Corn Nitrogen Rate Trials

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Objective

To determine the optimal rate at which nitrogen is to be applied to corn at the V5-6 growth stage to produce the best economic return to inputs. This plot is in cooperation with the multi-state effort to produce a new Tri-State fertilizer recommendation publication.

Background

	Plot A	Plot B	Plot C	Plot D
Crop Year	2017	2017	2017	2017
Location	Ault Farms	Duncan Farms	Meeker Farms	Williams Farms
County/Town	Ross/Londonderry	Highland/Hillsboro	Ross/Londonderry	Ross/Bainbridge
Soil Type	Pike Silt Loam	Miamian - Russel Silt Loam	Taggart Silt Loam	Gessie Silt Loam
Drainage	Surface Only	Surface Only	Surface Only	Surface Only
Previous Crop	Soybeans	Soybeans	Soybeans	Soybeans
Planting Date	4/18/2017	5/15/17	4/27/2017	4/30/17
Variety	Becks 6158	Dyna-Gro 52VC91	Dekalb 6434	SC11AGT43
Seeding Rate	34,000	32,000	34,800	32,000
Treatment Date	6/8/2017	6/7/2017	6/1/2017	6/5/2017
Nitrogen Inhibitor	Nirian Express	Instinct	Instinct II	None
Harvest Date	11/10/2017	11/18/2017	10/31/2017	10/30/2017

Methods

This was a randomized complete block design with three replications. A pre-plant application of 45 lbs nitrogen in the form of 28% UAN was applied to the whole field with a burn down herbicide. Treatments consisted of 75 lbs, 105 lbs, and 135 lbs of 28% UAN on each of the locations. Nitrogen was injected in a single pass at the V5-6 growth stage. Plot A, B and C used a nitrogen inhibitor for both applications, while plot D did not use a nitrogen inhibitor for either application.

Results

Yield data, adjusted for moisture (15%), varied significantly for three out of the four sites. One site saw no significant yield difference. Using the 90% confidence level, the results for the four plots are presented below. The net economic difference was shown for each treatment based on $3.75 corn and $0.40 per/lb nitrogen cost compared to the base rate of 120 lbs nitrogen.

	Treatment	Yield	Economic Difference
Plot A	120	279.57	[1]
	150	278.79	$ (13.03)
	180	275.40	$ (35.22)
Not Significant p=.10			
Plot B	120	168.74[c]	
	150	194.49[b]	$ 79.83
	180	224.92[a]	$ 176.03[1]
Significant p=.10 LSD 8.20			
Plot C	120	158.10[c]	
	150	197.85[b]	$128.83
	180	212.48[a]	$169.71[1]
Significant p=.10 LSD 7.65			
Plot D	120	193.05[b]	
	150	205.14[a]	$32.01[1]
	180	207.60[a]	$30.30
Significant p=.10 LSD 6.69			

Superscripts a,b,c indicate significantly different yields within each plot. Superscript 1 signifies the most profitable economic rate applied in these plots.

Summary

Examining the results, three of the four plots showed a significantly different corn yields based on nitrogen rates. Plot A had no statistically difference in yield. Economic differences were inconsistent across plots with plots B and C returning the greatest return with the 180 lbs/A nitrogen, Plot D with the 150 lbs/A nitrogen and Plot A with the 120 lbs/A nitrogen. This data supports the notion that nitrogen availability from different soils and conditions will not be equal. In order to maximize the return to nitrogen, farmers should use the available technology to assist in making mid-season nitrogen adjustments at side-dress time.

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