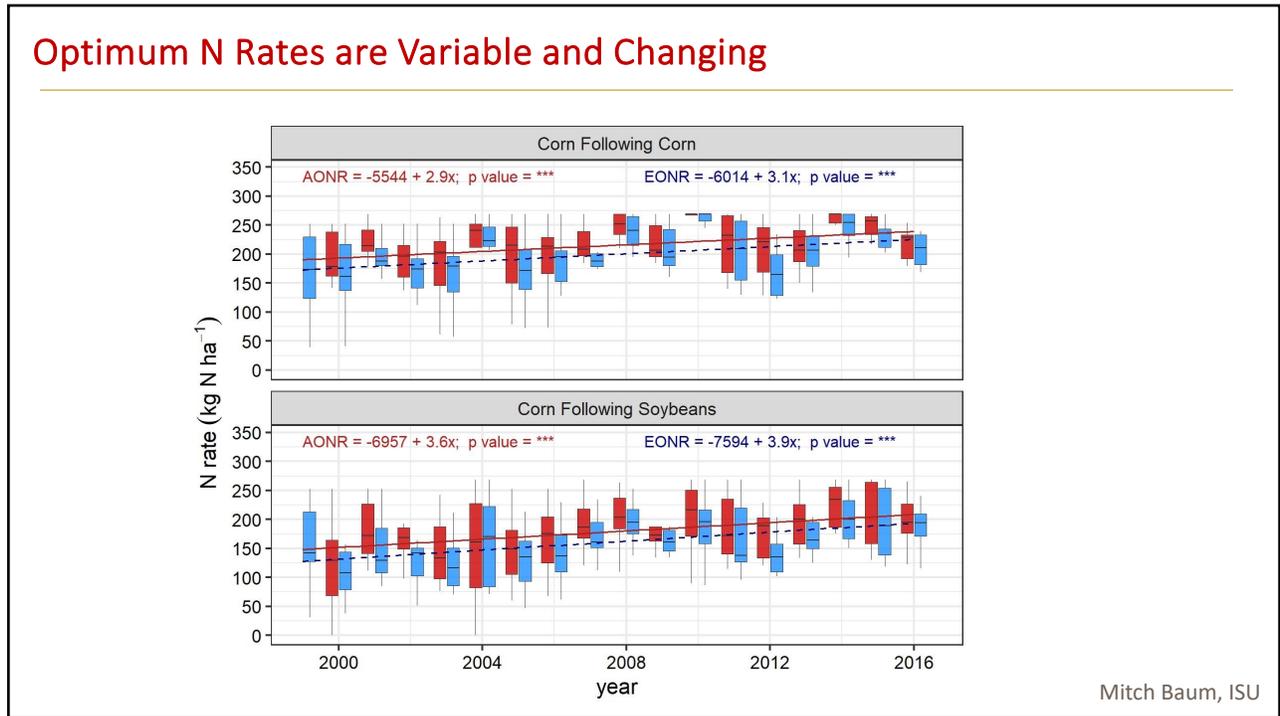


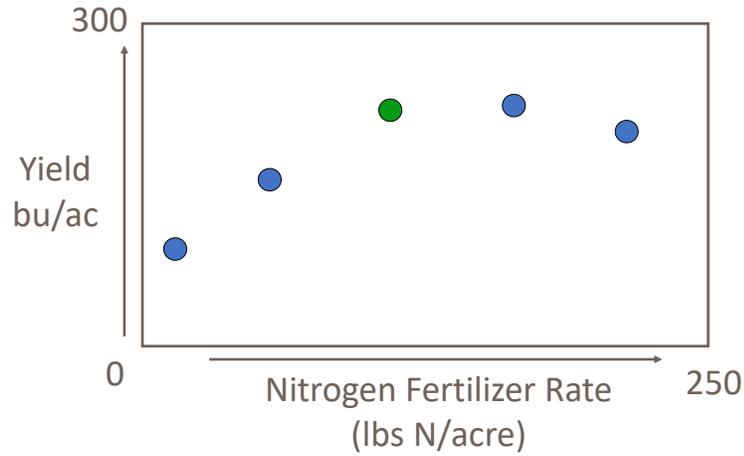
1



2

Nitrogen Fertilizer Management

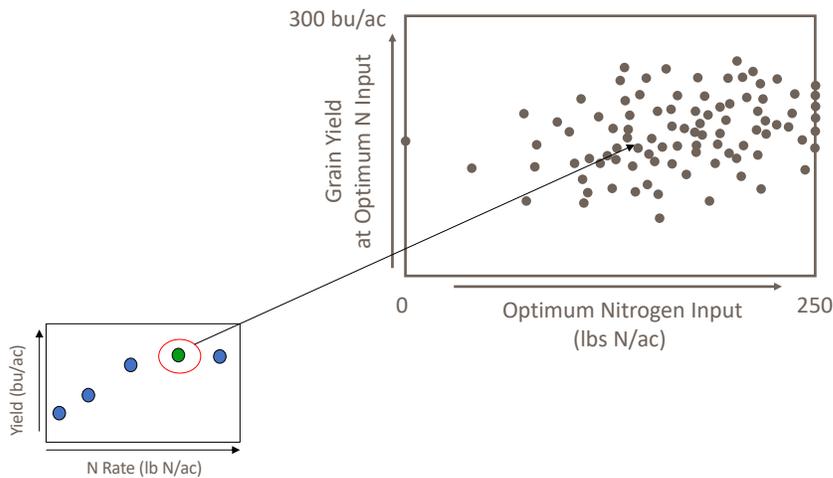
Crop yield generally increases with nitrogen fertilizer input



3

So what's the optimum nitrogen fertilizer rate:

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

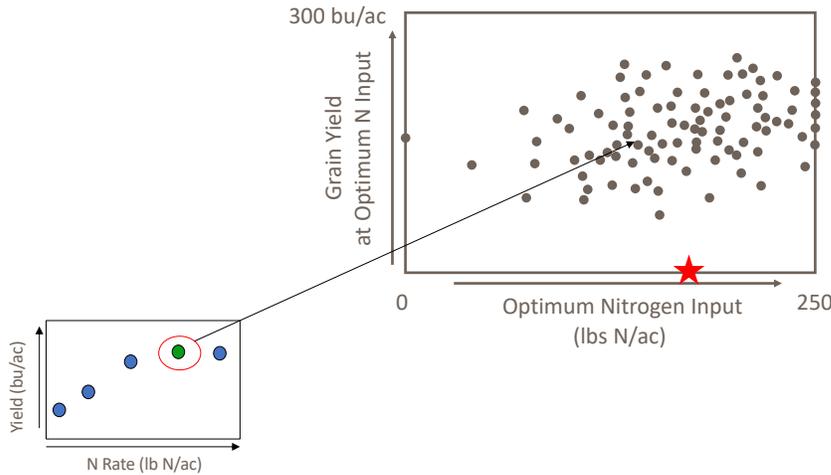


“Corn Nitrogen Rate Calculator”
<http://cnrc.agron.iastate.edu/>

4

Yet this is our best recommendation:

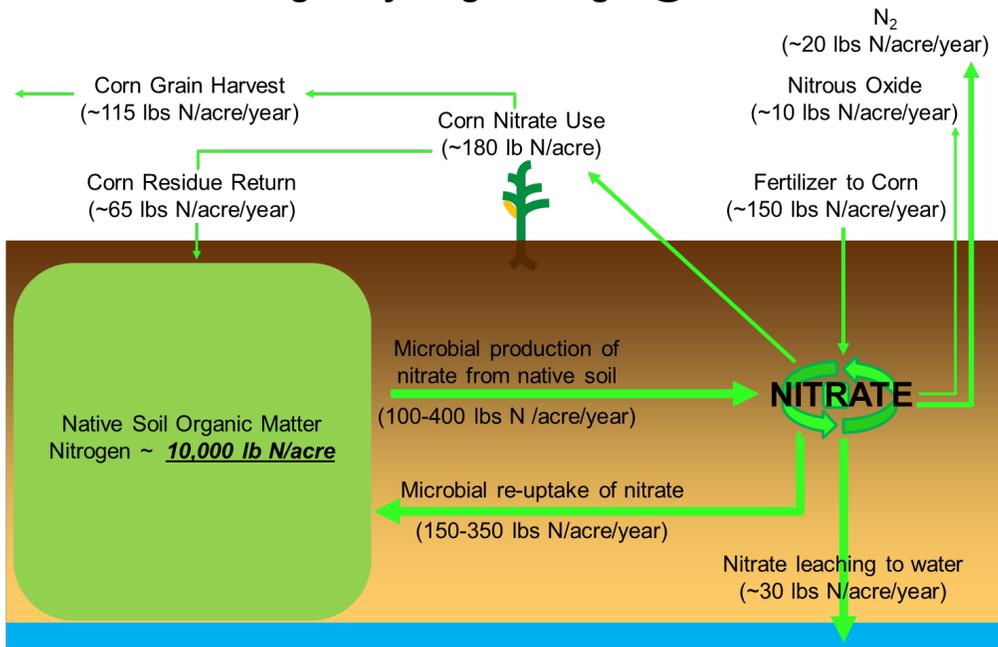
Trials: ~10 years across ~15 sites in central Iowa



