

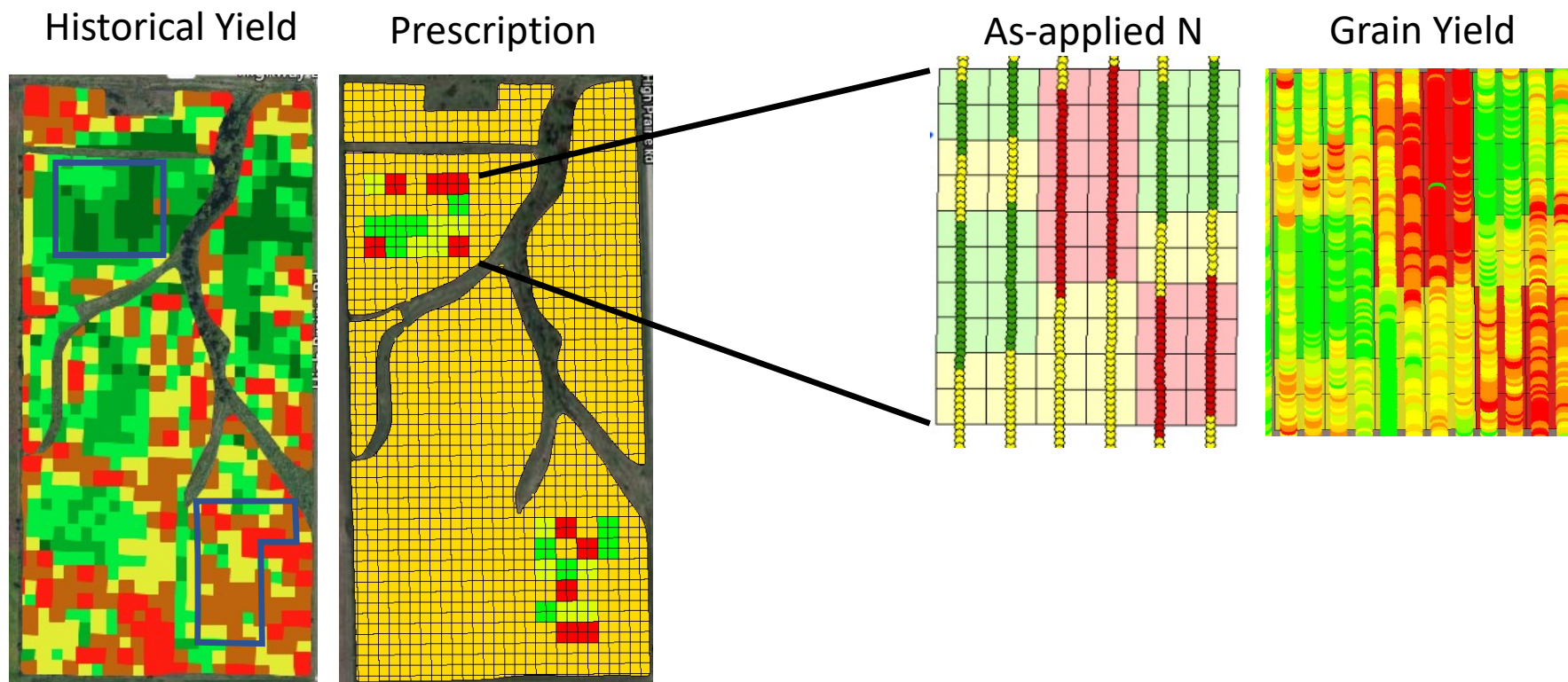
An aerial photograph of a large cornfield. The field is mostly green, but there is a distinct, irregularly shaped area in the center that is a lighter, yellowish-green color, indicating a nitrogen deficiency. The rows of corn are clearly visible, and the field is bordered by a dirt road on the right side. In the top right corner, there is a curved dirt path or road.

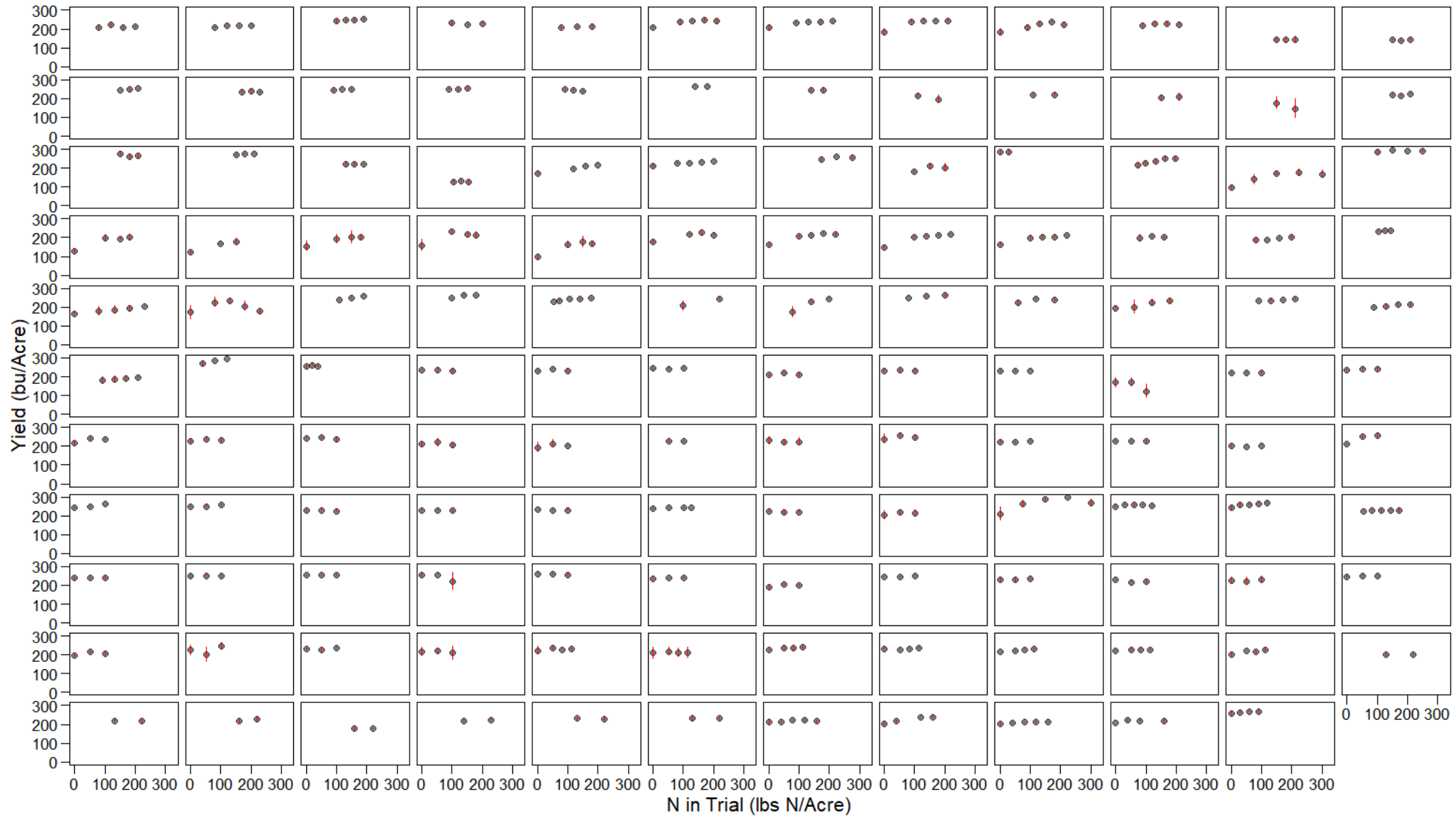
**The Iowa Nitrogen Initiative**

# Today's agenda

- History and methods of the Iowa Nitrogen Initiative
- Why focus so much on nitrogen management?
- Preliminary look at 2023 data
- Look ahead to 2024 – recruiting, research, and product development

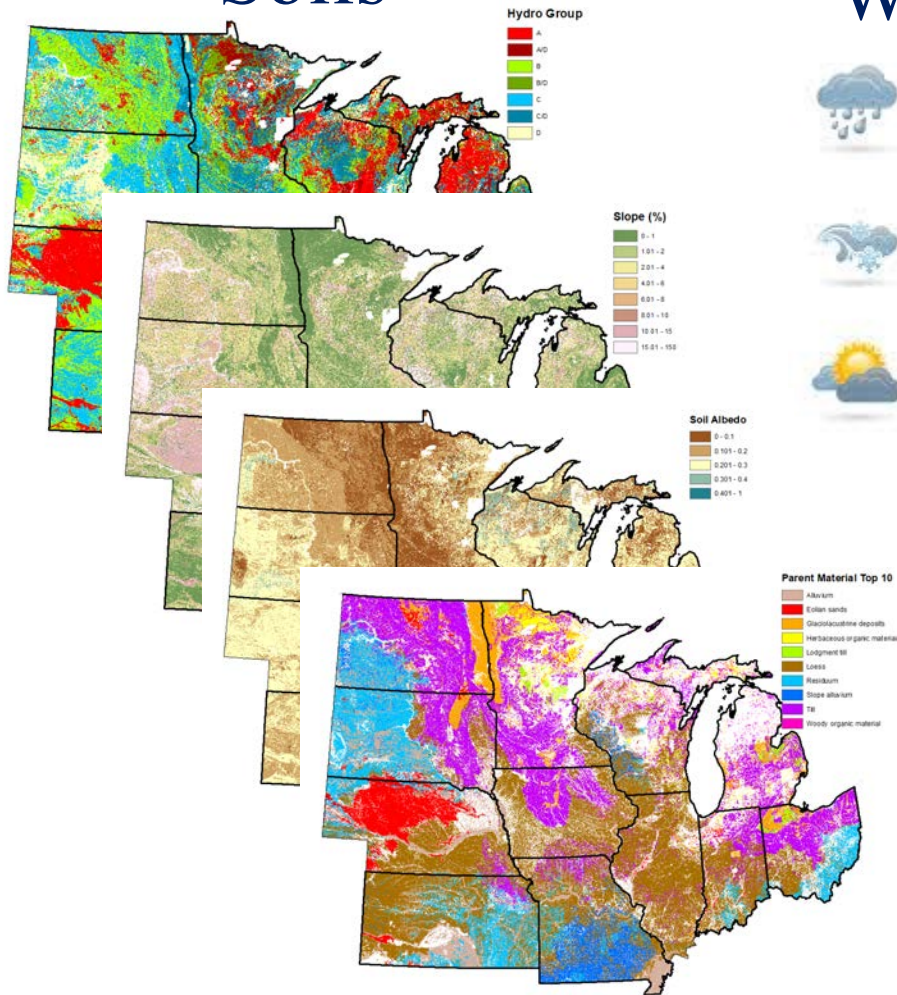
# The Iowa Nitrogen Initiative: Scaling with advances in precision agriculture: a public-private partnership





# APSIM

## Soils



## Weather

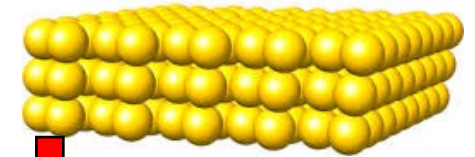
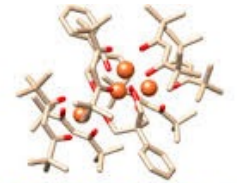


