Reducing the Health Impacts of the Nitrogen Problem

A Virtual Workshop from the Environmental Health Matters Initiative

New sessions every Thursday
from 2:30–5:30 PM (ET)
from January 28 – February 25, 2021

Engaging Farmers in Nitrogen Management Decision Making

Greg LaBarge
Field Specialist, Agronomic Systems
Ohio State University of Extension

EMHI Workshop #3
February 11, 2021

The National Academies of
SCIENCES · ENGINEERING · MEDICINE

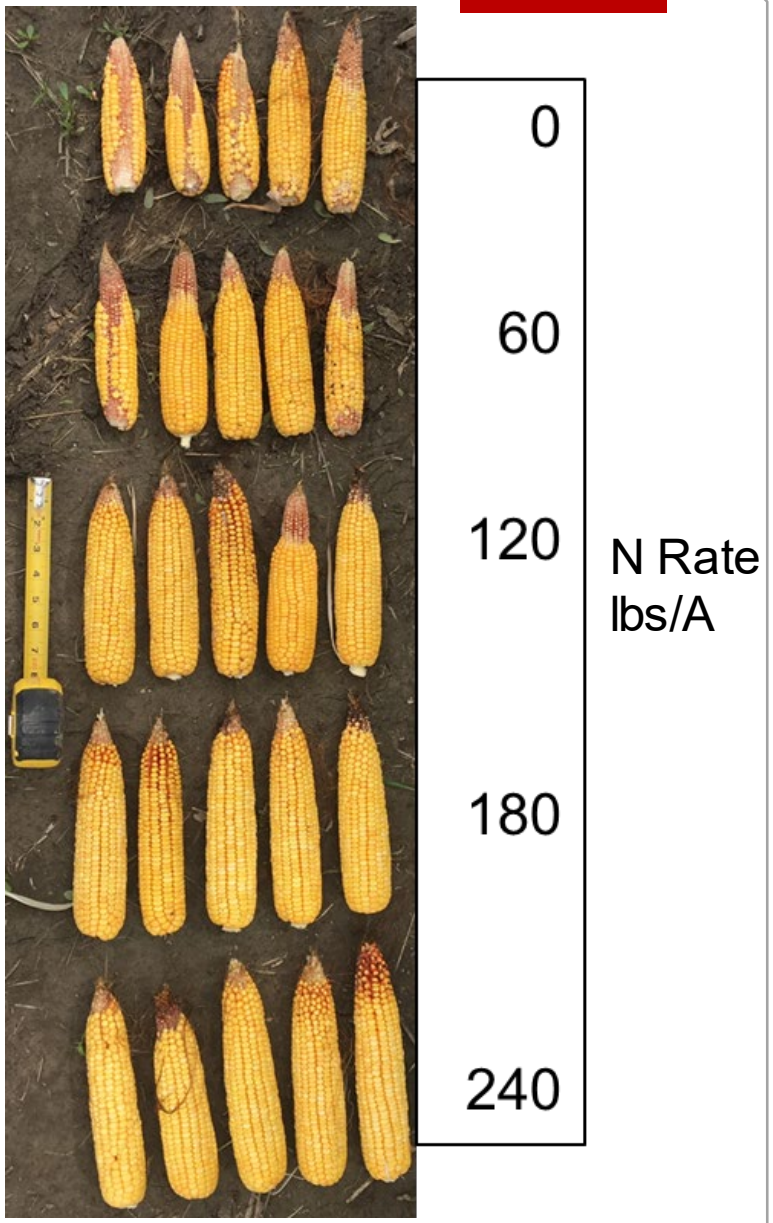
CFAES

Topics

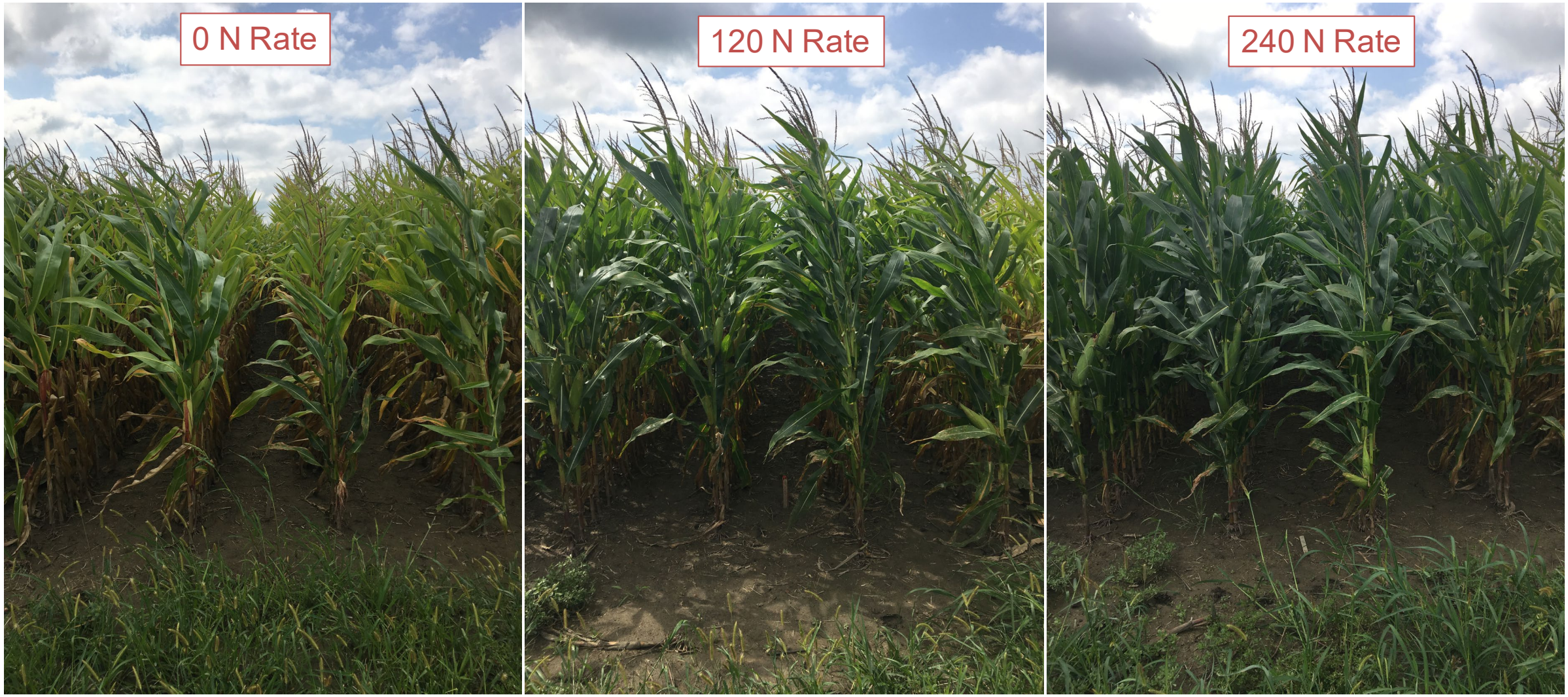
- Add to conversations on how farmers view conservation issues and help farmer understand how others view what they do.
- Conduct applied research that can be translated into recommendation tools.
- Add value to demonstration/research plot answering farmer question about application of recommendations using their fields and management.
- Identify opportunity where demonstration/research plots can measure environmental impacts.

