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

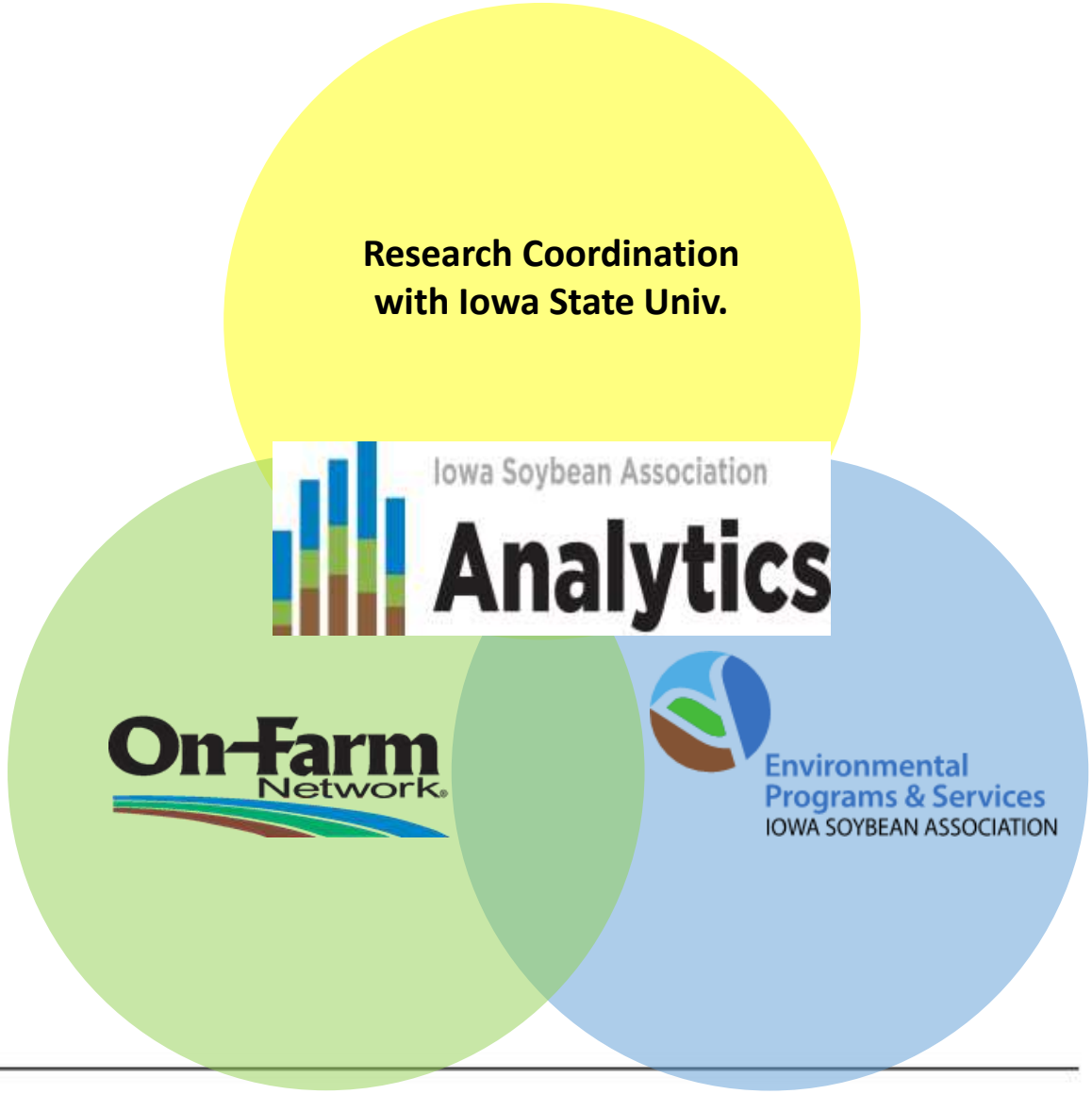
Iowa Soybean Association On-Farm Network®

IOWA SOYBEAN Association

Expanding Opportunities. Delivering Results.

Iowa Soybean Association Analytics

Iowa Soybean Association Research



ISA RESEARCH

IOWA SOYBEAN Association

Iowa Soybean Association On-Farm Network

Iowa Soybean Association Environmental Programs & Services

Iowa Soybean Association Analytics

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

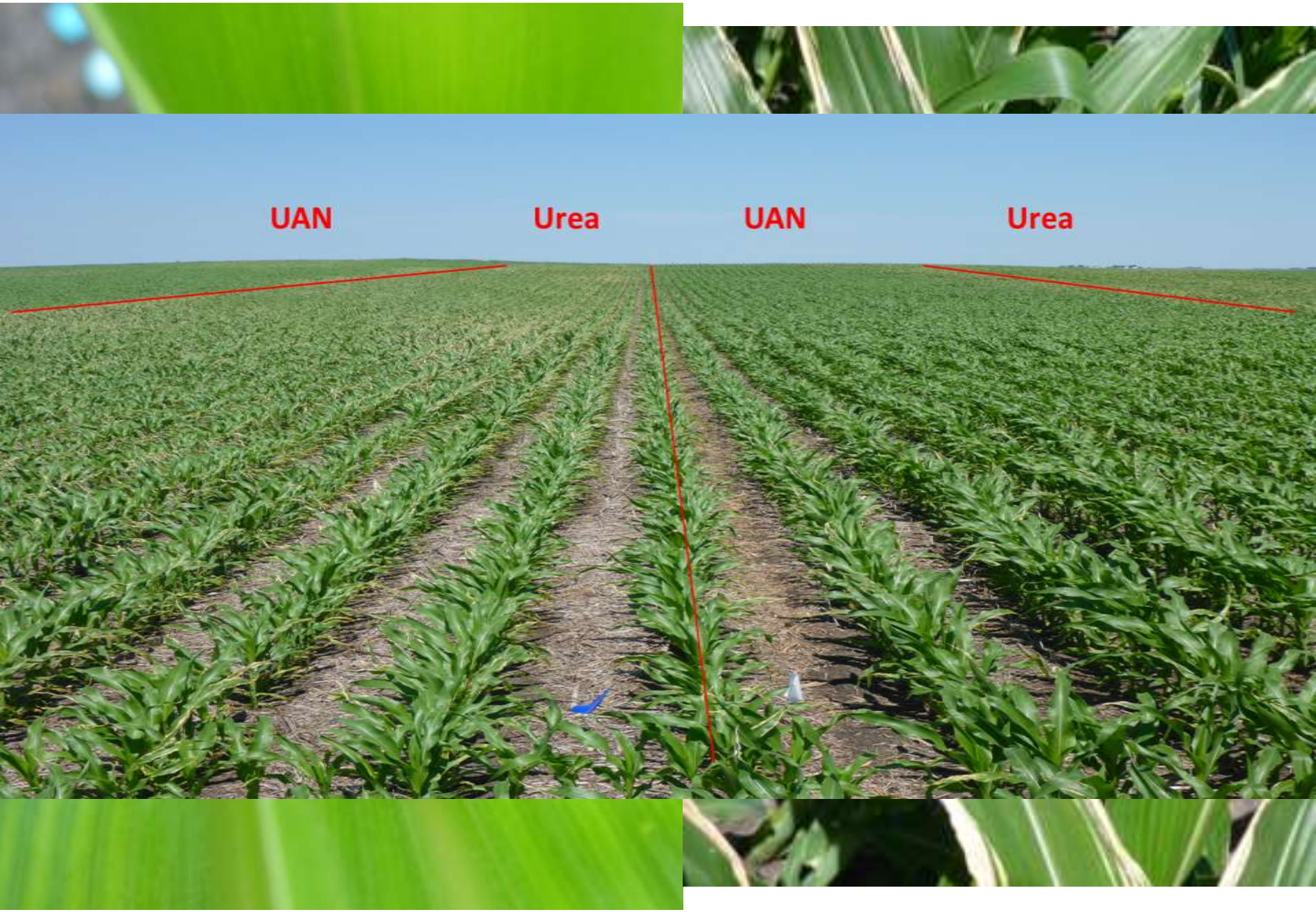
IOWA STATE UNIVERSITY

JOHN DEERE

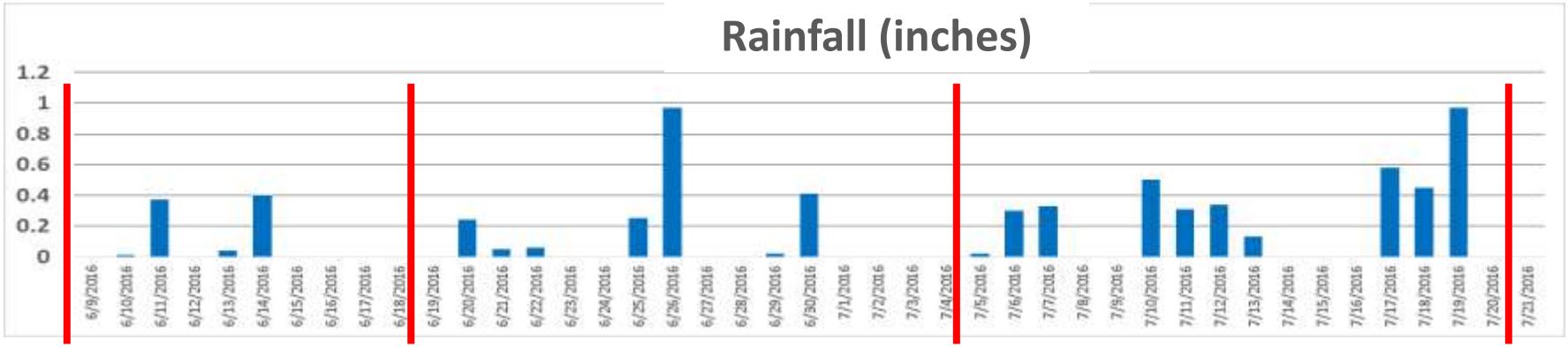
KOCH

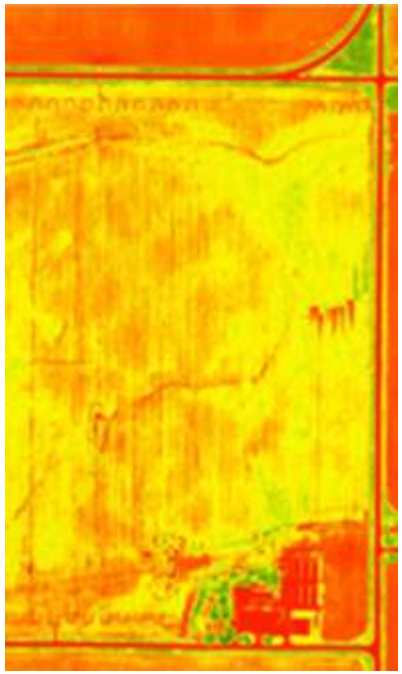
KOCH AGRONOMIC SERVICES, LLC

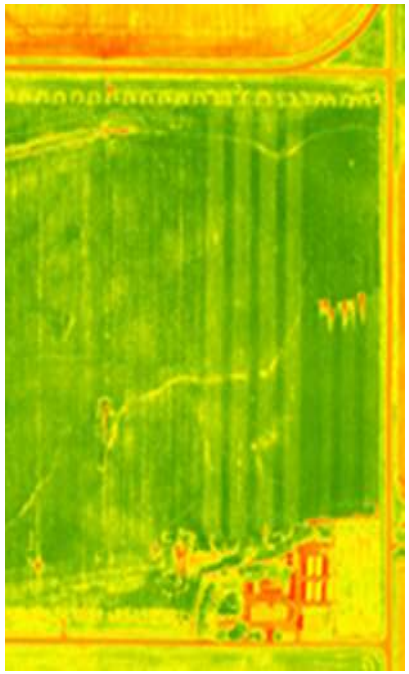
NEW LEADER

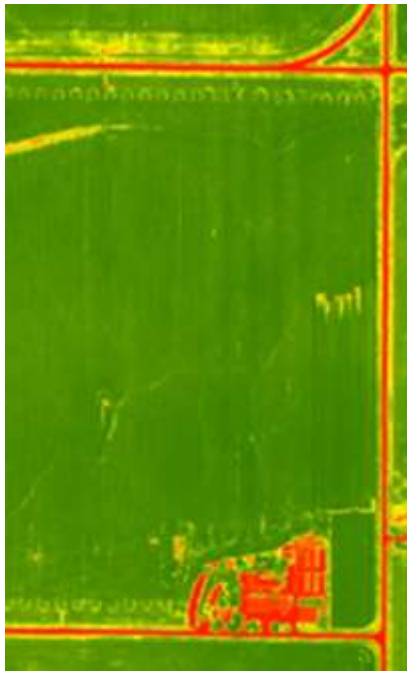

UAN
Urea
UAN
Urea

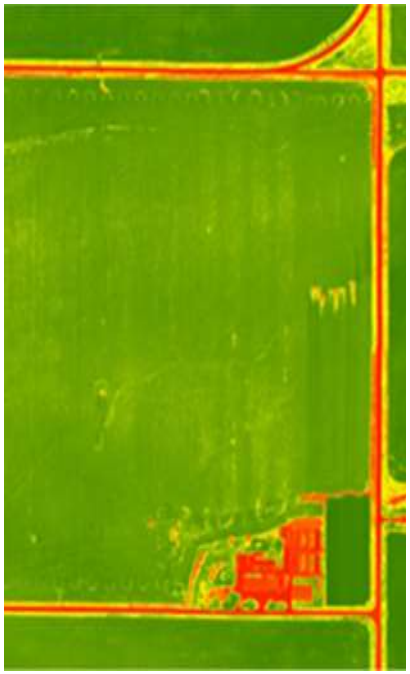
Urea Strips





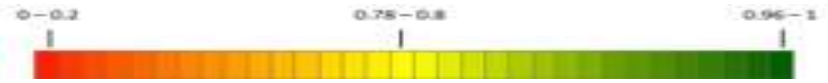






June 9 | June 19 | July 5 | July 21

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

Practices

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

Nitrogen

- Fertilizer
- Incorporation
- Rate
- Date
- Nitrapyrin Used

Soil

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

Information for Model

Planting

- Crop
- Hybrid/Variety
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Practices

