ depths for ammonium (lb/ac), nitrate (lb/ac), and total N (lb/ac) for the treatments with and without inhibitor.

	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡
Check	14.2 A*	211 A	741.95 A
DCD	14.1 A	212 A	736.36 A
P-Value	0.521	0.841	0.602

*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 $3.51/bu corn and $45/gal MicroSource® DCD 25 ($7.70/ac for MicroSource® DCD 25 at the 140 lb N/ac rate).

Summary:

- At the June 3 sample date, nitrate-N concentration was lower for the check in the 2nd foot sampled. There were no other statistical differences noted with soil samples between the treatments (Figure 1).
- The use of MicroSource® DCD 25 did not result in a statistical yield or marginal net return difference compared to the control.

Sponsored by: University of Nebraska Lincoln

In Partnership with: Nebraska CornBoard; Nebraska Soybean Checkoff; Nebraska CornGrowers Association; Nebraska Dry Bean Commission