

# Adaptive Management in Iowa Using Cornstalk Nitrate Test



Iowa Soybean Association  
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*Expanding Opportunities. Delivering Results.*

# On-Farm Network<sup>®</sup>

Organize growers to collect data in a specified methodology to address various production topics.

Key assumptions:

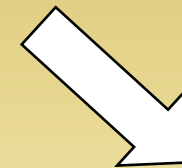
Most growers can find at least one thing to improve.

Collecting meaningful evaluations will lead to improvement.

Pooling data increases the value of the evaluations.

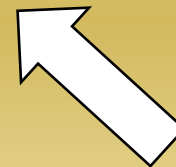
Adaptive Management

Plan



Adjust

Implement



Evaluate

# On-Farm Network<sup>®</sup>

## Why Nitrogen?

- The high price of nitrogen fertilizer/grain
- The complexity of N dynamics
- Regulatory concerns
- Potential for improvement



# On-Farm Network<sup>®</sup>

Precision ag tools help collect an unprecedented amount of data.

This provides a new opportunity to further fine-tune management at a local level and adapt to the local conditions.

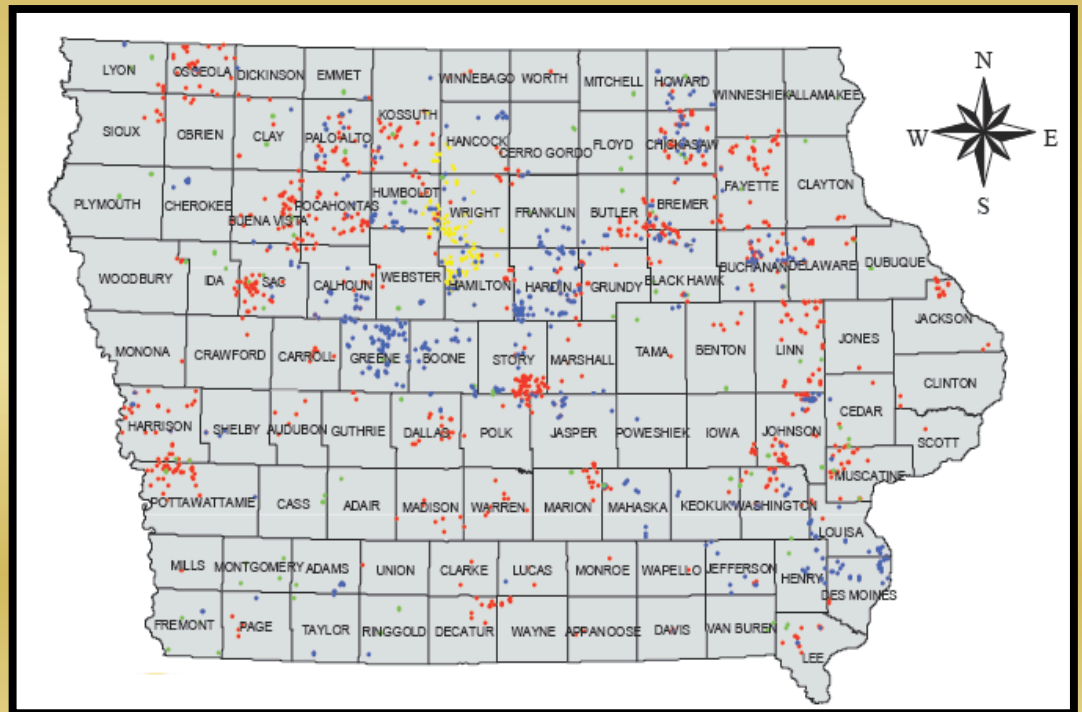


# Nitrogen Evaluations

## 2007 Statistics

Over 1,000 guided stalk sample fields.

Over 150 N replicated strip trials.