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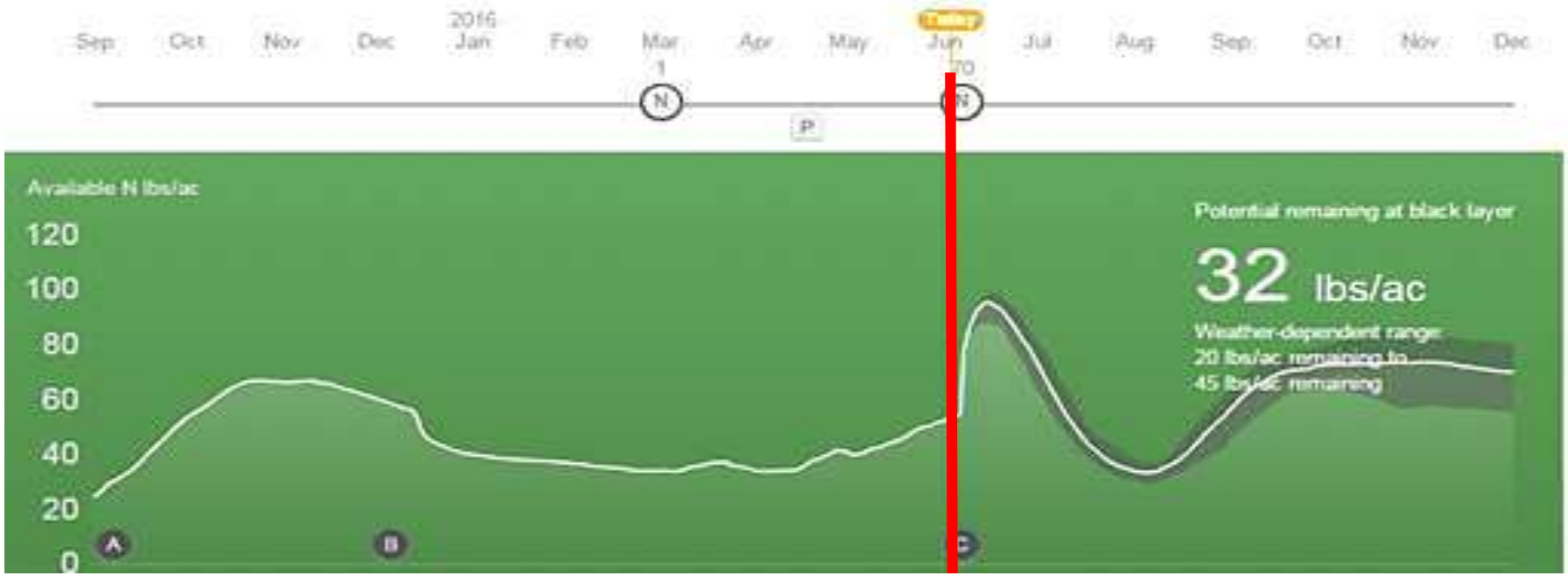
- Primary Tillage Date
- 2015/14/13 Tillage
- 2015/14/13 Manure

Soil

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

- Pattern Tile

Predicted Nitrogen Balance



Potential Remaining N at black layer

32 lbs/ac

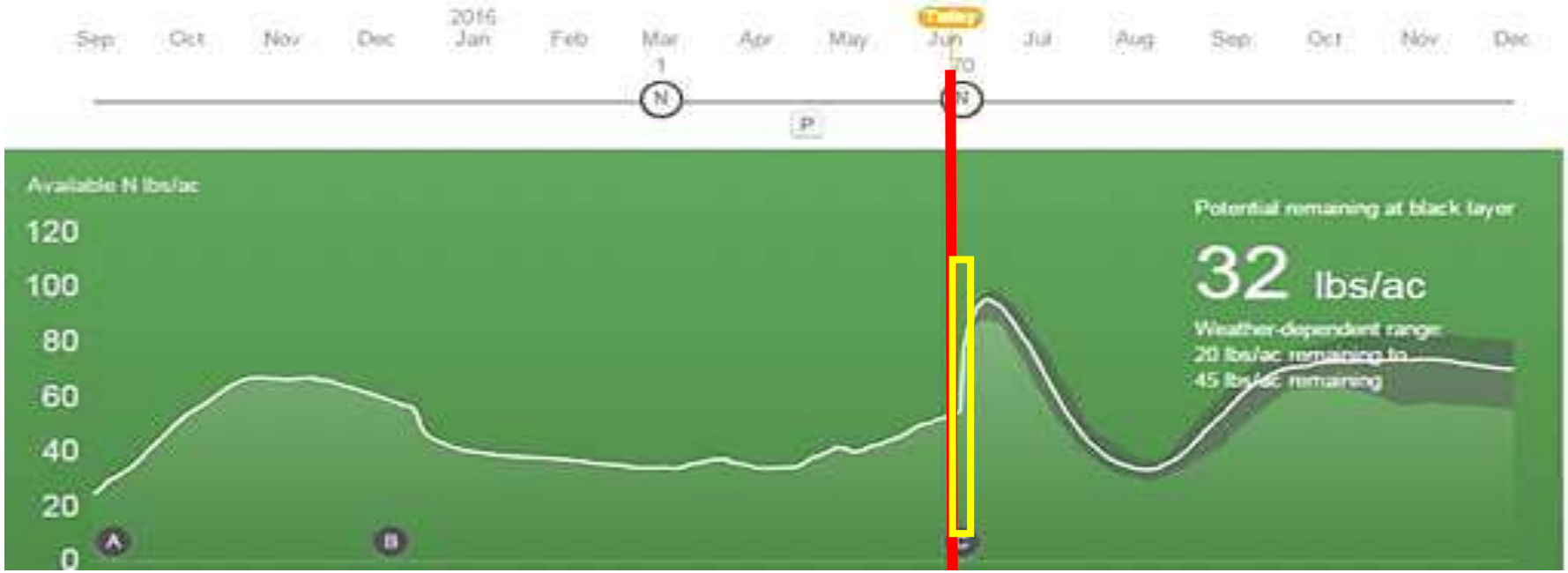
Weather dependent range
20 to 45 lbs/ac remaining N

"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



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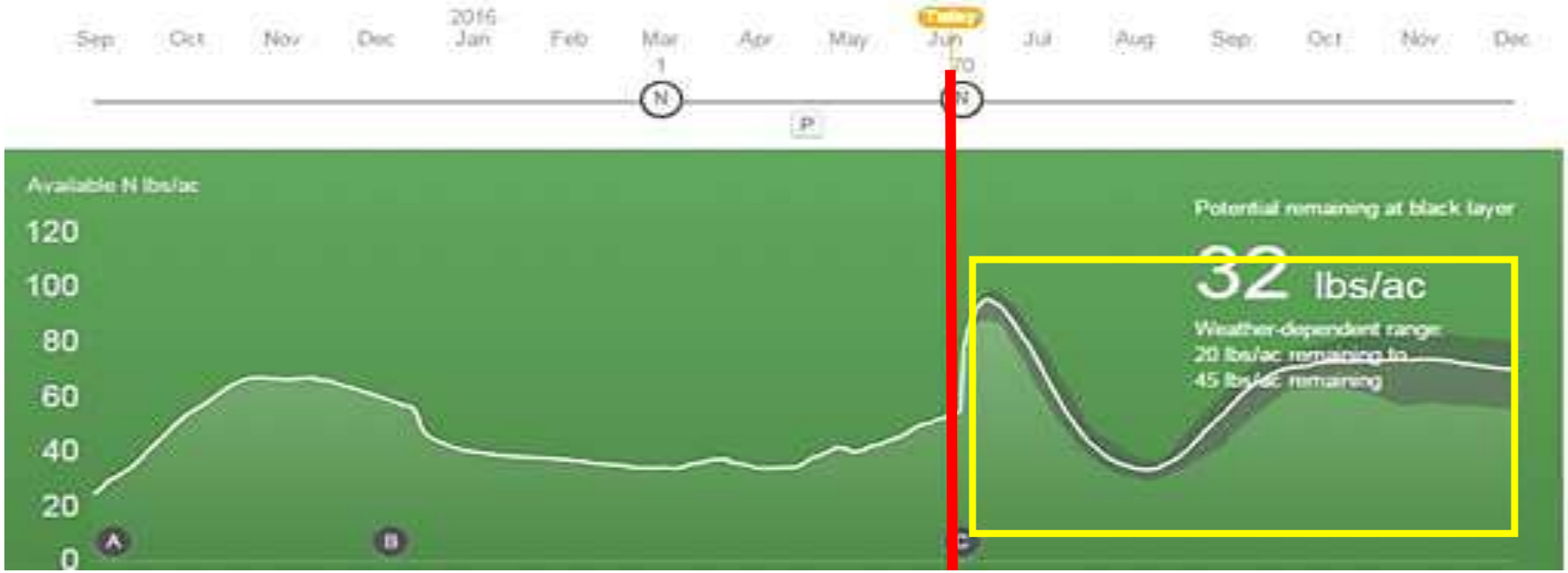
Predicted Nitrogen Balance cont'd



- **Weather Data**
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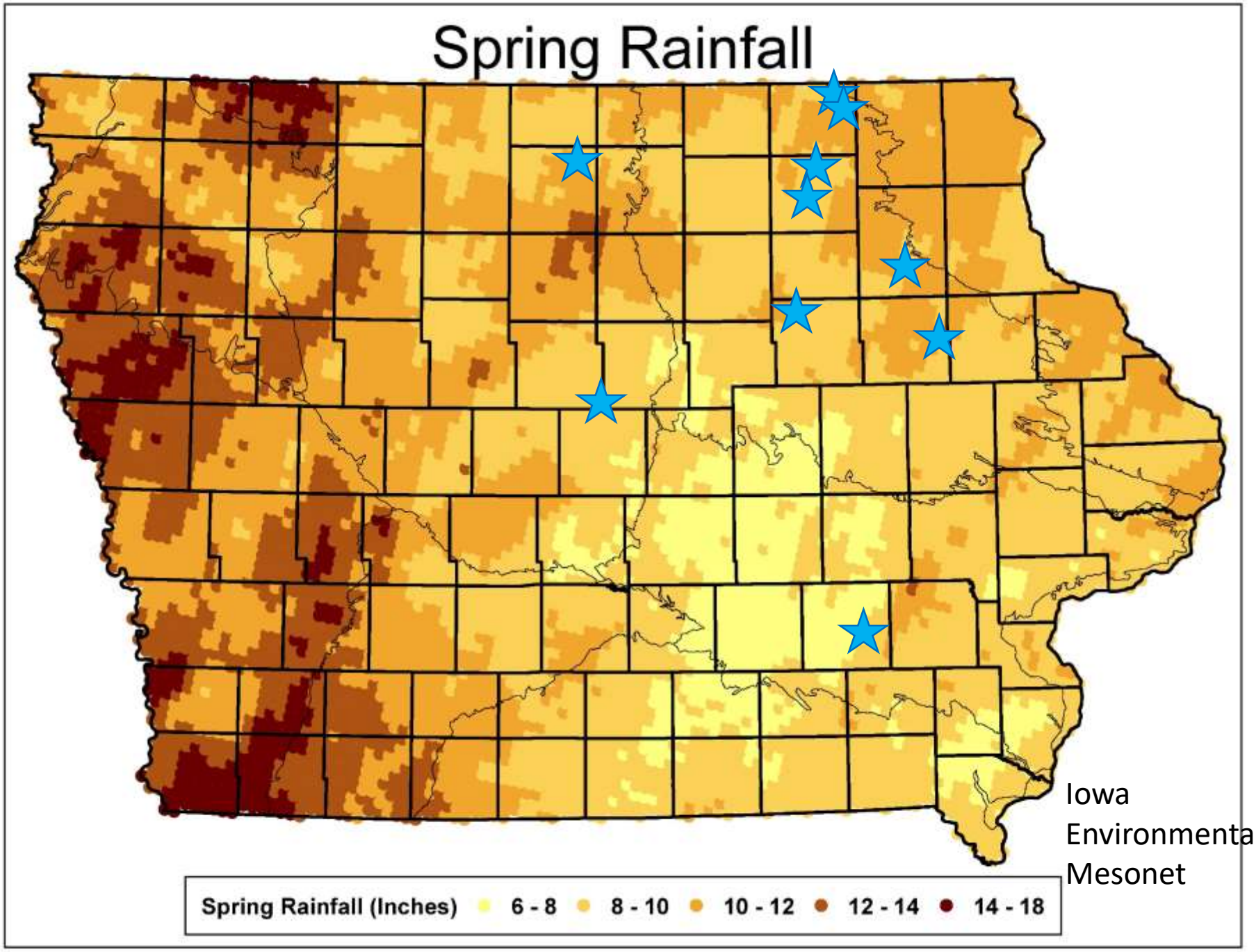
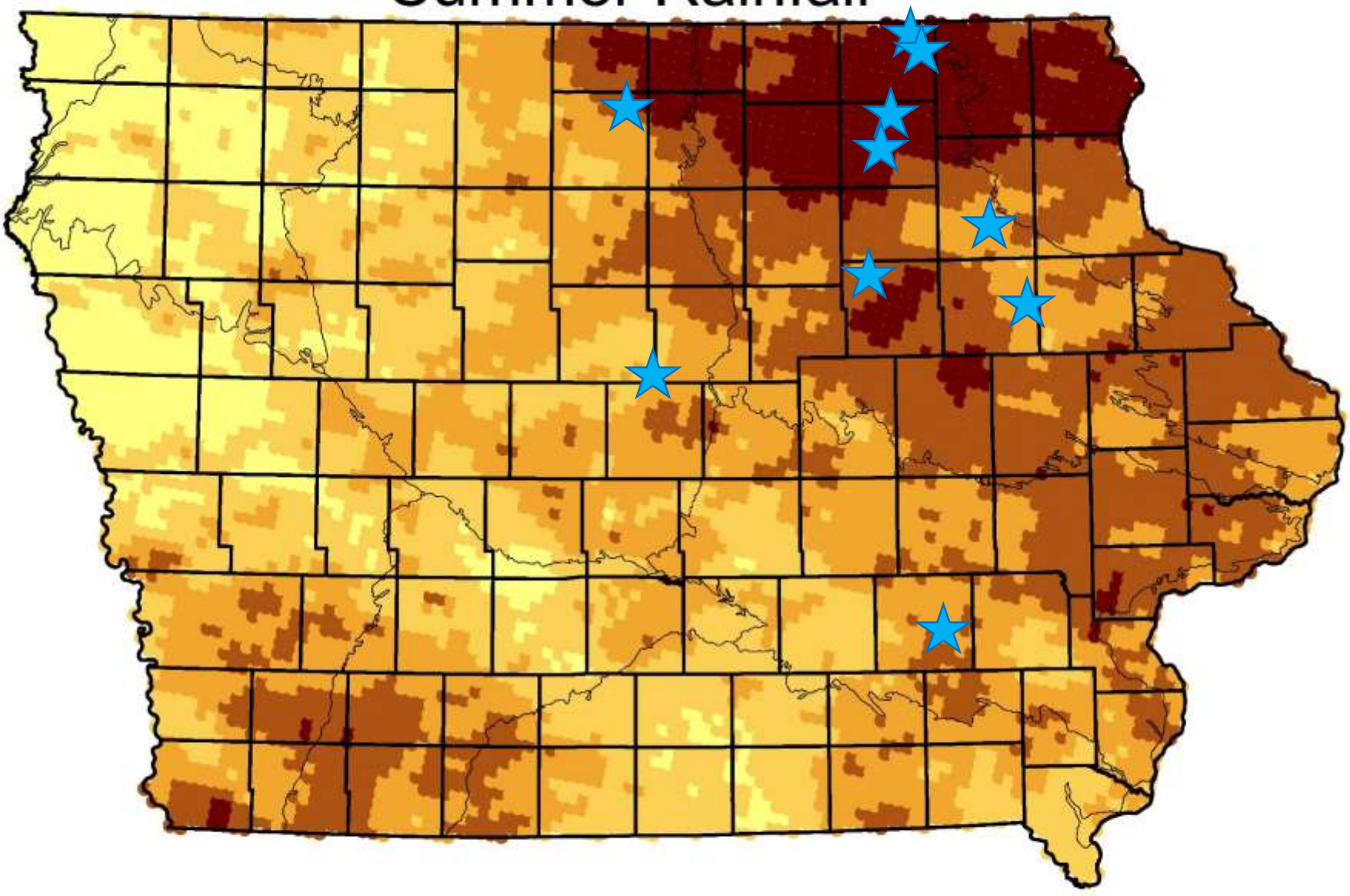