For farmers nitrogen as a very visual nutrient…
with uncertainty about the right rate…
but certainty that when nitrogen is deficient, yields will be reduced.

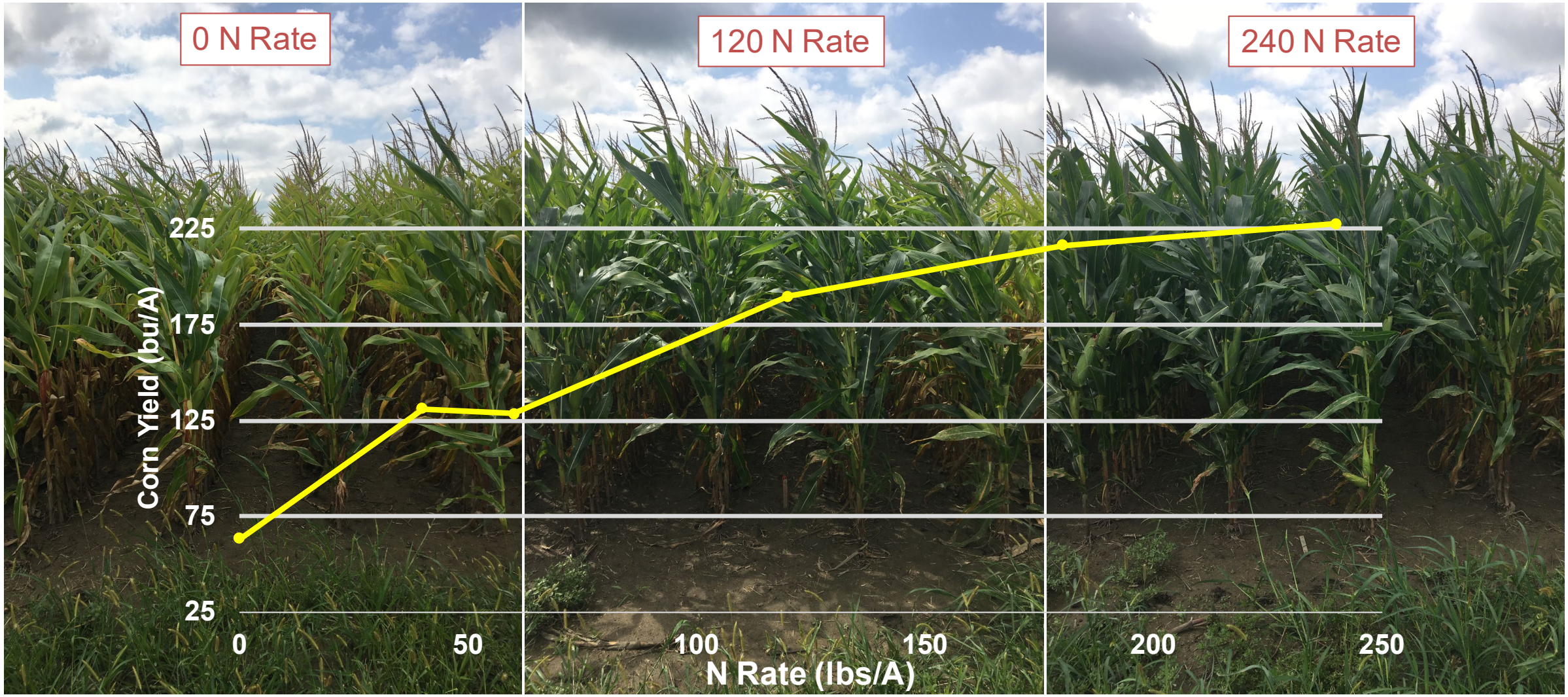
Nitrogen Deficiency Symptoms



2018 Corn N Response