- # Guided Stalk Sampling
- # Replicated Strip Trials
- # Scouting Network
- # Watershed Programming

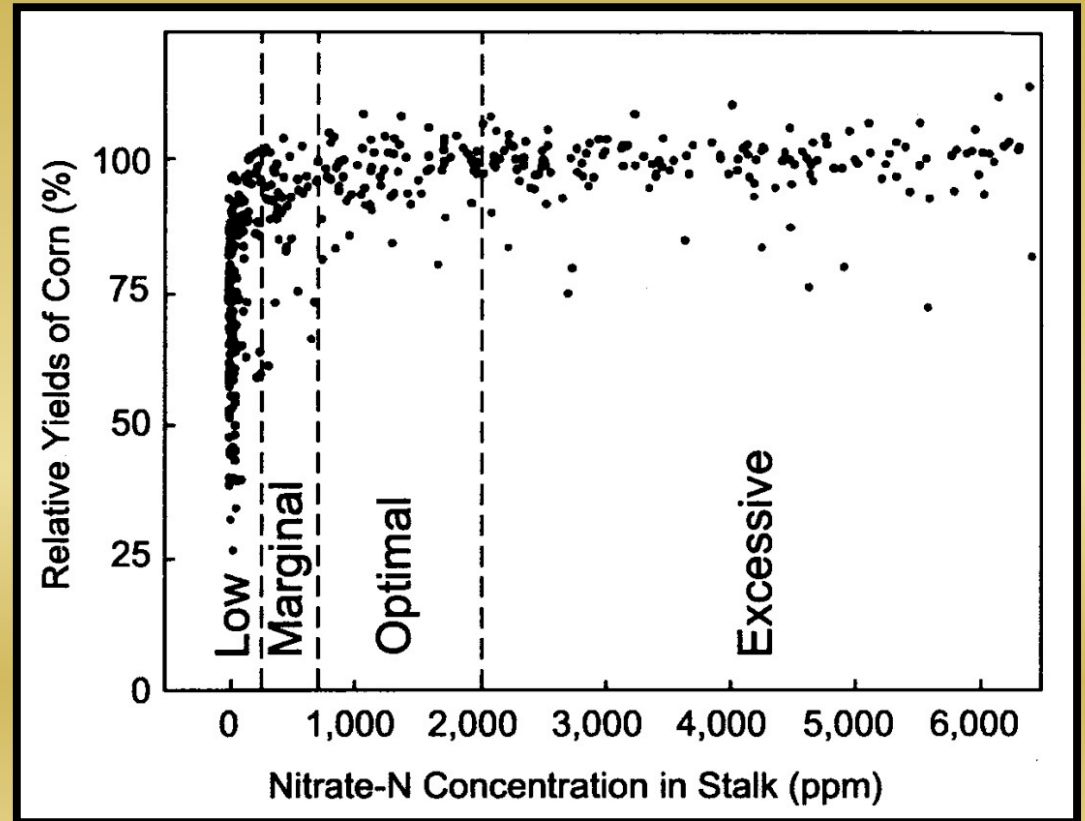
# End of Season Stalk Nitrate Test

Stalk samples collected from 6-14 inches above ground from 1/3 milk line to 2-3 weeks after physiological maturity.



# End of Season Stalk Nitrate Test

Stalk samples collected from 6-14 inches above ground after physiological maturity.

