



# 2015 Demonstration Report

MONSANTO LEARNING CENTER AT MONMOUTH, IL

## Nitrogen Rate by Product

University of Illinois Professor, Dr. Fred Below, ranks nitrogen (N) second only to weather in a list of seven important interacting factors that contribute to the production of a successful and profitable corn crop. The other factors in Dr. Below's list, in order of importance, included weather, corn product, previous crop, plant population, tillage, and growth regulators.<sup>1</sup>

Historically, N recommendations have ranged from 0.8 to 1.2 lbs of N/bu of corn production goal/acre.<sup>2</sup> These values provide a starting point for N management; however, the factors previously mentioned along with cost of N and corn market price should be considered to help achieve the highest return on N investment.

Product genetics is a factor that deserves research attention because each corn product may have a different N response as a farming operation's N management is fine tuned. To help determine the influence of genetics, a demonstration trial was conducted at the Monsanto Learning Center near Monmouth, IL to:

1. Identify any product by N rate interaction, and
2. Identify the most economical N rate on average for 18 diversely (genetically) different corn products.

### Study Guidelines

- 18 corn products representing six different companies were selected for the demonstration with relative maturities (RM) ranging from 107 to 114 days
- The demonstration was planted into second-year corn ground
- Tillage consisted of conventional tillage - fall chisel plow followed by soil finisher in the spring
- Planting date was April 29, 2015
- Seeding rate was 36,000 seeds/acre
- Two reps were planted that consisted of four rows of each product
- Six 32% UAN (lbs N/acre) preplant incorporated treatments were utilized
  1. 0
  2. 60
  3. 120
  4. 180
  5. 240
  6. 300

- Treatments were 60 feet in length
- Harvest date was September 15, 2015 with yields adjusted to 15% moisture content

### Results and Observations

1. Random pictures demonstrate the effect that higher N rates can have on corn growth. A corn product with 60 lbs of 32% UAN (Fig. 1) shows considerably more N deficient leaves than a corn product with 300 lbs of 32% UAN (Fig. 2).



Figure 1. Randomly selected corn product with 60 lbs of 32% UAN applied preplant incorporated.



Figure 2. Randomly selected corn product with 300 lbs of 32% UAN applied preplant incorporated.



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2. Yields for each of the 18 products at each of the UAN application rates were captured (Table 1).
3. With a 222.6 bu/acre average yield and gross revenue minus N cost of \$676/acre, the 180 lbs/acre N rate was the most profitable (Fig. 3). This finding is in line with previous research findings at the Monmouth Learning Center.<sup>3</sup>
4. The overall yield average of the 18 products at the 240 lbs/acre N rate was more than the 180 lbs/acre N rate, but additional yield was not economical (Table 2).
5. Product genetics responded differently to increasing rates of N, resulting in some products being most profitable at 120 lbs N/acre and others most profitable at 240 lbs N/acre; therefore, consult your trusted seed advisor or agronomist for specific, local recommendations (Figs. 4 & 5).

TABLE 1. RAW YIELD (BU/ACRE) FOR EACH PRODUCT BY NITROGEN RATE

Product	Nitrogen (Lbs/Acre)					
	0	60	120	180	240	300
A	89.11	141.91	173.84	211.54	197.23	172.50
B	76.33	134.74	182.53	210.49	213.92	157.51
C	60.91	130.65	187.31	219.84	223.21	182.07
D	72.56	140.31	196.80	210.61	229.78	176.17
E	74.38	161.69	208.90	225.39	233.66	192.77
F	70.65	148.07	197.28	224.17	223.42	186.02
G	73.63	155.78	212.10	232.18	242.17	216.04
H	80.09	151.82	202.06	214.45	226.77	206.45
I	80.89	148.64	210.69	232.99	246.70	207.65
J	91.22	155.61	206.21	233.41	233.70	201.53
K	82.38	153.43	201.10	215.92	221.39	197.57
L	77.35	147.98	210.05	232.34	232.27	204.50
M	73.49	146.84	199.51	221.13	214.75	182.82
N	80.38	142.97	205.92	230.06	231.15	188.12
O	83.68	142.52	191.53	225.01	230.94	189.54
P	90.27	145.43	191.17	226.60	225.03	186.62
Q	75.17	146.45	194.49	233.30	236.19	191.30
R	79.88	151.25	204.68	206.91	198.10	180.58
<b>AVG</b>	<b>78.46</b>	<b>147.01</b>	<b>198.68</b>	<b>222.58</b>	<b>225.58</b>	<b>189.99</b>

Source: Monmouth Learning Center Data - 2015; Yields adjusted to 15% moisture content.