## Management

# plants, N fertilizer



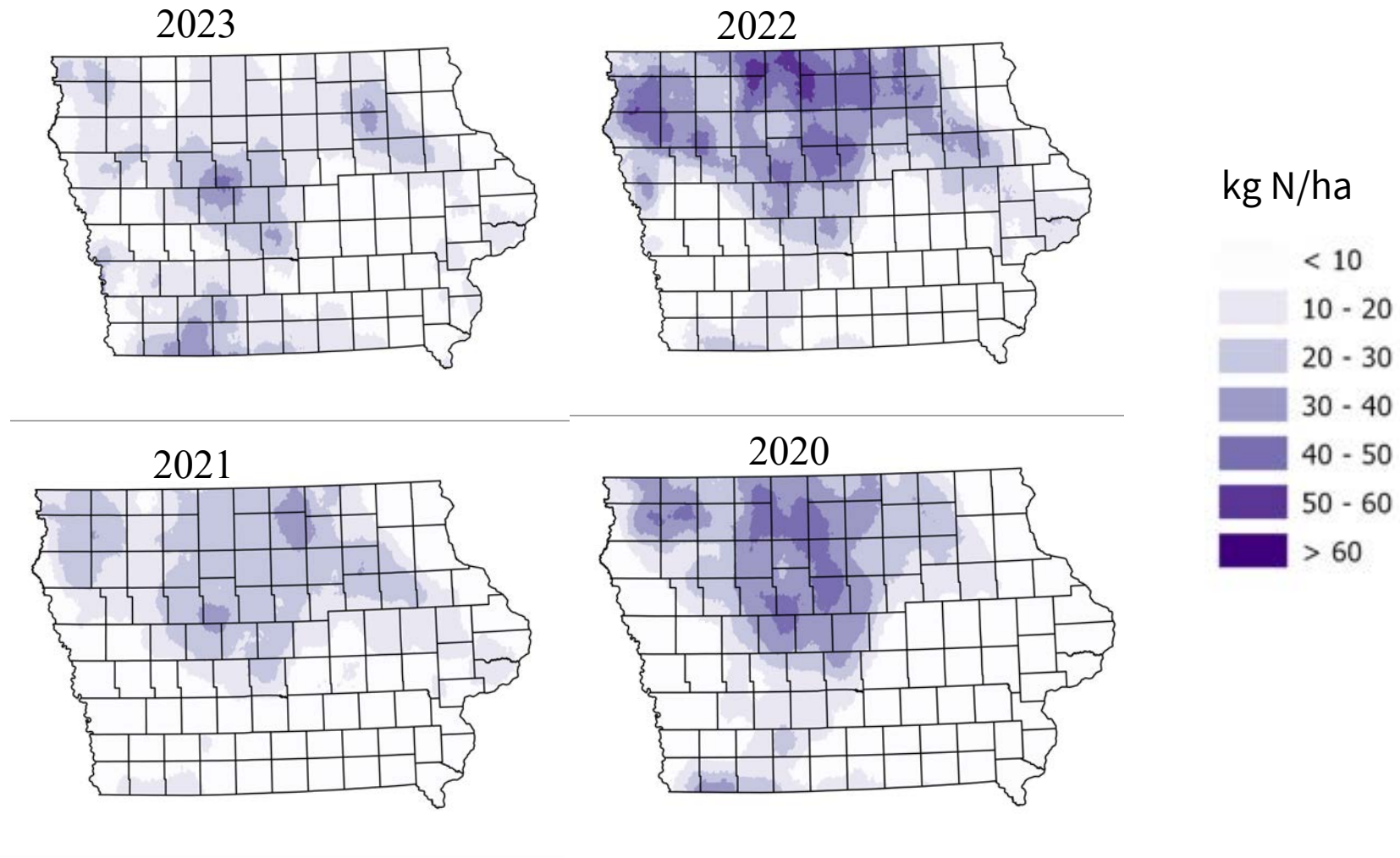
## Cultivars



APSIM Framework

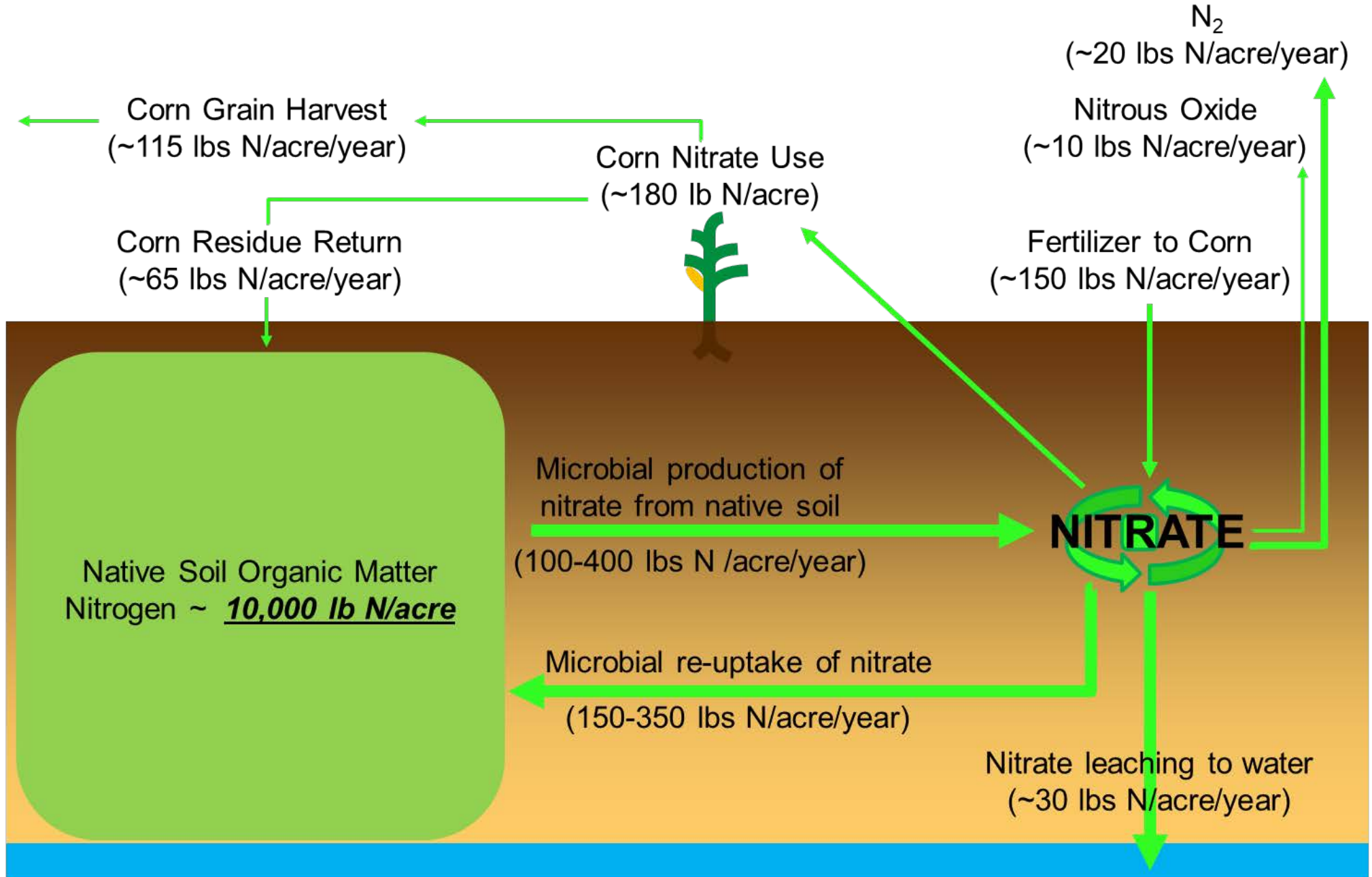
Yield response to N

# Simulated average soil nitrate in 0-30 cm from Nov 7 to 21



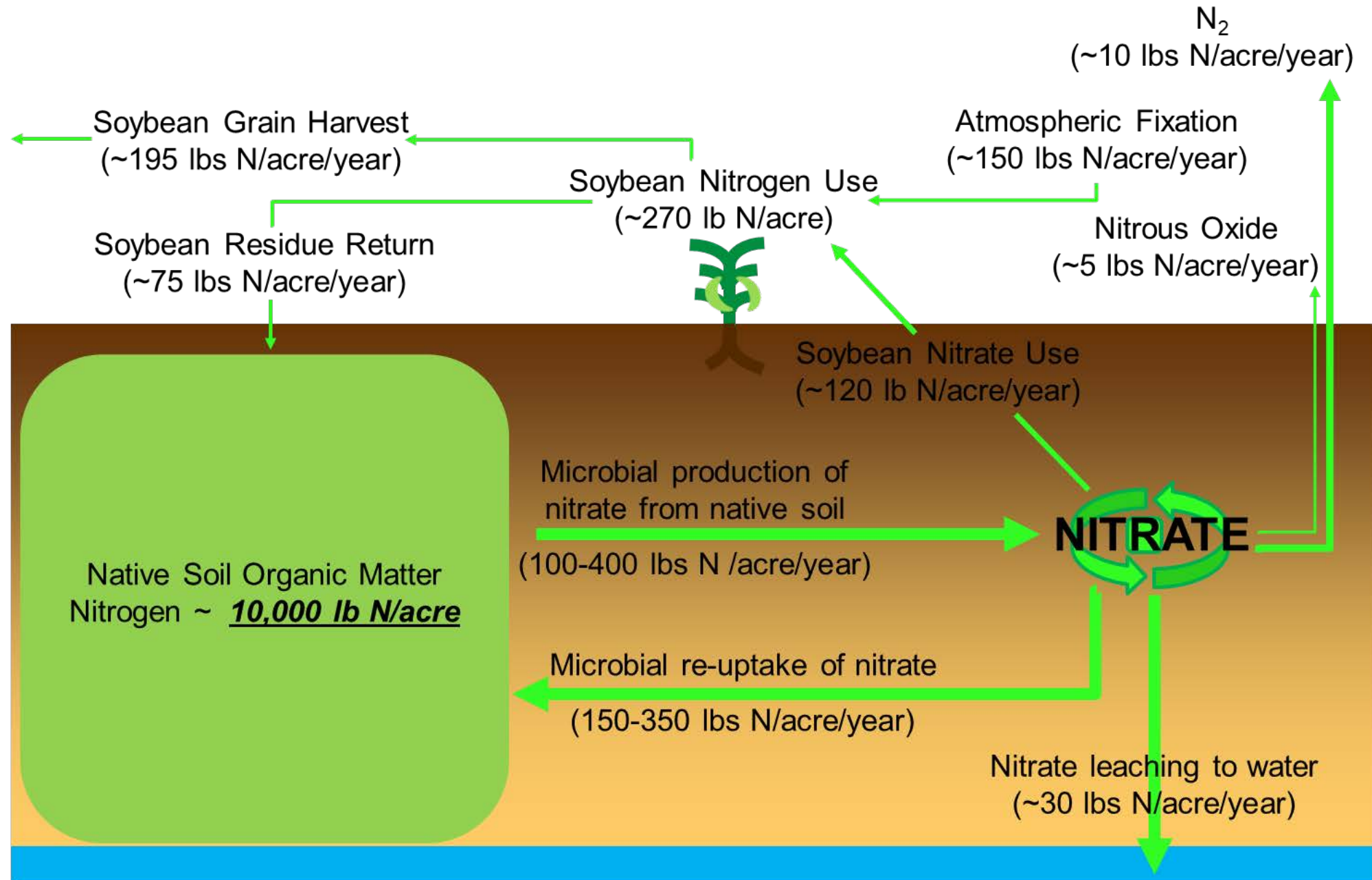
Why so focused on nitrogen management?

# Corn Nitrogen Cycling & Budget @ 200 bushels

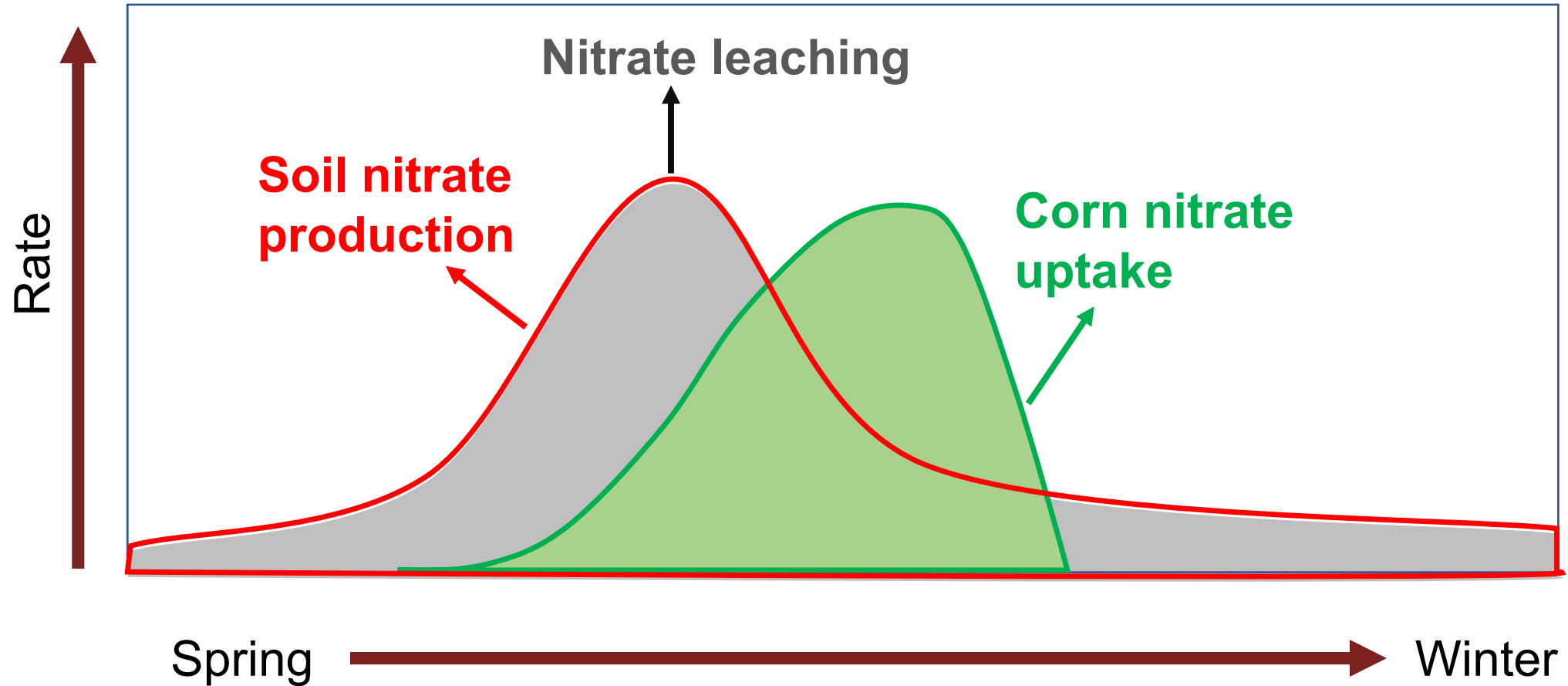




# Soybean Nitrogen Cycling & Budget @ 60 bushels



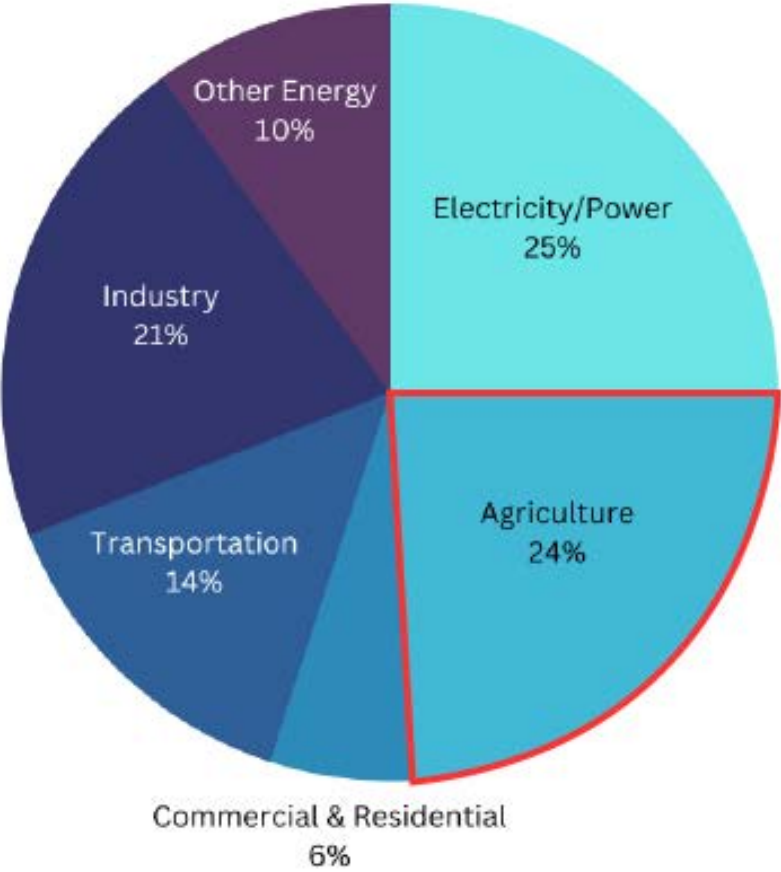
# Why do we lose N to the environment?



