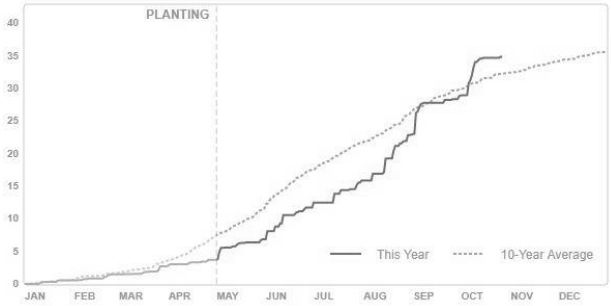
Impact of Anhydrous Ammonia Nitrogen Rate on Corn Yield

Study ID: 0701147201802
County: Richardson
Soil Type: Marshall silty clay loam 2-6% slopes
Planting Date: 5/1/18
Harvest Date: 9/22/18
Population: 27,500
Row Spacing (in): 30
Hybrid: Hoegemeyer® 8414
Reps: 4
Previous Crop: Soybean
Tillage: No-Till
Herbicides: ***Pre:*** 8 oz/ac Banvel® and 6 oz/ac of 6# 2,4-D ***Post:*** 2.5 lb/ac mesotrione, 1 pt/ac Atrazine, and 12 oz/ac of 5.4 lb Roundup®

Irrigation: None
Rainfall (in):



Soil Test (Dec. 2018):

Soil pH 1:1	CEC	OM	Bray P1 Weak Bray	Bray P2 Strong Bray	K	Mg	Ca	S	Zn	K	Mg	Ca	H
	mg/100g	*%*	*ppm*	*ppm*	*----------(ppm)----------*					*---% Base Saturation--*			
6.5	18.7	2.9	29	44	189	385	2723	8	4.1	2.6	17.2	72.8	7.4
6.9	19.2	3.0	30	52	173	375	3133	7	3.9	2.3	16.3	81.4	0
6.9	18.5	3.1	34	53	191	384	2962	7	4.1	2.6	17.3	80.1	0
7.0	20.3	2.8	22	32	177	353	3378	7	3.7	2.2	14.5	83.3	0

Introduction: The purpose of this study was to evaluate three nitrogen application rates to determine which nitrogen rate maximized yield and profit. The nitrogen was applied as anhydrous ammonia on December 21, 2017, with a minimal disturbance AgSynergy® Genesis TRX® anhydrous applicator. Aerial imagery was collected on July 28, 2018, with a drone and MicaSense RedEdge™ multispectral camera to observe differences in plant vegetation. Aerial imagery was used to calculate the normalized difference red edge index (NDRE). This index is indicative of overall plant biomass and greenness. True color imagery and NDRE are presented in Figure 1. Yield, grain moisture, test weight, and stand counts were collected at harvest on September 22, 2018. Yield data from the yield monitor is displayed in Figure 1. Yield data reported in the table below is from weigh wagon measurements. The anhydrous ammonia tank ran out on the furthest east treatment (160 lb N/ac); therefore, all measurements from this pass were excluded from the analysis.

Results:

	Harvest Stand Count (plants/ac)	Test Weight	Moisture (%)	NDRE (Red Edge Sensor)	Yield† (bu/ac)	Marginal Net Return‡ ($/ac)
130 lb N/ac	25,953 A*	56 A	17.0 A	0.621 B	184.4 A	565.60 A
160 lb N/ac	25,967 A	56 A	17.1 A	0.627 B	183.6 A	556.30 A
190 lb N/ac	25,868 A	56 A	17.4 A	0.640 A	194.0 A	583.10 A
P-Value	0.994	0.108	0.266	0.002	0.278	0.496

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield data reported from weigh wagon measurements. Bushels per acre adjusted to 15.5% moisture.
‡Marginal net return based on $3.23/bu corn and $0.25/lb N as anhydrous ammonia.

