

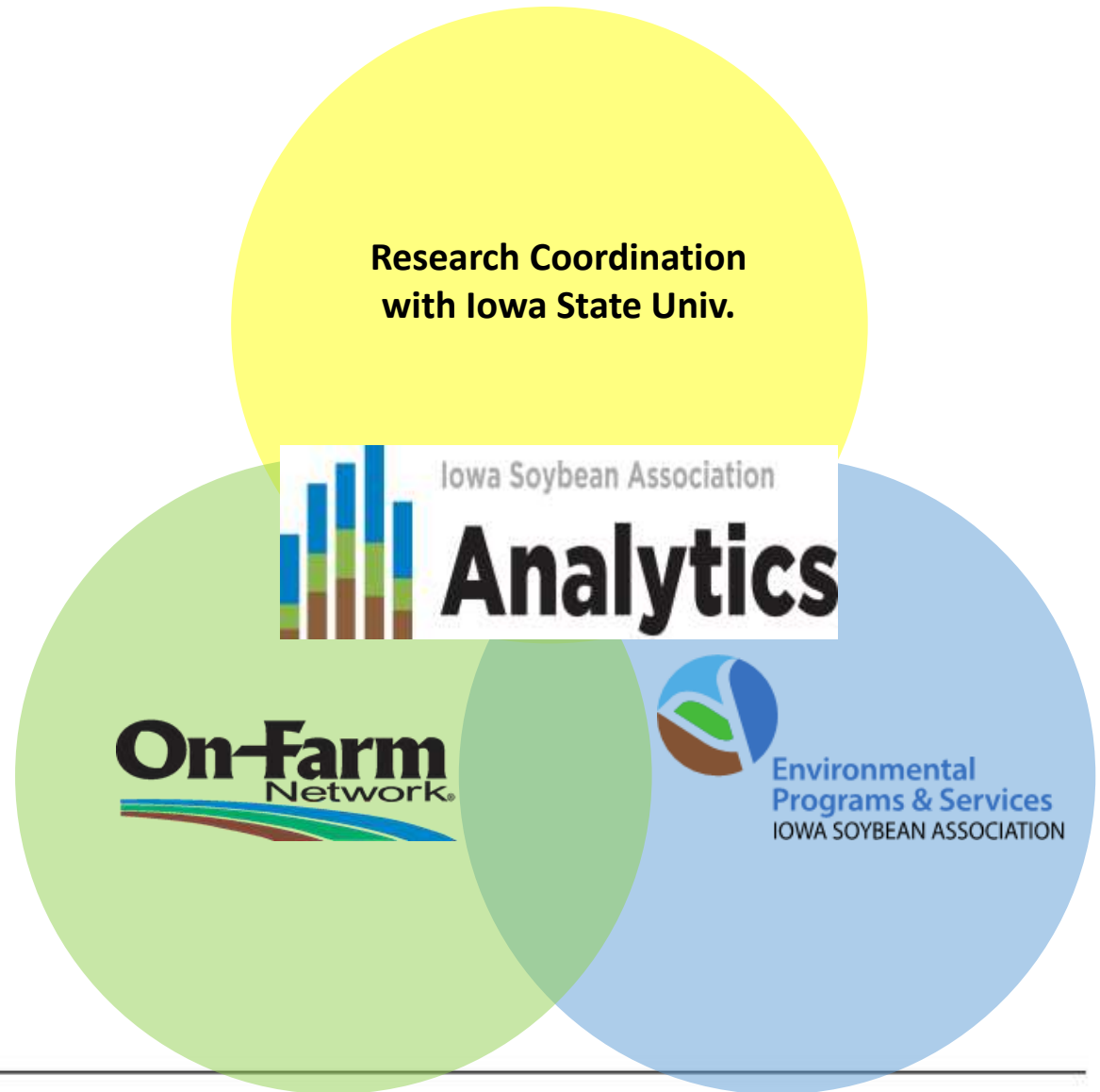
2017 MVTL Agronomic Update Meeting

Nitrogen Management Expectations and Surprises in 2016

Peter Kyveryga, PhD, Director of Analytics

Anthony Martin, Regional Agronomist, On-Farm
Network

Iowa Soybean Association Research



ISA RESEARCH



Outline

Evaluation of N Fertilizer Forms

UAN vs Urea

Evaluation of Commercial N Modeling Tools

Climate Fieldview Pro N Advisor

On-Line Database of On-Farm Replicated Strip Trials

Annual N Status Survey

On-Line Calculator of Late-Season N Deficiency

Broadcast Urea vs Injected UAN

Urea –SuperU

UAN –Agrotain in some trials

Rep 1	Broadcast Urea
	UAN
Rep 2	Broadcast Urea
	UAN
Rep 3	Broadcast Urea
	UAN
Rep 4	Broadcast Urea
	UAN

Research Partners



IOWA STATE
UNIVERSITY

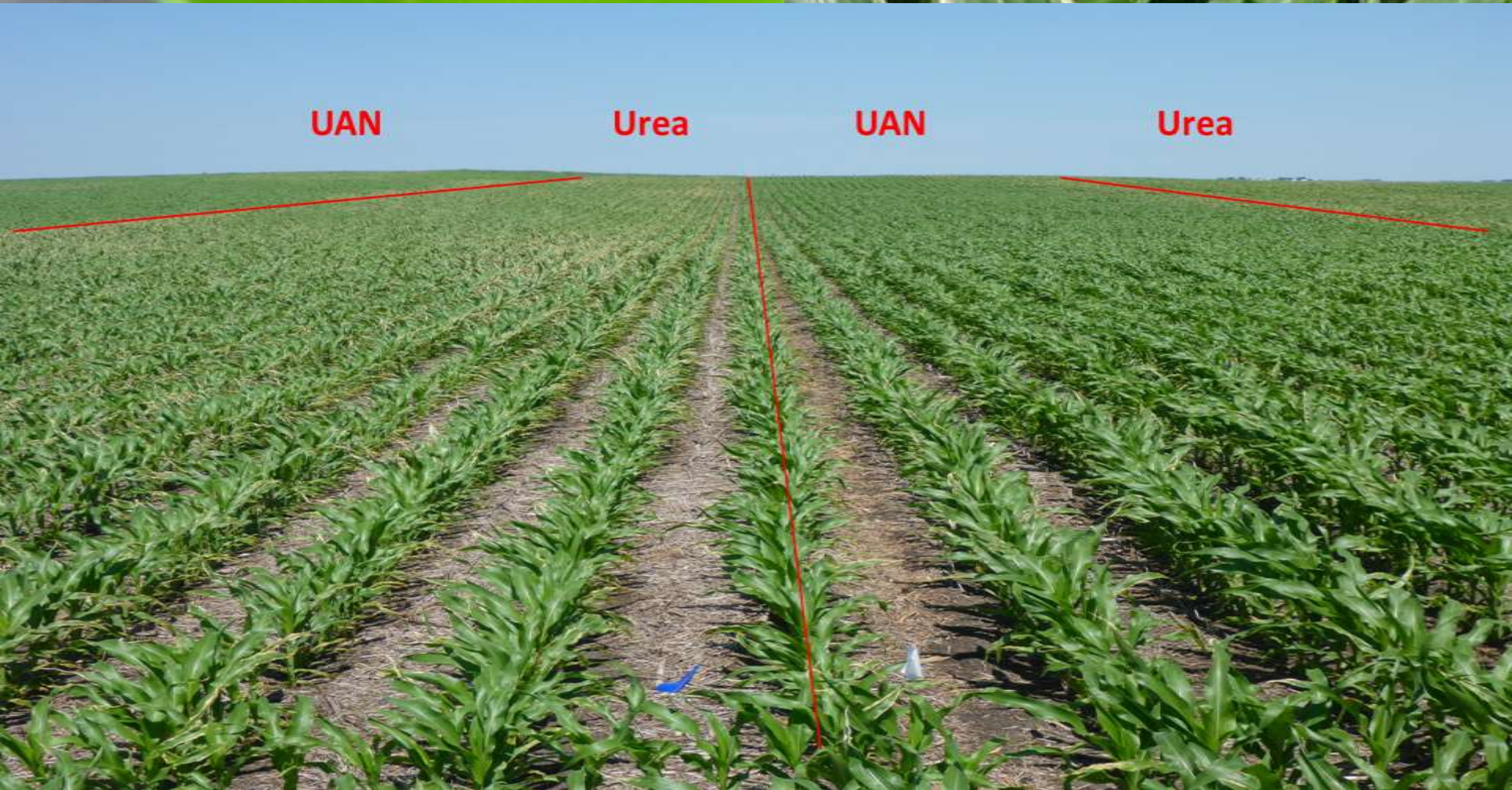


JOHN DEERE

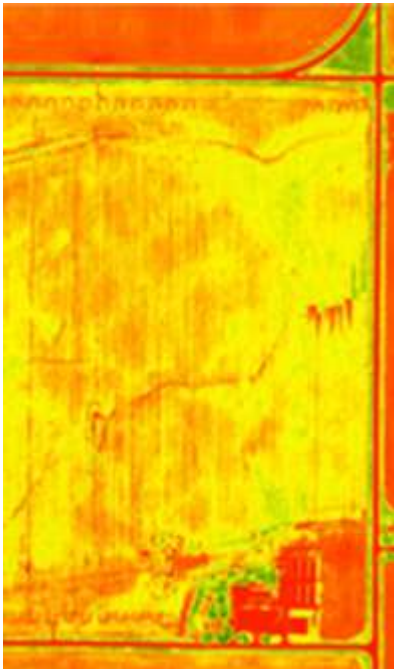
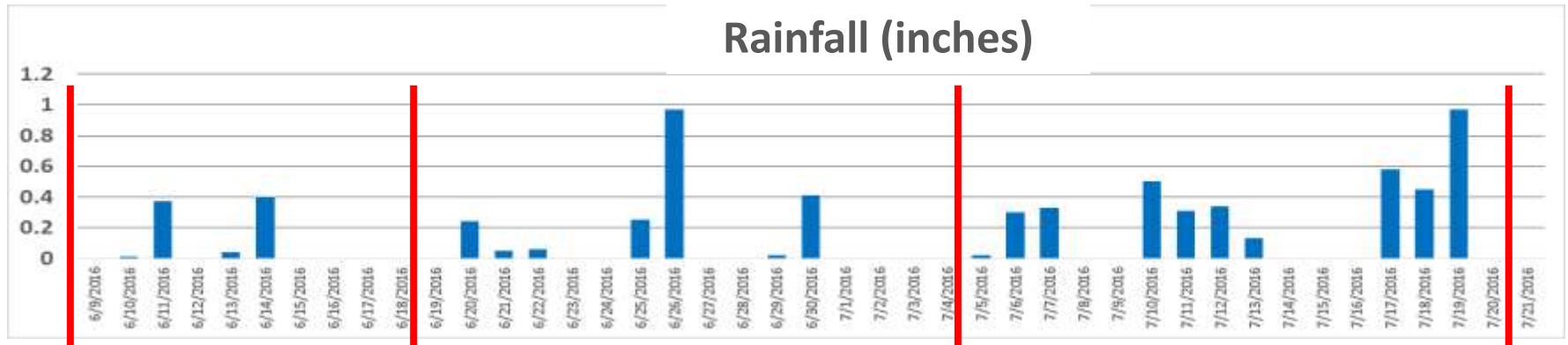
K KOCH

KOCH AGRONOMIC SERVICES, LLC

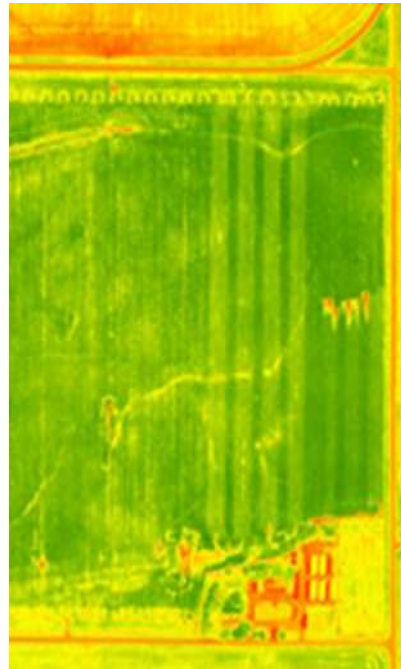
NEW LEADER



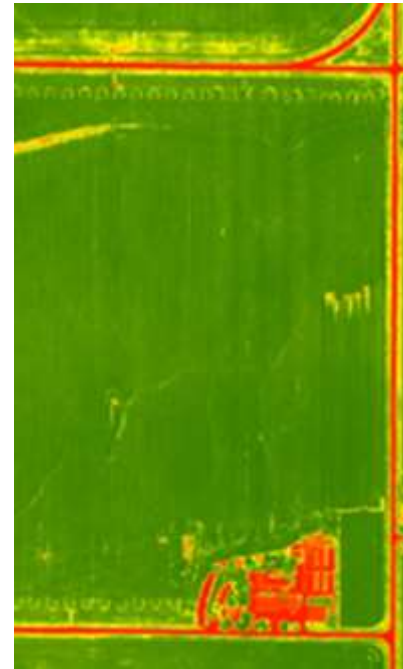
Urea Strips



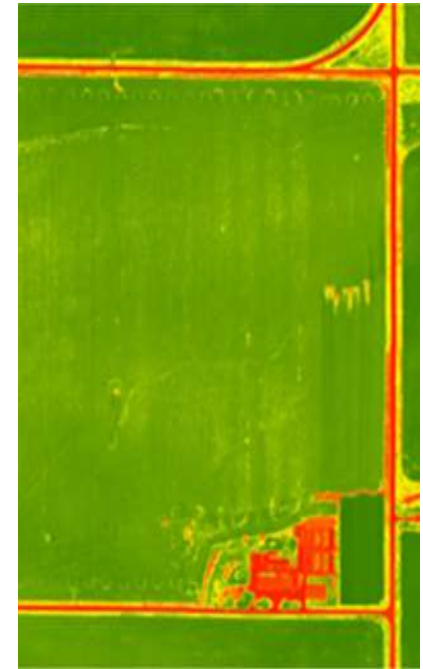
June 9



June 19



July 5



July 21

UAN – 6/10 Urea – 6/12



Urea vs UAN

Trial ID	County	Rotation	In-Season Rate (bu/a)		Yield Dif (bu/a)
			UAN	Urea	
141	Story	CC	240.1	241.5	-1.4
99	Greene	CS	256.1	255.9	0.2
85	Story	CS	222.9	222.2	0.7
66	Adams	CS	209.4	206.9	2.5
67	Adams	CS	228.8	226	2.8
140	Humboldt	CC	203.4	197.7	5.7
98	Greene	CS	203.8	196.5	7.3

- 98 –Dry for a week/10 days after application. No spring N applied.