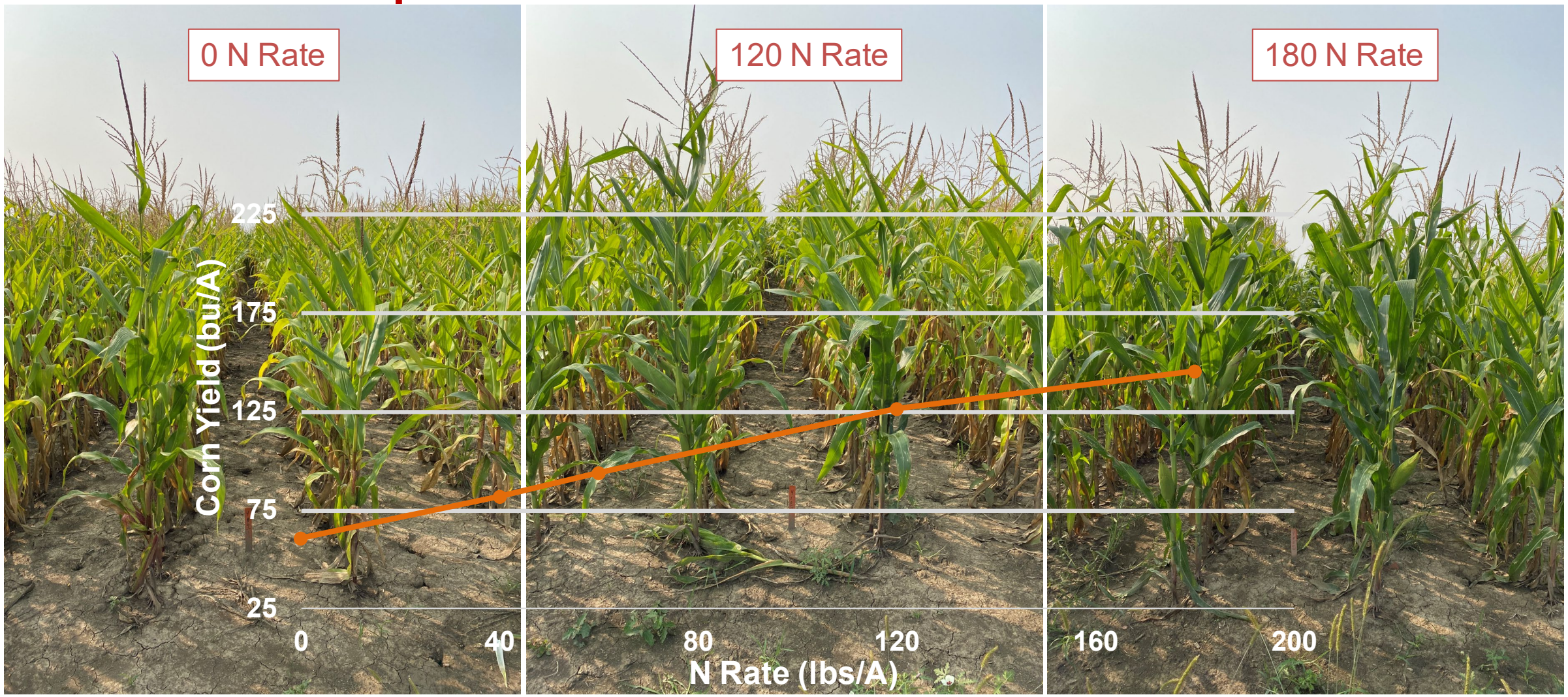


2018 Corn N Response



2020 Corn N Response

2020 Corn N Response

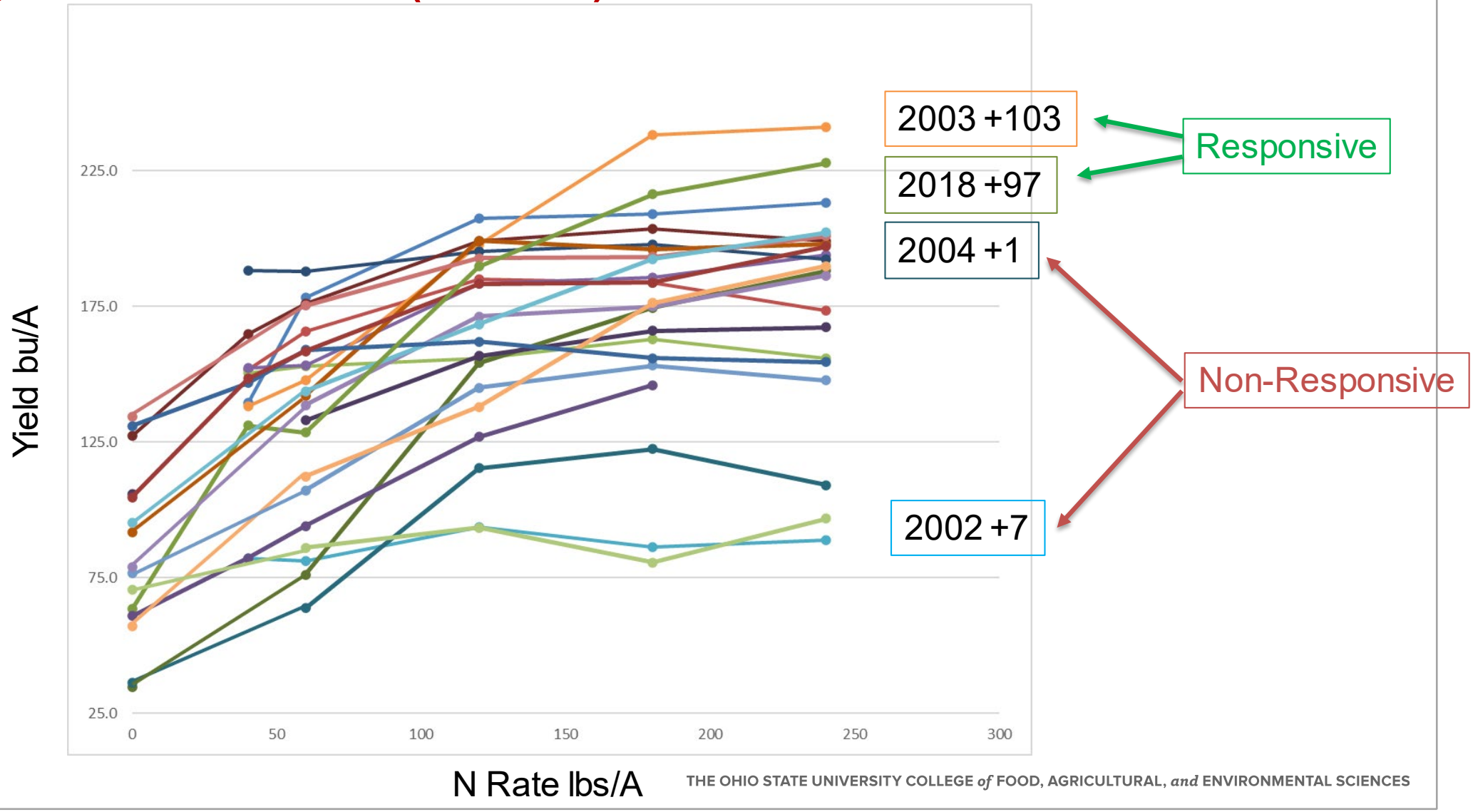


CFAES

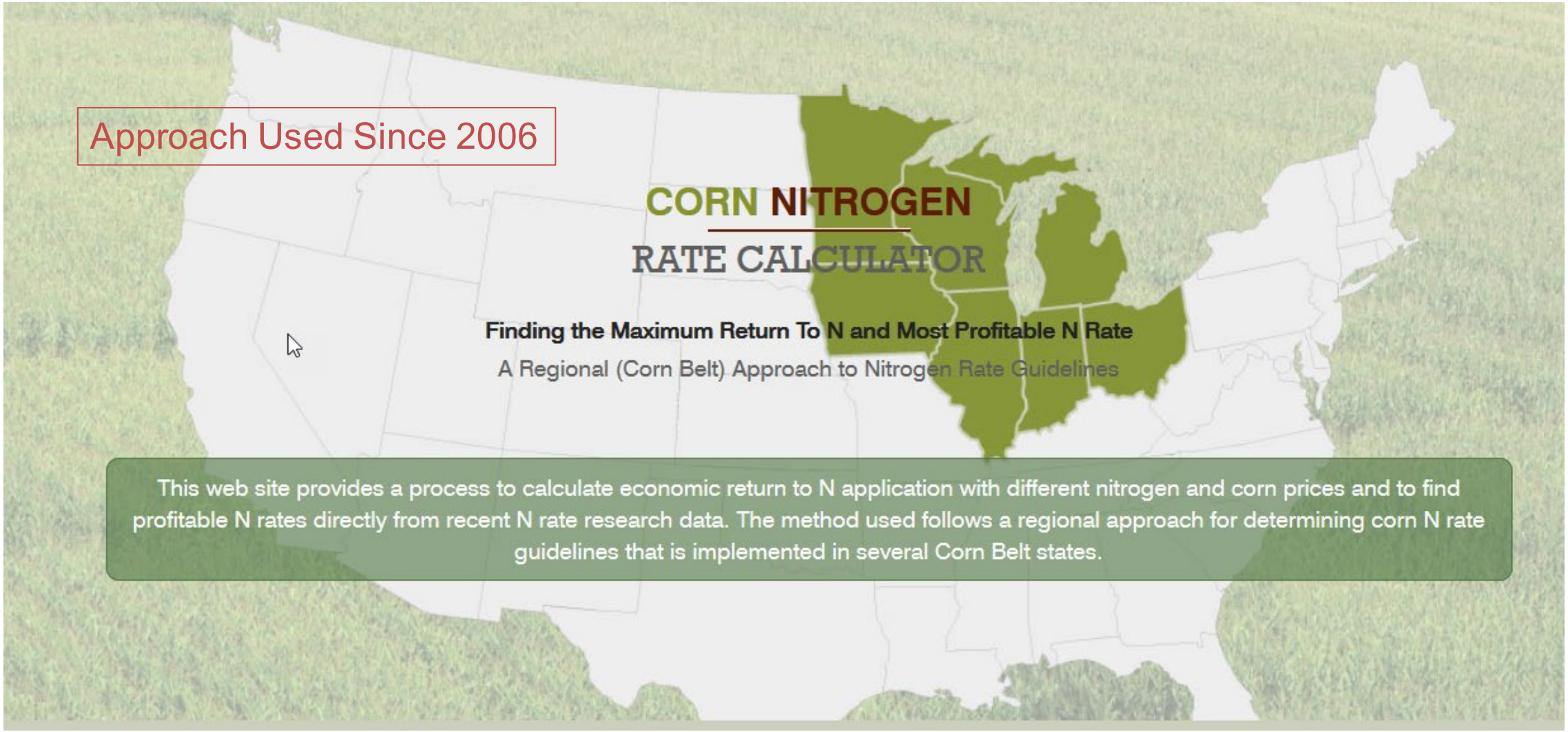
Conduct applied research translated into tools.