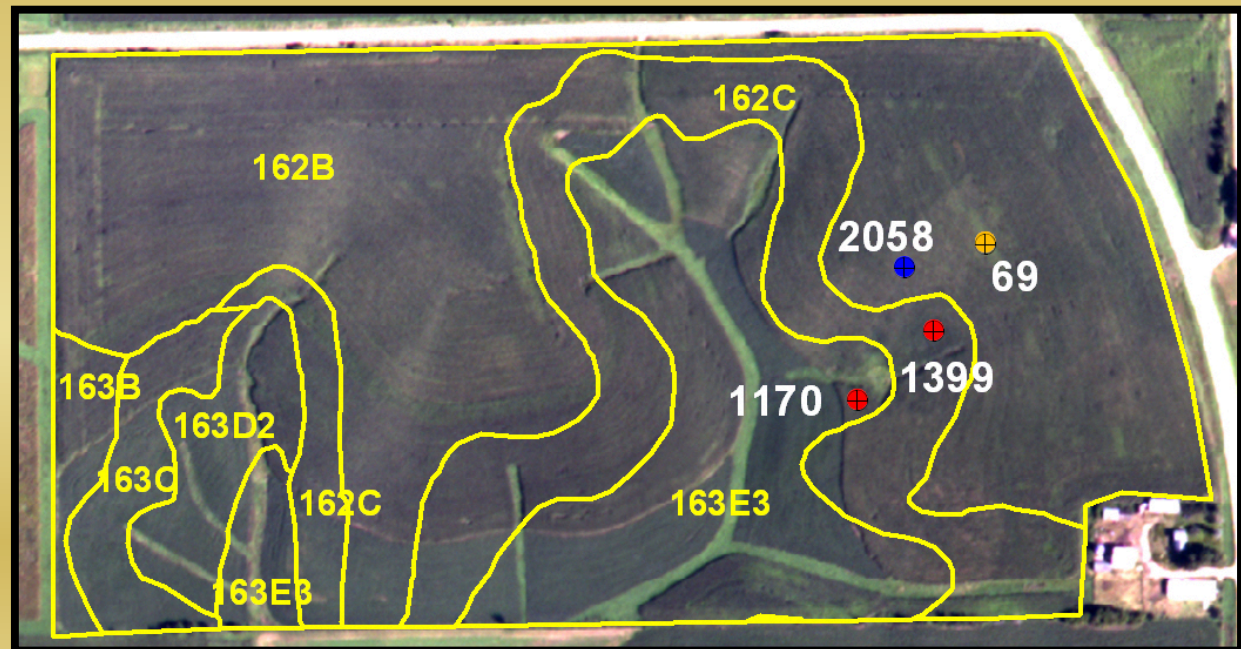


# Guided Stalk Sampling

Four stalk nitrate samples

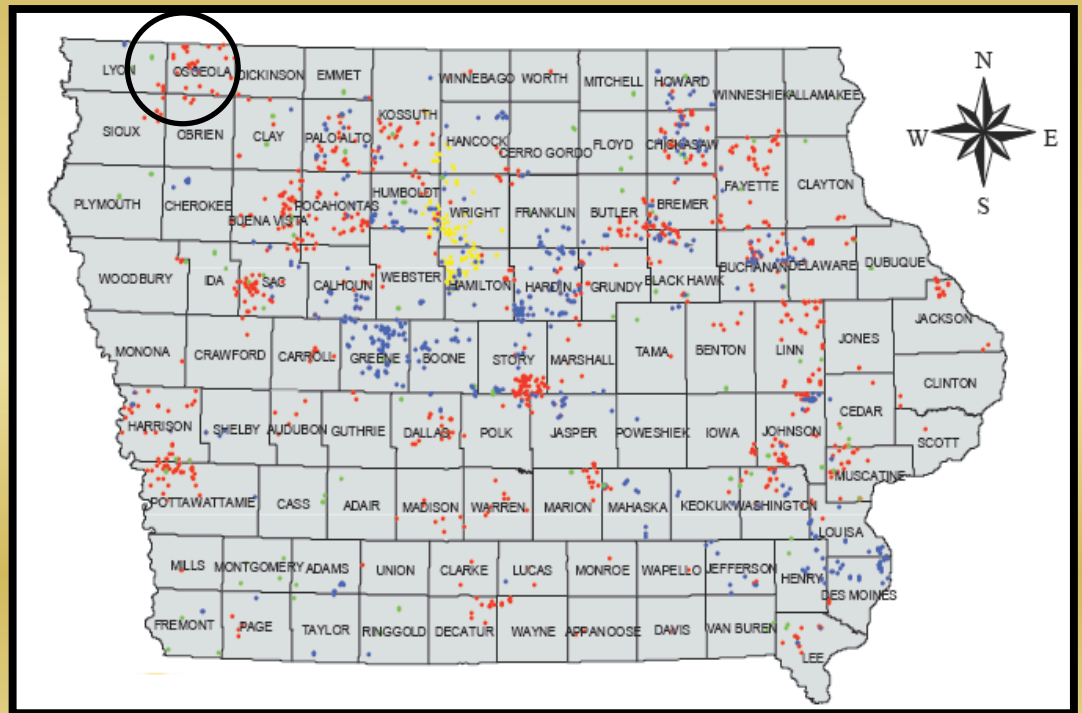
Three by soil map units

One sample based on image "deficiency"