Spring Rainfall
Spring Rainfall (Inches)
6 - 8
8 - 10
10 - 12
12 - 14
14 - 18
Iowa Environmental Mesonet

Summer Rainfall



Yield Summary

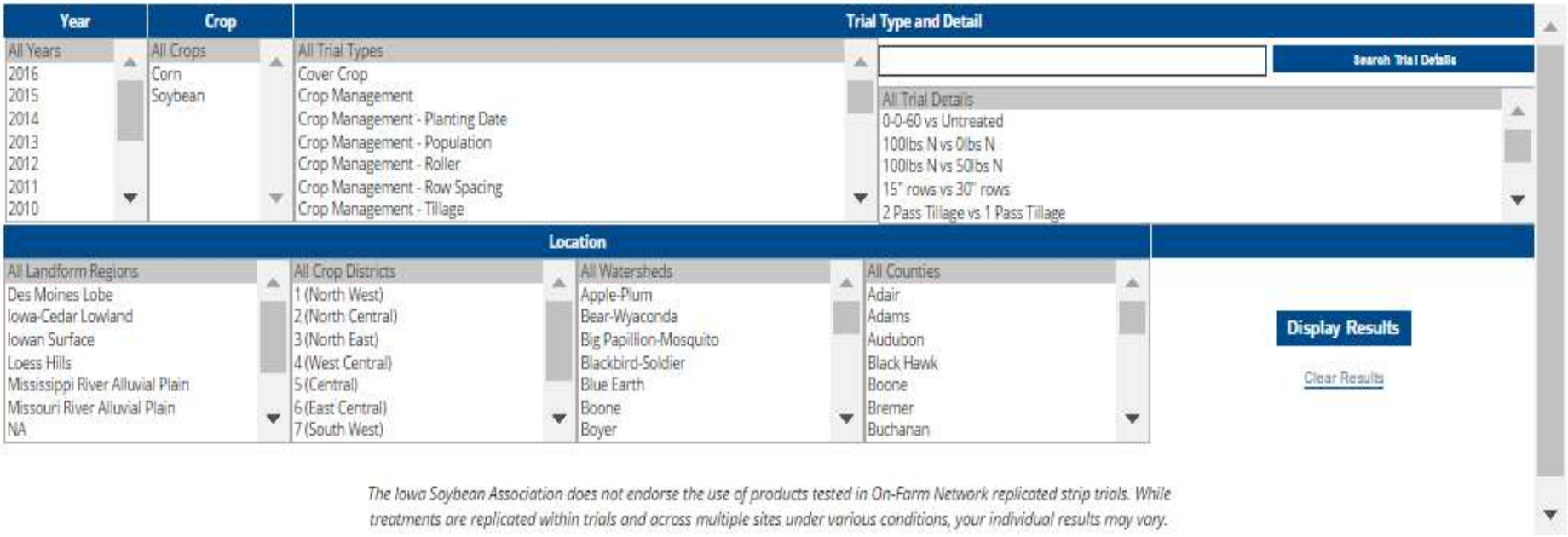
Trial ID	County	Base Rate (lbs N/a)	Model Detail	In-Season Rate (lbs N/a)		Yield (bu/a)		
				Farmer	Model	Normal	Model	Yld Dif
74	Fayette	**135**	N50, NH3 (6/7)	**235**	**185**	**217.4**	**205.5**	**-11.9**
144	Buchanan	**196**	N30, UAN (6/14)	**271**	**226**	**251.8**	**241.7**	**-10.1**
34	Chickasaw	**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



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

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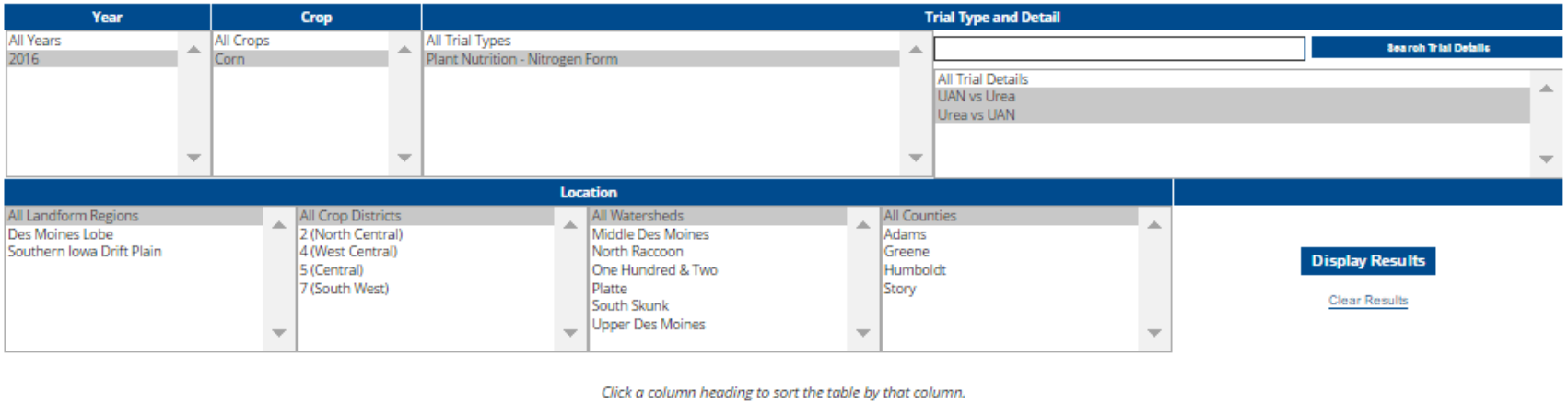
ON-FARM NETWORK® REPLICATED STRIP TRIAL DATABASE



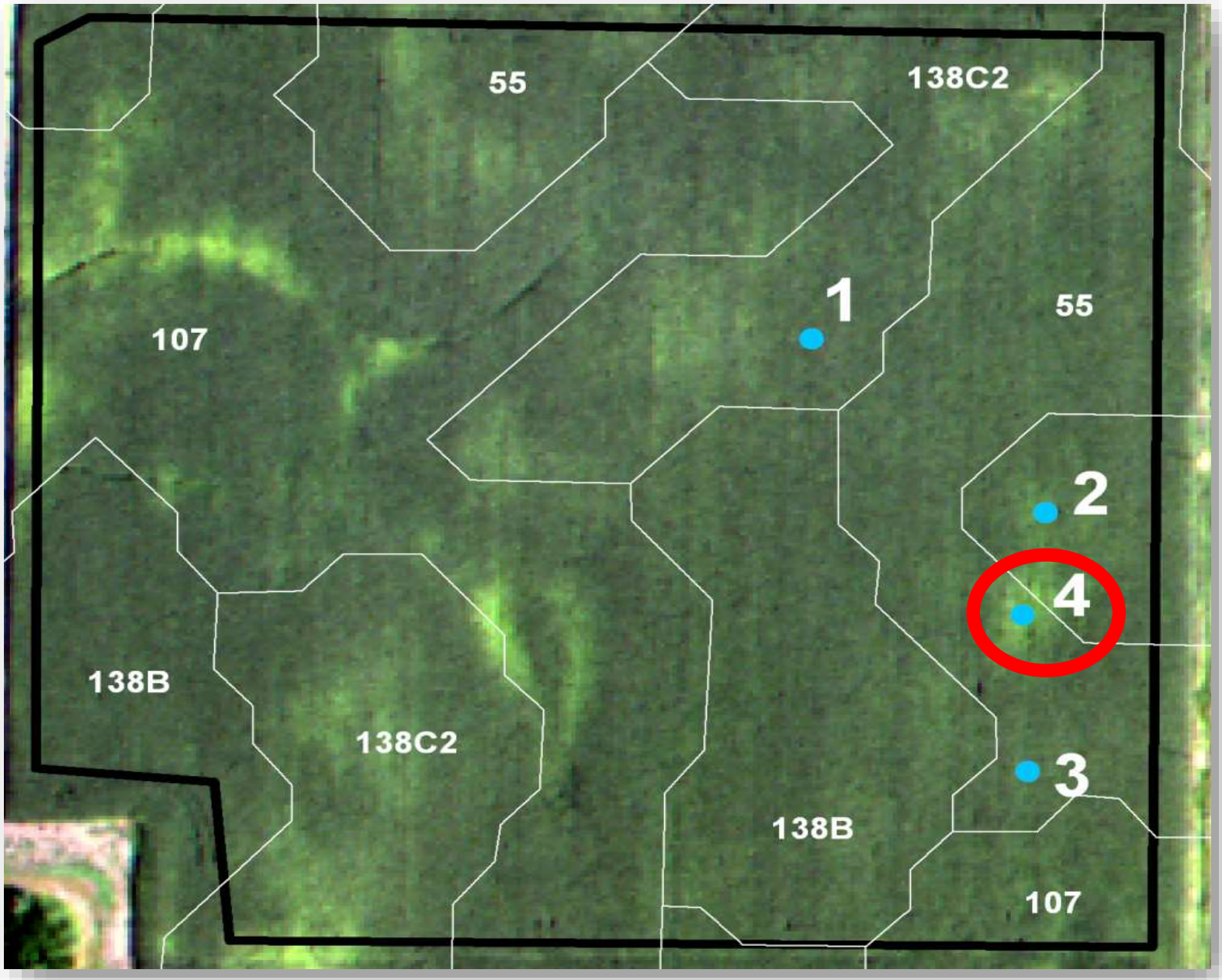
Average Difference for 6 trials

UAN vs Urea: 3.2 bu/acre

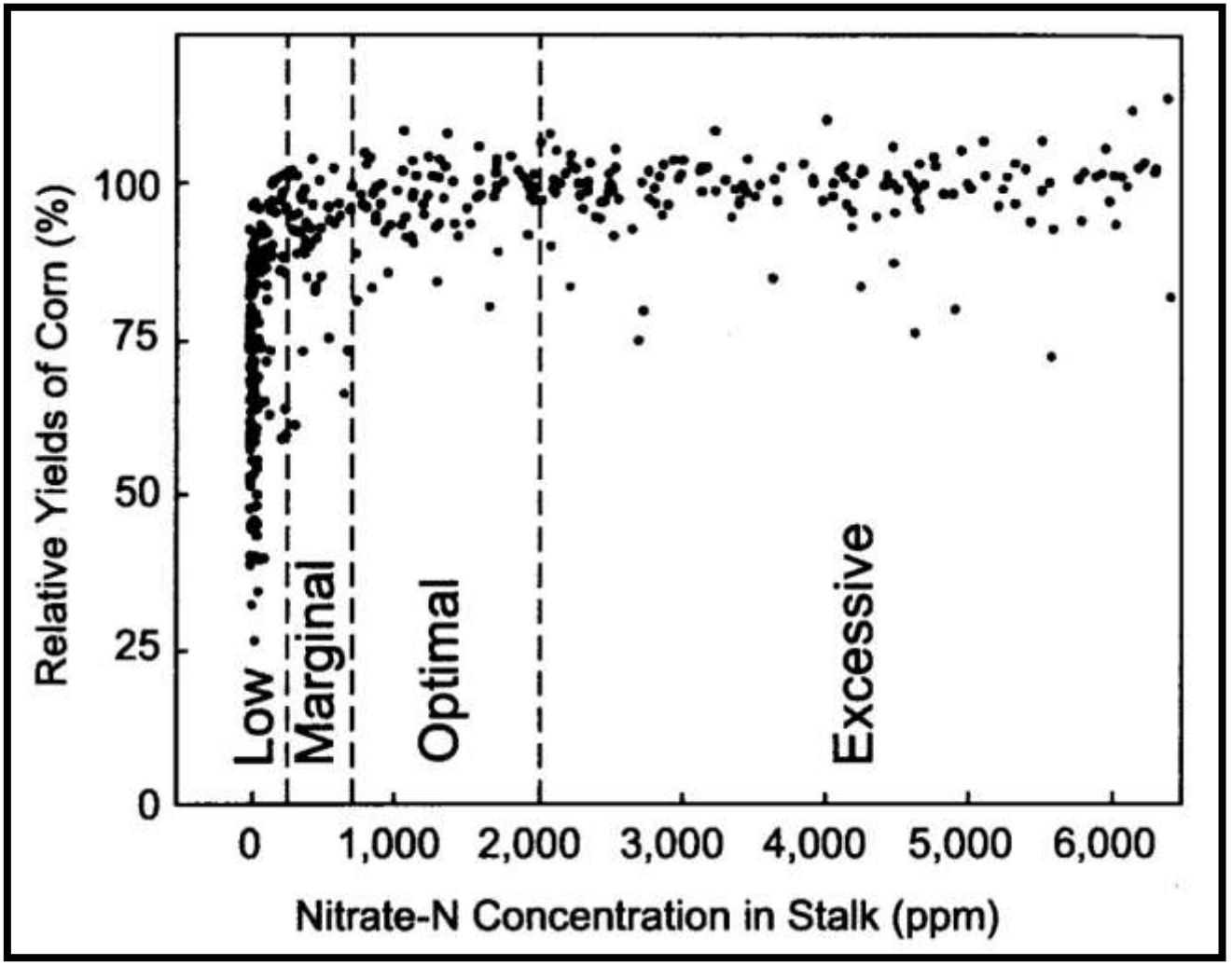
90% Confidence Interval for the Mean:

from 1.3 to 5.1 bu/acre

Corn N Status Survey with Imagery



Annual Nitrogen Status Survey:

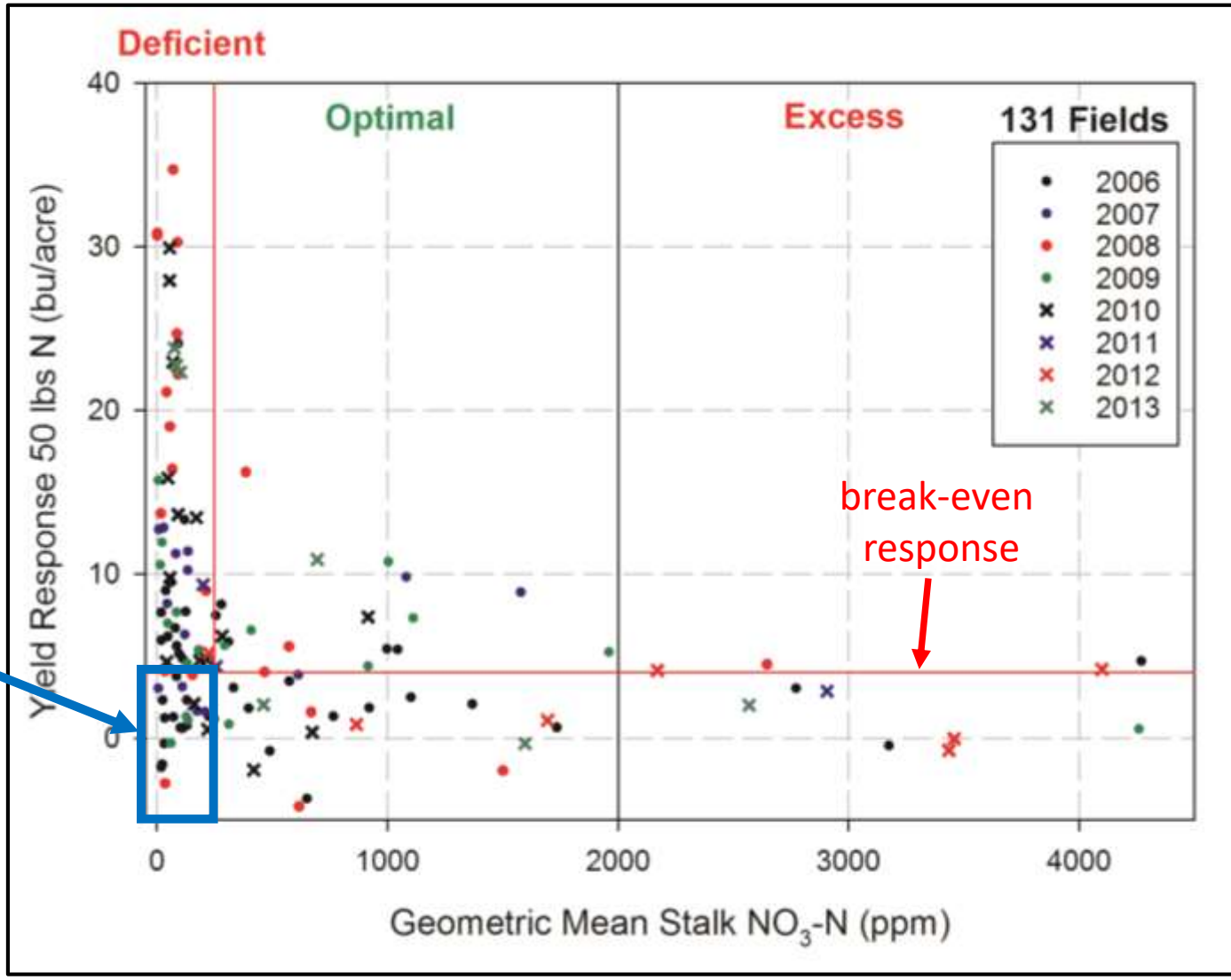


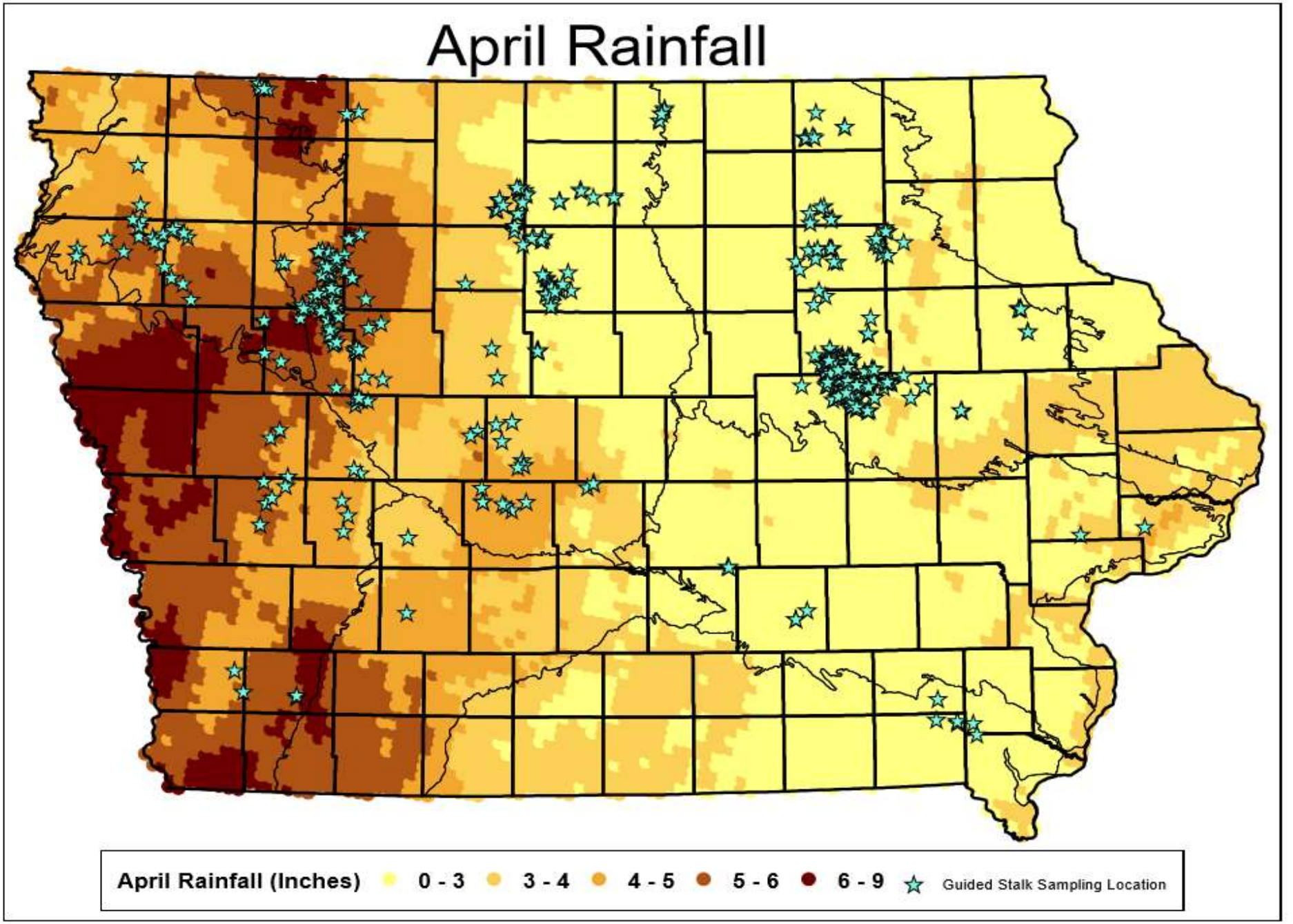
Iowa State Univ. PM 1584

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

Stalk Nitrate Test Calibration

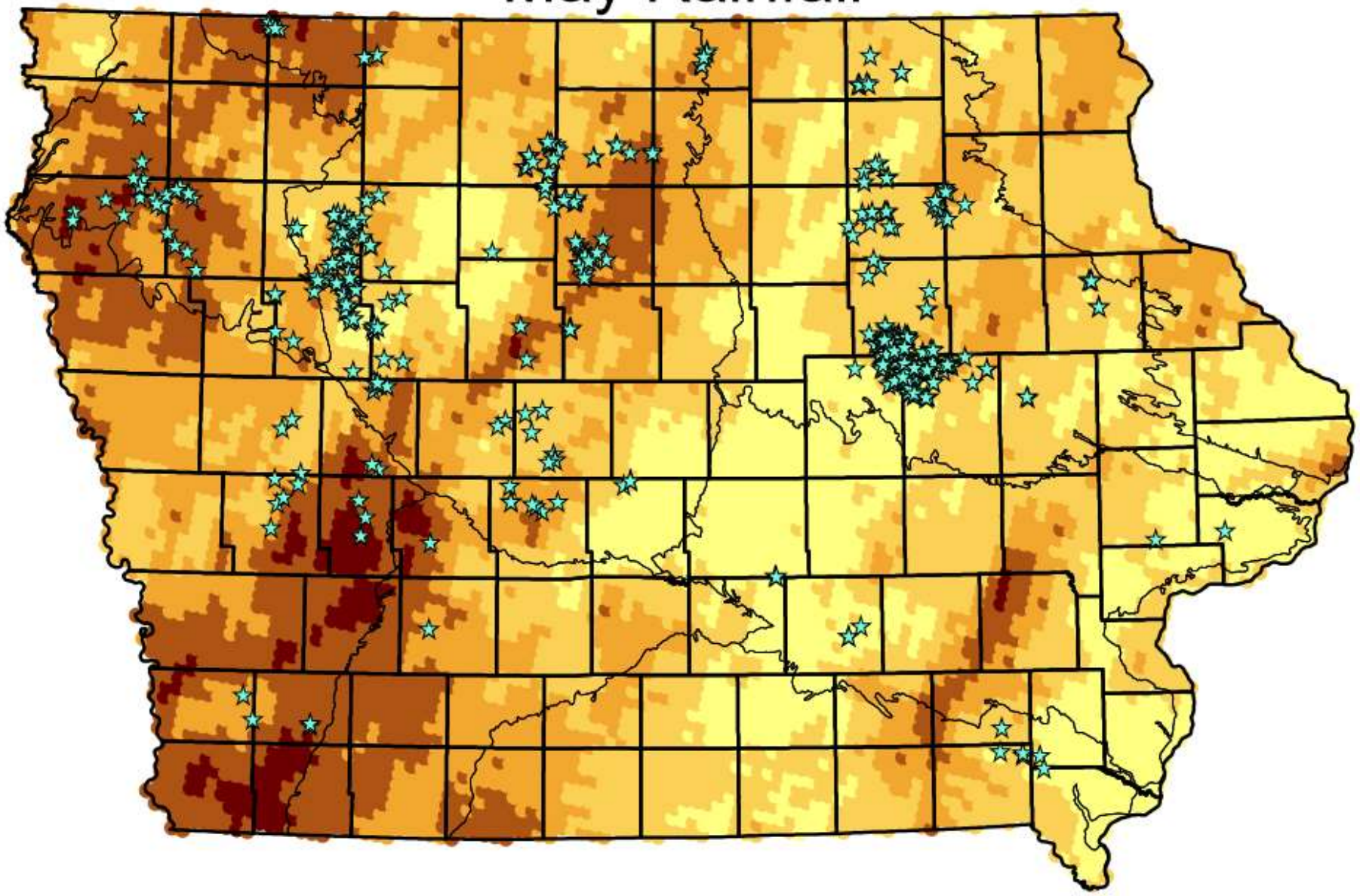
Error Rate for Deficient Category *20-25%*