TABLE 2. COMPARISON OF GROSS REVENUE MINUS NITROGEN COST/ACRE FOR EACH NITROGEN RATE AND YIELD FOR EACH RATE

	Nitrogen (lbs/acre)					
	0	60	120	180	240	300
Gross Revenue Minus N Cost (\$/acre)	274.62	480.32	626.97	676.41	652.72	493.95
Bu/acre (15%)	78.46	147.00	198.68	222.57	225.58	189.99

Source: Monmouth Learning Center Data - 2015; Calculations based on a nitrogen cost of \$0.57/lb and a corn price of \$3.50/bu.



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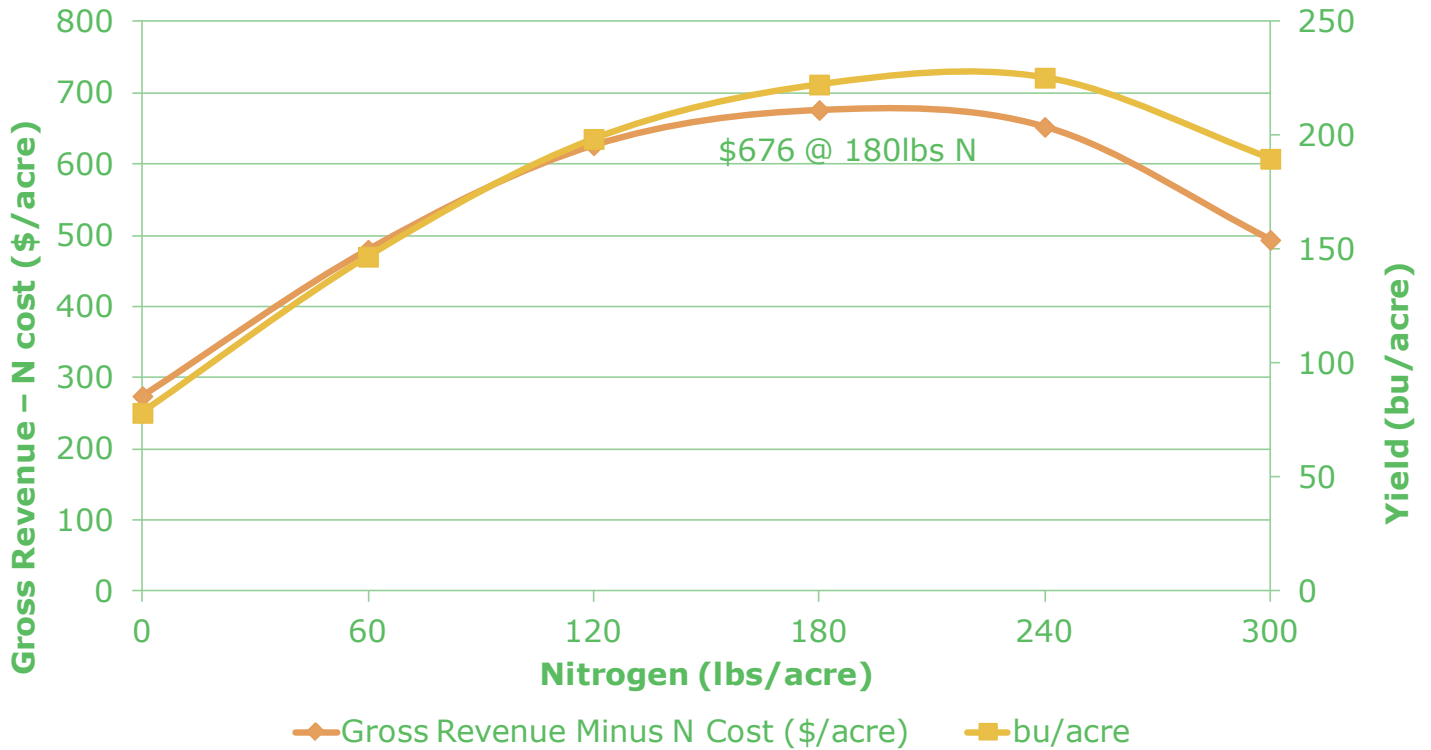


Figure 3. Gross Revenue/Acre after Nitrogen Cost. Source: Monmouth Learning Center Data - 2015; Calculations based on a nitrogen cost of 0.57/lb and a corn price of \$3.50/bu.