Commercial N Prescription Tools

1. Adapt N
2. Climate FieldView
3. Pioneer Encirca
4. FarmLogs
5. Mavrx
6. Other

Climate FieldView™ N Advisor

- “Recommended Rates” were set up using dummy applications
- All were fixed rates
- Farmers allowed to change rates

Rep 1	Climate Nitrogen Advisor
	Normal N Mgmt
Rep 2	Climate Nitrogen Advisor
	Normal N Mgmt
Rep 3	Climate Nitrogen Advisor
	Normal N Mgmt
Rep 4	Climate Nitrogen Advisor
	Normal N Mgmt

Information for Model

Planting

- Crop
- Hybrid/Variety
- Relative Maturity
- Target Yield
- Population (Avg.)
- Planting Date

Nitrogen

- Fertilizer
- Incorporation
- Rate
- Date
- Nitrapyrin Used

Practices

- Previous Crop
- Tillage System
- Primary Tillage Date
- 2015/14/13 Tillage
- 2015/14/13 Manure

Soil

- Texture
- Organic Matter
- Soil pH
- Soil CEC
- Pattern Tile

Information for Model

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- Crop
- Hybrid/Variety
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- Previous Crop
- Tillage System
- Primary Tillage Date
- 2015/14/13 Tillage
- 2015/14/13 Manure

Soil

- **Texture**
- **Organic Matter**
- **Soil pH**
- **Soil CEC**
- Pattern Tile

Predicted Nitrogen Balance



Potential Remaining N at black layer

32 lbs/ac

Weather dependent range
20 to 45 lbs/ac remaining N

“Dummy application”

Predicted Nitrogen Balance cont'd



- **Weather Data**

- **Before application date, observed weather is used**
- 2 weeks following application, weather predictions
- After this, historical weather is used

Predicted Nitrogen Balance cont'd



- **Weather Data**

- Before application date, observed weather is used
- **2 weeks following application, weather predictions**
- After this, historical weather is used

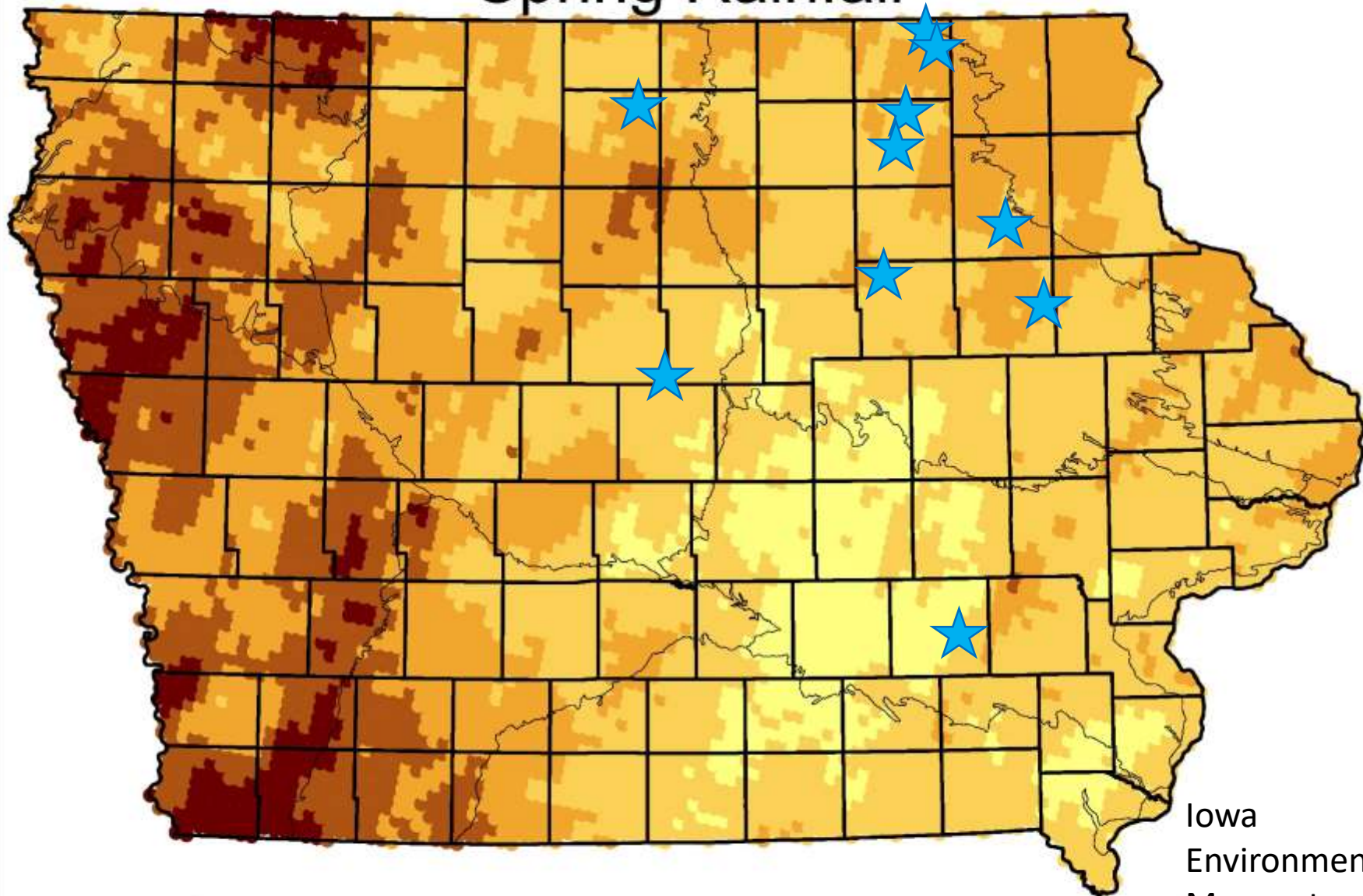
Predicted Nitrogen Balance cont'd



- **Weather Data**

- Before application date, observed weather is used
- 2 weeks following application, weather predictions
- **After this, historical weather is used**

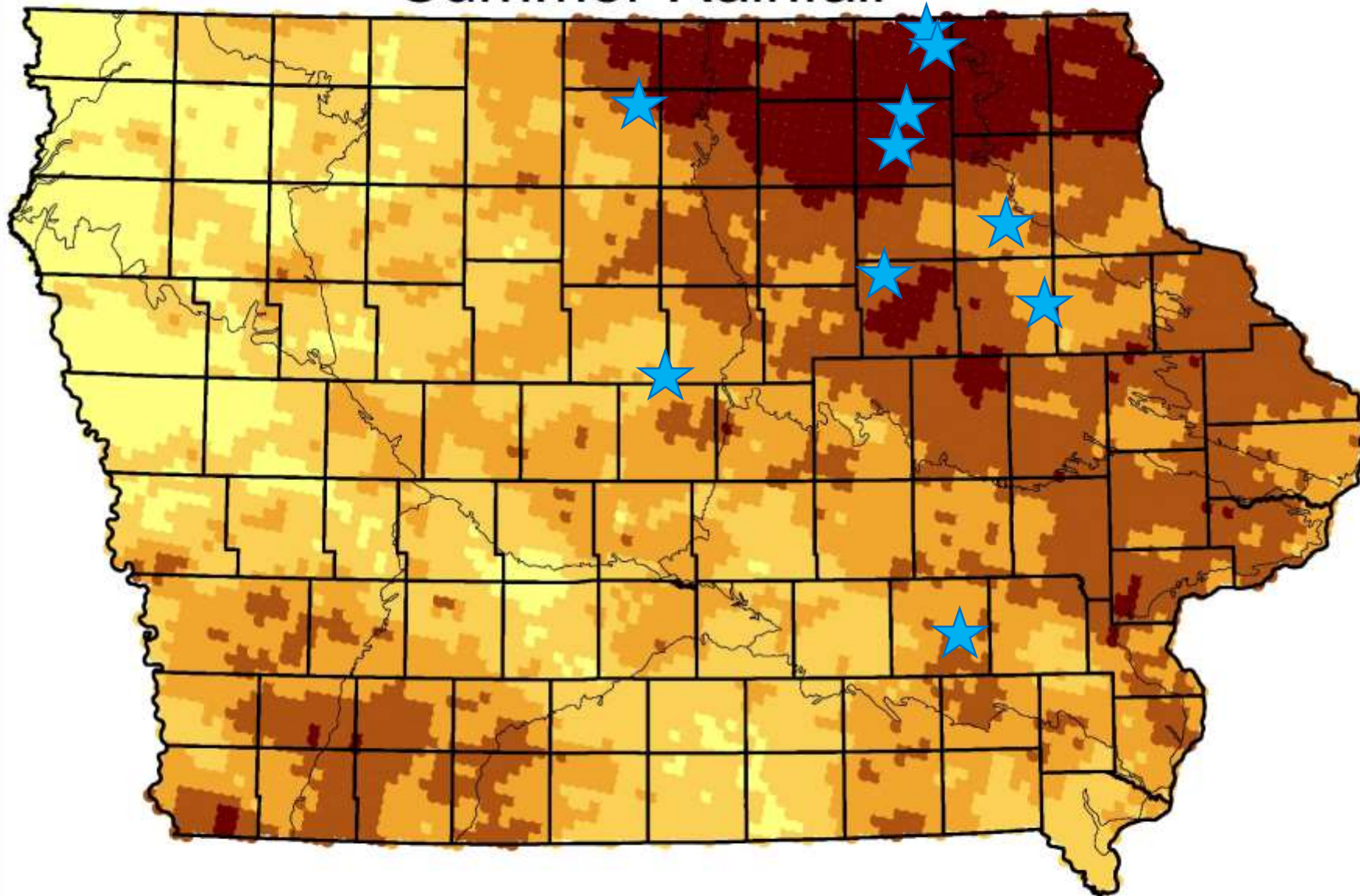
Spring Rainfall



Iowa
Environmental
Mesonet

Spring Rainfall (Inches) 6 - 8 8 - 10 10 - 12 12 - 14 14 - 18

Summer Rainfall



Summer Rainfall (Inches) 4 - 10 10 - 13 13 - 16 16 - 20 20 - 26

Yield Summary

Trial ID	County	Base Rate (lbs N/a)	Model Detail	In-Season Rate (lbs N/a)		Yield (bu/a)		
				Farmer	Model	Normal	Model	Yld Dif
74	Fayette	135	N50, NH3 (6/7)	235	185	217.4	205.5	-11.9
144	Buchanan	196	N30, UAN (6/14)	271	226	251.8	241.7	-10.1
34	Chickasaw	100	N0	150	100	228.9	221.3	-7.6
125	Hancock	0	N100, UAN (6/7)	120	100	217.9	214.3	-3.6
136	Black Hawk	85	N40, NH3 (6/7)	155	125	218.8	215.4	-3.4
126	Hancock	0	N95, UAN (6/6)	120	95	210.9	207.9	-3
57	Keokuk	140	N0	170	140	198	198	0
138	Howard	55	N112, UAN (6/19)	131	167	242.8	248.3	5.5
47*	Chickasaw	5	N130 UAN (6/8)	195	135	224.7	217.2	-7.5
76	Hamilton	130	N0	166	130	221.7	218.2	-3.5

- Model Rate for 47* was changed by farmer due to low recommendation
- Three models indicated no additional nitrogen was needed

Summary of Model Evaluations

- Model based rates were lower than farmers due to drier spring conditions.
- In many fields economic return for both treatments was almost the same.
- Higher summer rainfalls increased corn N demand.
- Site-specific data of soil test, soil organic matter and pH would improve prediction accuracy.

ON-FARM NETWORK® REPLICATED STRIP TRIAL DATABASE

Year	Crop	Trial Type and Detail			
All Years	All Crops	All Trial Types	<input type="text"/> <input type="button" value="Search Trial Details"/>		
2016	Corn	Cover Crop	All Trial Details		
2015	Soybean	Crop Management	0-0-60 vs Untreated		
2014		Crop Management - Planting Date	100lbs N vs 0lbs N		
2013		Crop Management - Population	100lbs N vs 50lbs N		
2012		Crop Management - Roller	15" rows vs 30" rows		
2011		Crop Management - Row Spacing	2 Pass Tillage vs 1 Pass Tillage		
2010		Crop Management - Tillage			
Location					
All Landform Regions	All Crop Districts	All Watersheds	All Counties		
Des Moines Lobe	1 (North West)	Apple-Plum	Adair		
Iowa-Cedar Lowland	2 (North Central)	Bear-Wyaconda	Adams		
Iowan Surface	3 (North East)	Big Papillion-Mosquito	Audubon		
Loess Hills	4 (West Central)	Blackbird-Soldier	Black Hawk		
Mississippi River Alluvial Plain	5 (Central)	Blue Earth	Boone		
Missouri River Alluvial Plain	6 (East Central)	Boone	Bremer		
NA	7 (South West)	Boyer	Buchanan		

The Iowa Soybean Association does not endorse the use of products tested in On-Farm Network replicated strip trials. While treatments are replicated within trials and across multiple sites under various conditions, your individual results may vary.