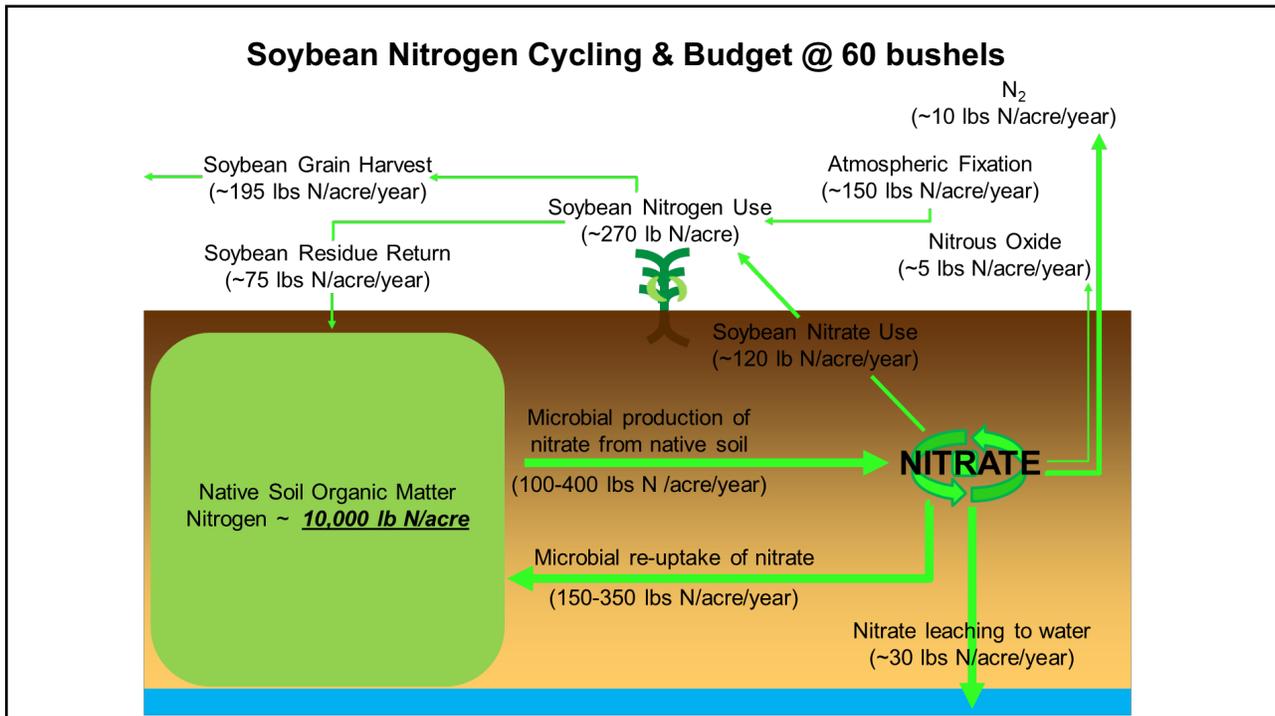
“Corn Nitrogen Rate Calculator”
<http://cnrc.agron.iastate.edu/>

5

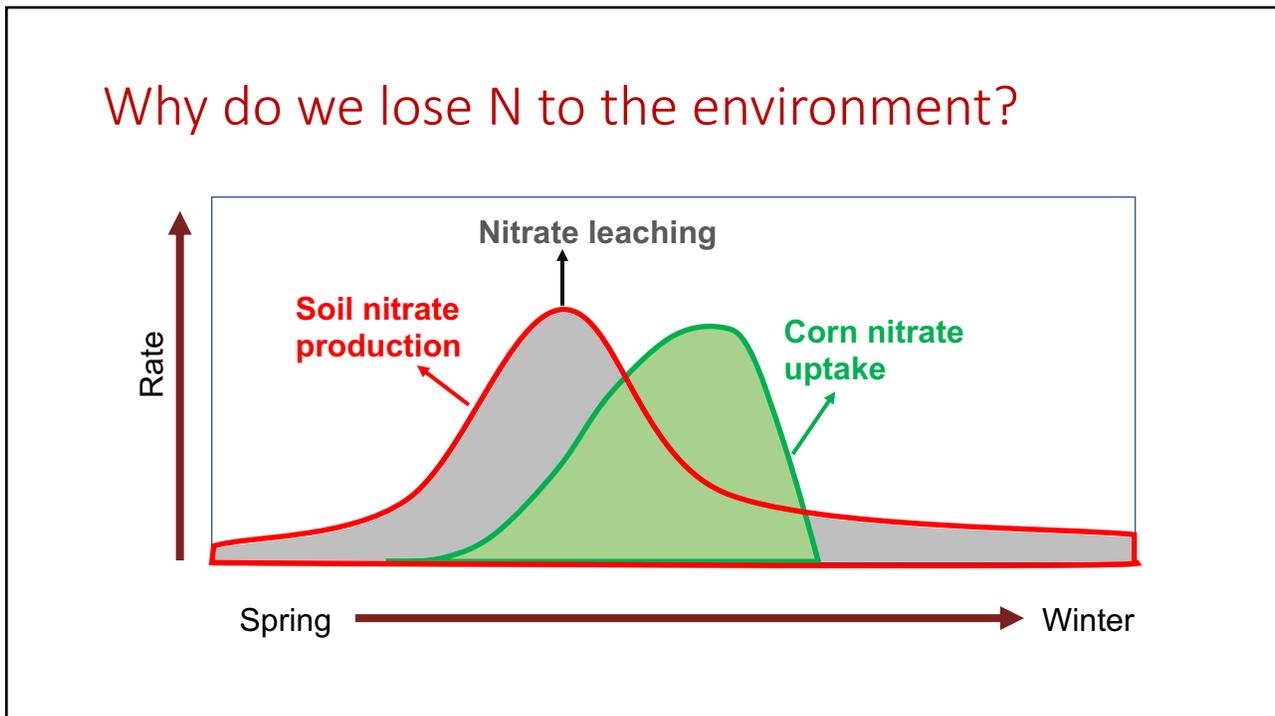
Corn Nitrogen Cycling & Budget @ 200 bushels



6



7

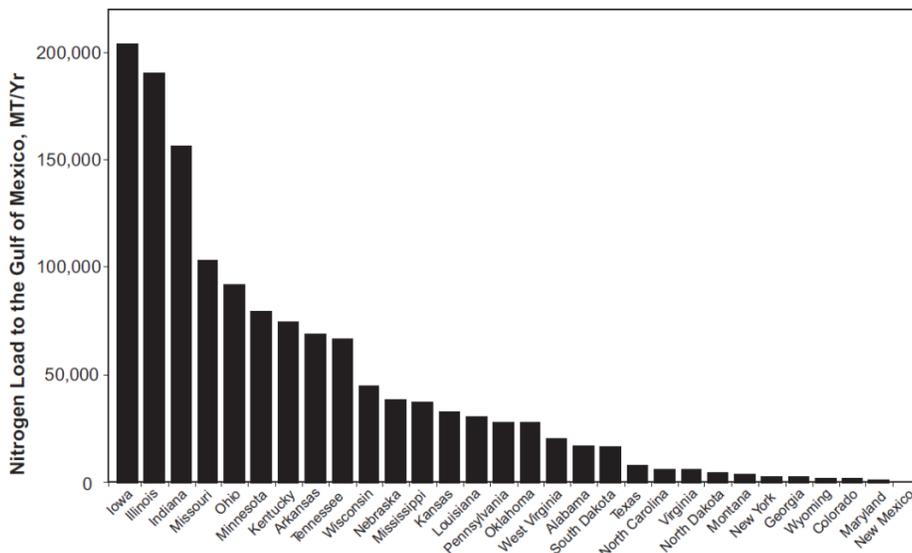


8

What are the consequences?
(why do we need to improve)