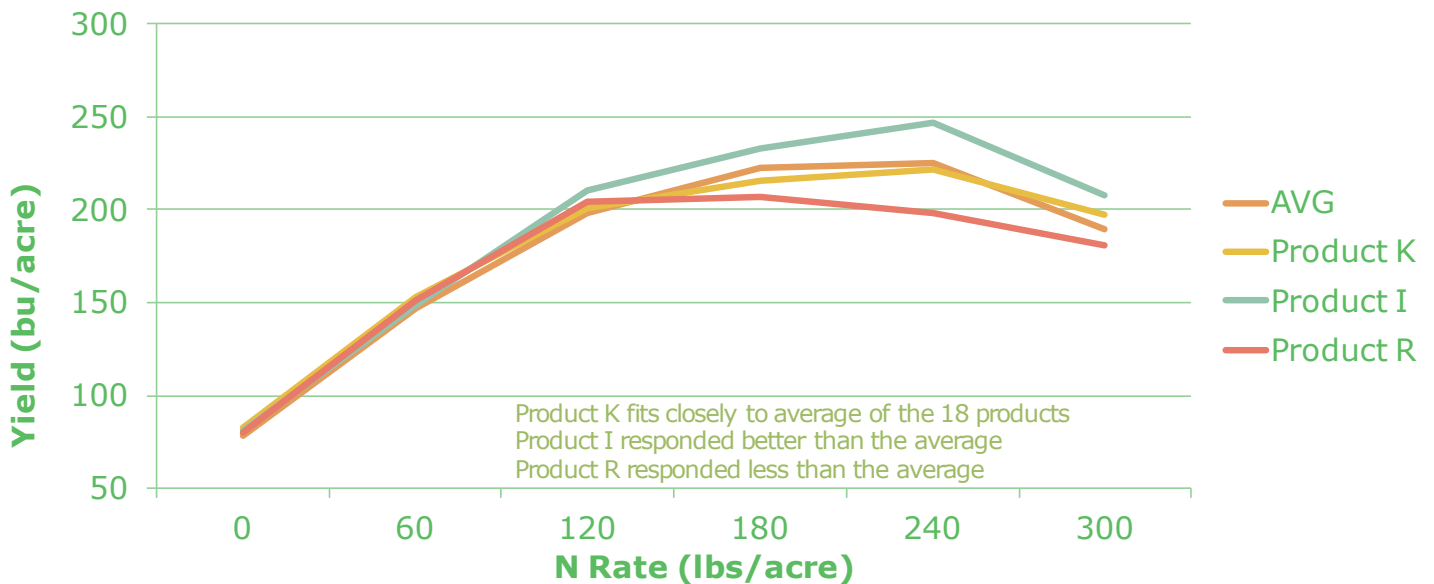


Figure 4. Nitrogen Response of Three Different Products Compared to the Average Response of 18 Products. Source: Monmouth Learning Center Data - 2015; Note: AVG represents all 18 products in this trial.