<http://www.iasoybeans.com/programs/isa-research/get-informed/research-results/online-database/>

ON-FARM NETWORK® REPLICATED STRIP TRIAL DATABASE

Year	Crop	Trial Type and Detail	
All Years 2016	All Crops Corn	All Trial Types Plant Nutrition - Nitrogen Form	<input type="text"/> Search Trial Details
			All Trial Details UAN vs Urea Urea vs UAN

Location			
All Landform Regions Des Moines Lobe Southern Iowa Drift Plain	All Crop Districts 2 (North Central) 4 (West Central) 5 (Central) 7 (South West)	All Watersheds Middle Des Moines North Raccoon One Hundred & Two Platte South Skunk Upper Des Moines	All Counties Adams Greene Humboldt Story

[Display Results](#)
[Clear Results](#)

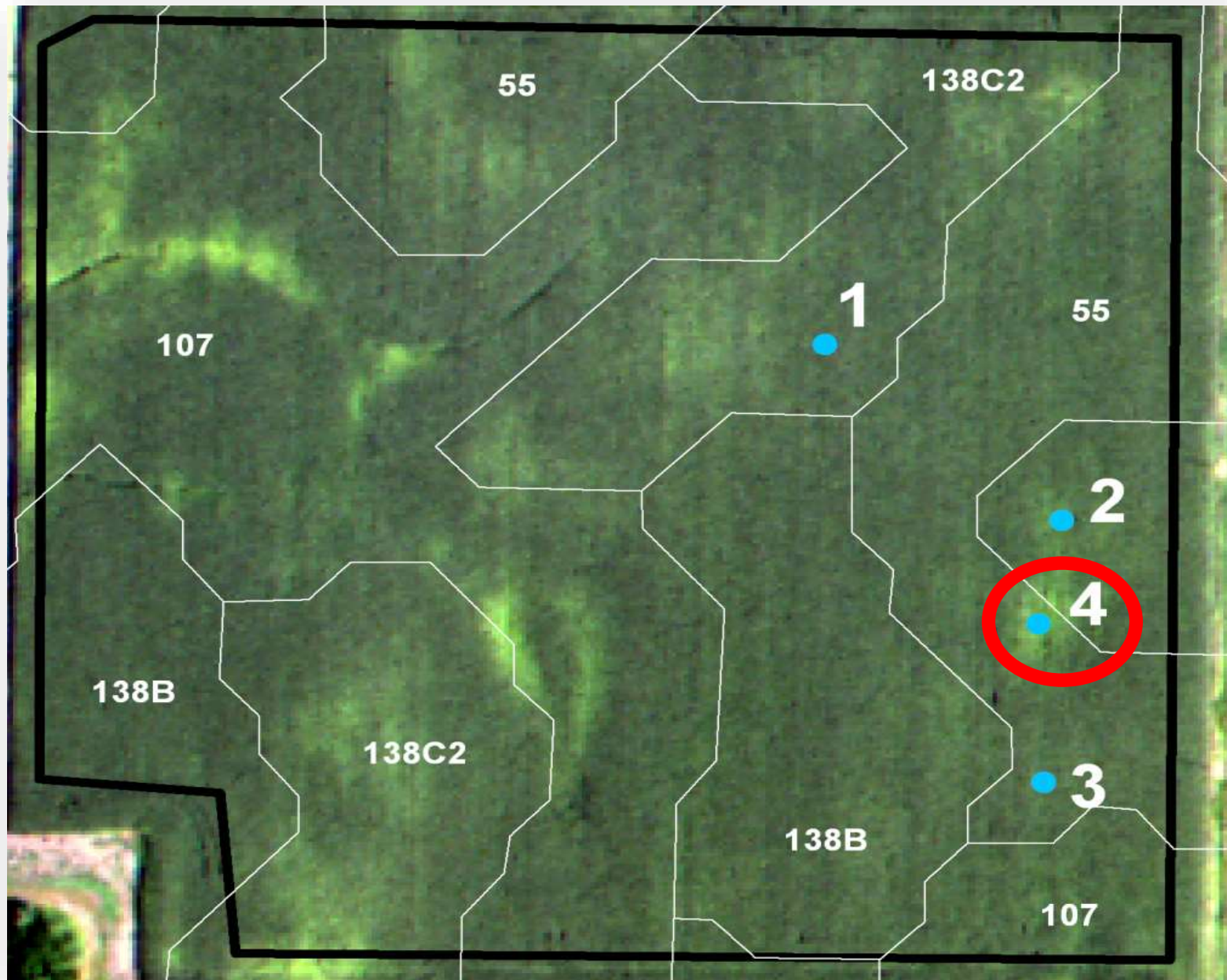
Click a column heading to sort the table by that column.

Year	Location	Trial Type	Year	Location	Trial Type	Avg. Yield	Year	Location	Trial Type
2016			2016				2016		
2016			2016				2016		
2016			2016				2016		
2016			2016				2016		
2016			2016				2016		

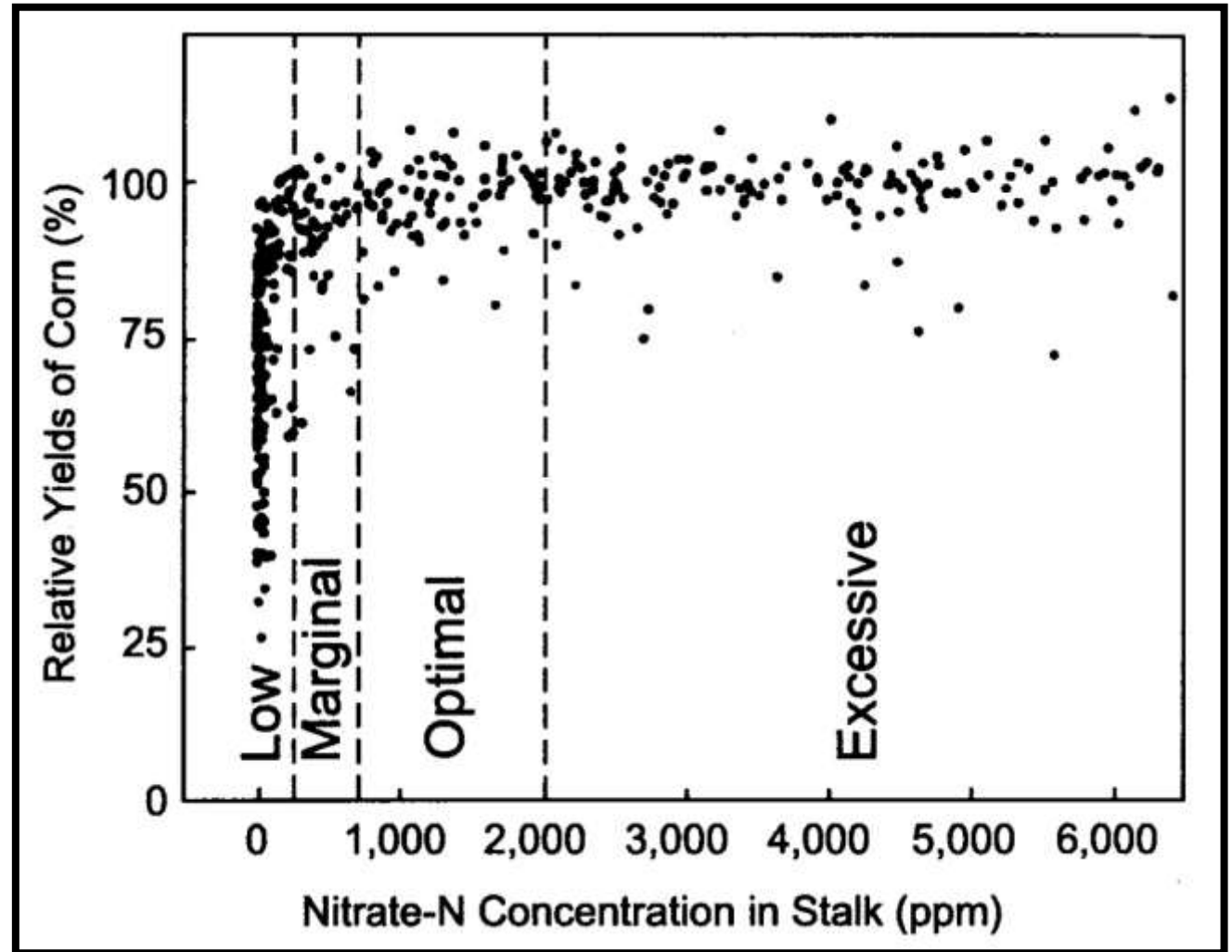
Average Difference for 6 trials
UAN vs Urea: 3.2 bu/acre

90% Confidence Interval for the Mean:
from 1.3 to 5.1 bu/acre

Corn N Status Survey with Imagery



Annual Nitrogen Status Survey:



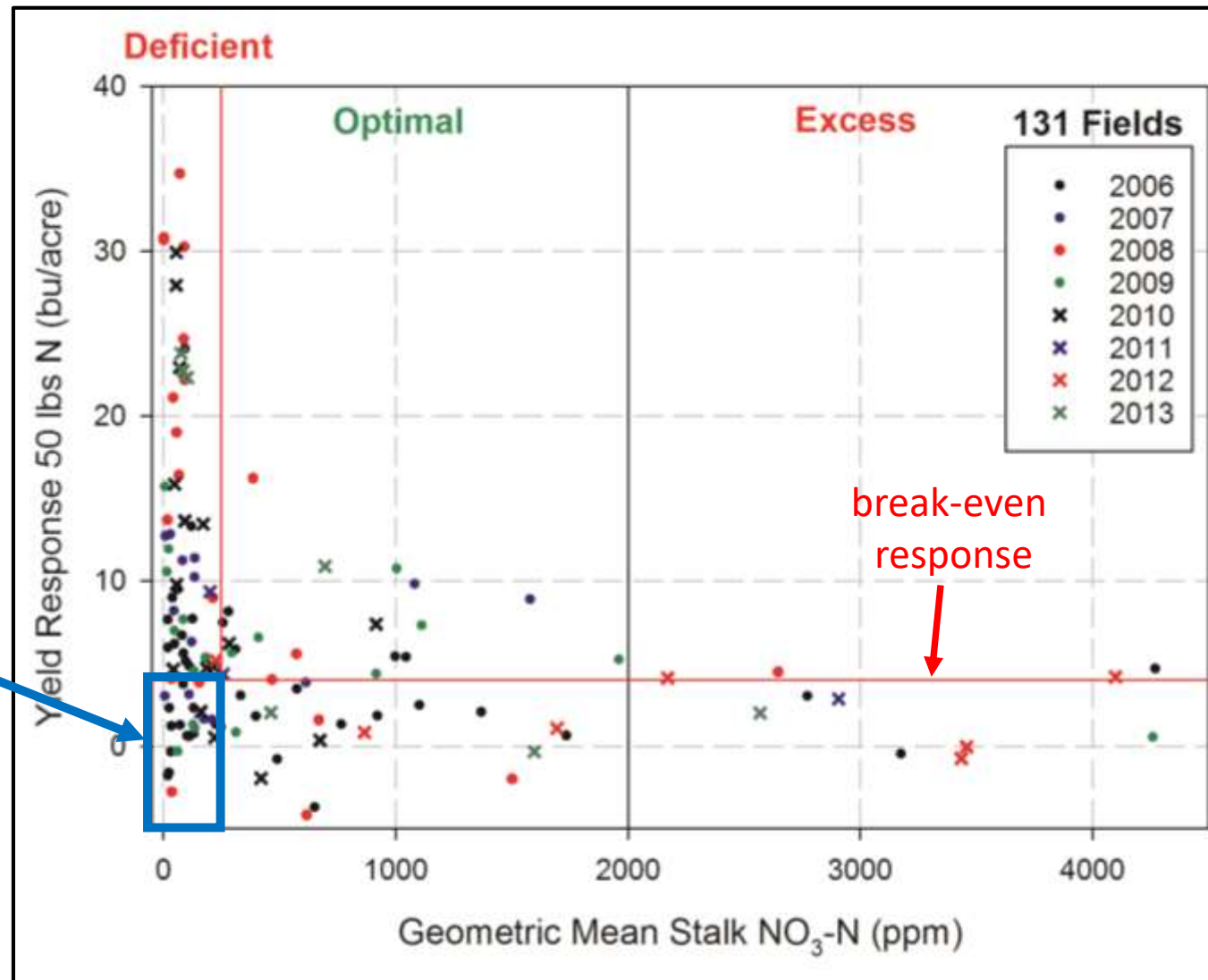
Iowa State Univ. PM 1584

6

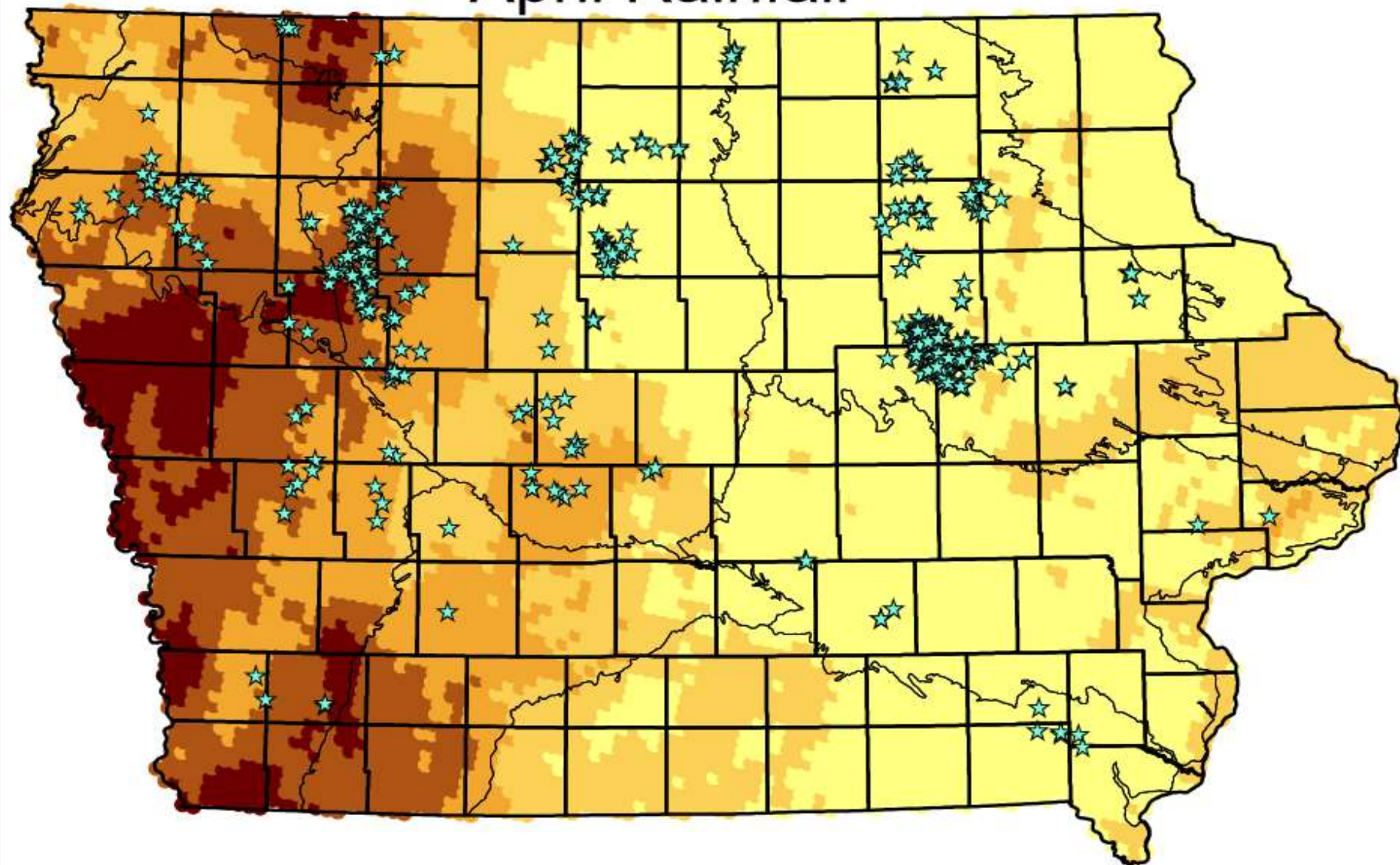
Yields do not correlate
with stalk nitrate
values for the same
sufficiency categories

Stalk Nitrate Test Calibration

Error Rate for
Deficient
Category
20-25%

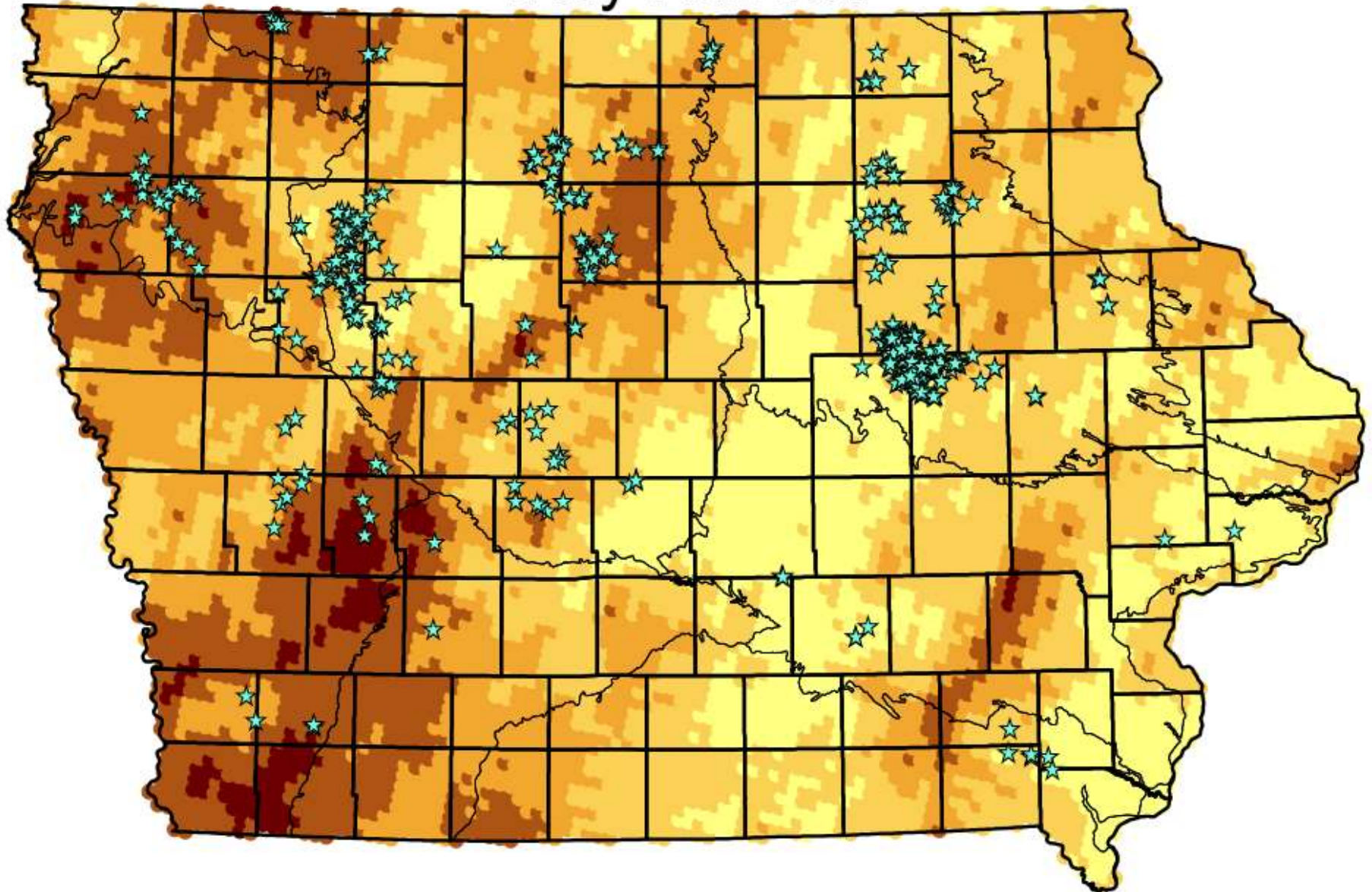


April Rainfall



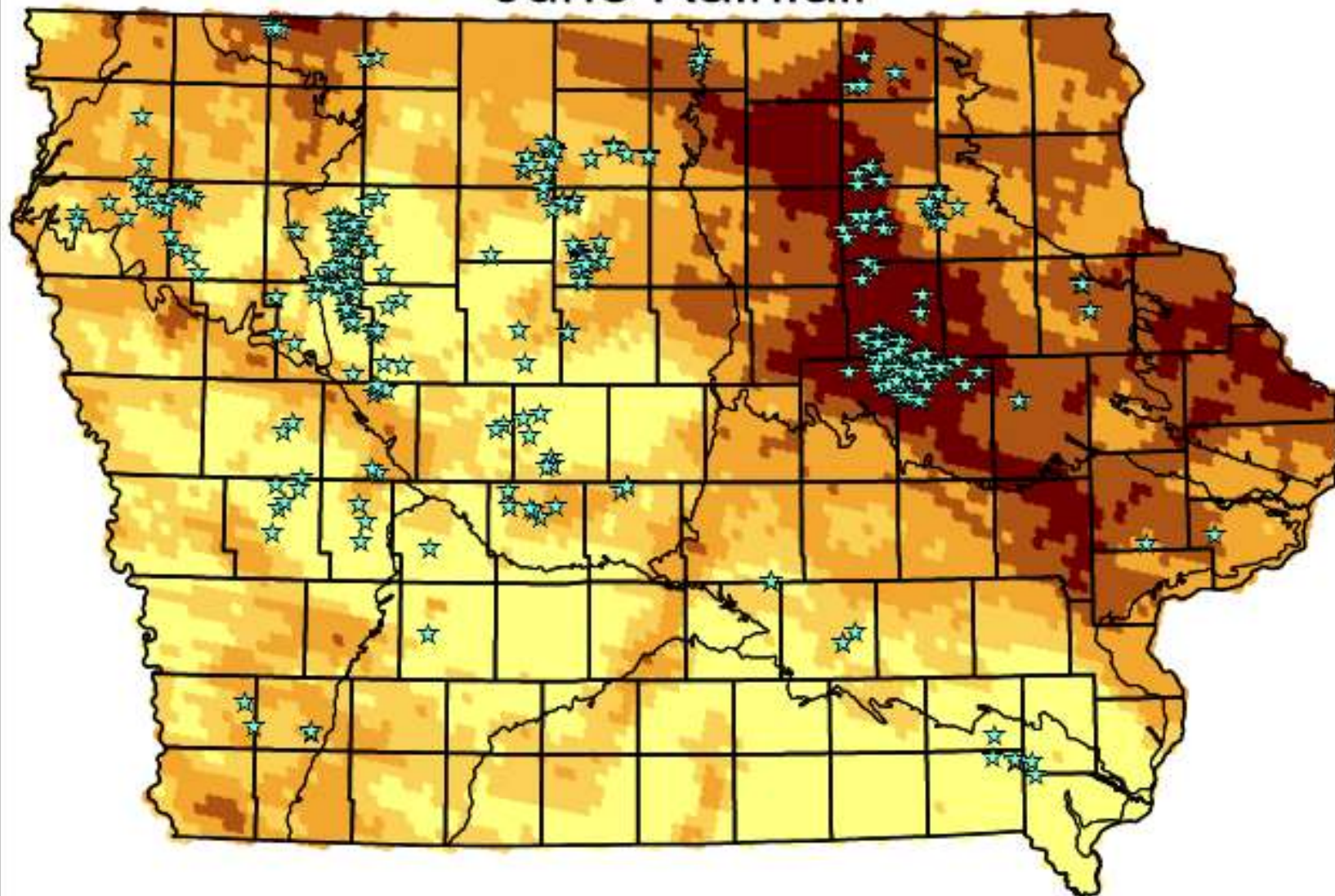
April Rainfall (Inches) 0 - 3 3 - 4 4 - 5 5 - 6 6 - 9 ★ Guided Stalk Sampling Location

May Rainfall



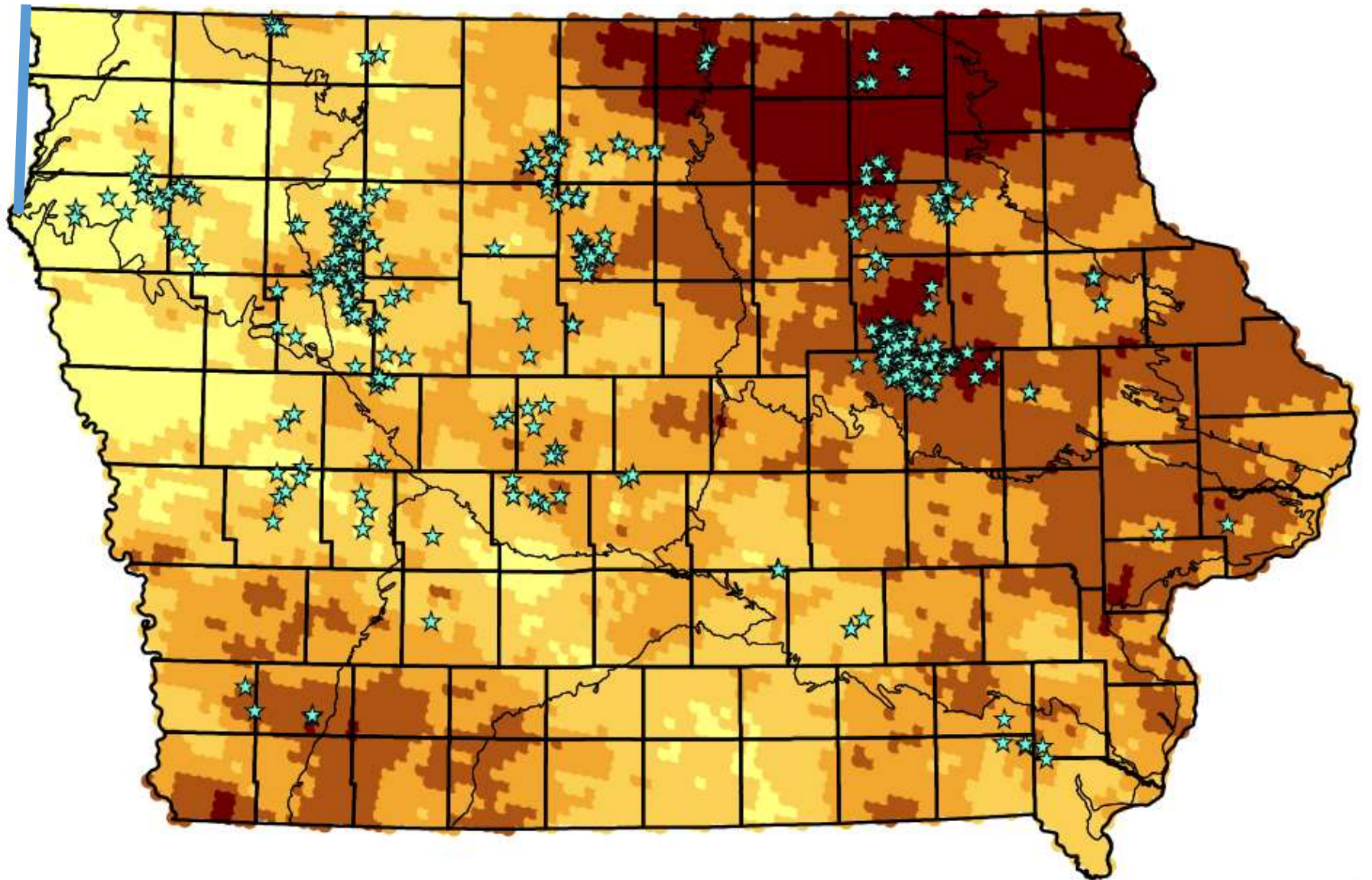
May Rainfall (Inches) 1 - 3 3 - 4 4 - 5 5 - 7 7 - 10 ★ Guided Stalk Sampling Location