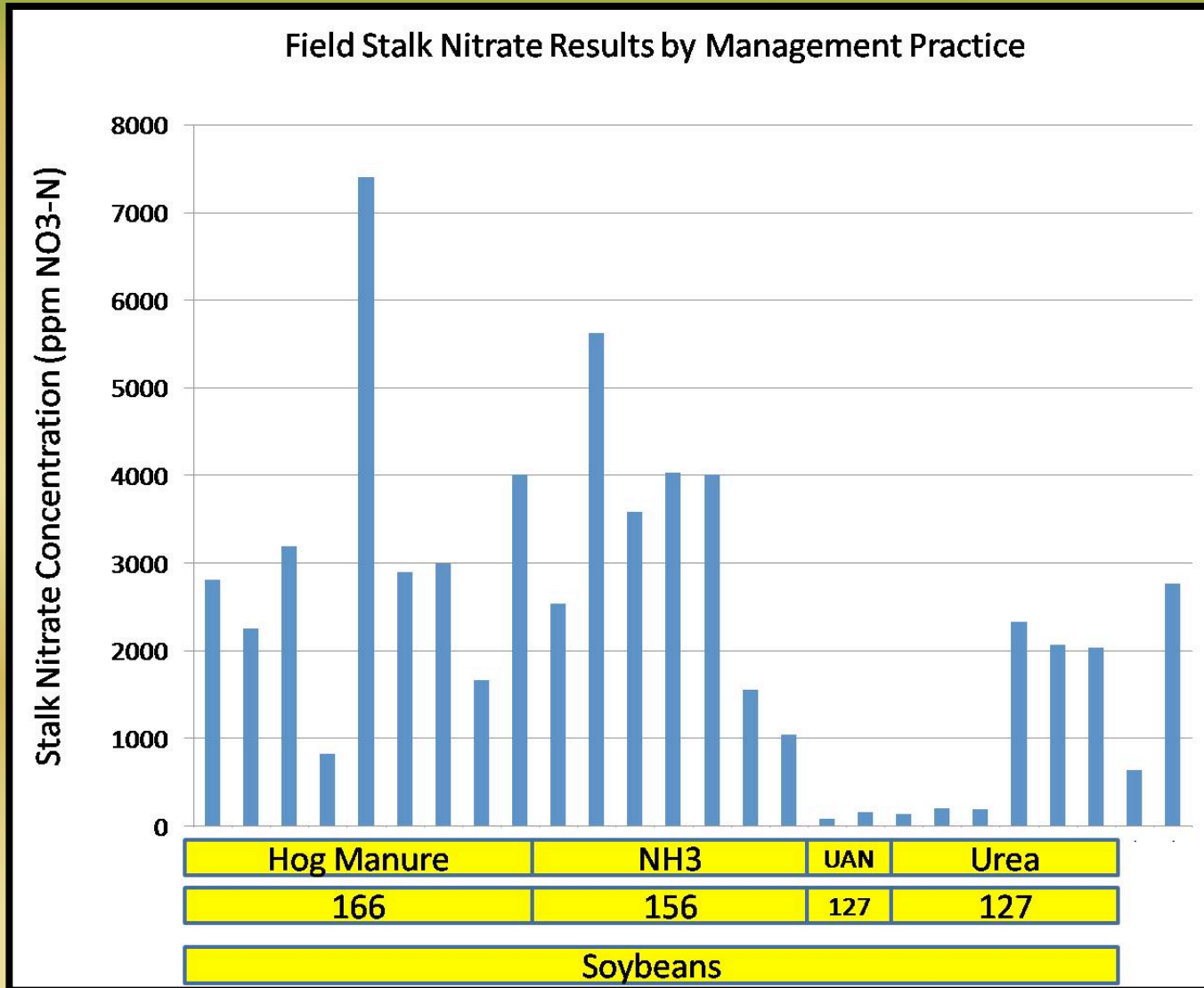


# Guided Stalk Sampling

The benefit is multiplied by focusing on results in a group – not just an individual.