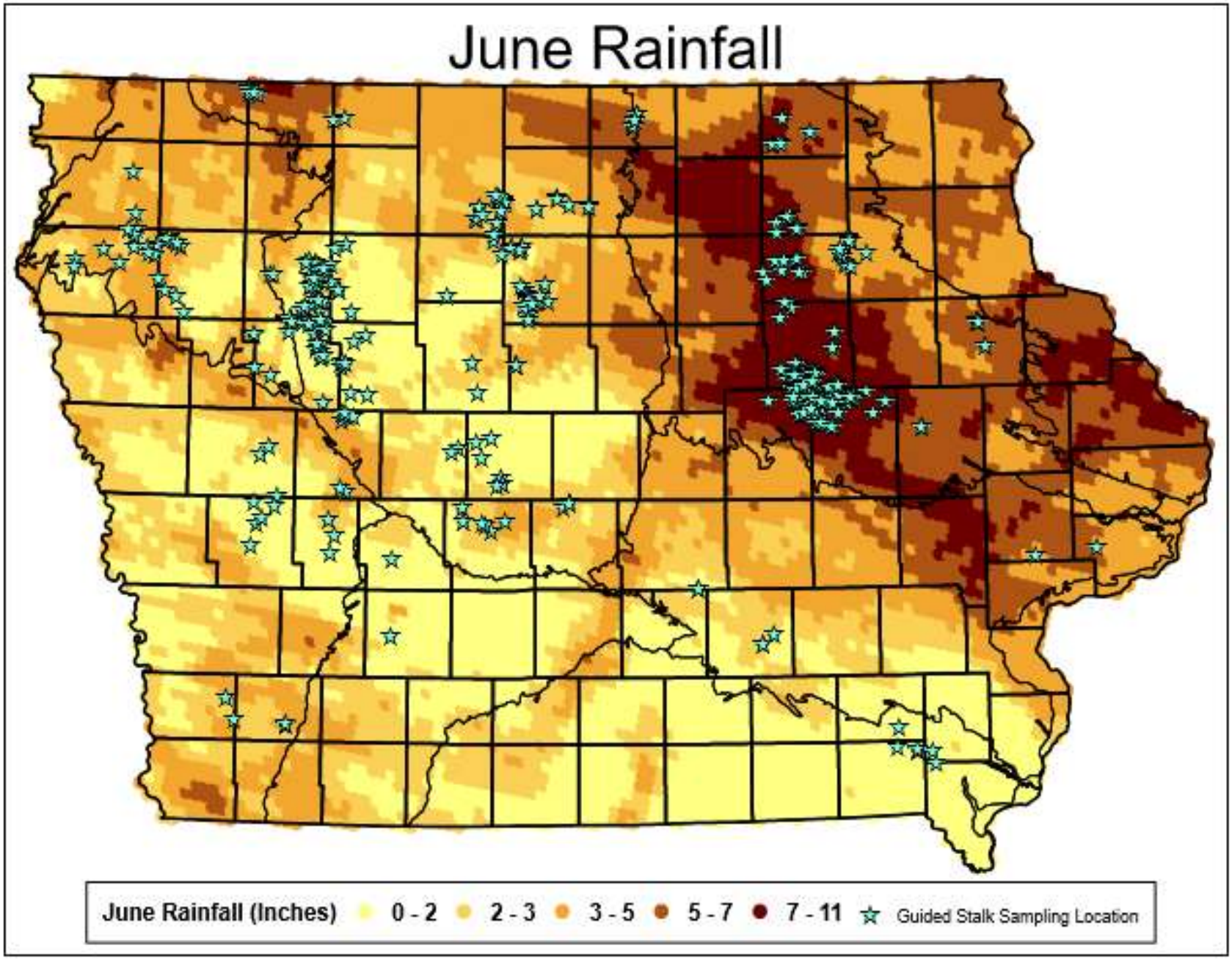




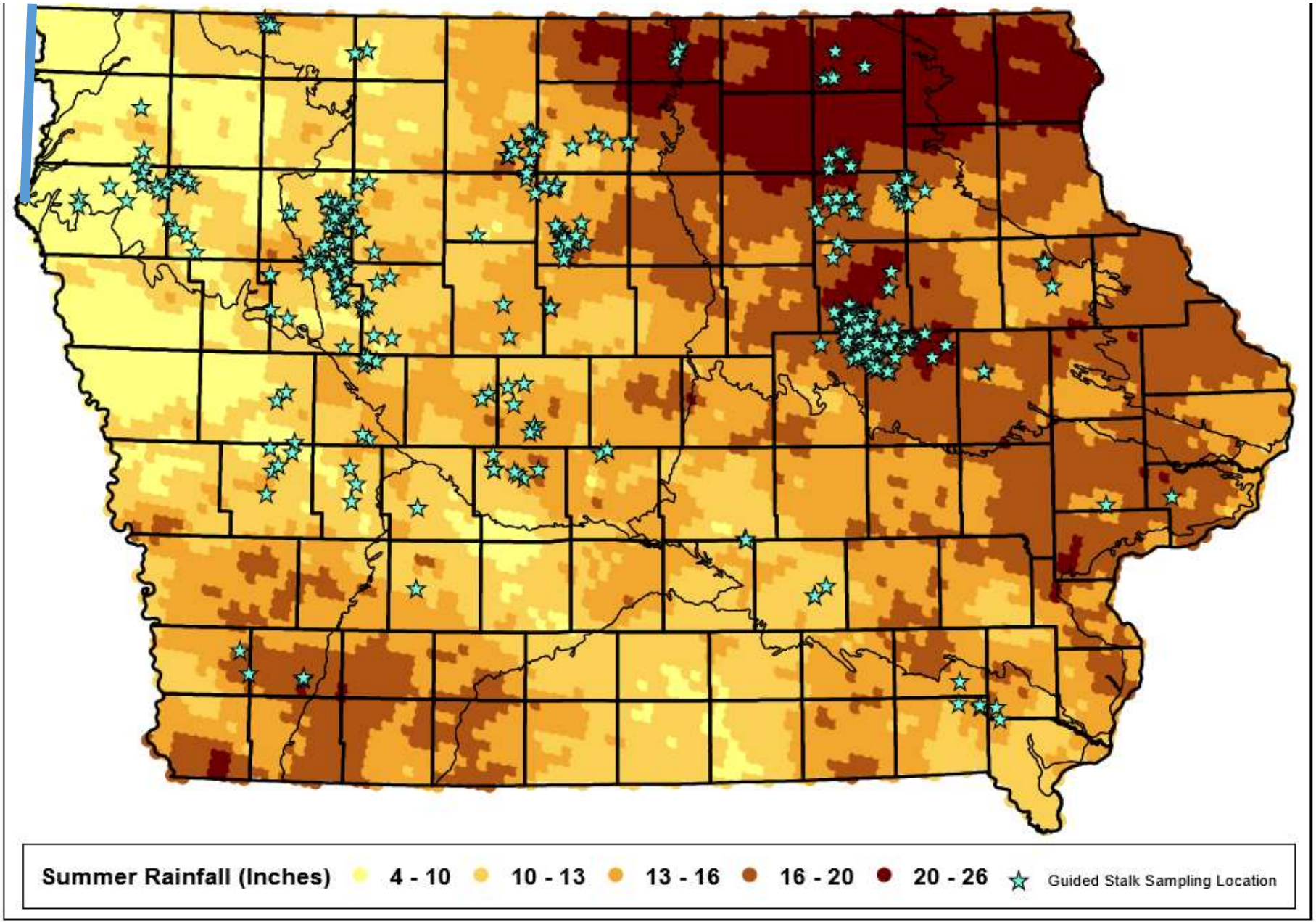
Iowa Environmental Mesonet

May Rainfall

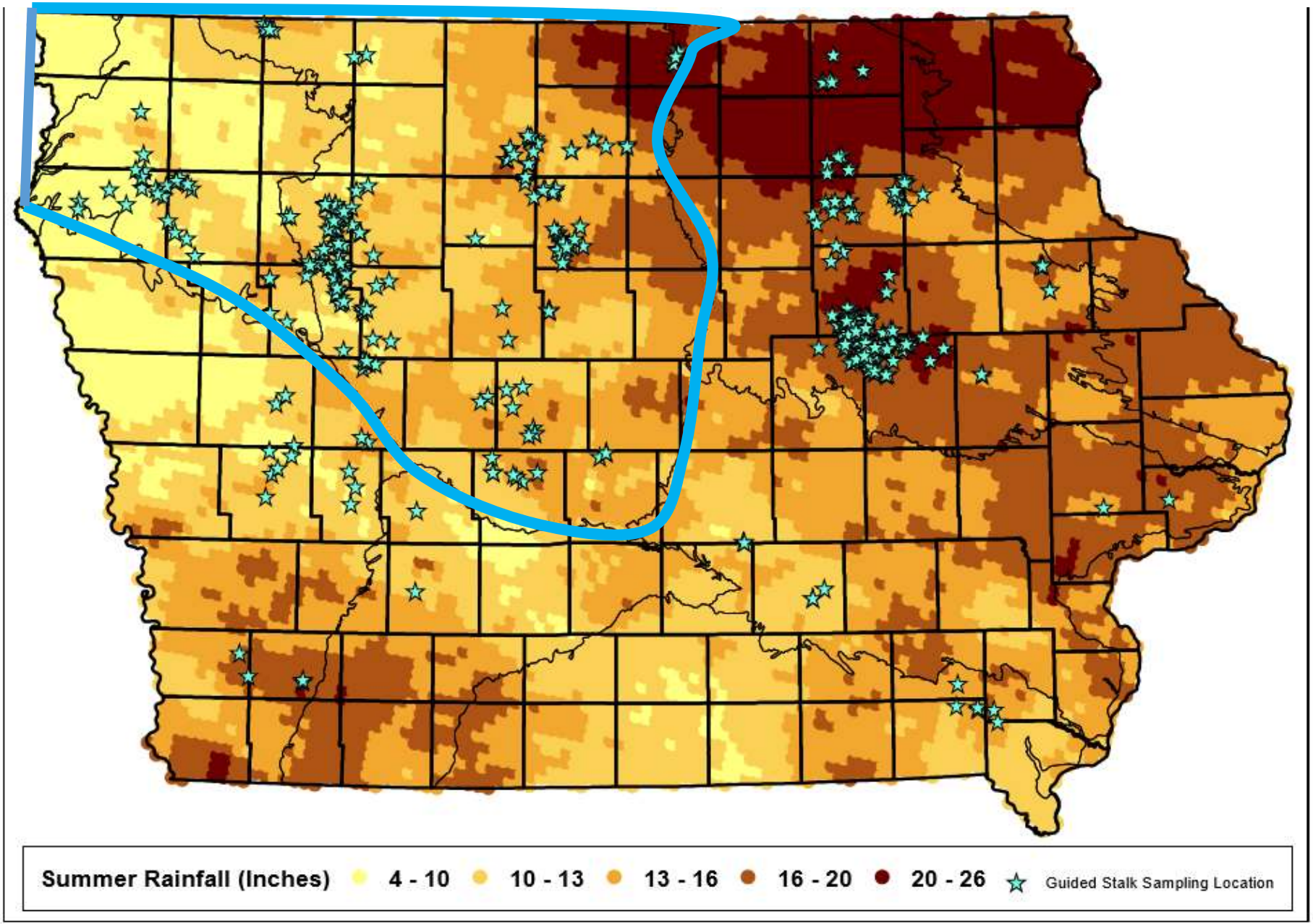



June Rainfall
June Rainfall (Inches)
0 - 2
2 - 3
3 - 5
5 - 7
7 - 11
Guided Stalk Sampling Location