The challenge for Iowa

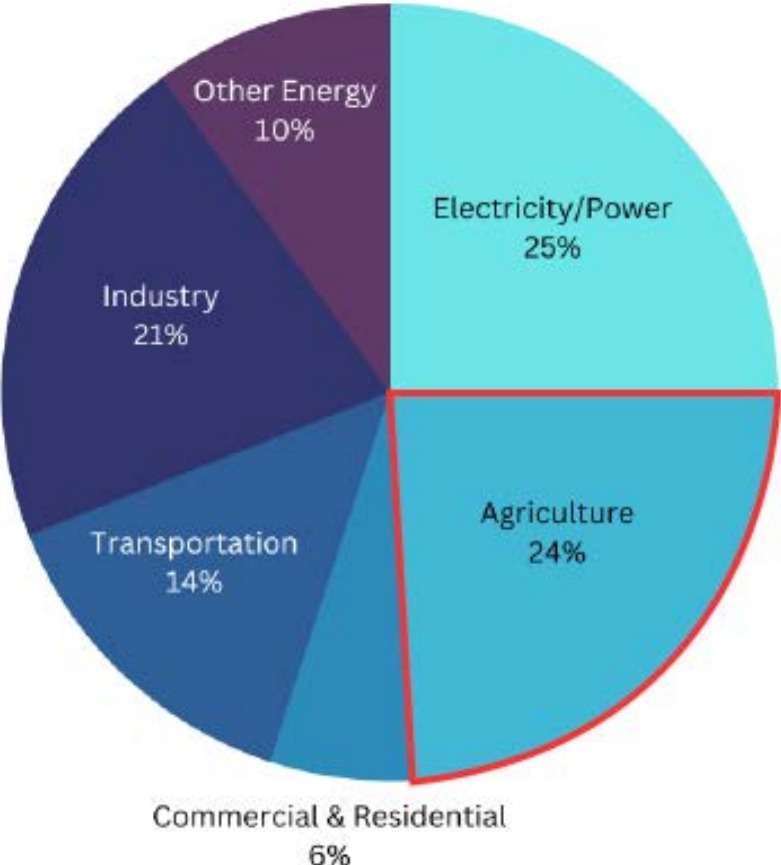
# Greenhouse Gas Emissions by Sector:

Global

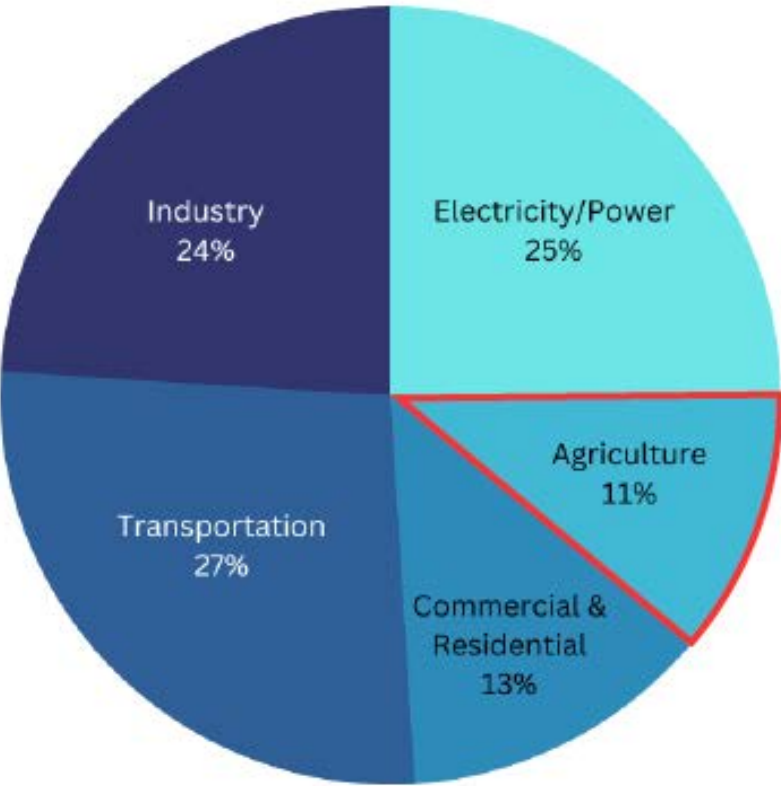


# Greenhouse Gas Emissions by Sector:

Global

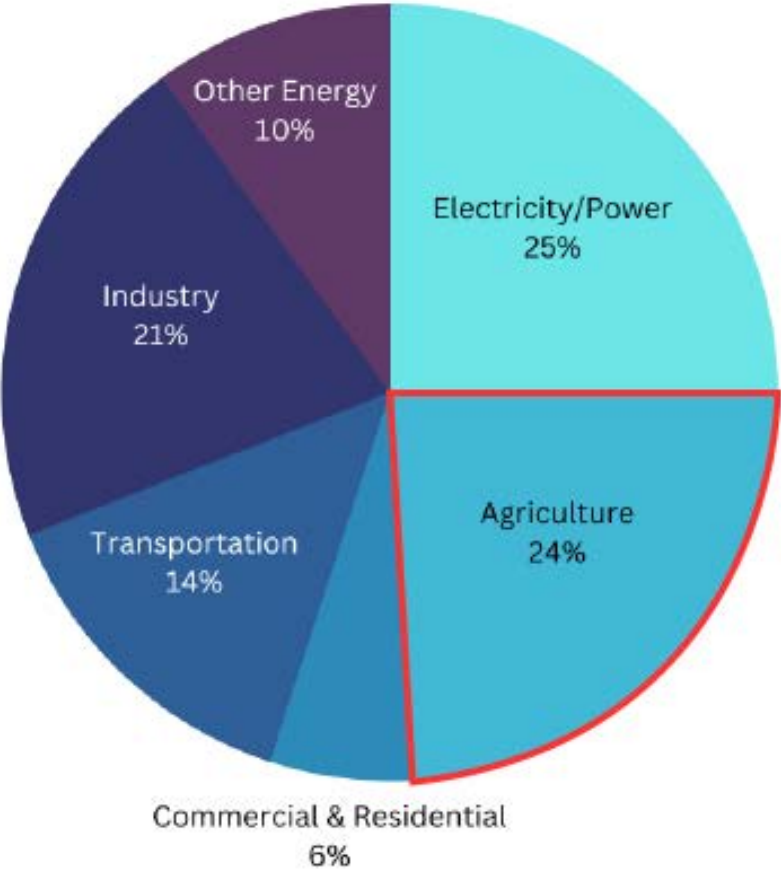


U.S.A.

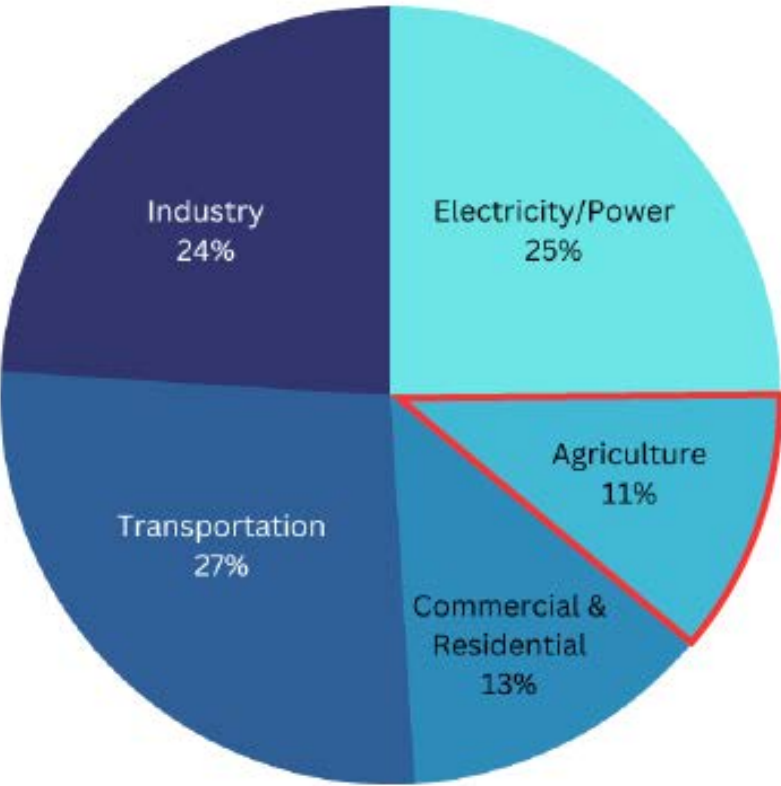


# Greenhouse Gas Emissions by Sector:

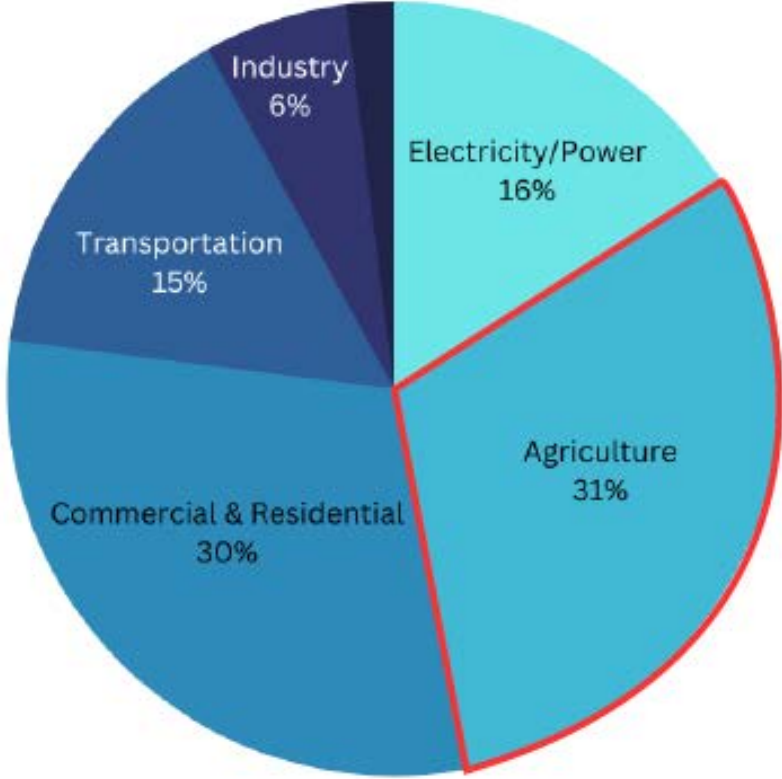
Global



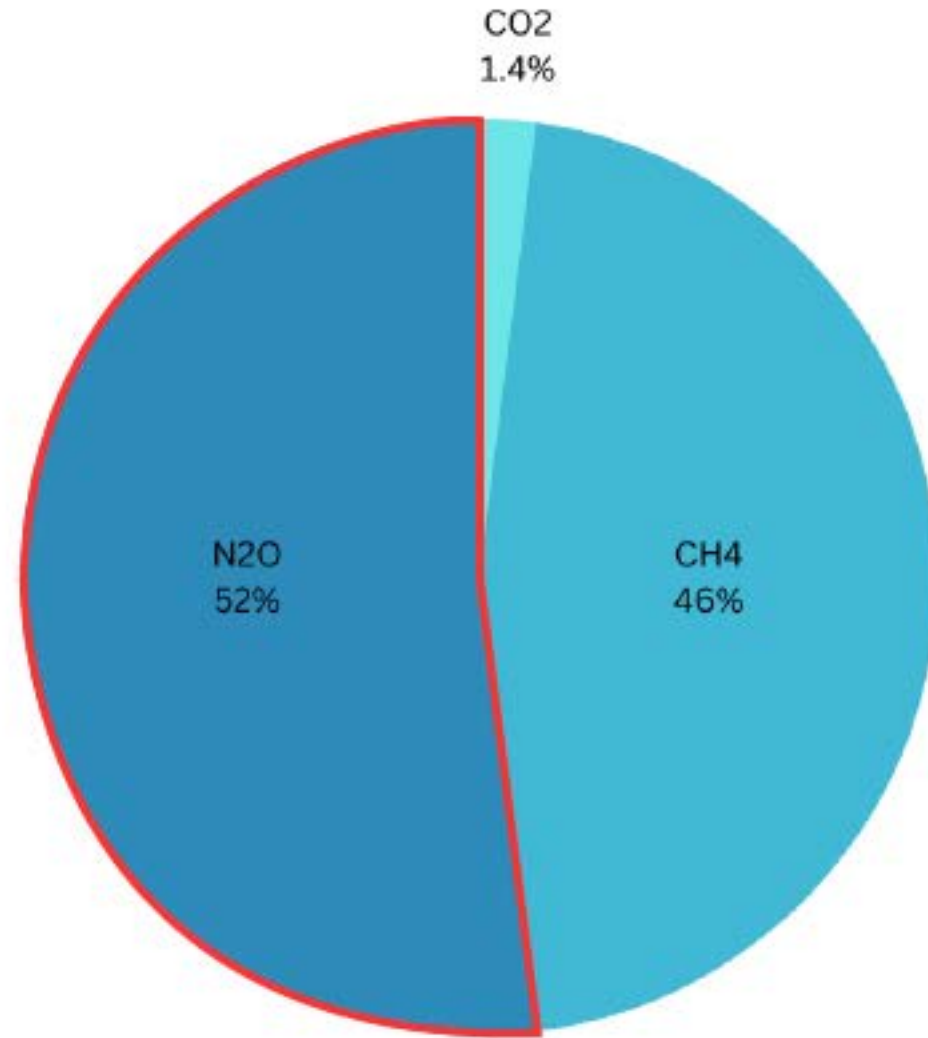
U.S.A.