June Rainfall



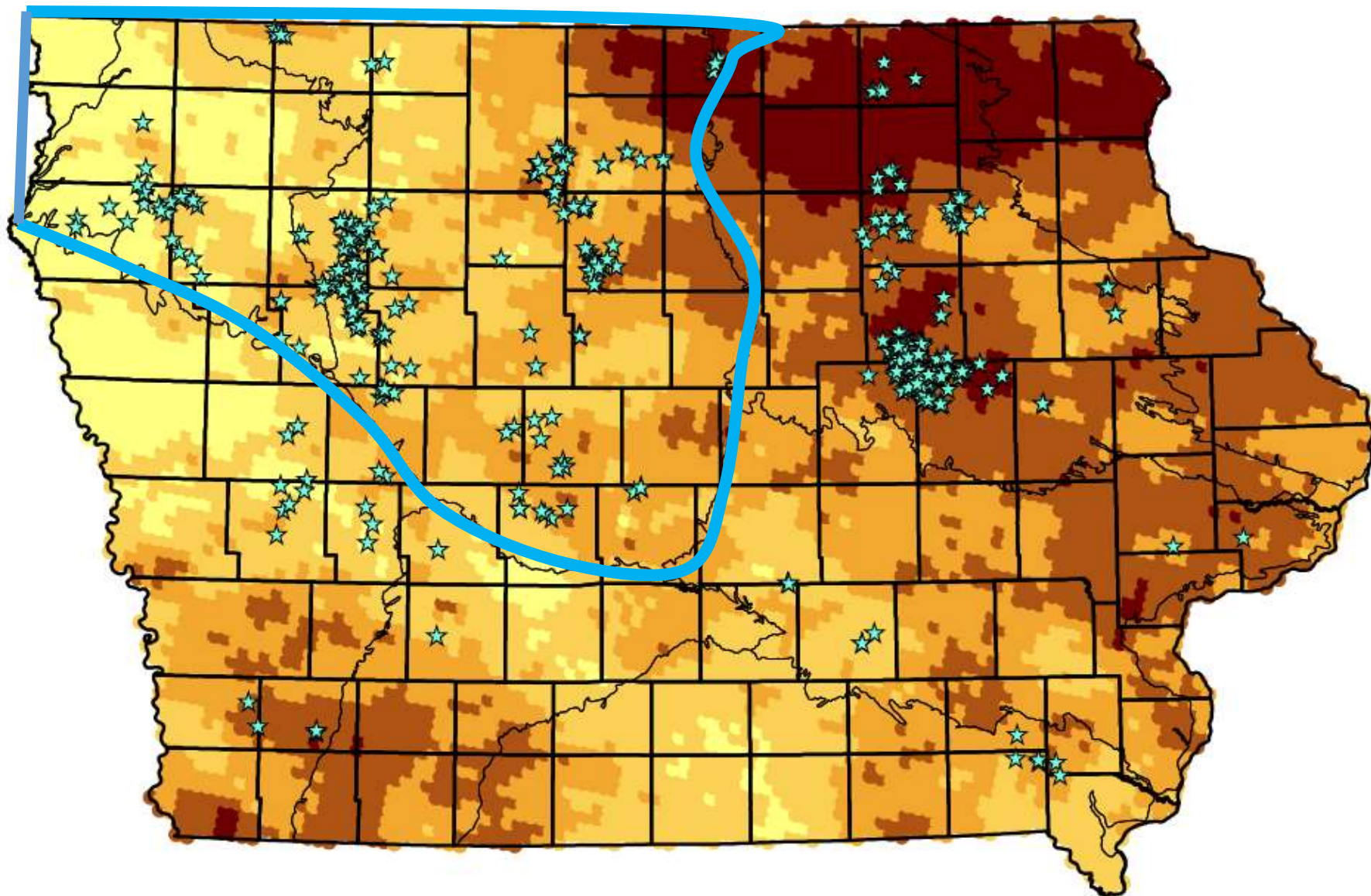
June Rainfall (Inches) 0 - 2 2 - 3 3 - 5 5 - 7 7 - 11 ★ Guided Stalk Sampling Location

Summer Rainfall



Summer Rainfall (Inches) 4 - 10 10 - 13 13 - 16 16 - 20 20 - 26 ★ Guided Stalk Sampling Location

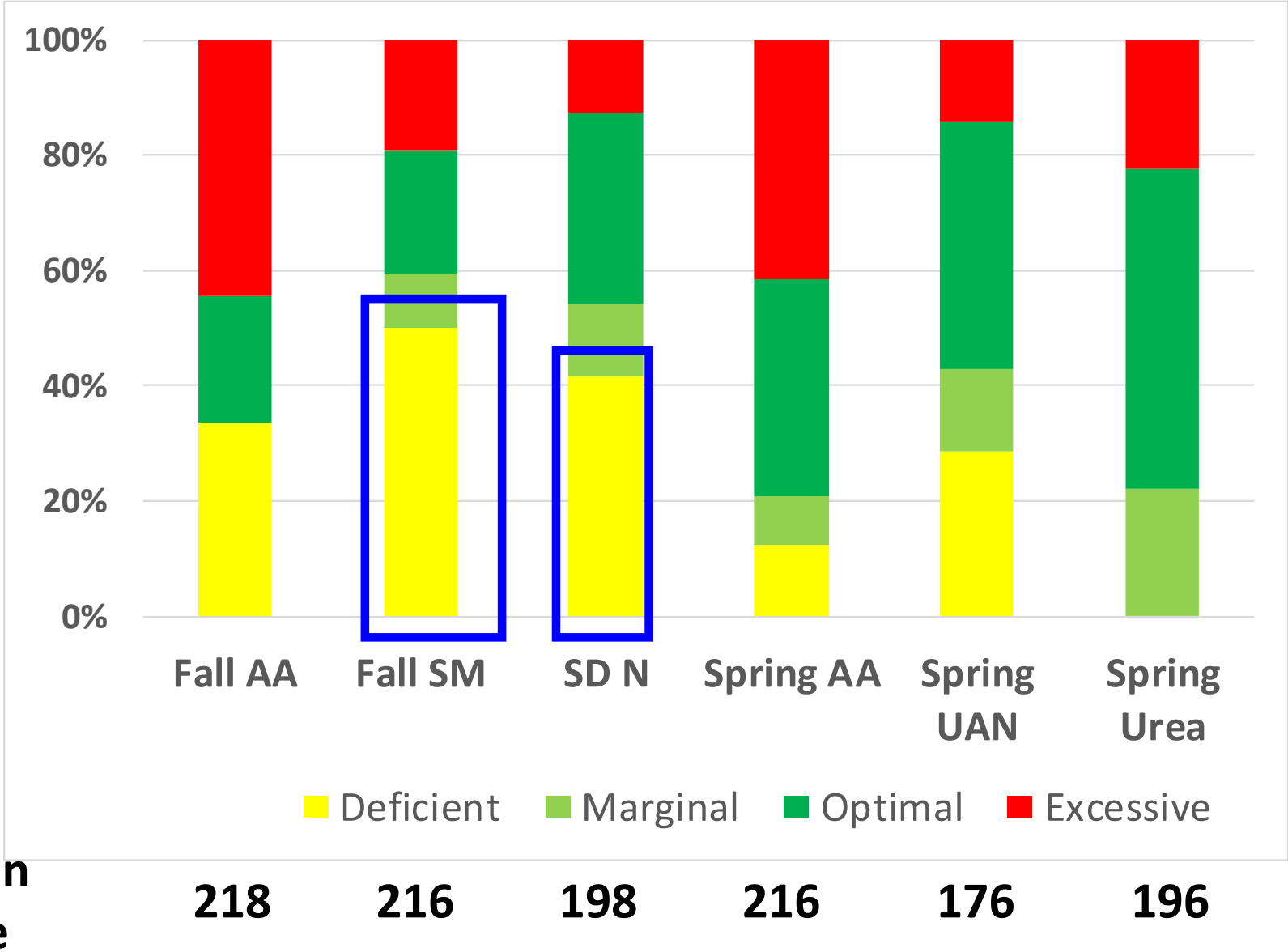
Northwest and Central Iowa



Summer Rainfall (Inches) 4 - 10 10 - 13 13 - 16 16 - 20 20 - 26 ★ Guided Stalk Sampling Location