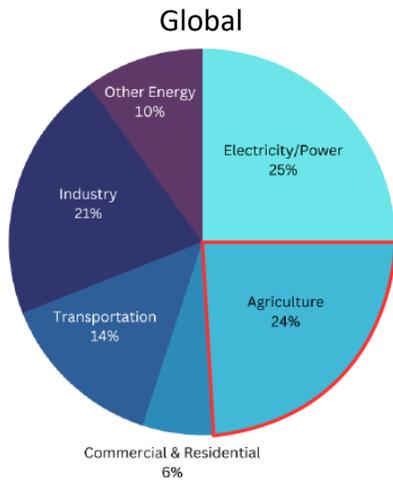
9

Nitrate loading to the Gulf by state:



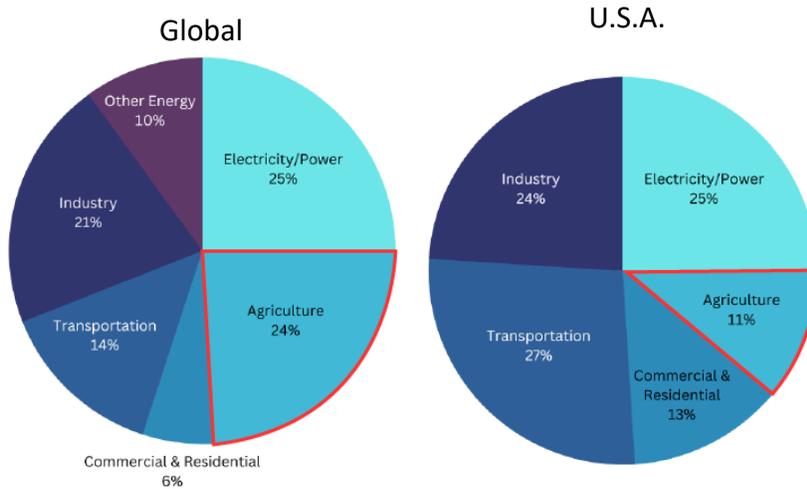
10

Greenhouse Gas Emissions by Sector:



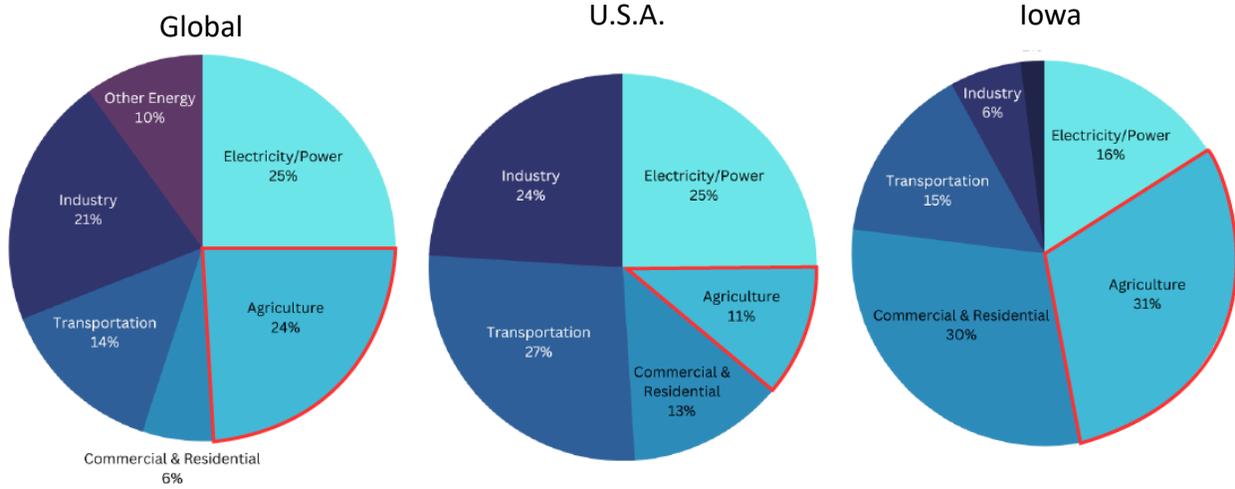
11

Greenhouse Gas Emissions by Sector:



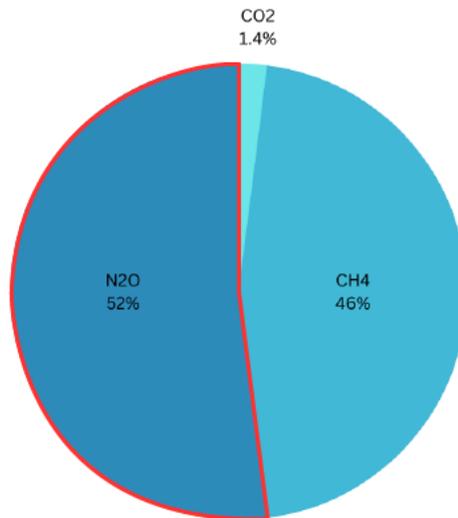
12

Greenhouse Gas Emissions by Sector:

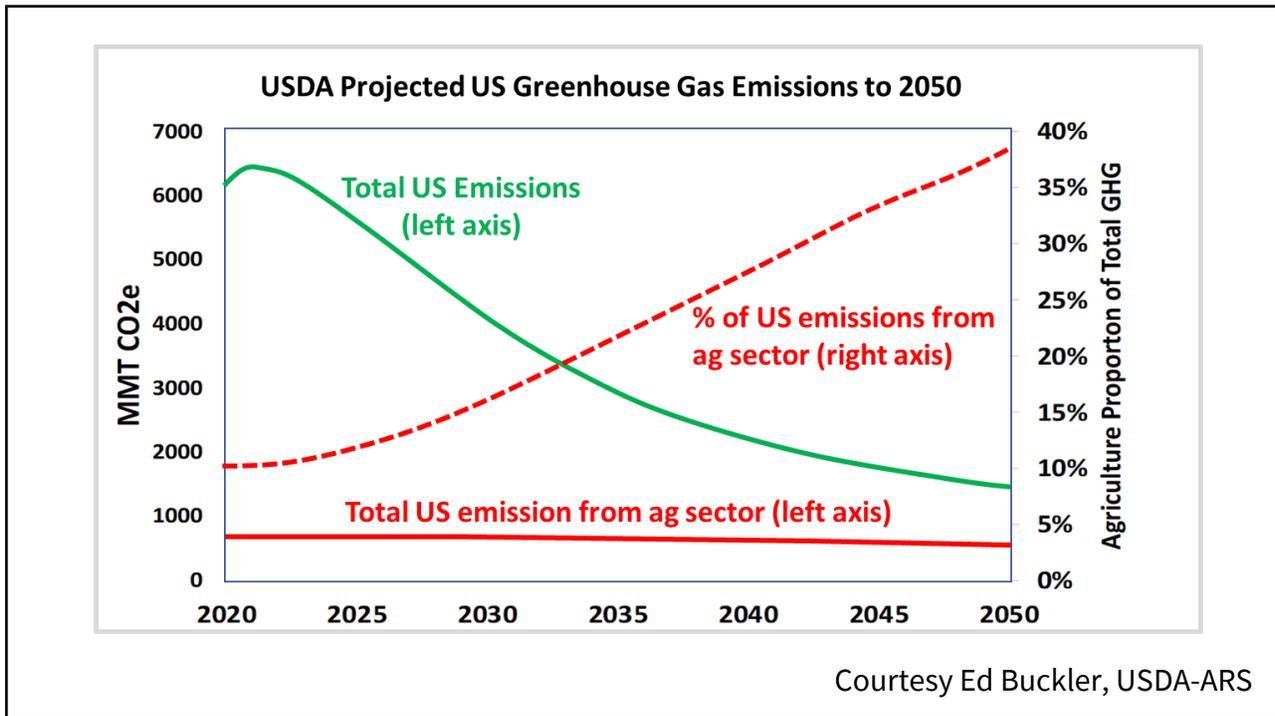


13

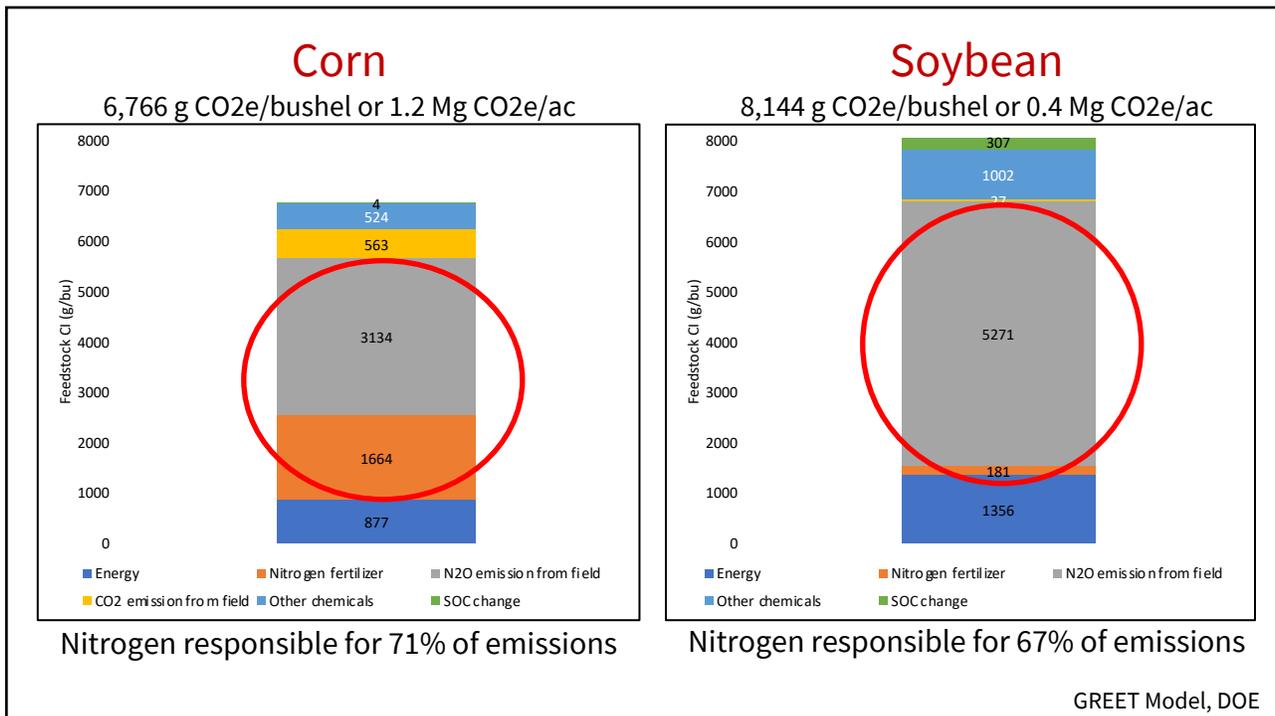
Sources of US agricultural emissions:



14

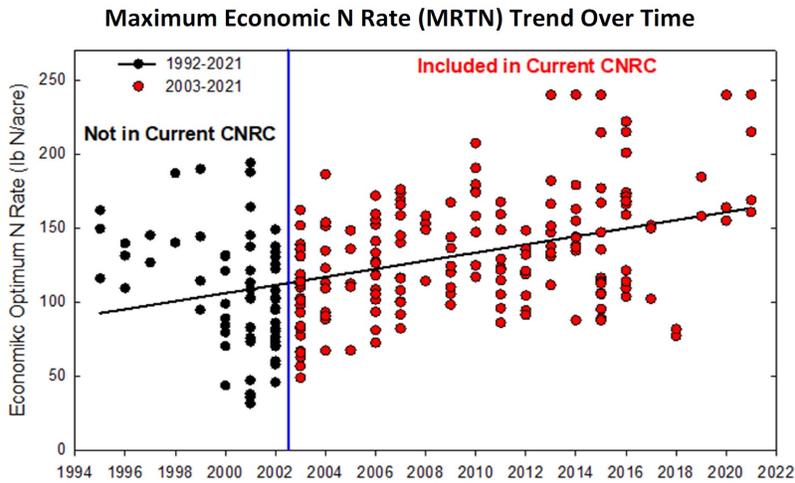


15



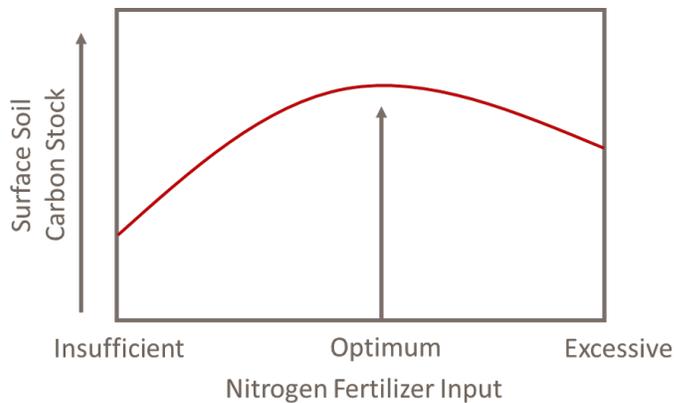
16

The optimum N rate is variable and changing:



17

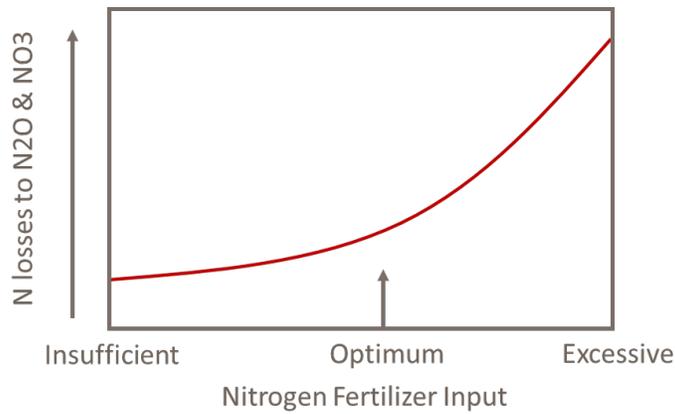
Getting the optimum right is important for productivity, profitability, and environmental performance (including soil health)



*Poffenbarger et al. 2017 PLOS ONE
Ordonez et al. 2020 Field Crops Res.
Mahal et al. 2019 Front Ecol & Evol*

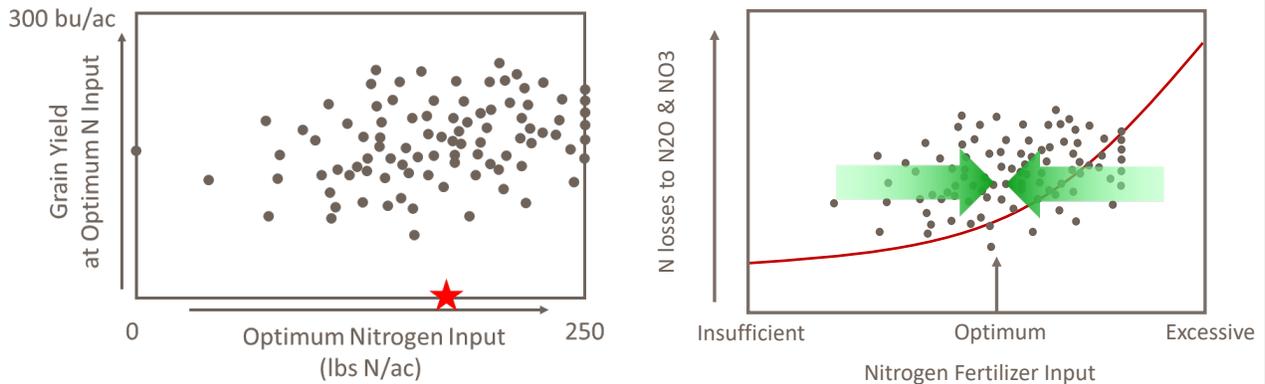
18

Getting the optimum right is important for productivity, profitability, and environmental performance (including soil health)