Summer Rainfall

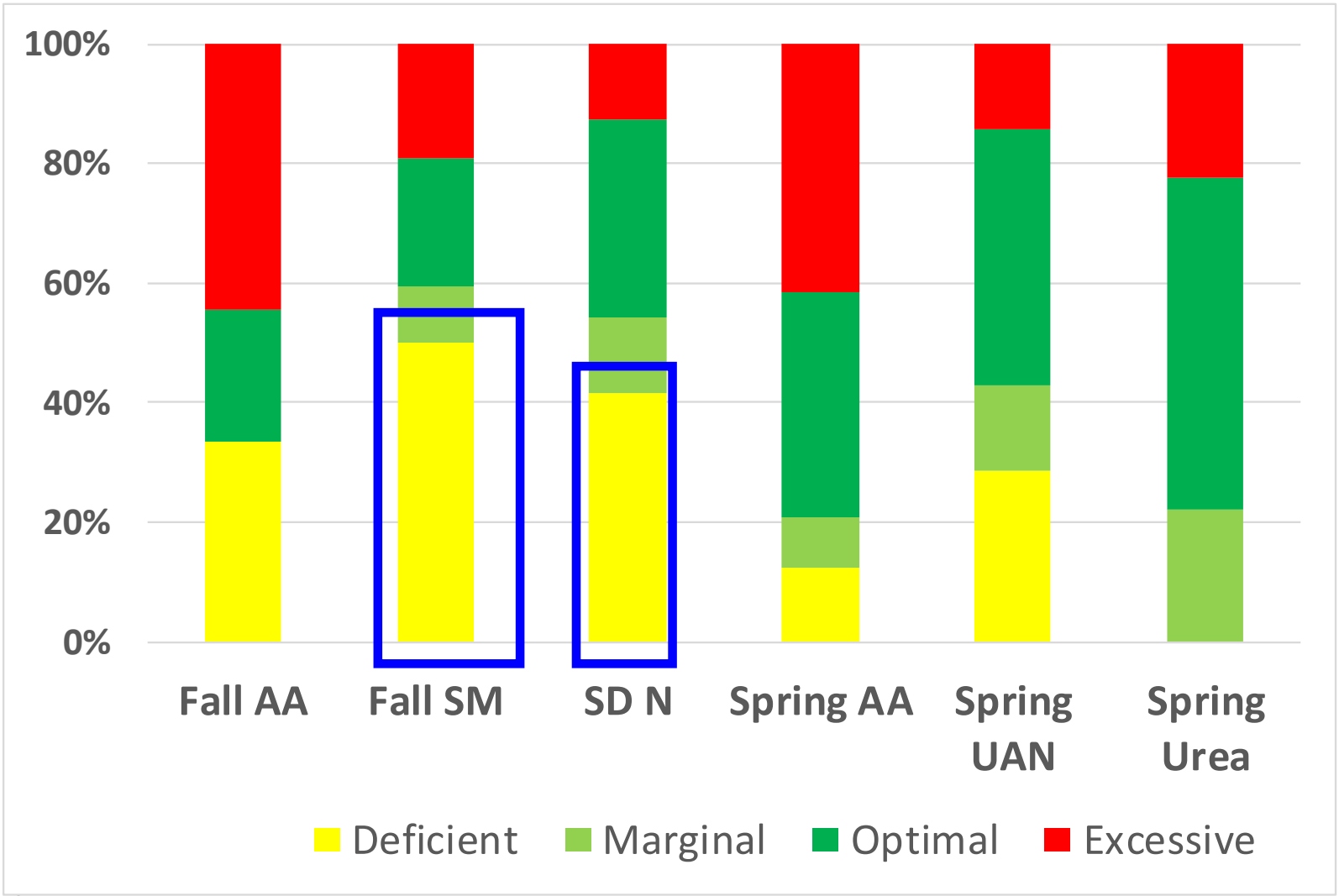


Northwest and Central Iowa



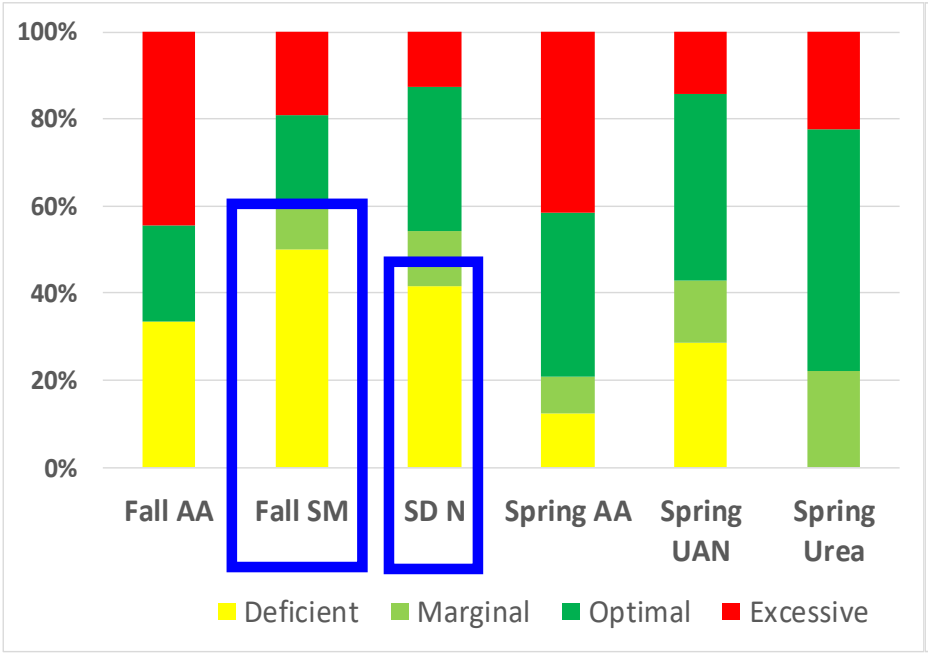
2016 Northwest and Central Iowa

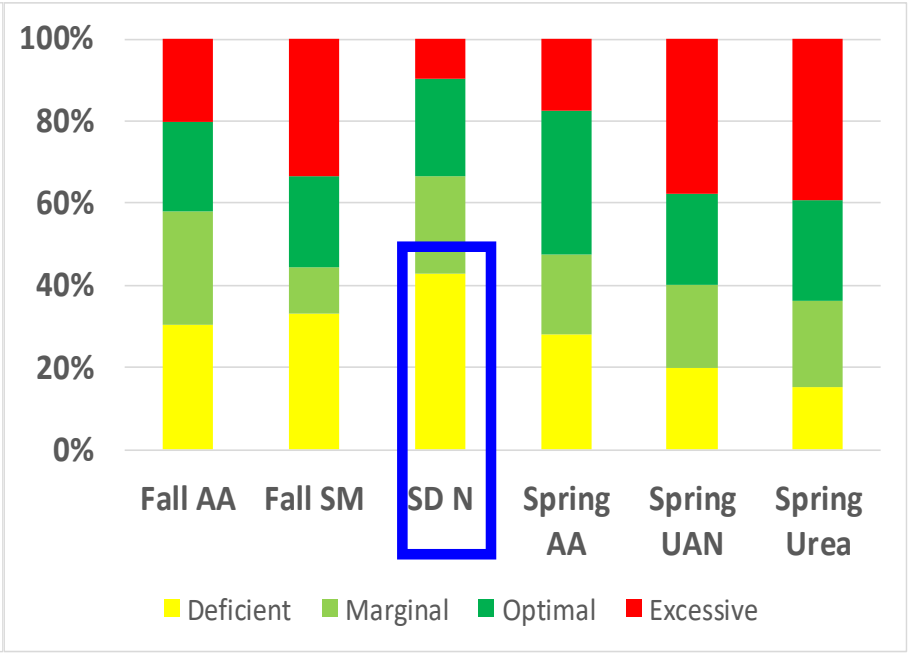
Corn after Corn



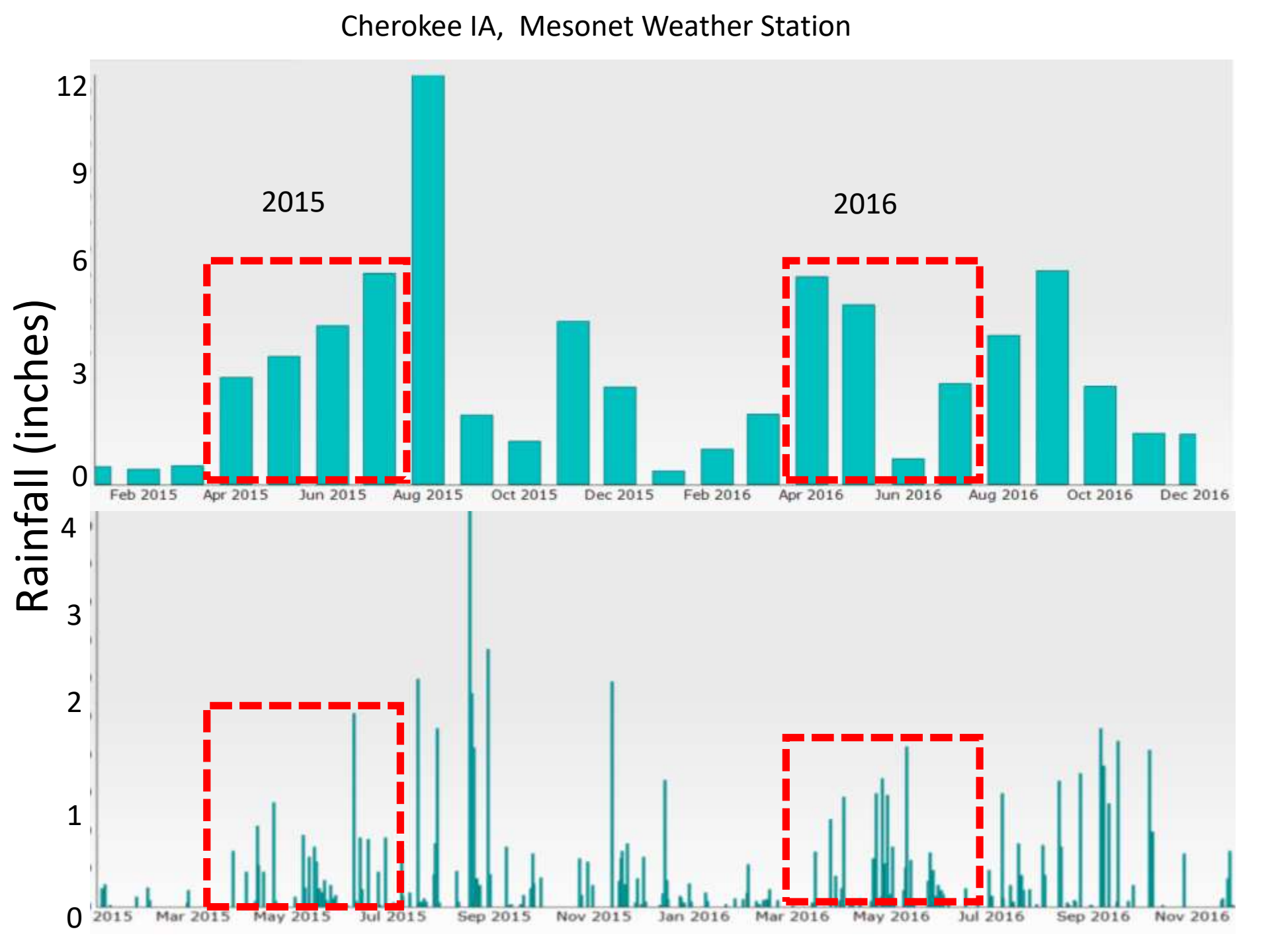
	Fall AA	Fall SM	SD N	Spring AA	Spring UAN	Spring Urea
Median N Rate	**218**	**216**	**198**	**216**	**176**	**196**

2016 Des Moines Lobe and Northwest Iowa

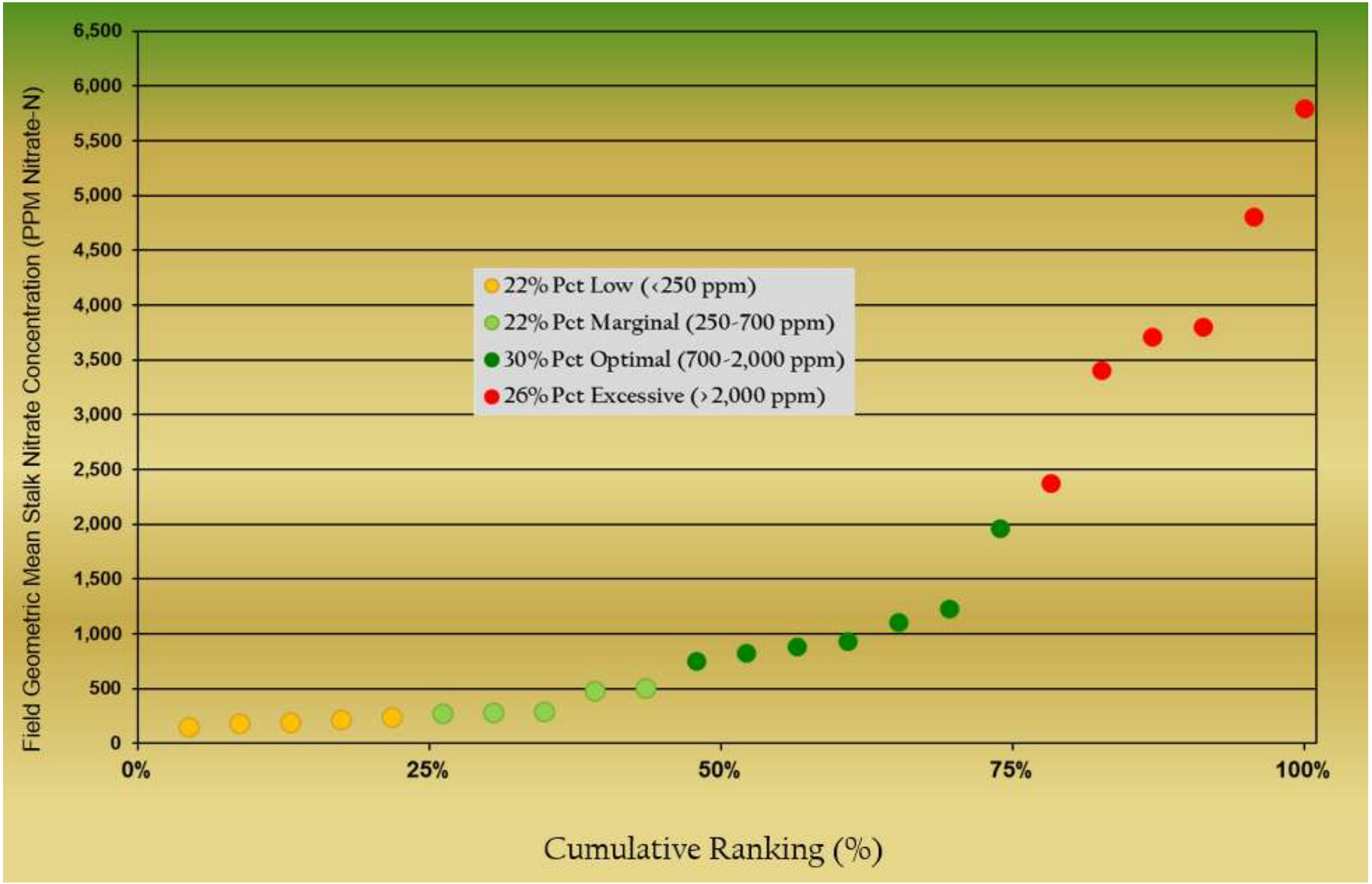




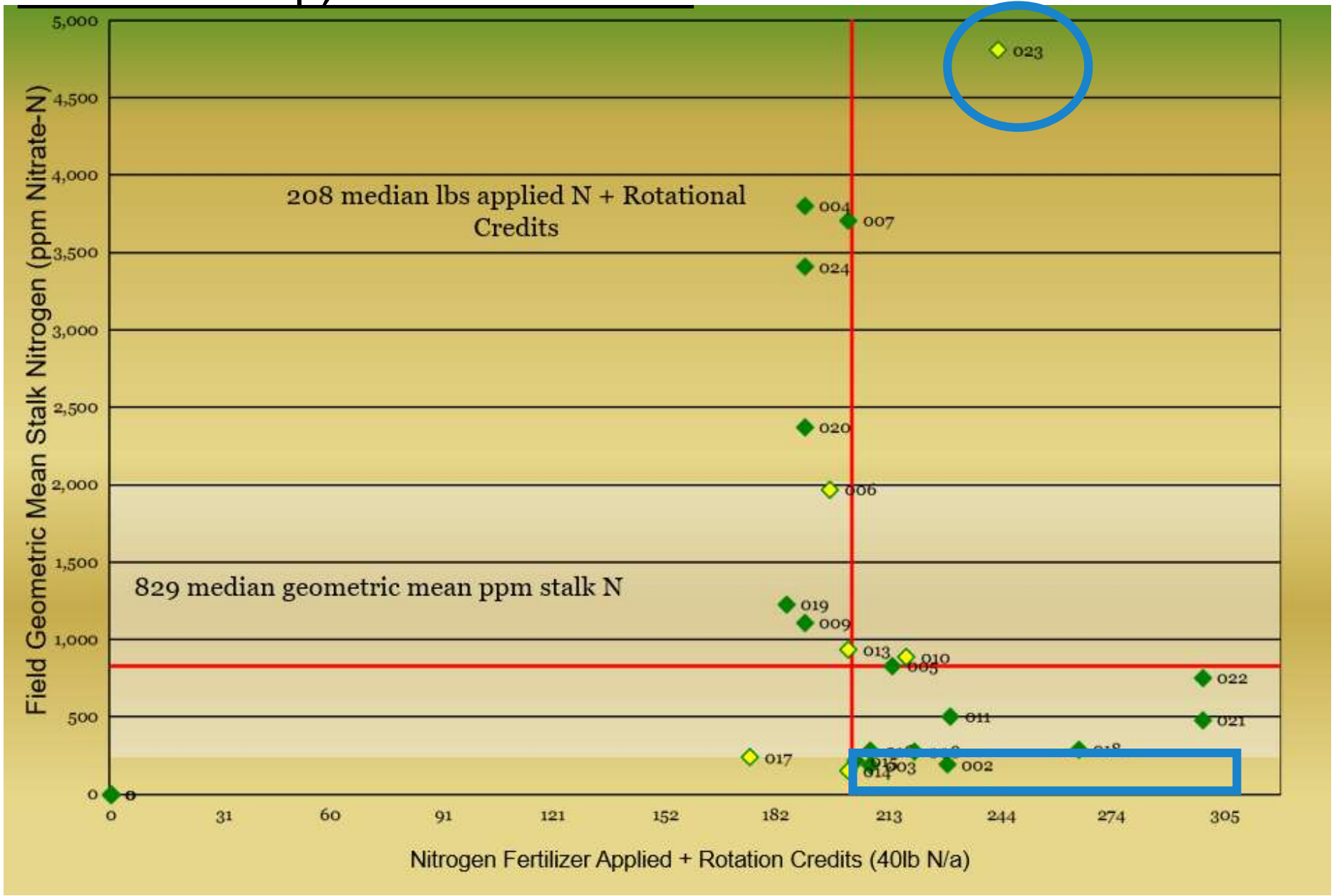
Median N Rate	218	216	198	216	176	196		165	195	150	150	173	150


Cherokee IA, Mesonet Weather Station
Rainfall (inches)
12
9
6
3
0
2015
2016
Feb 2015
Apr 2015
Jun 2015
Aug 2015
Oct 2015
Dec 2015
Feb 2016
Apr 2016
Jun 2016
Aug 2016
Oct 2016
Dec 2016
4
3
2
1
0
2015
Mar 2015
May 2015
Jul 2015
Sep 2015
Nov 2015
Jan 2016
Mar 2016
May 2016
Jul 2016
Sep 2016
Nov 2016

Geometric Means Stalk Nitrate: Farmer Group, Northwest Iowa

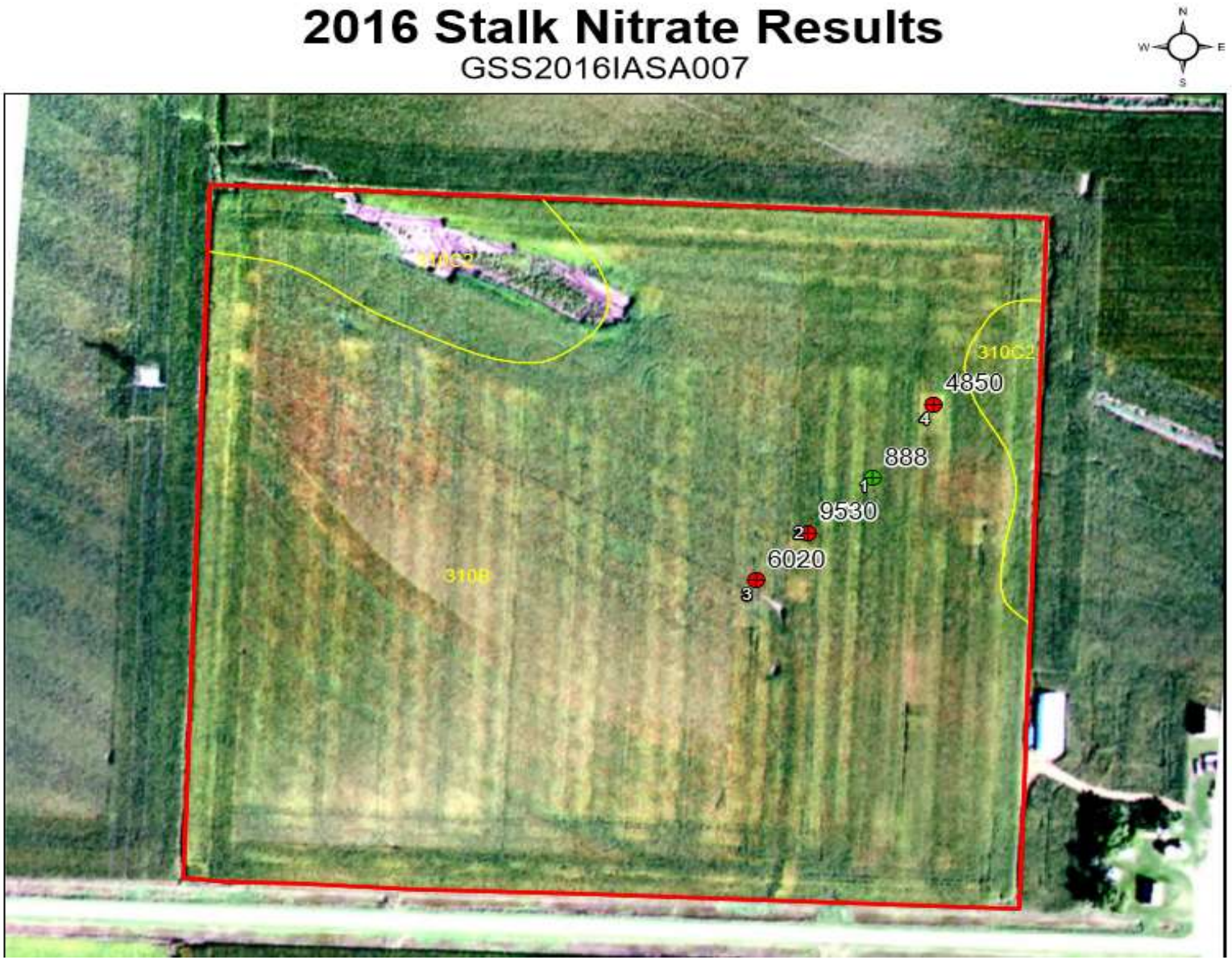


Nitrogen Rate plus Rotation Credit for Corn after Soybean Farmer Group, Northwest Iowa