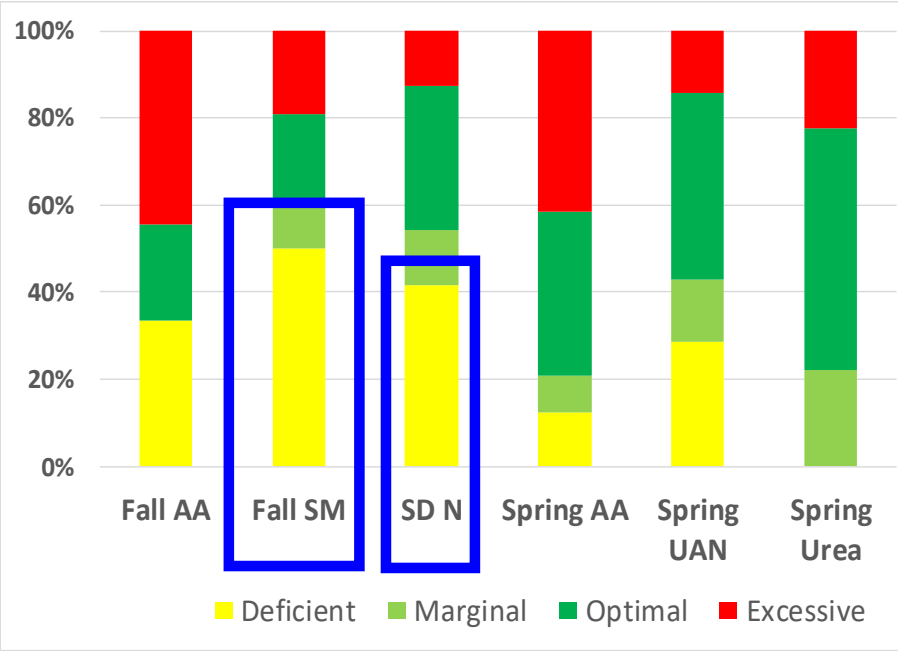
2016 Northwest and Central Iowa

Corn after Corn

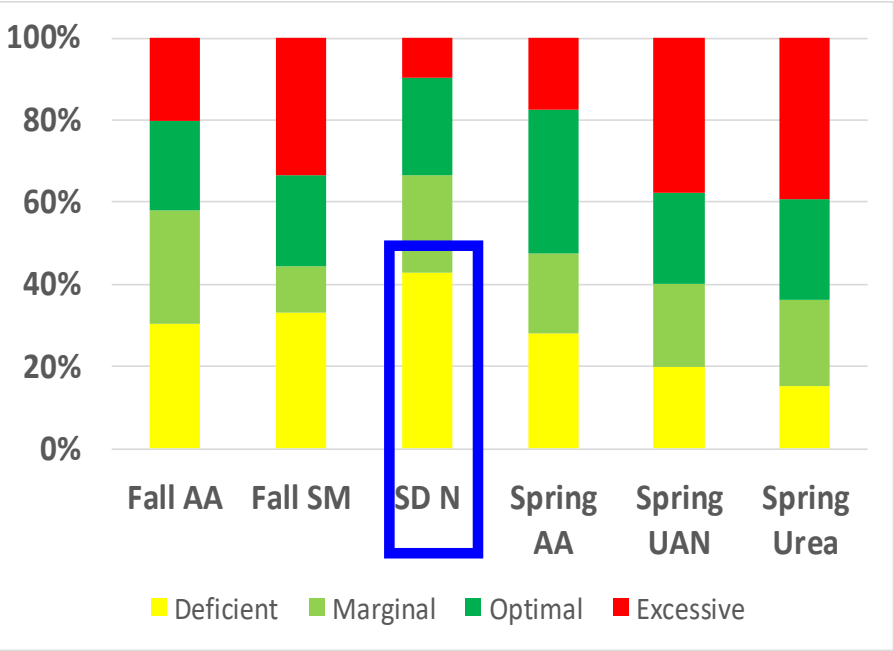


2016 Des Moines Lobe and Northwest Iowa

Corn on Corn



Corn on Soybean



Median
N Rate

218

216

198

216

176

196

165

195

150

150

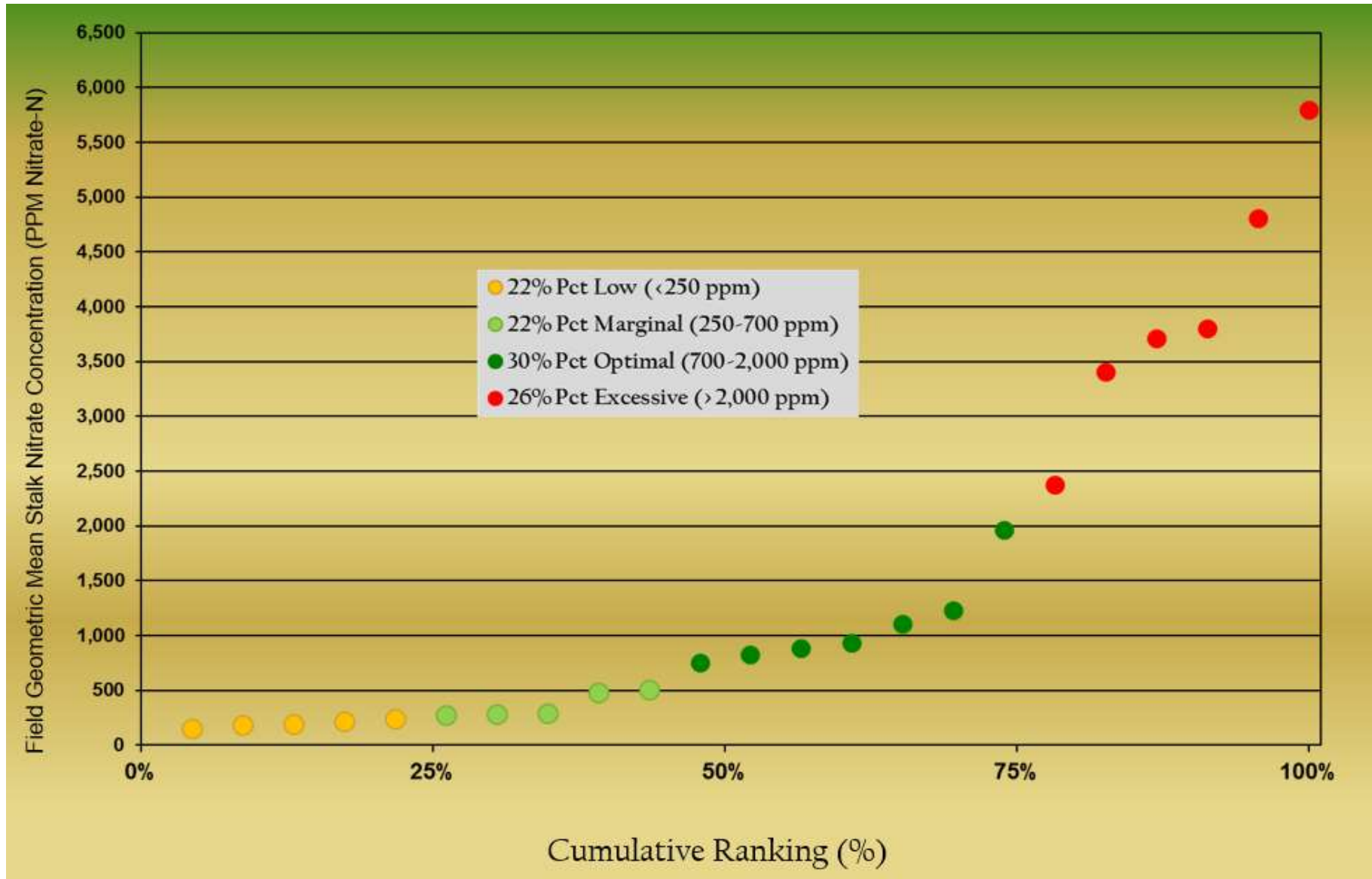
173

150

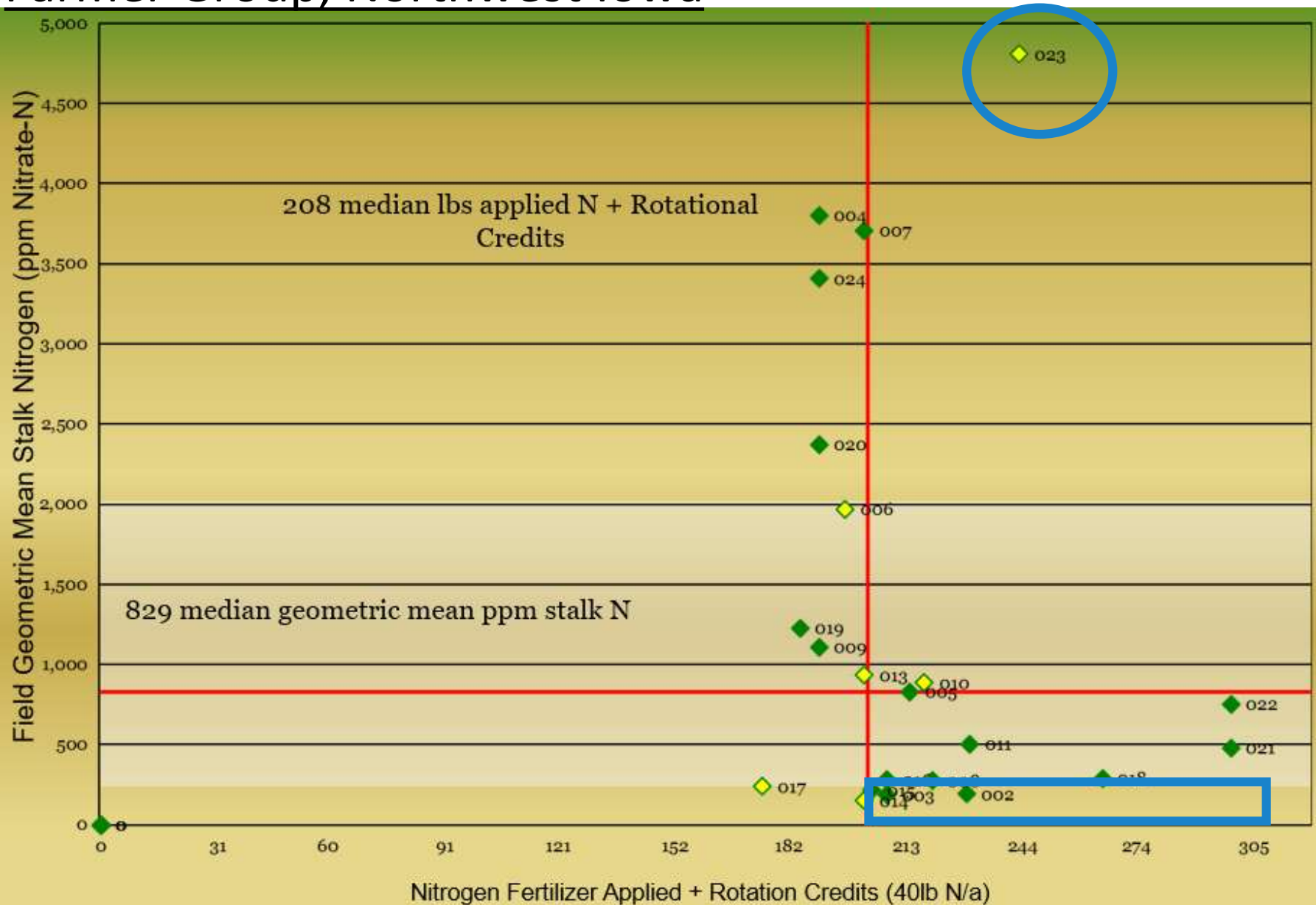
Cherokee IA, Mesonet Weather Station



Geometric Means Stalk Nitrate: Farmer Group, Northwest Iowa



Nitrogen Rate plus Rotation Credit for Corn after Soybean Farmer Group, Northwest Iowa