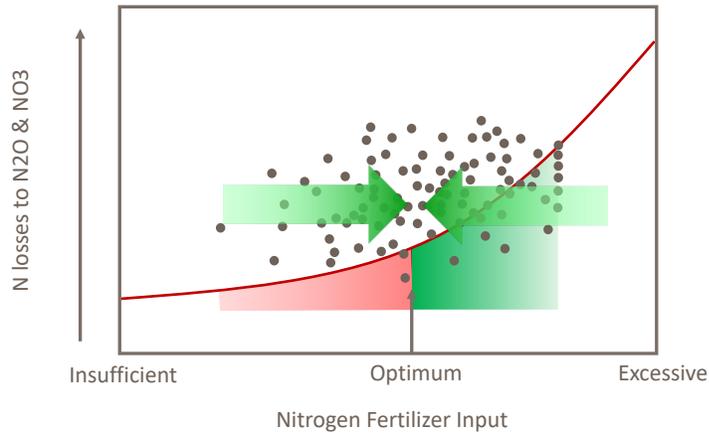
19

Improved Nitrogen Fertilizer Management: Environmental Benefits



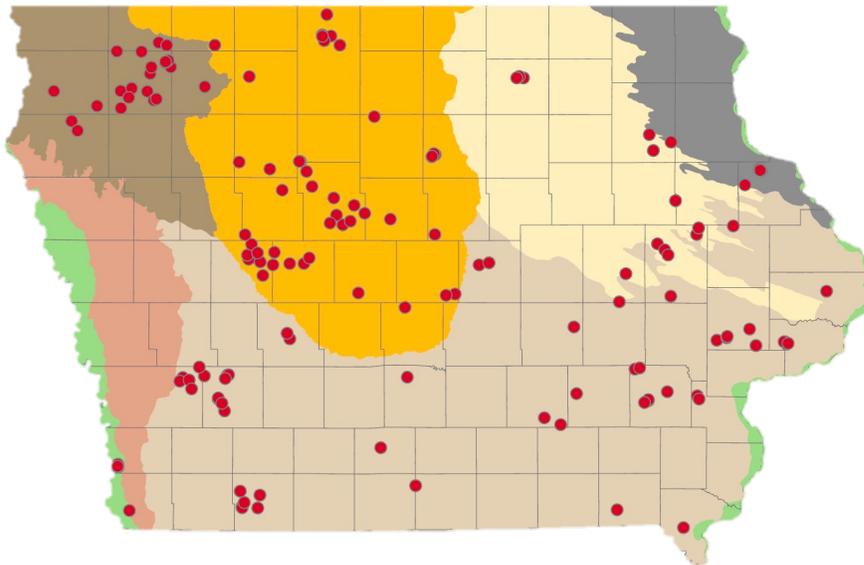
20

Managing for the optimum vs. the average:



21

The Iowa N Initiative

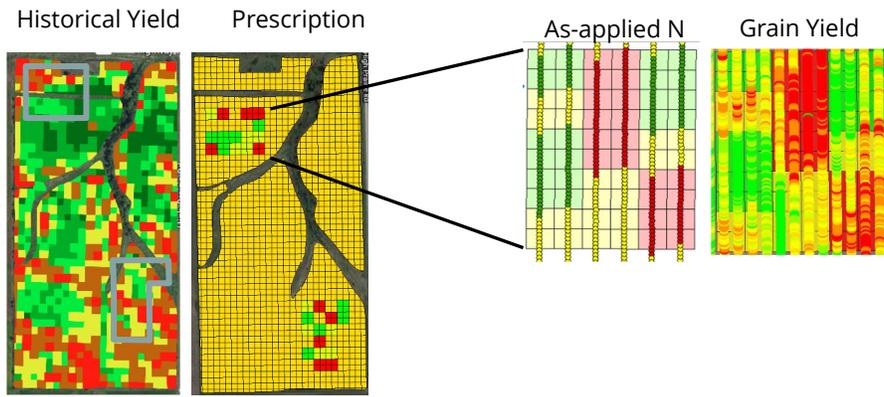


Crop Year 2023:

- 270 On-farm trials
- 148 fields
- 72 growers

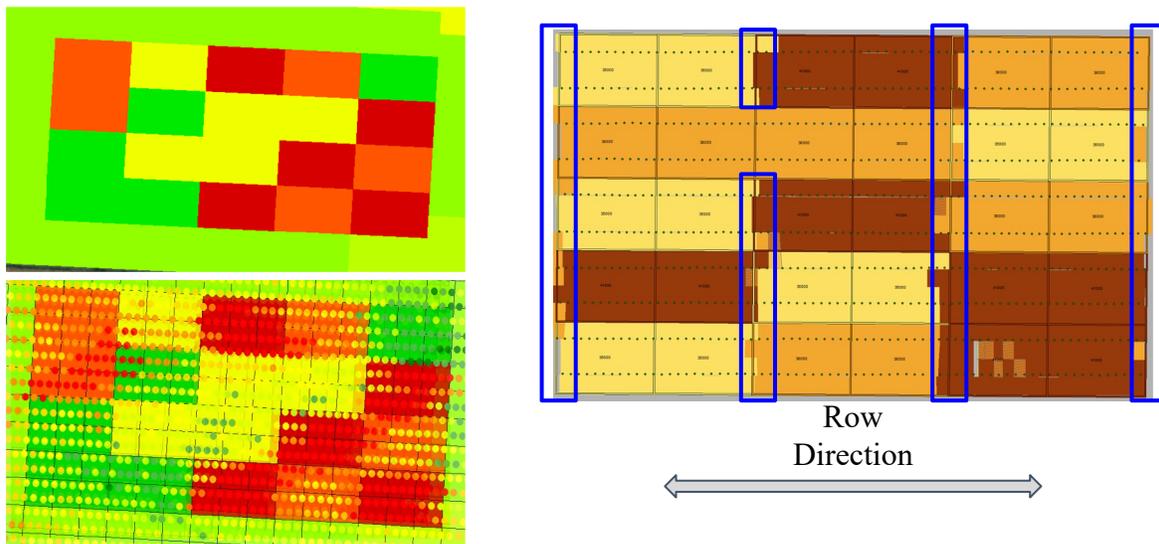
22

On-Farm Technology to Create Knowledge



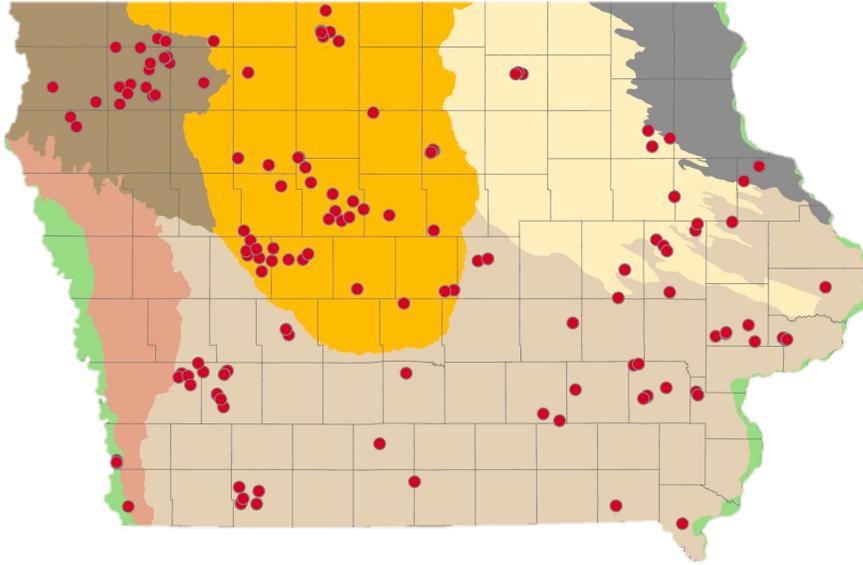
23

Quality Control



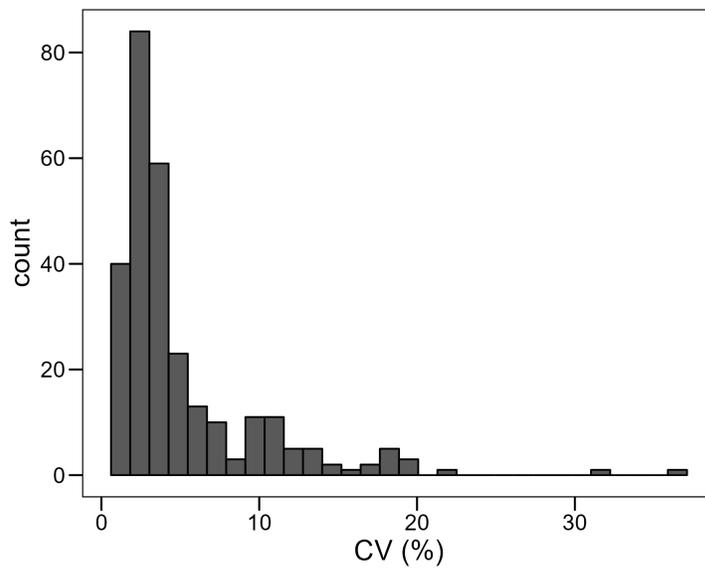
24

2023 Results: 90/270 trials are in

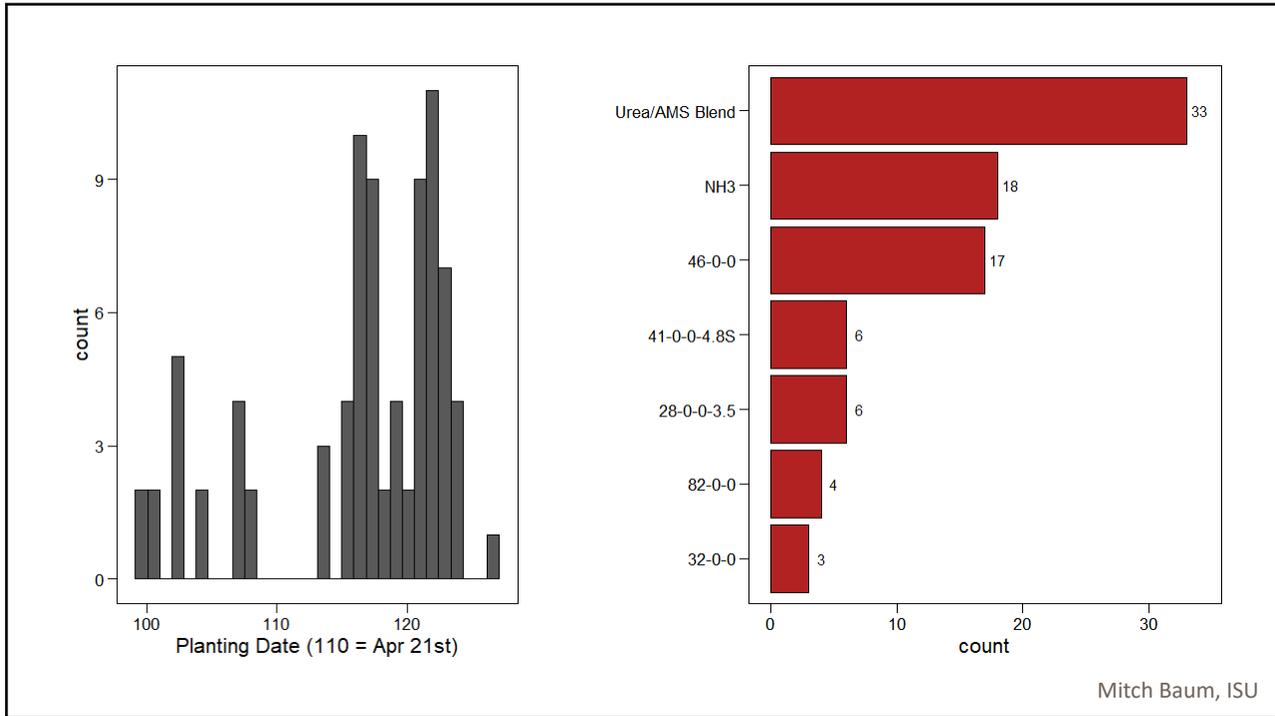


25

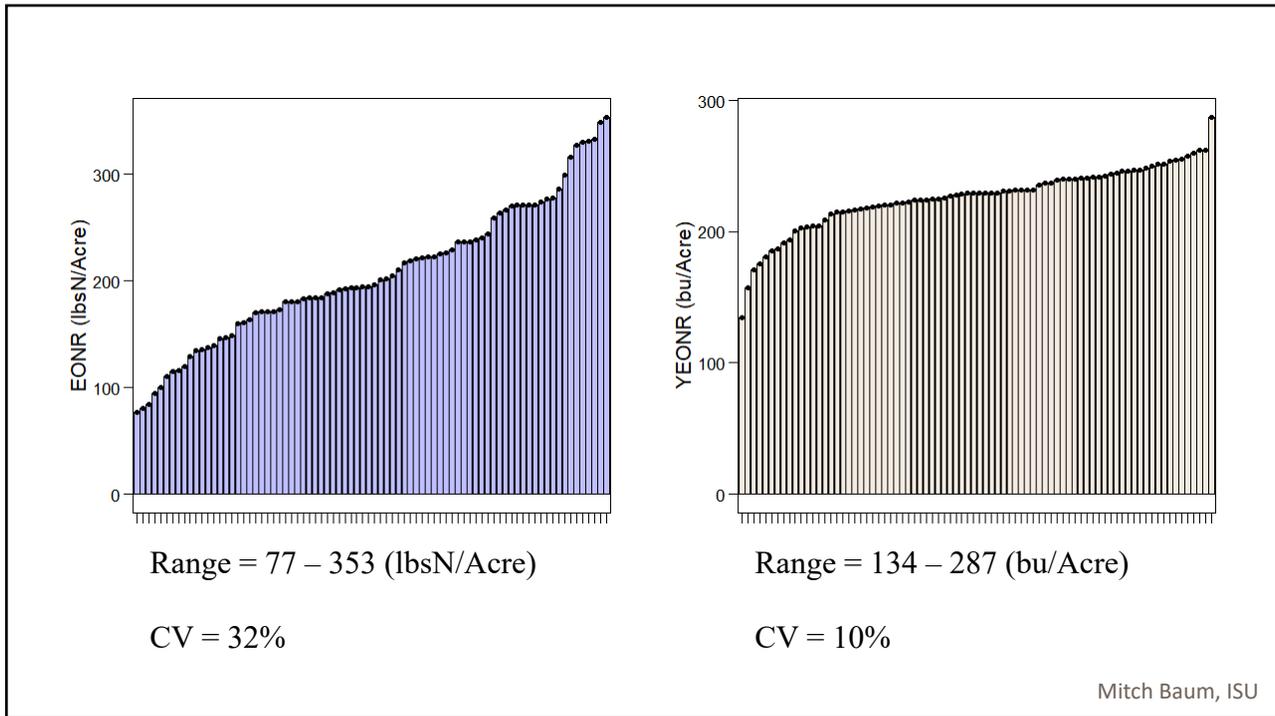
Quality Control