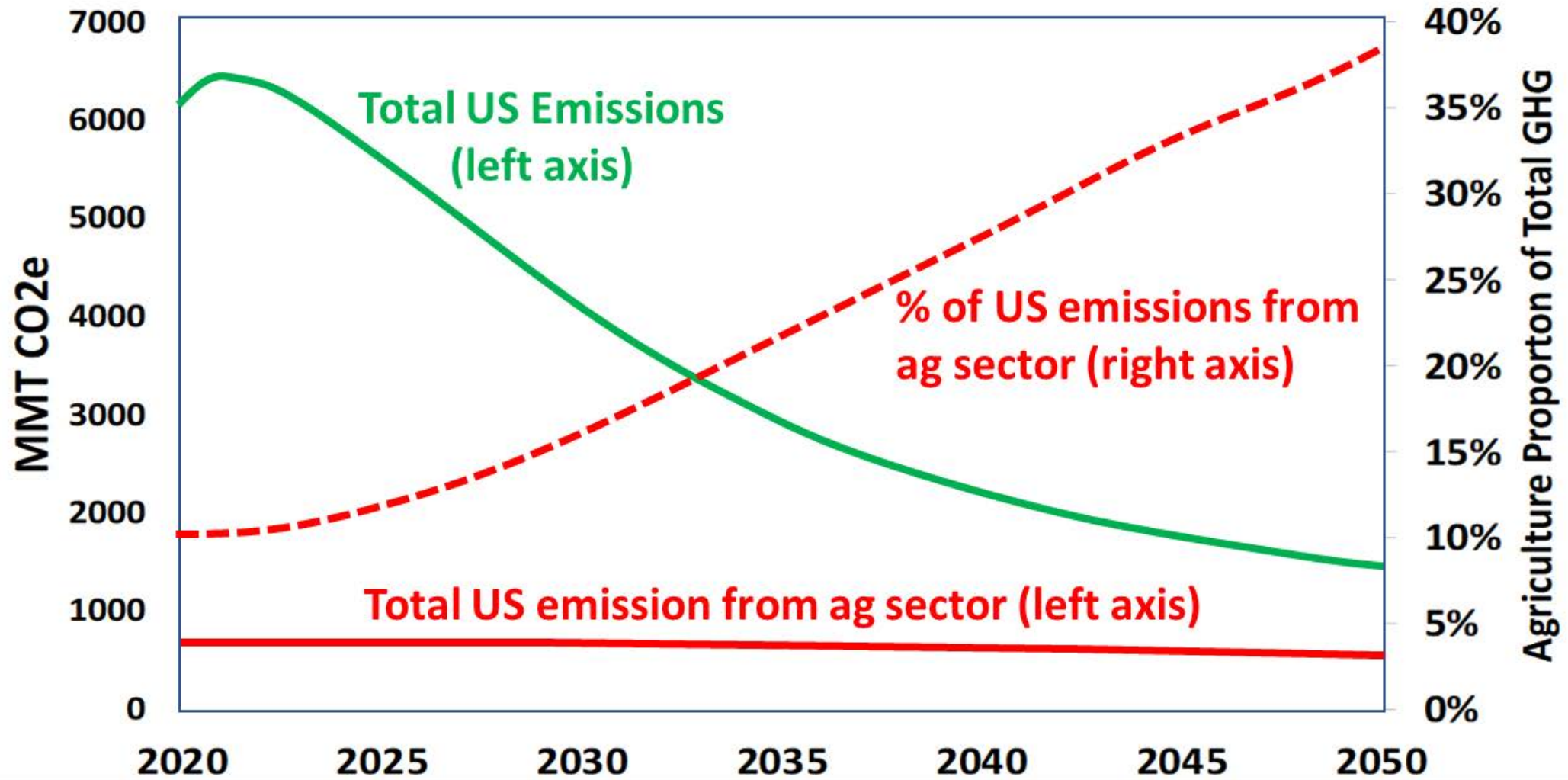
Iowa



# Sources of US agricultural emissions:



## USDA Projected US Greenhouse Gas Emissions to 2050

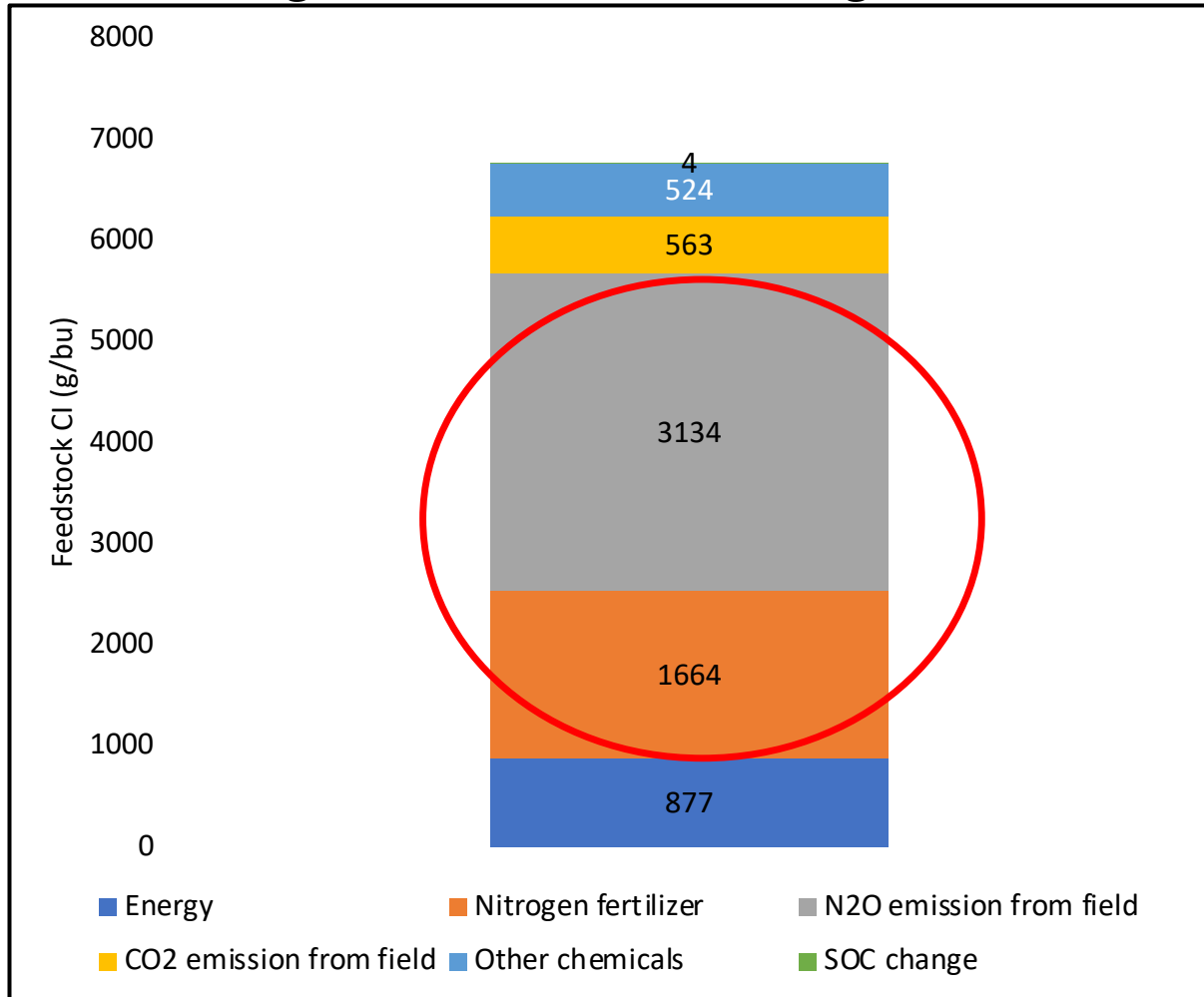


Courtesy Ed Buckler, USDA-ARS



# Corn

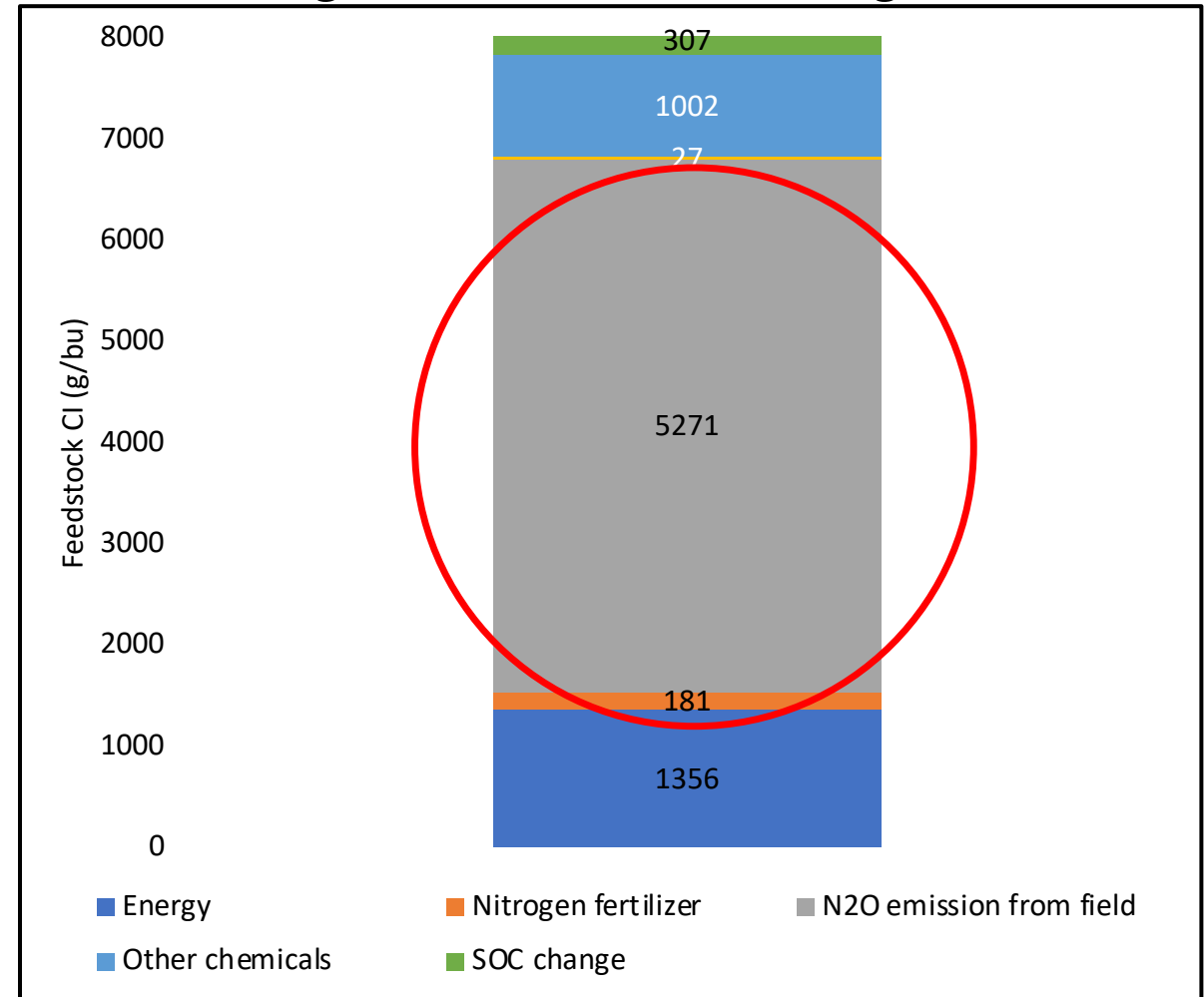
6,766 g CO<sub>2</sub>e/bushel or 1.2 Mg CO<sub>2</sub>e/ac



Nitrogen responsible for 71% of emissions

# Soybean

8,144 g CO<sub>2</sub>e/bushel or 0.4 Mg CO<sub>2</sub>e/ac

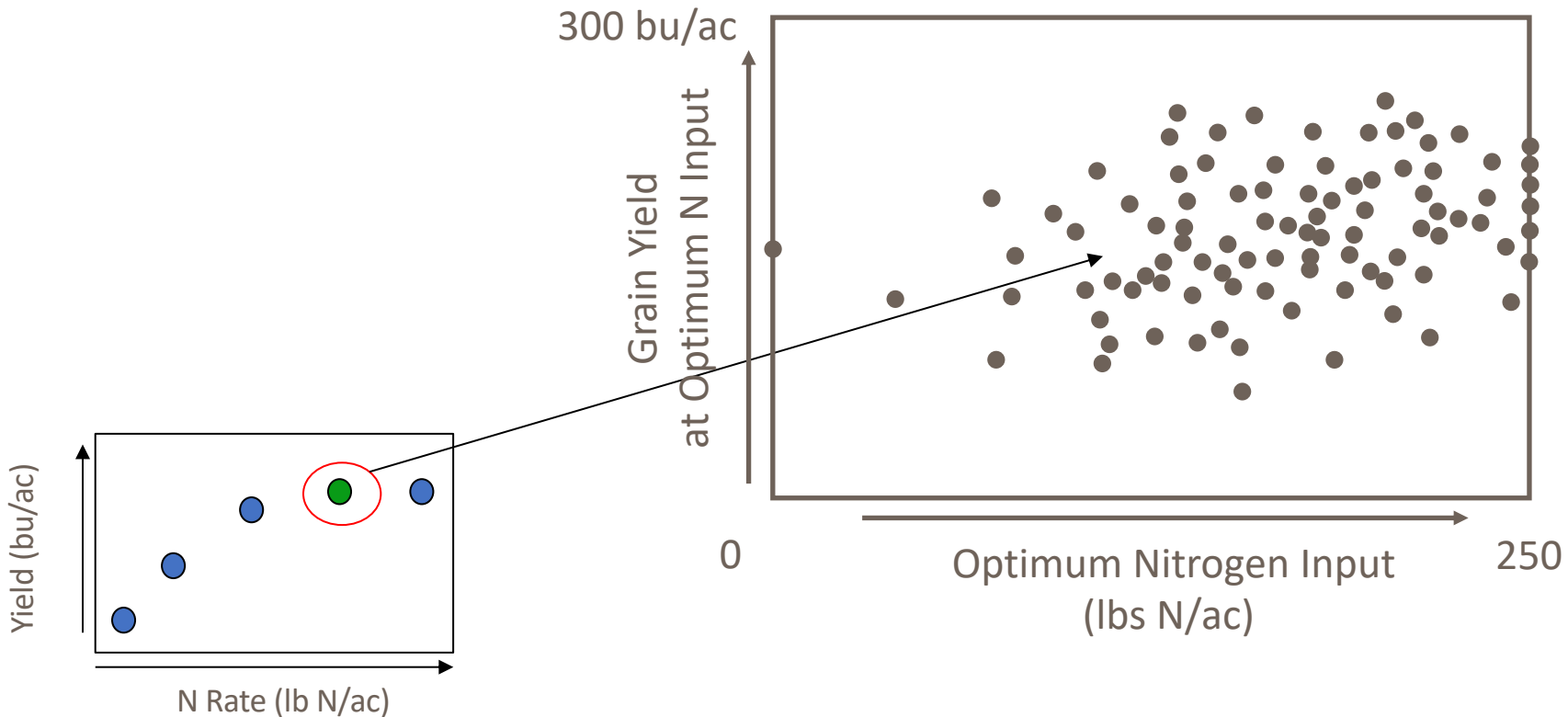


Nitrogen responsible for 67% of emissions

# Nitrogen Fertilizer Management

So what's the optimum N fertilizer rate?