Corn Response to Nitrogen in Corn-Soybean Rotation (1996-2020)

Northwest Ag Research Station (NWARS), Wood Co.



Maximum Return to Nitrogen (MRTN) http://cnrc.agron.iastate.edu/



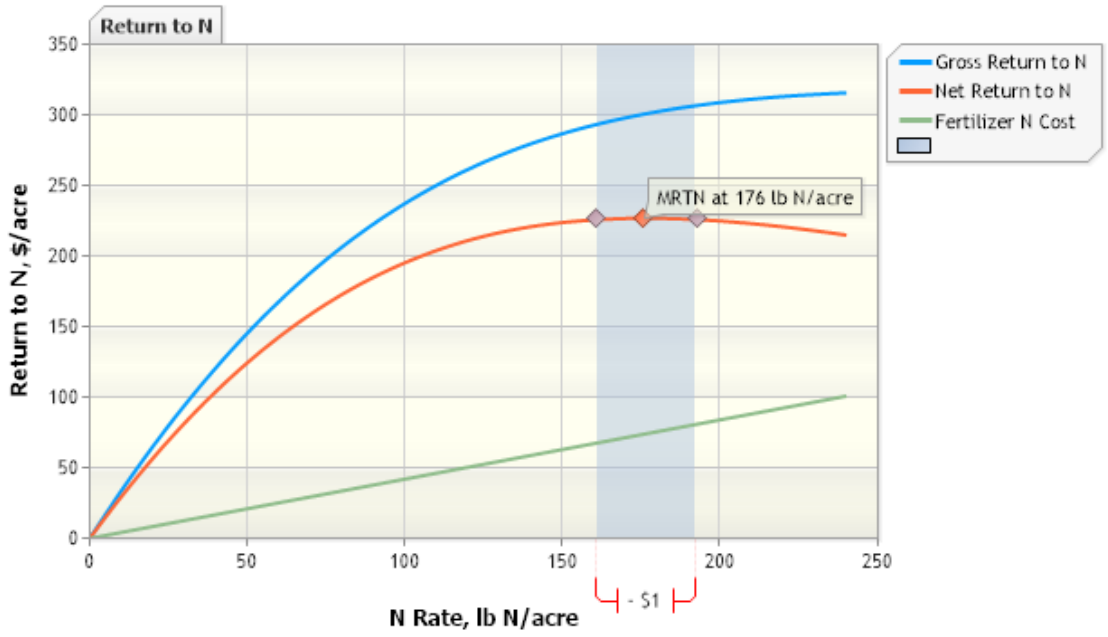
MRTN Rate based on January Nitrogen and Corn Prices