# Guided Stalk Sampling Group

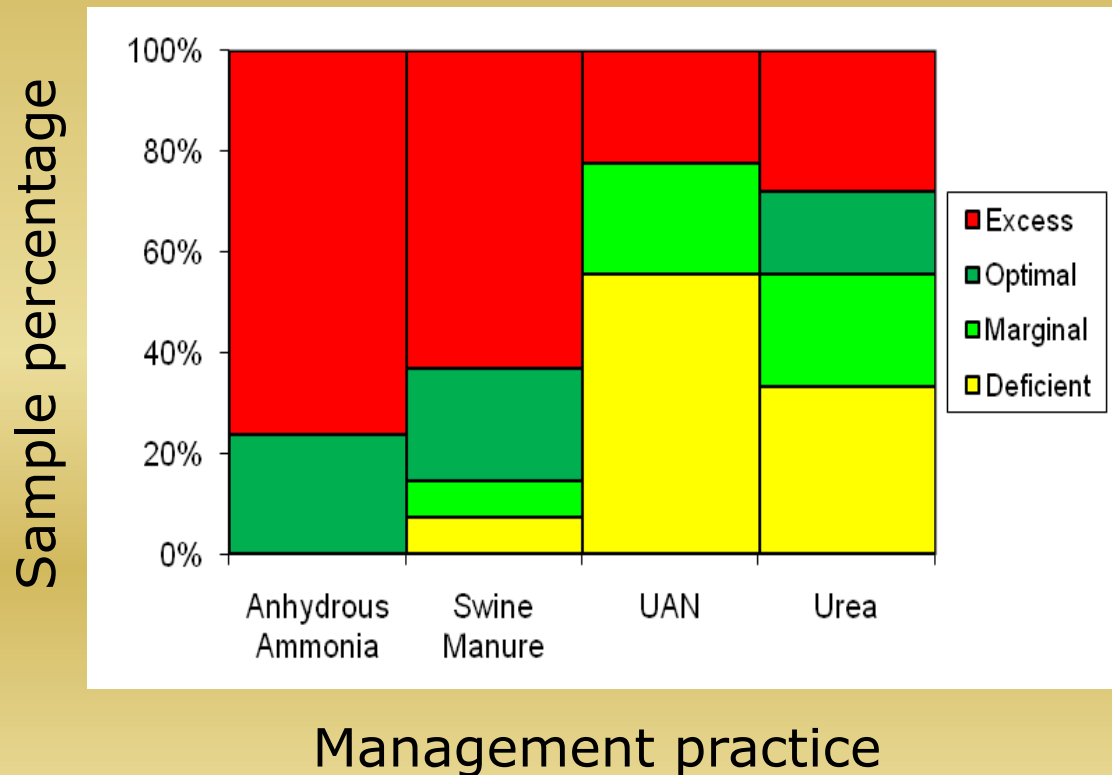


# Guided Stalk Sampling Group

## Summary of stalk nitrate samples

Differences among management practices are often observed at a group level.

Stronger differences can be detected on a larger scale (state-wide) with appropriate modeling/analysis.



# Statewide Analysis

Differences are observed between management practices at a statewide level.

These results can potentially:

- Rank “efficiency” of various practices
- Provide basis for incentive payments
- Guide further research needs

**Table 2. Percentage of samples in different stalk nitrate categories across Iowa in 2007**

Factor	Category	Number of fields	Corn stalk nitrate category			
			Deficient	Marginal	Optimal	Excess
			%			
Rotation	Alfalfa	5	6	0	20	73
	Soybean	524	46	19	18	17
	Corn	137	31	16	20	32
N form	Anhydrous Ammonia	371	37	18	21	23
	Beef Manure	9	14	4	11	70
	Poultry Manure	25	58	16	17	8
	Swine Manure	116	45	25	16	14
	UAN	265	46	17	18	19
	Urea	34	30	23	17	30
Timing	Fall	308	42	18	17	22
	Spring	393	39	18	19	24
	Sidedress	110	44	18	18	20
N rate, lb/acre	50-137	216	49	19	16	16
	137-174	368	44	18	19	19
	174-230	202	30	18	20	32
	230-360	29	26	9	21	43
Spring Rainfall, in	4.5-8.5	135	30	20	21	28
	8.5-11.2	310	40	16	17	26
	11.2-13.8	243	48	16	17	18
	13.8-19.7	185	40	18	20	21