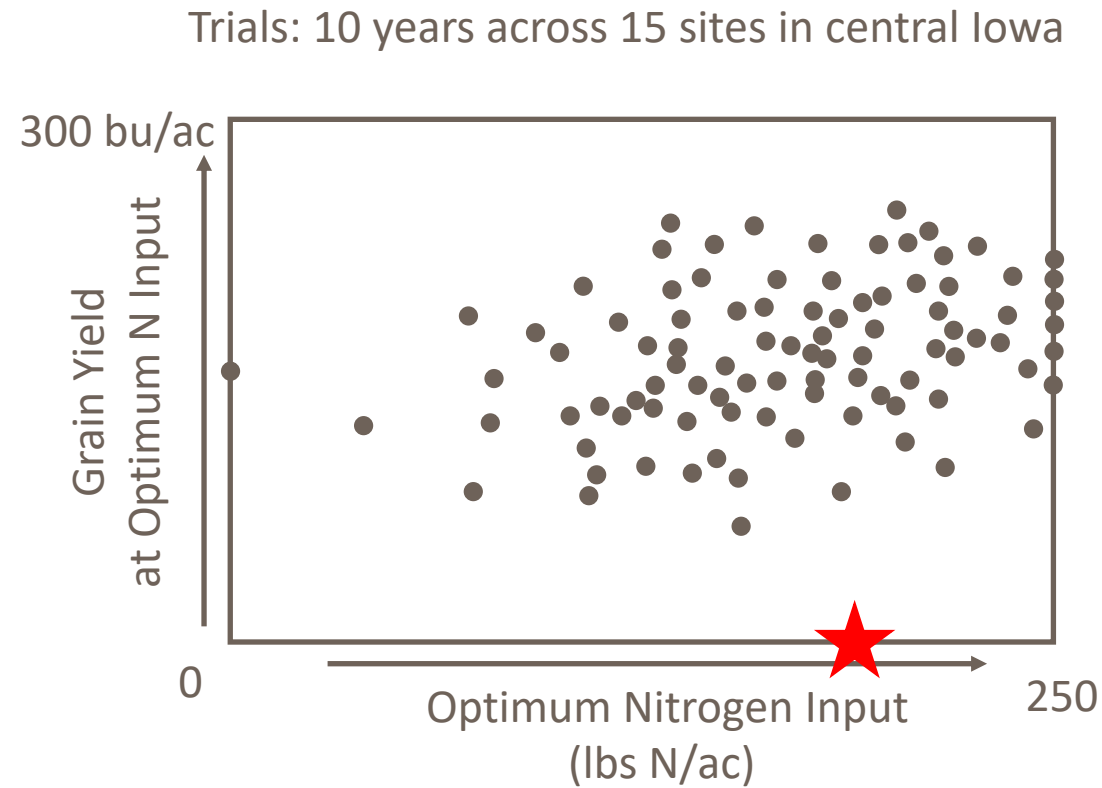
Trials: ~10 years across ~15 sites in central Iowa



*"Corn Nitrogen Rate Calculator"*  
<http://cnrc.agron.iastate.edu/>

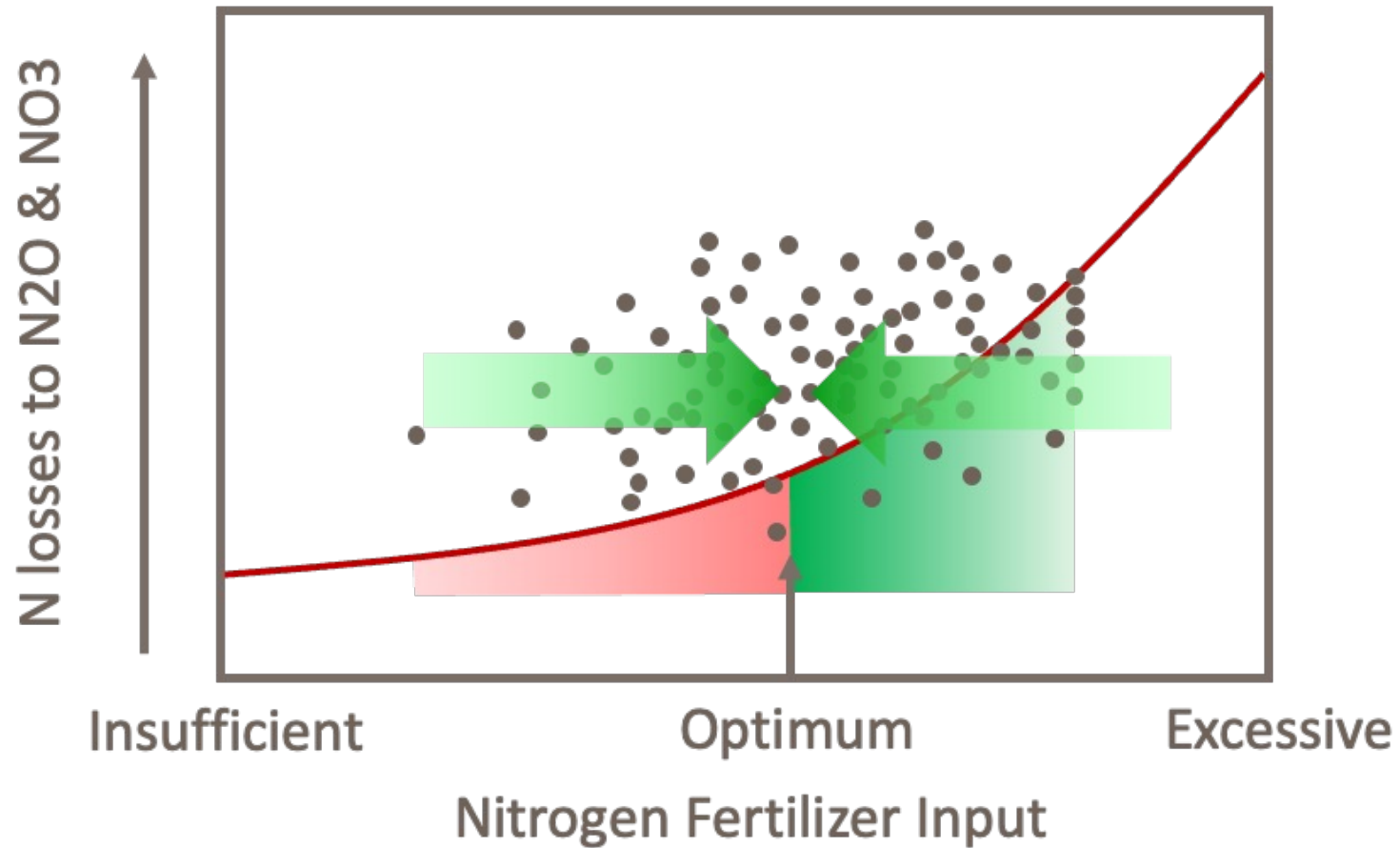
# Nitrogen Fertilizer Management

Yet, this is our best N recommendation.

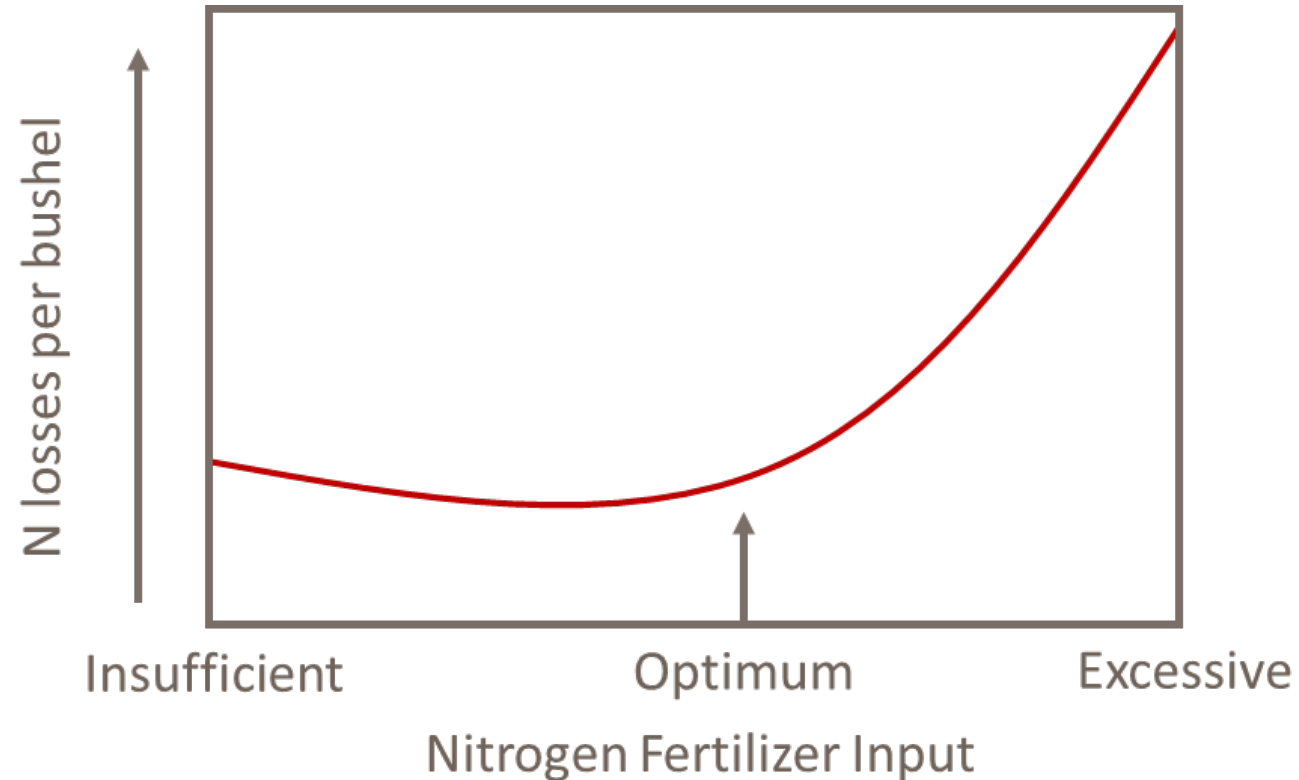


*"Corn Nitrogen Rate Calculator"*  
<http://cnrc.agron.iastate.edu/>

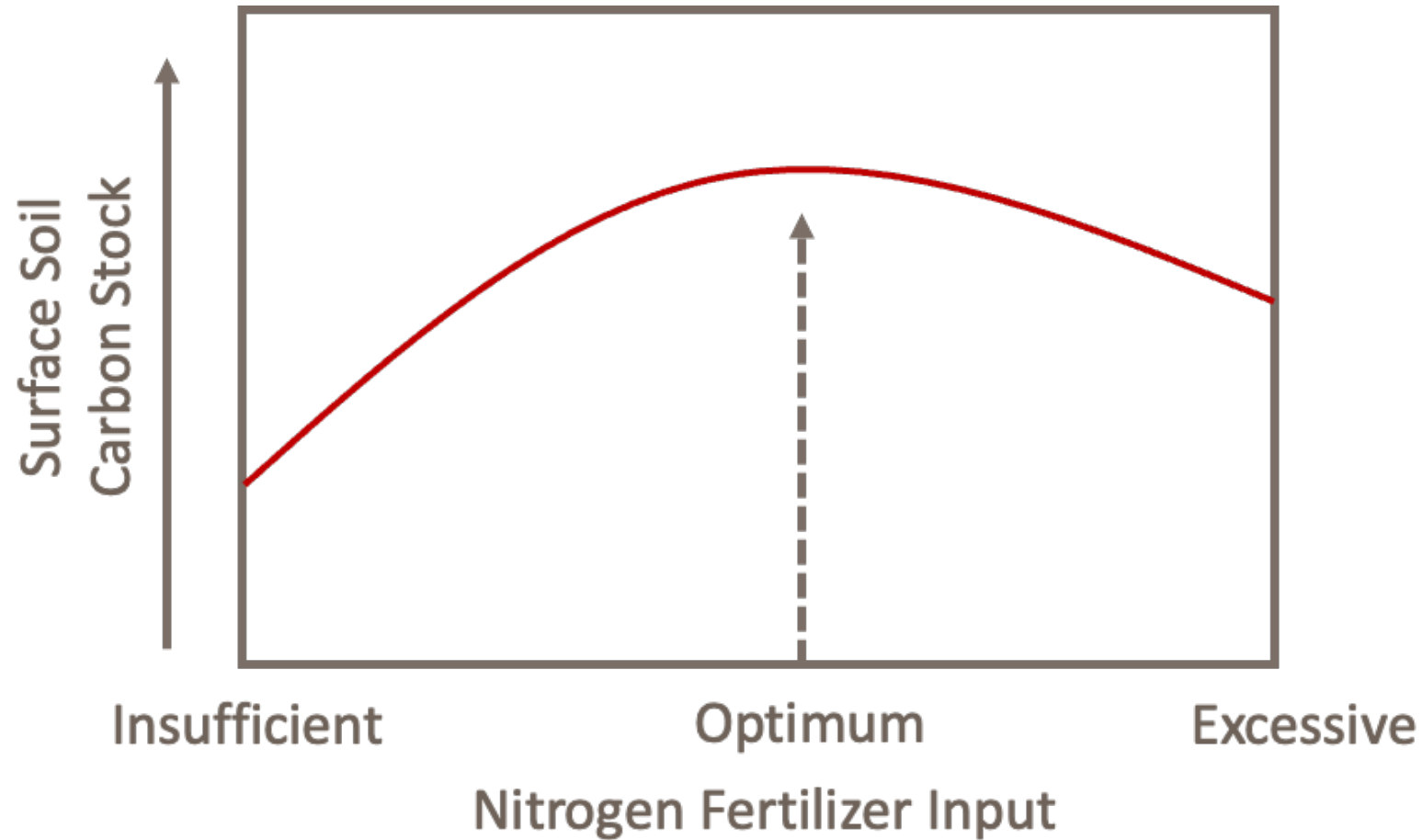
# Optimum N inputs: Environmental Performance