Rates and Charts

State: Ohio
Number of sites: 228
Rotation: Corn Following Soybean

January 2020
MRTN Rate=176
$N:$Corn=0.11

Nitrogen Price ($/lb):	0.42
Corn Price ($/bu):	3.93
Price Ratio:	0.11
MRTN Rate (lb N/acre):	176
Profitable N Rate Range (lb N/acre):	160 - 192
Net Return to N at MRTN Rate ($/acre):	$226.78
Percent of Maximum Yield at MRTN Rate:	98%
UAN (28% N) at MRTN Rate (lb product/acre):	628
UAN (28% N) Cost at MRTN Rate ($/acre):	$73.92

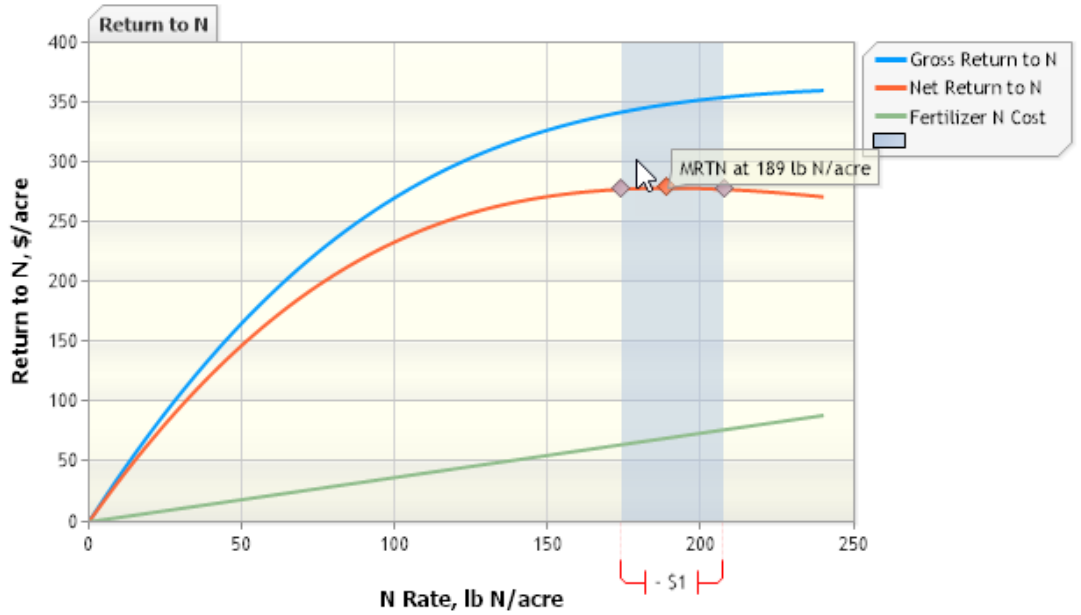


Rates and Charts

State: Ohio
Number of sites: 228
Rotation: Corn Following Soybean

January 2021
MRTN Rate=189
$N:$Corn=0.08

Nitrogen Price ($/lb):	0.37
Corn Price ($/bu):	4.48
Price Ratio:	0.08
MRTN Rate (lb N/acre):	189
Profitable N Rate Range (lb N/acre):	173 - 207
Net Return to N at MRTN Rate ($/acre):	$278.40
Percent of Maximum Yield at MRTN Rate:	98%
UAN (28% N) at MRTN Rate (lb product/acre):	674
UAN (28% N) Cost at MRTN Rate ($/acre):	$69.93



CFAES

Work with Farmers in their fields on their questions while collecting value added data.

In Season Application Manure to Corn and Wheat Reduces Seasonal System Nitrogen Inputs