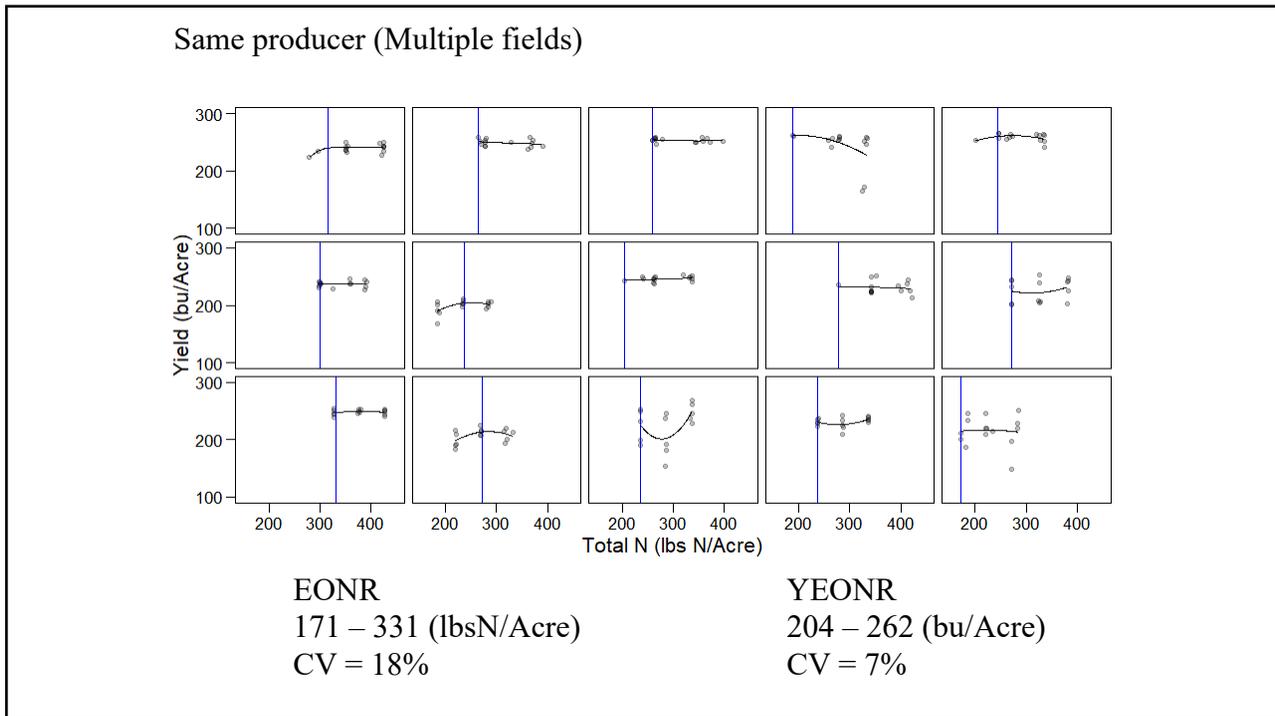
26



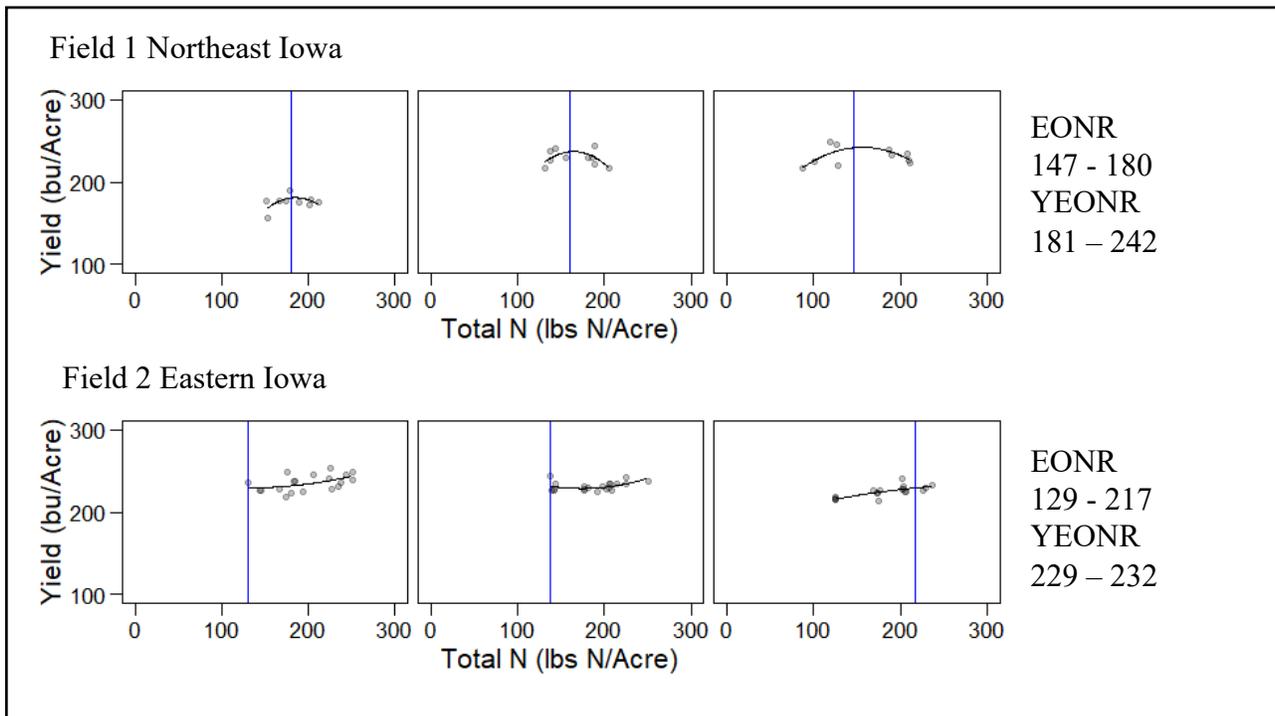
27



28



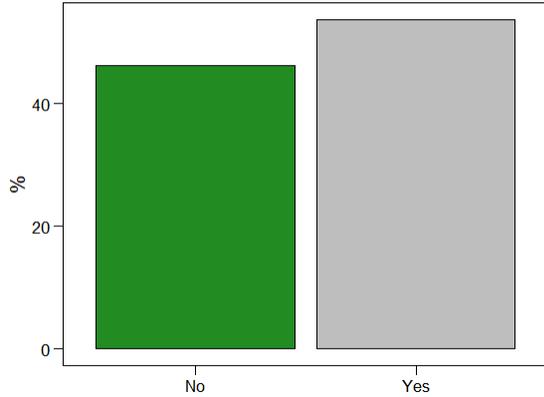
29



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Does Sidedress Pay?

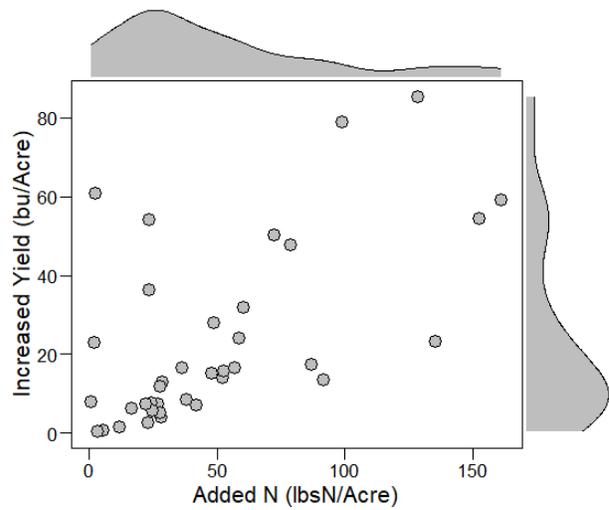
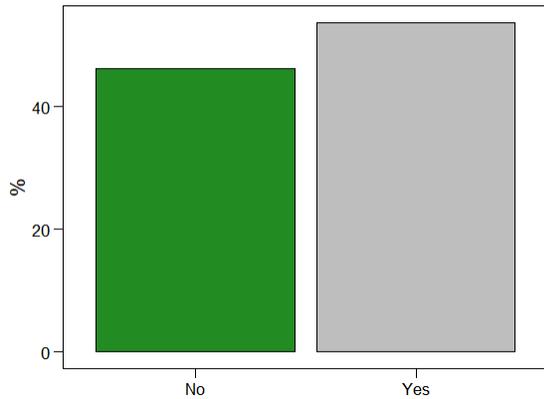
More N needed?



31

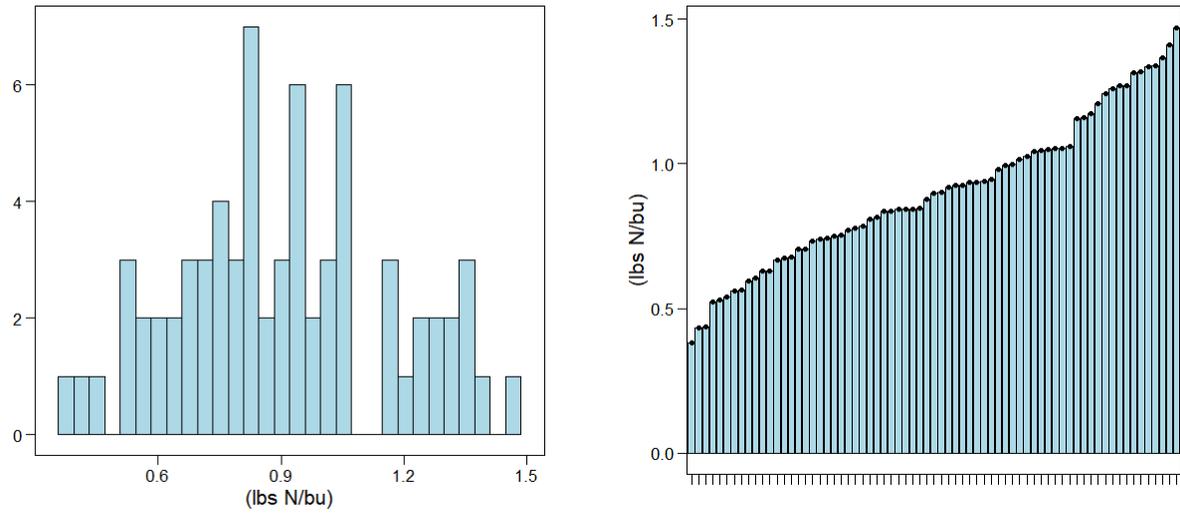
Does Sidedress Pay?