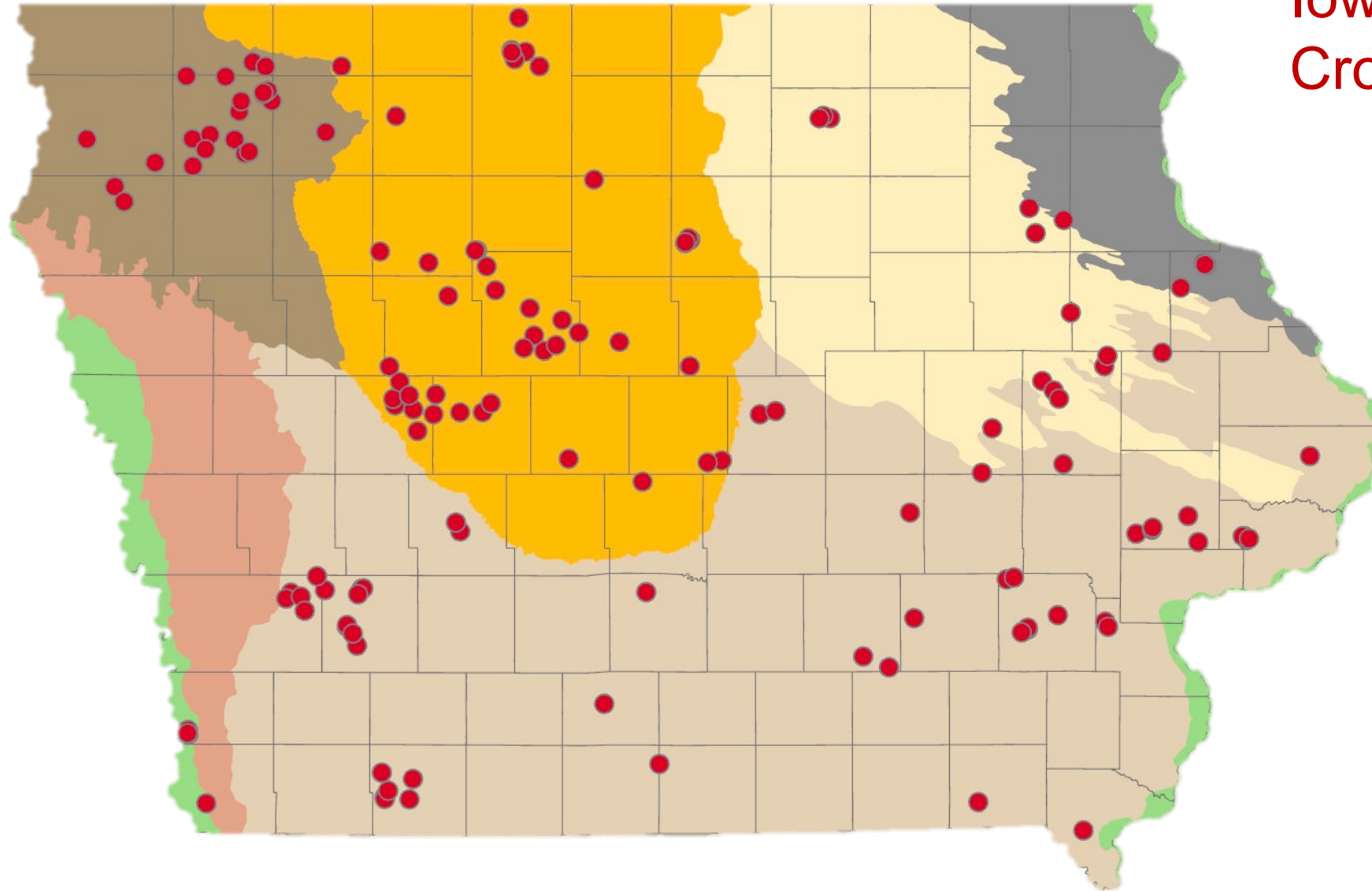
# Optimum N inputs: Environmental N Losses



# Optimum N inputs: Soil Health

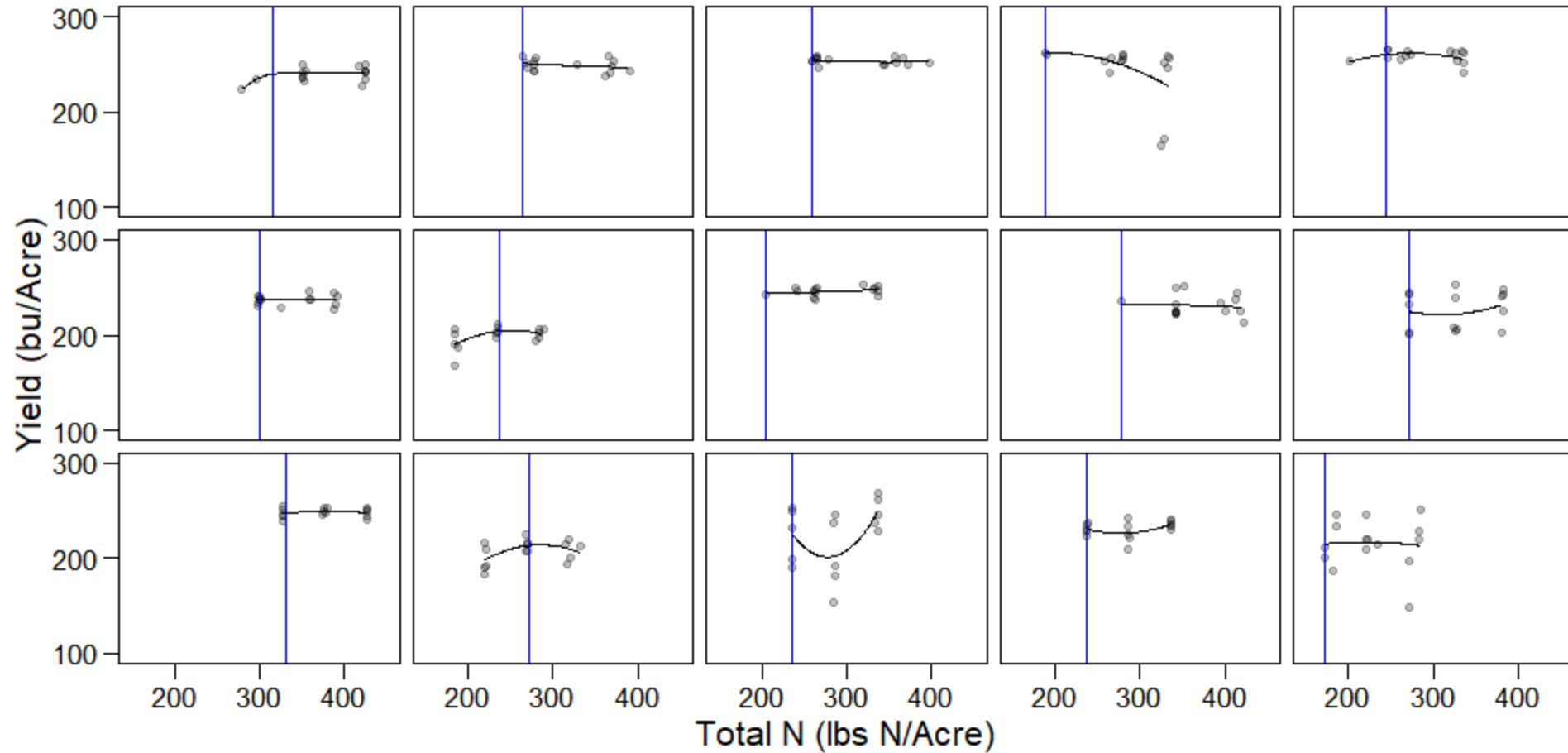


# Iowa Nitrogen Initiative Crop Year 2023



270 On-farm trials  
148 fields  
72 growers

# Same producer (Multiple fields)



EONR

171 – 331 (lbsN/Acre)

CV = 18%

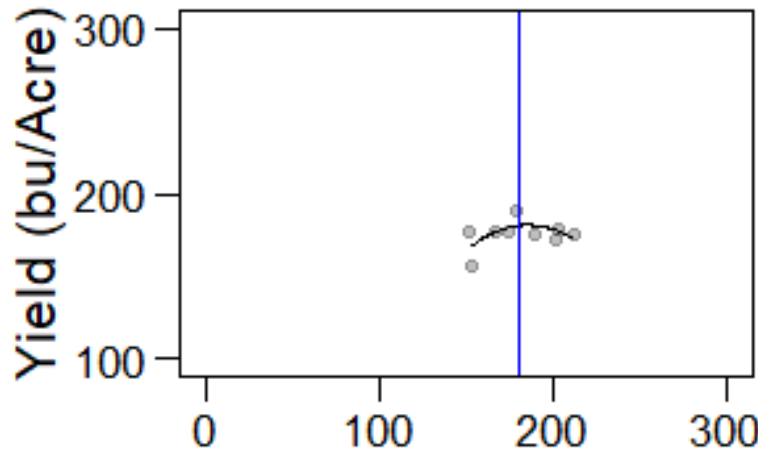
YEONR

204 – 262 (bu/Acre)

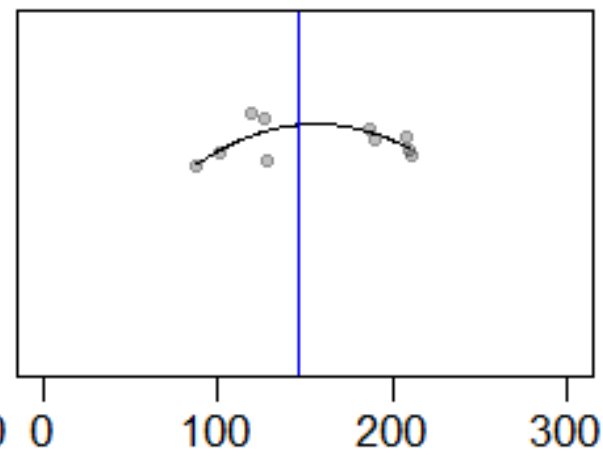
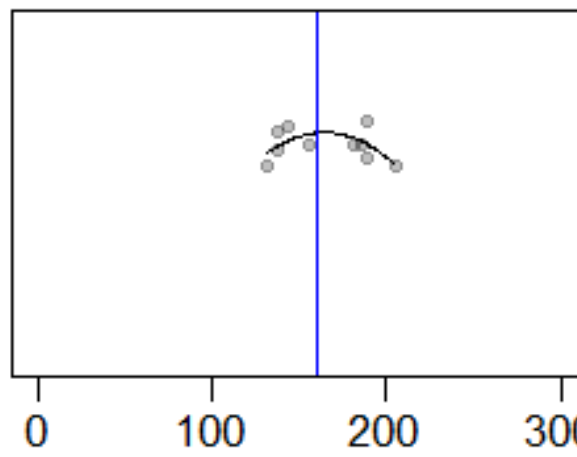
CV = 7%



Field 1 Northeast Iowa

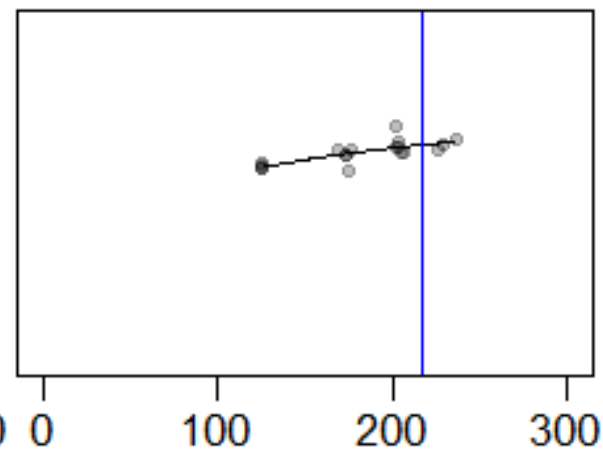
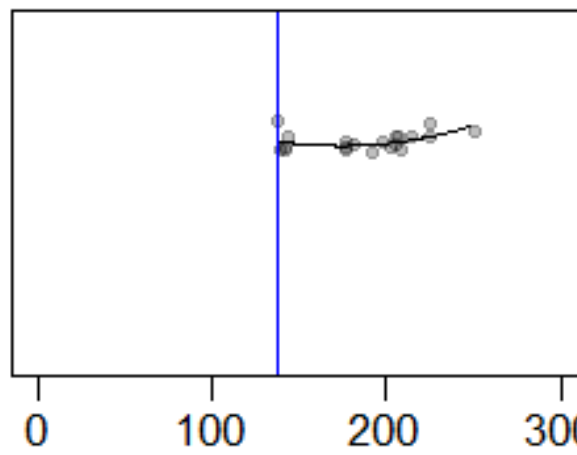
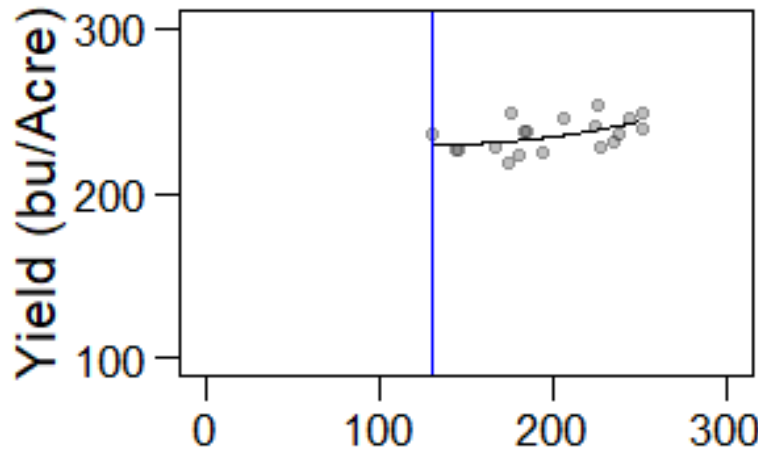