CFAES

Corn
N Requirement-190 lbs. Ac
$68.25 @ $0.35 N

Wheat
N Requirement-115 lbs. Ac
$40.25 @ $0.35 N

Fall Applied Manure with Sidedress 28% UAN compared to In-Crop Manure-2020

North Field Treatment

Swine manure @ 6000 gallons/acre in September 2019

- 275 pounds available N per acre
- Rye/Rape Seed cover crop planted

28% UAN applied on June 5

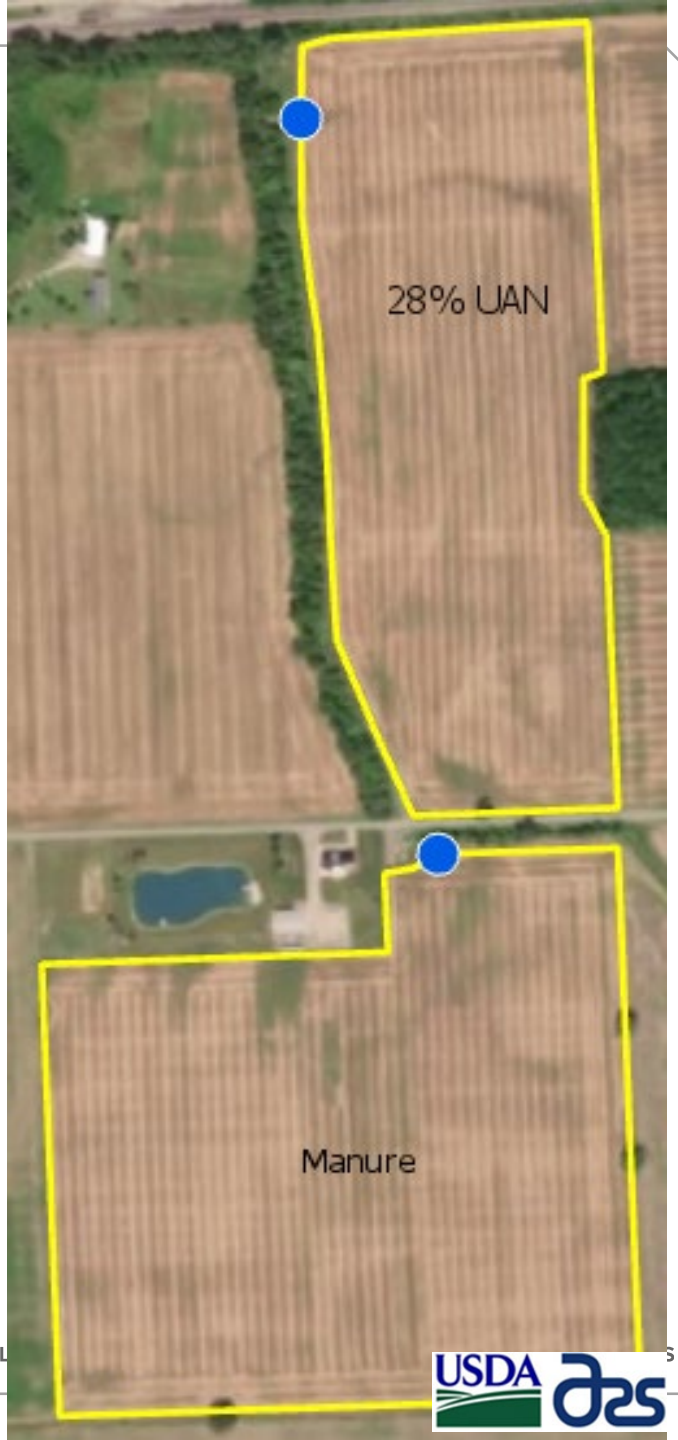
- 172 pounds of N per acre

South Field Treatment

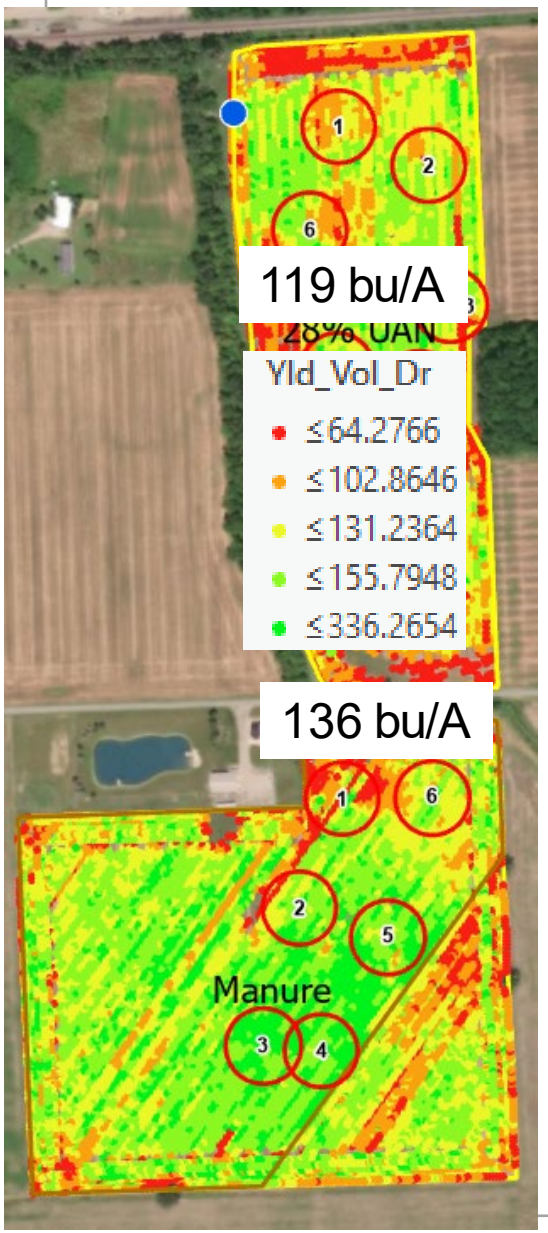
Rye/Rape Seed Cover crop planted September 2019

Swine manure @ 6000 gallons/acre in June 2020

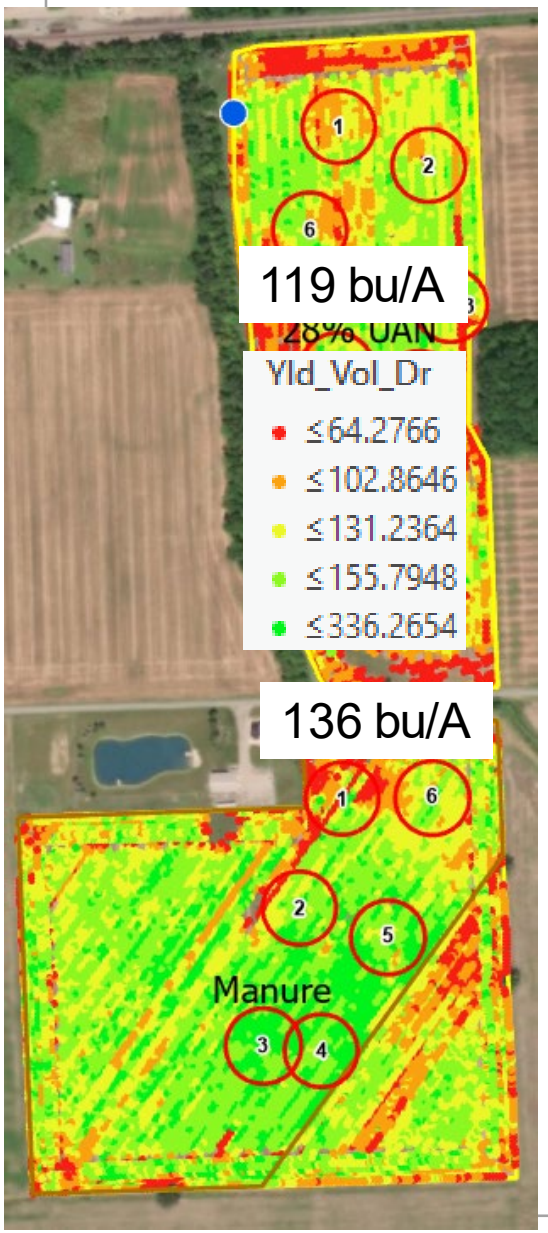
- 275 pounds available N per acre



Yield


119 bu/A
28% UAN
Yld_Vol_Dr
≤64.2766
≤102.8646
≤131.2364
≤155.7948
≤336.2654
136 bu/A
Manure
1
2
3
4
5
6