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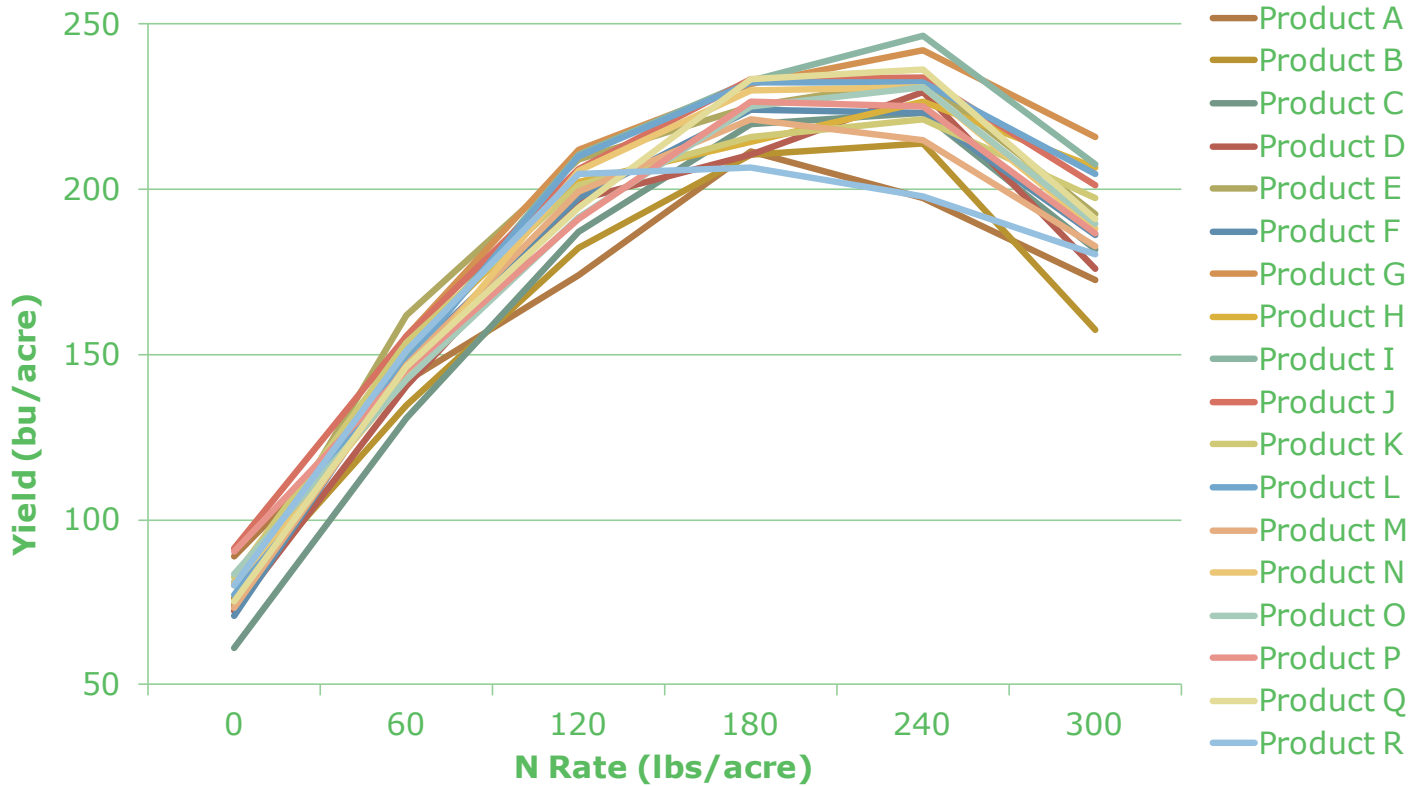


Figure 5. Product Response for all 18 Products to Six Nitrogen Rates.  
Source: Monmouth Learning Center Data - 2015

### Additional Demonstration Comments

- Many factors (soil type, tillage, rainfall, previous crop, N cost) can influence the profitability of N applications.
- Several tools, including the Iowa State University Maximum Return to N (MRTN) Corn Nitrogen Rate Calculator, are available to help make informed N management decisions.<sup>4</sup>
- It is important to consider yield goals and N cost when making N management decisions.

### Sources

<sup>1</sup> Below, F. The seven wonders of the corn yield world. University of Illinois Crop Physiology. [http://cropphysiology.crops.illinois.edu/research/seven\\_wonders.html](http://cropphysiology.crops.illinois.edu/research/seven_wonders.html)

<sup>2</sup> Camberato, J. 2012. A historical perspective on nitrogen fertilizer rate recommendations for corn in Indiana (1953-2011). Soil Fertility and Plant Nutrition. AY-335-W. Purdue University Extension. <https://www.extension.purdue.edu>

<sup>3</sup> 2011. Evaluation of a nitrogen rate calculator. Monmouth Learning Center Demonstration Report. Monsanto. <http://www.aganytime.com/Documents/ArticlePDFs/LC-Monmouth-Evaluation-of-a-Nitrogen-Rate-Calculator-2.pdf>.

<sup>4</sup> Corn nitrogen rate calculator. Iowa State University. <http://extension.agron.iastate.edu/soilfertility/nrate.aspx>

### Legals

*The information discussed in this report is from a single site, replicated demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.*

**Individual results may vary**, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

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