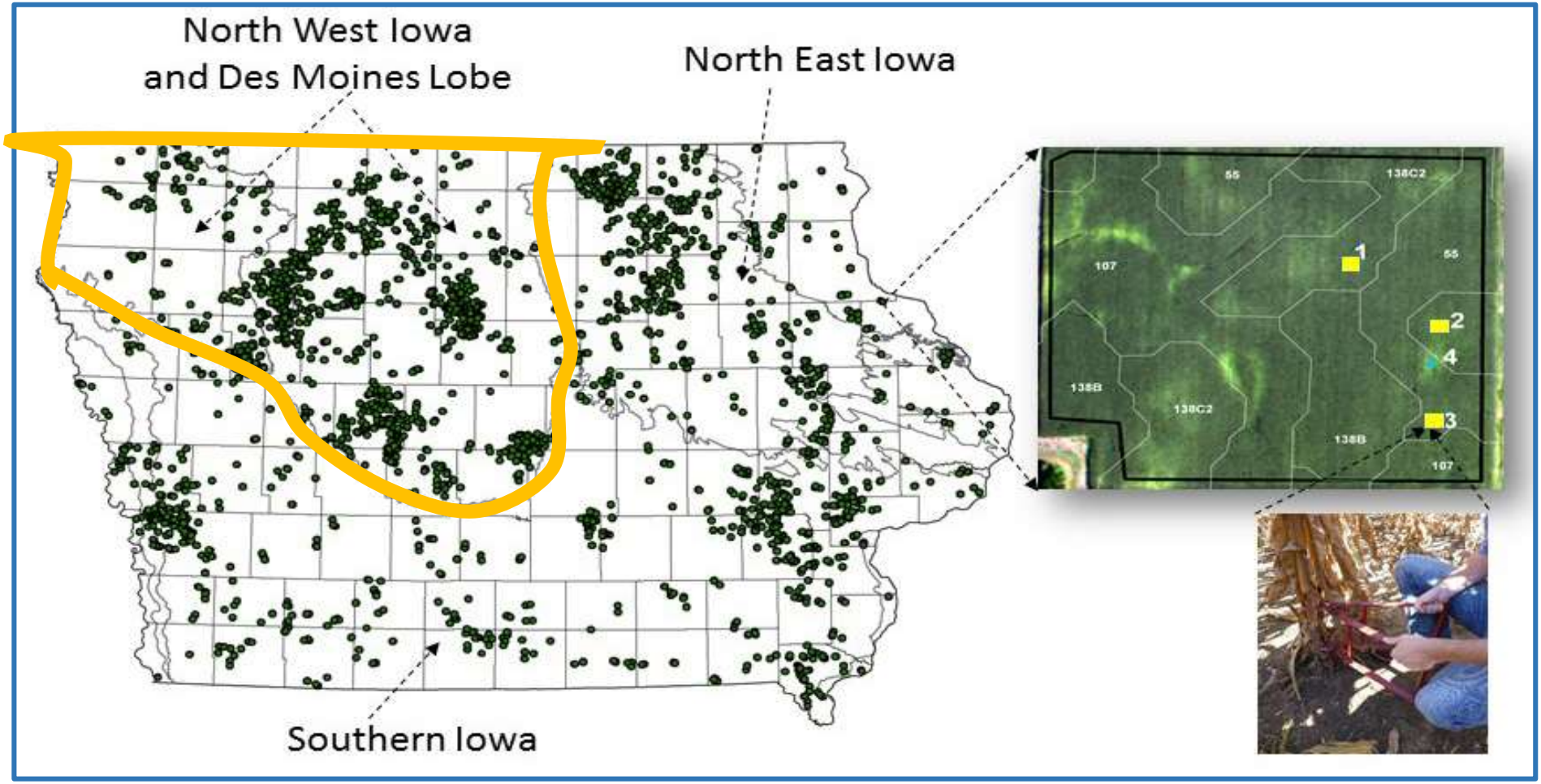
Identifying Problems in N Management

Identifying Problems in N Management

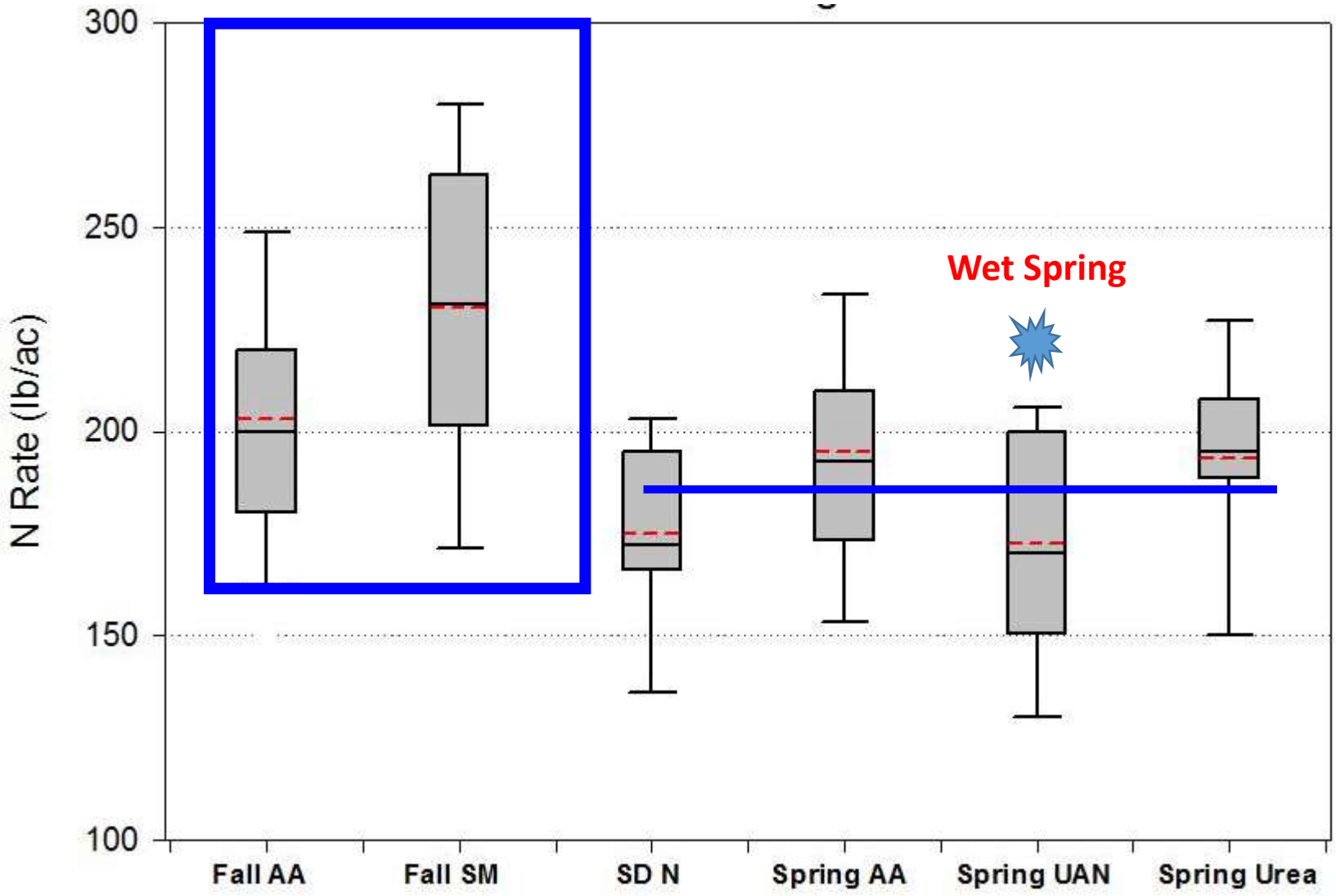


Historical Data

2345 fields

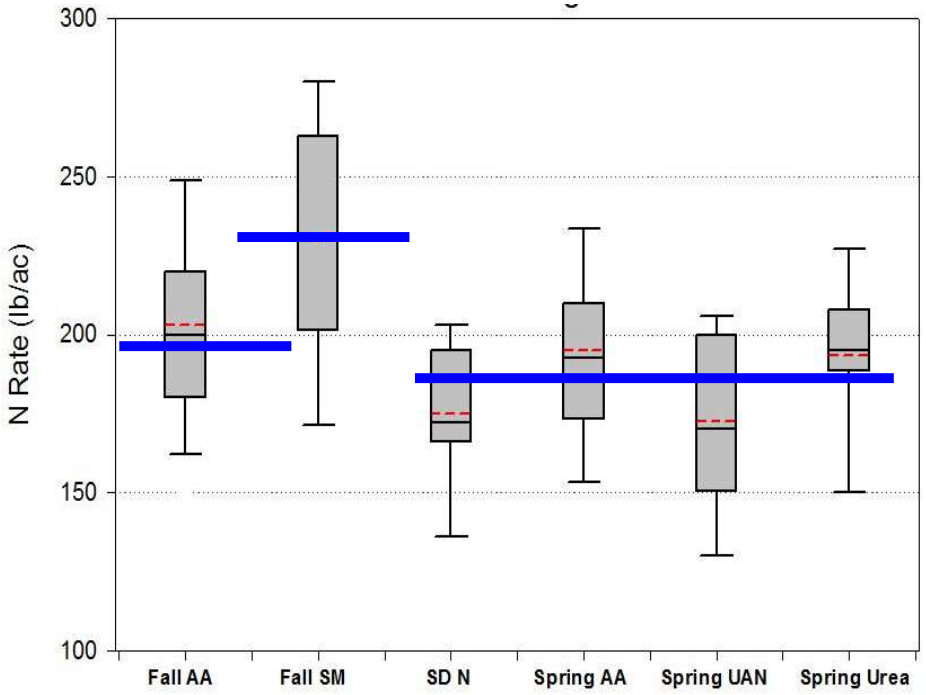


Des Moines Lobe and Northwest Iowa: 2006 to 2016: Corn on Corn

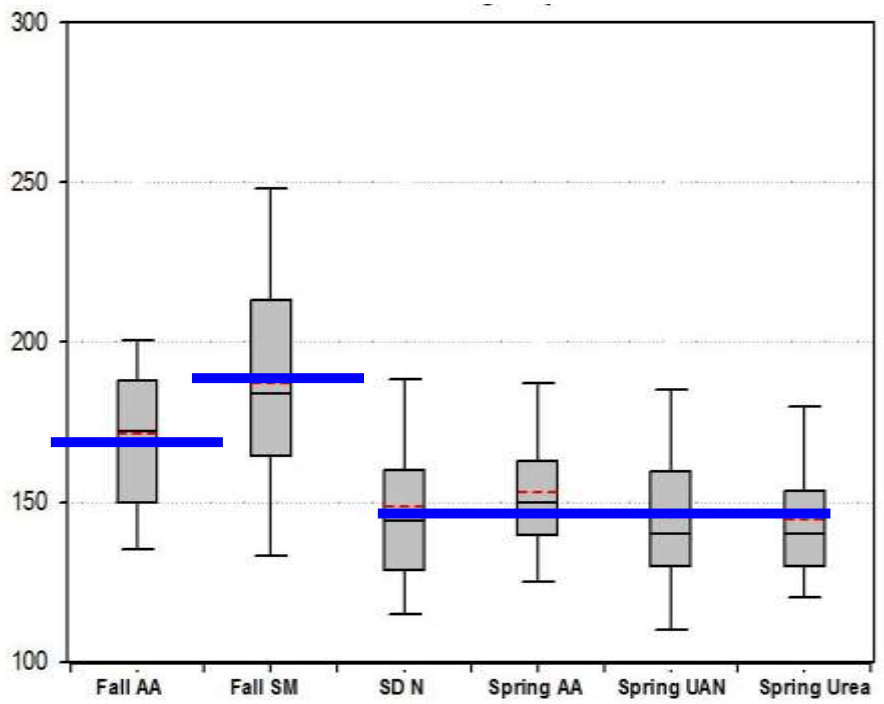


Des Moines Lobe and Northwest Iowa: 2006 to 2016

Corn on Corn



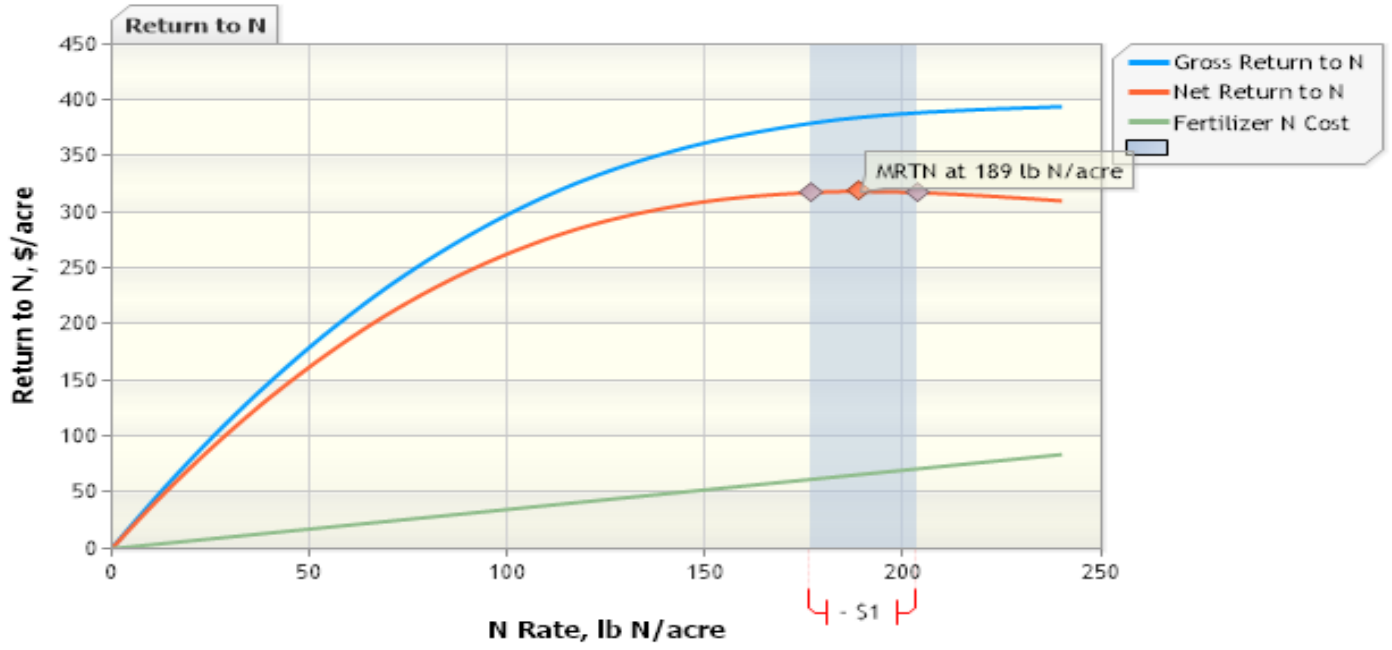
Corn on Soybean



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):	$318.65
Percent of Maximum Yield at MRTN Rate:	99%
Anhydrous Ammonia (82% N) at MRTN Rate (lb product/acre):	230
Anhydrous Ammonia (82% N) Cost at MRTN Rate ($/acre):	$66.15



Historical Trends: DSM Lobe and Northwest Iowa:

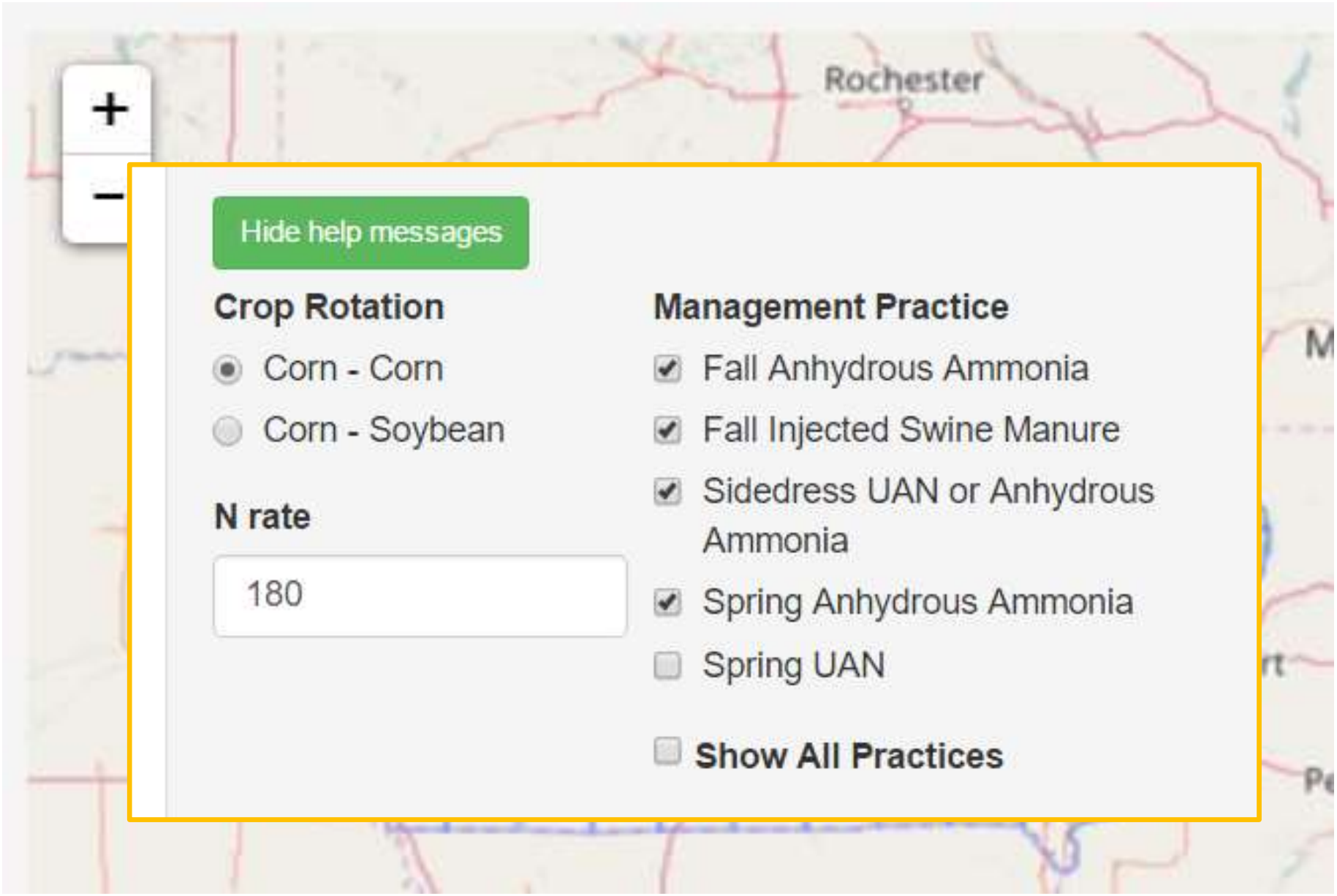
Increased chance of N deficiency:

1. With Higher May through June rainfall.

2. For Corn after Soybean vs Corn after Corn.

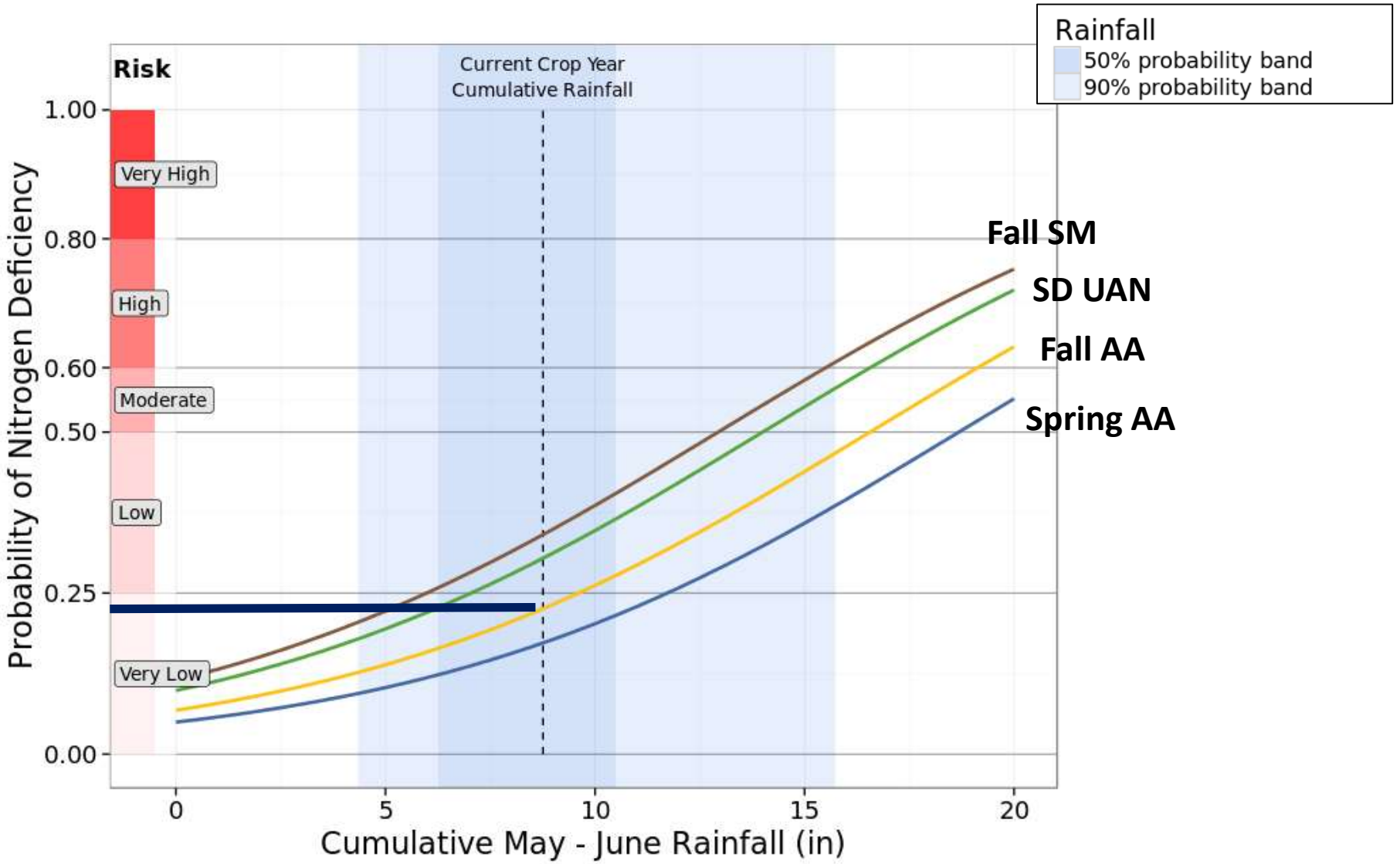
3. For Fall SM, Spring UAN or Sidedress N vs Spring AA.

Risk Calculator of Late-Season N Deficiency



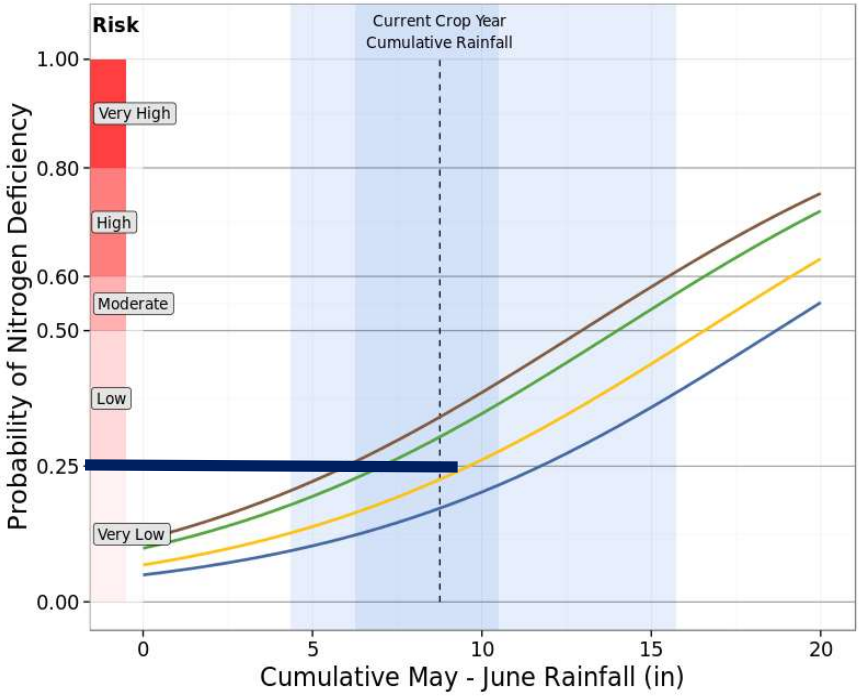
ISA Risk Calculator of Late-Season N Deficiency

Corn on Corn: 180 lb/N acre by Cherokee

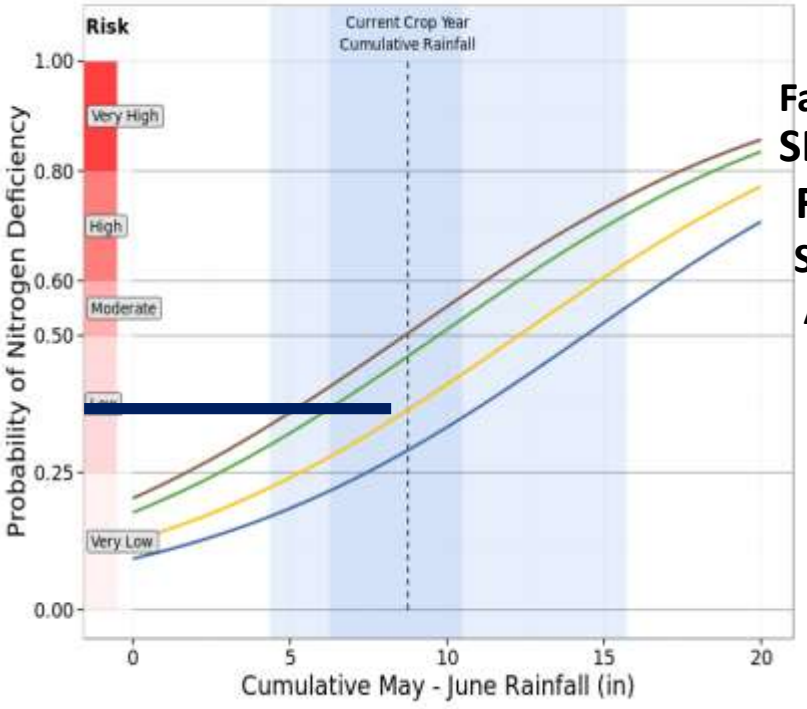


Corn on Corn vs Corn on Soybean

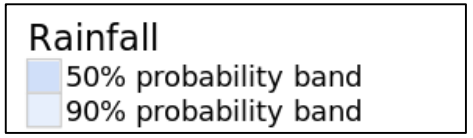
Corn on Corn: 180 lb/N acre



Corn on soybean: 150 lb/N acre



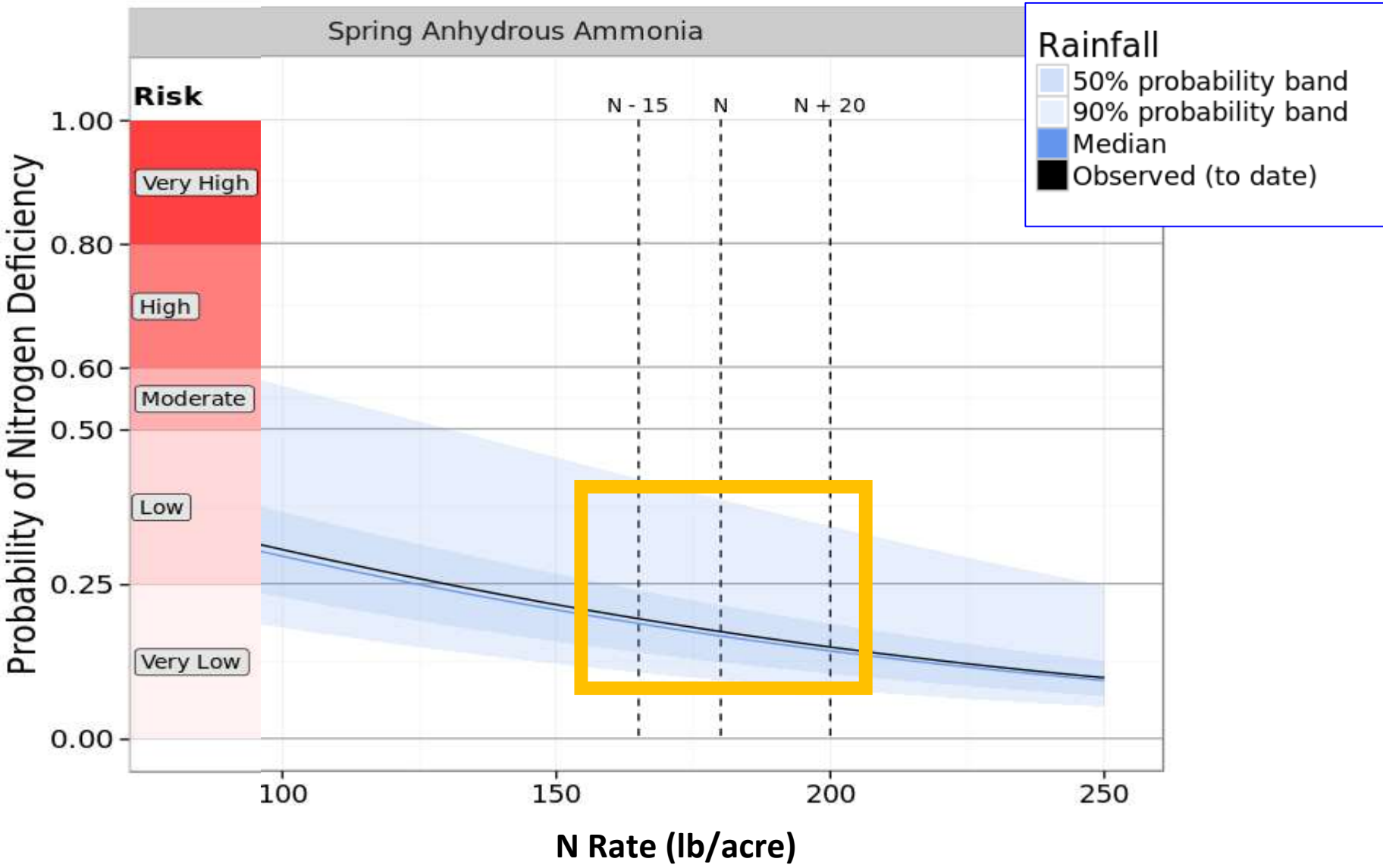
Fall SM
SD UAN
Fall AA
Spring AA



Risk Categories of Late-Season Deficiency

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

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?

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