Yield



Value Added Data

Plant Health

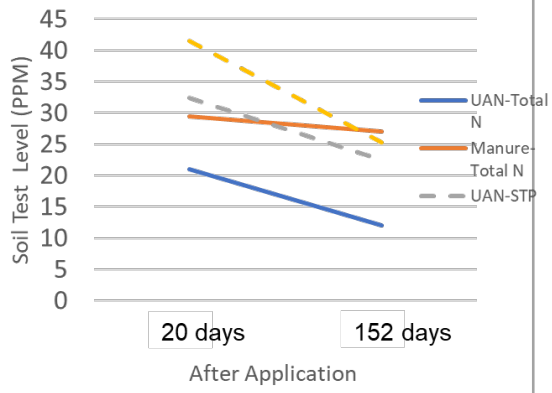
Document Nutrient Inputs

Treatment	Total N Applied (lbs/A)
Fall Manure/UAN	447
In Crop Manure	275

Economic

Treatment	Net Return ($/A)
Fall Manure/UAN	$127
In Crop Manure	$178

Soil Nutrient Status



Water Quality

CFAES

Identify opportunities to quantify water quality impacts of practices.

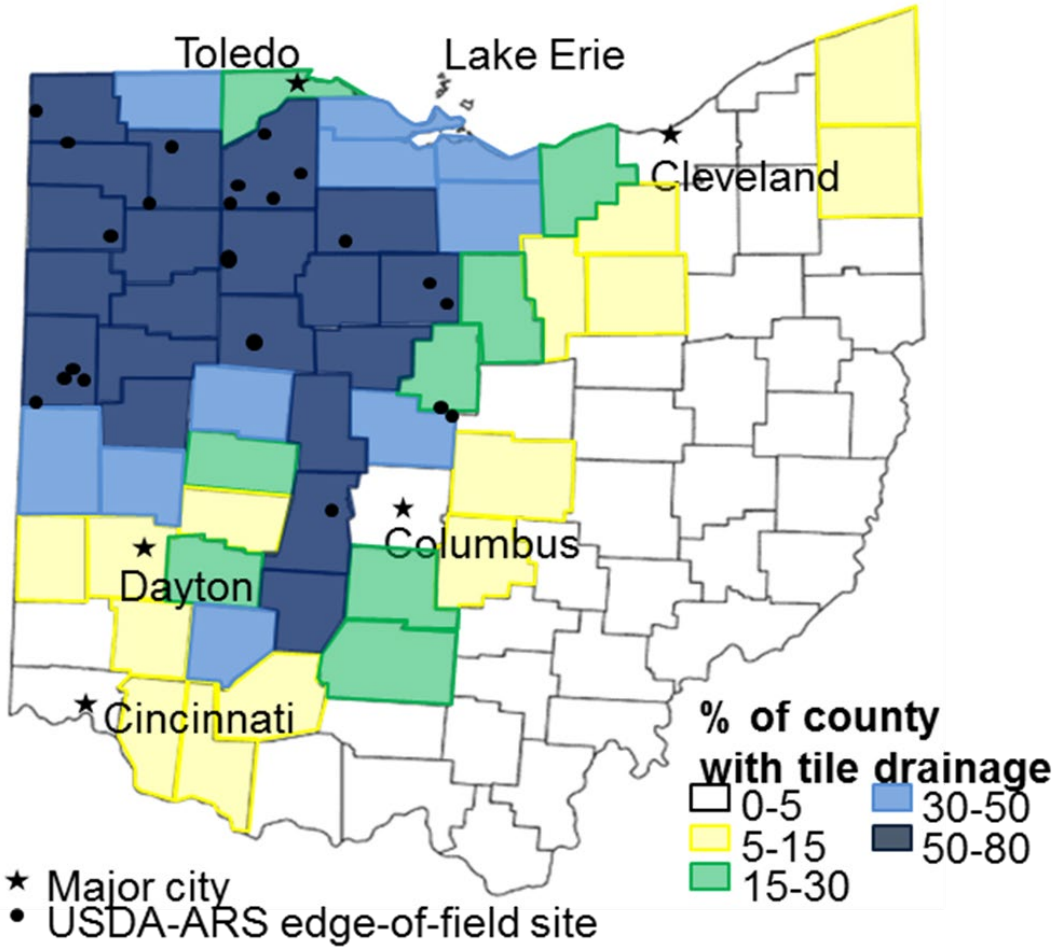
Edge of Field-EOF Sites

- 20 sites with paired fields
- 40 total fields being sampled for edge of field losses of nutrient