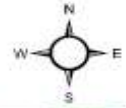
Identifying Problems in N Management



Identifying Problems in N Management

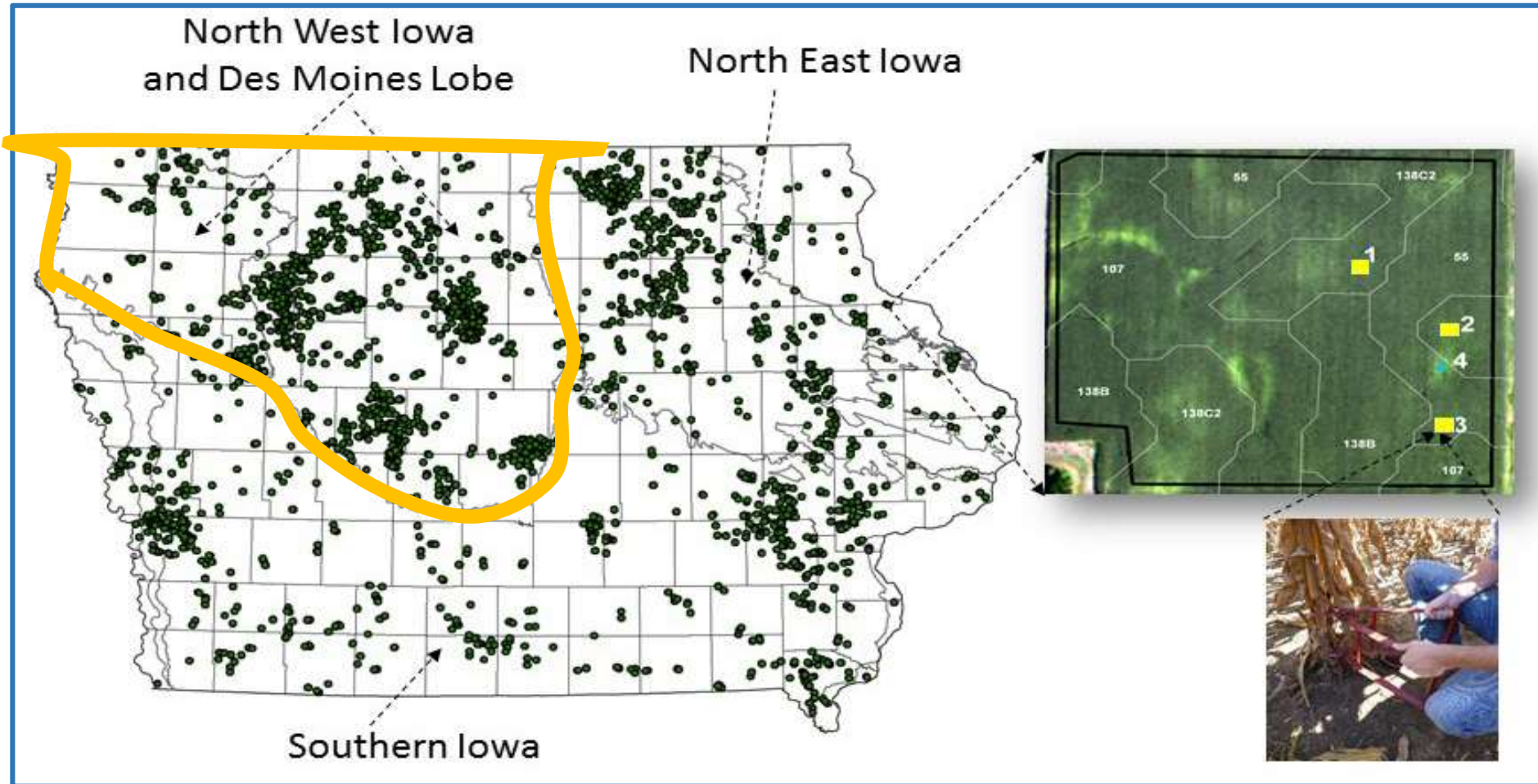
2016 Stalk Nitrate Results

GSS2016IASA007

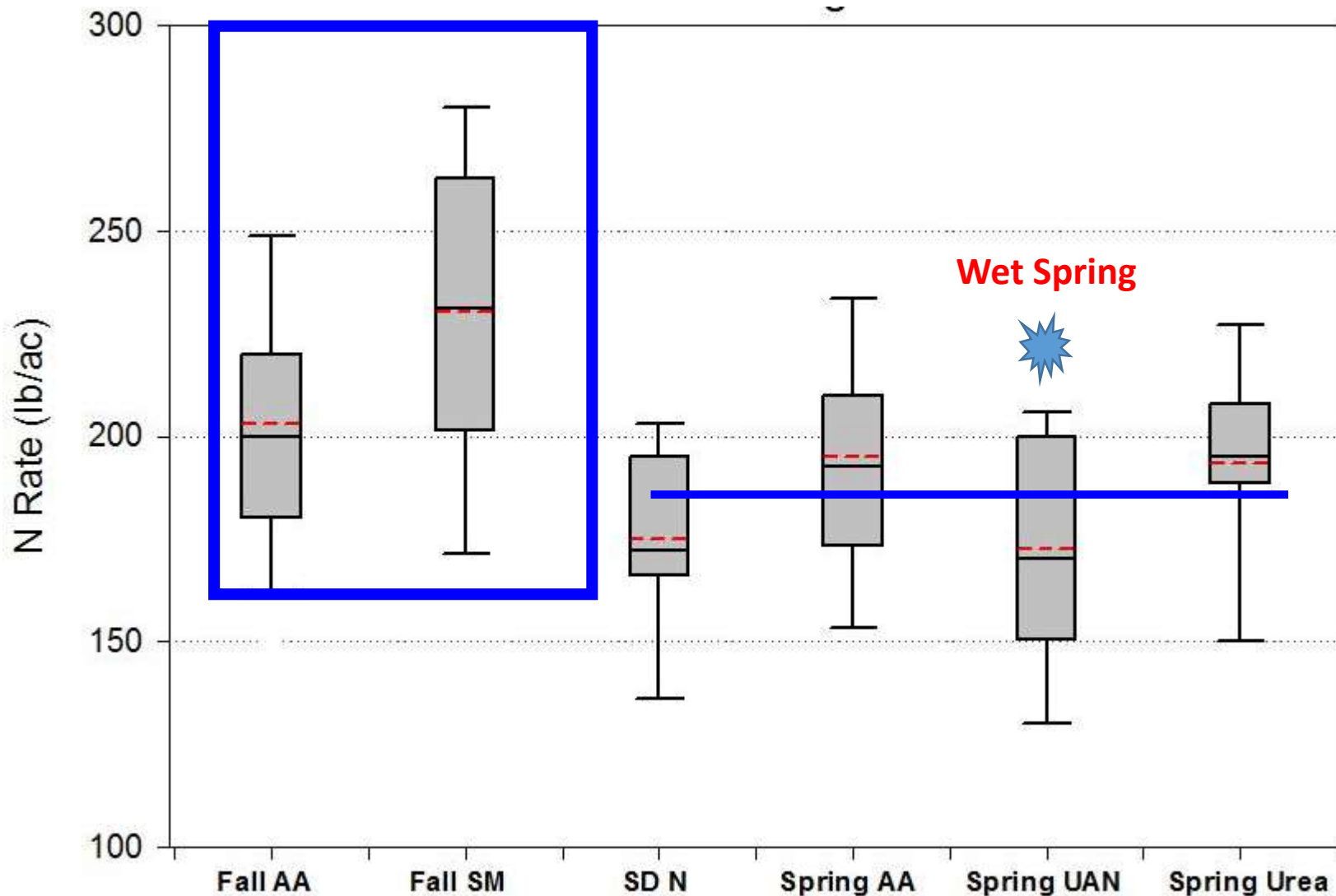


Historical Data

2345 fields

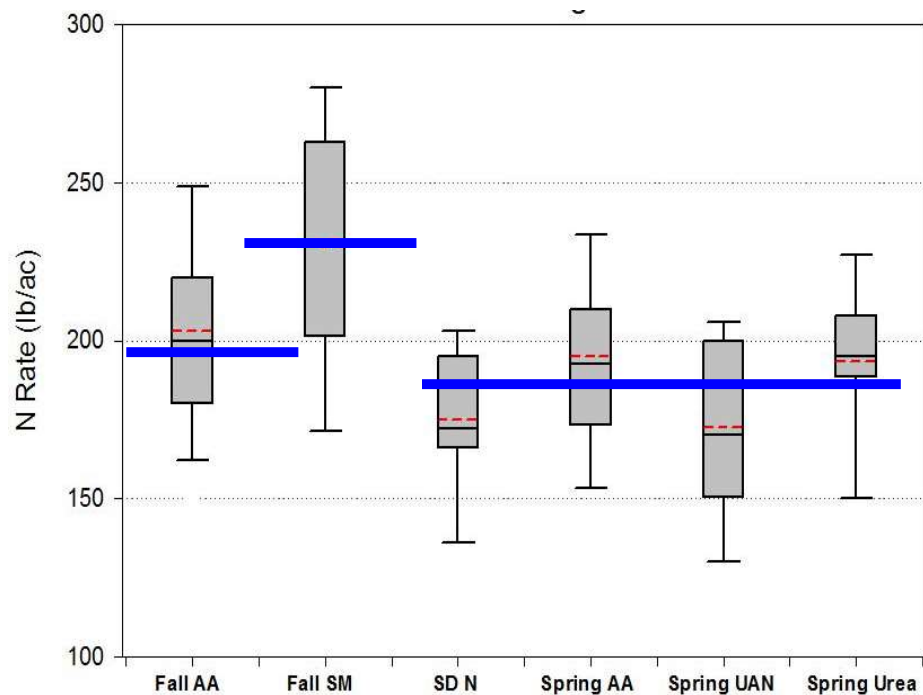


Des Moines Lobe and Northwest Iowa: 2006 to 2016: Corn on Corn

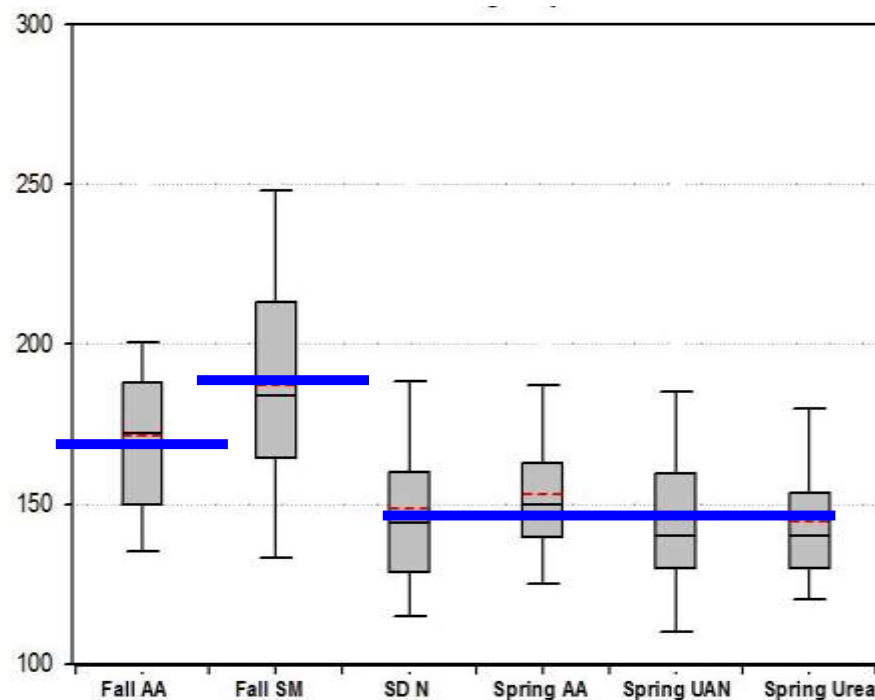


Des Moines Lobe and Northwest Iowa: 2006 to 2016

Corn on Corn



Corn on Soybean



Reference N Rates: ISU Maximum Return to N Calculator

State: Iowa

Region: Main

Number of sites: 105

Rotation: Corn Following Corn

Nitrogen Price (\$/lb): 0.35

Corn Price (\$/bu): 4.00

Price Ratio: 0.09

MRTN Rate (lb N/acre): 189

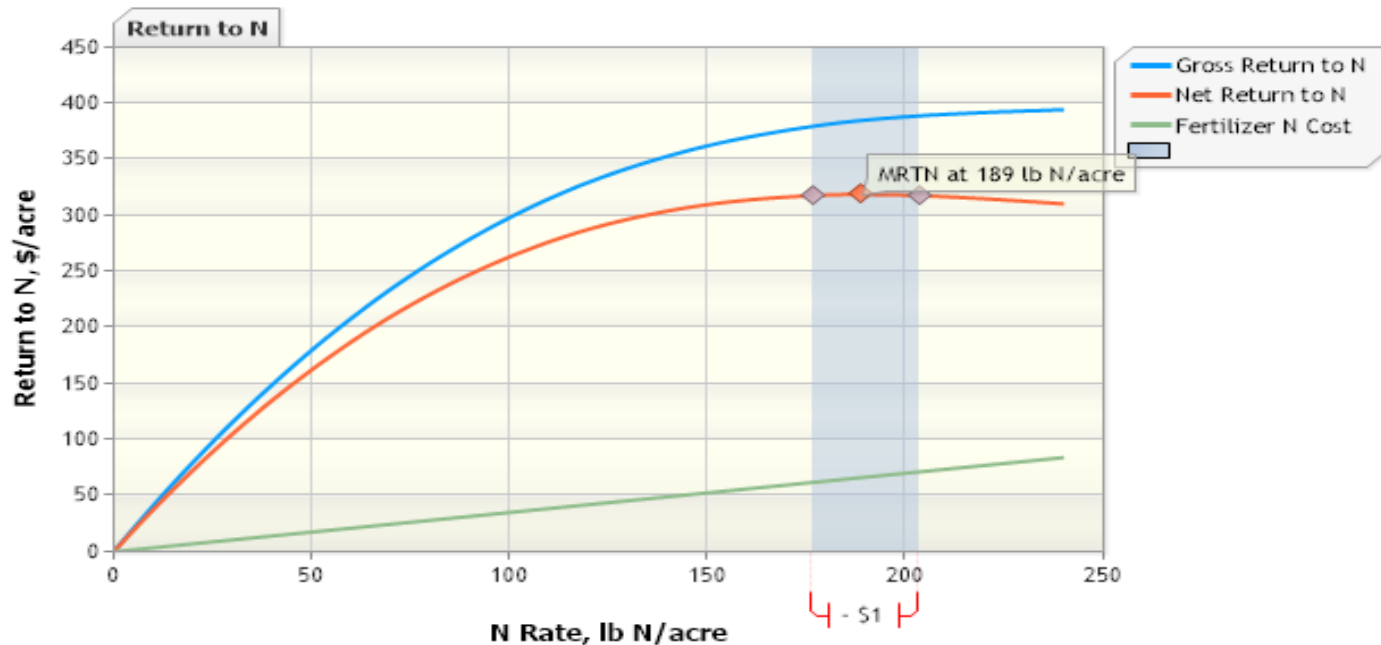
Profitable N Rate Range (lb N/acre): 176 - 203

Net Return to N at MRTN Rate (\$/acre): \$318.63

Percent of Maximum Yield at MRTN Rate: 99%

Anhydrous Ammonia (82% N) at MRTN Rate (lb product/acre): 230

Anhydrous Ammonia (82% N) Cost at MRTN Rate (\$/acre): \$66.15

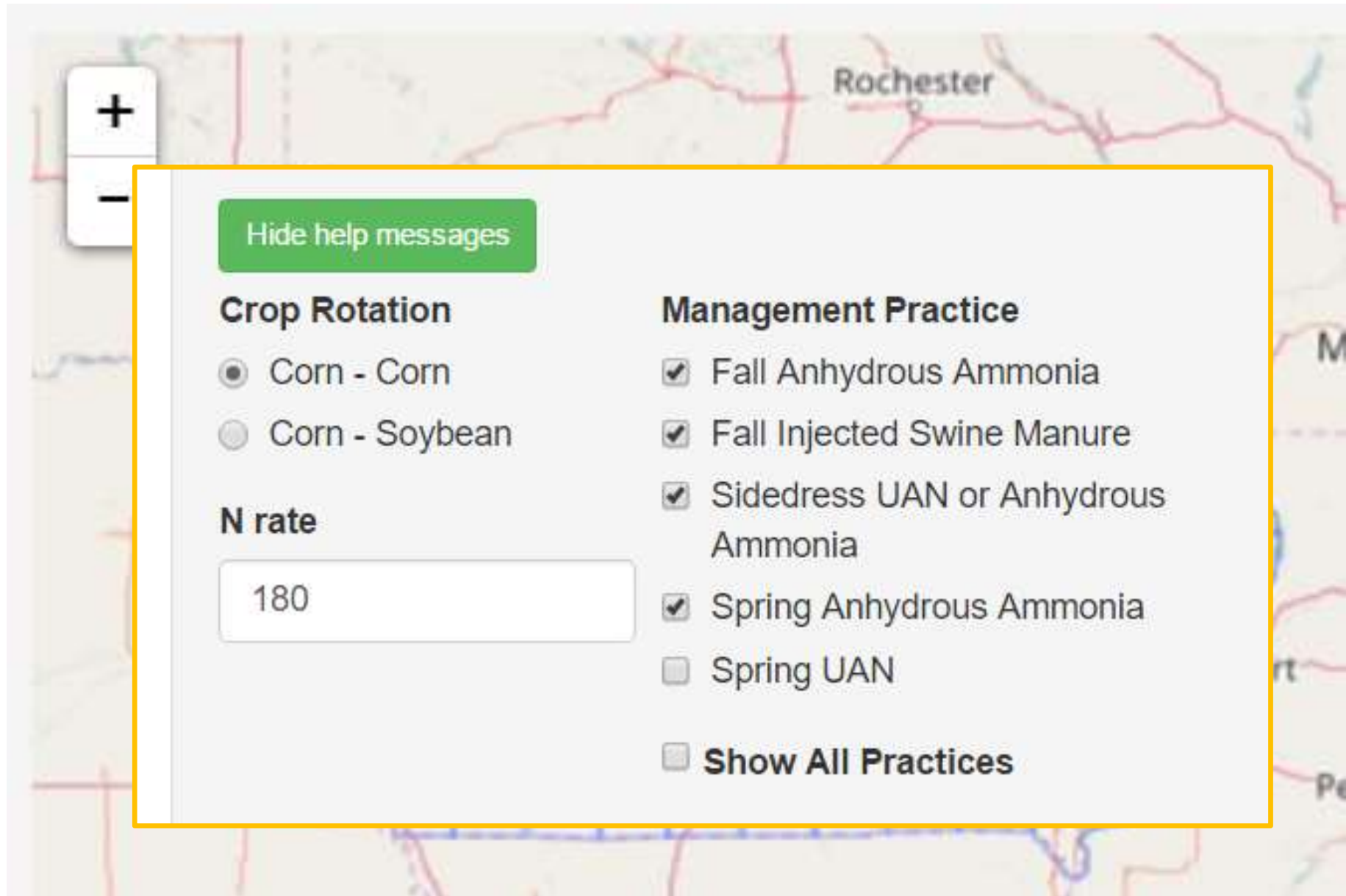


Historical Trends: DSM Lobe and Northwest Iowa:

Increased chance of N deficiency:

1. With Higher May through June rainfall.
2. For Corn after Soybean vs Corn after Corn.
3. For Fall SM, Spring UAN or Sidedress N vs Spring AA.