N rate and spring rainfall were classified by using k-means clustering algorithm

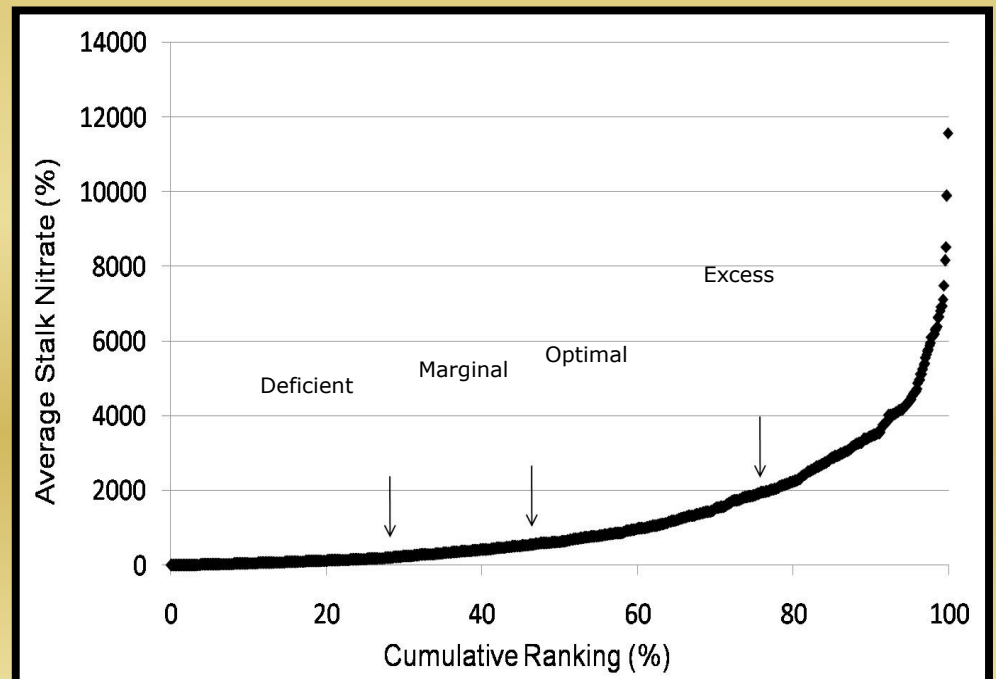
# Statewide Analysis

Applying adaptive management results in feedback data. One outcome is a “benchmark”.

The benchmark can:

- Provide a status of management to the public
- Track impact of programming
- Influence regulations

The distribution of stalk nitrate samples across Iowa in 2007

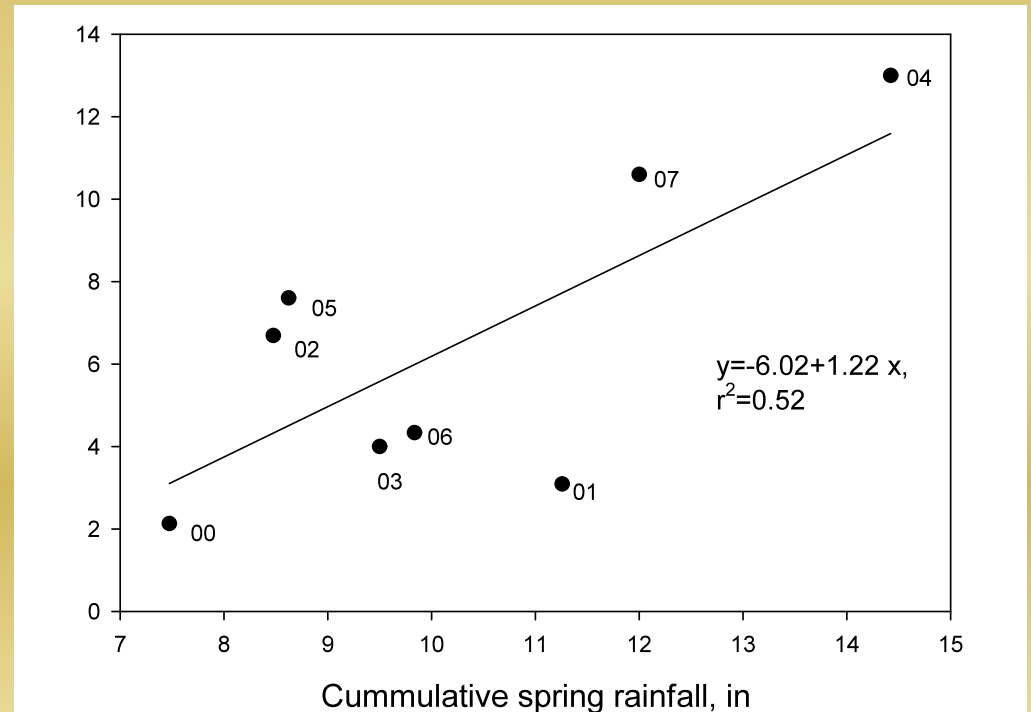


# Additional Analysis

Yield increase from an additional 50 lbs N/a as affected by rainfall

Rainfall has a huge impact on N management.

This should be factored into the evaluations.



# In-Season Evaluation

Monitoring the crop to detect N stress and applying only where it is detected as needed.

High clearance sprayer with Greensseeker sensor



# Summary Observations

There is a significant opportunity to further refine management.

Some inference can be made for statewide refinements

Further refinements can be made for local resources and management variables

Growers can and are changing

Guidance on how to use new tools and technologies to enable further improvement is needed

The use of third parties is critical

# Summary Observations

Government programs will need to adjust to help facilitate this process

Need to expand programming focus beyond the individual

Need to emphasize more of what to do with the results of programs (the 9<sup>th</sup> step of the planning process)

Need to involve 3<sup>rd</sup> parties or TSPs in process