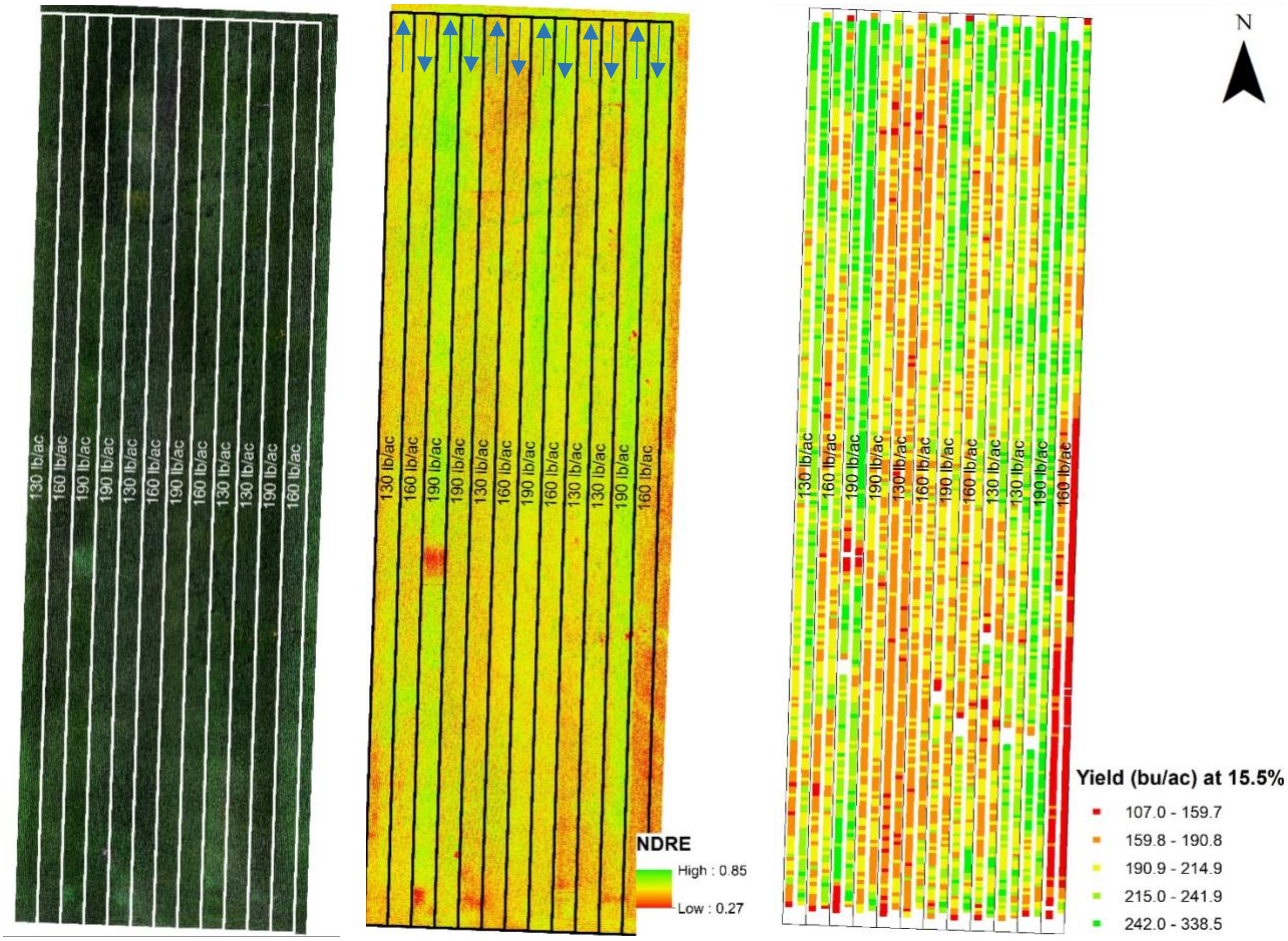


Figure 1. True color imagery of the plot from July 28, 2018 (left), NDRE imagery of the plot from July 28, 2018 (center), and yield of plot from combine yield monitor (right). The furthest east treatment (160 lb/ac) was eliminated from the analysis as the anhydrous ammonia tank ran out part way through the pass. The direction of travel of the anhydrous applicator is indicated on NDRE image with blue arrows.

Summary:

- Imagery from July 28, 2018, showed different NDRE values, with the 190 lb N/ac treatment having the highest NDRE reading. This indicates this treatment had greater biomass and/or greater chlorophyll content.
- There was no difference in test weight, grain moisture, harvest stand counts, yield, or marginal net return for the three nitrogen rates evaluated.
- Imagery and field observations of neighboring passes of the same rate suggest the applicator may not have been applying as much when headed south (downhill). Direction of anhydrous applicator travel is indicated on the NDRE map in Figure 1. This could have created greater variability in the treatment response; therefore, the study should be continued in future years.

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