

# Corn Yield Response to Nitrogen Rates

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## Objective

To determine the effects of total nitrogen rate on corn grain yield.

## Background

Crop Year: 2014

Location: Metamora, OH

County: Fulton

Soil Type: Hoytville loam

Drainage: Systematic

Previous Crop: Soybeans

Tillage: Conventional

Soil Test: pH 6.2, P 30 ppm\*, K 157 ppm

Planting Date: May 6, 2014

Starter: liquid 20 lbs N, 68 lbs P

Seeding Rate: 34,000 seeds/ac

Harvest Date: October 30, 2014

Rainfall April-Sept: 18.7"

\*Reported in Bray P1

## Methods

This trial included four treatments replicated four times in a randomized complete block design. Treatments were 100, 150, 200 and 250 total units of nitrogen per acre with credits given for starter nitrogen. Additionally, one plot strip had 0 units of in-season nitrogen applied, but this treatment was replicated. Plots were approximately 1,200 feet long by 12 rows (30 feet) wide. Corn variety was Dekalb 52-04. Plant population was determined by taking counts in 17.5 feet of row and Normalized Difference Vegetative Index (NDVI) readings were taken with Greenseeker handheld sensors approximately four weeks after nitrogen was applied. Approximately 1-2 weeks after black layer, stalk nitrate samples were to sent to A&L Labs to evaluate nitrate-nitrogen remaining in the plant at harvest. Plot centers were harvested with an 8 row head on a JD 9660 combine. Yield and moisture data was collected with a calibrated yield monitor and shrunk to 15% moisture. Weather data was obtained from weather.com.

## Results

Table 1. Corn Yield (bu/ac) Response to Total Nitrogen Rate

<u>Treatment</u>	<u>Harvest Stand</u>	<u>Avg NDVI Reading</u>	<u>Stalk Nitrate (ppm)</u>	<u>Dry Yield (bu/ac)</u>
0 lbs/ac*	33.0	.73	20	117.9 c
100 lbs/ac	33.4	.66	160	200.6 b
150 lbs/ac	32.6	.72	660	212.8 a
200 lbs/ac	33.3	.66	380	216.5 a
250 lbs/ac	33.5	.68	1350	216.8 a

LSD 7.23 (p<.05), CV 2.13 – Yes significant difference between treatments

\*0 rate was not replicated.

## Summary

Total Nitrogen Rate, lbs/ac	Yield	Gross Revenue per acre	Nitrogen Cost per Acre	Net Return per acre
0	117.9	\$472	\$--	\$472
100	200.6	\$802	\$41	\$761
150	212.8	\$851	\$61.50	\$790
200	216.5	\$866	\$82	\$784
250	216.8	\$867	\$102.50	\$765

**Economics:** Gross income= yield x \$4.00/bu;  
Nitrogen cost= \$0.41 per lb (source: OFR collaborator).

### Discussion:

There was a statistically significant difference in yield in treatments where at least 150 pounds of total nitrogen were applied to corn. While the zero rate was not replicated, it does give an indication of soil available N. The 100 pound rate was statistically lower than the other three rates of 150, 200, and 250 lbs/ac. The most economical rate was 150 lbs/ac. The stalk nitrate levels for the 150 and 250 pound rate fall in the ranges that are considered “optimal” by Purdue University nitrate nitrogen categories (450-2000 ppm). The stalk nitrate level for the 200 pound rate is believed to be an anomaly that could be from sampling error. Further data in the form of multi-year replications will add to the validity of these results.

### Acknowledgement

The author expresses appreciation to on-farm collaborator Keith Truckor for the planting and harvesting of this plot. Thanks to student worker Emily Herring for assistance with data collection.



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