Multiple Trials in the Same Field

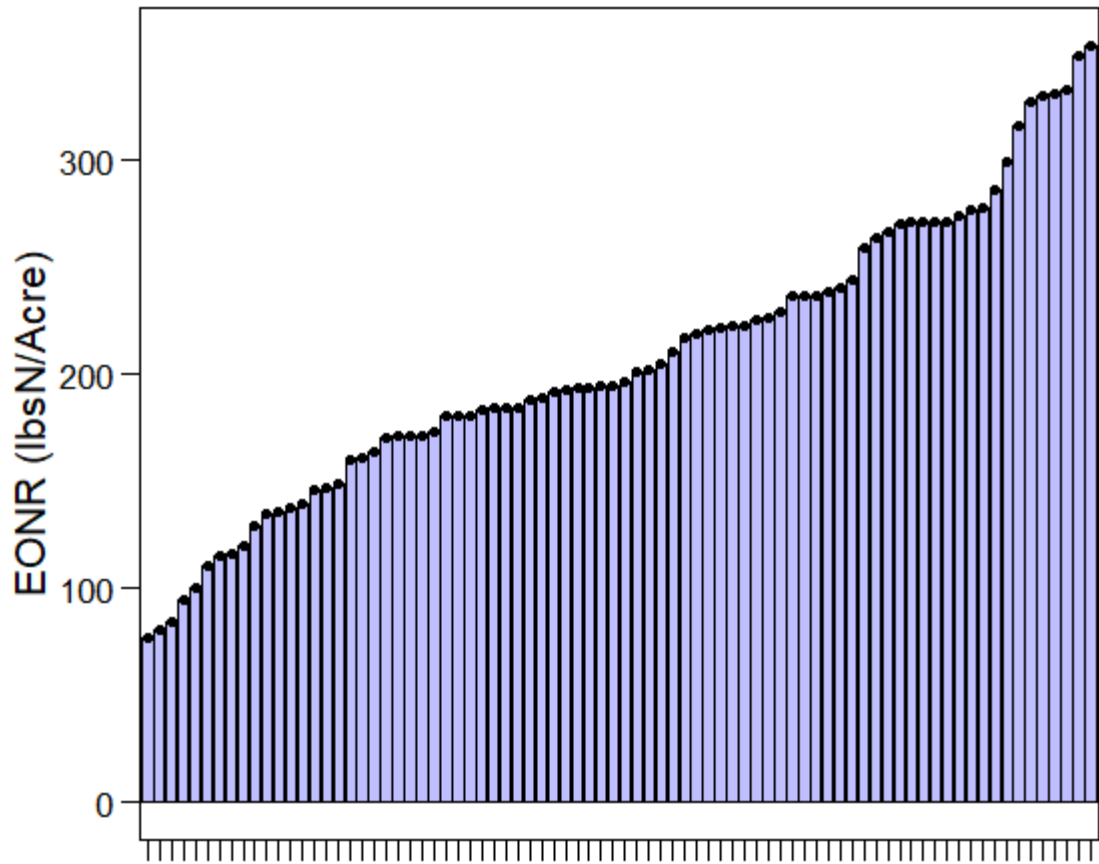


EONR  
147 - 180  
YEONR  
181 - 242

Field 2 Eastern Iowa

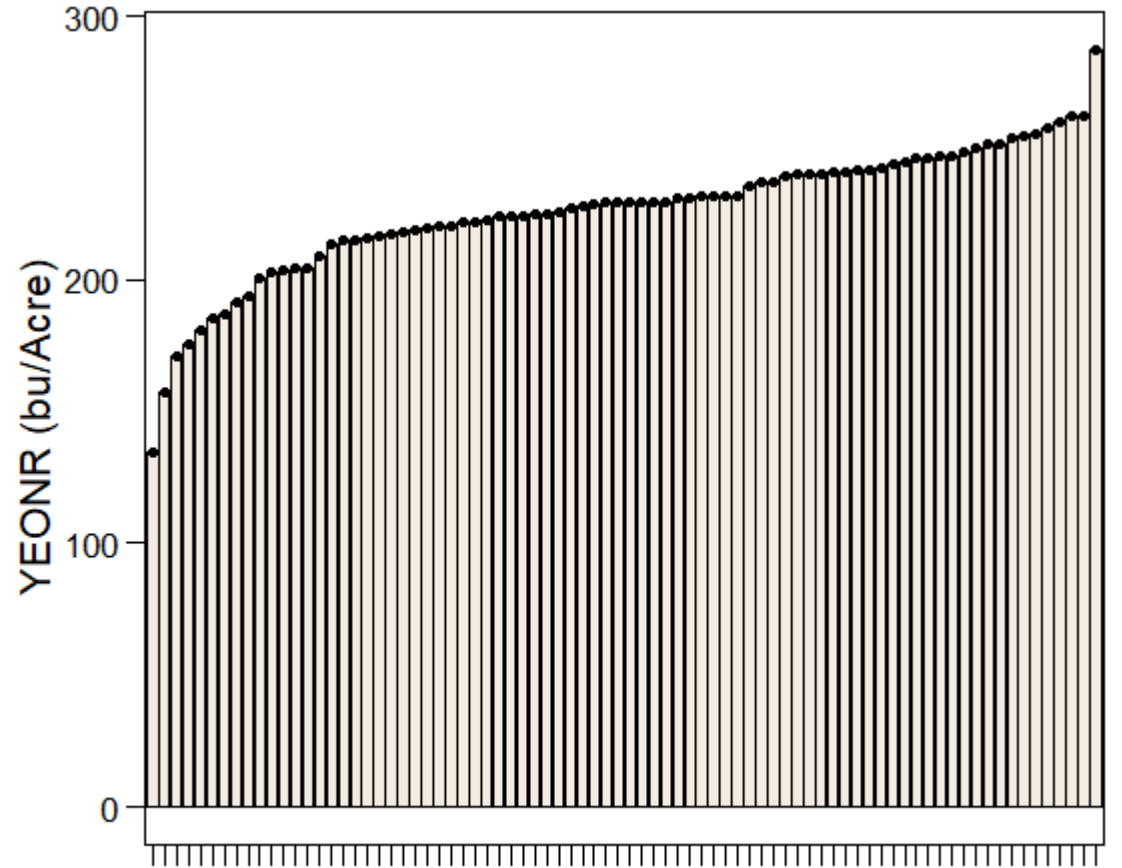


EONR  
129 - 217  
YEONR  
229 - 232



Range = 77 – 353 (lbsN/Acre)

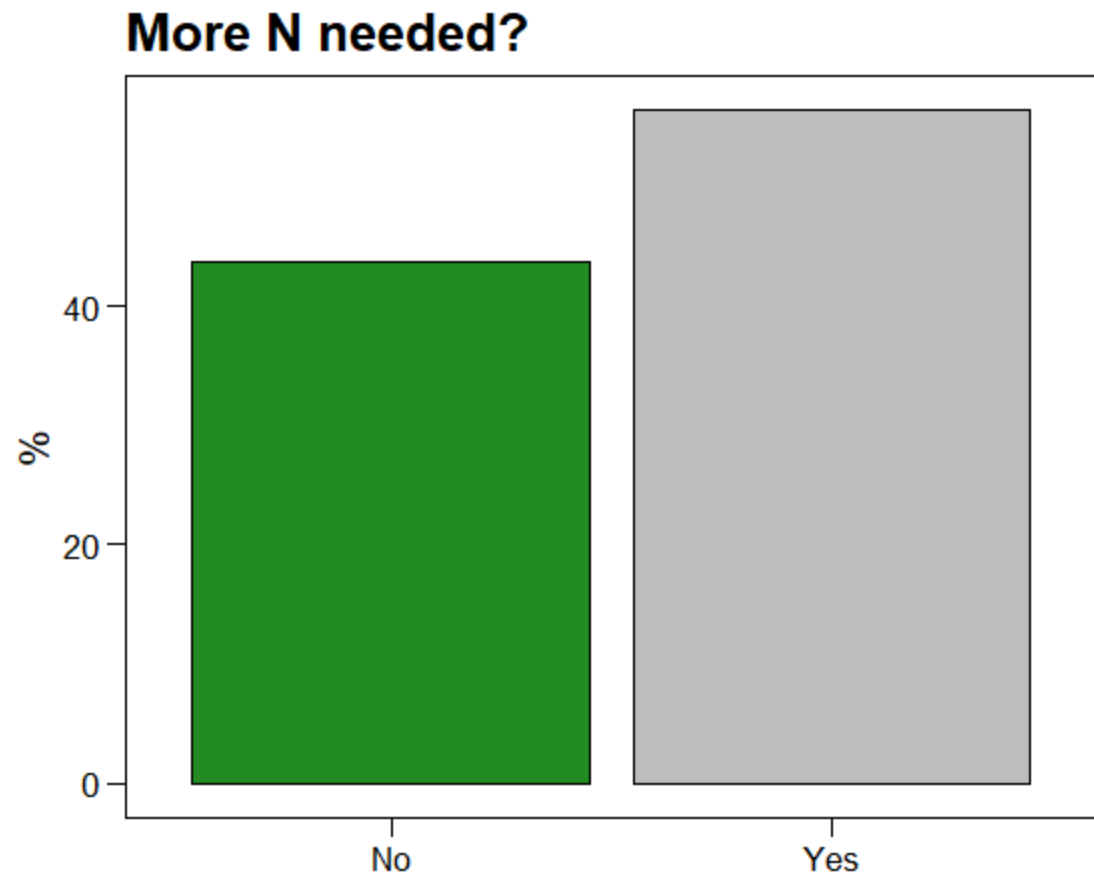
CV = 32%



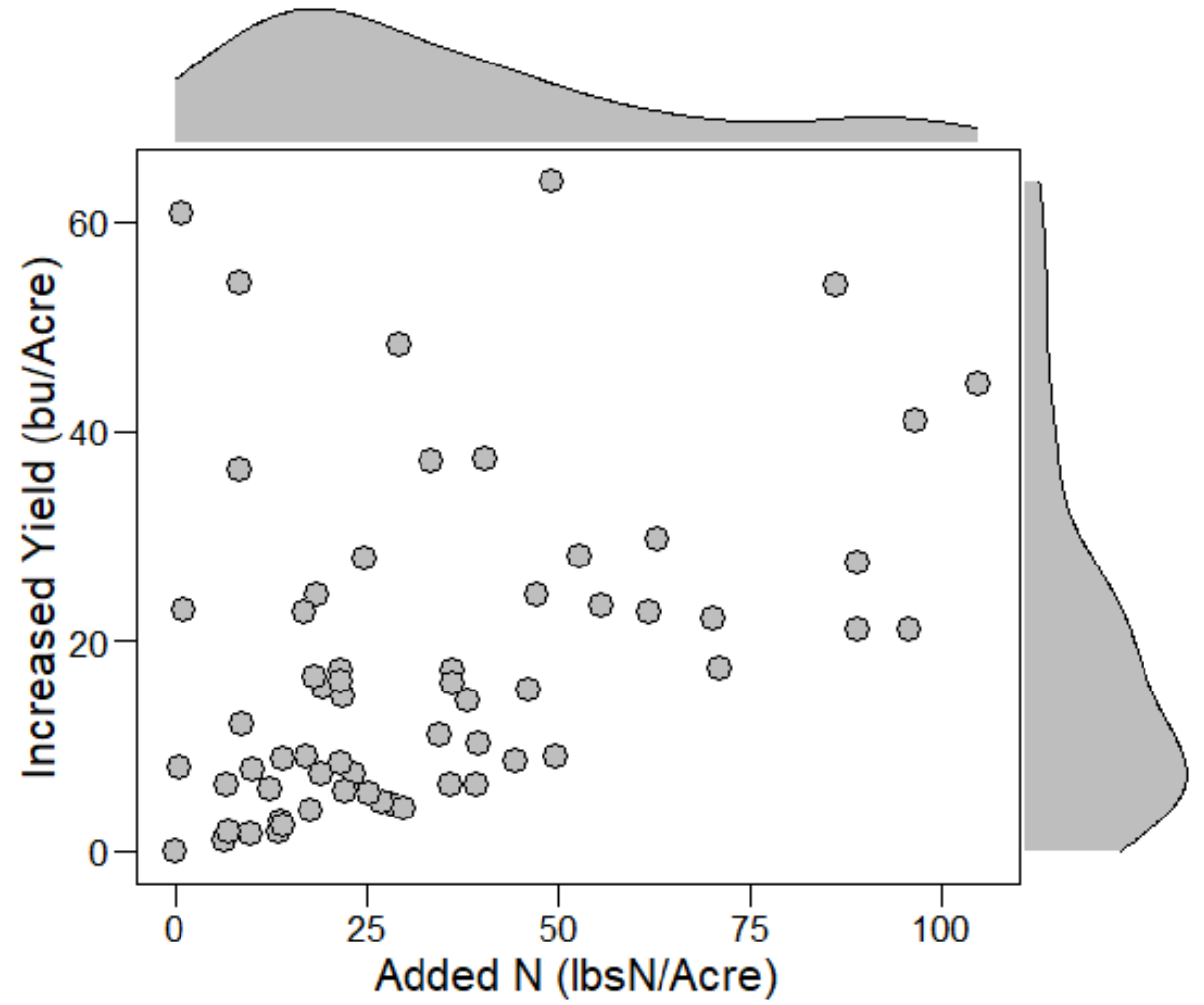
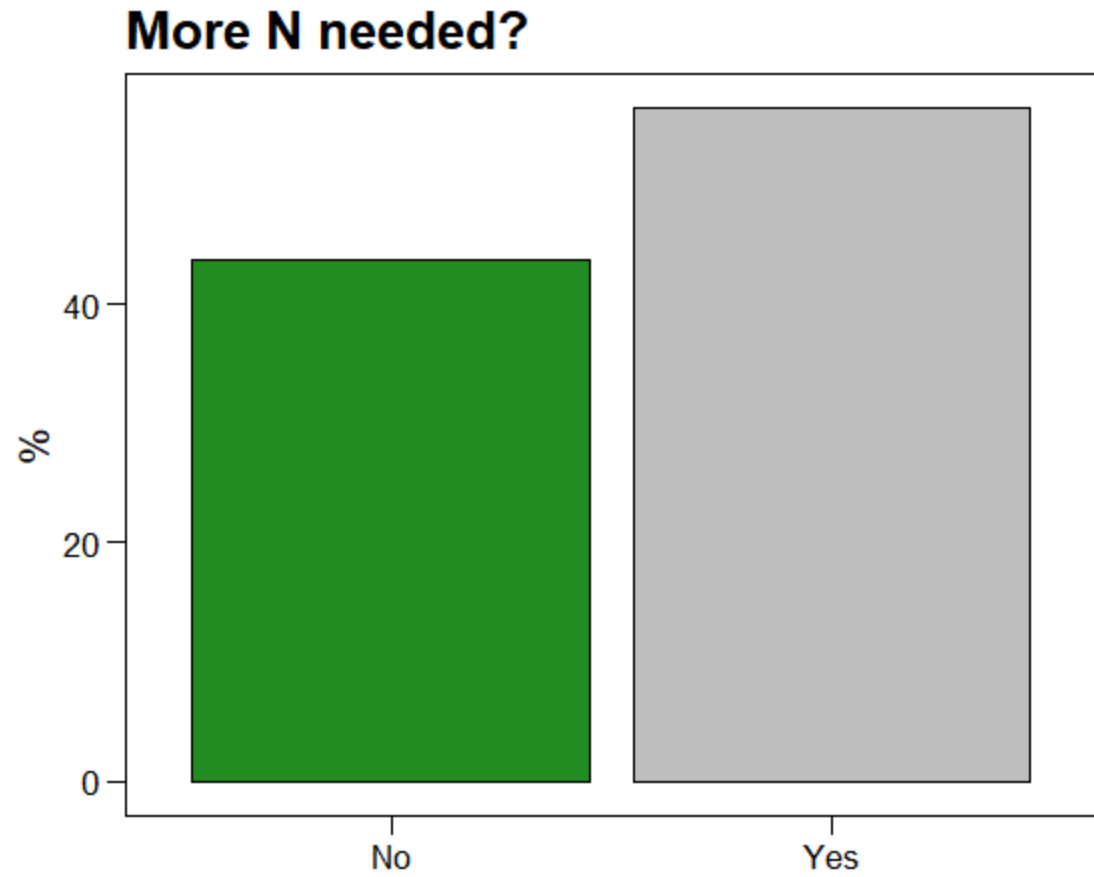
Range = 134 – 287 (bu/Acre)