More N needed?



32

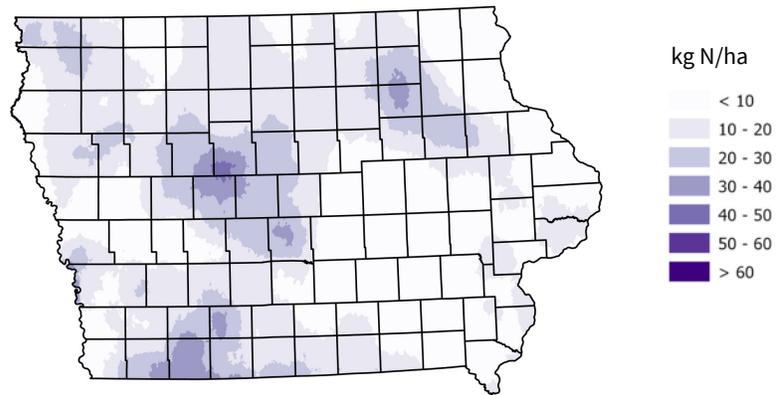
Nitrogen use efficiency (lbs N/bushel) at the economic optimum nitrogen rate:



33

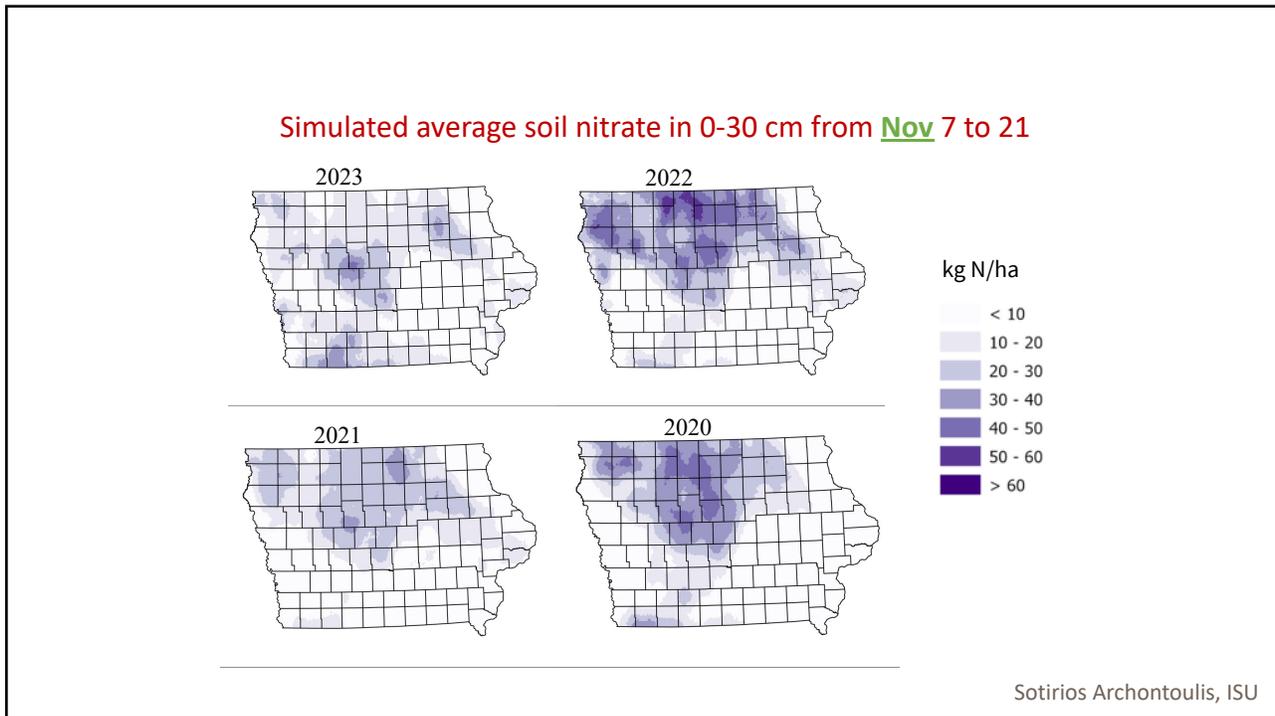
Residual Nitrate Map

Simulated average soil nitrate in 0-30 cm from **Nov 7 to 21, 2023**

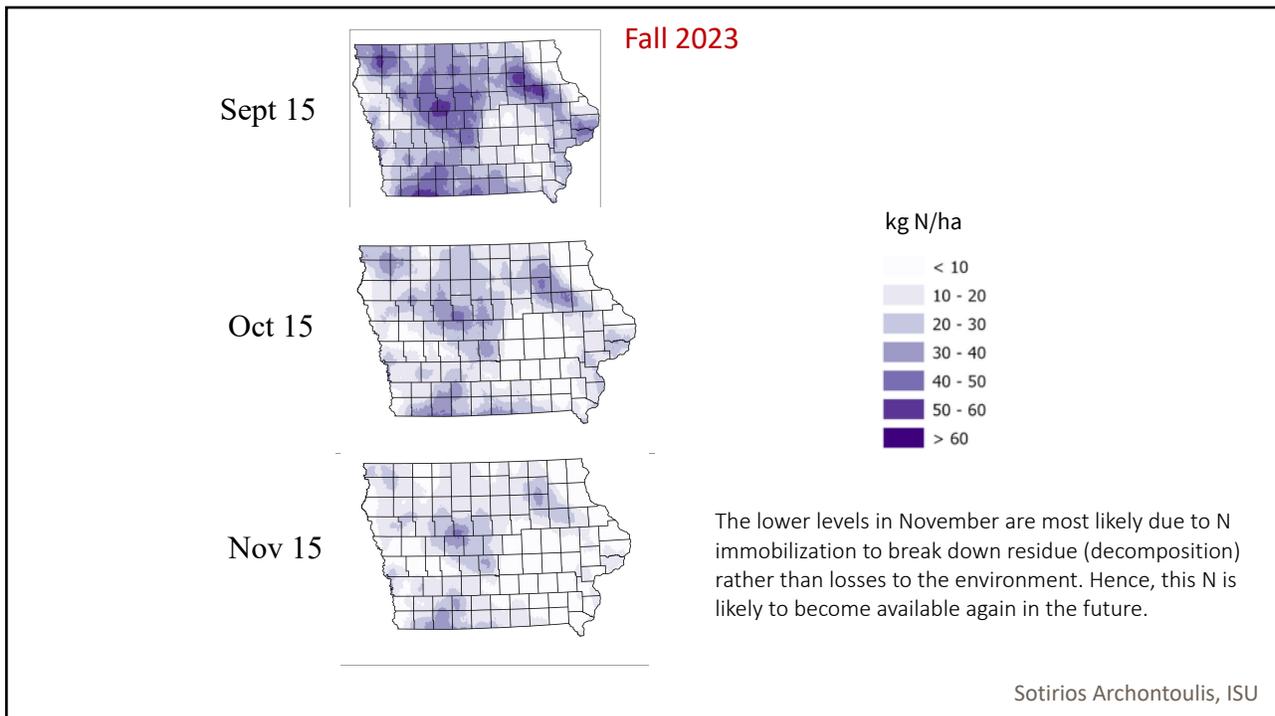


Sotirios Archontoulis, ISU

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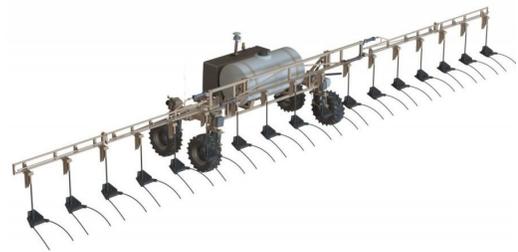


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Additional Research Foci for 2024

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



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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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