Risk Calculator of Late-Season N Deficiency



A map background showing a road network with the label "Rochester" in the upper right. On the left side, there is a vertical zoom control with a "+" sign at the top and a "-" sign below it.

Hide help messages

Crop Rotation

- ☒ Corn - Corn
- ☐ Corn - Soybean

N rate

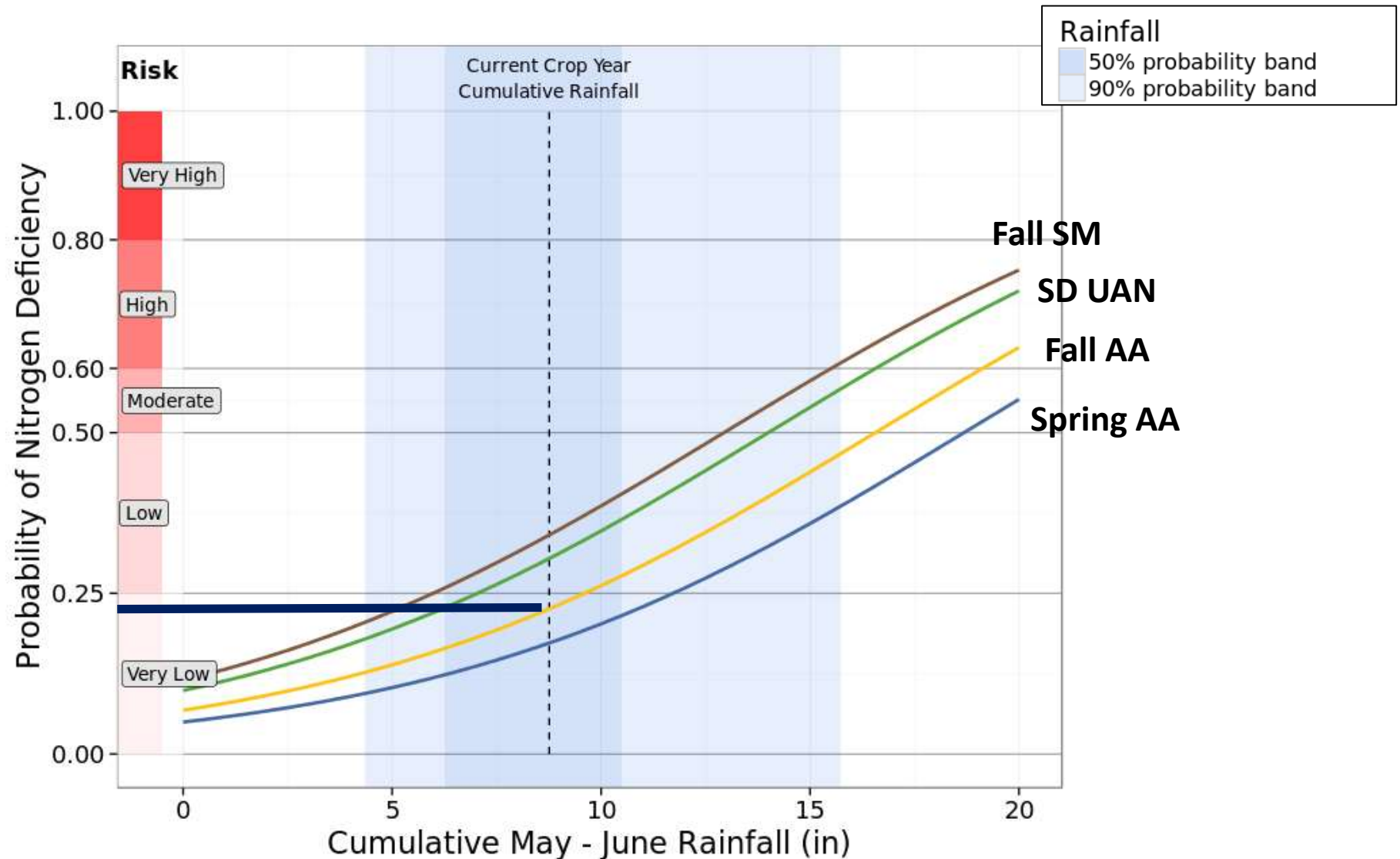
180

Management Practice

- ☒ Fall Anhydrous Ammonia
- ☒ Fall Injected Swine Manure
- ☒ Sidedress UAN or Anhydrous Ammonia
- ☒ Spring Anhydrous Ammonia
- ☐ Spring UAN
- ☐ **Show All Practices**

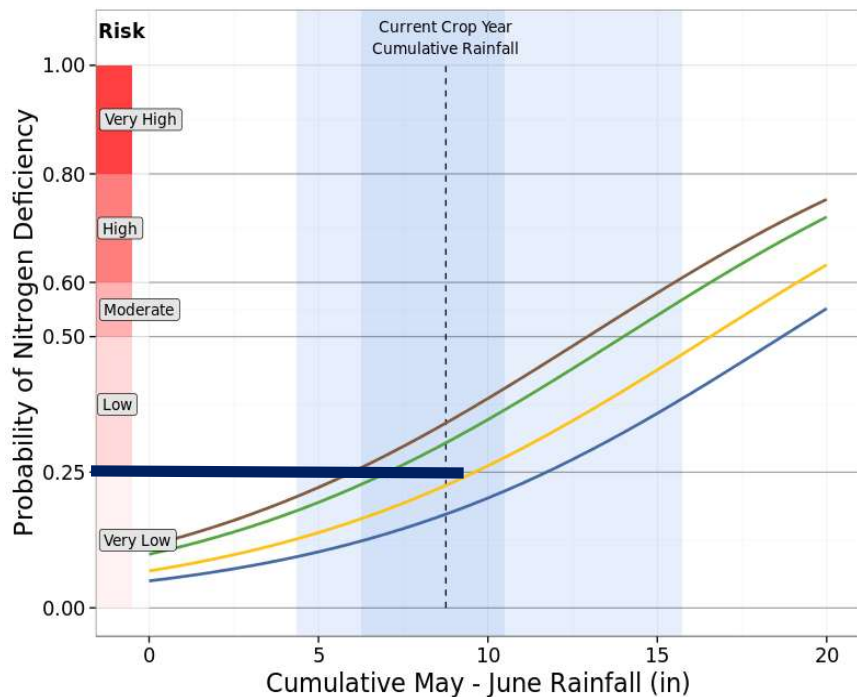
ISA Risk Calculator of Late-Season N Deficiency

Corn on Corn: 180 lb/N acre by Cherokee

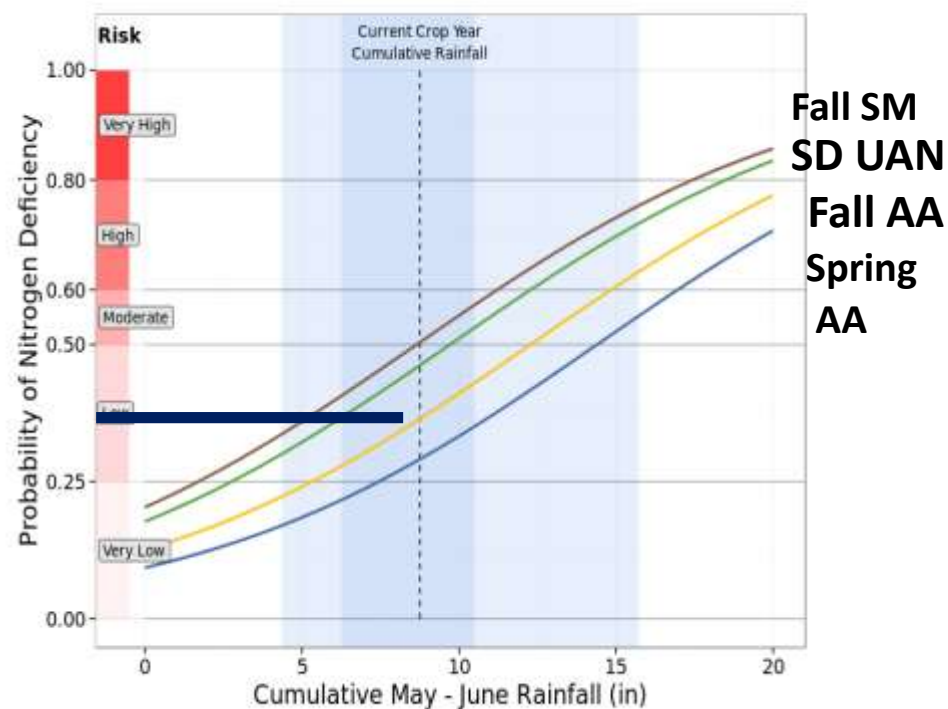


Corn on Corn vs Corn on Soybean

Corn on Corn: 180 lb/N acre




Corn on soybean: 150 lb/N acre



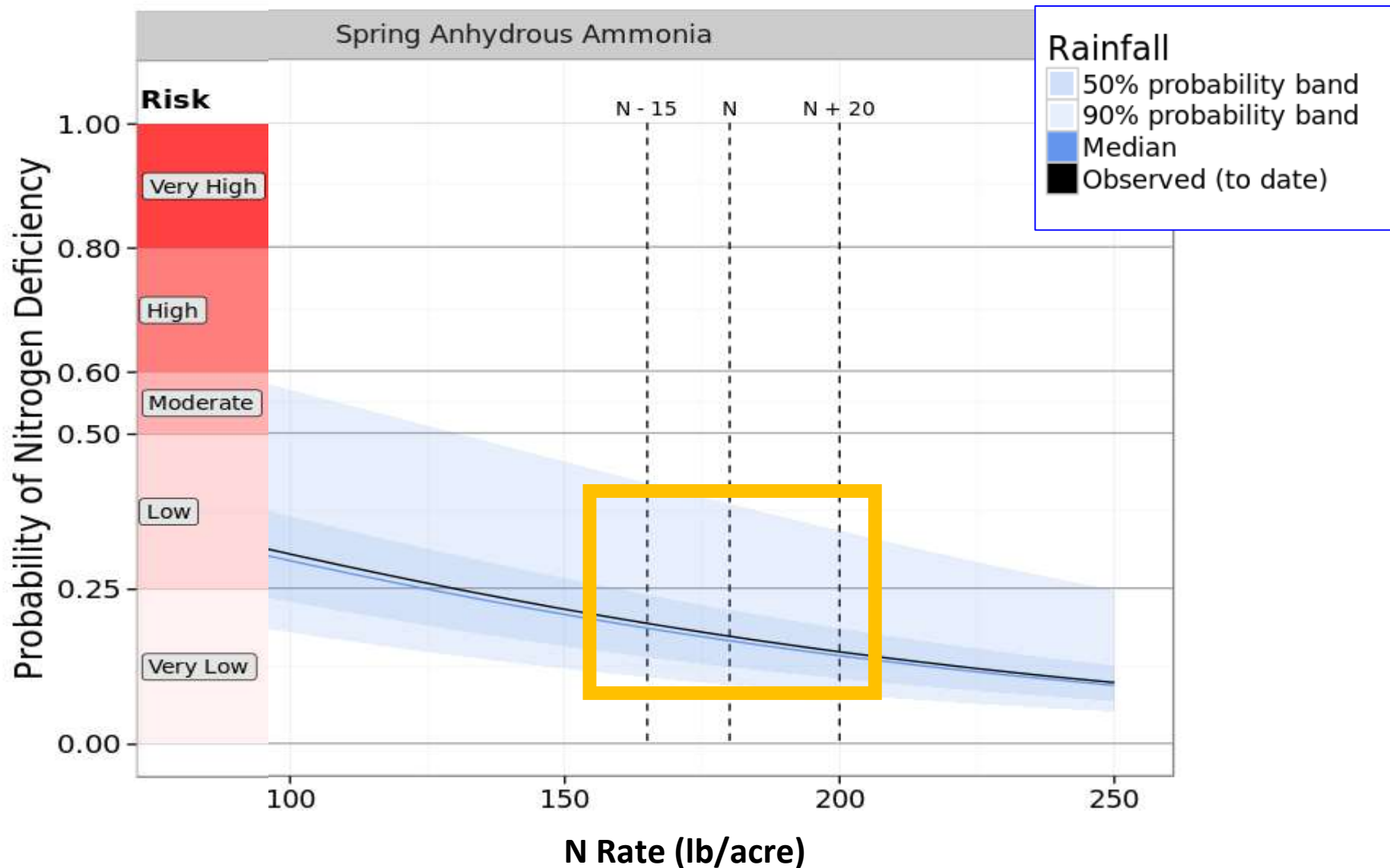
Rainfall

- 50% probability band
- 90% probability band

Risk Categories of Late-Season Deficiency

Probabilities of Deficient	Descriptive	Sign
0-.30	Very Low	 All Clear
.31-.50	Low	 CAUTION
.51-.60	Moderate	 WARNING
.61-.80	High	 DANGER
.81-.99	Very High	 DANGER

N Rate Effects on Risk of N Deficiency



Conclusions

1. “May through June” rainfalls- are driving the risk of N deficiency.
2. Spring and SD applications have higher efficiency than fall applications.

Conclusions

3. Risk of deficiency is the same for all combinations of timing and N forms, except Spring AA.
4. Higher N rates do not always reduce the risk of deficiency.
5. Manure fields should benefit from adaptive management approaches.

QUESTIONS?

pkveryga@iasoybeans.com

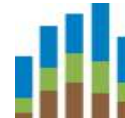


Iowa Soybean Association
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Analytics