CV = 10%

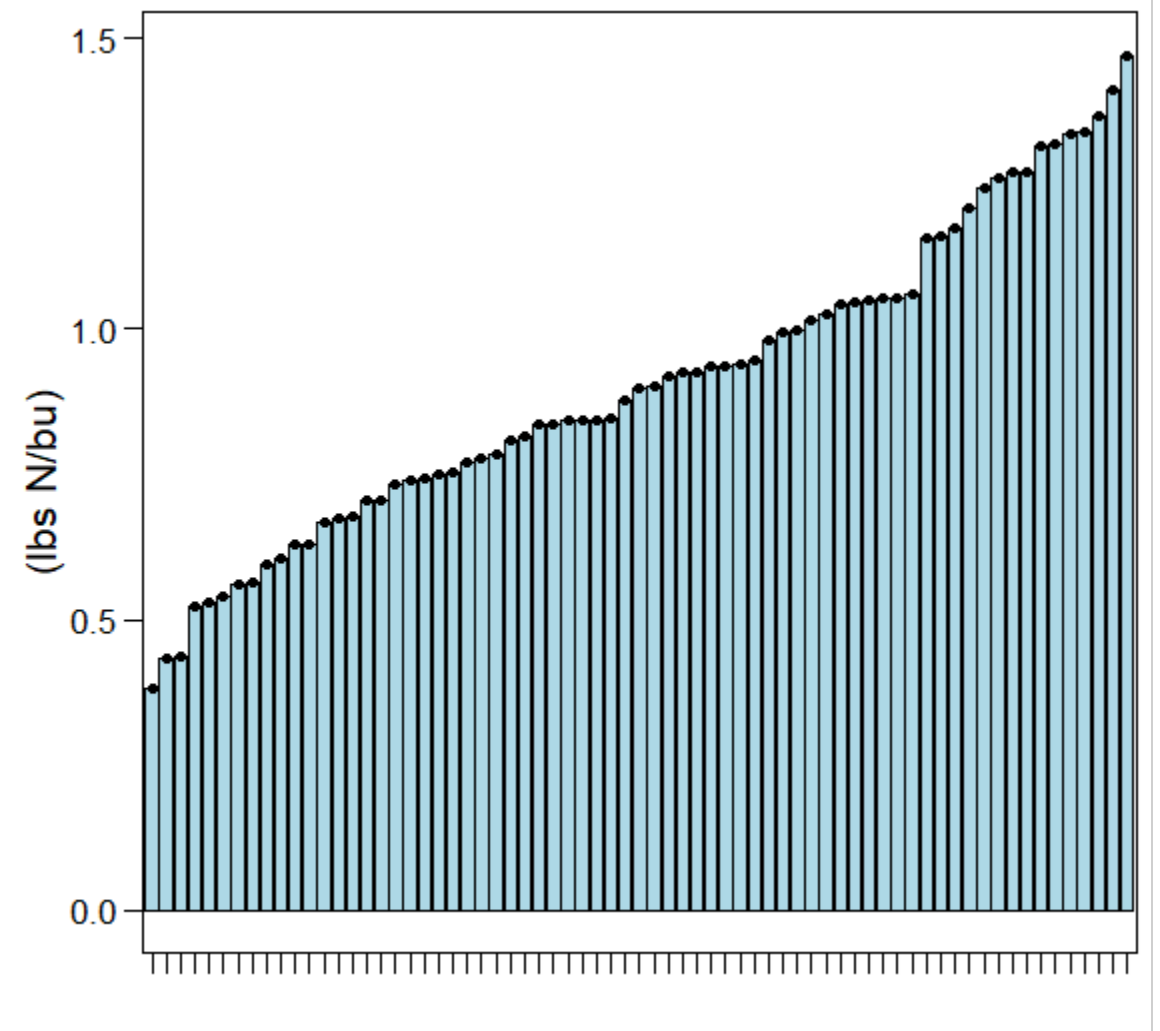
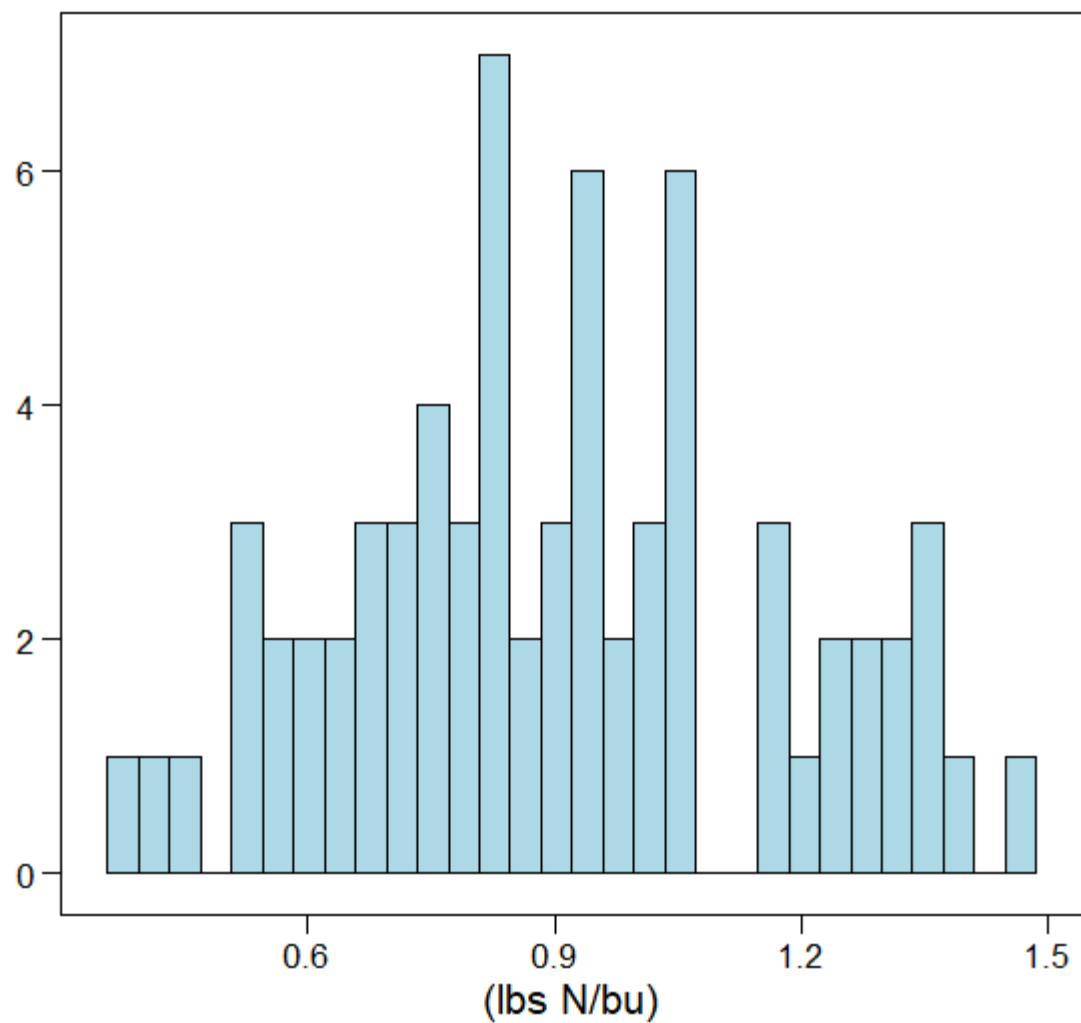
# Does sidedress pay in a year like 2023?



# Is sidedress needed in a year like 2023?



# Nitrogen use efficiency (lbs N/bushel) at the economic optimum nitrogen rate:



# 2024 Participation

## -Numbers

-44 Trials placed this fall

-14 new growers in the prospect list

## -Obstacles to participation

-Access to VRT

-Data privacy



# Data Privacy

Few concerns are heard.

But, some talking points:

*-ISU only gets the data from inside the trial area*

*-Trial data is exported, analyzed, and entered into the database without names, addresses, or contact information*

*-Information is protected by an exemption from public records requests*

If someone tells you they're not participating, ask them why!

# 2024 Recruitment

-Strategy

- return participants
- small group visits
- media

**Partnering for Better Nitrogen Science**

INVESTING CHECKOFF DOLLARS

The Iowa Soybean Association is joining forces with Iowa State University to conduct on-farm field trials through the Iowa Nitrogen Initiative.

**From Manure to Money: Researching a Model for Nitrogen Efficiency**

When it comes to the 48% of nutrient stewardship (the right source, rate, time, and placement), the right rate of nitrogen may be the hardest to predict from year to year - especially when deciding how much to supplement your manure application.

**2023 June Stewardship Advocate**

Posted on July 28, 2023 at 3:33 PM by Stewardship Advocate

LEARN MORE ABOUT THE IOWA NITROGEN INITIATIVE

The Iowa Nitrogen Initiative (INI) is a private-public partnership with a vision to provide Iowa farmers with the best nitrogen science in the world for the benefit of productivity, profitability, and environmental performance.

# Consider participation in nitrogen trial

AUTHOR PUBLISHED  
Bob Bjojn 2/20/2023



ISU's Michael Castellano discusses Iowa Nitrogen Initiative data with a group at the Agribusiness Association of Iowa Showcase. PHOTO / BOB BJOIN

TOPICS: **Crops** **Conservation & Natural Resources**

- Share
- Tweet
- Email

In other words, the manure application provided more than enough nitrogen to grow the best crop that year and additional N did not need to be applied. This kind of information saves time and money.

**Experimenting with cover crops**

As part of a USDA-funded grant awarded in 2021, INI in future years will also look specifically at optimum nitrogen rates on manured fields with cover crops. It's part of a project called Horizon II: A climate-smart future for corn, soybean, livestock, and renewable natural gas production.

**Research, continued from p. 11**

said Rudolph, a native of Burlington, Wis., whose graduate work is focused on genetics and genomics. She added that heat stress costs the U.S. swine industry nearly \$1 billion annually.

Missey Roths, a graduate student in ISU's animal physiology program, received third place and \$500. She and four others are named on research that suggests heat damage from heat stress could contribute to decreased animal performance. Gilt spent 24 hours in nearly 100-degree conditions before their hearts were collected, weighed, and dimensions measured.

"We were kind of shocked to see some of the changes after such a short time," said Roths, from Clarion.

Another round of judging was determined by Iowa Pork Congress attendees. The Producer's Choice winner was Gabby Myers, from Underwood, a graduate student in ISU's Department of Agricultural and Biosystems Engineering.

She received \$500 from IPRA for her project that assessed the impacts of agricultural management practices on corn yield and drainage water quality. Myers and her team compared varying nitrogen fertilizer sources and application timing (fall vs. spring), as well as the performance of annual and perennial cover crops.

A total of 12 research projects were in the contest. The posters were displayed at the IPIC booth during both days of the Iowa Pork Congress trade show.

**Other participants in the contest were:**

- Vishesh Thabisa, New Delhi, India; Logan Johnson, Rochester, S.D.; and Jacob Mastenburch, Okmaha, all graduate assistants in the Department of Animal Science.
- Betsy Armenta-Leyva, Los Mochis, Sinaloa, in Mexico; Daniel Morales, Ames; Benjie Murguiala-Ramirez, Mexico; and Rodrigo Pavia, Abre Campo, in the Brazilian state of Minas Gerais, all students in ISU's Veterinary Diagnostic and Production Animal Medicine.
- Grzegorz Tarasiuk, Pulawy, Poland, Veterinary Diagnostic Laboratory.

of terminating them before row crops are established". The project will put economic value on restored native prairie grasses and forbs by converting the sustainably harvested biomass and manure into clean, renewable natural gas.

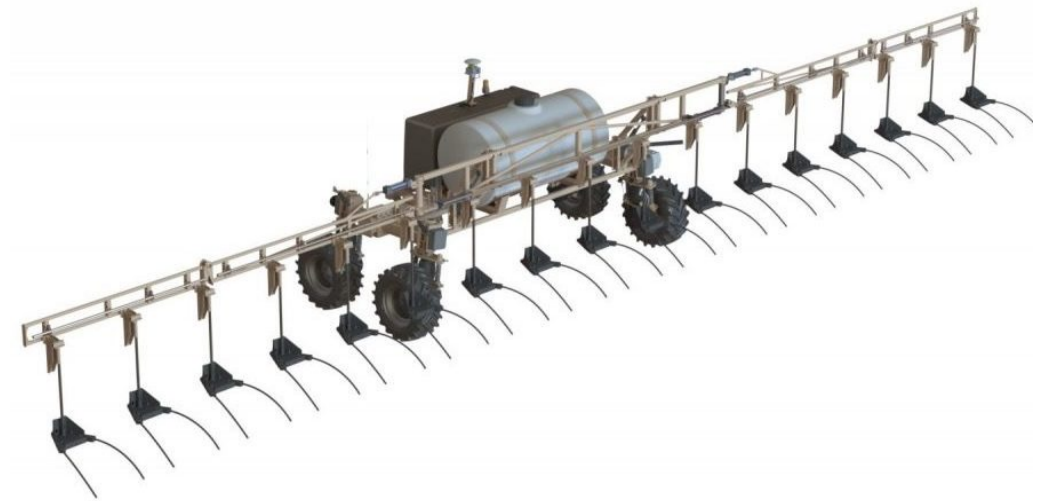
Scan to read more about INI.



# Additional Research Focus for 2024

Hoping for a different weather year!

- Planting date and tillage comparisons (ISU research farms)
- Corn-soy rotation with winter rye
- Autonomous N application
- Residue removal



# Decision Support Tool Development



Task	Y1Q1	Y1Q2	Y1Q3	Y1Q4	Y2Q1	Y2Q2
Design sprint	█					
PRD Development	█	█				
Customer discovery		█	█	█		
Build research database		█	█	█		
Development environment ready		█	█	█		
App dev, design, engineering					█	█
User Sessions					█	
Prep Launch						█
Launch						█



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[agron.iastate.edu/INI](http://agron.iastate.edu/INI)