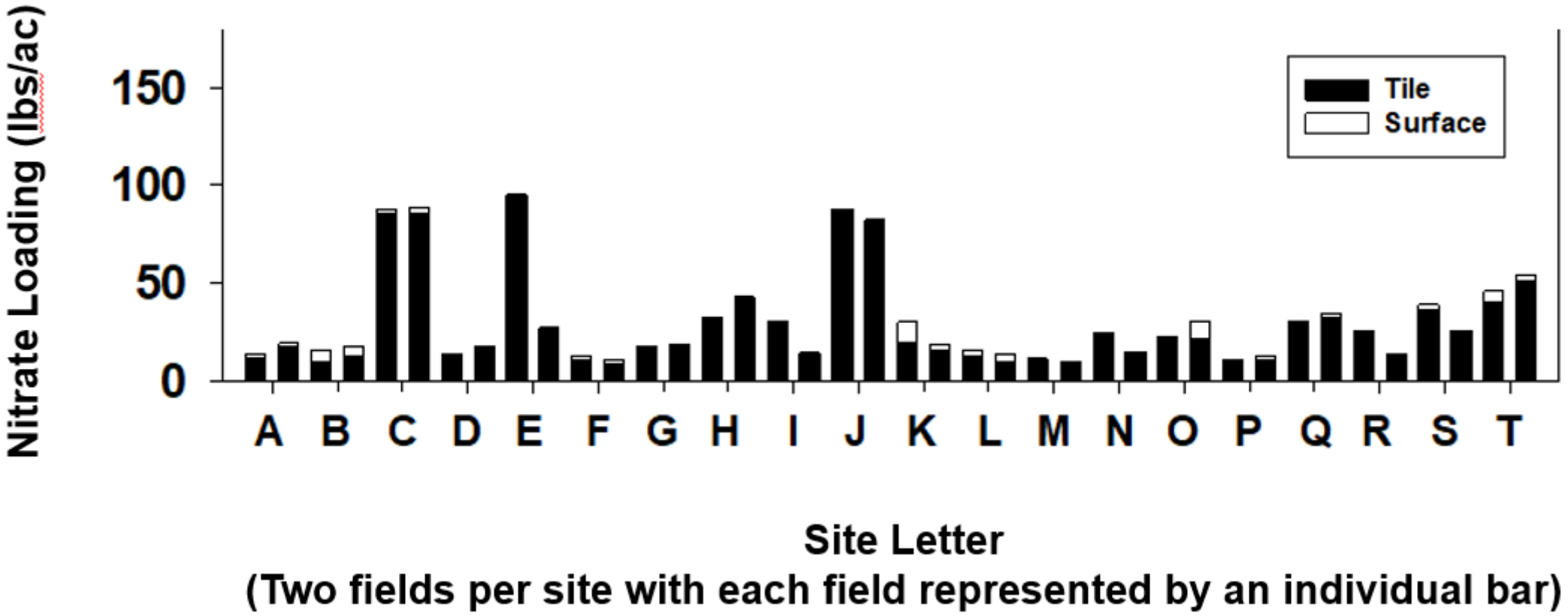
- Site Characteristics:

Soil Test P	9-380 PPM
Soil Type	Silt loam, silty clay loam & Clay loam
Tillage	No-till, strip till, rotational till, annual till

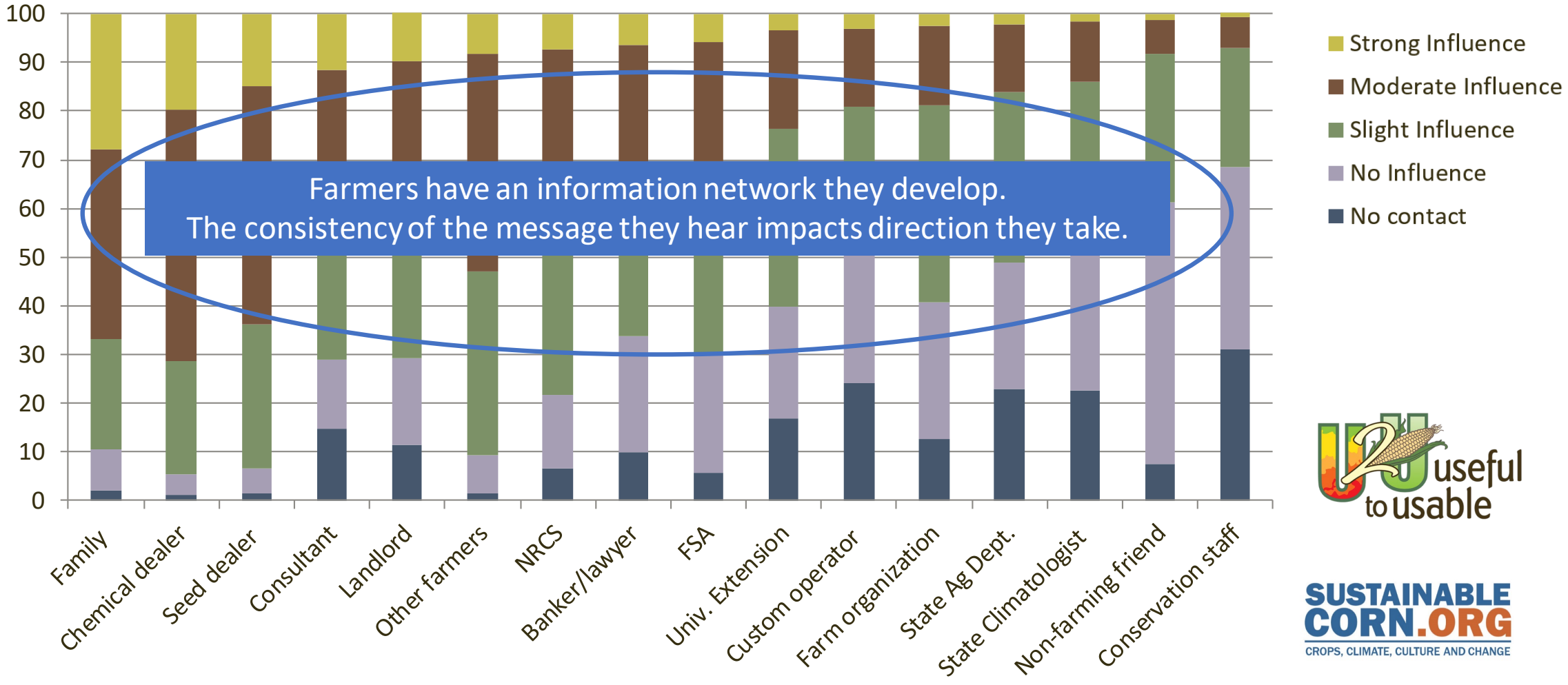
Sites are monitored 365 days a year using heating in winter



Water Year average annual nitrate loading from Edge of Field sites (2011-2020). Source: USDA-ARS



Q: Please indicate how influential the following groups and individuals are when you make decisions about agricultural practices and strategies



useful to usable

SUSTAINABLE CORN.ORG
CROPS, CLIMATE, CULTURE AND CHANGE

Source; Davidson et al. 2015, *Journal of Environmental Quality;* Prokopy et al. 2015 *Climatic Change*

Summary

- Extension works to connect people to solutions that address issue they have identified for their operation
- Extension works through a variety of specialist, researchers and farmers to impact practice adoption.
- We try to meet people where they are and take them to the next level.

Greg LaBarge
labarge.1@osu.edu
740-956-5047